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July 8, 2015

VIA OVERNIGHT CARRIER

Mr. James R. Carroll
Program Administrator
Land Restoration Program
Land Management Administration
Maryland Department of the Environment
1800 Washington Road, Suite 625
Baltimore, Maryland 21230

Re: Transmittal of the Revised Pages to the Preliminary Investigation Report for Greater Strawberry Point Former Buildings KC, KJ, and KQ Area and Comment Responses
Martin State Airport, 701 Wilson Point Road, Middle River, Maryland

Dear Mr. Carroll:

For your use and reference, please find enclosed two hard copies with CDs of the above-referenced documents. This response to comment document and revised pages address comments received from the Maryland Department of the Environment via email on March 20, 2015.

If you have any questions or require any additional information please contact me by phone at 240-676-5392, or via e-mail at paul.calligan@lmco.com.

Sincerely,

Paul E. Calligan

Paul E. Calligan, P.G.
Project Lead, Environmental Remediation
Lockheed Martin Corporation

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Preliminary Investigation Report for Greater Strawberry Point Former Buildings KC, KJ, and KQ Area Martin State Airport Middle River, Maryland

Prepared for:

Lockheed Martin Corporation

Prepared by:

Tetra Tech, Inc.

July 2015
REV. 1



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ACRONYMS

ADAMS	Agency-wide Documents Access and Management System
AEC	Atomic Energy Commission
Am	americium
ANPP	Army Nuclear Power Program
AST	aboveground storage tank
ATC	anticipated typical concentration
BaPEq	benzo[a]pyrene equivalent
Cm	curium
cpm	counts per minute
DPT	direct-push technology
DRO	diesel-range organics
ECD	electron-capture detector
Enviroscan	Enviroscan, Inc.
FOIA	Freedom of Information Act
GPS	global positioning system
GRO	gasoline-range organics
GSP	Greater Strawberry Point
HASP	health and safety plan
HEPA	high-efficiency particle absorption
Hz	hertz
KC	critical test facility
keV	kiloelectron volts
KJ	radioisotope laboratory
KQ	liquid-metal test facility
LFBR	liquid fluidized bed reactor
Lockheed Martin	Lockheed Martin Corporation
MAA	Maryland Aviation Administration
MDANG	Maryland Air National Guard
MDDOT	Maryland Department of Transportation
MDE	Maryland Department of the Environment
MeV	megaelectron volt
MHSWMA	Maryland Hazardous and Solid Waste Management Administration

MIP	membrane-interface probe
MND	Martin Nuclear Division
MRC	Middle River Complex
MSA	Martin State Airport
msl	mean sea level
NaI	sodium iodide
NAVD88	North American Vertical Datum 1988
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
PA	preliminary assessment
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PIA	Public Information Act
PID	photoionization detector
REC	recognized environmental condition
SNAP	Systems Nuclear Auxiliary Power
SNM	special nuclear material
SNAP	Systems Nuclear Auxiliary Power
SP	Strawberry Point
SVOC	semivolatile organic compound
TCLP	toxicity characteristic leaching procedure
Tetra Tech	Tetra Tech, Inc.
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TPH	total petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound

Section 1
Introduction

On behalf of Lockheed Martin Corporation (Lockheed Martin), Tetra Tech, Inc. (Tetra Tech) has prepared this report presenting the results of a preliminary investigation of the former locations of buildings KC, KJ, and KQ ("the site") in the Greater Strawberry Point (GSP) area of Martin State Airport (MSA) in Baltimore County, Maryland. This area formerly housed several airport maintenance facilities, two nuclear research buildings (KC and KJ), and a liquid-metal test facility (KQ). It is referred to in previous Greater Strawberry Point and Martin State Airport reports as recognized environmental condition (REC) #11.

The investigation scope includes the following tasks: review of available regulatory records related to the licensing and oversight of historical operations at the former locations of buildings KC and KJ; a ground-surface gamma radiation survey for health and safety screening within the area of interest; and non-invasive geophysical surveys to investigate subsurface features. The information developed in this report will guide future Phase II site characterization efforts. The study objective is to obtain information regarding specific historical operations performed at the former locations of buildings KC, KJ, and KQ, and to investigate (using a subsurface geophysical survey) whether any remnants of the former buildings remain.

This report is organized as follows:

Section 2—Background: Briefly describes the site history and previous facility investigations, including Martin State Airport and Strawberry Point Facility.

Section 3—Historical Records Review: Presents the results from various records searches, including Freedom of Information Act (FOIA) requests and records from government agencies.

Section 4—Field Investigation: Provides the methodology and results of the gamma surface scan and the geophysical survey.

Section 5—Summary: Presents the overall findings of this investigation, including any conclusions made based on the records review and the geophysical survey.

Section 6—References: Cites references used to compile this report.

Appendix A contains historical maps and documents, Appendix B contains copies of Freedom of Information Act (FOIA) requests and agency responses, Appendix C contains Nuclear Regulatory Commission (NRC) Freedom of Information Act and online records, Appendix D contains Maryland Department of the Environment (MDE) records, Appendix E contains Maryland Aviation Administration (MAA) records, and Appendix F contains other relevant historical records. Appendix G consists of a photographic log, Appendix H contains gamma scan documentation, and Appendix I contains the subcontractor's geophysical investigation report.

Section 2
Background

This section presents the site description and background, including site history.

2.1 SITE BACKGROUND

2.1.1 Martin State Airport

Martin State Airport (MSA) is in eastern Baltimore County, Maryland on the peninsula between Frog Mortar Creek and Stansbury Creek; both creeks are tributaries of Middle River. Eastern Boulevard (Route 150) bounds the site to the north and the Lockheed Martin Corporation (Lockheed Martin) Middle River Complex (MRC) borders the site to the west. Figure 2-1 shows the location of Greater Strawberry Point (GSP). MSA is a regional airport, home to private and corporate aircraft, a flight training school, and the Maryland Air National Guard (MDANG). MDANG occupies the northeastern corner of the airport property.

The MSA Main Terminal facility (west of the MDANG facility and north of GSP) is at 701 Wilson Point Road, Middle River, Maryland. The current MSA property (approximately 775 acres) was part of the Glenn L. Martin Company's approximately 1,260-acre property, which included what is now the MRC complex. A search of Maryland land records and deeds indicates that the Glenn L. Martin Company purchased six parcels of land (identified as 701 Wilson Point Road) from private landowners during the spring and summer of 1929. During the 1940s and 1950s, nine additional parcels at this location were acquired from private landowners. The Glenn L. Martin Company and American-Marietta Corporation merged to become Martin Marietta Corporation in 1961. In 1969, Martin Marietta Corporation transferred the properties to Chesapeake Park, Inc., a subsidiary, which then transferred what is now the MSA property to the State of Maryland in 1975.

Aerial photographs indicate that many of the original MSA Main Terminal facilities (three runways, Hangars 1 through 6, and the administration building) were developed between 1939 and 1941. When the property was transferred to the State of Maryland in 1975, the Maryland Aviation Administration (MAA) assumed ownership and operations of MSA and the Main Terminal. The approximate 775-acre MSA property is owned by the Maryland Department of Transportation

(MDDOT). The facility is fenced, and the main entrance is at the Main Terminal facility on Wilson Point Road. Figure 2-2 shows the location of the MSA Main Terminal facility.

The 104th Tactical Fighting Group, later reorganized as the 175th Wing of the Air National Guard, occupied the MDANG facilities in 1955. The 135th Tactical Air Group was located southwest of the MDANG facility at MSA in the 1960s and 1970s, and was relocated to the current MDANG facilities in October 1980. The MDANG facility currently leases 175 acres from the MAA in the northeastern quadrant of MSA. The MDANG facility includes taxiways, parking aprons, operations and training buildings, general supply and ammunition storage facilities, fuel storage structures, maintenance shops and sheds, and aircraft hangars. See Figure 2-2 for the location of the MDANG facility.

2.1.2 Strawberry Point and Greater Strawberry Point Facility

Strawberry Point (SP) is within the confines of the MSA at the southern tip of the peninsula, between the confluence of Stansbury and Frog Mortar Creeks. SP can be accessed from Wilson Point Road via Strawberry Point Road via a secured unmanned gate. The wooded area (approximately 25 acres) at the south end of the peninsula at SP was previously investigated (Tetra Tech, 2008). The wooded area is bounded by earthen berms near the water line and thick brush and trees cover the entire area. Much of the SP wooded area was filled during the 1940s, reportedly by deposition of dredge spoils from Stansbury and Frog Mortar Creeks. A locked gate controls the entrance to the wooded area.

The remainder of the area referred to as GSP is a cleared and partially developed 75-acre site comprising a former seaplane ramp, hangars, fuel tank farm, police building, and maintenance buildings. It extends from the southern end of the peninsula to the northern end bordering Taxiway J, and eastward from Stansbury Creek to Taxiway F. The airport runway is northeast of GSP.

The United States Navy leased GSP from the Glenn L. Martin Company from December 23, 1943 until 1963. During occupancy, the Navy used a large hangar for seaplane maintenance, launching, and recovery operations. The former hangar and surrounding GSP area was known as the Naval Weapons Industrial Reserve Plant No. 148. The United States Air Force subsequently occupied the facility (Permit No.1-N-MD-714) from December 16, 1963 until 1967.

The southern portion of the GSP near the wooded portion of the site contained 10 buildings during Navy and Air Force use. These included the beach house (Building No. 3), the pumping station (Building No. 4), the chlorination station (Building No. 5), two power-fence service houses (Buildings No. 6 and 9), solvent storage (Building No. 7), the equipment storage building (Building No. 8), the power-fence switch-house (Building No. 10), the delivery hangar (Building ND/No. 11), and a general storage building (Building No. 12). A tank farm containing aboveground storage tanks (ASTs) for aircraft fuels was adjacent to the wooded area, near the southernmost tip of the developed area. Figure 2-3 is an index map of current and historical building numbers.

During the same period (1940s to 1960s), the northern portion of GSP was developed with several improvements related to naval weapons research. These structures included the induction test building (Building No. 13), the control house (Building No. 14), the noise suppression building (Building No. 15), the jet test shed (Building No. 16), the storage building (Building No. 17), the propulsion test building (Building No. 22), the compressor shed (Building No. 23), the engine test building (Building No. 24), and the vibration/slosh test building (near the location of current ground surface mounding). A missile testing area along a straight road northwest of the propulsion test building included the hyper-therm test facility (Building No. 25), the propellant storage shed (Building No. 18), the furnace building (Building No. 19), the acetylene storage shed (Building No. 20), the Vanguard tower (Building No. 21), the block house (Building No. 26), and three coupon test sheds (Buildings No. 27, No. 28, and No. 29).

Several buildings dedicated to nuclear research and testing were constructed between 1957 and 1965. These facilities were farther northwest, along a former dirt road at the northern end of the GSP wooded area. Two main research buildings were designated as the critical test building (Building No. 36/Building KC) and the radioisotope lab (Building No. 35/Building KJ). Figure 2-3 shows the location of these facilities. Historical maps and aerial photographs depicting the locations of the former buildings in the 1960s are in Appendix A.

Historical records indicate that two underground storage tanks (USTs) were installed during the time that the Navy and Air Force used facilities in the southern portion of GSP. A 10,000-gallon heating oil UST adjacent to the delivery hangar (Building ND) stored fuel for the hangar's heating system. This UST was closed in place in 1987 by the State of Maryland (subsequent to Navy and Air Force occupancy), when the hangar's heating system was converted from fuel oil to natural

gas. Both the lease and permit held by the Air Force expired on November 30, 1967. In 1961, the Glenn L. Martin Company merged with Marietta Corporation to form Martin Marietta Corporation. On June 30, 1975, MSA was conveyed to MDDOT. The State of Maryland currently uses GSP to house and maintain police and medevac helicopters. The southern portion of GSP is occupied by the Baltimore County Marine Police.

Eleven USTs have been removed from the Main Terminal and GSP since 1983, and no evidence of leakage has been reported. The large hangar designated Building ND was demolished in 1989; two adjacent hangars that currently house the Maryland State Police were constructed in 1989 and 1990. Today, GSP has a tank farm consisting of 12 ASTs for jet fuel, fuel oil, and gasoline, along with a pump house and other ancillary buildings currently used by the airport. As many as six ASTs at the tank farm are used by other tenants. Oil spills were reported in 1989 and 1990 during construction of the new hangar, when fuel oil returns and receiving lines to two 12,000-gallon ASTs in the tank farm were severed. No additional information regarding these spills has been found in Maryland Department of the Environment (MDE) records (Defense Environmental Restoration Program for Formerly Used Defense Sites [DERP-FUDS], 1991).

2.1.3 Former Radiological Research Facilities

Former Buildings KC and KJ were constructed around 1957 as research and development facilities for nuclear-reactor fuel elements. Documentation indicates that the operations at former buildings KC and KJ were carried out under multiple Atomic Energy Commission[1] (AEC) licenses and amendments. The radioisotopes used in Buildings KC and KJ were managed under AEC license specifications that included engineering controls and limitations on the types and quantities of source materials that could be stored or handled.

These buildings were at the northern end of the GSP wooded area, west-northwest of the former Vanguard area, along a curved dirt road connecting Strawberry Point Road to a former airfield-maintenance storage building (Building No. 37). Building KC, the larger of the two nuclear buildings, was on the east side of the dirt road across from the former maintenance storage building. Its location (with respect to present features) was in the grass-covered area northwest of the wooded area, partially underlying the current Taxiway J surface, about halfway between

[1]The AEC's nuclear licensing, regulatory, and oversight responsibilities were assigned to the Nuclear Regulatory Commission (NRC), which was created when the AEC was abolished by the federal Energy Reorganization Act of 1974.

Taxiway F and the corporate hangar apron. Former Building KJ was approximately 330 feet southwest of Building KC, on the eastern side of the former dirt road and across the road from the former organic material and maintenance storage sheds. This location is at the northern edge of the current stormwater-detention basin spanning the northern GSP wooded area, near a sedimentation-basin discharge-structure. The basin directs runoff from portions of MSA toward Stansbury Creek. Figure 2-4 shows the location of the former facilities and the current layout.

Building KC (the critical test facility) housed two test cells, a storage vault, and a liquid fluidized-bed reactor (LFBR; also labeled as a third test cell in building layout plans). The operations in Building KC reportedly included the bundling of uranium fuel tubes and testing under subcritical conditions (e.g., releasing energy without a sustaining nuclear chain-reaction). The license amendments for Building KC indicate that planned research operations included testing of prototype reactor cores using uranium fuel sources, including the first "MH-1A" reactors installed by the United States government on aircraft carriers to provide energy for military operations in remote locations (NRC, 1957). The completed MH-1A fuel assemblies were reportedly stored in test cells at Building KC. The presence of an underground wastewater dump/holding tank reportedly under Building KC (according to a 1994 NRC closeout report) could not be verified during the NRC's closeout inspection (NRC, 1995).

The radioisotope laboratory (Building KJ) was used to assemble and develop prototype photovoltaic generators using radioisotopes (primarily americium and curium) as an energy source (NRC, 1963), according to NRC records. The Martin Company was issued a license amendment in 1957 to process radioactive americium (Am-241) and curium (Cm-242) in Building KJ (NRC, 1995). This initial permit was an extension of license No. 19-1398, held for nuclear research and fuel processing performed in Building D (which was located nearby at what is now the Lockheed Martin MRC) before construction of the GSP nuclear facilities. An NRC closeout report indicates that no production processing was conducted in Building KJ, and that only a small source of americium was used for development operations (NRC, 1995). A February 12, 1965 application for a byproduct-material license for Building KJ was found in NRC files (NRC, 1995). This application requested the addition of promethium-147 to license 19-1398 for research activities. The promethium was to be used in powder coatings as a photon source or catalyst in experimental photovoltaic generators.

The liquid-metal test facility (Building No. 34/Building KQ) was just south of the nuclear research facilities on the eastern side of the former dirt road. Its location is near the central, northwestern boundary of the current GSP wooded area, within the existing drainage detention basin. A 1970 survey and topographic map of Chesapeake Park, Inc. shows a transformer pad (approximately 15-foot square) southeast of the liquid-metal test facility and between the building and the former edge of the wooded area. Research and records reviews to date have not documented the former usage of (and/or operations of) the liquid-metal test facility (Building KQ).

Several sheds were near the nuclear labs, including a "field service storage" shed across the road from Building KJ and an organic material storage shed across from Building KQ. A historical facility drawing dated 1963 (Appendix A) indicates that radiological research buildings and surrounding facilities at GSP were serviced by an eight-inch vitreous-clay-pipe sanitary-sewer (Martin Company, 1963). The sewer line began at Building KC and continued southwest to a pump station near Strawberry Point Road. The pump station directed sanitary sewer flow from the northern end of GSP past the Main Terminal and east to Eastern Boulevard. The radiological research facilities and surrounding storage buildings were removed by the State of Maryland sometime between 1995 and 2000 to construct Taxiway J. The current status of the sanitary sewer pipes formerly connected to the nuclear research facilities is unknown.

2.2 PHYSICAL FEATURES

2.2.1 Land Use

MSA is generally characterized as a moderately developed tract in a largely suburban, moderate density, populated setting. Land use surrounding MSA is, to a significant degree, a combination of mixed suburban, industrial, and light-to-moderate commercially developed and woodland tracts. MSA is bordered on the north by Eastern Boulevard (Maryland Route 150) and Amtrak railroad tracks. Undeveloped woodland tracts and low-density residential properties are north of MSA and the Amtrak line. The eastern, southern, and western boundaries of MSA are bordered by Frog Mortar and Stansbury Creeks. These are wide, brackish, tidal tributaries of the Chesapeake Bay. The Lockheed Martin MRC, a facility that assembles missile-launching systems and aircraft parts, is along MSA's northwestern boundary. The Tilley Chemical Company occupies a parcel at the southwest corner of the MRC, and General Electric, Inc. is the main tenant of the MRC and Chesapeake Industrial Park. Low- to medium-density residential land use and light commercial land use (e.g., shopping centers, convenience stores, restaurants, etc.) are beyond the creeks north,

east, and west of MSA. Farther east and west of MSA are the high-density residential communities of Bengies Corner and Hawthorne Park.

2.2.2 Climate

The climate at MSA is characterized as humid temperate, with hot, humid summers and relatively mild winters. The Middle River, Maryland area receives an average of 42 inches of precipitation annually, distributed evenly throughout the entire year. Rainfall occurs normally in spring, summer, and fall in the form of showers and thunderstorms. During winter, precipitation is in the form of light to heavy rain or snow. Tropical storms in late summer and fall, and occluded, meso-scale frontal systems (i.e., coastal low-pressure systems) occasionally provide short-term, above-average precipitation to the area.

2.2.3 Physiography

MSA is in the western shore of the Coastal Plain physiographic province. The Coastal Plain comprises sediments composed of alluvium from the Pleistocene Epoch and the Potomac Group from the Cretaceous Period. Coastal Plain sediments begin at the fall line and follow a regional dip to the southeast at approximately 110 feet per mile (Hansen and Edwards, 1986). The Fall Line is the division between the Piedmont and Atlantic Coastal physiographic provinces, and refers to an imaginary line connecting waterfalls or changes in stream flow between the hard-rock upland areas of the Piedmont and the soft-sediment lowland areas of the Coastal Plain. The Coastal Plain is generally characterized by low topographic relief. However, steep embankments and hills are found along stream channels, rivers, and the Chesapeake Bay.

2.2.4 Topography

Most of the land surface at MSA is generally flat to gently sloping in the areas of the airport runway, taxiways, and surrounding support operations. The airport runway forms a northwest to southeast-trending topographic ridge or drainage divide that gently slopes from the northwest to the southeast end. Runway elevations range from slightly over 20 feet above mean sea level (msl) at the northern end of the runway to slightly over 10 feet above msl at the southern end. The land also slopes northeastward and southwestward, away from the runway toward Frog Mortar Creek and Stansbury Creek.

GSP is southwest and south of the runway. Site topography ranges from flat to gently sloping to the southwest toward Stansbury Creek. In the northern portion of GSP, land elevations range from approximately 11 feet above msl near the runway to nearly mean sea level along the Stansbury Creek shoreline. A manmade drainage-channel and stormwater-detention basin are along the northwest edge of the GSP wooded area, between the current Lockheed Martin corporate hangar and the current tree line. Localized topography along Taxiway J and the paved areas adjacent to the corporate hangar is sloped toward these features, and surface water drainage follows a southerly slope toward Stansbury Creek.

2.2.5 Surface Water Hydrology

Stansbury Creek is the nearest surface water body to recognized environmental condition (REC) #11, and is approximately 800 feet south-southwest of the former nuclear research facilities. Stansbury Creek is a wide, brackish, tidal tributary of the middle Chesapeake Bay. Surface water runoff from Taxiways F and J enters Stansbury Creek via localized drainage channels and storm sewers.

A drainage channel along the northern tree line of the GSP wooded area receives surface water drainage from the wooded area (Figure 2-4). This channel directs flow southerly to a stormwater culvert that passes below Strawberry Point Road to Stansbury Creek. A stormwater-detention basin is west of the drainage channel; it spans the northern border of the GSP wooded area from Taxiway F to the truck canopy and deluge tank south of the corporate hangar.

Stormwater enters the detention basin via three storm-drain inlets that convey runoff from the developed areas west of Taxiway J. Two storm drains pass below Taxiway J and enter the basin near the location of former Buildings KC and KJ. Stormwater entering the basin from these two inlets originates primarily from the grassy area between the runway and Taxiway F and from the Main Terminal southeast to REC #11. The third stormwater inlet enters the drainage basin near the northeast corner of the existing corporate hangar. Stormwater entering the basin at this inlet originates from storm drains in the concrete apron north and east of the corporate hangar. The detention basin contains tall grass, and the soils in the basin usually remain wet.

Drainage from the northern GSP stormwater-detention basin flows southwest, where it joins flow from the stormwater culvert crossing below Strawberry Point Road. It then appears to drain to the wetlands connected to Stansbury Creek. This localized drainage system appears to have been

constructed around 2000 when the Lockheed Martin corporate hangar was built, and is separate from two stormwater outfalls (Outfalls 007 and 012) in Stansbury Creek that are managed under the MSA National Pollutant Discharge Elimination System (NPDES) permit. Although the drainage-detention basin at REC #11 is closer to Outfalls 007 and 012, the *MSA Stormwater Pollution Prevention Plan* (Maryland Environmental Service [MES], 2010) reports that it is part of the Outfall 006 drainage area.

Outfall 006 receives drainage from: vehicle/equipment maintenance and de-icing operations; chemical waste storage areas; taxiway and runway access; parking, maintenance, and auto-shop areas; a fuel farm; private tenant hangars; and storage piles of soil, asphalt millings, and stone. The approximately 85-acre drainage area includes pervious grassy surfaces along Strawberry Point Road and between parking areas and dense tree zones. It also includes impervious surfaces consisting of portions of Strawberry Point Road, taxiways, hangar and maintenance buildings, and aircraft and vehicle parking areas. Monitoring for Outfall 006 is at the exit of an existing storm-drain system discharging into Stansbury Creek.

2.2.6 Regional Geologic and Hydrogeologic Conditions

MSA is in the western shore of the Coastal Plain physiographic province. Regional and local studies (Vroblesky and Fleck, 1991; Chapelle, 1985) indicate that MSA lies on the Patapsco Formation. This formation consists of complex and interbedded mixtures of gray, brown, and red sands, silts, and clays originating from sediment deposition in a low coastal plain traversed by low-gradient meandering streams. Below the Patapsco Formation is a regionally extensive, thick-clay confining unit known as the Arundel Formation. It is a massive and probably impermeable unit underlying MSA and surrounding area.

The GSP area has been historically documented as having poor surface/soil drainage. The 1989 preliminary assessment report for Martin State Airport states that the former nuclear buildings are in the Lenoir-Urban land complex, a soil type that is somewhat poorly drained and has a slow permeability (Maryland Hazardous and Solid Waste Management Administration [MHSWMA], 1989). The former shoreline of Stansbury Creek extended more than 1500 feet north of its present location, passing along what is now the west side of the Black and Decker hangar into a wet grassy area that has never been developed. The former northern reach of the creek was partially filled in 1941; its current shoreline was filled in approximately 1945. Natural drainage patterns near the

former creek bed about 600 feet west of the former Buildings KC and KJ make the entire area vulnerable to wet soil conditions.

2.2.7 Vicinity Subsurface Conditions

Subsurface conditions at MSA have been studied since at least 1987 (MHSWMA, 1989). Detailed studies of subsurface conditions are ongoing and extensive data are available for the Dump Road Area and eastern portion of MSA. More recently, subsurface data have been collected at GSP and the western and southern portions of MSA during investigations completed from 2009 through 2012 (Section 2.3). Numerous shallow soil borings at GSP have been advanced to depths up to 40 feet to collect soil samples for subsurface lithologic information and soil and groundwater samples for chemical analyses. Subsurface conditions in the GSP REC #11 area are summarized below.

2.2.7.1 Geology

Lithology encountered in the soil borings advanced across SP and GSP varies. At RECs in the southern portion of GSP, intermittent sand and clay layers of moderate thickness predominate the relatively shallow subsurface, and are often associated with varying amounts of silt. This lithology overlays a thick northwesterly dipping layer of stiff clay that is encountered at depths ranging from approximately six feet below grade in the southeastern portion of the area to 25 feet below grade in the western portion. The clay layer may be contiguous with the shallow dipping clay in the southern portion of GSP. REC #11 lithology is comprised of sand, clay, and occasional silt layers that vary in thickness and frequency. A layer of dense intermingled sand, silt, and clay lenses below these materials is encountered at depths ranging from about 15 to 30 feet below grade.

2.2.7.2 Hydrology

Groundwater depths (measured from the top of the well casings) in REC #11 range from 3.94 feet to 10.46 feet; corresponding groundwater elevations ranged from 1.75 feet to 4.1 feet. Groundwater elevations are reported in North American Vertical Datum 1988 (NAVD88). At REC #11, groundwater flow is generally to the southeast, and is consistent with regional groundwater flow toward the southeast tip of MSA where Frog Mortar and Stansbury Creeks converge. Groundwater flow in the southwestern portion of REC #11 is locally influenced by the large drainage swale between the wooded area and Taxiway J.

2.3 SUMMARY OF PREVIOUS INVESTIGATIONS

Studies of the SP and GSP areas began in 2007 with a Phase I environmental assessment focused on the SP wooded area (Tetra Tech, 2008). The Phase I objective was to evaluate historical site activities pertaining to the wooded area, tank farm, former hangar area (Building ND), facility maintenance yard, and nuclear research buildings (Tetra Tech, 2008). The investigation reviewed historical facility documents, drawings, photographs, aerial photographs, government records (NRC, United States Environmental Protection Agency [USEPA], MDE, and Baltimore County), and related permits and violations. Interviews with former and current employees, a visual site inspection, and geophysical investigations of the wooded area were also included. During the Phase I environmental assessment, several RECs related to SP and GSP were identified, and are summarized below by area:

- REC #1—the wooded area at the southern tip of SP
- RECs #2, 3, 4, 5, and 6—known as the ramp area, covers approximately eight acres over the southern, developed portion of GSP, and includes the former hangar area (Building ND) and supporting infrastructure
- RECs #7, 8, 9, and 10—an approximately 16-acre area in the central portion of GSP, north of the ramp area and Taxiway F, east of the MSA runway, and south of the GSP northern wooded area; it also includes the current MSA maintenance facility
- REC #11—an approximately two-acre area in the northern portion of GSP that includes the former nuclear research facilities (Buildings KC and KJ)

Subsurface (intrusive) investigations of soil and groundwater conditions have been performed at the GSP RECs listed above (RECs #7 to #11). REC #1 was addressed in 2008 as a separate investigation (Tetra Tech, 2009). A subsurface investigation for RECs #2 through #11 was completed in 2010 (Tetra Tech, 2010). An additional Phase II investigation in 2011 (Tetra Tech, 2012a) and follow-on investigation in 2012 focused on the RECs #7 through #11 areas (Tetra Tech, 2013).

To date, 170 soil borings have been advanced at GSP, and chemical characterization of soil samples was performed on each boring. Nineteen soil borings were completed at REC #11 (the area containing the former nuclear research facilities) in 2010 (Tetra Tech, 2010), 20 borings were advanced in 2011 (Tetra Tech, 2012a), and 15 borings were completed in 2012 (Tetra Tech, 2013). An additional 45 membrane-interface probe (MIP) borings have been completed to characterize

subsurface conductivity at GSP, including 15 borings at the REC #11 area in 2012 (Tetra Tech, 2013). Twenty monitoring wells have been installed at REC #11; an additional three temporary well points were installed in 2010 to characterize groundwater quality.

2.3.1 2010 Phase II Site Investigation

A Phase II environmental investigation in April and May 2010 assessed subsurface conditions at GSP RECs #2 through #11 (Tetra Tech, 2010). The following field investigations were completed in REC #11:

- Soil borings were advanced to a depth of 25 feet at 19 locations in REC #11. Soil samples were collected continuously for lithologic characterization; soils were screened in the field for volatile organic compounds (VOCs) using a portable photoionization detector (PID). Select soil samples from each boring were submitted for fixed-laboratory chemical analyses of VOCs, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals, total petroleum hydrocarbons (TPH)-diesel-range organics (DRO), and TPH-gasoline-range organics (GRO).

- DPT-probe groundwater samples were collected at two locations in REC #11 and submitted to a fixed laboratory for chemical analyses of VOCs, SVOCs, PCBs, metals, TPH-DRO and TPH-GRO.

- Three temporary wells were installed at DPT soil boring locations, and groundwater samples were collected and submitted to a fixed laboratory for chemical analyses of VOCs, SVOCs, PCBs, metals, TPH-DRO and TPH-GRO.

The following summarizes the results of the 2010 investigation findings specific to the REC #11 study area:

- REC #11 subsurface lithology varied and ranged from an area in the north comprised of nearly all silty clay (to a depth of 25 feet) to an area in the center of REC #11 consisting of 12 feet of silty sand and sandy silt overlying 13 feet of clay. Lithology in the southern portion of the REC was comprised mostly of sandy silt and a few clay layers.

- The water table at GSP ranged from just below the ground surface to nearly eight feet below grade. Shallower groundwater levels tended to be along the eastern portion of GSP in areas where shallow clay was observed. Groundwater elevations indicate that groundwater beneath GSP generally flows in a southeasterly direction toward Stansbury Creek and Frog Mortar Creek.

- Trace- to low-concentrations of VOCs were detected in soil samples collected at all GSP RECs. However, these levels were less than Maryland residential and nonresidential soil standards. Trichloroethene (TCE), a chlorinated solvent detected at the Dump Road area of MSA, was detected at low concentrations in deep soil samples at REC #11. Some of the highest concentrations of SVOCs in GSP were detected at REC #11. However, most

detections were less than residential and nonresidential standards. SVOC concentrations slightly exceeded residential standards at several RECs, and some SVOC concentrations in REC #11 exceeded nonresidential standards. However, these exceedances were limited to surface and shallow soil at a maximum depth of seven feet below grade.

- PCB concentrations ranging from 3,100–12,000 µg/kg in three shallow-soil samples at REC #11 exceeded the Maryland residential and nonresidential soil standards of 320 and 1,400 µg/kg (respectively). A fourth shallow sample at REC #11 (1,200 µg/kg) exceeded the residential standard only.

- Concentrations of arsenic, total chromium, iron, manganese, nickel, and vanadium in soil exceeded standards in most samples. Iron and manganese concentrations varied greatly, and may be due to fill material or former buildings. Although arsenic and vanadium frequently exceeded their risk-based standards, concentrations of these two metals were generally similar to MDE's anticipated typical concentrations (ATCs) or "regional background" concentrations for the eastern region of Maryland. Therefore, concentrations of arsenic and vanadium appear to be consistent with local background and not indicative of a release at GSP.

- Concentrations of arsenic, beryllium, iron, manganese, nickel, and vanadium exceeded groundwater standards in one or more groundwater samples. Several exceedances appear to be the result of high turbidity in the samples. VOCs and SVOCs detected in groundwater samples did not exceed standards, and were typically common laboratory contaminants and artifacts of laboratory analyses.

2.3.2 2011 Additional Phase II Site Investigation

Between May and July 2011, an additional Phase II site investigation further characterized areas of soil and groundwater contamination initially identified during the 2010 GSP Phase II site investigation. The *Additional Phase II Site Investigation Report* (Tetra Tech, 2012a) summarizes the results of the test pit explorations, soil borings, soil sampling, and groundwater monitoring well installation and sampling performed within REC #8, #9, #10, and #11 at GSP. The 2011 investigation included the advancement of 40 soil borings, excavation of 12 test pits, installation of eight monitoring wells, and collection of soil and groundwater samples for chemical analyses. Human health and ecological risk assessments were also performed to quantify potential risks to human receptors and ecological impacts from detected chemicals at GSP (Tetra Tech, 2012a).

The findings pertinent to the study area in the 2011 additional Phase II site investigation and risk assessment are summarized below:

- TCE was detected at low concentrations in one or more deep soil samples in REC #11, but all were less than MDE residential and nonresidential soil standards.

- TCE concentrations in groundwater exceeded MDE and federal groundwater criteria in three REC #11 area wells (GSP-MW-01, GSP-MW-04, and GSP-SB/WP-89).

- TPH-DRO was detected in groundwater at concentrations exceeding the MDE standard in three REC #11 groundwater samples (GSP-MW-01, GSP-MW-02, and GSP-MW-03).

- TPH-DRO concentrations exceeded MDE residential soil standards in five soil samples at REC #11, and exceeded both the residential and nonresidential standards in two surface soil samples from REC #11.

- PCBs (primarily Aroclor 1260) were detected in GSP soil boring samples at concentrations ranging from 19–3,400 µg/kg. Aroclor 1260 concentrations in four shallow soil samples at REC #11 exceeded both the Maryland residential and nonresidential soil standards.

- Two of the highest SVOC concentrations in soils, and greatest occurrence of concentrations exceeding residential and nonresidential soil criteria, were identified in subsurface soil samples from REC #11 (GSP-SB-120-18–20 and GSP-SB-121-6–8).

- Detected concentrations of arsenic and vanadium exceeded MDE residential criteria and their eastern Maryland ATCs in soil sample GSP-SB-111-6–8 (southeast of REC #11). Detected concentrations of arsenic and vanadium exceeded their MDE criteria in most soil samples, but were within the range of the eastern Maryland ATCs.

- The human health risk assessment identified regulatorily unacceptable risks for hypothetical child trespassers, lifelong recreational users, and lifelong residents, from ingestion, dermal contact, and inhalation of polycyclic aromatic hydrocarbons (PAHs) (expressed as benzo[a]pyrene-equivalents [BaPEq]) in surface and subsurface soils at REC #11. Potential exposure to manganese in surface and subsurface soil by future construction workers was also associated with regulatorily unacceptable risks. TCE was retained as a chemical of concern for hypothetical future residents at REC#11, based on potential exposure to groundwater due to direct contact, ingestion, and inhalation. Based on the results of groundwater sampling and qualitative risk analysis, TCE was also considered a potential vapor-intrusion risk for a hypothetical future resident or worker.

- The human health risk estimates were calculated in a conservative manner to assist risk managers tasked with making risk management decisions for the GSP RECs. These sites are currently within the airport area and are not used for residential or recreational purposes, so the potential for trespassing is very limited. Site groundwater is not used as a domestic water supply source. Thus, largely, the risk estimates are for *hypothetical* receptor exposure, should land use change in the future.

- The streamlined ecological risk assessment identified potential risks to birds and mammals based on exposure to Aroclor 1260 in surface soil at REC #11.

2.3.3 2012 Greater Strawberry Point Supplemental Soil and Groundwater Characterization

A supplemental soil and groundwater characterization was conducted at GSP in 2012 at RECs #7 through #11 to further determine the nature and extent of environmental contamination in soil and

groundwater. Specific chemical constituents and their concentrations in soil and groundwater were identified using field-screening techniques and fixed-laboratory analyses. Chemical analytical results were screened against Maryland human health standards for soil and groundwater to assess the need for additional sampling or to support no further action.

The following field investigations were completed in REC #11 during the 2012 investigation:

- Soil and groundwater were screened using MIP to a maximum depth of 44.6 feet below grade at 15 locations in REC #11 to help locate and delineate possible areas of subsurface contamination.

- Soil borings were advanced at 15 locations in REC #11 to 40 feet below grade via DPT to collect soil lithologic information, to screen soil in the field for VOCs using a PID, and to collect soil samples for fixed-laboratory chemical analyses of VOCs, SVOCs, PCBs, metals, TPH-DRO, TPH-GRO, and toxicity characteristic leaching procedure (TCLP) analytes.

- Four new groundwater monitoring wells were installed in REC #11 and two soil samples from each well boring were submitted to a fixed laboratory for chemical analyses of VOCs, SVOCs, PCBs, metals, TPH-DRO, and TPH-GRO.

- Groundwater samples were collected in April 2012 from existing monitoring wells and submitted to a fixed laboratory for the same chemical analyses listed above.

- Groundwater samples were collected in October 2012 from the newly installed monitoring wells and submitted to a fixed laboratory for previously listed chemical analyses.

- Static groundwater levels were initially measured at the newly installed monitoring wells and at existing monitoring wells on October 4, 2012. The static groundwater levels were measured again on October 23–26, 2012, and these levels were used to develop groundwater-elevation contour maps.

- Horizontal and vertical coordinates were surveyed for the MIP borings, DPT-advanced soil borings, and monitoring wells.

The following summarizes the results of these activities:

- The water table at GSP ranged from 4.45 feet to 13.3 feet below grade (measured from the top of the well casings). Groundwater elevations range from -6.69 feet NAVD88 at GSP-MW18 (REC #11) to 8.18 feet NAVD88 at GSP-MW-14 (REC #7).

- Groundwater elevations indicate that groundwater beneath the GSP generally flows in a southerly direction toward Stansbury Creek and Frog Mortar Creek.

- MIP screening indicated possible VOCs in soil in REC #11. Several elevated responses were recorded, especially from the electron-capture detector (ECD) in the southwestern portion of the REC.

- Trace to low concentrations of VOCs (including TCE) were detected in soil samples collected at all RECs. However, no sample in REC #11 exceeded the Maryland residential soil standard.

- SVOCs were detected in soil at several RECs, but most SVOC concentrations were less than the residential and nonresidential standards. BaPEq and associated compounds were the only SVOCs detected at concentrations exceeding their screening criteria. In REC #11, 13 soil samples contained BaPEq at concentrations exceeding the residential screening criterion, with five also exceeding the nonresidential screening criterion.

- No soil concentrations of PCB, TPH-DRO, or TPH-GRO exceeded MDE cleanup standards in samples collected during the 2012 investigation.

- Concentrations of arsenic, chromium, and vanadium in soil exceeded standards in some samples from all investigated RECs. Although arsenic and vanadium frequently exceeded their risk-based standards, detected concentrations of these two metals were generally similar to MDE ATCs for the eastern region of Maryland. Thallium was detected at a concentration exceeding its residential screening criterion in one sample from REC #11, although at a concentration below its ATC. Therefore, concentrations of these metals appear to be consistent with local background and not indicative of a release at the GSP.

- Low concentrations of the metals arsenic, barium, and chromium were detected in one of two samples collected from REC #11 and submitted for TCLP analysis, while a low concentration of the SVOC 3&4-methylphenol was detected in the other sample. TCLP results do not indicate constituent concentrations at hazardous levels.

- TCE was detected in groundwater at concentrations exceeding its MDE criterion in two REC #11 wells (GSP-MW-4 and GSP-MW-18). Two additional VOCs (1,2-dichloroethane and vinyl chloride) exceeded their respective MDE criteria in REC #11 groundwater samples collected from GSP-MW-18.

- The SVOC naphthalene was detected in groundwater at one REC #11 well (GSP-MW-18) at a concentration exceeding its MDE criterion.

- At REC #11, TPH-DRO concentrations exceeded MDE criteria in four of eight wells: GSP-MW-1 and GSP-MW-20 in the eastern portion of REC #11, and GSP-MW-4 and GSP-MW-18 in the southwest portion of REC #11

2.4 CURRENT SITE CONDITIONS AND OPERATIONS

The investigation area for Buildings KC, KJ, and KQ includes an approximate two-acre partially wooded area at the northern end of GSP. Currently, REC #11 contains no structures east of the Lockheed Martin hangar except for the stormwater detention basin and associated stormwater drainage systems and has no planned improvements. Former Buildings KC, KJ, and KQ were

demolished in 2000 so that Taxiway J and the corporate hangars could be constructed. The stormwater detention basin was constructed when Taxiway J and related midfield improvements were constructed. The detention basin supports tall wetlands vegetation (most greater than four feet high). South of the detention basin is a stream channel that intermittently drains REC #11 and overflow from the detention basin. A large earthen berm, nearly 20 feet wide and five feet tall, is between the drainage basin and stream channel.

The REC #11 area is bounded to the north by Taxiway J, to the east by Taxiway F, to the west by Strawberry Point Road, and to the south by a wooded area extending south to REC #10 and the former Vanguard area. A flat grassy area lies north of REC #11 beyond Taxiway J and between the leased hangars and Taxiway F. The Lockheed Martin corporate hangar is northwest of REC #11 at the western end of Taxiway J. The Black and Decker hangar is immediately northwest of the Lockheed Martin hangar. A grassy median and the main MSA runway are east of REC #11 beyond Taxiway F. Aircraft traffic occurs daily on Taxiway F and planes regularly taxi to and from the corporate hangar area across Taxiway J. Figure 2-4 shows the current features in and around Buildings KC, KJ, and KQ.



Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).

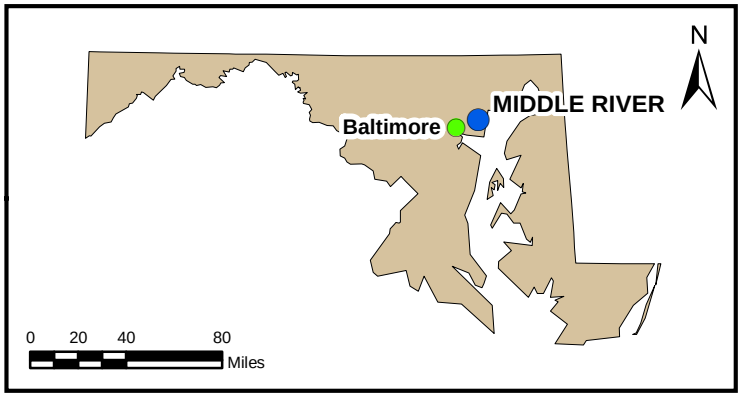

FIGURE 2-1

GREATER STRAWBERRY POINT
SITE LOCATION MAP

Lockheed Martin, Martin State Airport
Middle River, Maryland

DATE MODIFIED:	CREATED BY:
06/19/14	JEE

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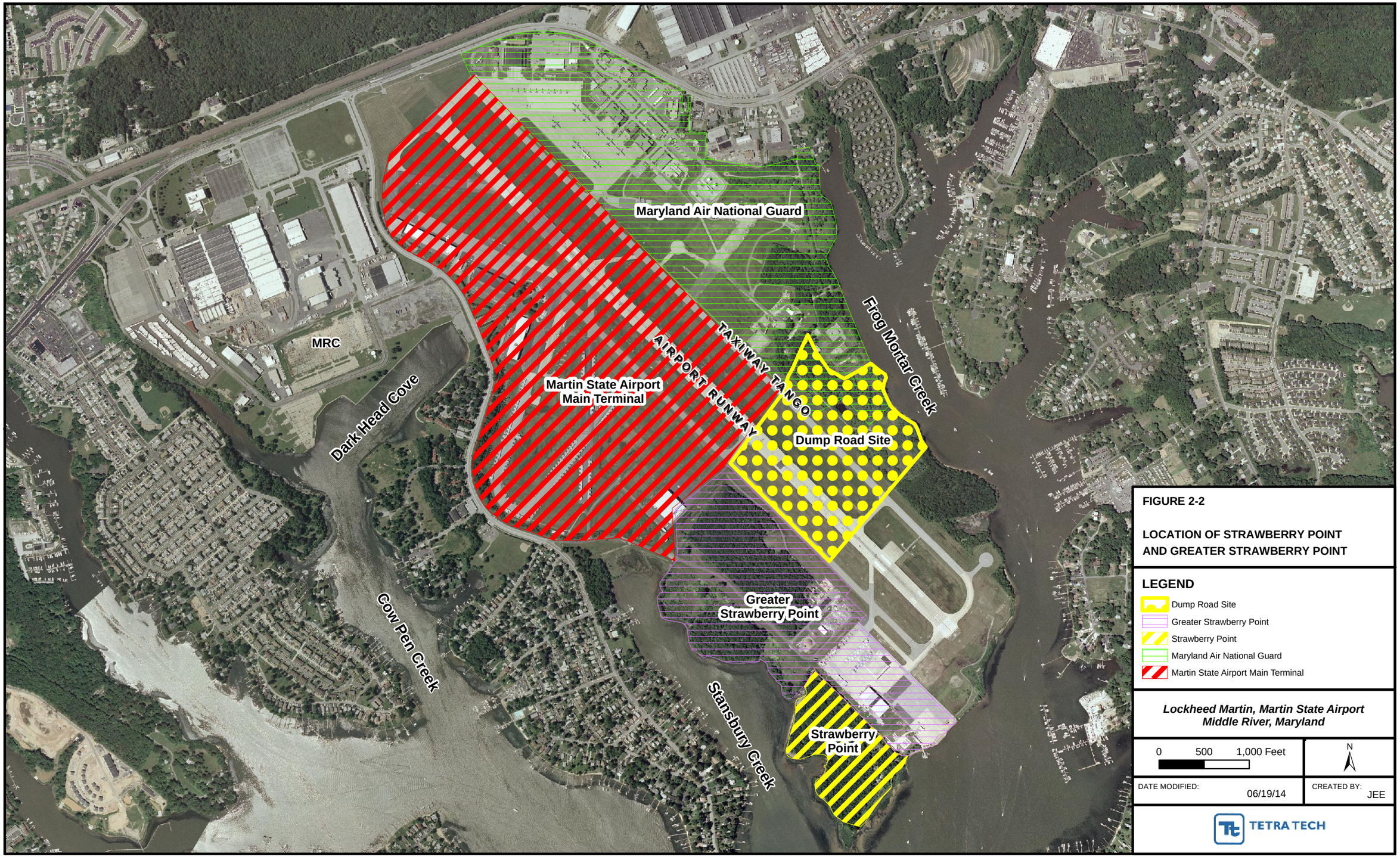

FIGURE 2-2

LOCATION OF STRAWBERRY POINT AND GREATER STRAWBERRY POINT

LEGEND

- Dump Road Site
- Greater Strawberry Point
- Strawberry Point
- Maryland Air National Guard
- Martin State Airport Main Terminal

Lockheed Martin, Martin State Airport
Middle River, Maryland

0 500 1,000 Feet

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DATE MODIFIED: 06/19/14

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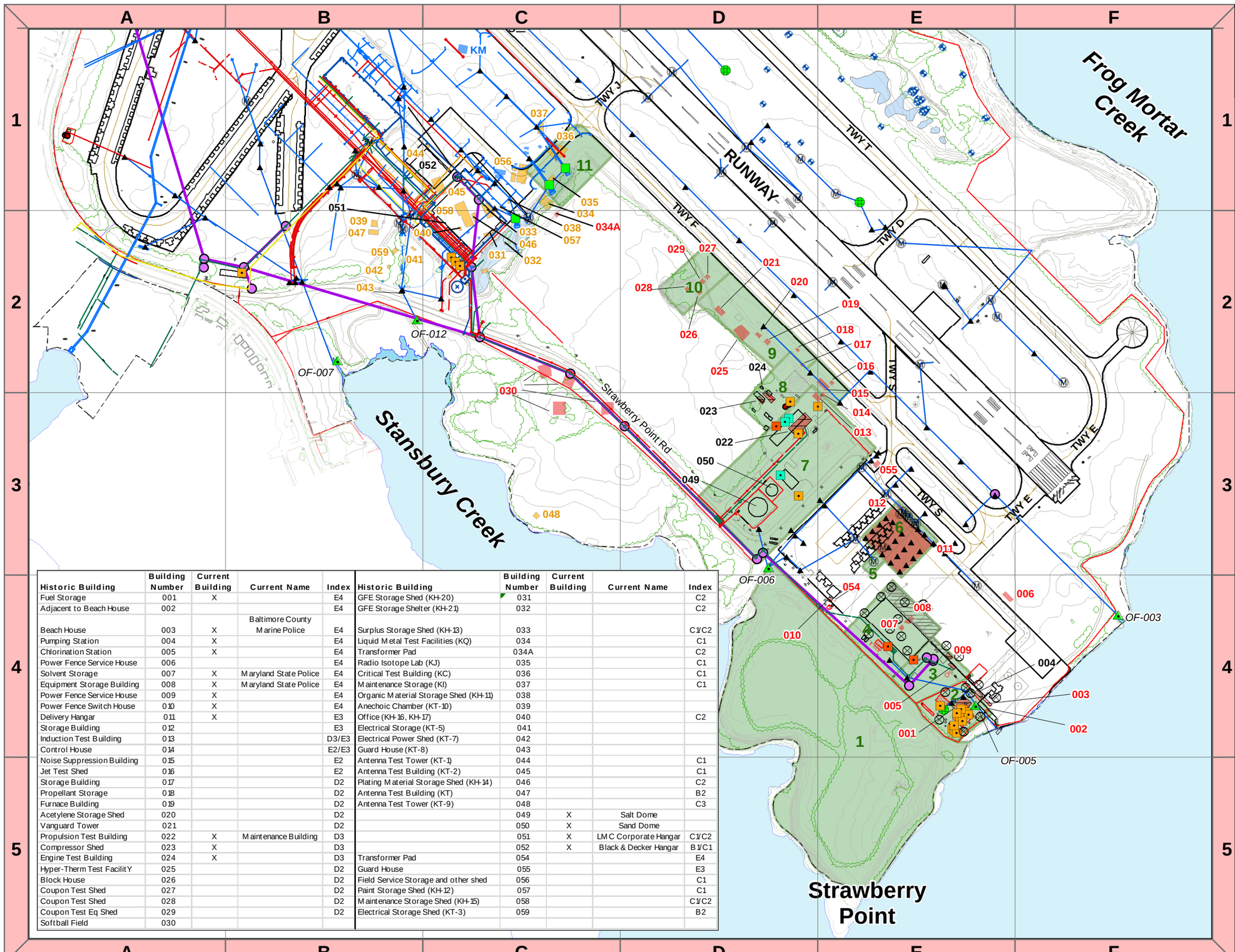
Figure 2-3
Index Map for Current and Historical Structures as Existing in the 1960's, Greater Strawberry Point



Historic Building	Building Number	Current Building	Current Name	Index
Fuel Storage	001	X		E4
Adjacent to Beach House	002			E4
Beach House	003	X	Baltimore County Marine Police	E4
Pumping Station	004	X		E4
Chlorination Station	005	X		E4
Power Fence Service House	006			E4
Solvent Storage	007	X	Maryland State Police	E4
Equipment Storage Building	008	X	Maryland State Police	E4
Power Fence Service House	009	X		E4
Power Fence Switch House	010	X		E4
Delivery Hangar	011	X		E3
Storage Building	012			E3
Induction Test Building	013			D3/E3
Control House	014			E2/E3
Noise Suppression Building	015			E2
Jet Test Shed	016			E2
Storage Building	017			D2
Propellant Storage	018			D2
Furnace Building	019			D2
Acetylene Storage Shed	020			D2
Vanguard Tower	021			D2
Propulsion Test Building	022	X	Maintenance Building	D3
Compressor Shed	023	X		D3
Engine Test Building	024	X		D3
Hyper-Therm Test FacilitY	025			D2
Block House	026			D2
Coupon Test Shed	027			D2
Coupon Test Shed	028			D2
Coupon Test Eq Shed	029			D2
Softball Field	030			
GFE Storage Shed (KH-20)	031			C2
GFE Storage Shelter (KH-21)	032			C2
Surplus Storage Shed (KH-13)	033			C1/C2
Liquid Metal Test Facilities (KQ)	034			C1
Transformer Pad	034A			C2
Radio Isotope Lab (KJ)	035			C1
Critical Test Building (KC)	036			C1
Maintenance Storage (KI)	037			C1
Organic Material Storage Shed (KH-11)	038			
Anechoic Chamber (KT-10)	039			
Office (KH-16, KH-17)	040			C2
Electrical Storage (KT-5)	041			
Electrical Power Shed (KT-7)	042			
Guard House (KT-8)	043			
Antenna Test Tower (KT-1)	044			C1
Antenna Test Building (KT-2)	045			C1
Plating Material Storage Shed (KH-14)	046			C2
Antenna Test Building (KT)	047			B2
Antenna Test Tower (KT-9)	048			C3
	049	X	Salt Dome	
	050	X	Sand Dome	
	051	X	LMC Corporate Hangar	C1/C2
	052	X	Black & Decker Hangar	B1/C1
Transformer Pad	054			E4
Guard House	055			E3
Field Service Storage and other shed	056			C1
Paint Storage Shed (KH-12)	057			C1
Maintenance Storage Shed (KH-15)	058			C1/C2
Electrical Storage Shed (KT-3)	059			B2

Legend

- Membrane Interface probe (MIP)
- Soil Borings (SB)
- Oil Filled Operational Equipment
- Drum Storage
- MTN Tanks
- MSA GW Wells
- MSA Inlets
- MSA Manholes
- NPDES Outfalls
- Sediment Basin
- Trench Drain
- Sanitary Manholes
- MTN Wells Pipes
- REC
- Current Structures
- Historical Structures (from 1964 Aerial Photo)
- Reported Historic Structures (from 1964 Map)
- Historical Structures (from 1956 Drawing)
- Sanitary Pipes
- Storm Pipes
- Gas
- Sanitary Line
- Storm
- Water
- Electricity
- Telephone Line
- Electric Utilities

Historic building location based on 1956 architect's drawing, 1963 utility drawing, and aerial photos from 1962 and 1964.

MSA – Martin State Airport
NPDES – National Pollutant and Discharge Elimination System
MTN – Main Terminal
REC – Recognized Environmental Condition

REC #	REC Name
REC 1	Strawberry Point Wooded Areas
REC 2	Fuel Storage Tank Farm
REC 3	Old Wastewater Treatment Plant
REC 4	Former Solvent Storage Area
REC 5	Transformer Pad
REC 6	Former Hangar (Building ND), Former Storage Building
REC 7	Facility Maintenance Area
REC 8	Former Induction Test, Former Engine Test, Former Jet Test Shed, Former Storage Building, Former Propulsion Test and Former Compressor Shed Buildings
REC 9	Former Propellant Storage, Former Acetylene Storage Shed, Former Furnace Building, Former Hyper-Therm Test Facilities and Former Vanguard Tower
REC 10	Former Coupon Test Shed and Former Block House
REC 11	Former Critical Test Building (KC), Former Radioisotope Lab (KJ) and Former Transformer Pad

Lockheed Martin, Martin State Airport
Middle River, Maryland

0 250 500 Feet

N

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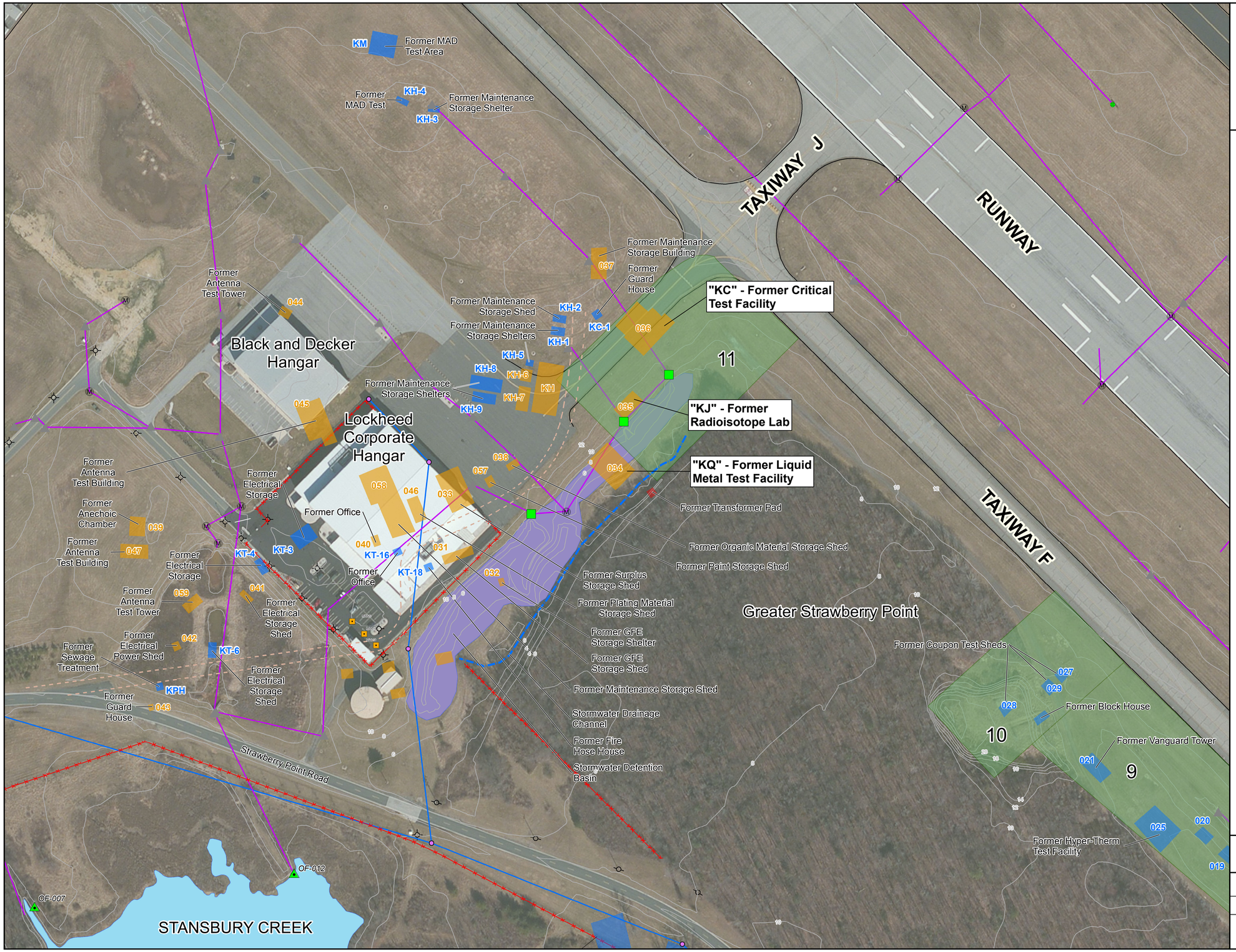

Figure 2-4

Area Layout Buildings KC, KJ, and KQ Greater Strawberry Point

LEGEND

- MSA Inlets
- MSA Manholes
- NPDES Outfalls
- Sediment Basin
- MTN Tanks
- Trench Drain
- Sanitary MH
- Historical Structures (from 1963 Utilites Map and 1964 Aerial Photo)
- Reported Historical Structures (from 1964 Facility Map)
- Historical Structures (from 1970 Topographic Plat)
- Dirt Road (from 1964 Aerial Photo)
- REC
- Current Structures
- Stormwater Holding Area
- Stormwater Drainage Channel
- Stormwater Lines
- Sanitary Lines
- Fence Line
- 10 Topographic Elevation Contour
- Electric Utilities
- 11 REC Number

Aerial photograph provided by ESRI's ArcGIS Online World Imagery map service (© 2011 ESRI and its data suppliers).

GFE - Government Furnished Equipment
MH - Manhole
MSA – Martin State Airport
MTN – Main Terminal
NPDES – National Pollutant and Discharge Elimination System
REC – Recognized Environmental Condition

REC #	REC Name
REC 09	Former Vanguard Tower Former Hyper-Therm Test Facility
REC 10	Former Coupon Test Shed and Former Block House
REC 11	Former Critical Test Building (KC), Former Radioisotope Lab (KJ) and Former Transformer Pad

Lockheed Martin, Martin State Airport
Middle River, Maryland

0 45 90 180 Feet

N

DATE MODIFIED: 5/1/15

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Map Document: (P:\GIS\Lockheed_MSA\MapDocs\MXD\Area Layout Building KC_KJ_KQ.mxd)
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Section 3
Historical Records Review

The following section summarizes agency information requests and the historical records review. This records research supplements previous records reviews conducted during a previous site investigation (Tetra Tech, Inc. [Tetra Tech], 2008), as described in Section 2.3.

3.1 FEDERAL AND STATE RECORD SEARCHES

Tetra Tech sent written Freedom of Information Act (FOIA; Public Information Act 5 U.S.C. 552) requests to the Nuclear Regulatory Commission (NRC), the Maryland Department of the Environment (MDE), and the Maryland Aviation Administration (MAA) for available records pertaining to past operations at the former nuclear research facilities in Greater Strawberry Point (GSP) Buildings KC, KJ, and KQ. The FOIA request letters and responses are in Appendix B. Records retrieved and reviewed in response to FOIA requests are summarized below. Copies of the federal and state records reviewed are in Appendices C, D, and E. In addition to requests submitted for agency-owned records, publicly available NRC records were researched and reviewed using the NRC online document repository—*Agencywide Documents Access and Management System* (ADAMS). Microfiche and electronically available records at the NRC's public library in Rockville, Maryland were also searched in person using the library system of records. Copies of ADAMS and NRC library records are in Appendix C.

3.2 NUCLEAR RESEARCH PROGRAM RECORDS OVERVIEW

The files obtained from NRC and MDE for this investigation are more extensive than those records obtained during the historical review completed for previous investigations (Section 2.3). These records provide information regarding the research performed at the site and the types and quantities of nuclear materials used. However, operational, procedural, and contractual documentation related to the programs is absent or partial; many records were presumably withheld for security reasons, given that the origins of these programs were associated with national defense. Some records obtained via this FOIA request were duplicates of those obtained during a prior site investigation (Tetra Tech, 2008).

Nuclear research was conducted in the 1950s and 1960s both at the Middle River Complex (MRC) in former Buildings C and D, as well as in former Buildings KC and KJ in Greater Strawberry Point (GSP). Original records (i.e., Atomic Energy Commission [AEC] licenses) were often universal to the Baltimore operations, without referencing a particular building or research area. In many records, specificity to a location or building can be inferred based on a reference to a program or experimental focus. For example, if the "critical facility" was referenced, the research primarily occurred in Building KC. An overview of the former Martin Company nuclear activities in the 1950s and 1960s (when research was first housed in the former Building D and then expanded to Martin State Airport) is provided below.

The Martin Company's Nuclear Division was formed in 1954. The division was centered in Baltimore but provided oversight for other nuclear research operations, including those at the radioisotopes pilot plant in Quehanna, Pennsylvania. At the MRC facilities, the Auxiliary Power Systems Department produced a variety of direct-conversion generators, including the Systems Nuclear Auxiliary Power (SNAP) generator, designed with no moving parts. It was the first to use the decay heat of radioisotopes as a basic energy source, and was developed at the MRC and Martin State Airport (MSA) facilities in the late 1950s using sealed radioisotope sources procured from Mound Laboratories in Miamisburg, Ohio (P&HS, Inc., 1987). Similar generators, used in the first nuclear-powered satellite (the Transit) and in the world's first radioisotope fueled weather station, are still used today.

Operations at former Building KC included research and development for a liquid fluidized-bed reactor (LFBR). "Packaged power plants" were also developed there, under contract with the AEC and the United States Navy. The packaged power plants were portable and used for power generation in remote military or research locations, such as McMurdo Sound, Antarctica. Some examples were the MH-1, MH-1A, PM-1, and the PM-3A. Research in the former Building KJ (radioisotope laboratory) is not well documented in the available records. The license for processing americium and curium and preparation of sealed sources (19-01398-20) in Building KJ was issued to the Martin Company in 1960. Records describing the purpose and usage of Building KQ were not located in the standard record sources described below. However, limited information regarding Building KQ was found in United States Department of Energy archived reference sources, as described in Section 3.7.

3.3 PAST RESEARCH SUMMARY

Regulatory agency records related to nuclear activities at the former facilities were reviewed during previous GSP investigations, including the 2008 Phase I environmental assessment (Tetra Tech, 2008). Many records previously reviewed were identified in this current search, due to overlapping licenses or synonymous search terms. Duplicate records were re-reviewed for information specific to Buildings KC, KJ, or KQ. This section summarizes information specific to Buildings KC and KJ that was reviewed again for this report, as documented in previously obtained NRC records (Tetra Tech, 2008). Information regarding Building KQ was not found in records obtained during previous environmental investigations.

Radiological research at Buildings KC and KJ was reportedly discontinued around 1964 and 1969, respectively. In 1965, Ebasco was licensed to dismantle and remove the LFBR from Building KC. No records of post-removal operations have been found on file, although documentation that the LFBR never achieved criticality is available (NRC, 1995). Reportedly, decontamination of the LFBR-wastewater holding tank was completed by sandblasting the tank and the residue was disposed of at a licensed burial site (NRC, 1995). According to the NRC closeout report, multiple licenses at MRC and MSA and license No. 19-01398-20 for Building KJ were terminated in late 1969 (NRC, 1995). The final cleanup and survey of Building KJ was reportedly performed by Isotopes, Inc., and included removal and disposal of the high-efficiency particle absorption (HEPA) filters used in the building. The wastewater holding tank at Building KC was reportedly abandoned in place. No records were identified that document the tank abandonment, or whether environmental testing was completed in or around the tank.

Closeout Verification Inspection Summary No. 94-001: Representatives of NRC and MDE conducted the closeout inspection of MRC and MSA facilities on November 3, 1994. The inspection and survey included MRC nuclear research laboratories (Building D and Building C), and GSP Buildings KC (critical test facility) and KJ (radioisotope laboratory). The facilities were reviewed against their issued licenses to determine if the licenses could be terminated, allowing the buildings to be released for unrestricted use. The inspectors also contacted and interviewed current and former employees of Lockheed Martin. The report concluded that no radiation above background levels was identified, and that no further action was required to release the sites for unrestricted use.

Radioisotope Laboratory (Building KJ): License No. 19-01398-20 was issued to Martin Marietta to conduct research using americium-241 (Am-241) and curium-242 (Cm-242) in Building KJ (the radioisotope laboratory). This type of work had been previously performed in Building D. The license was transferred to Isotopes, Inc. without a change in license number or work location. In late 1969, Isotopes, Inc. requested termination of the license, stating simply that all radioactive material possessed under the license had been disposed of in accordance with 10 CFR 20 by transfer to a company authorized to receive the licensed material. The AEC terminated the license without comment. No record of a termination or confirmatory survey is in the docket file. Mr. Richard Brisson (a former Martin Marietta and Isotopes, Inc. employee) stated that production processing did not occur in Building KJ, and that only small sources (microcurie amounts of Am-241, no Cm-242) were used in the building. He and one other member of the Isotopes, Inc. staff performed the final cleanup and survey of the facility, including the removal and disposal of the HEPA filters. Mr. Brisson's recollection is that this survey (demonstrating that the facility was ready for unconditional release) was sent to the AEC contracting office on Hudson St., New York City, New York (NRC, 1995).

Critical Test Facility (Building KC): Building KC, the critical test facility, was 330- feet northeast of Building KJ. The Martin Marietta LFBR was in one of the building's three "test cells." Completed MH-1A fuel assemblies were stored in the test cells under license No. SNM-53. License No. SNM-907 was issued to Ebasco Services, Inc. in 1965 to dismantle and remove the LFBR. The license included a provision to provide records for a post-removal survey to the AEC's New York Operations Office and to Martin Marietta. Although a pre-dismantling survey was performed, no records of the required post-removal survey could be found in the docket file. However, the LFBR never achieved criticality, according to documents in the file. Mr. Thomas Flynn (formerly an engineer with Raytheon-Ebasco Services, Inc.) stated that meticulous care was taken during dismantling to prevent the spread of any contamination. He further stated that an AEC inspector/health physicist from the New York field office/laboratory was on site, had overseen the final survey, and had signed the final report asserting that the dismantled LFBR had not added contamination (as compared to levels measured before operation) (NRC, 1995). Mr. Brisson confirmed that Ebasco's work produced no contamination, and stated that his group decontaminated the underground water-dump/holding tank by sandblasting the insides and disposing of the residue at a licensed burial site.

January 25, 1995 letter from NRC to Ms. Joanne Brooks, Maryland Aviation Administration: This letter was issued by NRC to confirm that the 1994 inspection identified no radiation above background levels at any of the sites. Based on these findings, no further action was recommended, and the sites were considered suitable for unrestricted use.

3.4 NUCLEAR REGULATORY COMMISSION RECORDS

Although many NRC records obtained during this investigation do not reference a specific facility, some records identify the critical facility (Building KC) or radioisotope laboratory (Building KJ), and include information for locations and types of radioactive materials used at the facilities during operation. Records obtained from NRC include ADAMs online records and public archives at the NRC library in Bethesda, Maryland. A summary of the information in the regulatory files relevant to the Greater Strawberry Point area radiological facilities is provided below.

3.4.1 Nuclear Regulatory Commission Agency-Wide Documents and Management System Research

A search of the NRC online document collection ADAMS generated multiple records that included duplicates of many previously obtained files (Tetra Tech, 2008). ADAMS records specific to Buildings KC and KJ (none for Building KQ) were obtained; relevant records are in Appendix C. Most of the records retrieved are associated with Building D activities. A brief synopsis of the records related to Buildings KC and KJ follows:

- ADAMS accession #ML080170107—This report documents the NRC closeout verification inspection (94-001) performed on 11/3/94. NRC personnel surveyed Buildings C and D at the Middle River Facility and Buildings KJ (radioisotope laboratory) and KC (critical test facility) at the Martin State Airport. The report states that an attempt was made to locate the underground dump/holdup tank described by a former employee. The inspectors were unable to locate the tank or any indication that it had been removed. We believe that the tank was probably abandoned in place. The report concluded that the facilities were suitable for unrestricted use.

- ADAMS accession #ML073400683, #ML080170088, #ML0734400526, #ML073400522, and #ML073400518—Oak Ridge National Laboratory site summaries of AEC license #19-01398-32, #STB-00187, #SNM-00053, and #SNA-00011. These reports summarize the operations and licensed quantities of radioactive material used in Building D. However, since some of the licensed activities were also performed in Buildings KC and KJ, mention is made of an NRC closeout inspection performed on 11/3/94 which addressed the operations in all three buildings.

- ADAMS accession #ML080150518—"Proposed Amendment to Byproduct Material" (license #19-01398-20). The license application discusses proposed research to be

performed in Building KJ, including experimental research on irradiated coupons of proposed reactor coolant and zircalloy (a proposed containment material). Research involved various analyses performed in ventilated hoods.

- ADAMS accession #ML080160081, #ML080160093 and #ML080160324—Correspondence between Isotopes Nuclear Systems Division, Martin Marietta Corporation, and the NRC. These documents discuss the completed decontamination of Building KJ and requests release of the building for public use. It also documents an AEC closeout inspection performed on 6/27/69, and subsequent approval of the building for unrestricted use.

- ADAMS accession #ML00070079—"Application for General License to Receive, Possess, Use, and Transfer Special Nuclear Material" is for proposed activities that were performed in Buildings D and KC, which included operation of the pilot manufacturing plant. This plant, in the basement of Building D, produced stainless-steel tubular fuel-elements containing highly enriched uranium oxide. Zero power testing of the prototype reactor cores was to occur in Building KC, according to the application.

3.4.2 Nuclear Regulatory Commission Records Produced Pursuant to Freedom of Information Act Request

Previous NRC record requests identified a large body of records possibly applicable to GSP and/or the MRC. Many of these records were publicly available online or through other public sources (e.g., ADAMS, the NRC library, etc.). Therefore, the FOIA request submitted to NRC was narrowed to documentation retrieved by NRC and not otherwise publicly available. Copies of the FOIA requests and agency responses are in Appendix B. Appendix C contains the NRC records, and any new information not obtained from prior reviews or summarized in previous reports is presented below.

Building KC operations were initially licensed in 1960 under transfer of "Special Nuclear Material" (SNM) license SNM-53 to develop and fabricate uranium/aluminum-alloy fuel elements. A 1960 letter from the Martin Company to AEC (NRC record A/45, docket No. 07000058) documents the fuel cores reportedly handled in Building KC. These operations involved fuel cell research and development using aluminum-uranium cores assembled in former Building D.

A December 12, 1957 letter from the Martin Company to the AEC (NRC record B/1, ML080320099) consists of the application for license SNM-53. An amendment to Martin Nuclear Division (MND) technical document No. 1063, "Criticality Precautions Manual," was included as an attachment to the license application. A map showing the work areas in Building KC was

included (Plate 3) with MND-1063. The map shows two test cells ("A" and "B"), a storage vault with a licensed capacity of 100 kilograms of uranium-235, and an assembly room.

A March 18, 1960 letter from the Martin Company to the AEC (record A/48, docket No. 07000058) indicates that the test cells in Building KC were being used to store PM-1 and Army Nuclear Power Program (ANPP) reactors. Subsequent correspondence on March 23, 1960 (record A/49, docket No. 07000058) refers to a storage vault in Building KC, 22 feet by 13 feet by 11 feet high, with walls of reinforced concrete nine inches thick. Birdcages (storage containers for source materials) were placed on racks along the walls at least 17 inches above the floor to avoid potential flooding. Storage racks for fuel elements were in the center of the room.

3.5 MARYLAND DEPARTMENT OF THE ENVIRONMENT RECORDS

On January 16, 2014, Tetra Tech submitted a Public Information Act (PIA) request for MDE files (Appendix B). Appendix D contains the MDE records produced by this request. Some files had been previously obtained; these records are summarized in Section 3.2. Tetra Tech reviewed a previously obtained State of Maryland report (report MD-304, "A Preliminary Assessment [PA] of Martin State Airport, Middle River, Maryland") dated March 1989 prepared by the Maryland Hazardous and Solid Waste Management Administration (MDE/MHSWMA). This PA references two memoranda prepared by MDE/MHSWMA:

- a memo dated March 30, 1989 to the Hazardous Waste Enforcement Division concerning stored materials in the abandoned Martin State Airport former nuclear research buildings
- a memo dated March 31, 1989 to the MDE Toxic Environmental Science and Health Center for Radiological Health concerning the lack of records for past generation and disposal of hazardous/radioactive waste from these facilities

These memoranda and any related correspondence were specifically requested from MDE on January 16, 2014. However, this information was not available. No new information regarding Buildings KC, KJ, or KQ was obtained via the PIA request to MDE. Note that the Closeout Verification Inspection Summary (No. 94-001), as summarized in Section 3.3, included photographs taken in 1994 of the interior of Buildings KC and KJ (Tetra Tech, 2008). The buildings were in deteriorated condition at that time (particularly Building KJ) and were overcrowded with abandoned maintenance supplies such as lime. The 1994 inspection summary did not reference the above-referenced MDE/MHSWMA memoranda.

3.6 MARYLAND AVIATION ADMINISTRATION RECORDS

On January 23, 2014, Tetra Tech contacted MAA to request records concerning the demolition of former Buildings KC, KJ, and KQ. The records MAA provided are in Appendix E. Demolition of these three buildings was carried out around 2000 by the State of Maryland as part of the "midfield" improvements at MSA. MAA provided a set of engineering drawings by TAMS Consultants, Inc. dated September 1998 entitled "Midfield Terminal Complex Site Development Phase I" (Appendix E).

The drawings note that Buildings KC, KJ, and KQ would be demolished following "removal of asbestos and other hazardous materials," and include partial floor plans for all three buildings (Sheet X-01). The Building KC floor plan includes a storage vault labeled as a "safe" and three test cells. The Building KQ floor plan identifies two tanks inside the building to be removed, but the tank volume and contents are not specified. All three buildings contained asbestos materials (e.g., floor tiles and pipe insulation). The plans present existing conditions for buildings and utilities from a construction and demolition perspective, but provide no information about environmental conditions, potential hazards associated with building components, and building-related utilities in the subsurface.

Of significance in the 1998 MAA engineering records is a topographic land survey completed by A. Morton Thomas & Associates, Inc. for the northern GSP (midfield development) in December 1996. The survey was conducted when Buildings KC, KJ, and KQ still stood. Some corners of the buildings were in the survey and provided "as-built" locations for the buildings relative to other MSA features, such as the runway. Previous maps showing these buildings approximated locations based on 1950s hand-drawn facility plans. The 1996 survey data was used to update current MSA map layers for use in GSP investigations and reports. Because the locations of Buildings KC, KJ, and KQ were adjusted, the former locations of several other buildings nearby were also adjusted. The revised maps are more accurate, and have been incorporated throughout this report.

Addendum No. 1 to the scope of work for Midfield Terminal Complex Site Development Phase I under state contract MAA-CO-97-019 dated April 27, 1998 includes questions and answers from a pre-bid site meeting. One bidder asked whether waste concrete would be allowed to be used as backfill in embankments (i.e., at the REC #11 drainage swale); the response indicates that waste concrete would not be allowed as backfill, and an addendum to the scope of work would provide

clarification. Another questioned Sheet D-01 because it does not clearly specify the types of hazardous materials removed during demolition. The response states that asbestos and traces of lead paint were the only hazardous materials anticipated to be encountered in the buildings.

Addendum No. 3 to the 1998 scope of work suggests that removal of up to 400 linear feet of underdrain pipe near Buildings KC, KJ, and KQ was a contract item. Removal of a sewer pump-station at the southern end of the dirt road was also specified in the scope of work. Therefore, the referenced underdrain may have been the former vitreous clay pipe that served as a sanitary sewer line.

3.7 OTHER HISTORICAL RECORDS

Although the FOIA requests and standard record sources examined for this investigation reveal no information regarding former Building KQ operations, a published journal article was found alluding to the liquid-metal test facility (C&E N, 1962; see Appendix F). The article indicates that in early 1962, the nuclear division of the Martin Company was finishing construction of a new research facility near Baltimore, Maryland. We assume this article and the photographs mentioned below pertain to Building KQ. The facility reportedly studied coolant systems used for the liquid-metal components of nuclear reactors used in space propulsion. Heated metals were pumped through loop systems to gather data on heat exchange.

The only test metal mentioned in the article was lithium; however, the article suggests that it was the first of many metals to be tested. Lithium was desirable for use in space systems due to its light weight. The article also mentions that cesium vapor, nickel-cadmium, and chromium were used in the test-loop apparatus (e.g., in coils and as insulators). Photographs of the liquid-metal test loop are also included in the article. No other information regarding the history of Building KQ was identified in available record sources.

A facilities map titled “Piping Distribution Mains” (dated 6/10/1963) is in Appendix F (see also Appendix A). This map shows the locations of Buildings KC, KJ, and KQ and the layout of water, gas, and sewer lines in GSP. A six- to eight-inch cast-iron pipe carried water to most of the maintenance/storage and nuclear research buildings in the area via a 12-inch county-supplied water main along Strawberry Point Road. Sanitary sewer from the GSP area was conveyed via an eight-inch vitreous-clay pipe to a pumping station formerly near the intersection of Strawberry Point Road and the former dirt road in recognized environmental condition (REC) #11. From there,

flow was directed west on Strawberry Point Road to a second pump station, where it was transferred to a 12-inch force-main sanitary-sewer line along Wilson Point Road. As described in Section 3.6, the demolition of the former pump station, and presumably the associated vitreous-clay-pipe sanitary-sewer line, were included in the demolition contract for Buildings KC, KJ, and KQ. Details regarding the condition or disposal of these materials were not identified in available records.

Section 4
Field Investigation

Field activities conducted on April 16, 2014 in the northern portion of Greater Strawberry Point included a gamma survey and geophysical survey. Photographs from the field investigation are in Appendix G. Gamma scan documentation is in Appendix H, and the contractor's geophysical survey report is in Appendix I.

4.1 GAMMA SURVEY

A gamma scan was performed at the ground surface over the entire investigation area before field activities began to screen for possible radiological hazards. This survey was performed as a health and safety measure for personnel working in the area. A Ludlum Model 2221 scaler/ratemeter combined with a Ludlum Model 44-10 gamma-scintillator probe was used for the survey. The 44-10 probe is a sodium iodide (NaI) gamma scintillator primarily used to detect high-energy gamma radiation ranging between 60 kiloelectron volts (keV) to 2 megaelectron volts (MeV); thus, it can detect gamma-emitting isotopes such as uranium-235 and cesium-134. The probe consists of a two-inch-diameter, two-inch-thick NaI crystal coupled to a photomultiplier tube housed in an aluminum canister. The scintillator/photomultiplier sends a constant stream of data to the Ludlum 2221 instrument. The electronics in the Ludlum 2221 instrument then display and output the gross count rate in counts per minute (cpm) at a rate of 1 hertz (Hz).

For this survey, the Ludlum 44-10 probe was carried 18 inches above the ground surface along survey lines spaced at five feet. Background measurements were collected in a nearby off-site area with similar surfaces (e.g., grass, concrete, and asphalt). The sensor was also tested with a cesium-137 (^{137}Cs) spike-source to ensure proper responses. Signal fall-off tests were also performed using a ^{137}Cs spike-source placed in the ground surface. Survey results in the areas of concern were similar to background and can be found in Appendix H, along with instrumentation information.

4.2 GEOPHYSICAL SURVEY

Tetra Tech performed the site geophysical surveys to locate subsurface anomalies possibly associated with buried materials. Enviroscan, Inc. (Enviroscan) conducted a reconnaissance-level electromagnetic survey over a four-acre area using a Geonics EM-61 Mark 2 metal detector and followed up with ground-penetrating radar (GPR). The primary purpose of the survey was to detect and delineate possible former building remnants, subsurface waste, or demolition debris within the investigation area. The follow-up surficial GPR survey further characterized areas of interest for possible distinct anomalies. Figure 4-1 shows the geophysical survey area. The Enviroscan geophysical investigation report is in Appendix I.

Surface conditions in the survey area consisted of the paved taxiways, grassy areas along the taxiways, the dirt access road between Taxiway F and Greater Strawberry Point (GSP), and the margins of the wooded area in the northern portion of GSP (where brush was sufficiently sparse to allow instrument navigation). Instrument navigation was not possible over the entire study area due to the uneven terrain, standing water, and dense wetland vegetation. A paved area east of the Lockheed Martin corporate hangar was also surveyed using a TW-6 pipe-and-cable locator and the GPR. Attempts were made to survey this area because the footprint of a former government-furnished equipment-storage shed appears to overlap the area. However, upon interpretation, these data were deemed not meaningful due to the presence of utilities and the perimeter fence.

4.2.1 Electromagnetic Survey Methodology

Electromagnetic (EM) mapping of the area using a Geonics EM-61 Mark 2 metal detector was performed to evaluate the presence/absence of subsurface metallic materials. The instrument uses a one-meter by one-half meter coil to transmit 150 EM pulses per second into the ground at each measurement station. A second transmitter coil is used to narrowly focus the pulses and to minimize possible interference caused by overhead and/or nearby magnetic sources (e.g., buildings, fences, power lines, surficial debris, and atmospheric EM activity).

The instrument receiver-coil measures the decay of transient electrical currents induced by the transmitted pulses. Electrical currents in moderately conductive earth materials (e.g., damp clays, mineralized or oxidized soils, etc.) dissipate rapidly, so more prolonged currents are likely due to buried metallic objects. The EM-61 Mark 2 detects and measures the prolonged transient currents

between transmitted pulses, thus providing a real-time digital read-out of the metallic content in the subsurface.

The survey scanned the investigation areas by automatically collecting EM readings at a frequency of eight readings per second along parallel profiles spaced approximately five feet apart and spanning all accessible portions of the survey area (Figure 4-1). Location control (with sub-meter accuracy) was provided by a differential global positioning system (GPS) to ensure environmental geographic information system (EGIS)-compatible mapping. Measurement locations were recorded using a mobile GPS receiver, with differential corrections applied relative to a fixed base-station GPS receiver. EM-61 and location data were analyzed on-site to identify targets for follow-on GPR scans. The larger targets identified with EM-61 were marked with plastic pin flags and/or marking paint. Many small scattered metallic items were observed with EM-61 or were visible on the surface throughout the survey area. The size and magnetic strength (density) of these metal debris items was investigated with the TW-6 pipe-and-cable locator to assess their suitability for follow-on investigation, and many of the smaller EM-61 anomalies were also marked for follow-on GPR scans.

4.2.2 Ground-Penetrating Radar Methodology

The GSSI SIR-2000 GPR instrument was used to obtain focused data in areas where the EM-61 subsurface scan indicated possible buried metallic objects. The GSSI SIR-2000 was operated with a dual frequency 800/300-megahertz antenna. First, areas of anomalous EM-61 data were re-acquired using a TW-6 pipe-and-cable locator. The TW-6 was used to locate/confirm the target anomaly, refine the target anomaly boundaries, and set the limits for GPR scans. GPR data were then collected at each follow-on location, over several parallel lines and along two perpendicular axes, to help identify the shape and orientation of the anomalies. GPR systems produce cross-sectional images of subsurface features and layers by continuously emitting pulses of radar frequency energy from a scanning antenna as it is towed along a survey profile. Radar pulses are reflected at interfaces between subsurface materials that have differing dielectric properties and return to the antenna. The GPR images are continuously displayed on a color monitor as a cross-section in real time. Areas or items exhibiting radar results of interest were marked with plastic pin flags and/or marking paint. In some cases, prior markings designating EM-61 results were adjusted based on GPR results.

4.3 GEOPHYSICAL SURVEY RESULTS

Geophysical anomalous areas of interest were identified by the EM and GPR surveys (see Figure 4-1). No anomalies were identified below Taxiway J or the concrete aprons near the hangars. Based upon the survey data, the blue rectangles/ovals shown on Figure 4-1 are representative of scattered metallic debris characteristic of urban fill. The purple rectangles/ovals shown on Figure 4-1 indicate items of interest (e.g., tanks, drums, or building remnants) based on their characteristic shape(s) in the survey data. Detailed results are provided in the geophysical investigation report in Appendix I.

Once all anomalies had been identified by EM-61, the GPR was used to ascertain physical characteristics through vertical radar imaging. Numerous small anomalies (smaller than a paint can) were scanned with GPR, but were not considered significant targets for environmental investigation because of their size. Eighteen larger anomalies were considered environmentally significant because their EM-61 images or locations indicated possible former building structures, underground storage tanks (USTs), or drums.

The GPR results for 14 of the 18 larger anomalies did not indicate of building foundations, USTs, or drums. Rather, they had the appearance of scattered (metallic) demolition debris or other metallic debris in fill. One large area of debris, shown as the largest blue rectangle on Figure 4-1, is near the former locations of two maintenance storage sheds (KH-1 and KH-2). Another area of debris, designated as a rectangle on Figure 4-1, is near the former liquid-metal test facility (Building KQ). As shown on Figure 4-1, many other former structures coincide with aircraft aprons or hangar areas that were constructed around the year 2000, but the EM-61 results do not indicate remnants of former buildings below the scanned concrete areas.

The GPR survey delineated four anomalies of interest near the former GSP REC #11 maintenance storage and nuclear research buildings that suggest structures, drums, or cylindrical objects. These four anomalies are labeled on Figure 4-1, and are described below:

- ***Anomaly of Interest 1***—a linear, upright (oriented along a plane perpendicular to the ground surface) anomaly that could indicate a possible foundation or wall remnant. This anomaly is near a former maintenance storage building (KI).
- ***Anomaly of Interest 2***—a long, high-amplitude, parabolic anomaly in the soil berm between the stormwater-detention basin and the drainage channel at the northern border of the wooded area that resembles a broken segment of large-diameter buried drain pipe,

possibly displaced or abandoned during construction of an adjacent storm drain from Taxiway J.

- ***Anomaly of Interest 3***—a parabolic response suggesting two rounded or semi-cylindrical objects each approximately 1.5- feet-wide, across their short axes. GPR images suggest an approximately two-foot separation between the objects, which may have flat or boxed edges in one direction. The area containing the similar-shaped objects within Anomaly of Interest 3 is about six feet by six feet, and the total area of the anomaly is approximately 30 feet by 35 feet. This anomaly is also within the soil berm separating the stormwater detention basin and the drainage channel. The location of Anomaly of Interest 3 appears to be near the eastern corner of former Building KQ (see Figure 4-1).

- ***Anomaly of Interest 4***—a cluster of several objects consistent with buried construction/demolition debris in the soil berm separating the stormwater-detention basin and the drainage channel, near the southernmost corner of former Building KQ.

Visual reconnaissance of the berm between the stormwater-detention basin and the wooded area identified exposed construction and demolition debris, such as bricks, metal strips, and concrete exposed and protruding from the soils along the sides of the berm (see Appendix G).

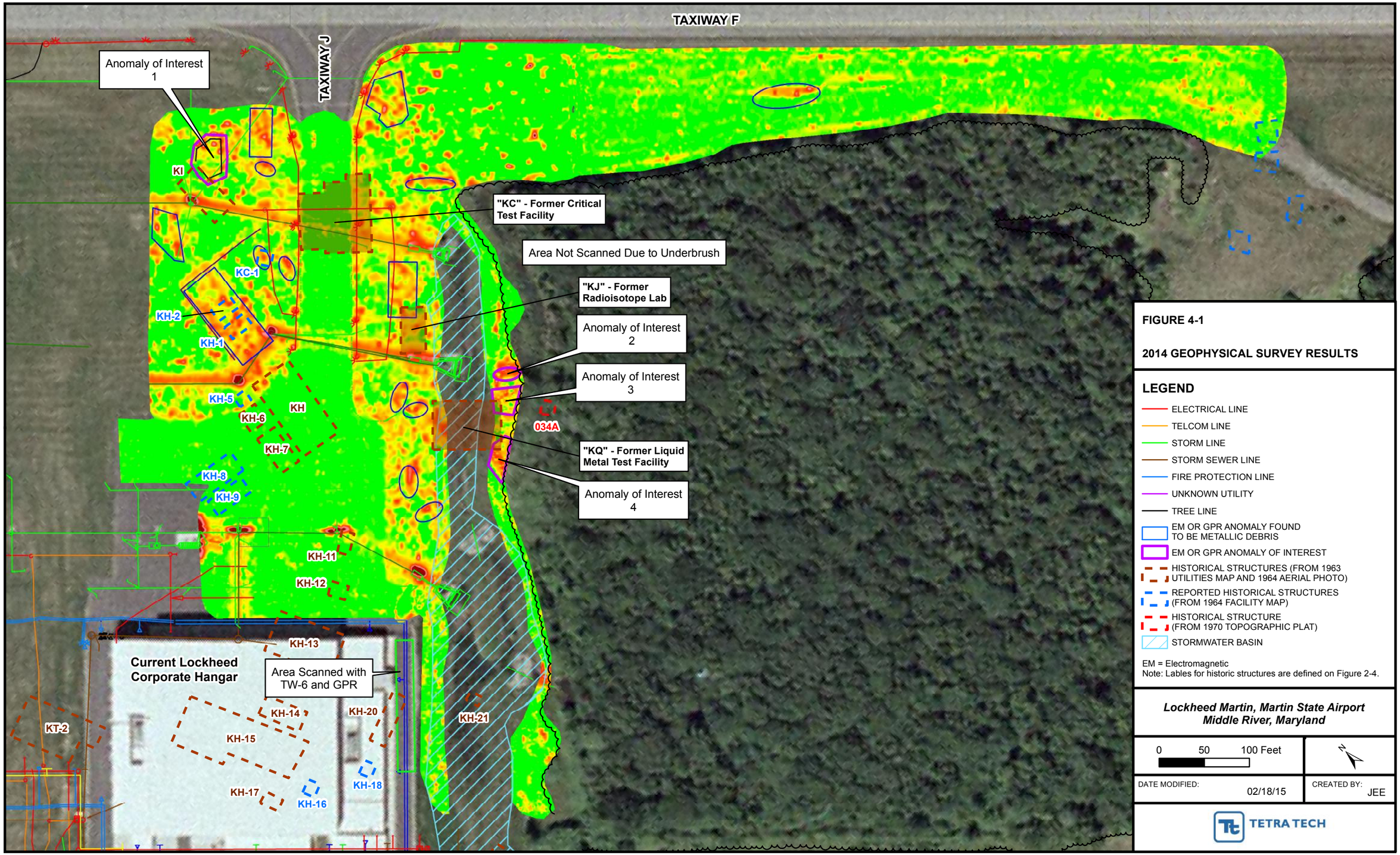

FIGURE 4-1

2014 GEOPHYSICAL SURVEY RESULTS

LEGEND

- ELECTRICAL LINE
- TELCOM LINE
- STORM LINE
- STORM SEWER LINE
- FIRE PROTECTION LINE
- UNKNOWN UTILITY
- TREE LINE
- EM OR GPR ANOMALY FOUND TO BE METALLIC DEBRIS
- EM OR GPR ANOMALY OF INTEREST
- HISTORICAL STRUCTURES (FROM 1963 UTILITIES MAP AND 1964 AERIAL PHOTO)
- REPORTED HISTORICAL STRUCTURES (FROM 1964 FACILITY MAP)
- HISTORICAL STRUCTURE (FROM 1970 TOPOGRAPHIC PLAT)
- STORMWATER BASIN

EM = Electromagnetic
Note: Lables for historic structures are defined on Figure 2-4.

Lockheed Martin, Martin State Airport
Middle River, Maryland

0 50 100 Feet

DATE MODIFIED: 02/18/15

CREATED BY: JEE

TETRA TECH

Map Document: (P:\GIS\Lockheed_MSA\MapDocs\MXD\gsp_em61_survey_20140317.mxd)
02/18/15 -- JEE

Section 5
Summary

The former sites of Buildings KC, KJ, and KQ and associated areas were investigated to evaluate historical site activities and the possible presence of subsurface remnants of the buildings and utilities. This investigation reviewed available facility drawings and aerial photographs, and agency records (Nuclear Regulatory Commission [NRC], Maryland Department of the Environment [MDE], and Maryland Aviation Administration [MAA]) for information regarding past operations and facility closure and/or demolition. A surface-gamma screening for health and safety of field investigation personnel and a geophysical investigation of the area were also conducted. A summary of the investigation findings is provided below:

- Requests for available historical license, facility operations, and demolition records were submitted through the Freedom of Information Act (FOIA) and Public Information Act (PIA) to the Nuclear Regulatory Commission and the Maryland Department of the Environment. The Freedom of Information Act and Public Information Act record search yielded records that had already been reviewed for previous investigations. Information from the records search is summarized in this report, and concerns operations and waste disposal practices at the former Martin Company Middle River nuclear facilities.

- Information regarding the former uses of Building KQ was not identified in the records reviewed. A building layout included with the demolition specifications for Building KQ indicates two storage tanks of unknown volume and contents were inside the building.

- A ground-surface scan for gamma radiation was performed in the investigation area that included the former radiological research facilities. The gamma scan was completed as a precaution for the health and safety of field-investigation personnel. Gamma results were consistent with background readings; no elevated gamma readings were identified.

- A geophysical survey was conducted over an approximate four-acre area corresponding to the accessible areas of the former Greater Strawberry Point maintenance, storage, and nuclear research facilities. The survey included electromagnetic (EM-61) and ground-penetrating radar (GPR) reconnaissance of the area.

- EM-61 data indicate numerous small or insignificant subsurface anomalies, likely representative of scattered metallic debris in fill or discarded pipe remnants. Several larger or regularly shaped anomalies were also imaged using ground-penetrating radar to help determine their shape and orientation. Of the anomalies scanned with ground-penetrating radar, four were identified with possible correlation to former buildings or utilities.

- One of the anomalies (Anomaly 1) is in the grassy field between Taxiway F and the Lockheed Martin corporate hangar. Anomaly 1 is near the former location of a maintenance storage building and may represent a buried wall or building remnant.

- Three anomalies (Anomalies 2 through 4) are in a raised-soil berm between the stormwater-detention basin and the wooded areas in northern Greater Strawberry Point. Anomaly 2 has a radar signature indicative of a piece of broken pipe, and the Anomaly 3 radar image suggests two rounded or semi-cylindrical objects, each approximately 1.5-feet-wide across their short axes. Anomaly 4 resembles possible construction or demolition debris. Anomalies 3 and 4 are close to the former Building KQ location.

Section 6
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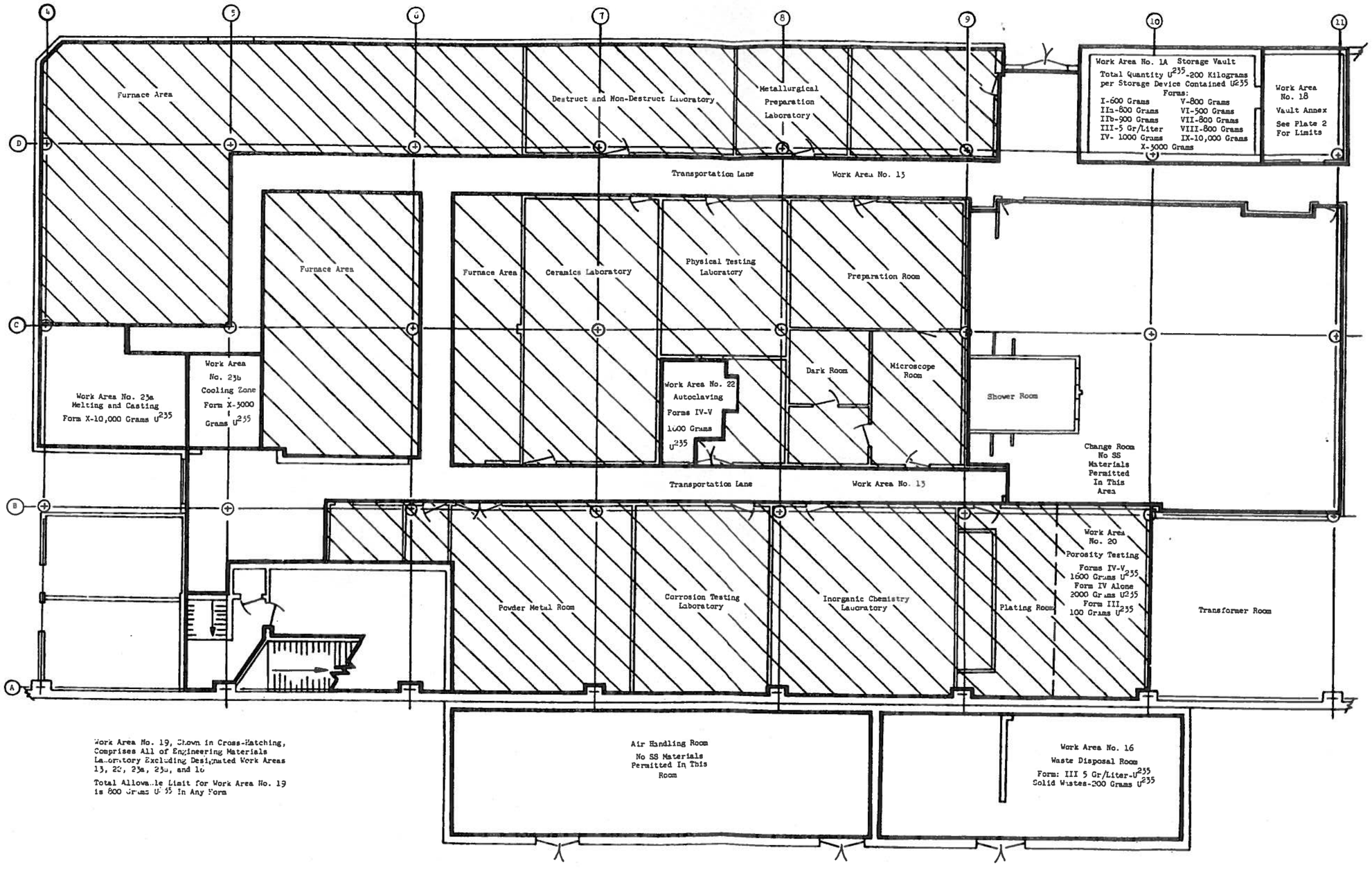
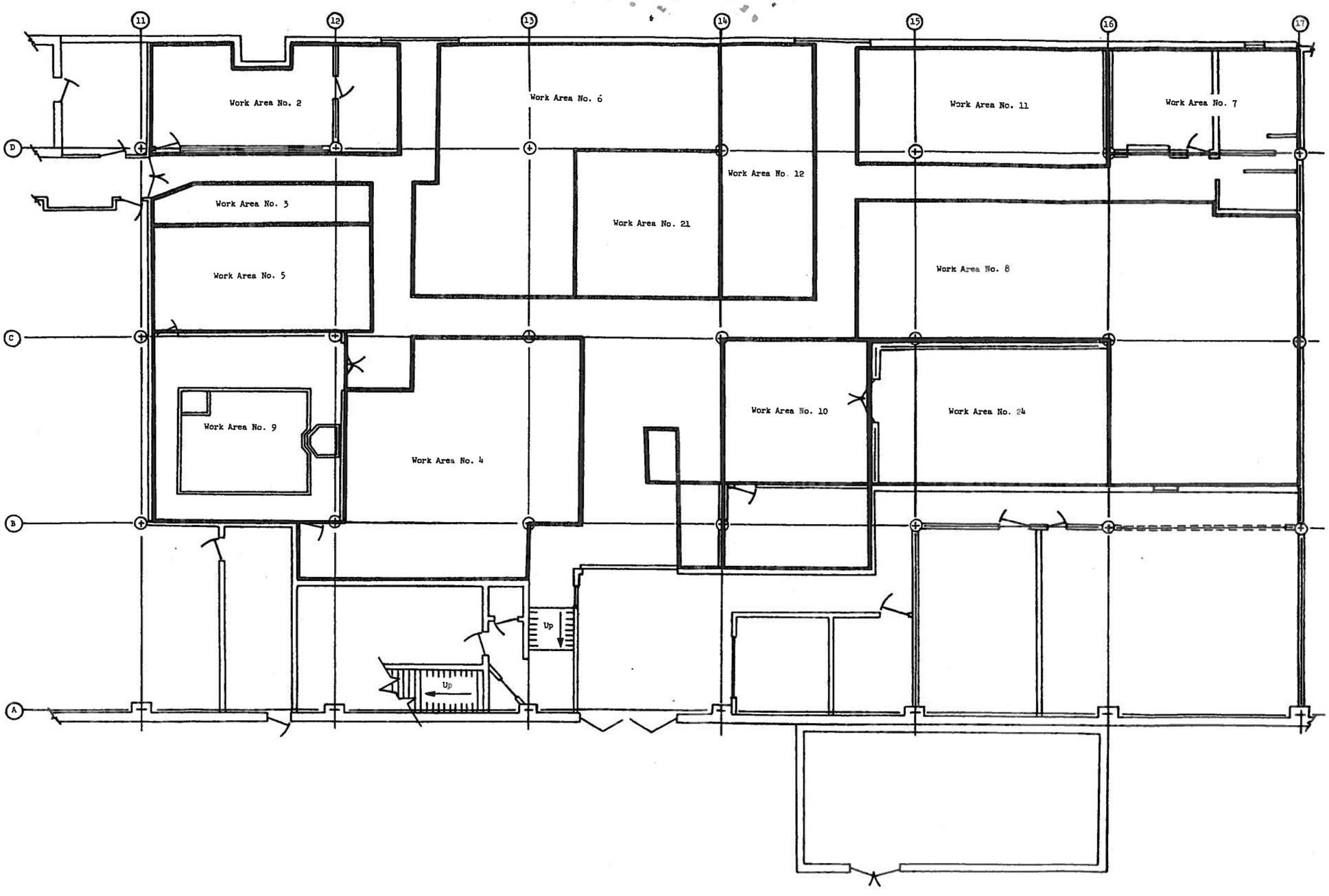
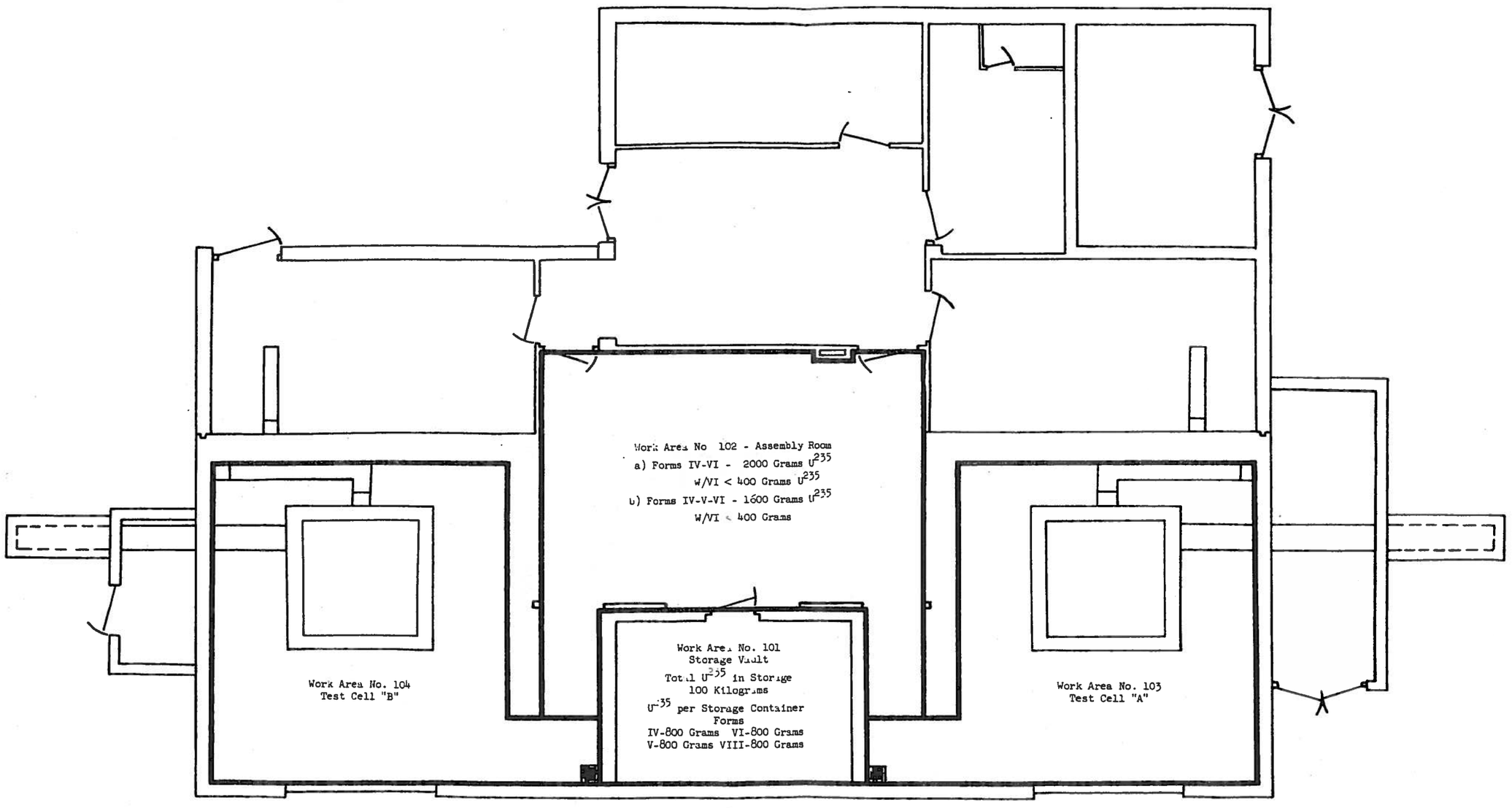
APPENDIX A—HISTORICAL MAPS AND DRAWINGS



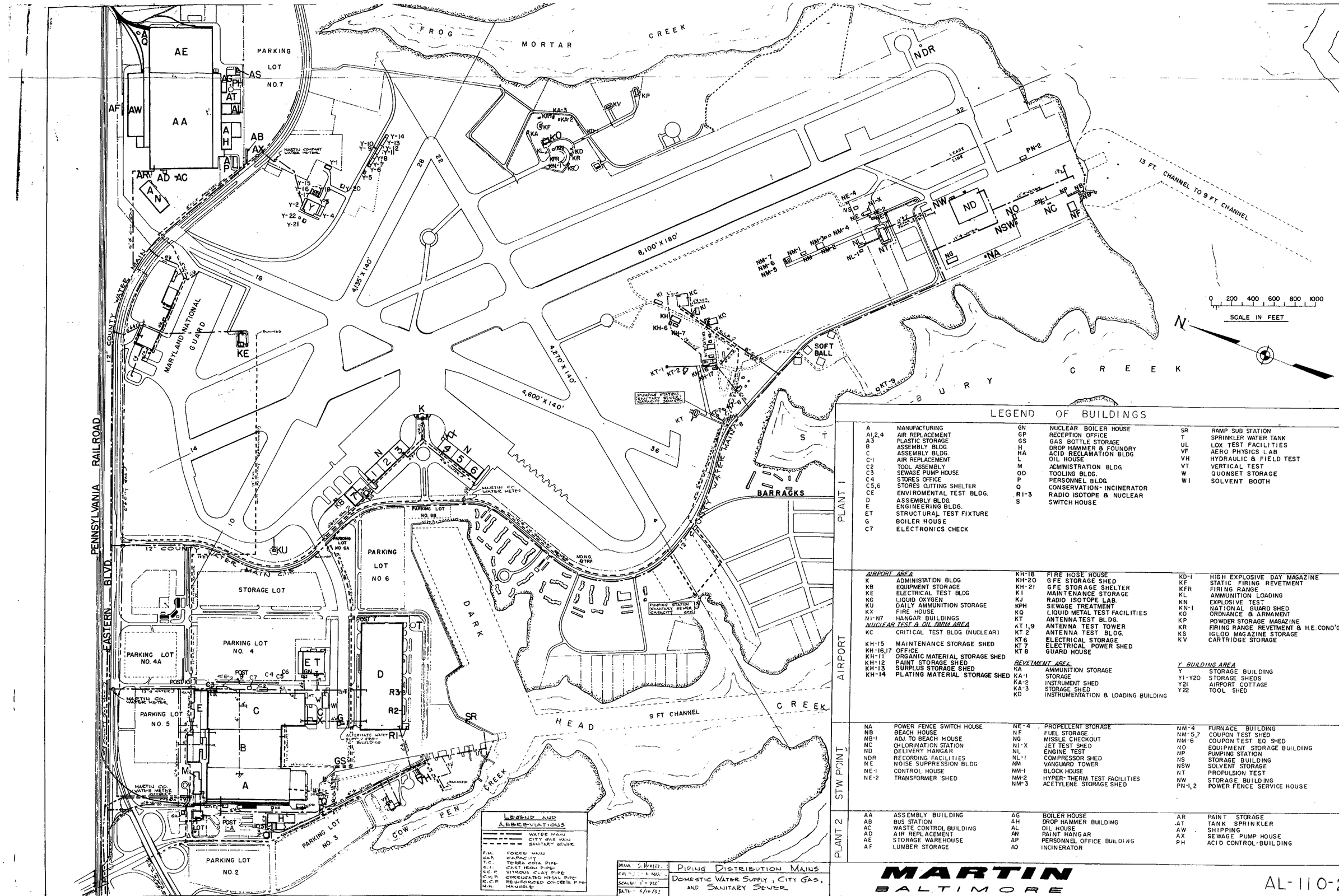
Martin Nuclear Division Engineering Materials Laboratory
Criticality Work Areas Plate 1



Martin Nuclear Division Criticality Wa...
Pilot Manufacturing Plant



Martin Critical Experiment Facility Criticality Work Area Plate 3



LEGEND OF BUILDINGS

PLANT 1

A	MANUFACTURING	GN	NUCLEAR BOILER HOUSE	SR	RAMP SUB STATION
A1,2,4	AIR REPLACEMENT	GP	RECEPTION OFFICE	T	SPRINKLER WATER TANK
A3	PLASTIC STORAGE	GS	GAS BOTTLE STORAGE	UL	LOX TEST FACILITIES
B	ASSEMBLY BLDG.	H	DROP HAMMER & FOUNDRY	VF	AERO PHYSICS LAB
C	ASSEMBLY BLDG.	HA	ACID RECLAMATION BLDG.	VH	HYDRAULIC & FIELD TEST
C-1	AIR REPLACEMENT	L	OIL HOUSE	VT	VERTICAL TEST
C2	TOOL ASSEMBLY	M	ADMINISTRATION BLDG.	W	QUONSET STORAGE
C3	SEWAGE PUMP HOUSE	OD	TOOLING BLDG.	WI	SOLVENT BOOTH
C4	STORES OFFICE	P	PERSONNEL BLDG.		
C5,6	STORES CUTTING SHELTER	Q	CONSERVATION- INCINERATOR		
CE	ENVIROMENTAL TEST BLDG.	R1-3	RADIO ISOTOPE & NUCLEAR		
D	ASSEMBLY BLDG.	S	SWITCH HOUSE		
E	ENGINEERING BLDG.				
ET	STRUCTURAL TEST FIXTURE				
G	BOILER HOUSE				
C7	ELECTRONICS CHECK				

AIRPORT

AIRPORT AREA

K	ADMINISTATION BLDG	KH-18	FIRE HOSE HOUSE	KD-1	HIGH EXPLOSIVE DAY MAGAZINE
KB	EQUIPMENT STORAGE	KH-20	G.F.E STORAGE SHED	KF	STATIC FIRING REVETMENT
KE	ELECTRICAL TEST BLDG	KH-21	G.F.E STORAGE SHELTER	KFR	FIRING RANGE
KG	LIQUID OXYGEN	KI	MAINTENANCE STORAGE	KL	AMMUNITION LOADING
KU	DAILY AMMUNITION STORAGE	KJ	RADIO ISOTOPE LAB.	KN	EXPLOSIVE TEST
KX	FIRE HOUSE	KPH	SEWAGE TREATMENT	KN-1	NATIONAL GUARD SHED
N1-N7	HANGAR BUILDINGS	KQ	LIQUID METAL TEST FACILITIES	KO	ORDNANCE & ARMAMENT

NUCLEAR TEST & OIL FARM AREA

KC	CRITICAL TEST BLDG (NUCLEAR)	KT	ANTENNA TEST BLDG.	KP	POWDER STORAGE MAGAZINE
KH-15	MAINTENANCE STORAGE SHED	KT 1,9	ANTENNA TEST TOWER	KR	FIRING RANGE REVETMENT & H.E. COND'G
KH-16,17	OFFICE	KT 2	ANTENNA TEST BLDG.	KS	IGLOO MAGAZINE STORAGE
KH-11	ORGANIC MATERIAL STORAGE SHED	KT6	ELECTRICAL STORAGE	KV	CARTRIDGE STORAGE
KH-12	PAINT STORAGE SHED	KT 7	ELECTRICAL POWER SHED		
KH-13	SURPLUS STORAGE SHED	KT 8	GUARD HOUSE		
KH-14	PLATING MATERIAL STORAGE SHED				

REVETMENT AREA

KA	AMMUNITION STORAGE		
KA-1	STORAGE		
KA-2	INSTRUMENT SHED		
KA-3	STORAGE SHED		
KD	INSTRUMENTATION & LOADING BUILDING		

Y BUILDING AREA

Y	STORAGE BUILDING
Y1-Y20	STORAGE SHEDS
Y21	AIRPORT COTTAGE
Y22	TOOL SHED

STW POINT

NA	POWER FENCE SWITCH HOUSE	NE-4	PROPELLENT STORAGE	NM-4	FURNACE BUILDING
NB	BEACH HOUSE	NF	FUEL STORAGE	NM-5,7	COUPON TEST SHED
NB-1	ADJ TO BEACH HOUSE	NG	MISSLE CHECKOUT	NM-6	COUPON TEST EQ SHED
NC	CHLORINATION STATION	NI-X	JET TEST SHED	NO	EQUIPMENT STORAGE BUILDING
ND	DELIVERY HANGAR	NL	ENGINE TEST	NP	PUMPING STATION
NDR	RECORDING FACILITIES	NL-1	COMPRESSOR SHED	NS	STORAGE BUILDING
NE	NOISE SUPPRESSION BLDG	NM	VANGUARD TOWER	NSW	SOLVENT STORAGE
NE-1	CONTROL HOUSE	NM-1	BLOCK HOUSE	NT	PROPULSION TEST
NE-2	TRANSFORMER SHED	NM-2	HYPER-THERM TEST FACILITIES	NW	STORAGE BUILDING
		NM-3	ACETYLENE STORAGE SHED	PN-1,2	POWER FENCE SERVICE HOUSE

PLANT 2

AA	ASSEMBLY BUILDING	AG	BOILER HOUSE	AR	PAINT STORAGE
AB	BUS STATION	AH	DROP HAMMER BUILDING	AT	TANK SPRINKLER
AC	WASTE CONTROL BUILDING	AL	OIL HOUSE	AW	SHIPPING
AD	AIR REPLACEMENT	AN	PAINT HANGAR	AX	SEWAGE PUMP HOUSE
AE	STORAGE WAREHOUSE	AP	PERSONEL OFFICE BUILDING	PH	ACID CONTROL-BUILDING
AF	LUMBER STORAGE	AQ	INCINERATOR		

LEGEND AND ABBREVIATIONS

WATER MAIN
CITY GAS MAIN
SANITARY SEWER

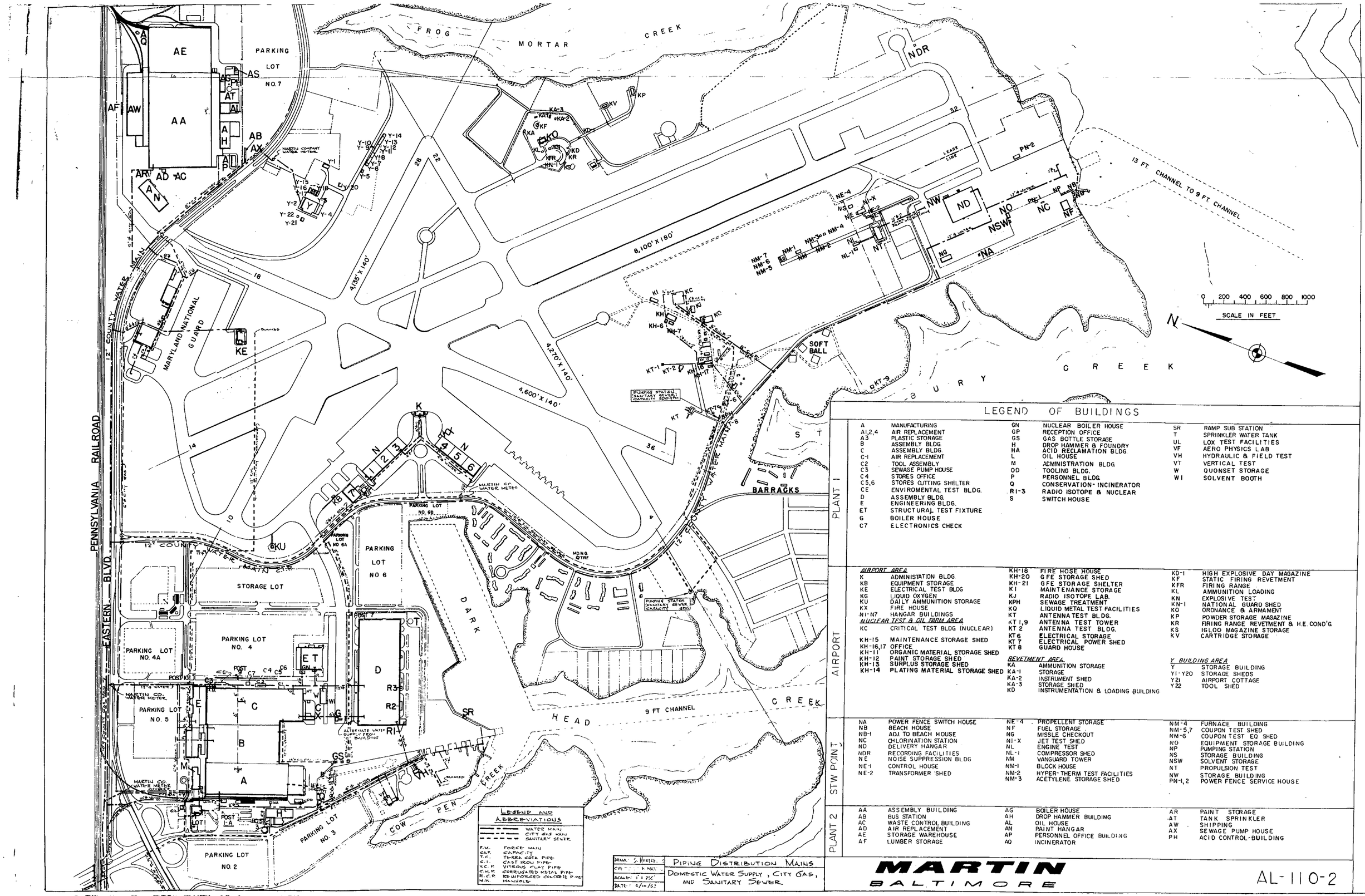
F.M.	FORCE MAIN
CAP.	CAPACITY
T.C.	TERRA COTA PIPE
C.I.	CAST IRON PIPE
V.C.P.	VITROUS CLAY PIPE
C.M.P.	CORRUGATED METAL PIPE
R.C.P.	REINFORCED CONCRETE PIPE
M.H.	MANHOLE

DRAWN: S. HARTZER
CHECKED: H. HALL
SCALE: 1" = 250'
DATE: 6/10/52

PIPING DISTRIBUTION MAINS
DOMESTIC WATER SUPPLY, CITY GAS, AND SANITARY SEWER

MARTIN
BALTIMORE

AL-110-2



LEGEND OF BUILDINGS

PLANT 1

A	MANUFACTURING	GN	NUCLEAR BOILER HOUSE	SR	RAMP SUB STATION
A1,2,4	AIR REPLACEMENT	GP	RECEPTION OFFICE	T	SPRINKLER WATER TANK
A3	PLASTIC STORAGE	GS	GAS BOTTLE STORAGE	UL	LOX TEST FACILITIES
B	ASSEMBLY BLDG.	H	DROP HAMMER & FOUNDRY	VF	AERO PHYSICS LAB
C	ASSEMBLY BLDG.	HA	ACID RECLAMATION BLDG.	VH	HYDRAULIC & FIELD TEST
C-1	AIR REPLACEMENT	L	OIL HOUSE	VT	VERTICAL TEST
C2	TOOL ASSEMBLY	M	ADMINISTRATION BLDG.	W	QUONSET STORAGE
C3	SEWAGE PUMP HOUSE	OD	TOOLING BLDG.	WI	SOLVENT BOOTH
C4	STORES OFFICE	P	PERSONNEL BLDG.		
C5,6	STORES CUTTING SHELTER	Q	CONSERVATION- INCINERATOR		
CE	ENVIROMENTAL TEST BLDG.	RI-3	RADIO ISOTOPE & NUCLEAR		
D	ASSEMBLY BLDG.	S	SWITCH HOUSE		
E	ENGINEERING BLDG.				
ET	STRUCTURAL TEST FIXTURE				
G	BOILER HOUSE				
C7	ELECTRONICS CHECK				

AIRPORT

AIRPORT AREA

K	ADMINISTATION BLDG	KH-18	FIRE HOSE HOUSE	KD-1	HIGH EXPLOSIVE DAY MAGAZINE
KB	EQUIPMENT STORAGE	KH-20	G.F.E STORAGE SHED	KF	STATIC FIRING REVETMENT
KE	ELECTRICAL TEST BLDG	KH-21	G.F.E STORAGE SHELTER	KFR	FIRING RANGE
KG	LIQUID OXYGEN	KI	MAINTENANCE STORAGE	KL	AMMUNITION LOADING
KU	DAILY AMMUNITION STORAGE	KJ	RADIO ISOTOPE LAB.	KN	EXPLOSIVE TEST
KX	FIRE HOUSE	KPH	SEWAGE TREATMENT	KN-1	NATIONAL GUARD SHED
N1-N7	HANGAR BUILDINGS	KQ	LIQUID METAL TEST FACILITIES	KO	ORDNANCE & ARMAMENT

NUCLEAR TEST & OIL FARM AREA

KC	CRITICAL TEST BLDG (NUCLEAR)	KT 1,9	ANTENNA TEST TOWER	KP	POWDER STORAGE MAGAZINE
KH-15	MAINTENANCE STORAGE SHED	KT 2	ANTENNA TEST BLDG.	KR	FIRING RANGE REVETMENT & H.E. COND'G.
KH-16,17	OFFICE	KT6	ELECTRICAL STORAGE	KS	IGLOO MAGAZINE STORAGE
KH-11	ORGANIC MATERIAL STORAGE SHED	KT 7	ELECTRICAL POWER SHED	KV	CARTRIDGE STORAGE
KH-12	PAINT STORAGE SHED	KT 8	GUARD HOUSE		
KH-13	SURPLUS STORAGE SHED				
KH-14	PLATING MATERIAL STORAGE SHED	*REVETMENT AREA*		*Y BUILDING AREA*	
		KA	AMMUNITION STORAGE	Y	STORAGE BUILDING
		KA-1	STORAGE	Y1-Y20	STORAGE SHEDS
		KA-2	INSTRUMENT SHED	Y21	AIRPORT COTTAGE
		KA-3	STORAGE SHED	Y22	TOOL SHED
		KD	INSTRUMENTATION & LOADING BUILDING		

STW POINT

NA	POWER FENCE SWITCH HOUSE	NE-4	PROPELLENT STORAGE	NM-4	FURNACE BUILDING
NB	BEACH HOUSE	NF	FUEL STORAGE	NM-5,7	COUPON TEST SHED
NB-1	ADJ. TO BEACH HOUSE	NG	MISSLE CHECKOUT	NM-6	COUPON TEST EQ SHED
NC	CHLORINATION STATION	NI-X	JET TEST SHED	NO	EQUIPMENT STORAGE BUILDING
ND	DELIVERY HANGAR	NL	ENGINE TEST	NP	PUMPING STATION
NDR	RECORDING FACILITIES	NL-1	COMPRESSOR SHED	NS	STORAGE BUILDING
NE	NOISE SUPPRESSION BLDG	NM	VANGUARD TOWER	NSW	SOLVENT STORAGE
NE-1	CONTROL HOUSE	NM-1	BLOCK HOUSE	NT	PROPULSION TEST
NE-2	TRANSFORMER SHED	NM-2	HYPER-THERM TEST FACILITIES	NW	STORAGE BUILDING
		NM-3	ACETYLENE STORAGE SHED	PN-1,2	POWER FENCE SERVICE HOUSE

PLANT 2

AA	ASSEMBLY BUILDING	AG	BOILER HOUSE	AR	PAINT STORAGE
AB	BUS STATION	AH	DROP HAMMER BUILDING	AT	TANK SPRINKLER
AC	WASTE CONTROL BUILDING	AL	OIL HOUSE	AW	SHIPPING
AD	AIR REPLACEMENT	AN	PAINT HANGAR	AX	SEWAGE PUMP HOUSE
AE	STORAGE WAREHOUSE	AP	PERSONEL OFFICE BUILDING	PH	ACID CONTROL-BUILDING
AF	LUMBER STORAGE	AQ	INCINERATOR		

LEGEND AND ABBREVIATIONS

WATER MAIN
CITY GAS MAIN
SANITARY SEWER

F.M. FORCE MAIN
CAP. CAPACITY
T.C. TERRA COTA PIPE
C.I. CAST IRON PIPE
V.C.P. VITROUS CLAY PIPE
C.M.P. CORRUGATED METAL PIPE
R.C.P. REINFORCED CONCRETE PIPE
M.H. MANHOLE

DRAWN: S. HARTER
CHK'D: H. HALL
SCALE: 1" = 250'
DATE: 6/10/62

PIPING DISTRIBUTION MAINS
DOMESTIC WATER SUPPLY, CITY GAS, AND SANITARY SEWER

MARTIN BALTIMORE

AL-110-2

KM (n/a)
MAD Test Area

KH-4 (n/a)
MAD Test

KH-3 (n/a)
Maintenance Storage Shelter

KI (037)
Maintenance Storage

KC-1 (n/a): Guard House

KT-1 (044)
Antenna Test Tower

KH-2 (n/a): Maintenance Storage Shed

KH-1 (n/a): Maintenance Storage Shelter

KC (036)
Critical Test Building

KH-5 (n/a): Maintenance Storage Shelter

KH-6 (056): Maintenance Storage Shed

KH-8 (n/a): Maintenance Storage Shelter

KH-9 (n/a): Maintenance Storage Shelter

KH (056): Field Service Storage

KT-2 (045)
Antenna Test Building

KH-7 (056): Maintenance Storage Shed

KJ (035)
Radio Isotope Lab

KH-14 (046)
Plating Material
Storage Shed

KH-12 (057)
Paint Storage Shed

KQ (034)
Liquid Metal Test Facility

KH-11 (038)
Organic Material
Storage Shed

KH-15 (058)
Maintenance Storage Shed

KT-10 (039)
Anechoic Chamber

KT-3 (n/a)
Electrical Storage

KH-13 (033)
Surplus Storage Shed

KT (047)
Antenna Test Building

KT-4 (n/a)
Electrical Storage

KH-17 (040)
Office

KH-20 (031)
GFE Storage Shelter

KH-16
(040)
Office

KH-18 (n/a)
Fire Hose House

KH-21 (032)
GFE Storage Shelter

KT-3 (059)
Antenna Test Tower

KT-5 (041)
Electrical Storage Shed

KH-7 (042)
Electrical Power Shed

KT-6 (n/a)
Electrical Storage Shed

Unidentified

KPH (n/a)
Sewage Treatment

KT-8 (043)
Guard House

36

BUILDINGS IDENTIFIED IN 1964
AERIAL PHOTOGRAPH AND FACILITY MAP
STRAWBERRY POINT

Legend

Historic Structures (from 1964 Facility Map and1964 Aerial Photo)

Dirt Road (from 1964 Aerial Photo)

"n/a" = Building number not available.

Lockheed Martin, Martin State Airport
Middle River, Maryland

0 75 150 Feet

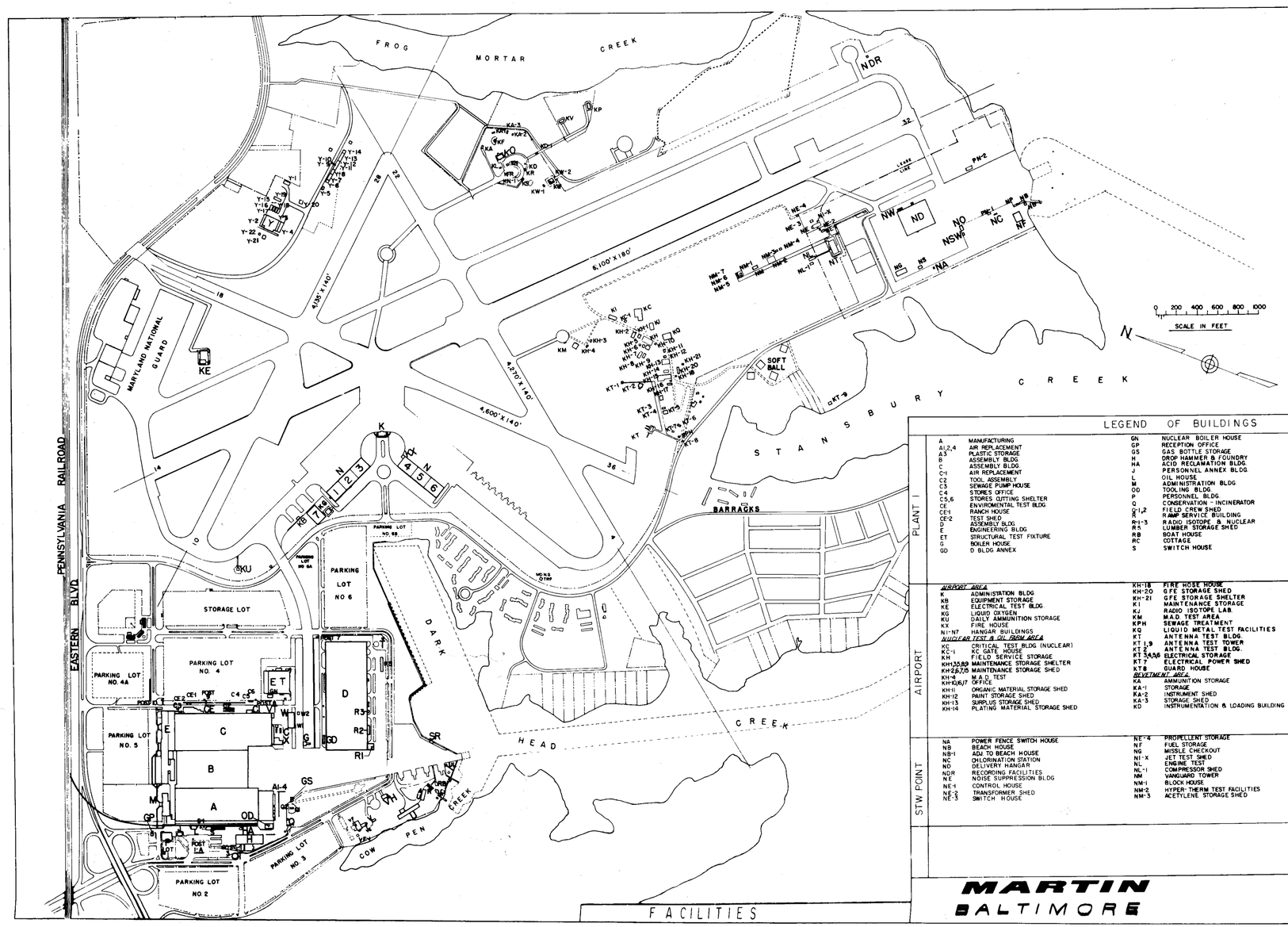
N

DATE MODIFIED: 06/06/14

CREATED BY: JEE

TETRA TECH

Map Document: (PGH P:\GIS\Lockheed_MSA\MapDocs\MXD\strawberry_point_1964_footprints.mxd)
06/06/14 -- JEE



LEGEND OF BUILDINGS

PLANT I

A	MANUFACTURING	GN	NUCLEAR BOILER HOUSE	SR	RAMP SUB STATION
A1,2,4	AIR REPLACEMENT	GP	RECEPTION OFFICE	T	SPRINKLER WATER TANK
A3	PLASTIC STORAGE	GS	GAS BOTTLE STORAGE	U	NUCLEAR OFFICE
B	ASSEMBLY BLDG	H	DROP HAMMER & FOUNDRY	UA	RAMP STORAGE BUILDING
C	ASSEMBLY BLDG	HA	ACID RECLAMATION BLDG.	UL	LOX TEST FACILITIES
C-1	AIR REPLACEMENT	J	PERSONNEL ANNEX BLDG.	V	VIBRATION TEST BUILDING
C2	TOOL ASSEMBLY	L	OIL HOUSE	VE	ENGINE TEST BUILDING
C3	SEWAGE PUMP HOUSE	M	ADMINISTRATION BLDG	VF	WIND TUNNEL TEST BUILDING
C4	STORES OFFICE	OD	TOOLING BLDG	VF-1	DECK STORAGE BUILDING
C5,6	STORES CUTTING SHELTER	P	PERSONNEL BLDG	VH	HYDRAULIC & FIELD TEST
CE	ENVIRONMENTAL TEST BLDG	Q	CONSERVATION - INCINERATOR	VT	VERTICAL TEST
CE-1	RANCH HOUSE	Q-1,2	FIELD CREW SHED	W	QUONSET STORAGE
CE-2	TEST SHED	R	RAMP SERVICE BUILDING	W-1	SOLVENT BOOTH
D	ASSEMBLY BLDG	R-1-3	RADIO ISOTOPE & NUCLEAR	W-2	MAINTENANCE SHED
E	ENGINEERING BLDG	RA	LUMBER STORAGE SHED		
ET	STRUCTURAL TEST FIXTURE	RB	BOAT HOUSE		
G	BOILER HOUSE	RC	COTTAGE		
GD	D BLDG ANNEX	S	SWITCH HOUSE		

AIRPORT

AIRPORT AREA

K	ADMINISTATION BLDG	KH-18	FIRE HOSE HOUSE	KD-1	HIGH EXPLOSIVE DAY MAGAZINE
KB	EQUIPMENT STORAGE	KH-20	GFE STORAGE SHED	KF	STATIC FIRING REVETMENT
KE	ELECTRICAL TEST BLDG	KH-21	GFE STORAGE SHELTER	KFH	FIRING RANGE
KG	LIQUID OXYGEN	KJ	RADIO ISOTOPE LAB.	KL	AMMUNITION LOADING
KU	DAILY AMMUNITION STORAGE	KM	M.A.D. TEST AREA	KN-1	NATIONAL GUARD SHED
KV	FIRE HOUSE	KPH	SEWAGE TREATMENT	KO	ORDNANCE & ARMAMENT
N1-N7	HANGAR BUILDINGS	KQ	LIQUID METAL TEST FACILITIES	KP	POWDER STORAGE MAGAZINE

AIRCRAFT TEST & OU TSIDE AREA

KC	CRITICAL TEST BLDG (NUCLEAR)	KT	ANTENNA TEST BLDG.	KR	FIRING RANGE REVETMENT & H.E. COND'G.
KC-1	KC GATE HOUSE	KT 1,9	ANTENNA TEST TOWER	KS	IGLOO MAGAZINE STORAGE
KH	FIELD SERVICE STORAGE	KT 2	ANTENNA TEST BLDG.	KV	CARTRIDGE STORAGE
KH1,3,5,8,9	MAINTENANCE STORAGE SHELTER	KT 3,4,5,6	ELECTRICAL STORAGE	KW	SPECIAL WEAPONS WS 107
KH-2,6,7,8	MAINTENANCE STORAGE SHED	KT 7	ELECTRICAL POWER SHED	KW-1	INSTRUMENTATION BUILDING
KH-4	M.A.D. TEST	KT 8	GUARD HOUSE	KW-2	POWER SHED
KH-10,6,7	OFFICE	*REVETMENT AREA*		*Y BUILDING AREA*	
KH-11	ORGANIC MATERIAL STORAGE SHED	KA	AMMUNITION STORAGE	Y	STORAGE BUILDING
KH-12	PAINT STORAGE SHED	KA-1	STORAGE	Y1-Y20	STORAGE SHEDS
KH-13	SURPLUS STORAGE SHED	KA-2	INSTRUMENT SHED	Y21	AIRPORT COTTAGE
KH-14	PLATING MATERIAL STORAGE SHED	KA-3	STORAGE SHED	Y22	TOOL SHED
		KO	INSTRUMENTATION & LOADING BUILDING		

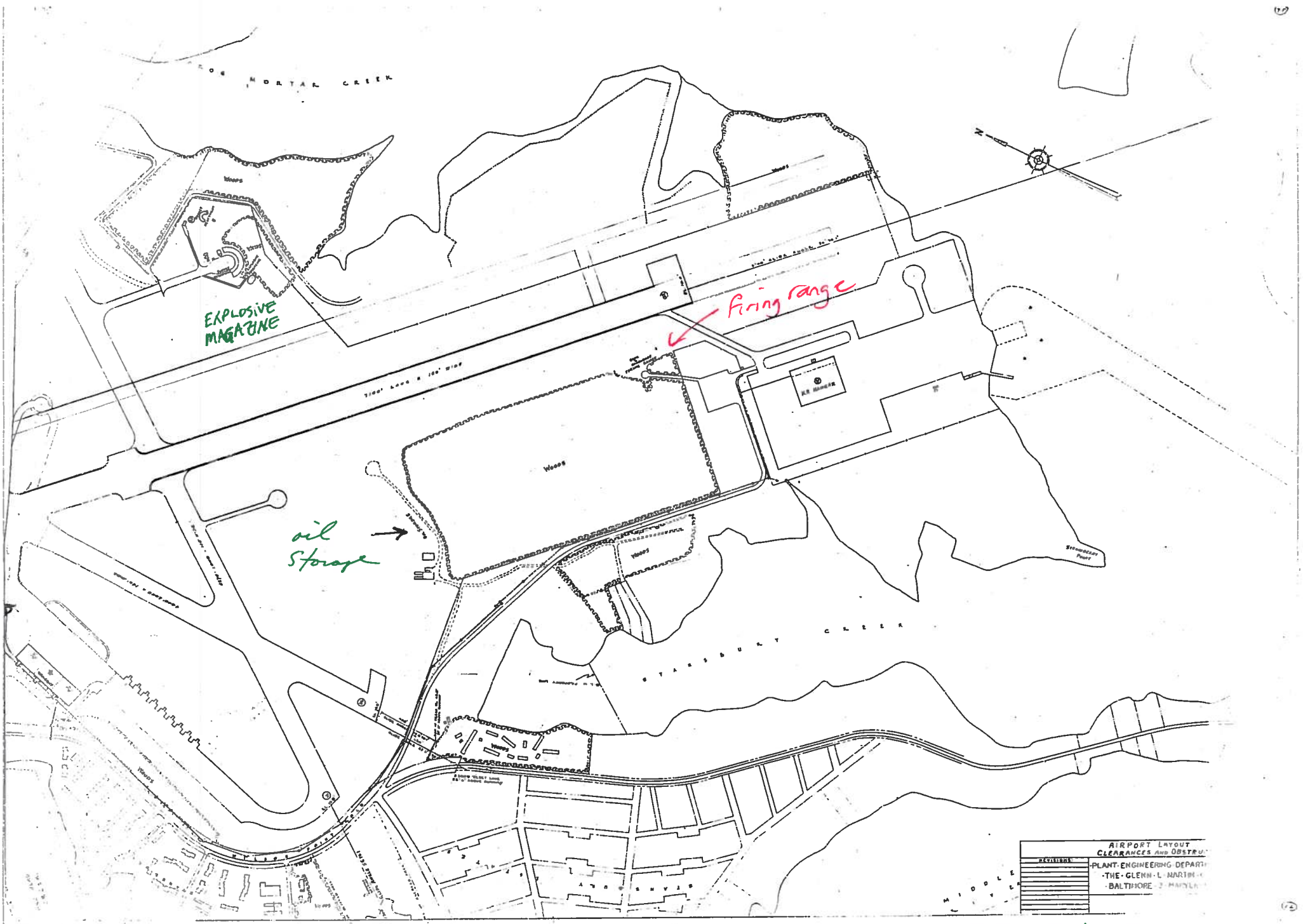
STW POINT

NA	POWER FENCE SWITCH HOUSE	NE-4	PROPELLENT STORAGE	NM-4	FURNANCE BUILDING
NB	BEACH HOUSE	NF	FUEL STORAGE	NM-5,7	COUPON TEST SHED
NB-1	ADJ. TO BEACH HOUSE	NG	MISSLE CHECKOUT	NM-6	COUPON TEST EQ SHED
NC	CHLORINATION STATION	NI-X	JET TEST SHED	NO	EQUIPMENT STORAGE BUILDING
ND	DELIVERY HANGAR	NL	ENGINE TEST	NP	PUMPING STATION
NDR	RECORDING FACILITIES	NL-1	COMPRESSOR SHED	NS	STORAGE BUILDING
NE	NOISE SUPPRESSION BLDG	NM	VANGUARD TOWER	NSW	SOLVENT STORAGE
NE-1	CONTROL HOUSE	NM-1	BLOCK HOUSE	NT	PROPULSION TEST
NE-2	TRANSFORMER SHED	NM-2	HYPER-THERM TEST FACILITIES	NW	STORAGE BUILDING
NE-3	SWITCH HOUSE	NM-3	ACETYLENE STORAGE SHED	PN-1,2	POWER FENCE SERVICE HOUSE

FACILITIES

MARTIN
BALTIMORE

(C-5)



NO DATE Airport Layout Clearances and Obstructions

APPENDIX B—FREEDOM OF INFORMATION ACT REQUESTS AND RESPONSES

FOIA/PA REQUEST
Case No.: 2014-0087
Date Rec'd: 12/17/13
Specialist: Burkhalter
Related Case:

TETRA TECH

December 13, 2013

U.S. Nuclear Regulatory Commission
Office of Information Services
Mail Stop T5-F11
Washington, DC 20555-0001
Attention: FOIA/Privacy Act Officer

Re: Request for Information under Freedom of Information Act (FOIA)/PIA
NRC records for Martin State Airport, 701 Wilson Point Road, Baltimore, Maryland 21220

Dear Sir or Madam:

This is a request under the Freedom of Information Act/Privacy Act (FOIA/PA) 5 U.S.C. 552). We are currently contracted by Lockheed Martin to review available records regarding prior operations and radioactive material handling at the above-referenced study area.

Because there have been many owners and license numbers associated with the facilities at Martin State Airport, we submit by Attachment Table 1 to be used to guide FOIA record searches for this request. The requested records are itemized by by facility name, address, license, owner, and keywords. We are interested in obtaining copies of records for all of the licenses referenced in Table 1 for the various addresses and tenants. (Note we are not requesting records specific to the separate Martin Company licensee address of 2323 Eastern Blvd. Baltimore, MD, but there may be some overlap in the records for the requested license numbers). The license information of we seek may contain one or more of the key words in Table 1. We are interested in reports, license amendments, applications, surveys, radiological health records, site inspections, and particularly maps or floor plans that may be contained in any of these records. Also of interest would be shipping and disposal records, if any, for the radiological wastes (e.g., filters, etc.) generated in any of these facilities or under any of the requested licenses.

If you have any questions concerning this request, please contact the undersigned at (301) 523-3018, or email me at Amy.McGivney@tetratech.com. We are willing to pay fees applicable to the processing of this request, however, please notify me in writing so the expense can be approved.

Sincerely,

Amy McGivney
Project Manager

Attachment: Table 1 – NRC FOIA request license and information matrix

Tetra Tech, Inc.
20251 Century Blvd., Suite 200, Germantown, MD 20874-7114
Tel 301 528 5552 Fax 301 528 3000 www.tetratech.com

TETRA TECH

Attachment 1: Table 1 (accompanies FOIA request by Tetra Tech dated December 13, 2013)

	Address	Tenant/Operator	License #s	Keywords (for each license)
1A	701 Wilson Point Road Baltimore County, MD 21220	Building KC; The Martin Company; Martin Company Nuclear Division; Martin Nuclear Materials Management; Martin Marietta; Ebasco Services; Site no. C03MD038500 (DERP-FUDS)	CX-7 SNM-907 (docket #070-00932) SNM-53 (docket # 070-00058) 19-01398-1 MND-2330 MND-1053 MND-1110, MND-1111, MND-1112 MND-E-1157 MND-2603 NMC-5	Martin Critical Facility; Critical Test Facility; critical facility; critical assembly; criticality; fuel assembly, fuel assemblies; liquid fluidized bed reactor; LFBR; test cells; fuel fabrication; water dump tank; holding tank; drain; sewer; Engineering Research and Development Laboratory, ERDL; fuel elements; MH-1A fuel elements; Special nuclear material vault; storage vault; Pathfinder fuel; Dosimetry records; Dosimeter logs; Detector records; Film badge records; Gamma Radiography Data Sheet; liquid metal; decontamination; survey outside building; violation; noncompliance; floor plan
1B	701 Wilson Point Road Middle River, MD 21220	Building KC; others as listed above	Same as above	Same as above
1C	Strawberry Point Road Baltimore County, MD 21220	Building KC; others as listed above	Same as above	Same as above
1D	Strawberry Point Road Middle River, MD 21220	Building KC; others as listed above	Same as above	Same as above

(Attachment 1: Table 1, continued)

	Address	Tenant/Operator	License #s	Keywords (for each license)
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2B	701 Wilson Point Road Middle River, MD 21220	Building KJ; others as listed above	Same as above	Same as above
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2D	Strawberry Point Road Middle River, MD 21220	Building KJ; others as listed above	Same as above	Same as above

From:	Burkhalter, Cornelia
To:	McGivney, Amy
Cc:	Burkhalter, Cornelia; FOIA Resource
Subject:	FOIA 2014-0087 FEE ESTIMATE
Date:	Tuesday, December 31, 2013 11:55:03 AM

Dear Ms. McGivney.

We have received the cost estimate for the search and review time of your FOIA case referenced above which was dated December 17, 2013. Region 1 has indicated that a total of 15 hours of search time, 44 hours of review time will be necessary to complete your request, which is expected to result in approximately 3000 pages.

Additionally, FSME has indicated that a total of 1 professional hour of search time, 30 minutes of clerical search time, and 1 hour of review time will be necessary to complete your request, which is expected to result in approximately 20 pages of records.

Because you were determined to be a "Commercial" requester, you will be responsible for all search, review, and duplication fees. Duplication costs may be reduced by requesting records electronically.

As such, your fee costs are as follows: 16 hours of professional search @ $56.36/hour plus 30 minutes of clerical search @ $25.16/hour = $914.34, 45 hours of professional review @ $56.36/hour = $2,536.20 and 3020 pages of duplication @ .20/page = $604.00. As such, the total fee estimate for processing your request is $4,054.54.

Pursuant to 10 C.F.R. 9.40(e), we will not continue processing your request until we receive a response from you of your willingness to pay the above-referenced fee. Additionally, because the estimated fee exceeds $250, the NRC will not process your request without the advance payment of the estimated fee.

If we have not received a response from you within 10 business days of this email, we will administratively close your request. You also may narrow the scope of your request to reduce both the estimated search and review fees associated with processing your request.

Cornelia Burkhalter
FOIA, Privacy, and Information Collections Branch
Customer Service Division
Office of Information Services
301-415-6600
"The part can never be well if the whole is not well." Plato

NRC FORM 509
(06-2013)

U. S. NUCLEAR REGULATORY COMMISSION
APPROVED BY OMB: 3150-0043
EXPIRES: (12/31/2014)

REQUEST NUMBER
FOIA/PA - 2014 - 0087

DATE

STATEMENT OF ESTIMATED FEES FOR FREEDOM OF INFORMATION ACT (FOIA) REQUEST

REQUESTER	NRC CONTACT	TELEPHONE
Amy McGivney	Cornelia Burkhalter	(301) 415-6600

Pursuant to the NRC's regulations, 10 CFR 9.40, 52 FR 49350, the NRC notifies a requester when estimated applicable fees exceed $25.00 or a limit stated in an FOIA request. The estimated fees for processing your FOIA request are noted below. If you wish to re-scope your request to reduce fees, you may telephone the NRC contact identified above to discuss re-scoping the request. Otherwise, please provide a written response on required action noted below. If the NRC does not receive notice from you on re-scoping your request or the required written response within 10 working days from the date of this notice, the NRC will presume that you have no further interest in NRC processing your request and will close the file on your request.

ESTIMATED FEES

SEARCH	$ 422.70	7.5 hours @ $56.36
REVIEW	$ 309.98	5.5 hours @ $56.36
DUPLICATION *	$ 206.60	1033 pages @ .20 per page
TOTAL	$ 939.28	

* Duplication estimate is based on the assumption that you want copies of disclosed records mailed directly to you. Please specify paper copy or a CD-Rom. If you choose a CD-Rom, the cost will be the cost of the CD-Rom to the NRC. If you prefer, the NRC will make disclosed records available, if appropriate, at the NRC Electronic Reading Room accessible from NRC's web site at http://www.nrc.gov/reading-rm.html. Please note your preference in the Response section below.

☑ Please note the comments provided on the attached NRC Form 509A.

☐ Your request for a waiver or reduction of fees does not provide sufficient information under 10 CFR 9.41 for the NRC to make a determination to waive or reduce fees. If you want the NRC to consider this matter further, please submit a written request pursuant to 10 CFR 9.41 within 10 working days from the receipt of this notice.

REQUIRED ACTION

☑ Please agree by signing below to pay fees as high as estimated by signing and dating the Response section of this form and returning the form to the NRC contact identified above at the U.S. Nuclear Regulatory Commission, Washington, DC, 20555-0001, or by fax to (301) 415-5130, within 10 working days from the date of this notice.

☐ Please provide an advance payment of the estimated fees by one of the methods described on the attached NRC Form 509A within 10 working days from the date of this notice. Any overpayment of fees will be refunded to you.

SIGNATURE - FOIA/PA SPECIALIST	SIGNATURE DATE
Cornelia Burkhalter	*01/17/2014*

RESPONSE

As required above, I agree to pay fees as high as estimated. I agree to pay estimated search fees even if the NRC conducts an unsuccessful search for responsive records or determines records located are exempt from disclosure. I prefer that copies of disclosed records be provided as stated below.

☐ Mailed directly to me. ☐ Placed in the NRC Electronic Reading Room.

☐ Paper copy ☐ CD-Rom

SIGNATURE - FOIA/PA REQUESTER	DATE

NRC FORM 509 (06-2013)

Estimated burden per response to comply with this mandatory collection request: 6 minutes. This form is used to notify a requester of the amount of the estimated fees and to obtain the requester's agreement to pay the fees. Send comments regarding burden estimate to the FOIA, Privacy, and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0043), Office of Management and Budget, Washington, DC20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

NRC FORM 629 (11-2013) U.S. NUCLEAR REGULATORY COMMISSION

AUTHORIZATION FOR PAYMENT BY CREDIT CARD

APPROVED BY OMB: NO. 3150-0190 EXPIRES: 06/30/2014

Estimated burden per response to comply with this voluntary collection request: 5 minutes. Requested information will allow respondents to transfer funds electronically. Send comments regarding burden estimate to the FOIA, Privacy, and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0190), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

The NRC is currently accepting credit card payment of fees and other debts. If you wish to pay by credit card, complete the authorization below. If you have any questions, contact NRC's collection service provider, DEVA and Associates at (301) 415-3878.

NAME OF CARDHOLDER		ACCOUNT NUMBER	CARD EXPIRATION DATE
ADDRESS		CARDS ACCEPTED (Check card you are using) ☐ VISA ☐ MASTERCARD ☐ NOVUS (DISCOVER) ☐ AMERICAN EXPRESS	
TELEPHONE	LICENSE NUMBER	SECURITY CODE - 3 DIGITS	
INVOICE NUMBER OR DESCRIPTION	TOTAL AMOUNT OF TRANSACTION	SIGNATURE OF CARDHOLDER	

If you are paying an application or registration fee (including new licenses, amendments, etc.), mail the completed form with your application to the appropriate regional office. For all other payments, send completed form to:

U.S. Bank
U.S. Nuclear Regulatory Commission
Accounts Receivable Team
P. O. Box 979051
St. Louis, MO 63197-9000

PRIVACY ACT STATEMENT
NRC FORM 629
AUTHORIZATION FOR PAYMENT BY CREDIT CARD

Pursuant to 5 U.S.C. 552a(e)(3), enacted into law by Section 3 of the Privacy Act of 1974 (Public Law 93-579), the following statement is furnished to individuals who supply information to the U.S. Nuclear Regulatory Commission (NRC) on NRC Form 629. This information is maintained as part of a system of records designated as NRC-32 and described at 77 *Federal Register* 67225 (November 8, 2012), or the most recent *Federal Register* publication of the NRC's "Republication of Systems of Records Notices" that is available in the NRC's Agencywide Documents Access and Management System.

1. **AUTHORITY:** 5 U.S.C. 552a; 5 U.S.C. 5514; 15 U.S.C. 1681; 26 U.S.C. 6103; 31 U.S.C. Chapter 37; 31 U.S.C. 6501-6508; 42 U.S.C. 2201; 42 U.S.C. 5841; 31 CFR 900-904; 10 CFR Parts 15, 16, 170, 171; Executive Order (E.O.) 9397, as amended by E.O. 13478; and E.O. 12731.

2. **PRINCIPAL PURPOSE(S):** To collect credit card account information and provide authorization for its use to collect a payment or debt.

3. **ROUTINE USE(S):** Information contained in this system may be disclosed to debt collection contractors or to other Federal agencies for the purpose of collecting and reporting on delinquent debts and to banks enrolled in the Automated Clearinghouse (ACH) Network to collect a payment or debt when the individual has given his or her authorization for this purpose. Information may be disclosed in accordance with any of the Routine Uses listed in the Prefatory Statement of General Routine Uses, including to an appropriate Federal, State, local or Foreign agency in the event the information indicates a violation or potential violation of law; in the course of an administrative or judicial proceeding; to an appropriate Federal, State, local and Foreign agency to the extent relevant and necessary for an NRC decision about you or to the extent relevant and necessary for that agency's decision about you; in the course of discovery under a protective order issued by a court of competent jurisdiction and in presenting evidence; to a Congressional office to respond to their inquiry made at your request; to NRC-paid experts, consultants, and others under contract with the NRC, on a need-to-know basis; and to appropriate persons and entities for purposes of response and remedial efforts in the event of a suspected or confirmed breach of data from this system of records.

4. **WHETHER DISCLOSURE IS MANDATORY OR VOLUNTARY AND EFFECT ON INDIVIDUAL OF NOT PROVIDING INFORMATION:** Providing this information is voluntary. However, not providing the requested information will not provide the NRC the information and authorization required to use your credit card to collect a payment or debt.

5. **SYSTEM MANAGER(S) AND ADDRESS:** Controller, Division of the Controller, Office of the Chief Financial Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 17, 2013

FOIA/PA-2014-00087

Amy McGivney
Tetra Tech Inc.
20251 Century Blvd., Suite 200
Germantown, MD 20874-7114

Dear Requester:

We received your Freedom of Information Act/Privacy Act (FOIA/PA) request on December 17, 2013.

Your request has been assigned the following reference number that you should use in any future communications with us about your request: **FOIA/PA-2014-00087**

To ensure the most equitable treatment possible of all requesters, the NRC processes requests on a first-in, first-out basis, using a multiple track system based upon the estimated time it will take to process the request. Based on your description of the records you are seeking, we estimate completion of your request will take more than 20 working days. We will advise you of any change in the estimated time to complete your request.

Due to the unexpected events in Japan in March 2011, the NRC is processing a larger than normal volume of FOIA requests including some that have qualified for expedited processing and have therefore been placed at the front of the queue. We are doing our best to process all requests in a timely manner but our response times are being affected. We appreciate your understanding.

For purposes of assessing fees in accordance with our regulations (10 CFR 9.33), we have placed your request in the following category: **Commercial.** If applicable, you will be charged appropriate fees for: **Search, Review, & Duplication of Records.**

A sheet has been enclosed that explains in detail the fee charges that may be applicable. **Please do not submit any payment unless we notify you to do so.**

The following person is the FOIA/PA Specialist who has been assigned responsibility for your request: **Cornelia Burkhalter** at **301-415-6600.**

If you have questions on any matters concerning your FOIA/PA request please feel free to contact the assigned FOIA/PA Specialist or me at (301) 415-7169.

Sincerely,

/S/

Donna L. Sealing
FOIA/Privacy Act Officer
Office of Information Services

Enclosures:
Incoming Request
Explanation of Fees

EXPLANATION OF FEES

Requester Fee Categories

Commercial: Fees are charged for document search, duplication, and review, when records are requested for commercial purposes. Fees (above the minimum fee charge) cannot be waived for this category of requester.

Educational, Non-Commercial Scientific, News Media and Privacy Act: Fees may be charged only for document duplication when records are not sought for commercial use and the request is made by an Educational or Non-Commercial Scientific Institution, whose purpose is scholarly or scientific research; or a Representative of the News Media; or a person requesting his/her own records that are in a Privacy Act system of records. No fee is charged for the first one hundred pages of duplication for this category of requester.

Non-Excepted: For any request not described above (Non-Excepted), fees may be charged for document search and duplication. No fee is charged for the first two hours of search time or for the first one hundred pages of duplication for this category of requester.

Fee Schedules

Fee schedules provide only for the recovery of the direct costs of search, duplication, or review. Review costs include only the costs for initial examination of a document to determine whether it must be disclosed and to determine whether to withhold portions that are exempt from disclosure. The fee schedule is as follows:

Search & Review Conducted By	**Rate**	
! SES/COMMISSIONER	$90.53/hour	(ES-maximum)
! PROFESSIONAL	$56.36/hour	(GG-13, Step 6)
! CLERICAL	$25.16/hour	(GG-7, Step 6)
Duplication Charges	$.20 per page	

Fees for non-standard search or duplication will be charged at the actual cost (e.g. providing copying of audio tapes or conducting computer searches).

Minimum Fee: No fee will be charged unless the fee is equal to or greater than $25.00.

When to Pay Fees

If we estimate that fees will not exceed $25.00 or you have stated in your request a higher amount that you are willing to pay, we assume your willingness to pay up to $25 or the amount stipulated and you will be billed after we have completed your request.

If we estimate that fees will exceed $25.00 or any amount that has been stated by you in your request, we will not proceed with your request until we have notified you and obtained your agreement to pay the estimated fees.

If we estimate fees will exceed $250, you will be required to pay the estimated fees in advance before we proceed further with your request. If, while processing your request, we find that the actual fees exceed the estimated fee, we will obtain your consent to pay the additional fees before continuing to process your request. If the actual fees to process your request are less than any advance payment you have made, you will be refunded the overpayment amount.

Fee Waivers

A waiver or reduction of fees may be granted for furnishing documents if a requester, by fully addressing the eight factors in 10 CFR 9.41, clearly demonstrates that disclosure of the information is in the public interest because it is likely to contribute significantly to public understanding of the operations or activities of the government and is not primarily in the commercial interest of the requester.

From:	Burkhalter, Cornelia
To:	"Amy.McGivney@tetratech.com"
Cc:	FOIA Resource; Burkhalter, Cornelia
Subject:	FW: FEE ESTIMATE FOR FOIA 2014-0087
Date:	Friday, January 17, 2014 9:35:16 AM
Attachments:	2014-0087.pdf FOIA 2014-0087.pdf

RESEND

From: Burkhalter, Cornelia
Sent: Friday, January 17, 2014 9:30 AM
To: 'Amy.McGivney@tetratech.com'
Cc: FOIA Resource; Burkhalter, Cornelia
Subject: FEE ESTIMATE FOR FOIA 2014-0087

Dear Ms. McGivney.

Please review the attached fee estimate carefully. A copy of your request is also attached. The fee amount is based on 7.5 hours of professional search time, 5.5 hours of professional review time and 1033 pages of duplication.

If you agree to pay the fees, please sign the form as indicated and return via fax or e-mail within 10 business days or by January 31, 2013. If a response is not received within 10 business days from the date of this notice, your request will be closed.

If you have any questions, please contact me via telephone or e-mail.

Thank you.

FOIA/PA REQUEST
Case No.: 2014-0087
Date Rec'd: 12/17/13
Specialist: Burkhalter
Related Case:

TETRA TECH

December 13, 2013

U.S. Nuclear Regulatory Commission
Office of Information Services
Mail Stop T5-F11
Washington, DC 20555-0001
Attention: FOIA/Privacy Act Officer

Re: Request for Information under Freedom of Information Act (FOIA)/PIA
NRC records for Martin State Airport, 701 Wilson Point Road, Baltimore, Maryland 21220

Dear Sir or Madam:

This is a request under the Freedom of Information Act/Privacy Act (FOIA/PA) 5 U.S.C. 552). We are currently contracted by Lockheed Martin to review available records regarding prior operations and radioactive material handling at the above-referenced study area.

Because there have been many owners and license numbers associated with the facilities at Martin State Airport, we submit by Attachment Table 1 to be used to guide FOIA record searches for this request. The requested records are itemized by by facility name, address, license, owner, and keywords. We are interested in obtaining copies of records for all of the licenses referenced in Table 1 for the various addresses and tenants. (Note we are not requesting records specific to the separate Martin Company licensee address of 2323 Eastern Blvd. Baltimore, MD, but there may be some overlap in the records for the requested license numbers). The license information of we seek may contain one or more of the key words in Table 1. We are interested in reports, license amendments, applications, surveys, radiological health records, site inspections, and particularly maps or floor plans that may be contained in any of these records. Also of interest would be shipping and disposal records, if any, for the radiological wastes (e.g., filters, etc.) generated in any of these facilities or under any of the requested licenses.

If you have any questions concerning this request, please contact the undersigned at (301) 523-3018, or email me at Amy.McGivney@tetratech.com. We are willing to pay fees applicable to the processing of this request, however, please notify me in writing so the expense can be approved.

Sincerely,

Amy McGivney
Project Manager

Attachment: Table 1 – NRC FOIA request license and information matrix

Tetra Tech, Inc.
20251 Century Blvd., Suite 200, Germantown, MD 20874-7114
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TETRA TECH

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State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: _____ Date 85/02/13

Facility Name: Glenn L. Martin State Airport, Box 1, 701 Wilson Point Road, Balto Md 21220

Remarks: John Beazley, Barry Chambers, Valer. Doyle, and Mike Griffen met with J. Leonard Wood and Jake West at the Martin State Airport office on Feb 13 at 1300hrs J. Leonard Wood is the Martin State Airport manager. John Beazley, Barry Chambers, Valeri Doyle, and Mike Griffen accompanied Leonard Wood on a tour of the Facility. [redacted] Tech Sgt. Charles Smith of the Air Guard accompanied us when touring the facility east of the air strip.

From the beach along Frog Motar Creek, concrete rubble, corrugated steel pipe, and a couple of drums were observed in the side of the Fill. Indiscriminate dumping was observed at this site in the past as noted in the inspection report of Sept 16, 1981 by James Curtis from this office.

West of the airstrip several areas of dumping were observed. A deer carcass, cylinders of refrigerant, assorted junk, and rubble were observed. Thirty nine drums were observed by the KJ building; some, but not all, of the drums were empty. One empty drum, denatured ethanol, had a 'Tilly Chemical' label. Drums were observed in the fill area near the KJ building, again demonstrating the indiscriminate waste handling practices at this facility. Photographs were taken by Barry Chambers during this survey.

Mr Griffen discussed the ground water contamination with Mr. Wood and informed Mr. Wood that the airport will have to contract out for surveying and analysis regarding the ground water contamination. Since the Maryland Environmental Service handles the sampling required in the airport's NPDES permit and operates the waste treatment plant at the airport, the recommendation that MES be used as consultant was made.

Mr. Chambers recommends that this site be put on a remedial clean up list such as the State Superfund list and/or the Federal Superfund list.

Observer: _____ Person Interviewed: _____

DHMH 3879

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

TO JK From MQ Date 2.7.85

Subject GLENN L. MARTIN STATE AIRPORT

PHONE CONVERSATION WITH TECH. SGT. C. SMITH, WARFIELD AIR NATIONAL GUARD.

SGT. SMITH HAS LOCATED DESIGN PLANS, CIRCA 1958, FOR A "NEW" ACID PIT (UNLINED, OF COURSE) TO REPLACE ANOTHER ONE THAT WAS "REAL BAD". THE "REAL BAD" ONE WAS CLOSER TO FROG MORTAR CREEK THAN THE 4 ON OUR PLAN COPY AND WAS BULLDOZED IN BY THE AIR NATIONAL GUARD WHEN THEY CONSTRUCTED THE NEW ONE.

INFORMATIONALLY, THE MUNITIONS TESTING PIT WAS ALSO CONSTRUCTED BY THE AIR NATIONAL GUARD (CIRCA 1958) AS WAS THE TAXIWAY.

ONE FINAL TIDBIT: ALL LEFTOVER BOMBS WERE DEACTIVATED (REALLY?) AND DUMPED INTO A HOLE AT THE BOTTOM OF FROG MORTAR CREEK.

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Paul T

Copies { JOHN KOONTZ

TO ~~Mr. Frank Henderson~~ via ~~Mr. John Koonts~~ From ~~Mr. Paul Thompson~~ PT Date 2/7/85

Subject Glenn L. Martin State Airport

Frank we need your section's/assistance in establishing and implementing a sampling plan for:

1. Groundwater Sampling (Two contaminated wells on site).
2. Four (maybe 5) unlined pits - referred to as "Acid Pits" by plans and Maryland Air National Guard Employees.
3. Two known areas of landfill activity (Dredge Spoils, etc.)
4. One area of munitions dumping into Frog Mortar Creek.

We have the permission/cooperation of both the State Aviation Administration (Leonard Wood - 391-9500) as property owner, and the Maryland Air National Guard (Tech. Sgt. Charles Smith - 687-6270 ext. 428) as tenant.

PT/jj

Have OWNERS of site do work per our NORMAL PROCEDURES. Get them UNDER A CONSENT ORDER/AGREEMENT re DUNDALK MARINE TERMINAL.

MIKE,

BACK TO YOU.

P

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies { Mr. Dave Healy
Mr. John Beazley

Thru: Mr. John Koontz

TO Mr. Frank Henderson From Mr. Paul Thompson Date 2/26/85

Subject Glenn L. Martin State Airport, Baltimore County

Staff investigation of this site indicates improper waste disposal practice.

These include:

1. acid and waste oil disposal pits (at least 4)
2. landfilling (indiscriminate)
3. explosives disposal (deactivated bombs, we're told!) into dredge holes in Frog Mortar Creek.

Private labs show trace organic (L 1-ppb range) contamination of two potable wells on site, yet sampling does not substantiate this.

Therefore, this site should be added to your next published list of sites for future assessment and/or investigation.

by who

From:	Colleen D. Williams -MDE-
To:	McGivney, Amy
Cc:	Degen, Amanda
Subject:	PIA 2014-56353: Martin Airport - Radiological
Date:	Friday, January 10, 2014 7:40:22 AM

Dear Ms McGivney,

The Maryland Department of the Environment (MDE) received your recent request for information under the Public Information Act (PIA). Your request has been assigned the tracking number listed above. Please use this number in all communications referring to this request.

After the search for information is complete, I will notify you as to whether or not pertinent records exist. We address PIA requests in the order in which we receive them. There may be fees associated with the search or production of documents. If files exist, I will notify you of an estimated cost and you will be required to provide payment authorization before documents will be produced or sent to you.

You may find it helpful to review the following information regarding the PIA process:

http://www.mde.state.md.us/programs/Marylander/PublicInfoAct/Pages/index.aspx

Please contact me with any questions or concerns.

Colleen Donnelly Williams
Colleen.Williams@Maryland.gov
MDE ARMA Compliance & PIA Liaison
1800 Washington Blvd., Suite 715
Baltimore, MD 21230-1720
(w) 410-537-4127

---------- Forwarded message ----------
From: **Amanda Degen -MDE-** <amanda.degen@maryland.gov>
Date: Wed, Jan 8, 2014 at 4:12 PM
Subject: Fwd: PIA Request - Radiological Health Division
To: "Colleen D. Williams -MDE-" <colleen.williams@maryland.gov>

Your assistance with the enclosed request is greatly appreciated.

Thank you,

Amanda R. Degen
Public Information Act Coordinator
Office of Communications

Maryland Department of the Environment
410-537-4120
amanda.degen@maryland.gov

Please consider the environment before printing this e-mail.

---------- Forwarded message ----------
From: **McGivney, Amy** <Amy.McGivney@tetratech.com>
Date: Wed, Jan 8, 2014 at 4:05 PM
Subject: PIA Request - Radiological Health Division
To: "MDE.PIA@maryland.gov" <MDE.PIA@maryland.gov>

Dear Sir or Madam,

This email is to request a search and retrieval of specific MDE Radiological Health archived records under the Public Information Act. Tetra Tech is conducting environmental due diligence research for a property in Middle River, Maryland on behalf of a former property owner. The property was located on a former dirt road at the current Martin State Airport, 701 Wilson Point Road, Middle River, Baltimore County, Maryland.

The property of interest may be identified by the above address (Martin State Airport) in MDE records, or listed by name under former tenants of two nuclear fuel research facilities which previously operated at said location between 1957 and 1966, approximately. Former tenant names include Martin Company, Ebasco, Raytheon, Radioisotopes, Inc, and Isotopes, Inc. The facilities were known as the Martin Critical Facility, or Critical Test Facility, and the Radioisotope Lab. After termination of Nuclear Regulatory Commission (NRC) Licenses (est. 1965-1970), these buildings were abandoned for several years before being demolished around 2000 by the State of Maryland (Maryland Aviation Administration). In 1989, while the buildings were still present, MDE was involved in a joint inspection of the facilities with NRC to help determine suitability for unrestricted use. Tetra Tech reviewed a State of Maryland report (report MD-304, "A Preliminary Assessment of Martin State Airport, Middle River, Maryland") prepared by the Maryland Hazardous and Solid Waste Management Administration (MDE/HSWMA) and dated March 1989, which contains reference to two memoranda: (1) Memo dated March 30, 1989 from MDE/HSWMA to the Hazardous Waste Enforcement Division, concerning materials in storage in the abandoned, above-referenced buildings; and (2) Memo dated March 31, 1989 from MDE/HSWMA to the MDE Toxic, Environmental Science and Health, Center for Radiological Health concerning lack of records of past generation and disposal of hazardous and radioactive waste from these facilities. By this PIA request, we are making specific request for these memoranda, any related correspondence or files, and information on the final disposition of these files. We also request any records you may have concerning the demolition of these facilities around 2000.

We sincerely appreciate your assistance with this request. I can be contacted at the number below for more information or with any questions.

Sincerely,
Amy McGivney

Amy McGivney | Project Manager | Engineer III

Direct: 301.528.3018 | Main: 301.528.5552 | Fax: 301.528.3000
amy.mcgivney@tetratech.com<mailto:amy.mcgivney@tetratech.com>

Tetra Tech, Inc. | Environmental Services
20251 Century Blvd. Suite 200 | Germantown, Maryland 20874 |
www.tetratech.com<http://www.tetratech.com>

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From: McGivney, Amy
To: "maria.stephens@maryland.gov"
Subject: PIA Request - Hazardous waste records from 1989
Date: Thursday, January 16, 2014 5:28:00 PM

Dear Ms. Stephens,

This email is to request a search and retrieval of specific MDE Hazardous and Solid Waste division archived records under the Public Information Act. The subject request was also submitted to MDE's Radiological Health division and Colleen Williams referred my request to you. Tetra Tech is conducting environmental due diligence research for a property in Middle River, Maryland on behalf of a former property owner. The property was located on a former dirt road at the current Martin State Airport, 701 Wilson Point Road, Middle River, Baltimore County, Maryland.

The property of interest may be identified by the above address (Martin State Airport) in MDE records, or listed by name under former tenants of two nuclear fuel research facilities which previously operated at said location between 1957 and 1966, approximately. Former tenant names include Martin Company, Ebasco, Raytheon, Radioisotopes, Inc, and Isotopes, Inc. The facilities were known as the Martin Critical Facility, or Critical Test Facility, and the Radioisotope Lab. After termination of Nuclear Regulatory Commission (NRC) Licenses (est. 1965-1970), these buildings were abandoned for several years before being demolished around 2000 by the State of Maryland (Maryland Aviation Administration). In 1989, while the buildings were still present, MDE was involved in a joint inspection of the facilities with NRC to help determine suitability for unrestricted use. Tetra Tech reviewed a State of Maryland report (report MD-304, "A Preliminary Assessment of Martin State Airport, Middle River, Maryland") prepared by the Maryland Hazardous and Solid Waste Management Administration (MDE/HSWMA) and dated March 1989, which contains reference to two memoranda: (1) Memo dated March 30, 1989 from MDE/HSWMA to the Hazardous Waste Enforcement Division, concerning materials in storage in the abandoned, above-referenced buildings; and (2) Memo dated March 31, 1989 from MDE/HSWMA to the MDE Toxic, Environmental Science and Health, Center for Radiological Health concerning lack of records of past generation and disposal of hazardous and radioactive waste from these facilities. By this PIA request, we are making specific request for these memoranda, any related correspondence or files, and information on the final disposition of these files. We also request any records you may have concerning the demolition of these facilities around 2000.

We sincerely appreciate your assistance with this request. I can be contacted at the number below for more information or with any questions.

Sincerely,
Amy McGivney

Amy McGivney | **Project Manager** | **Engineer III**
Direct: 301.528.3018 | Main: 301.528.5552 | Fax: 301.528.3000
amy.mcgivney@tetratech.com

Tetra Tech, Inc. | Environmental Services
20251 Century Blvd. Suite 200 | Germantown, Maryland 20874 | www.tetratech.com

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From: McGivney, Amy
To: MDE.PIA@maryland.gov
Subject: PIA Request - Radiological Health Division
Date: Wednesday, January 08, 2014 4:05:58 PM

Dear Sir or Madam,

This email is to request a search and retrieval of specific MDE Radiological Health archived records under the Public Information Act. Tetra Tech is conducting environmental due diligence research for a property in Middle River, Maryland on behalf of a former property owner. The property was located on a former dirt road at the current Martin State Airport, 701 Wilson Point Road, Middle River, Baltimore County, Maryland.

The property of interest may be identified by the above address (Martin State Airport) in MDE records, or listed by name under former tenants of two nuclear fuel research facilities which previously operated at said location between 1957 and 1966, approximately. Former tenant names include Martin Company, Ebasco, Raytheon, Radioisotopes, Inc, and Isotopes, Inc. The facilities were known as the Martin Critical Facility, or Critical Test Facility, and the Radioisotope Lab. After termination of Nuclear Regulatory Commission (NRC) Licenses (est. 1965-1970), these buildings were abandoned for several years before being demolished around 2000 by the State of Maryland (Maryland Aviation Administration). In 1989, while the buildings were still present, MDE was involved in a joint inspection of the facilities with NRC to help determine suitability for unrestricted use. Tetra Tech reviewed a State of Maryland report (report MD-304, "A Preliminary Assessment of Martin State Airport, Middle River, Maryland") prepared by the Maryland Hazardous and Solid Waste Management Administration (MDE/HSWMA) and dated March 1989, which contains reference to two memoranda: (1) Memo dated March 30, 1989 from MDE/HSWMA to the Hazardous Waste Enforcement Division, concerning materials in storage in the abandoned, above-referenced buildings; and (2) Memo dated March 31, 1989 from MDE/HSWMA to the MDE Toxic, Environmental Science and Health, Center for Radiological Health concerning lack of records of past generation and disposal of hazardous and radioactive waste from these facilities. By this PIA request, we are making specific request for these memoranda, any related correspondence or files, and information on the final disposition of these files. We also request any records you may have concerning the demolition of these facilities around 2000.

We sincerely appreciate your assistance with this request. I can be contacted at the number below for more information or with any questions.

Sincerely,
Amy McGivney

Amy McGivney | Project Manager | Engineer III
Direct: 301.528.3018 | Main: 301.528.5552 | Fax: 301.528.3000
amy.mcgivney@tetratech.com<mailto:amy.mcgivney@tetratech.com>

Tetra Tech, Inc. | Environmental Services
20251 Century Blvd. Suite 200 | Germantown, Maryland 20874 | www.tetratech.com<http://www.tetratech.com>

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From: Colleen D. Williams -MDE-
To: McGivney, Amy
Cc: Degen, Amanda
Subject: Re: PIA 2014-56353: Martin Airport - Radiological
Date: Thursday, January 16, 2014 1:47:16 PM

Dear Ms McGivney,

The Maryland Department of the Environment (MDE) received your recent request for information under the Public Information Act (PIA). After a thorough search of all available information, the MDE Air & Radiation Management Administration found no records responsive to your request.

I suggest that you submit your request for information to Maria Stephens in MDE's Land Administration, since that is the group that oversees Hazardous and Solid Waste. No charges were incurred.

Thank you,

Colleen Donnelly Williams
Colleen.Williams@Maryland.gov
MDE ARMA Compliance & PIA Liaison
1800 Washington Blvd., Suite 715
Baltimore, MD 21230-1720
(w) 410-537-4127

ATTENTION to our PIA requesters, regarding electronic documents: On the advice of counsel, it is now the Department's policy to provide only PDF or other non-editable versions of data files. We apologize for any inconvenience.

On Fri, Jan 10, 2014 at 7:39 AM, Colleen D. Williams -MDE- <colleen.williams@maryland.gov> wrote:

> Dear Ms McGivney,
>
> The Maryland Department of the Environment (MDE) received your recent request for information under the Public Information Act (PIA). Your request has been assigned the tracking number listed above. Please use this number in all communications referring to this request.
>
> After the search for information is complete, I will notify you as to whether or not pertinent records exist. We address PIA requests in the order in which we receive them. There may be fees associated with the search or production of documents. If files exist, I will notify you of an estimated cost and you will be required to provide payment authorization before documents will be produced or sent to you.
>
> You may find it helpful to review the following information regarding the PIA process:

http://www.mde.state.md.us/programs/Marylander/PublicInfoAct/Pages/index.aspx

Please contact me with any questions or concerns.

Colleen Donnelly Williams
Colleen.Williams@Maryland.gov
MDE ARMA Compliance & PIA Liaison
1800 Washington Blvd., Suite 715
Baltimore, MD 21230-1720
(w) 410-537-4127

---------- Forwarded message ----------
From: **Amanda Degen -MDE-** <amanda.degen@maryland.gov>
Date: Wed, Jan 8, 2014 at 4:12 PM
Subject: Fwd: PIA Request - Radiological Health Division
To: "Colleen D. Williams -MDE-" <colleen.williams@maryland.gov>

Your assistance with the enclosed request is greatly appreciated.

Thank you,

Amanda R. Degen
Public Information Act Coordinator
Office of Communications
Maryland Department of the Environment
410-537-4120
amanda.degen@maryland.gov

Please consider the environment before printing this e-mail.

---------- Forwarded message ----------
From: **McGivney, Amy** <Amy.McGivney@tetratech.com>
Date: Wed, Jan 8, 2014 at 4:05 PM
Subject: PIA Request - Radiological Health Division
To: "MDE.PIA@maryland.gov" <MDE.PIA@maryland.gov>

Dear Sir or Madam,

This email is to request a search and retrieval of specific MDE Radiological Health archived records under the Public Information Act. Tetra Tech is conducting environmental due diligence research for a property in Middle River, Maryland on behalf of a former property owner. The property was located on a former dirt road at the current Martin State Airport, 701 Wilson Point Road, Middle River, Baltimore County, Maryland.

The property of interest may be identified by the above address (Martin State Airport) in

MDE records, or listed by name under former tenants of two nuclear fuel research facilities which previously operated at said location between 1957 and 1966, approximately. Former tenant names include Martin Company, Ebasco, Raytheon, Radioisotopes, Inc, and Isotopes, Inc. The facilities were known as the Martin Critical Facility, or Critical Test Facility, and the Radioisotope Lab. After termination of Nuclear Regulatory Commission (NRC) Licenses (est. 1965-1970), these buildings were abandoned for several years before being demolished around 2000 by the State of Maryland (Maryland Aviation Administration). In 1989, while the buildings were still present, MDE was involved in a joint inspection of the facilities with NRC to help determine suitability for unrestricted use. Tetra Tech reviewed a State of Maryland report (report MD-304, "A Preliminary Assessment of Martin State Airport, Middle River, Maryland") prepared by the Maryland Hazardous and Solid Waste Management Administration (MDE/HSWMA) and dated March 1989, which contains reference to two memoranda: (1) Memo dated March 30, 1989 from MDE/HSWMA to the Hazardous Waste Enforcement Division, concerning materials in storage in the abandoned, above-referenced buildings; and (2) Memo dated March 31, 1989 from MDE/HSWMA to the MDE Toxic, Environmental Science and Health, Center for Radiological Health concerning lack of records of past generation and disposal of hazardous and radioactive waste from these facilities. By this PIA request, we are making specific request for these memoranda, any related correspondence or files, and information on the final disposition of these files. We also request any records you may have concerning the demolition of these facilities around 2000.

We sincerely appreciate your assistance with this request. I can be contacted at the number below for more information or with any questions.

Sincerely,
Amy McGivney

Amy McGivney | Project Manager | Engineer III
Direct: 301.528.3018 | Main: 301.528.5552 | Fax: 301.528.3000
amy.mcgivney@tetratech.com<mailto:amy.mcgivney@tetratech.com>

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APPENDIX C—NUCLEAR REGULATORY COMMISSION FREEDOM OF INFORMATION ACT AND ONLINE RECORDS

Document Title

FOIA/PA-2012-0117 - Former NRC license Nos: 19-01398-32, SNM-11, SNM-53, SNM-1192 and STB-187, describe the locales and menus of storage and disposal of source materials governed under the license and any notice of violation dated 1957-1970

ORNL Sites - Summary, License No. 19-01398-32.

FOIA/PA-2008-0006 - Resp 1 - Partial.

ORNL Sites - Summary, License No. SMN-0011.

ORNL Sites - Summary, License No. SNM-00053.

ORNL Sites - Summary, License No. STB-0187.

ORNL Sites - Summary, License No. SNM-1192.

The Martin Company - Notice of Special Meeting of Stockholders.

NRC Region 1 Inspection License Number SNM-53 - ORNL Sites Summary for The Martin Company, Isotopes, Inc.

ORNL Sites Summary & Review - License STB-00187.

ORNL Sites Summary & Review - License SNM-00011.

NRC Region I Inspection Report, NRC-Generated, Text-Inspection & Audit of Bldgs C&D.

NRC Region 1 Inspection No. 94-001 Submitted by J. D. Kinneman and Relative Documents.

Enclosure 2- Loose Material Licenses Reviewed by the Regions or Transferred to an Agreement State.

04/15/1964 Ltr from C. Keller of Martin Co. to L. Johnson of US Atomic Energy Commission, re Renewal of Byproduct Material License 19-1398-29, including Application for Byproduct Material License Form AEC-313, Radioisotopes Pilot Plant - Facility Design.

Ltr from P. Nelson of USAEC to W. Roy of USAEC, Regarding Martin Marietta Corporation.

The Martin Company Application for General License to Receive, Possess, Use & Transfer Special nuclear Material (Part 70, CFR 10).

The Martin Company - Notice of Special Meeting of Stockholders.

Memo: To - R.E. Brinkman, From - C.W. Keller RE: three Copies of Byproduct Material License.

Letter: To - J. A. McBride, From - R. G. Macaulay, RE: Request for Release for Public Use of a Facility Formerly Used for Nuclear Activities by the Martin Marietta Corporation.

Letter: To - R. E. Brinkman, From - P. J. Knapp, RE: Abandonment of a Facility Formerly Used for Nuclear Activities.

Letter to File: From - H. W. Crocker, RE: Release for Public Use of a Facility Formerly Used for Nuclear Activities by Martin Marietta Corp. and Isotopes, Inc.

Letter: To - R. Brinkman, From - P. J. Knapp, RE: Notification of Isotopes' Nuclear Systems Division Move to New Facilities.

Letter & Application for general license.

Accession Number	Date Added	Document Date	Size
ML12020A174	02/24/2012 09:39 AM EST	1/12/2012	115.22 Kb
ML073400518	12/10/2007 12:10 PM EST	1/23/1995	113.49 Kb
ML073400251	12/10/2007 12:10 PM EST	11/23/2007	291.84 Kb
ML073400522	12/10/2007 12:10 PM EST	1/23/1995	117.46 Kb
ML073400526	12/10/2007 12:10 PM EST	3/10/1995	149.78 Kb
ML073400529	12/10/2007 12:10 PM EST	1/23/1995	111.42 Kb
ML073400683	12/10/2007 12:10 PM EST	1/23/1995	104.38 Kb
ML080090583	02/19/2008 08:58 AM EST	8/30/1960	4 Mb
ML080170042	02/19/2008 08:57 AM EST	3/10/1995	5.05 Mb
ML080170088	02/19/2008 08:57 AM EST	1/23/1995	111.16 Kb
ML080170097	02/19/2008 08:57 AM EST	1/23/1995	118.37 Kb
ML080170107	02/19/2008 08:57 AM EST	1/23/1995	396.45 Kb
ML080170481	02/19/2008 08:57 AM EST	1/25/1995	8.35 Mb
ML012710531	10/09/2001 11:44 AM EDT	9/26/2001	114.46 Kb
ML041450086	05/27/2004 05:18 PM EDT	4/15/1964	10.7 Mb
ML073400686	12/10/2007 12:10 PM EST	4/12/1971	2.24 Mb
ML080070079	02/19/2008 08:58 AM EST	12/13/1957	1 Mb
ML080090583	02/19/2008 08:58 AM EST	8/30/1960	4 Mb
ML080150518	02/19/2008 08:57 AM EST	11/18/1966	408.79 Kb
ML080160081	02/19/2008 08:55 AM EST	6/11/1969	150.47 Kb
ML080160093	02/19/2008 08:55 AM EST	6/17/1969	174.34 Kb
ML080160324	02/19/2008 08:54 AM EST	7/7/1969	77.18 Kb
ML080160349	02/19/2008 08:55 AM EST	8/15/1969	129.72 Kb
ML080320099	02/12/2008 04:36 PM EST	12/12/1957	1.06 Mb

ML12020A174

TETRA TECH

January 12, 2012

FOIA/PA REQUEST
Case No.: 2012-0117
Date Rec'd: 1-20-12
Specialist: Kilgore
Related Case:

U.S. Nuclear Regulatory Commission
Office of Information Services
Mail Stop T5-F11
Washington, DC 20555-0001
Attention: Donna Sealing, FOIA/Privacy Act Officer

Re: Request for Information "Building D" at "Block E"
Middle River Facility and Martin State Airport,
Baltimore, Maryland 21220

Dear Sir or Madam:

This is a request under the Freedom of Information Act/Privacy Act (FOIA/PA) 5 U.S.C. 552). This is a supplement to prior requests #2006-0006 and #2008-0059. We are currently contracted by Lockheed Martin to review available records regarding past hazardous substance usage and waste generation, including radioactive materials, at the above-referenced study area. Of particular interest would be ***records (likely dated 1957 to 1970) to describe the locales and means of storage and disposal of source materials governed under the licenses, and any notices of violation***, for the former NRC License Nos. 19-01398-32, SNM-11, SNM-53, SNM-1192, and STB-187. Also of interest are documents that itemize and/or list quantities of chemicals and radioactive materials that were obtained, stored or used, and quantities of hazardous or radioactive wastes generated, shipped and/or disposed in connection with the facility activities under licenses listed above. Additionally, as the above-referenced licenses (reviewed by our staff previously) pertained to manufacturing and research processes, in this letter we are requesting that NRC identify any additional licenses held by the subject facility for the storage, use, testing, and/or and handling of radioactive instruments and equipment (e.g., night-vision goggles, aviation and aeronautical dials and gages, etc.) from the 1950s to 1980s, along with related records.

The current address for the Middle River Facility is *2323 Eastern Boulevard* in Middle River (Baltimore), Maryland. Previous NRC correspondence for this address also referenced the site as the *Martin State Airport at 701 Wilson Point Road*, Baltimore, Maryland. The Middle River facility was formerly known as *Chesapeake Industrial Park and Chesapeake Park Plaza*, and former tenants at the effective time of the license included *Martin Marietta, Middle River Aircraft Systems, and the Martin Company.*

TETRA TECH

The former Building D was approved for unrestricted use in an NRC Region I Inspection Report (No. 94-001) dated January 25, 1995. Through previous FOIA Request #PA-2008-0006, we already have obtained copies of documents pertaining to the decommissioning (in 1970) and related inspections, as well as the permit applications and amendments. **We do not wish to retrieve records that are duplicates with those obtained in the previous request.** The specific records of interest were highlighted above.

If you have any questions concerning this request, please contact the undersigned at (301) 523-3018, or email me at Amy.Stattel@tetratech.com. We are willing to pay fees applicable to the processing of this request, however, please notify me in writing so the expense can be approved.

Sincerely,

Amy Stattel

Amy Stattel
Staff Engineer

ML012710531

Loose Material Licenses Reviewed by the Regions or Transferred to an Agreement State

Enclosure 2

Loose Material Licenses Reviewed by the Regions

REGION I

License #	Licensee Name	City	State	Transfer
SUB-00960	AAI Corporation	Hunt Valley	MD	
19-00294-12	Aberdeen Proving Ground	Aberdeen	MD	Yes
D-00131	AD Mackay, Inc.	New York	NY	Yes
37-05105-04	Air Products and Chemicals	Trexlertown	PA	
SMB-00914	Air Products and Chemicals, Inc.	Trexlertown	PA	
C-01883	Air Reduction Company, Inc.	Murray Hill	NJ	
C-03721	Allegheny Ludlum Steel Corp.	Watervliet	NY	
SUB-00755	Allied Chemical Corp	Morristown	NJ	
SMC-00144	Allied Chemical Corporation	Marcus Hook	PA	
31-11835-01	Allied Crossroads Nuclear Corp	New York	NY	
SMB-00398	Allis Chalmers	Washington	DC	
C-05293	Alvares Turner Corporation	New York	NY	
29-00209-03	American Cyanamid Co.	Bound Brook	NJ	
C-05299	American Cytoscope Makers, Inc.	New York	NY	Yes
C-03134	American Light Alloys	Paterson	NJ	
C-04855	American Machine & Foundry Co.	Greenwich	CT	
37-13360-01	Analytical Instruments Dev.	West Chester	PA	
06-21140-02	ANEFCO, Inc.	Ridgefield	CT	
SNM-00215	Anton Electronic Laboratories	Brooklyn	NY	
C-05032	Arwood Corporation	Tilton	NH	
37-02262-07	Armstrong World Industries	Lancaster	PA	
31-11640-01	Atcor, Inc.	Elmsford	NY	
STB-00913	Atlantic Metals Corp	Philadelphia	PA	
37-01048-03	Atlantic Refining Company	Philadelphia	PA	
SMB-00373	Avco Corporation	Wilmington	MA	Yes
C-04413	Avco Research and Advanced Dev.	Wilmington	MA	
20-07287-01	Baird Atomic, Inc. (Chemtrac Corp.)	Cambridge	MA	
20-01481-04	Baird Corporation	Cambridge	MA	Yes
29-01348-02	Bakelite Company	Bound Brook	NJ	
SUB-00723	Baldwin Lima Hamilton Corp.	Eddystone	PA	
20-11372-01	Barringer Research, Inc.	East Natick	MA	
37-07690-07	Bartol Research Foundation	Swarthmore	PA	
STB-00117	Bausch and Lomb Optical Company	Rochester	NY	Yes
20-13881-01	Baxter Diagnostics, Inc.	Cambridge	MA	Yes
C-03657	Bell Aircraft Corporation	Buffalo	NY	Yes
29-01556-01	Bendix Corporation	Eatontown	NJ	
STB-00397	Bendix Corporation	South Bend	IN	
STB-00424	Bendix Corporation	Teterboro	NJ	
STB-00954	Bermero Nickel and Alloy Co.	Jersey City	NJ	
SNM-00975	Boston College, Dept of Chemistry	Chestnut Hill	MA	

License #	Licensee Name	City	State	Transfer
38-00169-20	Brown University	Providence	RI	
38-00169-32	Brown University	Providence	RI	
SUB-00868	Budd Company	Phoenixville	PA	
STB-00926	C.G. Sargent's Sons Corporation	Graniteville	MA	
20-13162-01	Cambridge Hospital	Cambridge	MA	
29-12944-01	Cambridge Nuclear Radiopharm	Princeton	NJ	
SNM-0214	Carborundum Company	Niagara Falls	NY	
37-00602-02	Carnegie Mellon University	Delmont	PA	
C-04233	Ceramic Color & Chemical Mfg.	New Brighten	PA	
C-05274	Ceramic Color and Chemical Mfg	New Brighton	PA	
SUB-00490	Ceramic Color and Chemical Mfg	New Brighten	PA	
SUB-00619	Colonial Metals Company	Columbia	PA	
31-05542-02	Columbia University	Irvington	NY	
SUB-00503	Columbia University	Plainsboro	NJ	
STB-00050	Combustion Engineering	Windsor	CT	
04-02171-03	Consolidated American Services	Shippingport	PA	
SMB-00646	Controls for Radiation, Inc.	Cambridge	MA	
SNM-00166	Controls for Radiation, Inc.	Cambridge	MA	
37-02416-02	Curtiss Wright Corp	Quehanna	PA	
29-00460-01	Curtiss Wright Corporation	Clifton	NJ	
29-00460-02	Curtiss Wright Corporation	Woodridge	NJ	
29-00460-05	Curtiss Wright Corporation	Quehanna	PA	
C-03699	Curtiss Wright Corporation	Quehanna	PA	
SNM-00156	Curtiss Wright Corporation	Quehanna	PA	
SNM-00172	Curtiss Wright Corporation	Quehanna	PA	
SNM-00302	Curtiss Wright Corporation	Quehanna	PA	
C-01129	Dentists' Supply Company of NY	York	PA	
08-16855-01	Department of Commerce, Maritime	Beaumont	TX	
19-00296-11	Department of Health and Human	Bethesda	MD	
08-00861-03	Department of Interior, Geo Survey	Washington	DC	
08-00861-08	Department of Interior, Geo Survey	Gaithesburg	MD	
20-03095-02	Department of the Air Force	Bedford	MA	
19-00294-12	Department of the Army	Aberdeen	MD	
SUB-00459	Department of the Army	Independence	MO	
SUB-01339	Department of the Army	Philadelphia	PA	
SUC-01308	Department of the Army	Chambersburg	PA	
37-01091-07	Dept. of Army (Frankford Arsenal)	Philadelphia	PA	
SUB-00459	Dept. of Army (Frankford Arsenal)	Philadelphia	PA	
19-02891-04	Department of the Navy	Bethesda	MD	
STB-00760	Department of the Navy	Quonset Point	RI	
SUB-00967	Dorr-Oliver Incorporated	Stamford	CT	
07-02343-01	E.I. du Pont de Nemours	Newport	DE	
SNM-00254	E.I. du Pont de Nemours	Wilmington	DE	
STB-00489	E.I. du Pont de Nemours	Newport	DE	
SNM-00907	Ebasco Services, Inc.	Middle River	MD	
SNM-00994	Electro-Nucleonics, Inc.	Caldwell	NJ	

License #	Licensee Name	City	State	Transfer
C-03387	Engelhard Industries, Inc.	Newark	NJ	
C-04558	Engelhard Industries, Inc.	Newark	NJ	
SMC-01207	Engelhard Minerals and Chemicals	Great Lakes	IL	
SNM-00098	Englehard Industries, Inc.	Newark	NJ	
SUB-00172	Engelhard Ind. Inc (DE Makepeace)	Attleboro	MA	
29-09801-02	ENSECO, Inc.	Berkeley Hts	NJ	
SUB-00636	EON Corporation	Brooklyn	NY	
SNM-01543	Exxon Research and Engineering	Linden	NJ	
SUB-00400	Federal Civil Defense Admin.	Washington	DC	
STB-00177	Federal Mold and Engineering Corp	Clinton	MA	
SNM-01000	Fenwal Incorporated	Ashland	MA	
C-03349	Firth Sterling, Inc.	Pittsburgh	PA	
C-03497	Firth Sterling, Inc.	Pittsburgh	PA	
SUB-00020	Firth Sterling, Inc.	Pittsburgh	PA	
SMB-00201	Fisher Scientific Co.	Fair Lawn	NJ	
C-04633	Fisher Scientific Co.	Fair Lawn	NJ	
37-00637-10	Franklin Institute	Philadelphia	PA	
37-27883-02	Franklin Research Center	Philadelphia	PA	
29-12346-01	Gamma Industries	Port Norris	NJ	
SUB-00948	Gamma Industries	Port Norris	NJ	
31-12236-01	Gamma Process Company, Inc.	Morton Grove	IL	Yes
SNM-00871	General Atomic Company	New Haven	CT	Yes
20-00815-06	General Electric Company	Lynn	MA	
31-05712-06	General Electric Company	Schenectady	NY	
37-01294-01	General Electric Company	Erie	PA	
37-02006-06	General Electric Company	Philadelphia	PA	
SUC-00626	General Electric Company	Philadelphia	PA	
SMB-01005	General Electric Corp	King of Prussia	PA	
31-00549-01	General Electric Corporation	Schenectady	NY	
29-04459-01	General Instruments Corporation	Neptune	NJ	
D-00711	Groma Metal Corporation	New York	NY	
20-15610-01	GTE Laboratories, Inc.	Waltham	MA	Yes
37-07380-01	GTE Sylvania, Inc.	Towanda	PA	
37-00136-12	Gulf Research and Development	Harmarville	PA	
C-03731	Gulton Industries Incorporated	Metuchen	NJ	
20-12482-01	Haveg Industries	Taunton	MA	
C-03691	Haynes Stellite Company	New York	NY	
C-04505	Heppenstahl Company	Bridgeport	CT	
37-13831-03	Hershey Medical Center	Hershey	PA	
37-07002-02	Hewlett-Packard Company	Avondale	PA	
SNM-00449	High Temperature Materials Lab	Boston	MA	
20-20795-01	HMM Associates, Inc.	Woburn	MA	
37-05278-01	HRB Singer, Inc	State College	PA	
06-02885-03	Industrial Nuclear Radiation Con.	Kensington	CT	
06-02885-03	Industrial Nuclear Radiation Con.	New Britain	CT	
29-03686-02	Industrial Reactor Laboratories	Plainsboro	NJ	

License #	Licensee Name	City	State	Transfer
C-05235	Industrial Reactor Laboratories	Plainsboro	NJ	
20-14082-01	Interex Corporation	Waltham	MA	
20-13235-01	International Chemical and Nuclear	Waltham	MA	
37-00345-03	International Chemical and Nuclear	West Mifflin	PA	
37-15278-01	Interstate Nuclear Services	New Kensington	PA	
SNM-01126	Intl. Chemical and Nuclear Corp	Waltham	MA	
19-01398-20	Isotopes, Inc.	Middle River	MD	
19-01398-32	Isotopes, Inc.	Middle River	MD	
SMB-00927	Isotopes, Inc.	Westwood	NJ	
SNM-00053	Isotopes, Inc.	Middle River	MD	
SNM-01150	Isotopes, Inc.	Timonium	MD	
C-03485	Jessop Steel Company	Washington	PA	
SNM-01094	Johns Hopkins Medical Inst.	Baltimore	MD	
19-00585-28	Johns Hopkins University	Baltimore	MD	
SNM-00776	Johns Hopkins University	Baltimore	MD	
C-03493	Koppers Company, Inc.	Verona	PA	
29-11418-03	J.T. Baker, Inc.	Phillipsburg	NJ	
SMB-00256	Kulite Tungsten Corporation	Ridgefield	NJ	
20-01382-15	Laboratory for Electronics	Waltham	MA	
SNM-00819	Laboratory for Electronics	Waltham	MA	
SUB-00459	Lake City Arsenal	Independence	MO	
20-05463-01	Laundering Specialist Corp	South Boston	MA	
STB-00715	Lavelle Aircraft Corporation	Newton	PA	
20-01006-01	Liberty Mutual Insurance Co., inc.	Hopkinton	MA	Yes
29-09446-01	Lionel Electronic Laboratories	Hillside	NJ	
STB-00109	Ludwig Honold Manufacturing Co.	Folcroft	PA	
SUB-00936	Machining Technology Corporation	South Windsor	CT	
18-14820-01	Maine Yankee Atomic Power	Wiscasset	ME	
29-13564-01	Mallinkrodt Chemical	Carlstadt	NJ	
19-01398-10	Martin Company	Middle River	MD	
SNM-00011	Martin Company	Middle River	MD	
STB-00187	Martin Marietta	Middle River	MD	
SNM-00849	Martin Marietta Company	Timonium	MD	
19-01398-22	Martin Marietta Corp	Quehanna	PA	
19-01398-29	Martin Marietta Corp	Quehanna	PA	
C-05178	Max Zuckerman and Sons	Baltimore	MD	
SUC-00060	Max Zuckerman and Sons	Baltimore	MD	
C-04978	MB Electronics (Textron)	New Haven	CT	
C-04800	Metaloy, Inc.	New York	NY	
SMB-00216	Metals & Controls, Inc.	Attleboro	MA	
C-04507	Metals Research and Development	Exeter	PA	
C-05166	Miller Engineering Company	Baltimore	MD	
29-00505-08	Mobil Oil Company, Inc.	Pennington	NJ	
29-00505-11	Mobil Oil Company, Inc.	Paulsboro	NJ	
29-00505-11	Mobil Oil Company, Inc.	Pennington	NJ	
29-00505-13	Mobil Oil Company, Inc.	Paulsboro	NJ	

License #	Licensee Name	City	State	Transfer
20-07896-01	Moleculon, Inc.	Cambridge	MA	Yes
SNM-00121	MSA Research Corp	Callery	PA	
SUB-00337	National Aniline Division	New York	NY	
SMB-00096	National Beryllia Corporation	Haskell	NJ	
C-04957	National Lead Company	New York	NY	
SMB-00211	National Lead Company	Niagara Falls	NY	
SNM-00316	National Lead Company	Albany	NY	
SNM-00686	National Lead Company	Albany	NY	
SUB-00748	National Lead Company	Billerica	MA	
RD-00169	National Research Corporation	Cambridge	MA	
20-12743-01	New England Aquarium, Inc.	Boston	MA	Yes
20-00289-03	New England Deaconess Hospital	Boston	MA	
07-03860-04	NL Industries	Wilmington	DE	
SUB-00972	NL Industries, Inc.	Wilmington	DE	
SMB-01542	Nord Ilmenite Company	Jackson	NJ	
R-00122	North American Philips Company	Lewiston	ME	
STB-00770	Norton Company	Worcester	MA	
20-15898-01	Nuclear International Corporation	Waltham	MA	
37-07575-01	Nuclear Laundry Rental Service	Jeannette	PA	
06-02601-01	Nuclear Laundry Service	Waterbury	CT	
SMB-00502	Nuclear Materials and Equipment	Apollo	PA	
SNM-01088	Nuclear Materials and Equipment	Clearfield	PA	
C-03429	Nuclear Metals	Cambridge	MA	
SNM-00065	Nuclear Metals	Cambridge	MA	
SNM-00160	Nuclear Metals, Inc.	Cambridge	MA	
SNM-00219	Nuclear Metals, Inc.	Cambridge	MA	
SNM-00006	Nuclear Science and Engineering	West Mifflin	PA	
20-05663-02	O.G. Kelly and Company	Boston	MA	
C-04233	Peerless Products, Inc.	Hamden	CT	
37-06614-01	Penn Overall Supply Company	Pittsburgh	PA	
SNM-00189	Pennsylvania State University	University Park	PA	
SUB-00750	PF Avery Corporation	Billerica	MA	
37-00408-07	Philco Ford Corporation	Philadelphia	PA	
37-00408-08	Philco Ford Corporation	Blue Bell	PA	
D-00132	Philipp Brothers Inc.	New York	NY	
29-18345-01	Platina Refining Laboratories	South Plainfield	NJ	
37-00862-04	PPG Industries	Pittsburgh	PA	
06-00550-01	Pratt and Whitney Aircraft	East Hartford	CT	
06-00550-03	Pratt and Whitney Aircraft	Middletown	CT	
SUB-00764	Pressure Science Incorporated	Beltsville	MD	
06-01175-03	Quantum, Inc.	Wallingford	CT	
SNM-01524	Radiation Management Corp.	Philadelphia	PA	
20-12867-01	Radiation Materials Company	Waltham	MA	
C-04479	Raytheon Company Gov Equip Div	Waltham	MA	
C-04841	Raytheon Manufacturing Company	Wayland	MA	
29-00651-02	RCA Corporation	Princeton	NJ	

License #	Licensee Name	City	State	Transfer
31-00072-02	Rensselaer Polytechnic Institute	Troy	NY	
SNM-00825	Rensselaer Polytechnic Institute	Troy	NY	
SUB-00677	Richard D. Brew & Company Inc.	Concord	NH	
D-00619	Robert E. Williams	Kenmore	NY	Yes
D-00594	Rotel Corporation of America	New York	NY	
37-09743-01	R.W. Johnson Pharmaceutical Inst.	Ft. Washington	PA	
37-11711-01	Sanitary Overall Supply, Inc.	Tarentum	PA	
STB-00835	Sikorsky Aircraft	Bridgeport	CT	
29-07685-03	Singer Company	Little Falls	NJ	
C-03334	Sintercast Corporation of America	Yonkers	NY	
SNM-00601	Speer Carbon Company	Niagara Falls	NY	
SNM-00637	Sperry Rand Research Center	Sudbury	MA	
20-00484-03	Sprague Electric Company	North Adams	MA	Yes
STC-00130	Stepan Chemical Company	Maywood	NJ	
29-06177-02	Stuart Lee Adelman	South Orange	NJ	
D-00170	Sun Flame Appliances, Ltd.	Paterson	NJ	
C-03459	Superb Light Alloys, Inc.	Farmingdale	NY	
C-03480	Superior Steel Corporation	Scott Township	PA	
C-03951	Supreme Tool and Die Company	Hartford	CT	
31-02374-01	Sylvania Corning Nuclear Corp	Bayside	NY	
SNM-00141	Sylvania Electric Products	Bayside	NY	
SNM-00082	Sylvania Electric Products, Inc.	Hicksville	NY	Yes
STB-00719	Sylvania Electric Products Inc.	Manchester	NH	
20-00277-03	Technical Operations	Burlington	MA	
SUB-00466	Tenneco Chemicals	Fords	NJ	
SNM-00797	Thermo Electron Corporation	Waltham	MA	
SNM-01935	Thermo Electron Corporation	Waltham	MA	Yes
20-27837-01	Thermo Environ. Instruments, Inc.	Hopkinton	MA	Yes
31-00076-06	U.S. Naval Hospital	St. Albans	NY	
STC-00450	United Iron and Metal Company	Baltimore	MD	
SNM-00368	United Nuclear Corp	New Haven	CT	
SNM-00012	United Nuclear Corporation	White Plains	NY	
20-02014-01	United Shoe Machinery Corp	Beverly	MA	
SNM-00336	University of Pittsburgh	Pittsburgh	PA	
SNM-0009	US Army Chemical Center	Army Chem Cntr	MD	
C-05242	US Dielectric Products, Inc.	Leominster	MA	
SUB-01501	Valentec Product Dev. Center	Wharton	NJ	
SMB-00028	Vitro Corporation of America	West Orange	NJ	
SNM-00506	Vitro Laboratory	West Orange	NJ	
C-04625	Vitro Rare Metals Company	Canonsburg	PA	
C-04391	W.R. Grace and Company	New York	NY	
R-00196	W.R. Grace and Co (Davison Chem)	Pompton Plains	NJ	
SNM-00840	W.R. Grace and Company	Clarksville	MD	
SNM-00929	W.R. Grace and Company	Wayne	NJ	
STA-00422	W.R. Grace and Company	Pompton Plains	NJ	
37-05809-03	Westinghouse Electric Company	Cheswick	PA	

License #	Licensee Name	City	State	Transfer
SMB-00353	Westinghouse Electric Corp	Bloomfield	NJ	
SNM-00037	Westinghouse Electric Corp	Blairsville	PA	
SNM-00182	Westinghouse Electric Corp	Horseheads	NY	Yes
SNM-00338	Westinghouse Electric Corp	Cheswick	PA	
SNM-00697	Westinghouse Electric Corp	Madison	PA	
SNM-00783	Westinghouse Electric Corp	Madison	PA	
37-09442-01	Westinghouse Electric Corporation	Madison	PA	
C-03735	Westinghouse Electric Corporation	Baltimore	MD	
C-03940	Westinghouse Electric Corporation	Bloomfield	NJ	
C-04971	Westinghouse Electric Corporation	Blairsville	PA	
SNM-00234	Westinghouse Electric Corporation	East Pittsburgh	PA	
STB-00625	Westinghouse Electric Corporation	Baltimore	MD	
29-21348-01	Westinghouse Radiological Svcs	Marlton	NJ	
06-11369-01	WHYCO Chromium Company	Thomaston	CT	
C-05222	Wyman Gordon Company	Worcester	MA	
STB-00041	Wyman Gordon Company	Worcester	MA	
SUB-00493	Wyman Gordon Company	Worcester	MA	

REGION 2

01-00126-13	Army-Redstone Arsenal	Huntsville	AL	
01-02861-01	US Army Chem.Corps	Ft. McClellan	AL	
SNM-00842	EPA (Eastern Env.Rad. Facility)	Montgomery	AL	
09-01708-01	Orlando Research, Inc.	Orlando	FL	Yes
08-01393-02	Naval Research Lab	Washington	DC	
09-02747-04	US Air Force	Eglin AFB	FL	
09-07428-02	Florida Power & Light	Ft. Pierce	FL	
SNM-00260	Lockheed-Georgia	Dawsonville	GA	
10-00512-01	US Public Health Service (HHS)	Savannah	GA	
10-00512-04	US Public Health Service (HHS)	Savannah	GA	
10-01937-15	Georgia Tech	Atlanta	GA	
10-01125-01	University of Georgia	Athens	GA	
10-09653-01	Luminous Processes, Inc.	Athens	GA	Yes
16-00380-03	US Army Med. Res. Lab.	Ft. Knox	KY	
SNM-00430	Radiochemistry, Inc.	Louisville	KY	Yes
SUB-00432	Pittsburgh Metallurgical Co.	Calvert City	KY	
32-00632-16	Duke Univ.Med.Cntr.	Durham	NC	
32-06655-07	Duke University	Durham	NC	
51-12758-02	US Army	Fort Davis Canal Zone	Panama	
52-13137-01	Dept.of HEW	San Juan	PR	
52-15968-01	TII Industries, Inc.	Toa Alta	PR	
39-00743-05	Medical College of South Carolina	Charleston	SC	
39-01285-03	University of South Carolina	Columbia	SC	
39-12662-01	Jerry Walker and Charles Lee	Clemson	SC	
41-08165-09	Tennessee Valley Authority	Soddy Daisy	TN	

License #	Licensee Name	City	State	Transfer
41-08165-17	Tennessee Valley Authority	Chattanooga	TN	
C-03469	American Lava	Chattanooga	TN	
C-03569	Kingston Pencil Corp.	Chattanooga	TN	Yes
C-05317	Knoxville Iron Co.	Knoxville	TN	
SMA-00227	Vitro Chemical	Chattanooga	TN	
SMB-00720	Union Carbide	Lawrenceburg	TN	
SNM-00724	Union Carbide	Lawrenceburg	TN	
SNM-00109	American Lava	Chattanooga	TN	
SNM-01315	US Nuclear	Oak Ridge	TN	
SNM-01476	Tennessee Valley Authority	Chattanooga	TN	
SUB-00587	David Witherspoon	Knoxville	TN	
10-12233-02	Southern Space, Inc.	Portsmouth	VA	
45-00953-02	US Army	Ft. Belvoir	VA	
45-02808-02	Atlantic Research Corp (ARCO)	Alexandria & Gainesville	VA	
45-03499-05	College of William & Mary	Williamsburg	VA	
45-10085-03	Roanoke College	Salem	VA	
45-13733-01	Meloy Labs, Inc.	Springfield	VA	
45-14090-02	EPA	Vienna	VA	
45-17819-01	US Army (535th Engr.Det.)	Ft. Belvoir	VA	
C-03465	B&W NNFD	Lynchburg	VA	
C-03523	National Adv. Com.for Aeronautics	Langley Field	VA	
SNM-00730	B&W NNFD	Lynchburg	VA	
SUB-00921	Atl Research Corp (Res.&Ord. Div)	Alexandria	VA	
SUC-01047	Portsmouth Terminal	Portsmouth	VA	
47-01163-20	West Virginia University	Morgantown	WV	
47-17725-01	Appalachian Reg.Hosp.	Beckley	WV	
C-04327	Fostoria Glass Co.	Moundsville	WV	
C-04345	Wheeling Tile Co.	Wheeling	WV	
C-04576	Hercules Powder Co.	Ridgely	WV	
C-04922	Carborundum Company	Parkersburg	WV	
STB-00058	E.I. DuPont de Nemours	Belle	WV	
STB-00440	AMAX Spec.Metals	Washington	WV	
SUB-00081	Homer Laughlin China	Newell	WV	
SUC-00628	Fostoria Glass Co.	Moundsville	WV	
U. S. Navy Licenses				
04-02579-01	Naval Postgraduate School	Monterey	CA	
04-07316-02	Naval Energy & Env. Support Activity	Port Hueneme	CA	
31-00718-02	New York Naval Shipyard Mat. Lab	Brooklyn	NY	

REGION 3

SUC-1211	African Metals Corp	Fernald	OH
STB-513	Alliance Boring Company	Fenton	MI

License #	Licensee Name	City	State	Transfer
SUB-954	Allied Chem. Corp and Lucius Pitkin	Metropolis	IL	
SNM-237	Allis Chambers Manufacturing Corp.	Greendale	WI	
SMB-680	Allis Chalmers Manufacturing Corp.	West Allis	WI	
48-02621-01	Allis Chalmers Manufacturing Corp.	Milwaukee	WI	
SUB-118	Alloys and Chemical Corporation	Cleveland	OH	
SUC-250	Alluminum and Magnesium Inc	Sandusky	OH	
C-3737	American Bearing Corp.	Indianapolis	IN	
SUB-1320	American Cyanamid Company	Hannibal	MO	
12-11437-01	American Medical Assoc.	Chicago	IL	Yes
SMB-389	American Metal Products Company	Ann Arbor	MI	
12-04932-01	American Potash and Chemical Corp.	West Chicago	IL	Yes
SUB-465	American Smelting and Refining Co.	Whiting	IN	
SUB-00701	Anocut Engineering Company	Chicago	IL	Yes
SUB-215	Apex Smelting Company	Chicago	IL	Yes
SMB-00444	Armour Res. Found. of Illinois	Gary	IN	Yes
34-15141-01	Ashland College	Ashland	OH	
24-13402-01	Atcor Laboratories	Columbia	MO	
SNM-010	Atomic Power Development Assoc.	Detroit	MI	
SMB-00103	AVCO Corporation	Richmond	IN	
13-12285-01	AVCO Corporation	Richmond	IN	
C-3374	Battelle Memorial Institute	Columbus	OH	
21-01931-03	Bendix Corporation	Southfield	MI	
STB-397	Bendix Corporation	South Bend	IN	
21-01931-02	Bendix Aviation Corporation	Detroit	MI	
C-3743	Benson Manufacturing Company	Kansas City	MO	
12-10745-01	Borg Warner Corp.	Decatur	IL	Yes
STB-362	Brooks and Perkins	Livonia	MI	
12-02172-02	Burgess Battery Co.	Freeport	IL	Yes
12-00013-06	Caterpillar Tractor Company	Peoria	IL	
21-01432-01	Central Michigan College	Mt Pleasant	MI	
C-5324	Chambers Aircraft Corporation	Shelbyville	IN	
SUB-852	Chemetron Corporation	Cleveland	OH	
SUC-700	Chemical Com. Inc (Lake City Arsenal)	Independence	MO	
STB-00354	Chicago Magnesium Casting Co.	Blue Island	IL	Yes
STB-543	Cleveland Pneumatic Tool Company	Cleveland	OH	
34-03410-01	Cleveland Pneumatic Tool Company	Cleveland	OH	
SNM-183	Clevite Corporation	Cleveland	OH	
SMC-907	Commercial Disc. Corp. & Cotter Corp.	Hazelwood	MO	
SMB-654	Contemporary Metals Corp.	Hazelwood	MO	
SMA-862	Continental Mining & Milling Co	St. Louis	MO	
34–00472-04	Department of the Air Force	Wright-Patterson	OH	
SNM-423	Detroit Edison	Detroit	MI	
SNM-832	Diamond Alkali Company	Ashtabula	OH	
C04799	Doall Co.	Des Plaines	IL	Yes
SNM-307	Eagle Picher Company	Joplin	MO	
SMC-01377	Edlow International Co.	East St. Louis	IL	Yes

License #	Licensee Name	City	State	Transfer
SMC-1207	Engelhard Minerals and Chemicals	Ravenna	OH	
SUC-1332	Engelhard Minerals and Chemicals	Savanna	IL	
21-00641-01	Ethyl Corporation	Ferndale	MI	
SUB-00225	Fansteel Mettalurgical Corp.	Chicago	IL	Yes
SMB-418	Ford Motor Co. & Electric Autolite Co.	Fostoria	OH	
SNM-059	General Electric Company	Warren	MI	
34-00499-07	General Electric Company	Evandale	OH	
SMB-1153	General Electric Company	Evandale	OH	
SNM-1202	General Electric Company	Evandale	OH	
13-01106-02	General Motors Corporation	Indianapolis	IN	
SNM-197	General Motors Corporation	Warren	MI	
34-00508-06	Goodyear Tire & Rubber Company	Akron	OH	
C-4284	Harshaw Chemical Company	Cleveland	OH	
C-3924	Hart Metal Products Corporation	Elkart	IN	
SUB-023	Haynes Stellite Company	Kokomo	IN	
34-10844-01	Hill Top Research	Cincinnati	OH	
C-03249	Hills-McCanna Company	Chicago	IL	Yes
22-01870-01	Honeywell, Inc.	Bloomington	MN	
C-3496	Horizons, Inc.	Cleveland	OH	
STB-00815	Howard Foundry Co.	Chicago	IL	Yes
13-00108-02	Indiana University	Bloomington	IN	
12-00920-01	International Harvester Company	Huntsville	MO	Yes
12-02904-02	Isotope Chemical Comapny	Chicago	IL	Yes
34-13774-01	John C. Haynes Company	Newark	OH	
SMB-1003	Kaiser-Nelson Steel & Salvage Corp.	Cleveland	OH	
34-00124-01	Kent State University	Kent	OH	
C-04343	Kemlite Laboratories Inc.	Chicago	IL	Yes
R-119	Lamp Division of GE	Cleveland	OH	
SUB-1063	Lancaster Glass Company	Lancaster	OH	
12-10040-01	Linear Alpha Inc.	Evanston	IL	Yes
C-5080	Maffitt Tool and Machine Company	St. Louis	MO	
C-4052	Magline, Inc	Pinconning	MI	
C-4275	Magnethermic Corporation	Youngstown	OH	
SNM-230	Mallinckrodt Chemical Works	Hematite	MO	
SNM-033	Mallinckrodt Chemical Works	Hematite	MO	
R-226	Mallinckrodt Chemical Works	St Louis	MO	
12-11988-01	Mallinckrodt Chemical Works	Decatur	IL	Yes
12-11393-01	Mallinckrodt Chemical Works	Rosemont	IL	Yes
STB-049	McDonnell Aircraft Corporation	St Louis	MO	
C-2210	McDonnell Aircraft Corporation	St Louis	MO	
STC-076	Michigan Chemical Corporation	St. Louis	MI	
SMB-833	Michigan Chemical Corporation	St. Louis	MI	
C-4333	Michigan Seamless Tube Company	South Lyon	MI	
SMB-239	Minnesota Mining & Manufac. Co.	St. Paul	MN	
SNM-764	Minnesota Mining & Manufac. Co.	Arden Hills	MN	
SNM-958	Minnesota Mining & Manufac. Co.	Roseville	MN	

License #	Licensee Name	City	State	Transfer
SNM-211	Minnesota Mining & Manufac. Co.	St Paul	MN	
SUB-711	Minnesota Mining & Manufac. Co.	St Paul	MN	
22-00057-04	Minnesota Mining & Manufac. Co.	St Paul	MN	
24-01113-01	Monsanto Chemical Company	St Louis	MO	
C-04705	Morton Pottery Company	Morton	IL	Yes
SUB-1072	Mose Cohen and Sons, Incorporated	Cincinnati	OH	
C-04065	M.P. Heinze Company	Chicago	IL	Yes
SNM-746	National Aeronautics & Space Admin.	Cleveland	OH	
SNM-716	National Aeronautics & Space Admin.	Cleveland	OH	
SNM-323	National Aeronautics & Space Admin.	Cleveland	OH	
SNM-605	National Aeronautics & Space Admin.	Sandusky	OH	
SNM-252	National Carbon Company	Fostoria	OH	
SMB-366	National Carbon Company	Fostoria	OH	
C-4931	National Lead Company	Grand Rapids	MI	
SNM-073	National Spectographic Laboratories	Cleveland	OH	
C-2316	North American Aviation, Inc.	Columbus	OH	
12-00094-03	Northwestern University	Lemont	IL	Yes
SNM-591	Oliver Corporation	Battle Creek	MI	
SUB-579	Oliver Corporation	Battle Creek	MI	
C-3725	Oliver Corporation	Battle Creek	MI	
SNM-152	Owens Corning Fiberglas Corporation	Newark	OH	
SUB-896	Park-Ohio Industries	Cuyahoga Hghts	OH	
34-13517-01	Parkwell Laboratories, Inc.	Croton	OH	
34-11105-01	General Nuclear, Inc.	Croton	OH	
SNM-1347	Parkwell Laboratories, Inc.	Croton	OH	
SNM-0909	General Nuclear, Inc.	Croton	OH	
STB-481	Partz Products Inc.	Owosso	MI	
21-05609-01	Power Reactor Development Assoc	Newport	MI	
C-4373	Progressive Industries Company	Detroit	MI	
SUB-193	Red Wing Potteries, Inc	Red Wing	MN	
SNM-268	Reuter Stokes Inc.	Cleveland	OH	
13-08998-01	Rose Hulman Institute of Technology	Terra Haute	IN	
SMC-1206	Samincorp Inc.	Great Lakes	IL	
STB-801	Speedway Machine and Tool Co. Inc	Indianapolis	IN	
SUB-756	Standard Oil Company of Ohio	Lima	OH	
SUB-941	Standard Oil Company	Cleveland	OH	
R-219	St. Eloi Corporation)	Cincinnati	OH	
STB-303	Taylor Forge & Pipe Works	Gary	IN	Yes
12-02520-01	The Rheumatic Fever Res. Found.	Chicago	IL	Yes
STB-460	The Siegler Corporation	Maple Heights	OH	
C-04646	Thomas C. Thompson Co.	Highland Park	IL	Yes
SUB-00957	Thomas C. Thompson Co.	Highland Park	IL	Yes
C-3245	Thompson Products, Inc	Cleveland	OH	
STB-663	Thompson Ramo Wooldridge (TRW)	Cleveland	OH	
STB-161	Thompson Ramo Wooldridge (TRW)	Cleveland	OH	
34-05619-01	Thompson Ramo Wooldridge, Inc	Cleveland	OH	

License #	Licensee Name	City	State	Transfer
C-4756	Thompson Ramo Wooldridge, (TRW)	Cleveland	OH	
34-05619-04	Thompson Ramo Wooldridge, Inc	Wickliffe	OH	
12-18379-03	Tracor Analytic Inc.	Elk Grove Village	IL	Yes
SUB-955	TRW, Inc	Port Clinton	OH	
STB-994	Union Carbide Corporation	Kokomo	IN	
SNM-175	Union Carbide Corporation	Parma	OH	
34-000999-9	Union Carbide Corporation	Parma	OH	
24-01882-02	Universal Match Corporation	Ferguson	MO	
SNM-00285	Universal Match Corporation	Ferguson	MO	
C-04792	Universal Match Corporation	Ferguson	MO	
SUB-696	U.S. Reduction Company	East Chicago	IN	
SNM-091	Washington University	St. Louis	MO	
24-00063-04	Washington University	St. Louis	MO	
C-4539	Wellman Bronze and Aluminum Co	Cleveland	OH	
STB-136	Wellman Bronze and Aluminum Co	Bay City	MI	
SUB-00777	Whiting Corporation	Harvey	IL	Yes
C-3723	Williams Patent Crusher & Pulverizer	St Louis	MO	
STB-841	Wolverine Metal Company	Detroit	MI	
SMB-850	Vanadium Corporation of America	Cambridge	OH	
12-00733-03	Volk Radiochemical Company	Skokie	IL	Yes

REGION 4

50-10023-01	Dept. of the Army	Fort Richardson	AK	
C-00654	Reynolds Metals Co.	Bauxite	AR	
03-02814-01	Naval Ammo Depot	Shumaker	AR	
02-07592-01	Airesearch Man. Co.	Phoenix	AZ	Yes
C-03575	Infilco, Inc.	Tucson	AZ	Yes
C-05180	Southwest Metal Industries	Phoenix	AZ	Yes
SNM-00031	Aerojet General Corp.	San Ramon	CA	
04-00580-07	Isotopes Specialty Co.	Burbank	CA	Yes
SNM-00035	Department of the Navy	San Francisco	CA	
SNM-00862	General Atomics	San Diego	CA	
04-00487-03	Department of the Navy	San Francisco	CA	
SNM-00054	General Electric Co.	San Jose	CA	
SNM-01002	U.S. Nuclear Corporation	Burbank	CA	
04-02561-01	Western Radiation Lab.	Los Angeles	CA	
04-00580-03	Isotopes Specialties Co.	Burbank	CA	Yes
06-02543-02	United Aircraft Corp.	Livermore	CA	
04-05479-01	California Salvage Co.	San Pedro	CA	
SNM-00342	Northrop Corporation	Hawthorne	CA	
04-06953-01	Rad-Science Corporation	Los Angeles	CA	
04-00205-02	Shell Development Co.	Emeryville	CA	
STB-00494	Marquardt Corporation	Van Nuys	CA	
04-00424-06	Douglas Aircraft Company	Santa Monica	CA	

License #	Licensee Name	City	State	Transfer
R-00204	Radio Chemical Corp.	Rosamond	CA	
SNM-01034	Torrence Extrusion Corp.	Banning	CA	
SMB-00372	Atomics International	Canoga Park	CA	
R-00183	Verdi Development Co.	Mojave	CA	Yes
04-01043-10	SRI International	Menlo Park	CA	
04-00650-07	Regents of Univ. of CA	Berkeley	CA	
SNM-00693	Univ. of CA-Los Angeles	Los Angeles	CA	Yes
R-00224	Crown Uranium Co.	Taft	CA	
C-04902	H&S Metal Products Co.	Los Angeles	CA	
04-00748-04	Reed Curtis Nuclear Ind.	Culver City	CA	
C-04761	Halaco Engineering Co.	Gardena	CA	
SNM-00143	Nuclear Engineering Co.	Walnut Creek	CA	Yes
SMB-00164	General Electric Co.	San Jose	CA	
C-03754	Lockheed Aircraft Corp.	Palo Alto	CA	Yes
04-07845-01	NASA	Moffett Field	CA	
04-00436-02	Aerojet-General Corp.	Azusa	CA	
C-04463	Quality Aircraft Corp.	Burbank	CA	
C-04462	Certified Spotwelding Corp.	Burbank	CA	
C-04545	Texture Lamps Corp.	Los Angeles	CA	Yes
04-07177-02	Dept. of the Air Force McClellan & Eielson AFBs		CA	
SUB-00310	U.S. Nuclear Corp.	Burbank	CA	Yes
04-01611-05	General Dynamics Corp.	San Diego	CA	Yes
STB-00496	Straza Industries	El Cajon	CA	Yes
SNM-00119	Aerojet General Corp.	San Ramon	CA	
C-04241	BMW Manufacturing Co.	Torrance	CA	
C-03998	Stainless Polishing Corp.	Oakland	CA	Yes
C-05350	Marcel Instruments Inc.	Monrovia	CA	Yes
STB-00511	Automation Industries, Inc.	Manhattan Beach	CA	
04-01516-02	Shell Development Co.	Modesto	CA	Yes
STC-00098	Cal-State Metals	Gardena	CA	
C-05310	Light Metals Research Lab	Santa Clara	CA	
C-03931	Rheem Manufacturing Co.	Downey	CA	Yes
SNM-01677	Teledyne Cast Products	Pomona	CA	
C-04694	Monogram Precision Ind.	North Hollywood	CA	Yes
SUB-00367	General Dynamics/Convair	San Diego	CA	Yes
C-04544	Skyline Engineering, Inc.	El Segundo	CA	
C-03895	Hayward Scientific Glass	Whittier	CA	Yes
STB-00074	Basic Tool Industries, Inc.	Gardena	CA	
STB-00270	Ladish Company	Los Angeles	CA	Yes
SMB-00376	Dept. of the Navy, NRDL	San Francisco	CA	
04-02112-01	Bio-Rad Laboratories	Berkeley	CA	Yes
C-05377	South Gate Alum. & Mag.	South Gate	CA	
SNM-00386	Solid State Radiations, Inc	Culver City	CA	Yes
STB-00124	Magnesium Alloy Products	Compton	CA	Yes
C-04101	Pride Machine Products	Culver City	CA	Yes
SNM-01471	Univ. of CA-Berkeley	Berkeley	CA	

License #	Licensee Name	City	State	Transfer
STB-00015	Reimer Metals, Inc.	South Gate	CA	Yes
STB-00411	Temescal Metallurgical	Berkeley	CA	Yes
P-03869	Sawyer Petroleum Co.	Los Angeles	CA	Yes
C-05062	R.H. Osbrink Manuf. Co.	Los Angeles	CA	Yes
C-04996	Turco Products, Inc.	Los Angeles	CA	Yes
SUB-00590	Douglas Aircraft Co.	Santa Monica	CA	Yes
04-05479-02	IT Corporation	Wilmington	CA	
C-04740	Dow Chemical Company	Pittsburgh	CA	Yes
C-04066	American Brake Shoe Co.	Rivera	CA	Yes
SMB-00415	General Atomics	San Diego	CA	
SMB-00430	Dow Chemical Company	Pittsburgh	CA	Yes
C-03330	Sequoia Metalcraft Co.	San Carlos	CA	
SNM-00115	American Radiator	Mountain View	CA	
C-04810	California Avitron Corp.	Inglewood	CA	Yes
STB-00487	Bruce Engineering Co.	Gardena	CA	Yes
C-04138	The Hufford Corporation	El Segundo	CA	
C-04421	Convair (Astronautics)	San Diego	CA	Yes
C-04531	Meridian Metalcraft, Inc.	Whittier	CA	Yes
D-00683	Pacific Graphite Co.	Oakland	CA	
STB-00568	Halaco Engineering Co.	Gardena	CA	
04-00321-04	City of Los Angeles	Hollywood	CA	Yes
SNM-00235	Truesdail Laboratories	Los Angeles	CA	Yes
C-04274	North American Aviation	Canoga Park	CA	
C-03911	Nat'l Plating & Processing	National City	CA	Yes
C-04481	Aerojet General Corp.	Sacramento	CA	
C-04485	Pomona Tile Manufacturing	Pomona	CA	Yes
SMB-00563	Aerojet General Corp.	San Ramon	CA	
STB-00071	Turco Products, Inc.	Los Angeles	CA	Yes
C-03908	Kaiser Aircraft & Electronics	San Leandro	CA	Yes
C-04907	S&M Corporation	San Leandro	CA	
SNM-00162	San Diego State College	San Diego	CA	
C-04387	Precision Metal Routing	Compton	CA	Yes
C-03994	Standard Aircraft Company	Long Beach	CA	Yes
STB-00504	Central Tool & Engineering	Los Angeles	CA	Yes
C-04567C-03755	Norair (Northrop Aircraft)	Hawthorne	CA	
C-04530	Modern Pattern & Foundry	Los Angeles	CA	Yes
STB-00222	Hughes Tool Company	Culver City	CA	Yes
SNM-00380	Colorado State Univ.	Fort Collins	CO	Yes
R-00208	Crater Oil Corporation	Denver	CO	Yes
R-00201	Brown's Park Mining Co.	Boulder & Moffit Co.	CO	Yes
P-03356	Missouri Metal Reduction	Fremont	CO	Yes
05-09968-01	Burlingame & Evans	Boulder	CO	
R-00215	George E. Davis	Gateway	CO	Yes
SUB-00143	Kerr McGee Oil Industries	Golden	CO	
SMB-00746	Coors Porcelain Co.	Golden	CO	
P-02802	International Randwick	Slick Rock	CO	

License #	Licensee Name	City	State	Transfer
R-00143	Mining Research Corp.	Slick Rock	CO	
R-00203	Lucky June Mining & Milling	Denver	CO	
STC-00656	Rare Earth Uranium Mining	Canon City	CO	
C-03863	Sundstrand - Denver	Denver	CO	Yes
C-04991	Sundstrand - Turbo	Denver	CO	Yes
53-12084-01	Hawaii Dept. of Agriculture	Honolulu	HI	
53-00017-01	University of Hawaii	Honolulu	HI	
R-00199	Lucky Gem Mining & Milling	Emmett	ID	
R-00230	Salmon River Uranium	North Fork	ID	
R-00150	Porter Brothers Corp.	Valley County	ID	
SUC-00314	Stoddard Transfer & Fuel	Coeur d'Alene	ID	
D-00601	Poston Mining & Milling Co.	Cascade Valley	ID	
SNM-00329	Spencer Chemical Co.	Pittsburgh	KS	
15-00598-01	Kansas University	Lawrence	KS	
C-03645	H&H Parts Co.	Wichita	KS	
STB-00188	Beech Aircraft Corp.	Wichita	KS	
R-00218	Spencer Chemical Co.	Pittsburgh	KS	
STB-00095C-03647	Boeing Airplane Co.	Wichita	KS	
C-05269	Marine Cathodic Protection	Harvey	LA	Yes
R-00229	Sawyer Petroleum Co.	Glen	MT	
26-15267-01	Omaha Public Power Dist.	Ft. Calhoun	NE	
26-00162-08	University of Nebraska	Omaha	NE	
27-05861-01	U.S. EPA	Las Vegas	NV	
SUB-00771	Nevada Freeport Storage	Elko	NV	
R-00200	National Resources Develop.	Tonopah-Nye	NV	
SUB-00905	Dawn Mining Co.	Elko	NV	
R-00198	Yuma Exploration & Develop.	Reno	NV	
SUA-00789	Vanadium Corp. of America	Shiprock	NM	
SNM-00289	Eberline Instrument Corp.	Santa Fe	NM	
30-03110-02	Department of the Air Force	Kirtland AFB	NM	
SUB-00888	DASASandia	Base	NM	
D-00652	Orco Corporation	Grants	NM	
R-00225	American Milling Corp.	Albuquerque	NM	
SUC-00793	Kerr McGee Oil Industries	Bowman	ND	
SUA-00698	Georesources Exploration	Belfield	ND	
SUA-00649	Manidon Mining Co.	Bismark	ND	
35-00502-02	Halliburton Company	Duncan	OK	
SMA-00826	Kerr McGee Nuclear Corp.	Cimarron Facility	OK	
35-00237-02	Okahoma A&M College	Stillwater	OK	
35-00161-05	Well Surveys, Inc.	Tulsa	OK	
STB-00472	Standard Magnesium Corp.	Tulsa	OK	
STB-00588	Automation Industries, Inc.	Tulsa	OK	
STC-00595	Wah Chang Corporation	Albany	OR	
C-04589	Wah Chang Corporation	Albany	OR	
SUA-00713	Susquehanna Western, Inc.	Buffalo	SD	
42-01864-01	Department of the Air Force	Randolph AFB	TX	
SMB-00123	Dow Chemical Company	Freeport	TX	
42-05032-01	Department of the Air Force	Austin	TX	

License #	Licensee Name	City	State	Transfer
SUB-01288	Gulf Chemical and Metallurgical Co.	Texas City	TX	
42-00145-04	Humble Oil and Refining Co.	Houston	TX	
STB-00220	Southwest Airmotive Co.	Big Bear Creek	TX	
STB-00454	Am. Smelting & Refining Co.	Houston	TX	
STB-00352	Ling-Temco-Vought, Inc.	Dallas	TX	Yes
C-04656	Texas Bronze Manufacturing	Fort Worth	TX	
STB-00585	Emtex, Missile Systems Corp	Carrollton	TX	
SUA-00712	AZ Minerals Corporation	Mexican Hat	UT	
SUA-00814	Vitro Corporation of America	Salt Lake City	UT	
STB-00434	Marquardt Corporation	Ogden	UT	
R-00175	Ore Beneficiation Company	Salt Lake City	UT	Yes
C-03650	Marquardt Corporation	Van Nuys	CA	
43-01316-04	Department of the Army	Dugway	UT	
SNM-00942	Battelle Memorial Institute	Richland	WA	Yes
SNM-01016	McDonnell Douglas Astro.	Richland	WA	
SNM-01269	Douglas United Nuclear, Inc.	Richland	WA	
SNM-00103	University of Washington	Seattle	WA	
R-00187	Dawn Mining Co.	Ford	WA	
46-12754-01	Department of the Army	Fort Lewis	WA	
46-09588-13	State College of Washington	Pullman	WA	
R-00207	Uranyl Research Company	Baggs	WY	
P-04072,	International Mining Co.	Greenville	OH	
SUA-00208	International Mining Co.	Greenville	OH	
SNM-00280	University of Wyoming	Laramie	WY	

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Sealed Source Licenses Reviewed by the Regions or Transferred to an Agreement State

Enclosure 3

Sealed Source Licenses Reviewed by the Regions

REGION 1

License #	Licensee Name	City	State	Transfer
SNM-01487	Dyck Carol L.		CN	
SNM-01481	Saint Mary's Hospital	Waterbury	CT	
SNM-01076	Hartford State Technical College	Hartford	CT	
SNM-00201	Fenn Manufacturing Co.	Newington	CT	
CSA-03580	Yale University	New Haven	CT	
0618175-02	Elector Atomic Products	New Milford	CT	
06-12117-01	Frank L. Clifford	Niantic	CT	
06-07702-01	Landers Frary and Clark	New Britain	CT	
06-07522-03	United Aircraft Corporation	East Hartford	CT	
06-05220-01	Plax Corporation	Bloomfield	CT	
06-02736-01	Rowland products Incorporated	Kensington	CT	
06-02388-02	New Britain General Hospital	New Britain	CT	
06-01175-02	Quantum Inc.	Wellington	CT	
060050-03	Yale University	New Haven	CT	
SNM-00565	US Department of Commerce	Washington	DC	
08-15386-01	Georgetown Instruments Inc.	Washington	DC	
08-15225-01	MCI Communications Corporation	Washington	DC	
08-12010-01	Department of the Treasury Secretary	Washington	DC	
08-07799-02	United States Coast Guard	Washington	DC	
08-05979-14	Department of the Navy	Washington	DC	
08-02534-09	Department of the Army	Washington	DC	
08-02534-01	Department of the Army	Washington	DC	
08-00482-04	Department of HEW	Washington	DC	
07-14852-02	Airport Technical Service Corp	Wilmington	DE	
07-00455-04	E.I DuPont De Nemours & Co. Inc.	Wilmington	DE	
SNM-01585	American Optical Corporation	Crosby Drive	MA	
SNM-00797	Thermo Electron Corporation	Waltham	MA	
SNM-00648	Merrimack College	N. Andover	MA	
SNM-00528	Boston Umiversity	Boston	MA	
SNM-00292	University of Massachusetts	Amherst	MA	
20-19536-01	CE Maguire Inc	Waltham	MA	
20-19373-01	Elscint Incorporated	Boston	MA	Yes
20-16639-01	Walter Kidde and Company Inc	Ashland	MA	
20-14938-01	Beckwith Arden Inc	Wakefield	MA	
20-14083-01	Howard Needles, Tammen & Bergendoff	Boston	MA	
20-13946-01	J.M. Devine Company	Newton	MA	
20-12814-01	Machinery Electrification inc.	Northboro	MA	
20-10176-01	EG&G	Bedford	MA	
20-09618-01	Conesco Inc.	Cambridge	MA	

License #	Licensee Name	City	State	Transfer
20-07875-01	MIE, Inc.	Bedford	MA	Yes
20-06156-01	Atomium Corporation	Waltham	MA	
20-05826-01	J Diratis & Co Inc	Westfield	MA	
20-03683-01	Foxboro Company	Foxboro	MA	
20-03502-02	Cooley Dickenson Hospital	Northampton	MA	
20-02196-02	Kendall Mills Division	Walpole	MA	
20-01896-03	Raytheon Corporation	Quincy	MA	Yes
20-00882-05	Massachusetts University	Amherst	MA	
20-00815-06	General Electric Company	Lynn	MA	
20-00551-09	Peter Bent Brigham Hospital	Boston	MA	
20-00297-56	Harvard College	Cambridge	MA	
20-00277-04	Technical Operations Incorporated	Burlington	MA	
SNM-01218	United Kingdom Atomic Energy Auth.	Washington	DC	
SNM-00852	Armed Forces Radiobiology Res. Ctr.	Bethesda	MD	
SNM-00849	Teledyne Isotopes	Timonium	MD	
SNM-00722	General Electric Company	Baltimore	MD	Yes
SNM-00532	Columbia Union College	Takoma Park	MD	Yes
SNM-00402	Department of HEW	Rockville	MD	
SNM-00229	ACF Industries	Washington	DC	Yes
SNM-00064	University of Maryland	College Park	MD	Yes
GL-00342	Powers Regulator Company	Baltimore	MD	
GL-00155	Gilro Associates	Glen Burnie	MD	
19-10785-03	Greater Baltimore Medical Center	Baltimore	MD	
19-04003-06	W.R. Grace and Company	Clarksville	MD	Yes
19-02891-04	Department of the Navy	Bethesda	MD	
19-02486-08	Baltimore Gas and Electric	Baltimore	MD	
19-01933-01	Glidden Company	Baltimore	MD	Yes
19-01398-21	Isotopes Inc.	Timonium	MD	
19-01398-16	The Martin Company	Baltimore	MD	Yes
19-00294-13	Department of Army	Aberdeen	MD	
19-00294-05	Department of Army	Aberdeen	MD	
19-00294-04	Department of Army	Aberdeen	MD	
19-00271-03	Esso Standard Oil Company	Baltimore	MD	Yes
19-00166-03	US Naval Ordinance Laboratory	White Oak	MD	
08-11145-01	Tellurometer Inc	Rockville	MD	
08-07799-03	United States Coast Guard	Washington	DC	
18-17403-01	Pyr Alarm Inc	Brewer	ME	
18-14820-01	Maine Yankee Atomic Power Co.	Augusta	ME	
SNM-00652	New York Shipbuilding Corp	Camden	NJ	
SNM-00464	Newark College of Engineering	Newark	NJ	
29-28027-01	Safe International Incorporated	Mount Laurel	NJ	
29-18089-01	Wuester Tumor Clinic	Elizabeth	NJ	
29-16648-01	Ocean County Sewerage Authority	Toms River	NJ	
29-16561-01	Radiologic Group of North Jersey	Wayne	NJ	
29-16021-02	Lummus Company	Bloomfield	NJ	
29-15363-01	Ingersoll Rand Company	West Caldwell	NJ	

License #	Licensee Name	City	State	Transfer
29-14930-01	Graviner Inc	Mountainside	NJ	
29-13799-02	Montville Township High School	Montville	NJ	
29-13438-01	Federal Electric Corporation	Paramus	NJ	
29-13296-01	Pompton Lakes High School	Pompton Lakes	NJ	
29-13294-01	St Aloysius High School	Jersey City	NJ	
29-13030-01	Bayley Ellard High School	Madison	NJ	
29-12852-01	College of St. Elizabeth	Convent Station	NJ	
29-12472-01	Fisher Scientific Company	Springfield	NJ	
29-10816-02	Merrick Scale Manufacturing	Passaic	NJ	
29-10532-01	Radiography Inspection Incorporated	Woodridge	NJ	
29-09203-01	R M D Laboratory	Totowa	NJ	
29-04333-02	St. Elizabeth Hospital	Elizabeth	NJ	
29-03686-02	Industrial Reactor Laboratories	Plainsboro	NJ	
29-03297-03	Mountainside Hospital	Montclair	NJ	
29-02477-03	United States Testing Company	Hoboken	NJ	
29-02210-02	Dresser Industries Incrporated	Harrison	NJ	
29-02204-02	New York Shipbuilding Corporation	Camden	NJ	
29-02138-01	Radiology Affiliates of Central NJ	Trenton	NJ	
29-02023-03	Armando Leone MD	Paterson	NJ	
29-00102-06	Newark Beth Israel Medical Center	Newark	NJ	
29-00040-06	Allied Chemical Corporation	Morristown	NJ	
29-00040-05	Allied Chemical Corporation	Morristown	NJ	
29-00040-03	Allied Chemical Corporation	Morristown	NJ	
SUD-00581	Clarkson College of Technology	Potsdam	NY	
SUD-00394	Columbia University in City of NY	New York	NY	
SUD-00308	Rochester University College of Eng	Rochester	NY	
SUD-00302	Syracuse University	Syracuse	NY	
SUD-00288	Rensselaer Polytechnic Institute	Troy	NY	Yes
SUD-00271	Cornell University	Ithica	NY	Yes
SNM-01358	Veterans Admistration Hospital	Brooklyn	NY	
SNM-00993	United Nuclear Corporation	Elmsford	NY	
SNM-00643	Rosary Hill College	New York	NY	Yes
SNM-00640	Niagara University	Niagara	NY	
SNM-00624	Syracuse university	Syracuse	NY	
SNM-00613	Queens College	Flushing	NY	Yes
SNM-00604	Fordham University	New York	NY	Yes
SNM-00598	Iona College Physics Dept	New Rochelle	NY	
SNM-00527	Bausch and Lomb Incorporated	Rochester	NY	Yes
SNM-00485	Hofsrtra College	Hempsted	NY	
SNM-00460	Bronx Community College	New York	NY	Yes
SNM-00455	Canisius College	Buffalo	NY	
SNM-00446	Yeshiva University	New York	NY	Yes
SNM-00305	Institute of Industrial Medicine	New York	NY	Yes
SNM-00248	Rochester University College of Eng	Rochester	NY	
SNM-00227	Clarkson College of Technology	Potsdam	NY	
SNM-00194	New York University	New York	NY	Yes

License #	Licensee Name	City	State	Transfer
SNM-00182	Westinghouse Electric Corporation	Horseheads	NY	Yes
SNM-00132	Columbia University in New York	New York	NY	
SNM-00028	Department of the Navy	Brooklyn	NY	
37-06223-01	Atomic Energy of Canada Limited	BALA-CYNWYD		
31-18015-01	Department of the Navy	FPO New York	NY	
31-14852-01	Airport Technical Service	Jamaica	NY	Yes
31-13511-01	Northport Veterans Admin. Hospital	Northport	NY	
31-09672-01	Department of the Navy	Brooklyn	NY	
31-08753-01	Department of the Navy	Brooklyn	NY	
31-06945-01	Jerome Zwanger MD	Massapequa	NY	
31-06915-01	Department of the Navy	New York	NY	
31-05508-01	P.Lorillard Company	New York	NY	Yes
31-05489-05	Allied Chemical Corporation	New York	NY	Yes
31-04601-03	Picker X Ray Corporation	White Plains	NY	Yes
31-04595-01	Department of the Army	New York	NY	
31-01545-02	Consolidated Testing Laboratories Inc	New Hyde park	NY	
31-01231-03	Ulrich K Henschke MD	New York	NY	
31-01228-02	American Tradair Corporation	Long Island	NY	Yes
31-01181-03	Edward J Meyer Memorial Hospital	Buffalo	NY	
31-008434-02	Eastern testing Laboratories Inc	Corona	NY	Yes
31-00829-02	Isotope Products Incorporated	Buffalo	NY	Yes
31-00718-10	Department of the Navy	Brooklyn	NY	
31-00463-03	United States Steel Corporation	New York	NY	Yes
31-00072-04	Rensselaer Polytechnic Institute	Troy	NY	Yes
SNM01041	Milletron Incorporated	Pittsburgh	PA	
SNM-00738	Westinghouse Electric Corporation	Pittsburgh	PA	
SNM-00566	Gulf Research and Development	Pittsburgh	PA	
SNM-00336	Pittsburgh University	Pittsburgh	PA	
SNM-00075	American Machinery and Foundry Co	York	PA	
SNM-00063	Pennsylvania State University	Univ. Park	PA	
SNM-00006	Nuclear Science and Engineering Corp	Homestead	PA	
54-00300-14	Atomic Energy of Canada Limited	Horsham	PA	
37-28568-01	GZA Geoenvironmental Inc	King of Prussia	PA	
37-21162-01	H J Schneider Construction inc	Pittsburgh	PA	
37-18456-01	Construction Engineering Consultants	Laughlintown	PA	
37-16507-01	Taylor Hospital	Ridley park	PA	
37-16280-02	Allis Chalmers Corporation	York	PA	
37-15836-01	A Johnson and Company Inc	Wayne	PA	
37-15445-01	United States Testing Company Inc	Reading	PA	
37-14094-01	Kurt J Lesker Company	Pittsburgh	PA	
37-13221-01	American Telephone and TelegraphCo	Malvern	PA	
37-12299-01	Department of the Navy	Mechanicsburg	PA	
37-10913-03	Defense Supply Agency	Philadelphia	PA	
37-10092-01	Clairton Municipal Authority	Clairton	PA	
37-10041-01	Gulf Oil Corporation	Philadelphia	PA	
37-07739-02	New Castle Hospital	New Castle	PA	

License #	Licensee Name	City	State	Transfer
37-06223-02	Atomic Energy of Canada Limited	BALA-CYNWYD		
37-03528-01	Buckeye Pipeline Company	Allentown	PA	
37-03330-04	United States Steel Corporation	Monroeville	PA	
37-02852-01	Atlantic X Ray Inc	Norristown	PA	
37-02567-08	Jones and Laughlin	Aliquippa	PA	
37-02567-07	LTV Steel Company Inc	Aliquippa	PA	
37-02550-01	Treadwell Engineering Company	Easton	PA	
37-02262-10	Armstrong Cork Company	Lancaster	PA	
37-02262-9	Armstrong Cork Company	Lancaster	PA	
37-02262-8	Armstrong Cork Company	Lancaster	PA	
37-02262-5	Armstrong Cork Company	Lancaster	PA	
37-02137-02	R L Holliday Company	Pittsburgh	PA	
37-01861-08	Bethlehem Steel Corporation	Bethlehem	PA	
37-01712-07	Department of the interior - Mines	Pittsburgh	PA	
37-01712-04	Department of the interior - Mines	Pittsburgh	PA	
37-01258-08	Jones and Laughlin Steel Corporation	Pittsburgh	PA	
37-00896-01	McKeesport Hospital	McKeesport	PA	
37-00862-04	PPG Industries Inc	Pittsburgh	PA	
37-0086202	Pittsburgh Plate Glass Company	Creighton	PA	
37-00637-08	Franklin Institute	Philadelphia	PA	
37-00611-04	Budd Company Nuclear Div.	Philadelphia	PA	
37-00611-03	Budd Company	Philadelphia	PA	
37-00602-02	Carnegie Institute of Technology	Pittsburgh	PA	
37-00503-02	Stainless Inc. Dept of Radiography	N Whales	PA	
37-00497-08	Westinghouse Electric Corporation	Pittsburgh	PA	
37-00448-06	Albert Einstein Medical Center	Philadelphia	PA	
37-00345-03	International Chemical and Nuclear Corp	Pittsburgh	PA	
37-00276-03	Pittsburgh Testing laboratory	Pittsburgh	PA	
19-01398-30	Martin Marietta Corporation	Baltimore	MD	
05-16016-01	Stearnes Roger Inc	Denver	CO	
SUD-00387	Rhode Island University	Kingston	RI	
SNM-00518	Rhode Island University	Kingston	RI	
38-19045-01	Rosenthal Metceram Corp	Providence	RI	
38-03260-10	Rhode Island University	Kingston	RI	Yes
38-01396-03	Miriam Hospital X Ray Therapy	Providence	RI	

REGION 2

01-01905-01	AW Williams Inspection Co.	Mobile	AL	
01-02377-01	Vester Thompson	Mobile	AL	
01-02377-02	Vester Thompson	Mobile	AL	
01-02510-02	Central Foundry Co.	Holt	AL	
01-03568-01	Caldwell Foundry	Birmingham	AL	
01-03568-02	Caldwell Foundry	Birmingham	AL	
01-04151-01	Ephriam Camp, MD	Huntsville	AL	Yes

License #	Licensee Name	City	State	Transfer
01-05661-03	Lloyd Noland Hospital	Fairfield	AL	
01-09722-01	HK Porter	Birmingham	AL	
01-11485-01	Chicago Bridge & Iron	Birmingham	AL	
19-01398-31	Isotopes, Inc./US Coast Guard	Mobile	AL	
CSA-03529	Alabama Polytechnic Inst.	Auburn	AL	
SNM-00766	University of Alabama	Tuscaloosa	AL	
SNM-00842	EPA Eastern Env. Rad. Facility	Montgomery	AL	
04-07326-02	Aerospace Corp.	Cape Canaveral	FL	
09-07428-02	Florida Power & Light	Ft. Pierce	FL	
09-11579-01	QC Labs	Hollywood	FL	
09-23043-01	TRW Space and Defense Sector	Cape Canaveral	FL	
SUD-00263	University of Florida	Gainesville	FL	
10-09383-01	Dynatomics	Chamblee	GA	Yes
10-09823-01	Georgia Power	Mcdonough	GA	Yes
16-00380-03	Army Medical Research	Ft. Knox	KY	
16-17692-01	Mason & Hanger Silas Mason Co.	Lexington	KY	
41-08165-01	Tennessee Valley Authority	Drakesboro	KY	
CSA-05228	University of Louisville	Louisville	KY	
SNM-00413	University of Louisville	Louisville	KY	
SUD-00278	University of Kentucky	Lexington	KY	
23-10448-01	Superior Inspection Co.	Gulfport	MS	
SNM-00479	Mississippi State Univ.	State College	MS	
SUD-00158	Mississippi State Univ.	State College	MS	
CSA-05230	University of Mississippi	University	MS	
SNM-00396	University of Mississippi	University	MS	
SNM-00393	Research Triangle Inst.	Durham	NC	
SNM-00698	Wake Forest College	Winston Salem	NC	Yes
SUD-00395	North Carolina State	Raleigh	NC	Yes
52-03569-05	Commonwealth of PR - Civil Def	Gurabo	PR	
52-09574-01	Puerto Rico Water Resources	San Juan	PR	
52-17662-01	Geotec Subsoil Explor. & Materials Lab.	Rio Piedras	PR	
52-18076-01	Chevron Chemical Co.	Guayama	PR	
SNM-01372	Hospital Pavia	Santurce	PR	
SNM-01944	Hospital Pavia	Santurce	PR	
CSA-03841	University of Puerto Rico	Mayaguez	PR	
SUD-00601	University of South Carolina	Columbia	SC	Yes
19-08794-02	JM Huber	Etowah	TN	Yes
41-08165-15	Tennessee Valley Authority	Johnsonville	TN	
41-08706-11	University of Tennessee	Memphis	TN	Yes
SNM-00478	Memphis State University	Memphis	TN	Yes
SNM-00484	Christian Brothers College	Memphis	TN	Yes
SNM-00537	Oak Ridge Technical	Oak Ridge	TN	Yes
SNM-00586	Tennessee Polytechnic Inst.	Cookeville	TN	Yes
SNM-00671	University of Chattanooga	Chattanooga	TN	Yes
SNM-00813	Southern Missionary College	Collegedale	TN	Yes
SNM-00854	Vanderbilt University	Nashville	TN	Yes

License #	Licensee Name	City	State	Transfer
SUD-00561	University of Tennessee	Knoxville	TN	Yes
45-00174-03	Robert McClelland	Danville	VA	
45-01972-02	Allied Chemical	Hopewell	VA	
45-06177-04	Stuart Lee Adelman, PhD	Virginia Beach	VA	
45-09361-06	American Machine & Foundry	Alexandria	VA	
45-09469-01	Avtex Fibers	Front Royal	VA	
45-11841-01	AT&T	Purcellville	VA	
45-11842-01	AT&T	Keswick	VA	
45-12222-01	AT&T	Buckingham County	VA	
45-12698-01	U.S. Public Health Service Hospital	Norfolk	VA	
45-13195-01	AT&T	Moseley	VA	
45-13307-01	Bassett Furniture	Bassett	VA	
45-15353-01	James Hancock	Norfolk	VA	
45-17132-01	Army	Norfolk	VA	
CSA-03518	Virginia Polytechnic Inst.	Blacksburg	VA	
GL-00337	Cottrell Electronics	Richmond	VA	
GL-00307	Epperson & Dull Co.	Richmond	VA	
GL-00306	Jack Hartman & Co.	Roanoke	VA	
GL-00344	Powers Regulator Co.	Arlington	VA	
GL-00345	Powers Regulator Co.	Arlington	VA	
SNM-00138	Virginia Tech	Blacksburg	VA	
34-21191-01	Hunt Wireline Services	Parkersburg	WV	
47-00260-07	Union Carbide Corp	S. Charleston	WV	
47-01163-26	West Virginia University	Morgantown	WV	
47-09638-05	Charleston General Hospital	Charleston	WV	
47-13738-01	Mathiessen & Hegeler Zinc	Spelter	WV	
47-17264-01	Geological Services Inc.	Huntington	WV	
47-17373-01	State Construction Inc.	Ripley	WV	
47-17428-01	Allied Chemical	Capels	WV	
47-17517-01	Preston Contractors	Kingwood	WV	
47-19164-01	Green Construction Co.	Green Sulphur Springs	WV	
47-21213-01	Acme Construction Co.	Skelton	WV	
SNM-00522	Dept. Of Interior	Morgantown	WV	
SNM-01512	West Virginia Univ.	Morgantown	WV	

U.S. Navy Licenses

SNM-00232	Navy - Bureau of Ships	Mare Island, CA	
SNM-00491	Naval Ordnance Test Station	China Lake, CA	
SNM-00678	Naval Civil Engineering Lab.	Port Hueneme, CA	
03-02814-01	Naval Ammo Depot	Shumaker	AR
04-00364-06	Mare Island Naval Shipyard	Vallejo	CA
04-01039-01	San Francisco Naval Shipyard	San Francisco	CA
04-01429-02	Department of the Navy	Concord	CA
04-03141-01	Naval Weapons Station	Concord	CA
08-00038-54	Naval Electronics Systems Com.	Washington	DC

License #	Licensee Name	City	State	Transfer
09-03267-01	Navy Mine Defense Lab	Panama City	FL	
10-00287-04	Marine Corps Logistics Base	Albany	GA	
04-04484-01	Navy - Subic Bay Repair Facility	Guam		
19-00318-03	Naval Explosive Ordnance Tech Ctr	Indian Head	MD	
19-00360-02	Naval Propellant Plant	Indian Head	MD	
19-00360-08	Explosive Ordnance Disp. Facility	Indian Head	MD	
37-00314-06	Philadelphia Naval Shipyard	Philadelphia	PA	
38-07741-03	Naval Construction Battalion Center	Davisville	RI	
39-06126-01	Charleston Naval Shipyard	Charleston	SC	
45-04052-02	Norfolk Naval Shipyard	Norfolk	VA	
45-07740-01	Navy	Yorktown	VA	

REGION 3

24-10695-02	Air Reduction Company, Inc.	St Louis	MO	
SNM-759	Allis-Chalmers	Dayton	OH	
16-19083-01	AMOCO Pipeline Company	Manhattan	IL	
48-00736-04	A. O. Smith Corporation	Milwaukee	WI	
SNM-00937	Arnold Engineering Company	Marengo	IL	Yes
SNM-502	Battelle Memorial Institute	West Jefferson	OH	
22-07944-01	Bemidji State University	Bemidji	MN	
SNM-360	Bendix Corporation	Ann Arbor	MI	
12-00561-02	Cenco Instruments Corp.	Chicago	IL	Yes
SNM-01643	Chicago osteopathic Medical Center	Chicago	IL	Yes
21-09012-01	City of Flint, Dept. of Public Works	Flint	MI	
12-02203-09	Cook Electric Company	Morton Grove	IL	Yes
13-01264-03	Commercial Solvents Corporation	Terre Haute	IN	
34-02831-02	Crobaugh X-Ray Laboratories, Inc.	Cleveland	OH	
13-02515-01	Department of the Navy	Crane	IN	
21-00265-02	Dow Chemical Company	Midland	MI	
12-12435-01	Engis Equipment Company	Morton Grove	IL	Yes
24-16322-01	Entronic Corporation	Earth City	MO	
34-05599-02	Federal Glass Company	Columbus	OH	
42-00787-04	General Dynamics Corporation	Camp McCoy	WI	
12-06175-01	General Dynamics Corporation	Romeo	IL	Yes
SNM-421	General Electric Company	Shelbyville	IN	
13-10675-05	General Motors Corporation	New Brunswick	NJ	
21-08678-02	General Motors Corporation	Saginaw	MI	
12-01361-02	Good Samaritan Hospital	Mt Vernon	IL	Yes
48-04059-02	Gunnar A. Gundersen, MD	LaCrosse	WI	
12-07696-01	Hussey Mulopulos, Phillips MD	Park Ridge	IL	Yes
13-09689-02	Indiana Department of Transportation	W. LaFayette	IN	
21-04462-01	Industrial X-Ray and Research, Inc.	Muskegon Hts	MI	
12-07276-02	International Havester Company	Chicago	IL	Yes
12-14053-01	James Electronics Inc.	Chicago	IL	Yes

License #	Licensee Name	City	State	Transfer
24-15578-01	John J. Wegeschoide, Jr.	St Louis	MO	
48-02951-01	Ladish Company	Cudahy	WI	
12-17675-01	Lamac Engineering Company	Mt. Carmel	IL	Yes
21-09786-01	Louis J. Abdoo, Jr.	Detroit	MI	
C-4874	Magnethermic Corporation	Youngstown	OH	
12-04918-01	Marquette Cement Manufacturing Co	Chicago	IL	
16-17692-01	Mason & Hanger-Silas Mason Co Inc	Middletown	IA	
13-16961-01	Materials Inspection and Testing, Inc.	Ft Wayne	IN	
12-10663-01	Medusa Portalnd Cement Company	Dixon	IL	Yes
21-11891-01	Medusa Portland Cement Company	Charlevoix	MI	
21-11929-01	Melvin H. Johnson, M.D.	Battle Creek	MI	
12-03567-03	Methodist Hospital of Central IL	Peoria	IL	Yes
SUD-375	Michigan Technological University	Houghton	MI	
12-24866-01	Midwest Testing Inc	Indianapolis	IN	
22-00187-47	Minnesota University	Minneapolis	MN	
22-00589-01	Modern Constructors	Duluth	MN	
22-00589-02	Modern Constructors	Duluth	MN	
SNM-01104	Monsanto Industrial Chemicals Co	St Louis	MO	
24-18303-01	M. V. P., Inc. Sales and Survey Dept	Cape Girardeau	MO	
SNM-605	National Aeronautics & Space Admin	Sandusky	OH	
12-01434-01	National Aluminate Corp(NALCO)	Chicago	IL	
13-15828-01	Newman Foundry Company, Inc.	Kendallville	IN	
12-09406-01	Nitrin Inc.	Cordova	IL	Yes
22-03064-01	Northern Ordnance Inc	Minneapolis	MN	
13-01983-01	Notre Dame University	Notre Dame	IN	
13-01983-08	Notre Dame University	Notre Dame	IN	
21-02159-02	Nuclear X-Ray Incorporated	Ann Arbor	MI	
34-00293-05	Ohio State University	Columbus	OH	
34-06535-01	Ohio Wesleyan University	Delaware	OH	
21-15257-01	Peckham Engineering	Lansing	MI	
34-07225-06	Picker X-Ray Corporation	Cleveland	OH	
SUD-253	Power Reactor Development Co	Detroit	MI	
SNM-268	Reuter Stokes Inc.	Cleveland	OH	
34-10096-01	Richard L. King, MD	Cleveland	OH	
SNM-00481	Roosevelt University	Chicago	IL	Yes
13-08998-01	Rose Hulman Institute of Technology	Terre Haute	IN	
34-04068-01	Roy B. McCauley, Ohio State Univ.	Columbus	OH	
12-02542-01	Sherwin Williams Company	Chicago	IL	Yes
SNM-01533	St Elizabeths Hospital	Granite City	IL	Yes
24-04581-17	St Louis University	St Louis	MO	
22-03251-04	St Mary's Hospital	Minneapolis	MN	
12-03391-02	St Mary’s Hospital	Streator	IL	Yes
13-12983-01	Stauffer Chemical Company	Bremen	IN	
34-19607-01	Terex Corporation	Hudson	OH	
34-08671-01	Union Carbide Corporation	Cleveland	OH	
34-00999-09	Union Carbide Corporation	Parma	OH	

License #	Licensee Name	City	State	Transfer
12-00269-04	Universal Oil Products Company	Des Plaines	IL	Yes
SNM-00236	University of Illinois	Urbana	IL	Yes
SNM-705	University of Michigan	Ann Arbor	MI	
SNM-617	University of Michigan	Ann Arbor	MI	
SNM-027	University of Michigan	Ann Arbor	MI	
SNM-934	University of Missouri	Columbia	MO	
24-15235-02	Veterans Administration Hospital	Columbia	MO	
34-00486-01	Victoreen, Inc.	Cleveland	OH	
34-00486-04	Victoreen, Inc.	Cleveland	OH	
34-00486-05	Victoreen, Inc.	Cleveland	OH	
SUC-1266	Victory White Metal Company	Cleveland	OH	
34-00738-05	Western Reserve University	Cleveland	OH	
SNM-00955	Winona State College	Winona	MN	
SUD-00319	Wisconsin University	Madison	WI	
SNM-1760	Wisconsin University Hospital	Madison	WI	
34-07515-02	Worthington Steel Company	Worthington	OH	
21-00049-01	X-Ray Incorporated	Highland Park	MI	

REGION 4

50-23392-01	Cold Regions Consulting	Anchorage	AK	
50-02430-09	University of Alaska	Fairbanks	AK	
50-21297-01	State of Alaska	Eagle River	AK	
SNM-00579	University of Arkansas-GIT	Little Rock	AR	
SNM-00482	Arkansas Polytechnic Coll.	Russellville	AR	
SNM-00060	University of Arkansas	Fayetteville	AR	
SNM-00681	Harding College	Searcy	AR	
SNM-00578	VA Consolidated Hospital	Little Rock	AR	
02-21033-01	Western Technologies, Inc.	Phoenix	AZ	Yes
SNM-00911	General Atomics	La Jolla	CA	Yes
04-05241-08	U.S. Nuclear Corp.	Burbank	CA	
04-00647-03	Aerojet General Corp.	San Ramon	CA	
04-00487-03	Department of the Navy	San Francisco	CA	
SNM-00678	Department of the Navy	Port Hueneme	CA	
04-06042-01	General Services Admin.	Stockton	CA	
04-02561-01	Western Radiation Lab.	Los Angeles	CA	
04-00672-06	McCullough Tool Company	Los Angeles	CA	Yes
SNM-00213	University of California	Berkeley	CA	
SNM-01089	Lockheed Aircraft Corp.	Redlands	CA	Yes
SNM-00321	General Electric Co.	San Jose	CA	
SNM-00102	General Electric Co.	San Jose	CA	
SNM-00232	Department of the Navy	Vallejo	CA	
SNM-00483	U.S. Nuclear Corp.	Burbank	CA	
SNM-00491	Department of the Navy	China Lake	CA	
SNM-00425	Marquardt Corporation	Van Nuys	CA	
SNM-00162	San Diego State University	San Diego	CA	

License #	Licensee Name	City	State	Transfer
SNM-00523	Aerospace Corporation	El Segundo	CA	
04-08699-01	Department of the Air Force	McClellan AFB	CA	
SNM-00540	Valley College	Van Nuys	CA	
SNM-00514	California State Polytechnic	San Luis Obispo	CA	
SNM-00283	Pacific Union College	Angwin	CA	
SNM-00177	Occidental College	Los Angeles	CA	
04-07326-02	Aerospace Corp.	El Segundo	CA	
04-07182-01	Pacific Union College	Angwin	CA	
SNM-00342	Northrop Corporation	Beverly Hills	CA	
04-04484-01	Department of the Navy	San Francisco	CA	
04-03697-02	Culver City Hospital	Culver City	CA	
04-03365-03	Lefiell Manufacturing	Santa Fe Springs	CA	
04-03141-01	Department of the Navy	Concord	CA	
04-01964-01	Lockheed Aircraft Corp.	Sunnyvale	CA	Yes
SNM-00519	Immaculate Heart College	Los Angeles	CA	
04-10858-01	Automation Industries, Inc.	Manhattan Beach	CA	
SNM-00606	Reactor Experiments, Inc.	Belmont	CA	Yes
04-00354-01	J.W. Birsner	Bakersfield	CA	Yes
04-00059-01	Richardson X-Ray Service	Alhambra	CA	
SNM-00191	San Diego State College	San Diego	CA	
04-02221-01	Kaiser Steel Corporation	Napa	CA	Yes
04-00205-02	Shell Development Corp.	Emeryville	CA	
04-00616-04	X-Ray Engineering Co.	Burlingame	CA	
SNM-00105	General Electric Co.	San Jose	CA	
SNM-00104	Lockheed Aircraft Corp.	Sunnyvale	CA	Yes
04-01964-06	Lockheed Aircraft Corp.	Vandenberg AFB	CA	
04-00059-02	Richardson X-Ray Service	Alhambra	CA	
SUD-00572	La Sierra College	La Sierra	CA	
SUD-00378	California State Polytechnic	San Luis Obispo	CA	
SUD-00360	Univ. of California at Berkeley	Berkeley	CA	
SUD-00341	San Diego State College	San Diego	CA	
SUD-00316	California Inst. of Technology	Pasadena	CA	
SUD-00289	Pacific Union College	Angwin	CA	
04-01429-02	Department of the Navy	Barstow	CA	
SNM-00174	American Electronics, Inc.	Culver City	CA	Yes
08-07749-02	Department of the Interior	Point Loma	CA	
04-09544-01	X-Weld Services, Inc.	Hayward	CA	Yes
04-01039-01	Department of the Navy	San Francisco	CA	
04-00904-02	California Research Corp.	La Habra	CA	Yes
42-10083-01	Self Organizing Systems	Edwards AFB	CA	
51-05106-02	Gorgas Hospital	Balboa Heights	CZ	
05-16016-01	Stearns-Rogers	Denver	CO	
05-13500-01	United Geophysical Corp.	Denver	CO	Yes
54-00300-06	Atomic Energy of Canada	Colorado Springs	CO	Yes
05-07977-01	Ball Brothers Research	Boulder	CO	Yes
SNM-00118	Colorado State University	Fort Collins	CO	Yes

License #	Licensee Name	City	State	Transfer
05-19046-01	Department of the Interior	Canon City	CO	
05-01399-04	U.S. Geological Survey	Denver	CO	
SNM-00095	Pennsylvania State Univ.	Honolulu	HI	
53-02551-01	X-Ray Engineering Company	Honolulu	HI	
11-01416-02	Eastern Idaho Construction	Idaho Falls	ID	
SNM-00600	Ottawa University	Ottawa	KS	Yes
SNM-00718	Wichita University	Wichita	KS	Yes
SNM-00646	Kansas State College	Pittsburgh	KS	Yes
SNM-00451	Baker University	Baldwin	KS	Yes
SUD-00246	Kansas State University	Manhattan	KS	
17-15543-01	North American Inspection	West Monroe	LA	Yes
SNM-01598	CENEX, Inc.	Laurel	MT	
25-07596-02	City of Helena	Helena	MT	
25-18246-01	Dugdale Construction Co.	Butte	MT	
25-17576-01	Empire Sand and Gravel Co.	Billings	MT	
25-08686-01	Hoerner Waldorf Paper	Missoula	MT	
26-15267-01	Omaha Public Power DistrictFt.	Calhoun	NE	
SNM-00843	EG&G, Inc.	Las Vegas	NV	
SNM-00867	Nevada Dept. of Highways	Carson City	NV	
SNM-00265	University of Nevada	Reno	NV	
SNM-01122	Nevada Southern University	Las Vegas	NV	
SNM-00595	Hughes Aircraft Co.	Culver City	CA	
30-03110-02	Deparment of the Air Force	Kirtland AFB	NM	
30-02363-01	Int'l. Minerals & Chemical	Carlsbad	NM	
30-04450-03	NM Inst. of Mining & Tech.	Socorro	NM	
05-00682-05	Ideal Cement Co.	Tijeras	NM	Yes
SNM-00376	University of North Dakota	Grand Forks	ND	
35-15239-01	Department of the Interior	Muskogee	OK	
35-21007-01	Phoenix Wireline	Henryetta	OK	
35-08990-01	Go International	Oklahoma City	OK	
SNM-00293	Well Surveys/Dresser	Tulsa	OK	
35-15486-01	Nurrie Construction Co.	Muskogee	OK	
SNM-00045	Continental Oil Company	Ponca City	OK	
35-01122-02	Thayer X-Ray Service	Tulsa	OK	
35-12135-01	Booth Perforators	Oklahoma City	OK	
SNM-01117	In-Val-Co/Combustion Eng.	Tulsa	OK	
35-11581-01	Department of the Interior	Ada	OK	
35-19898-01	City of Faith Medical & Res.	Tulsa	OK	
35-02941-01	Pan American Petroleum	Tulsa	OK	
35-02149-01	Elder & McNulty, Inc.	Tulsa	OK	
36-15526-01	Department of the Interior	Salem	OR	
36-14803-01	Department of the Army	Portland	OR	
40-02331-16	University of South Dakota	Vermillion	SD	
SNM-00585	Gulf Logging & Perforating	Houston	TX	
SNM-00418	Lane-Wells Company	Genoa	TX	Yes
SNM-00932	Frontier Perforators	Pampa	TX	

License #	Licensee Name	City	State	Transfer
31-00246-02	M.W. Kellogg Co.	Houston	TX	Yes
31-00246-04	M.W. Kellogg Co.	Houston	TX	
31-00246-01	M.W. Kellogg Co.	Houston	TX	
42-19866-01	CRC Wireline, Inc.	Grand Prairie	TX	
SNM-00701	NASA	Houston	TX	
42-00434-04	M.D. Anderson Hospital	Houston	TX	Yes
42-01485-03	Texas Nuclear Corp.	Austin	TX	Yes
SNM-00673	Mandrel Industries, Inc.	Houston	TX	
SNM-00480	Baylor University	Waco	TX	
SNM-00294	Texas Woman's University	Denton	TX	
SNM-00169	Rice University	Houston	TX	Yes
42-15692-01	North Am. Insp. Services	Houston	TX	Yes
SNM-00619	St. Mary's University	San Antonio	TX	
SNM-00435	St. Edward's University	Austin	TX	
SNM-00186	Shell Oil Co.	Houston	TX	
42-07236-01	Southwestern Radiological	Houston	TX	Yes
42-02976-01	Precision Inspection Ltd.	Houston	TX	Yes
42-09000-02	Radiation Products Co.	Dallas	TX	Yes
42-01061-01	Southwestern Laboratories	Houston	TX	Yes
SUD-00669	A&M College of Texas	College Station	TX	Yes
SUD-00596	Southern Methodist Univ.	Dallas	TX	Yes
SUD-00552	Texas Technological College	Lubbock	TX	
42-10857-01	General X-Ray Co.	Petersburg	TX	Yes
42-06108-01	Industrial X-Ray Engineers	Houston	TX	Yes
42-05560-01	X-Ray Services	Fort Worth	TX	Yes
42-00948-01	Industrial Welding & Testing	Houston	TX	Yes
42-02689-01	Industrial Radiography Lab.	Beaumont	TX	Yes
42-01068-05	Halliburton Company	Houston	TX	Yes
42-00145-04	Humble Oil and Refining Co.	Houston	TX	
SNM-00663	University of Utah	Salt Lake City	UT	Yes
SNM-00945	State of Utah	Salt Lake City	UT	Yes
43-26821-01	Met-Chem Testing Lab.	Salt Lake City	UT	Yes
43-16815-01	Rollins, Brown, & Gunnell	Provo	UT	
05-19361-01	Plateau Resources, Ltd.	Grand Junction	CO	
43-07665-01	Kaiser Steel Corp.	Sunnyside	UT	Yes
43-07608-02	Sandy City Corporation	Sandy	UT	
46-15183-01	Department of the Air Force	McChord AFB	WA	
SNM-00978	Washington State University	Pullman	WA	
SNM-00153	Washington State University	Pullman	WA	
46-07811-01	Skagit Steel & Iron Works	Sedro Wooley	WA	
46-01662-03	University of Washington	Seattle	WA	
46-11974-02	McDonnell Douglas Astro.	Richland	WA	
46-01497-01	Industrial X-Ray Engineers	Seattle	WA	
46-01497-03	Industrial X-Ray Engineers	Seattle	WA	
SNM-00103	University of Washington	Seattle	WA	
49-14030-01	Minerals Exploration Co.	Casper	WY	

License #	Licensee Name	City	State	Transfer
SNM-00280	University of Wyoming	Laramie	WY	
SNM-00530	Department of the Air Force	Sundance AFB	WY	
49-19334-01	Howard-Donley Associates	Casper	WY	
49-18219-01	Amoco Pipeline Company	Ft. Laramie	WY	
49-19015-01	CTL Thompson, Inc.	Casper	WY	
19-01398-26	Martin-Marietta Corp.	Sundance AFB	WY	

ML031010195

GUIDE PAGE - REPORT TES-3210

This is the Guide Page to update report TES-3210 to Revision 2, December 1991.

1. Replace "Title Page" with new title page

2. Add "Preface to Revision 2" - pages vi-a and vi-b

3. Replace "Table of Contents" pages vii and viii

4. Add Appendix E: "Operating Procedures," and Appendix F "Acceptance Test and Maintenance Program," pages E-1 thru E-5 and page F1 at end of report (after Appendix D, "Specification for Shield and Generator Housing Materials").

9112110177 911202
PDR ADOCK 07104888
C PDR

RESUBMITTAL OF PRIOR APPLICATIONS AND SUPPLEMENTS FOR APPROVAL TO TRANSPORT THE SENTINEL (LCG) - 25C RADIOISOTOPE THERMOELECTRIC GENERATOR AS A TYPE B ( ) PACKAGE

TES-3210

AUGUST 1986

REVISION 1

OCTOBER 1986

REVISION 2

DECEMBER 1991

TELEDYNE ENERGY SYSTEMS
110 W. TIMONIUM ROAD
TIMONIUM, MARYLAND 21093

PREFACE TO REVISION 2

Revision 2 is in response to a NRC request* to supply additional information to include specific specific sections on operating procedures and maintenance program. The applicability of these two sections is addressed below.

OPERATING PROCEDURES

The intent of this chapter in the NRC Regulatory Guide 7.9 "Standard Format and Content of Part 71 Applications for Approval of Packaging of Type B, Large Quantity and Fissile Radioactive Material" is apparently to provide procedures for use in the loading and unloading of a typical "package" such as a shipping cask used to transport radioactive materials. A radioisotope fueled thermoelectric generator (RTG), however, is designed to convert the energy given up by the radioisotope's decay directly to electricity and hence, is useful only when loaded.

The Sentinel-25 series packages (RTGs) have been loaded or "fueled" at Oak Ridge National Laboratory (ORNL) and each RTG will remain "fueled" or loaded throughout its useful lifetime. If, and when, at the end of the RTG's useful life, the decision is made to "de-fuel" or unload the RTG, procedures will be developed based on the facilities to be used. Obviously, it is not possible to ship and "empty" package for these same reasons. The procedures for loading, unloading and transport of an empty package as described in the Regulatory Guide, therefore, are not applicable to an RTG. There are, however, procedures that must be followed to properly handle and transport an RTG and these procedures are outlined in new Appendix E: "Operating Procedures."

ACCEPTANCE TESTS AND MAINTENANCE PROGRAM

Again, the NRC Regulatory Guide, under the heading of "acceptance tests" requests that the applicant discuss those tests to be performed prior to the first use of a package. All of the Sentinel-25 series packages were fabricated and inspected many years ago. Even though tests were performed to assure that the radioisotopic heat sources were leak tight and that the radiation shielding is adequate to meet the requirements of 10 CFR Part 71, no additional units may be built and therefore this section is not applicable. Additionally, an RTG is designed to be maintenance free such that the only maintenance required is related to the shipping pallet and the associated attaching hardware, these items are discussed in new Appenedix F: "Acceptance Test and Maintenance Program."

---

* U.S. NRC letter SGTB:MGB 71-4888 dated 04 November 1991 from Charles E. MacDonald to John F. Vogt (TES) with enclosure.

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	Preface to Revision 2	vi-a	R2 12/91
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APPENDIX E

OPERATING PROCEDURES

DECEMBER 1991

The operating procedures discussed in this Appendix pertain to generator handling and transportation requirements.

1. RTG Handling

The SENTINEL 25 Series of RTGs are certified for shipment in vessels, cargo-only aircraft, rail cars and motor vehicles. They may be shipped without any special shipping container, but they must be attached to the steel pallets provided with the generator. The RTG is designed to be handled by fork-lift truck, with the forks fully engaged under the pallet, or by an overhead hoist or crane attached to a suitable sling. The generator is designed to be lifted by any 2 of the lifting/tie-down lugs. The sling must have a safe working load of at least 6900 pounds (the weight of the RTG and pallet plus a handling load of 3 G's).

An RTG should be handled with reasonable care. The thermoelectric modules are relatively fragile and open or short circuits can develope if the RTG is handled roughly. RTGs should never be dropped or pulled along a surface. Forklift and crane operators should take care to set the units down gently.

2. RTG Preparation for Shipment

To prepare the RTG for shipment the following steps must be taken:

a. Insure that the finned radiator assembly is bolted to the RTG's lid. (It should not normally ever be removed.)

b. Insure that the "shorting plug" furnished with the RTG is installed, when the RTG is disconnected from its electrical load.

c. Insure that the RTG is properly installed on its steel shipping pallet and tied down with the hardware shown on Figure E-1. Note that the Sentinel 25C is the only RTG in the entire Sentinel 25 series of generators that is not bolted directly to the steel pallet but is attached by means of turnbuckles. The shipping pallet was modified by the user and the attaching hardware provided as "government furnished equipment." General arrangement of hardware, however, is shown in Figure E-1 and the torque should be limited to 85-90 foot pounds.

d. Health Physics personnel should verify that the radiation dose rates measured at the RTG surface and at one meter from the surface are in compliance with 10 CFR 71.47.

e. Health Physics personnel should wipe test the outer surface of the generator and shipping pallet to assure compliance with 10 CFR 71.87 (i), and license leak test requirements.

f. The RTG's were marked and labelled prior to their initial shipment. Verification should be made to assure that the nomenclature is legible.

Markings

The following markings are required by 49 CFR. Letters must be at least 1/2" high.

(1) "RADIOACTIVE MATERIAL, SPECIAL FORM, N.O.S."

(2) (Gross Weight)

(3) "TYPE B"

(4) "USA/4888/B ( )" for Sentinel 25 Series RTGs

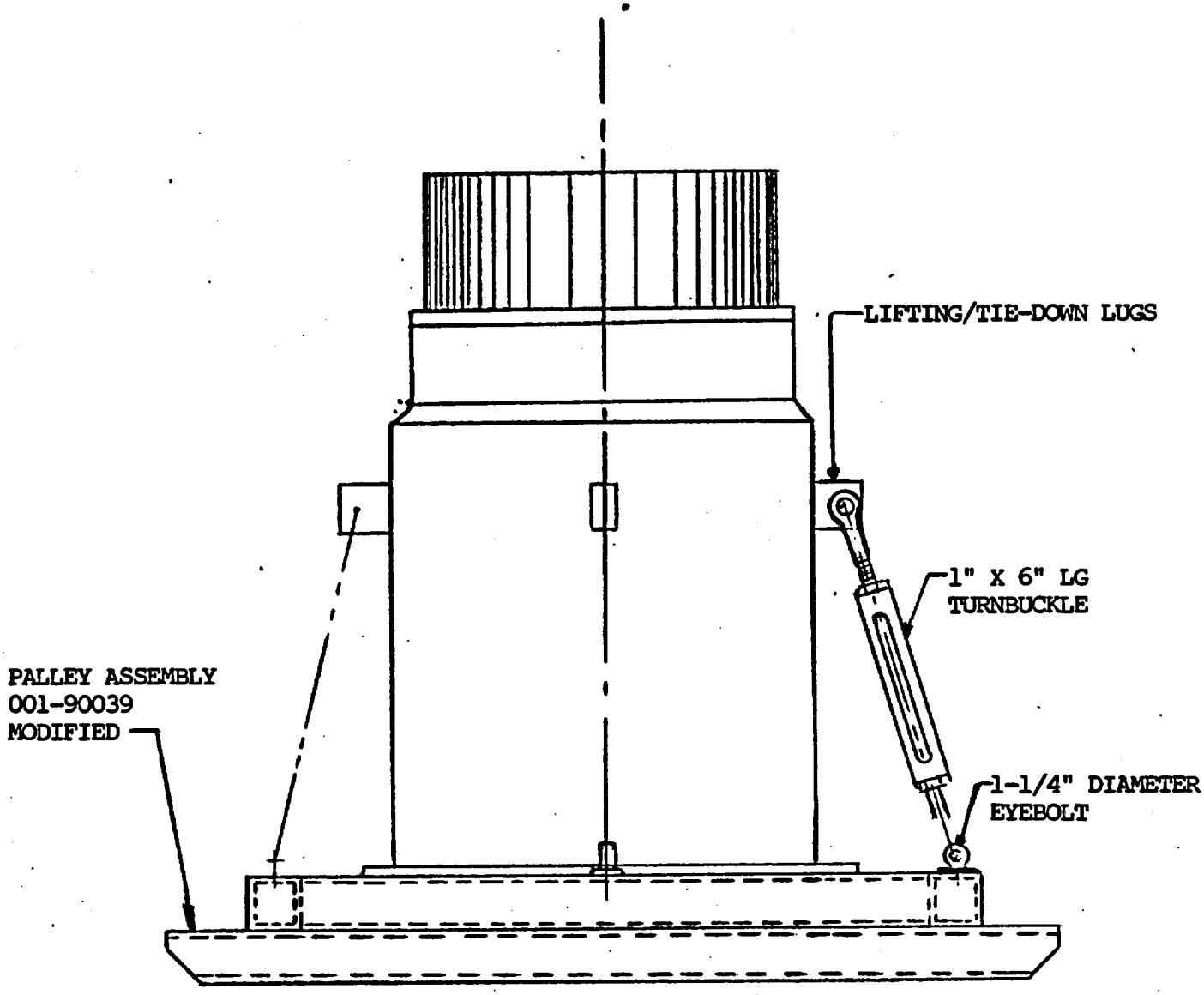


FIGURE E-1. SENTINEL 25C IN SHIPPING CONFIGURATION

(5) "UN 2974"

(6) (Model Number; e.g.: "SENTINEL 25F")

Labelling

Two "RADIOACTIVE-YELLOW III" labels are required on each RTG. They must be completed to show the radioisotope (strontium-90) curie content (as appropriate), and transport index (as appropriate) and are placed on opposite sides of generator.

The RTG, when loaded for shipment is to be tied down in a configuration similar to that shown in Figure E-2. In addition, the RTG must not be covered and should be kept at least one foot from bulkheads, other cargo and any other obstructions which might restrict the flow of air around the generator.

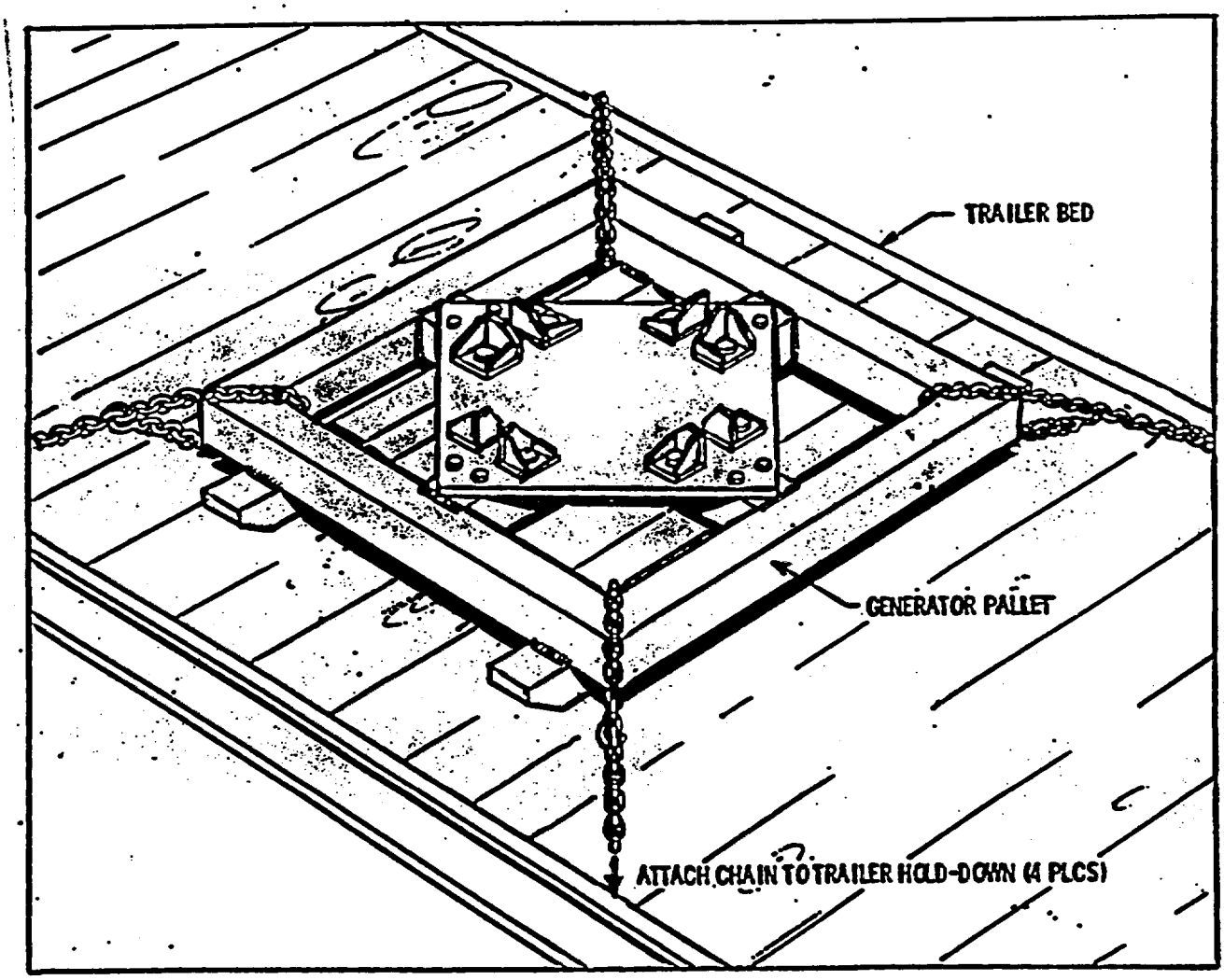


FIGURE E-2. PALLET TIE-DOWN CONFIGURATION

END OF APPENDIX E

APPENDIX F

ACCEPTANCE TEST AND MAINTENANCE PROGRAM

DECEMBER 1991

As discussed in the preface to Revision 2, there are no acceptance tests applicable to the SENTINEL 25 series of packages. In addition, the RTG is basically designed to be maintenance free due to its use primarily in remote, un-attended locations. This chapter deals with the very minor maintenance program required to ensure continued performance of the RTG package.

1. General Testing

There are no structural or pressure testing required to ensure the package performance. "Wipe" testing of the RTG's outer surface to check for the presence of removable radioactive contamination is required prior to the shipment of an RTG (see Chapter VIII). This test verifies that containment has not been breached since the previous shipment and is also the basis for demonstrating compliance with 10 CFR 71.87 (i).

2. Pallet

Prior to each shipment, as a minimum, the steel pallet should be visually inspected for evidence of rust, paint flaking and/or chipping and other signs of general deterioration, the pallet should be wire brushed and painted with one coat of primer and two finish coats of a good grade enamel paint when rusting is evident.

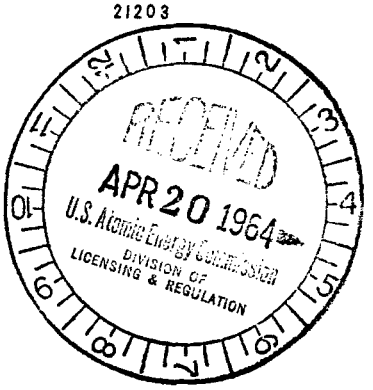
3. Hardware

The hardware that attaches the RTG to its shipping pallet (see Figure E-1) should be inspected prior to each shipment for signs of corrosion, structural damage and other forms of deterioration. The hardware must be replaced with new hardware if structural integrity is in doubt.

END OF APPENDIX F

MARTIN COMPANY

NUCLEAR
DIVISION
Baltimore,
Maryland
21203



In reply refer to:
ACC-277

April 15, 1964

Material Licensing Division
U. S. Atomic Energy Commission
Washington, D. C.

Attention: Mr. Lyall E. Johnson, Acting Director
Material Licensing Division

Subject: Renewal of Byproduct Material License 19-1398-29

Enclosure:
(1) Application for Byproduct Material License Form AEC-313 (6 copies)
(2) Radioisotopes Pilot Plant - Facility Design and Safety Evaluation MND-3137 (6 copies)
(3) Cell 4 Process Control Panel N-0009748 (6 copies)
(4) Cell and Isolation Concept for Cells 3 and 4 N-0009744 (6 copies)

Gentlemen:

We request that Byproduct Material License No. 19-1398-29, covering the operation of the Martin Marietta Corporation Pilot Plant at Quehanna, Pennsylvania utilized for the production of isotopic heat sources, be renewed.

We have compiled "Radioisotopes Pilot Plant - Facility Design and Safety Evaluation", MND-3137 in support of our request for license renewal. Chapter 3, Part 3.6 of MND-3137 "Reagents" sets forth classified information in connection with License No. 19-1398-29 and is being forwarded under separate cover.

B-69

We intend that "Radioisotopes Pilot Plant - Facility Design and Safety Evaluation", MND-3137, replace all previous submissions in connection with the existing byproduct license 19-1398-29 with the following exceptions:

(1) A Proposed Amendment to License 19-1398-29 submitted to you on April 1, 1964 covering the removal and disposal of the Stationary Overhead Transfer System.

(2) A proposed amendment to be submitted to you in the near future to obtain Commission approval for the rehabilitation of Cells 1 and 2.

Your approval of this submission is required no later than July 1, 1964 in order that we may resume production of heat sources at that time.

We will be happy to participate in any discussions you may desire and will contact your office in approximately two weeks to establish a firm meeting date to discuss any questions you may have concerning this submission. Please contact me on 301-687-3800, Extension 513 at any time if we can be of assistance in this matter.

Thank you for your early consideration of this matter and for the excellant cooperation of your personnel in past licensing actions.

Very truly yours,

C W Keller

C. W. Keller,
Nuclear Accountability &
Licensing Representative

CWK/mc

Encls.



Form AEC-313 (5-58)	ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE**	Form approved. Budget Bureau No. 38-R027.4.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*	(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*
Martin Marietta Corporation Baltimore, Maryland	Martin Marietta Pilot Plant Quehanna, Pennsylvania
2. DEPARTMENT TO USE BYPRODUCT MATERIAL	**3. PREVIOUS LICENSE NUMBER(S).** *(If this is an application for renewal of a license, please indicate and give number.)*
Martin Marietta Corporation Nuclear Division	Renewal of Byproduct License 19-1398-29
4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*	**5. RADIATION PROTECTION OFFICER** *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*
Please refer to Chapter 4, Part 4.4 of MND-3137	Richard J. Brisson (Resume submitted in regards to license #9 dated 3/29/63)

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*	
Strontium-90	6,000,000 curies	Please refer to Chapter 3 of MND-3137 especially Part 3.6 "Reagents" which is classified.
Associated Contaminants		
Strontium-89	1,800,000 curies	
Cerium-144	30,000 curies	
Other gross fission products	30,000 curies	

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

For the production of isotopic heat sources.

(Continued on reverse side)

In reply refer to:
ACC-277

April 15, 1964

Material Licensing Division
U. S. Atomic Energy Commission
Washington, D. C.

Attention: Mr. Lyall E. Johnson, Acting Director
Material Licensing Division

Subject: Renewal of Byproduct Material License
19-1398-29

Enclosure: (1) Application for Byproduct Material License Form AEC-313 (6 copies)

(2) Radioisotopes Pilot Plant - Facility Design and Safety Evaluation MND-3137 (6 copies)

(3) Cell 4 Process Control Panel N-0009748 (6 copies)

(4) Cell and Isolation Concept for Cells 3 and 4 N-0009744 (6 copies)

Gentlemen:

We request that Byproduct Material License No. 19-1398-29, covering the operation of the Martin Marietta Corporation Pilot Plant at Quehanna, Pennsylvania utilized for the production of isotopic heat sources, be renewed.

We have compiled "Radioisotopes Pilot Plant - Facility Design and Safety Evaluation", MND-3137 in support of our request for license renewal. Chapter 3, Part 3.6 of MND-3137 "Reagents" sets forth classified information in connection with License No. 19-1398-29 and is being forwarded under separate cover.

We intend that "Radioisotopes Pilot Plant - Facility Design and Safety Evaluation", NMO-3137, replace all previous submissions in connection with the existing byproduct license 19-1388-29 with the following exceptions:

(1) A Proposed Amendment to License 19-1388-29 submitted to you on April 1, 1964 covering the removal and disposal of the Stationary Overhead Transfer System.

(2) A proposed amendment to be submitted to you in the near future to obtain Commission approval for the rehabilitation of Cells 1 and 2.

Your approval of this submission is required no later than July 1, 1964 in order that we may resume production of heat sources at that time.

We will be happy to participate in any discussions you may desire and will contact your office in approximately two weeks to establish a firm meeting date to discuss any questions you may have concerning this submission. Please contact me on 301-587-3800, Extension 513 at any time if we can be of assistance in this matter.

Thank you for your early consideration of this matter and for the excellent cooperation of your personnel in past licensing actions.

Very truly yours,

[redacted]

C. W. Keller,
Nuclear Accountability &
Licensing Representative

C.W.K/sc

Encls.

Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.4.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)

Martin Marietta Corporation
Baltimore, Maryland

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)

Martin Marietta Pilot Plant
Quehanna, Pennsylvania

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Martin Marietta Corporation
Nuclear Division

3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)

Renewal of Byproduct License
19-1300-28

4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)

Please refer to Chapter 4, Part 4.4 of MND-3137

5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)

Richard J. Briscoe
(Resume submitted in regards to license #0 dated 3/29/63)

(a) BYPRODUCT MATERIAL. (Elements and mass number of each.)	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)
Strontium-90	6,000,000 curies
Associated Contaminants	
Strontium-89	1,500,000 curies
Cerium-144	30,000 curies
Other gross fission products	30,000 curies

Please refer to Chapter 3 of MND-3137 especially Part 3.6 "Reagents" which is classified.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

For the production of isotopic heat sources.

(Continued on reverse side)

Form AEC-313 (5-58) Page Two

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	Please refer to Chapter 4 Part 4.4 of MND-3137		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
	Please refer to Chapter 4, Part 4.4 of MND-3137			

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
Please refer to Chapter 10 of MND-3137					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

Please refer to Chapter 10 of MND-3137

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

Please refer to Chapter 10 of MND-3137

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No

Please refer to Chapter 5, MND-3137

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If applicable, concerning sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

Please refer to Chapter 10, MND-3137

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

Chapter 7, MND-3137

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

MARTIN MARIETTA CORPORATION

April 15, 1964

Date

Applicant Name

Roller

Nuclear Accountability &

Licensing Representative

Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

* U.S. GOVERNMENT PRINTING OFFICE 1961 O—615963

Martin Marietta Corporation

RADIOISOTOPES PILOT PLANT

Quehanna, Pennsylvania

FACILITY DESIGN AND SAFETY EVALUATION

MND-3137

April 1964

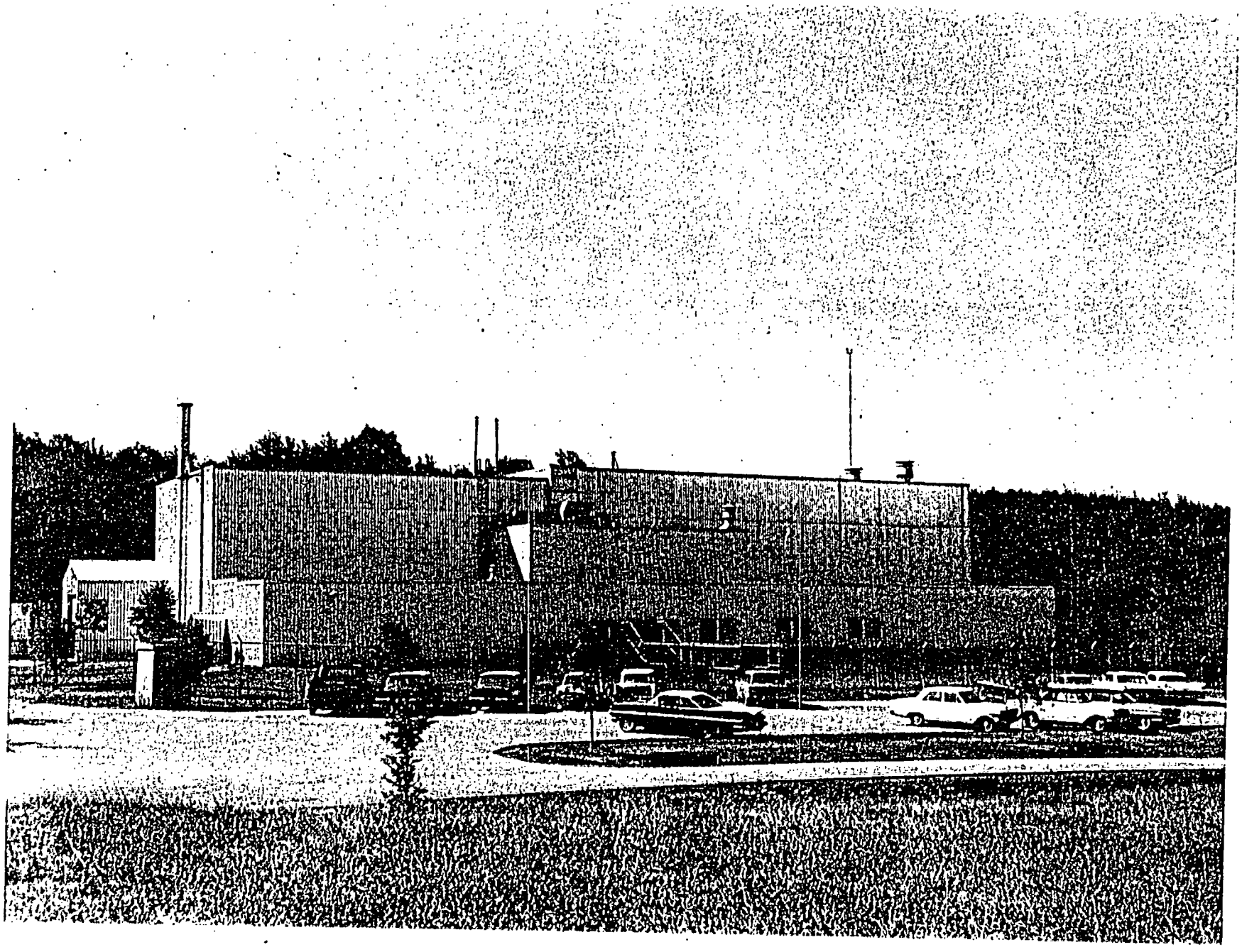
Prepared by: C. O. Riggs

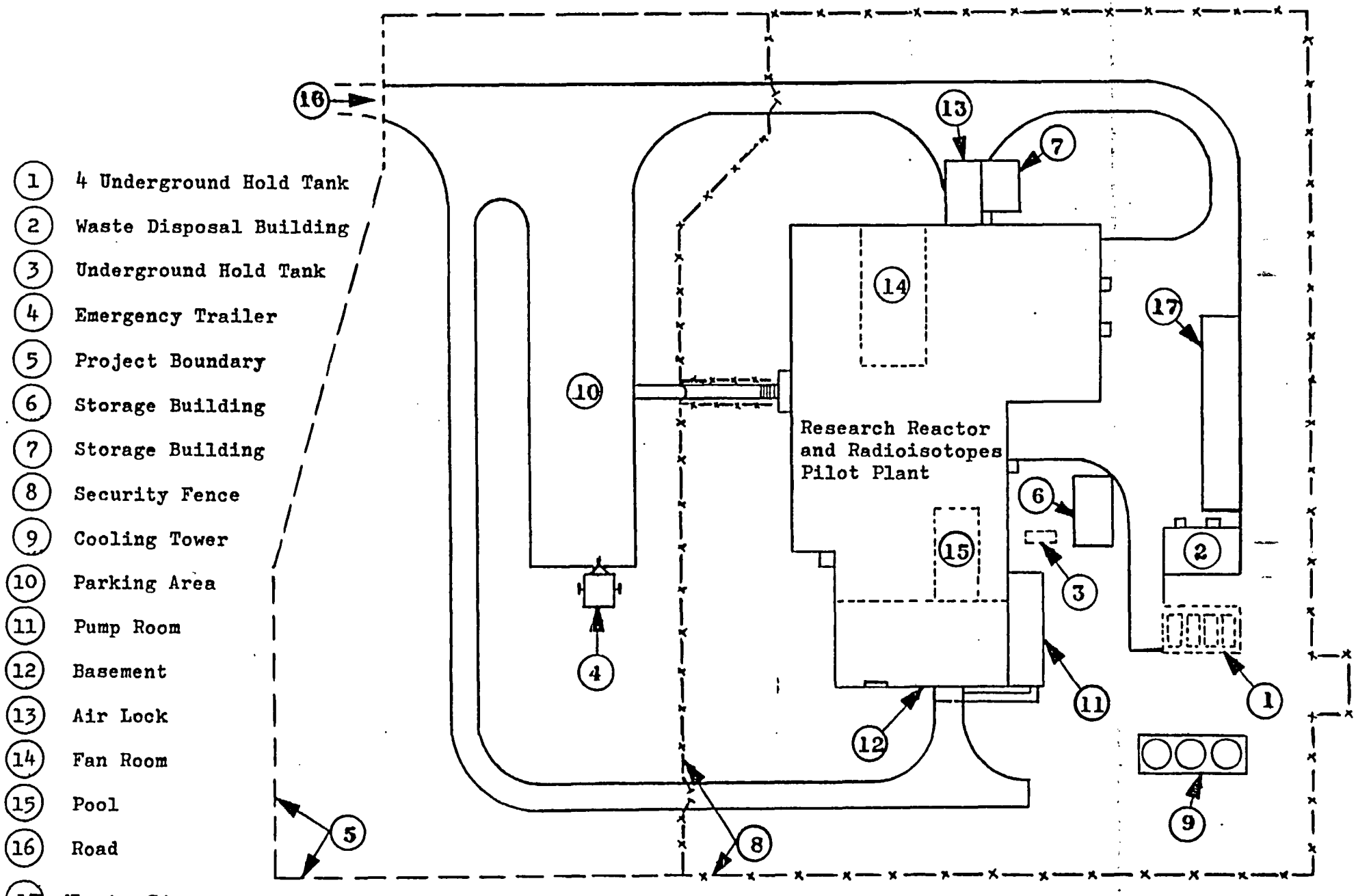
T. W. Conway

L. K. Clark

Approved by: W. A. Vogele, Suprv.
Nuclear Safety Unit

W. G. Ruehle





Layout of the Radioisotopes Pilot Plant Site

ACKNOWLEDGEMENTS

This report has been prepared and edited by members of the Nuclear Safety Unit of the Martin Nuclear Division. In addition to those listed on the title page, R. Huebschman assisted in the early portion of the work. I. Gray also assisted the Unit in the beginning.

The work could not have been brought to a successful completion without the continued cooperation and assistance of the Quehanna Plant staff, including J. Cochran, Plant Manager, and M. Bowles. The latter, designated for liaison, worked closely with the Unit.

The chapter on health physics was prepared by R. Brisson, Supervisor of Health Physics, and J. Toennies. This group gave other valuable criticisms and suggestions.

The sections on shielding were prepared by D. C. Anderson, A. Spamer and K. Davenport of the Shielding Unit and they have reviewed other sections, as appropriate.

Dr. Merrill Eisenbud, Professor of Industrial Medicine has reviewed the report and made highly valued comments.

Figure 2.2 has been reproduced from the official state map of Pennsylvania by the kind permission of that state's Department of Highways. Figure 2.3 was prepared from a map of the United States Geological Survey.

FOREWORD

This report is submitted to the Division of Licensing and Regulation of the United States Atomic Energy Commission by the Nuclear Division of the Martin Company. It presents the plant design, process description and safety evaluation of the Radioisotopes Pilot Plant at Quehanna, Pennsylvania. It is presented in support of the Martin Company application for license to continue the production of radiostrontium fuel forms.

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CHAPTER 1

INTRODUCTION

This summary report has been prepared by Martin Nuclear Division, Baltimore, Maryland, a division of Martin Marietta Corporation. It presents the plant design and production process of the Radioisotopes Pilot Plant at Quehanna, Pennsylvania, and provides a general safety evaluation of the facility and operation. The report is submitted to the United States Atomic Energy Commission in support of an application for license to continue processing multi-curie quantities of radiostrontium.

The Radioisotopes Pilot Plant has been operated by the Martin Company since July, 1962. In this time invaluable experience has been gained and much of this is reflected in the improvements in plant design, process equipment and procedures and safety provisions described in the present report.

The operations of the Radioisotopes Production Pilot Plant are directed to the production of radioisotopic sources of heat. Several generators employing such sources are now in use furnishing power for remotely-located automatically-reporting weather stations, navigation buoys, etc., and are contemplated for use in space vehicles. The requirements in these field are expected to utilize the full capacity of the Pilot Plants in the immediate future and to exceed it in the

near future.

The building in which the Radioisotopes Production Pilot Plant is located was constructed by the Curtiss-Wright Corporation in 1957 and presented to the Pennsylvania State University in September 1960. The Martin Company leases from the University which retains control of part of the building and monitors the liquid waste disposal to the streams.

CHAPTER 2

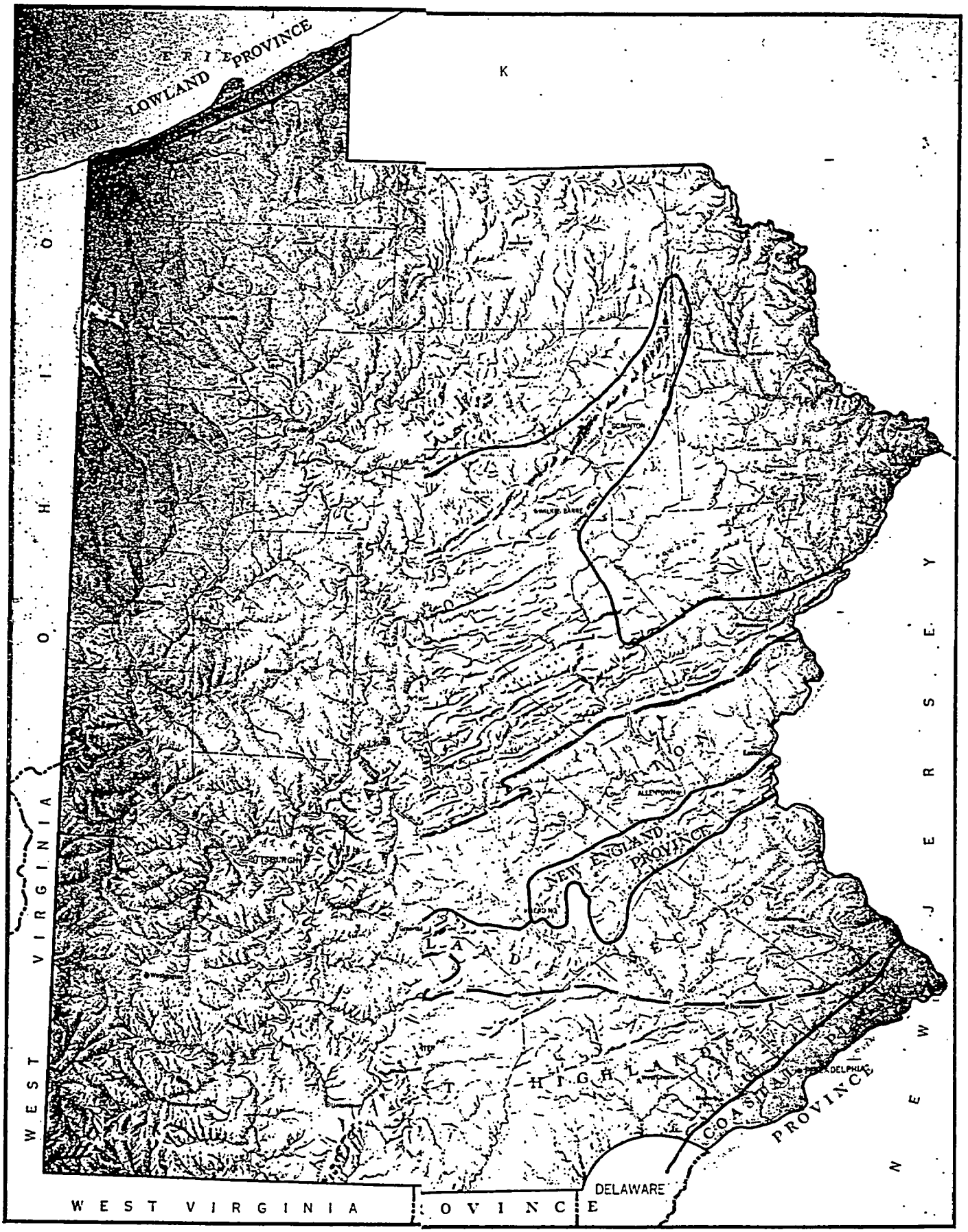
QUEHANNA SITE

The area within which the Martin Radioisotopes Pilot Plant is located is the former Curtiss-Wright Quehanna Research Facility, 45 miles northwest of State College in north-central Pennsylvania. It includes parts of Elk, Cameron, and Clearfield Counties. Figure 2.1 shows the area in relation to the State of Pennsylvania. This location is perhaps the most remote one for a nuclear facility in the eastern United States, since it is in a sparsely populated region and has an area of approximately 80 square miles. The nearest population centers, Sinnemahoning (population 300) and Karthaus (population 400), are nine miles from the site. This site is ideal for the hot cell operations with respect to its population, meteorologic and hydrologic characteristics. Its general features are representative of those of the Appalachian Plateau physiographic province. Radioisotope production has been carried out by the Martin Company on the site under license from the Atomic Energy Commission since 1962; previous to that reactor and nuclear facilities were operated by the Curtiss-Wright Corporation and the Pennsylvania State University. This study extends and brings up-to-date a previous site description (Reference 2.1)

2.1 Site Location

2.1.1 Regional

Figure 2.2 is a political map of the area around the facility showing the highway network and towns and villages.



CENTRAL LOWLAND PROVINCE
K
SCRANTON
WILKES BARRE
ALLENTOWN
NEW ENGLAND PROVINCE
PITTSBURGH
HIGHLANDS
PHILADELPHIA
COASTAL PLAIN PROVINCE
DELAWARE
WEST VIRGINIA
WEST VIRGINIA
NEW JERSEY

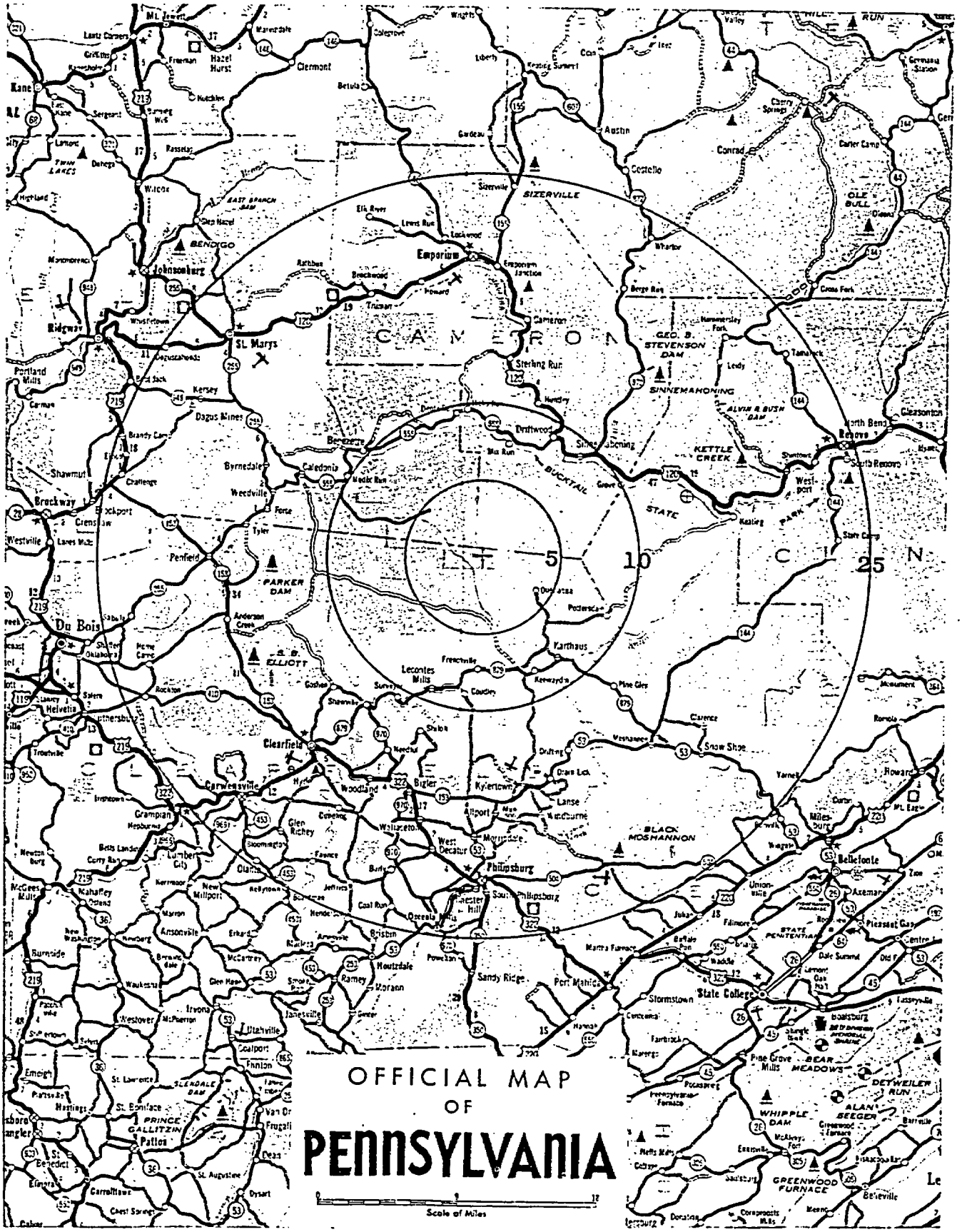


Figure 2.2
Environs of Martin
Radioisotopes Pilot Plant,
Quehanna, Pennsylvania

The land is largely state forest and state gameland. Circles of 5, 10 and 25 mile radius have been superimposed on the map.

2.1.2 Exclusion Area

Figure 2.3 is a reproduction of a topographic map of the site area. The laboratory site is shown near the upper left corner of the map.

The exclusion area is defined as that area around the laboratory which is under control of the Martin Company and the Pennsylvania State University. The terms of the agreement between Martin and the University with respect to this exclusion area are described in Reference 2.2. The reference states that "all necessary steps" are being taken to assure that an exclusion area is maintained which will be satisfactory to Martin and the Atomic Energy Commission. Control is maintained around the facility via Cyclone fence and guard service.

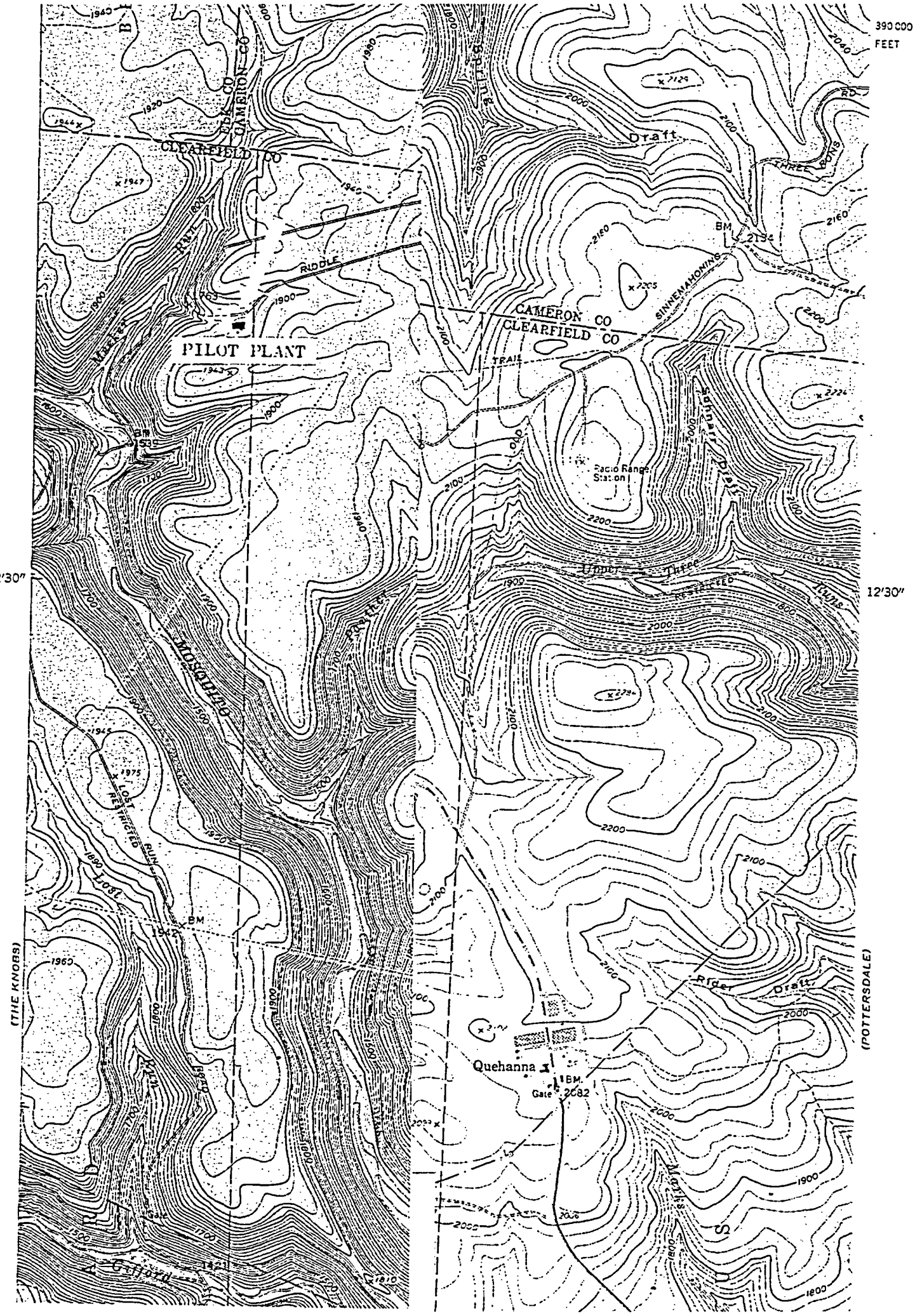
2.2 Geography

2.2.1 Topography

The topography of the region is typical of the Appalachian Plateau; it is a relatively flat area at an average elevation of 2000 feet above mean sea level. The edge of the exclusion perimeter is incised by several gorges up to one-half mile in width and 1000 feet in depth which radiate from their origin near the center of the site.

2.2.2 Land Usage

The area is included in state forest land with a secondary growth of trees. In this area, there is seasonal



390 000 FEET
12'30"
12'30"
(THE KNOBS)
(POTTERSDALE)
CLEARFIELD CO
CAMERON CO
CLEARFIELD CO
PILOT PLANT
RIDDLE
TRAIL
SINNEMAHONING
Draft
THREE PONS
Radio Range Station
Upper Three Runs
RESTRICTED
MOSQUITO
Panther
LOST RUN
RESTRICTED
Lost
Rider Draft
Quehanna
BM
Gate
2082
Gilford

recreation activity especially hunting. Beyond the state forest land, within outlying townships, there is small-scale agricultural activity. Land usage is therefore quite limited.

2.3 Population Density and Distribution

The sparse population in its environs is perhaps the most favorable feature of the site. The state forest surrounding the facility has a low permanent population density. Within a 25 mile radius of the site, the population density is 27 individuals per square mile, with a total population within this zone of about 53,000.

The population within a 25 mile radius of the site is distributed into about 50 small villages with populations less than 1000 individuals (average 400), six small towns averaging 5000 individuals and a minimal number of outlying individual habitations. The total population of this zone has decreased by about 8000 during the past 8 years due to the closing of nearby mines and stripping operations.

Table 2.1 gives the population distribution within a 25 mile radius of the site. The population within 22.5° sectors of this area is listed in Table 2.2.

The predominant wind directions at the site are from the west-northwest and south-southeast. From a population distribution standpoint these are favorable, since they are not directed at the major population centers of the region nor into areas of above average population density.

2.4 Meteorology (Reference 2.3)

TABLE 2.1

Towns Nearest Reactor Site*

	Population		Population
Allport	300	Kylertown	300
Bald Hill	250	Lanse	300
**Bellefonte	6088	Lecontes Mills	250
Benezette	200	Medix Run	60
Bigler	500	Mineral Springs	500
Bloomington	160	Morrisdale	800
Blue Hill	450	Moshannon	500
Brandy Camp	400	Munson	450
**Brockport	450	Oak Grove	200
**Brockway	2563	Olanta	80
Caledonia	300	Oshanter	150
Cameron	80	**Orviston	275
Challenge	30	Penfield	700
Chester Hill	919	Philipsburg	3872
Clarence	500	Pine Glen	50
Clearfield	9200	Pottersdale	50
**Crenshaw	350	**Renovo	3316
Curwensville	3231	**Ridgway	6387
Dagus Mines	450	Rockton	200
Dents Run	30	Sabula	80
Drifting	50	**State College	22500

TABLE 2.1 (Cont'd)

	Population		Population
Driftwood	203	St. Marys	8065
Drury Run	200	Shawville	25
**Dubois	10,600	Shintown	65
Elbon	150	Sinnemahoning	300
Emporium	3397	Snow Shoe	714
Force	400	**South Renovo	777
Frenchville	50	Sterling Run	150
Glen Rickey	400	Surveyor	100
Grassflat	850	**Sykesville	1479
Hammersley Fork	15	Truman	75
Hawk Run	850	Tyler	250
Hollywood	200	Wallaceton	429
Howard	45	Weedville	500
Hyde	850	West Decatur	750
**Johnsonburg	4966	Westport	135
**Kane	5380	Wharton	25
Karthaus	400	Woodland	900
Keating	35	Windburne	800
Keewaydin	35	Byrnedale	500
Kersey	600		

*From Rand McNally Commercial Atlas and Marketing Guide, 1963 Edition. Includes towns within 25 mile radius of site.

**Towns slightly outside the 25 mile radius.

TABLE 2.2

Population within 25 mile Redius of Site by 22.5° Sectors.

Sector	Population
N-NNE	3627
NNE-NE	228
NE-ENE	415
ENE-E	4328
E-ESE	275
ESE-SE	1264
SE-SSE	1050
SSE-S	8472
S-SSW	3748
SSW-SW	14696
SW-WSW	200
WSW-W	780
W-WNW	3530
WNW-NW	9375
NW-NNW	~ 0
NNW-N	~ 150

2.4.1 Data Available

Meteorological data recorded at the facility site show its weather conditions to be quite similar to those at the Philipsburg airport, 27 miles southeast of the site, for which complete meteorological records have been kept. The information reported here is taken from observations at the airport, although observations are now being recorded at the site.

2.4.2 Wind Flow

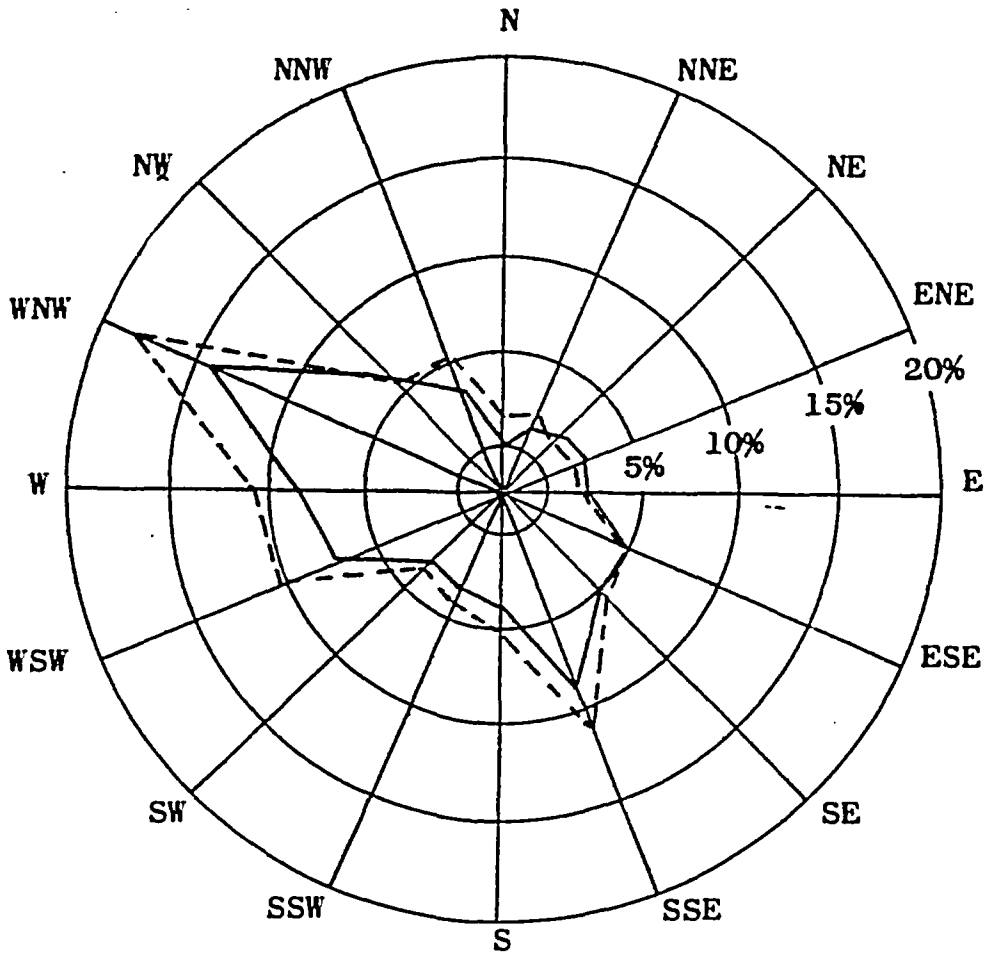
Hourly wind observations for an eight-year period were studied in detail. Table 2.3 presents the annual frequency of wind speeds for various times and weather conditions; Figure 2.4 and Table 2.4 show the annual frequency due to time of day, weather condition and season of the year. The winds are predominantly from north-northwest to west-southwest and occur 30 to 40% of the the time. About 20% of the winds are from the sector from east-southeast to south.

Wind speeds during the daylight hours vary from a maximum average of 12.4 mph (spring) to 8.2 mph (summer). Night time speeds are somewhat lower, with a highest average speed of 10.1 mph (winter) and a lowest speed of 4.2 mph (summer). The maximum number of calms occur during the summer (night) when, 39% of the time, the wind is less than 1 mph. Maximum wind speeds are generally from the west with a maximum speed of 50 mph and a peak instantaneous gust of 60 mph recorded. Unrecorded

TABLE 2.3

Annual Frequency of Wind Speeds (%) at Airport Philipsburg, Pennsylvania

Wind Speed (mph)	Calm	1 to 3	4 to 12	13 to 24	25 to 31	32 to 46	≥ 47
Daylight	6.8	3.4	59.8	27.3	2.2	0.4	<0.1
Night	23.0	7.9	51.2	16.3	1.3	0.3	<0.1
During Precipitation	5.1	3.4	52.4	34.4	3.8	0.9	<0.1
Visibility ≤ 6 miles	16.9	6.9	55.1	19.1	1.7	0.4	<0.1



Day	3 mph and calm	10.1%
	Average speed	10.4 mph
Night	3 mph and calm	30%
	Average speed	7.3 mph

Fig. 2.4 Annual Wind Direction at Airport, Philipsburg, Pennsylvania

TABLE 2.4

Annual Frequency of Wind Directions
at Airport, Philipsburg, Pennsylvania

Direction (Wind Speed > 4 mph)	Daylight (07-1700 EST)	Night (18-0600 EST)	During Precipitation	During Low Visibility
N	1.7	0.9	0.8	0.8
NNE	2.1	1.4	1.4	1.3
NE	1.2	2.1	1.1	1.5
ENE	1.6	2.3	2.0	2.4
E	1.7	2.0	2.3	2.5
ESE	4.9	4.9	7.1	7.1
SE	5.5	5.1	6.8	7.3
SSE	11.1	8.6	11.7	12.2
S	5.1	3.8	4.2	5.0
SSW	4.1	3.1	5.5	4.3
SW	3.5	3.8	2.4	3.2
WSW	10.1	7.0	9.2	8.0
W	10.6	8.3	10.2	8.6
WNW	18.8	14.3	21.9	13.1
NW	5.7	6.1	5.2	3.4
NNW	5.4	3.4	3.2	2.4
3 mph and calm	10.1	30.9	8.5	23.8
Avg. speed (mph)	10.4	7.3	11.8	8.3

gusts may attain 80 to 90 mph. It is noted that the most frequent winds are between 4 and 12 mph (50%) with the second frequency preference in the 13 to 24 mph category. Five tornadoes have been reported in the surrounding five counties in a 35-year period. The winds aloft have the same general pattern as the surface winds, except that they increase in velocity with altitude.

2.4.3 Precipitation

The average annual precipitation at the site is estimated to be between 40 and 50 inches per year. Maximum precipitation occurs in May through July, and the minimum precipitation occurs in November and December. The range of average precipitation is from 2.5 to 4.5 inches per month. Table 2.5 shows the average number of days of precipitation. Because of the frequency of storms, precipitation is quite variable. Storms occur throughout the year, with heavy rainfall from thunderstorms during the spring and summer months. Maximum precipitation varies from 1.38 inches, registered over a one-hour period, to 4.68 inches, recorded in a 48 hour period.

Snowfall is estimated to be an average total of 40 inches per year. Heavy snowfalls are not uncommon (10 inches in a single storm). The maximum snowfall recorded was 20.0 inches over a 24 hour period.

2.4.4 Atmospheric Stability

The vertical temperature distribution at or

TABLE 2.5

Average Number of Days of Precipitation
at Airport
Philipsburg, Pennsylvania

Inches	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Annual
≥0.10	8	10	9	9	10	8	7	6	6	6	8	6	89
≥0.50	1	2	3	3	3	2	2	2	2	3	2	2	27
≥1.00	*	*	1	1	1	1	1	1	1	1	1	1	9

Range of Precipitation Occurrences

≥0.10	From 72/year to 113/year
≥0.50	24/year to 38 year
≥1.00	3/year to 15/year

near the site has not been measured. Extrapolation has been made from other locations having similar weather conditions. Observations indicate that inversion conditions exist about one-third of the time, chiefly at night. Variations are expected in the duration of inversions due to the site topography where inversions in the air drainage of the radial gorges will be more prolonged than those on the plateau above. However, good dispersion is expected during the daylight hours, and inversions would be of short duration.

2.4.5 Temperature

The average monthly temperature ranges from 65°F in July to 22°F in January, with an annual average temperature of 44°F. Below-freezing temperatures occur many days per year.

2.4.6 Summary

Qualitative estimates of the meteorological pattern can be made from the Philipsburg Airport data and from regional characteristics which are relatively uniform. Diffusion characteristics can be deduced from the local topography and subsequent air drainage into the surrounding gorges.

2.5 Geology

2.5.1 Stratigraphy

Table 2.6 shows the stratigraphic section in the site area. Outcrops in the area are meager and incomplete logs of drill holes must serve as the basis for evaluation.

TABLE 2.6

Generalized Section of Geology at
Quehanna, Karthaus, Pennsylvania

Age	Formation	Thickness(ft)	Description	Water-Bearing Properties
Pennsylvanian	Pottsville	200 ±	Consists of massive coarse-grained gray-to-white sandstones with pebbles as large as hazelnuts. Caps hilltops. Probably represents the Olean member of formation.	Sandstones productive where found below drainage level, generally yield small to moderate supplies elsewhere.
Mississippian	Mauch Chunk shale	50 ±	Red and green argillaceous shale with some sandstone. Not generally exposed, indicated by terrace developed between Pottsville conglomeratic cliffs above and steep Knapp slopes below.	Not a water-bearing horizon, probably forms impervious strata retarding downward percolation of water.
Mississippian or Devonian	Knapp (Pocono)	600 ±	Succession of alternating olive-gray, gritty, micaceous sandstones gray-green argillaceous shales. Some red beds occur near bottom of formation.	Productive consolidated rock where encountered below drainage level.

However, due to the lack of tectonic disturbances in the area, lateral correlation from existing data is possible. The lower portion of the Pottsville formation caps the area. It consists of sandstones, with the lowest sandstone member as the predominant aquifer. This is underlain by the Mauch Chunk shale which is an impervious layer about 50 feet thick. Beneath it is the Pocono formation of interbedded sandstones and shales which form the steep slopes of the gorges.

2.5.2 Structure

In the site area the beds are generally horizontal and demonstrate the lack of structural disturbance in the area. In the northern portion of the site area, there is field evidence of gentle folding. Faults, joints and fractures are probably not abundant at the site, and the area is considered to be stable.

2.6 Hydrology

2.6.1 Subsurface Hydrology

As stated previously, the predominant aquifer in the area is contained at the base of the Pottsville, though it is not very productive. Since the Pottsville forms the surface exposure, it collects water and transmits it downward to a saturated sandstone member 40 feet thick near the interformational contact with the impervious Mauch Chunk shale. Secondary recharge is provided by streams cutting the Pottsville, and

discharge occurs at springs at the interformational contact. The top of Mauch Chunk is less than 1900 feet elevation and is presumed to be less than 100 feet, vertically, from the laboratory.

Water for the facility is obtained from a dam on Meeker Run. The dam is located upstream from the facility approximately 1100 feet down the mountain and is capable of releasing 120 gpm.

Downward transmission of contaminants released to the Pottsville formation is prevented by the underlying impervious Mauch Chunk shale. Lateral transmission within the Pottsville aquifer would be of a somewhat limited nature and would not pose a significant subsurface contamination problem in the light of the large exclusion area surrounding the laboratory. In fact, the movement of soluble contaminants within the Pottsville would be measured in the terms of feet per year. (Reference 2.4).

2.6.2 Surface Hydrology

Surface drainage from the site exclusion area is from four major radial stream systems; Mix Run (north), Wykoff Run (northeast), Upper Three Run (southeast), and Mosquito Creek (south). The former two streams drain into Sinnemahoning Creek, which flows into the west branch of the Susquehanna River; the later two drain directly into the river.

Of prime interest is Mosquito Creek, which drains the laboratory area as shown in Figure 2.5. Surface water in this area flows successively into Reactor Run, Meeker Run, Mosquito Creek and ultimately into the west branch of the Susquehanna. The river has a rather large average flow rate at Karthaus (maximum, 50,900 cfs; average, 2463 cfs; minimum 109 cfs). This branch of the Susquehanna is not used for public water supply because of its acidity (p H=3, Reference 2.4).

There are two reservoirs within the exclusion area, both of which are removed from the laboratory by several miles, and away from the runoff of Meeker Run.

2.7 Seismology

A total of six recorded earthquakes have had their epicenters in Pennsylvania, with some of the anadian and New York state earthquakes being felt there. Of the six epicenters cited, none was in the site region, and all were in Eastern Pennsylvania, involving low-intensity shock (maximum 6 to 7 Rossi-Forel Scale). It is consluded that, due to their low frequency and intensity, the foundation material, of the facility and its massive structure, earthquakes do not present a significant problem (Reference 2.5).

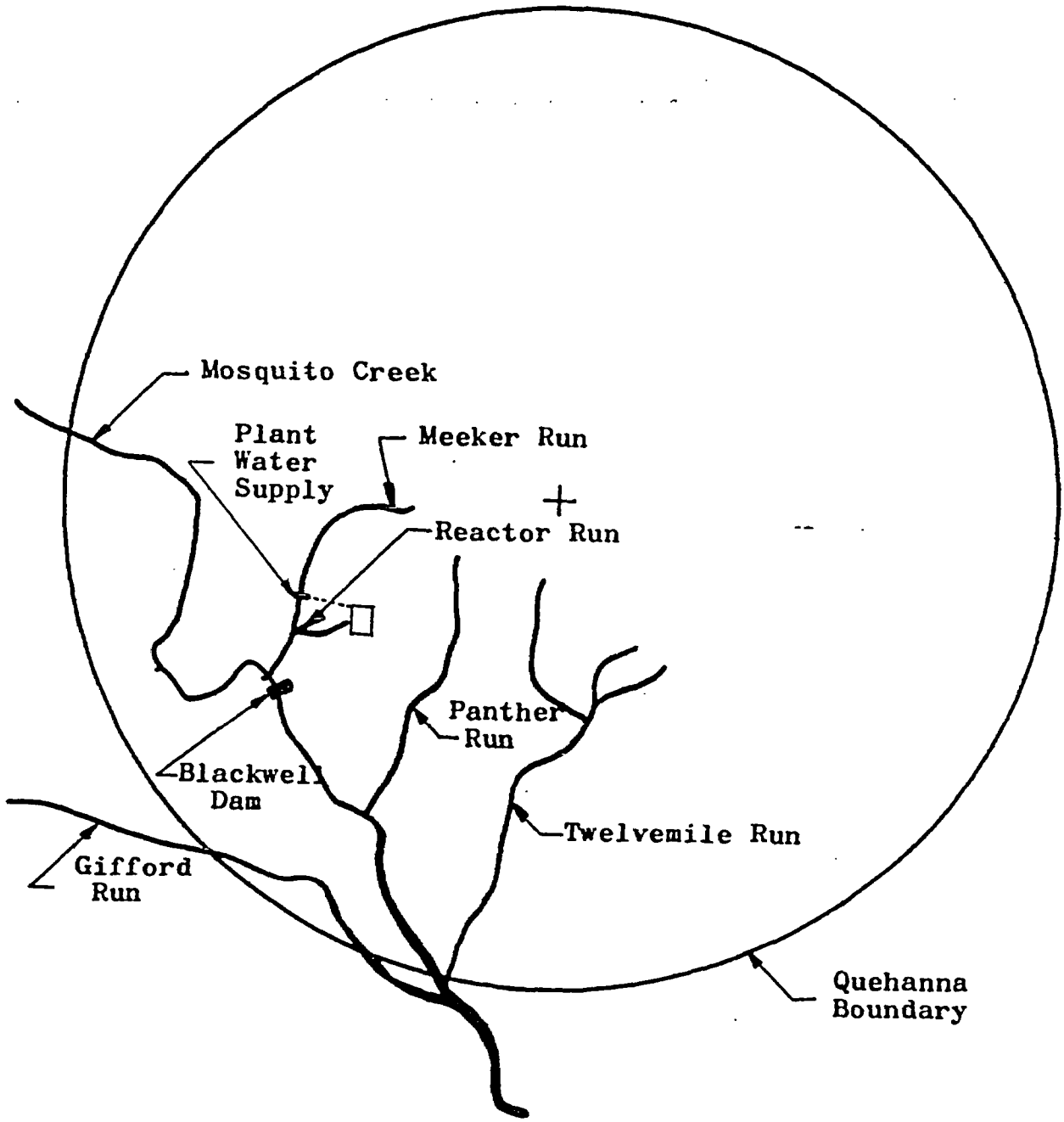


Fig. 2.5 Site Drainage--Radioisotopes Production Facility, Quehanna, Pennsylvania

2.8 References

2.1 "Hazards Evaluation Report, Curtiss-Wright Research Reactor, 4 Megawatt, "CWR-4062, April 1959.

2.2 Donkin, M., Vice President and Treasurer, The Pennsylvania State University, Letter to the Division of Lecensing and Regulation, AEC, October 28, 1960.

2.3 Pack, D. H., "Meteorological Appraisal of the Quehanna, Pennsylvania, Site of Curtiss-Wright," May 1956.

2.4 DeBuchananne, G. D., "Reconnaissance of the Geology and Hydrology of the Quehanna Site," U. S. Geological Survey, April, 1956.

2.5 Heck, H. N., "Earthquake History of the United States, Part I," USCGS 609, 1947.

CHAPTER 3

PROCESS DESCRIPTION FOR STRONTIUM-90

3.1 General Description

3.1.1 Summary

The Quehanna Radioisotopes Pilot Plant processes strontium-90 to encapsulated sources suitable for a variety of uses. In this chapter the Quehanna process and planned variations used in production of strontium-90 fuel forms are described. In all variations of the process, a precipitate is formed from a $Sr(NO_3)_2$ solution by addition of inorganic nonflammable reagents. The precipitate is filtered and dried; the resulting powder is loaded and densified; the fuel container is sealed and decontaminated; measurements are made as desired and the final fuel container is loaded into a generator, cask or storage facility.

3.1.2 Possession and Process Limits

The Quehanna Radioisotope Pilot Plant is authorized to have in its possession a maximum of 6,000,000 curies of strontium-90. Radioactive contaminents in association with the 6,000,000 curies of strontium-90 will not exceed:

Strontium-89	1,800,000 curies
Cerium-144	30,000 curies
Other gross fission products	30,000 curies

The ratio of contaminents to Sr-90 will not be changed by processing.

Further limitations are established for maximum quantities of strontium-90 within the facility. These are:

1. Feed solution in HAPO shipping cask - 500,000 curies
2. Feed material stored in T-31 - 750,000 curies
3. Material in process, i.e., withdrawn from T-31, but not processed to final fuel form. (A final fuel form is a sintered pellet or fully processed fuel, densely packed into a fuel container by pressure or heat. A final fuel form does not consist of loosely packed fuel in a container.) - 50,000 curies
4. Material stored in final fuel form in chamber 4A, but not necessarily with the final seal made on the fuel container. - 150,000 curies
5. Total in chamber 4A - 150,000 curies
6. Sealed in metal containers and stored in chamber 4B - 100,000 curies
7. Total in process box - 250,000 curies
8. Sealed material in Cell 5 storage - 1,000,000 curies
9. Doubly-sealed material in pool storage - 5,000,000 curies

10. Waste; packaged in not more than 500 containers and awaiting removal - 22,000 curies

3.2 Feed Material Handling

3.2.1 Receipt of Shipping Cask

The AEC furnishes radioactive feed material to the Radioisotope Pilot Plant at Quehanna, Pennsylvania. Strontium-90, in the form of $SrCO_3$, is shipped in casks designed and fabricated by Hanford Atomic Products Operation of General Electric Company. This feed material, prepared from gross fission products, may contain, in addition to the strontium-90, activity due to strontium-89, cerium-144, and other fission products. There may also be non-radioactive strontium, barium and calcium compounds.

Each cask, loaded at the Hanford Works, is shipped from Richland, Washington, by rail and by motor truck to Quehanna. Upon arrival at the building containing the hot cells, the cask is removed from the truck by a crane and placed on a pallet truck; it is then moved into an airlock which provides access to the hot cell service area.

The cask and its content are under the continuing surveillance of the Health Physics group from its arrival until it leaves the site after being emptied. This surveillance includes appropriate surveys at each step in the process and any indicated corrective action required for the protection of personnel

and the area from radiation and contamination. (See Chapter 10 for details).

3.2.2 Preparation of Cask for Removal of Feed Material

The cask is moved from the airlock, through the service area and into the isolation room of Cell 4. The exterior of the cask is usually covered with heavy-duty aluminum foil at this point, both to guard against possible contamination of the cask during subsequent operations, and to lower the heat transfer rate of the cask cooling fins. The decreased heat loss is desirable for the leak check of the cask cooling coil performed prior to cask unloading. The protective blanks are removed from the cask cooling coil and the heater well and the outer well cover is removed from the depression on top of the cask which contains the triply-sealed process line blanks; the cover of the triply-sealed cask vent valve connection is also removed. The following connections, which may vary with the particular cask as indicated, are made:

(1) A line is connected to the cask cooling coil inlet to permit introduction of either high velocity (up to 60 cfm) air, or water from ambient temperature to 180°F.

(2) A line is connected to the cask cooling coil outlet. This line is provided with valves which permit the air from the coils to be exhausted through the filtered cell

air exhaust system and water from the coils to be returned to the closed cycle water system.

(3) A thermocouple is inserted through a well on the cask to indicate the cask inner temperature.

(4) A special rod-type electric heater is inserted in the heater well on the top of the cask. The heater is connected to an electrical circuit through controlling and monitoring devices such as a variable output transformer or volt-ampere meters.

(5) In cases where the cask is fitted with a gas pressure transmitter over the internal annulus containing the heat transfer medium, air lines are connected to a booster valve and indicator or other appropriate readout instrument. In cases where a direct reading pressure gauge is provided, the gauge is read by the use of a closed circuit television system.

The next step is a leak test of the cask cooling coils. The test is performed in accordance with standard instructions from Hanford and consists of the following steps:

(1) The cask temperature is increased until

the heat transfer medium is molten. The electrical heater is normally used for this step.

(2) High pressure air (about 70 psig) is introduced to the cask cooling coil with the discharge line closed.

(3) The pressure on the cask gauge or transmitter is observed for thirty minutes. Since the gauge lead on the cask penetrates to the argon filled volume in the same cavity with the molten alloy, any increase in pressure on the gauge would indicate a leak in the cooling coil.

(4a) Should no leak in the coil be indicated, the cask is cooled according to a standard procedure to minimize internal stress on the cask and coils as the alloy solidifies and the cask is readied for unloading. The cask may be cooled by simply removing the electrical heater and passing high velocity cool air through the coil or, after partial cooling has been achieved, controlled temperature water may be used to increase the heat loss.

(4b) Should it be determined that a leak exists

in the coil, the electrical heater would be turned off and steps would be taken to cool the cask short of introducing water to the coil. The AEC would be notified and no further action would be taken to unload the cask pending instructions from the AEC.

The leak check may be performed either directly or remotely. It is usually performed remotely because complete instrumentation is provided on the cell face for the operation.

Upon completion of the leak test, a ventilated cupola is sealed to the top of the cask. This cupola is similar to a standard glovebox in concept in that it has glove ports, an absolute type filter on both the inlet and exhaust air lines and a transfer port as well as provisions for sealing the process line penetrations. The four process lines are inserted into the cupola and the insertion port is sealed, after which the following operations are performed:

(1) The two secondary covers are removed from the cask vent valve, the vent line is attached, and the vent valve is opened to relieve any pressure in the container.

(2) The second of the three protective covers are removed from each of the three cask process line blanked connections which are located in a well.

(3) Each of the cask process line blank fittings are removed and the connection to its respective line is made in such a manner that only one line is open to the cupola at one time. The connections are not necessarily made in the order given below.

(a) The solvent feed line is attached to the cask connection marked FILTRATE OUT. This method of adding the solvent permits a back-washing action of the filter and a subsequent fast release of the filter cake to the bottom of the cask container.

(b) One branch of the line leading to the feed storage tank is connected to the cask fitting marked SLURRY IN. The SLURRY IN line penetrates only to the top of the product container, so when fitted with a separate valve, this connection permits release of the gas buildup encountered during dissolution of cask content without forcing the dissolving liquid out of the bottom of the cask.

(c) The second branch of the line mentioned in (b) above, is also fitted with individual valving and is connected to the cask fitting marked SOLVENT IN. This line penetrates to the bottom of the cask container and is used to transfer the dissolved product to the feed storage tank.

3.2.3 Removal of Feed Material From Shipping Cask

The feed material is received as a solid strontium carbonate cake loaded on a filter screen in the product container portion of the shipping cask. Nitric acid of various concentrations is used to loosen the cake from the screen and to dissolve it for transfer to the feed storage tank as soluble strontium nitrate.

Each dissolution is calculated from the analysis furnished by HAPO. This analysis gives the curies of strontium-90, the ratio of total strontium to strontium-90, and the amount of inert impurities as a ratio to total strontium as well as the radioactive impurities as a ratio to the curies of strontium-90. The quantity of nitric acid required to completely dissolve the contents of the cask and leave the resulting feed solution from 0.4 to 0.6 molar in free acid is then added. The total liquid volume is calculated to make the radioactive concentration of the feed solution from 2.0 to 3.0 curies per milliliter with

respect to strontium-90. The actual dissolution of the cake and transfer of the resulting solution is carried out as follows:

(1) The fittings between the cask and the storage tank are leak checked by pulling a vacuum on the system, closing the vacuum valve, and observing the leak-down rate. No acid is added to the system until a satisfactory vacuum can be maintained.

(2) The valve in the line connected to the cask SLURRY IN fitting is opened to permit release of carbon dioxide, a slight vacuum is placed on both the cask and the feed storage tank through the storage tank (T-31), and a few (5 to 10) liters of dilute (0.5 to 1.0 molar) nitric acid are added through the solvent feed line. This first addition is made at a carefully controlled rate which does not exceed 100 ml per minute in order to prevent an overly vigorous reaction and to permit the vacuum to be maintained in the system. Added precautions, such as a check valve in the solvent feed line to prevent release of carbon dioxide through that system are included. As noted previously the feed storage tank

(T-31) is maintained at a negative pressure during dissolution. The vacuum system has an 8.4-cfm pump and a surge volume in excess of 200 liters. The acid is added at a rate that does not exceed 0.3 moler per minute. If the carbon dioxide is released at the same rate the evolution does not exceed 6.72 liters/minute, STP. The volume produced is negligible in comparison to the capacity of the vacuum system. No difficulty has been encountered in maintaining a negative pressure in the cask.

(3) The material added in step (2) is allowed to digest until no further reaction is apparent, after which small volumes of more concentrated (up to 4 molar) nitric acid are added and allowed to digest. The technique described in steps (2) and (3) prevents an overly vigorous reaction rate with attendant loss of control while permitting one to obtain a relative high nitrate ion concentration in the final solution.

(4) When the cask is filled with liquid and

digestion is complete, the valve on the SLURRY IN line is closed, the valve on the SOLVENT IN line is opened, and the solution is transferred to the feed storage tank by vacuum.

(5) Steps (2), (3) and (4) are repeated with variations in acid concentration until all the acid has been added and a final water wash of the cask has been performed.

(6) The contents of the feed storage tank are air sparged and a sample is taken and radioassayed. This assay is compared to the Hanford analysis to determine the amount of activity remaining in the cask.

The cask is dried by the use of heat and vacuum, the lines disconnected, the seals replaced, the cask decontaminated, placed in its outer shipping container or bumper, and returned to the railhead for shipment to Hanford.

3.3 Processing to Fuel Form

3.3.1 Metering and Precipitation of Feed Solution

The solution in the feed storage tank (T-31) is mixed by air sparging prior to transferring each batch of solution; this is accomplished by opening the air sparge valve connected to the vent header and drawing a slight vacuum on the tank to bubble air through the solution for 15 to 30 minutes. After sparging, a sample is taken to check the free acid content of the solution and to insure that no evaporation with accompanying concentration of the solution has occurred. The remainder of the required analyses, such as total cation concentration and strontium-89/strontium-90 ratio are run at the start of processing each new cask as a check on the Hanford furnished analysis. Experience to date has shown the Hanford analysis to be accurate in every case within the limits of experimental error.

The process feed batch is transferred from the feed storage tank (T-31) to the precipitation tank (T-33) via a fine metering tank (T-32). In addition to the Foxboro liquid level indicator, accurate to plus or minus 0.5 percent, this small tank is equipped with three calibrated stand pipes which deliver 1, 2 or 3 liters. All excess solution is returned to the feed storage tank and, if for any reason it is not desired to dump the batch to the precipitator, all feed may be returned to the storage tank.

The acidic strontium nitrate solution is adjusted to the desired pH with a sodium hydroxide solution.

The temperature of the precipitator may be varied from about 55°F to nearly 180°F by circulating water at a controlled temperature through the external coils of T-33. All liquid reagents are added to the precipitator from a metering tank in the operations area by means of a diaphragm pump through appropriate block valves, check valves and a siphon break. Solid, reagents, such as TiO_2, are weighed in the laboratory into small plastic bottles, passed into the process box and dumped into the top of the precipitator through a funnel which may be sealed when a vacuum on the precipitator vessel is required. See Section 3.6 for reagents and quantities used.

The precipitating reagents are added to the neutralized or slightly basic strontium nitrate solution in amounts stoichiometric to the total cation concentration. The mixture is stirred, either by an air driven mechanical stirrer or by pressure air sparging at approximately three liters per minute and 5 psig pressure. The air supply for sparging is located in the isolation room of Cell 4. It is controlled by check valves and double pressure reducers. The sparging is turned on and off from outside the isolation room. A bleed line is installed adjacent to the bottle; in the event the line becomes clogged the pressure can be released to the cell. The optimum flow rate for sparging varies slightly with batch size.

Upon completion of the digestion period, the precipitator may be brought to ambient temperature and cold water added to speed settling of the precipitate. After allowing time for settling, the precipitate is drawn over to an alundum filter-crucible in filter housing T-34 and the filtrate collected in the filtrate storage tank (T-25) by applying vacuum to T-35 and opening the valve connecting T-33 through T-34 to T-35. T-33 and the precipitate are washed with water, as required, by adding water to T-33 and drawing it by vacuum into T-35.

The filtrate and washings, stored in T-35, are assayed. Should an activity of more than 3 curies/liter be present as would occur if insufficient sodium hydroxide or precipitating reagent were added to the batch or if the T-34 filter had been defective or the seals had been imperfect, the washed precipitate would be removed from T-34 in its crucible, the crucible would be replaced with an empty one, and the filtrate and wash from T-35 would be recycled through T-33 and T-34 to T-35 after any required reagents had been added. The T-35 solution would be resampled and, if the strontium content were low enough, the solution would be vacuum-transferred to the waste storage tank, T-20. The T-35 solution is normally transferred to T-20 immediately after assay.

3.3.2 Calcination, Blending and Compaction

The alundum crucible containing the precipitate is removed from the stainless steel filter holder (T-34) by swinging back the top and lifting out the crucible with manipulators using a special handling tool. The contents of the crucible are examined visually and the crucible and contents are placed in the furnace for the drying and/or calcination step.

3.3.2.1 Process Furnace

The furnace used for the drying step is a versatile unit capable of sustained operation at temperatures as high as 1500°C; it is also used for subsequent sintering steps. The furnace proper is heated by three sets of four "glo-bar" resistance elements, with each set being individually adjustable for output from the control panel in the operations area. The entire furnace is powered and automatically controlled through a saturable reactor which receives its signal from one of six replaceable thermocouples in the furnace; the furnace cycle can be varied within a wide range by use of precision cut cams. The in-cell portion of the assembly is easily removable from its water-cooled well in the process box for replacement of heating elements and thermocouples.

3.3.2.2 Drying and Calcination

The purpose of this operation is to dry the filtrate and remove CO_2 without raising the temperature high enough to sinter the product. The furnace is closed, but not sealed air tight. The temperature is taken to 250 to 300°C and held for sufficient time to insure removal of free water vapor. After this drying is complete, the temperature in the furnace is increased to 600 - 970°C depending on the batch size and the product desired. Maximum temperature is maintained for a predetermined period. In one case, the reaction rate of the strontium carbonate - TiO_2 mixture is temperature dependent above its initiation temperature and since considerable self-heating occurs from the strontium-90 content a relatively low temperature is maintained for several hours to permit conversion to strontium titanate without sintering the central portion of the cake. In the other case the removal of occluded water is a relatively slow process.

3.3.2.3 Blending

It is necessary to break up lumps and reduce the particle size of the dried and calcined cake prior to final fuel forming to obtain consistently high density material. At the present time, a Waring-type blender is used for this operation, but other equipment such as a "y" tube blender and a small, enclosed hammer mill will probably be tested and used.

3.3.2.4 Powder Densifying

Strontium titanate powder has traditionally been pressed into "green" pellets by standard powder metallurgical techniques, using a die of the desired dimensions, loading the die with the desired mass of powder and pressing with a hydraulic press. The pellet is then sintered at high temperature to cause it to shrink with an accompanying increase in density. The Quehanna Pilot Plant has retained this capability, which requires a pressure of only about 5 tons per square inch on the pellet area, and at the same time has built-in versatility to permit more efficient compaction. When sintered pellets are loaded into capsules there are always void spaces which decrease the power density. Work done by Martin Nuclear Division indicates that good density material without voids may be obtained by "step pressing," particularly when strontium compounds other than the titanate are made. In this process, a fuel container is placed in a large die and a small volume of powder is added and pressed at 40 to 50 tsi. The process is repeated until the container is full or until the desired thermal output is obtained. A 250-ton press with a 12-inch ram is employed in the process box. The hydraulic unit is located in the operations area and connected to the ram by high pressure tubing through the cell wall. When step pressing is employed, sintering is omitted.

3.3.2.5 Sintering

Green titanate pellets are transferred onto zirconia covered setter plates, the plates are loaded into the furnace in as many as three trays at different elevations and a programmed sintering cycle is initiated. The maximum sintering temperature is about 1450°C and a complete cycle requires approximately 20 hours. Inert gas services are provided in the furnace. Upon removal from the furnace, the fuel pellet is checked for physical characteristics and thermal output.

3.3.3 Interim Fuel Storage

Shielded storage units are provided in both chambers of the process box to permit storage of either exposed or sealed fuel and containers as desired during processing. If the pellet form of material is required, batches of pellets would be stored in special open liners until the correct number and type of pellets were available to make a final capsule loading. If step-press loading is employed, a container or containers will also be stored temporarily until loading is completed. Open storage will be used only in the shielded storage chamber accessible to the A side of the process box. Shielded storage is also provided on the B side of the process box for temporary storage of sealed containers. The shielded storage chambers are so designed that air will circulate through the interior and the fuel will thus be cooled by convection currents.

3.3.4 Fuel Container Welding

Both final fuel containers and containers to be used for long-term storage are welded shut. The welding is performed by use of an Heliarc power supply placed near the face of the cell and a welded tip and jig within the cell. Materials to be welded will be chosen from among 300 series stainless steel, Hastelloy C, Haynes 25 and tantalum. Techniques and apparatus for each welding requirement are tested and approved by Quality Control prior to utilization. Such materials as Hastelloy C and 300 series of steel have been remotely welded successfully with penetrations from 0.015 inch for light stainless steel liners to 0.090 inch on Hastelloy C with this apparatus.

Prior to removing any welded fuel container from the process box, a mass spectrometer leak check is performed. The existing system can detect leaks as small as 10^{-8} standard cc's of helium/second; the acceptable maximum leak rate for a welded fuel container is 5×10^{-6} standard cc's of helium/second.

3.3.5 Fuel Container Decontamination

Decontamination of each sealed fuel container is performed in several steps. The first step is in the A side of the process box accomplished by the use of an immersion bath.

Each immersion tank is fitted with ultrasonic transducers to assist in the cleaning. After the preliminary decontamination, the container is moved to the B side of the process box and immersed in additional ultrasonic cleaning tanks. The immersion may be interspaced with scrubbing and/or the use of special reagents as required. Swipe samples are taken, removed from the box and counted to determine when the fuel container is sufficiently cleaned for removal from the B section of the process box. The decontaminated container is transferred to Cell 5 for calorimetry and storage in the shielded capsule storage container. From there, if long-term storage will be required, it is sealed in a secondary stainless steel container, welded, leak checked and transferred to the gamma pool after the required waiting period.

3.4 On-Site Storage

3.4.1 Cell 5 Storage

Storage in this cell is described in Paragraph 9.1.3.3.

3.4.2 Transfer from Cell 5 to Pool Storage

The cask (see Paragraph 9.1.2.3) containing the doubly sealed and leak-tested capsules is removed from Cell 5 in either of two ways.

The service area crane is used to lift the cask out the top of Cell 5 through the opening left by removing the concrete roof plugs. The crane then moves on an unobstructed direct path to the pool. The cask is moved over the pool edge above the specified section of pool in which no capsules are stored. This prevents the possibility of the cask being accidently dropped on a capsule. The cask is lowered into the pool. A special tool is used to remove the capsules from the cask. The cask is removed from the pool, drained and decontaminated, if necessary, for further use.

The other method of transfer is performed by using a dolly to remove the cask from Cell 5. The dolly is moved across the smooth, unobstructed floor to the edge of the pool. The service area crane is then used to place the cask in the pool as in the other method.

3.5 Final Loading Operations

Prior to loading into a generator or shipping cask the decontaminated fuel capsules are accumulated in the Cell 5 shielded storage container. Calorimetry is repeated if desired, all capsules returned to the Cell 5 shielded storage container and the generator or cask is moved into Cell 5. The loading operation entails either the placement of one or more fuel capsules in the shielded generator block, addition of shielding to the generator, and a final checkout of the generator

internal atmosphere and electrical output prior to shipment to the Baltimore site for further testing, or, loading one or more fuel capsules into a shipping cask, attaching the cover and final checking of the cask before release for shipment to its destination.

3.6 Reagents

This section is classified and will be transmitted as a separate submittal.

CHAPTER 4

ADMINISTRATIVE CONTROL

The function of the administration of the Radioisotopes Production Pilot Plant is the economical processing and encapsulation of radiostrontium for power production. Recognizing that the handling of multicurie quantities of strontium-90 presents safety problems unique in private industrial operations, the Martin Company has set up administrative controls designed to enable the plant operations to be carried on with the least possible hazard. (Refer to Figure 4.1)

4.1 Operations and Responsibilities

In order to achieve the necessary degree of administrative control, reliance is placed not only on defined procedures but also on properly trained and indoctrinated personnel. This concept of administrative control starts with the hot cell operator and his responsibilities, and works up in the line and staff organization through a series of overlapping responsibilities which provide necessary checks on the operations. This system may perhaps be explained most readily by a review of responsibilities.

4.1.1 Hot Cell Operator

The hot cell operator is responsible for carrying out the actual processing operations. The operations to be conducted during each shift are reviewed with the operator by

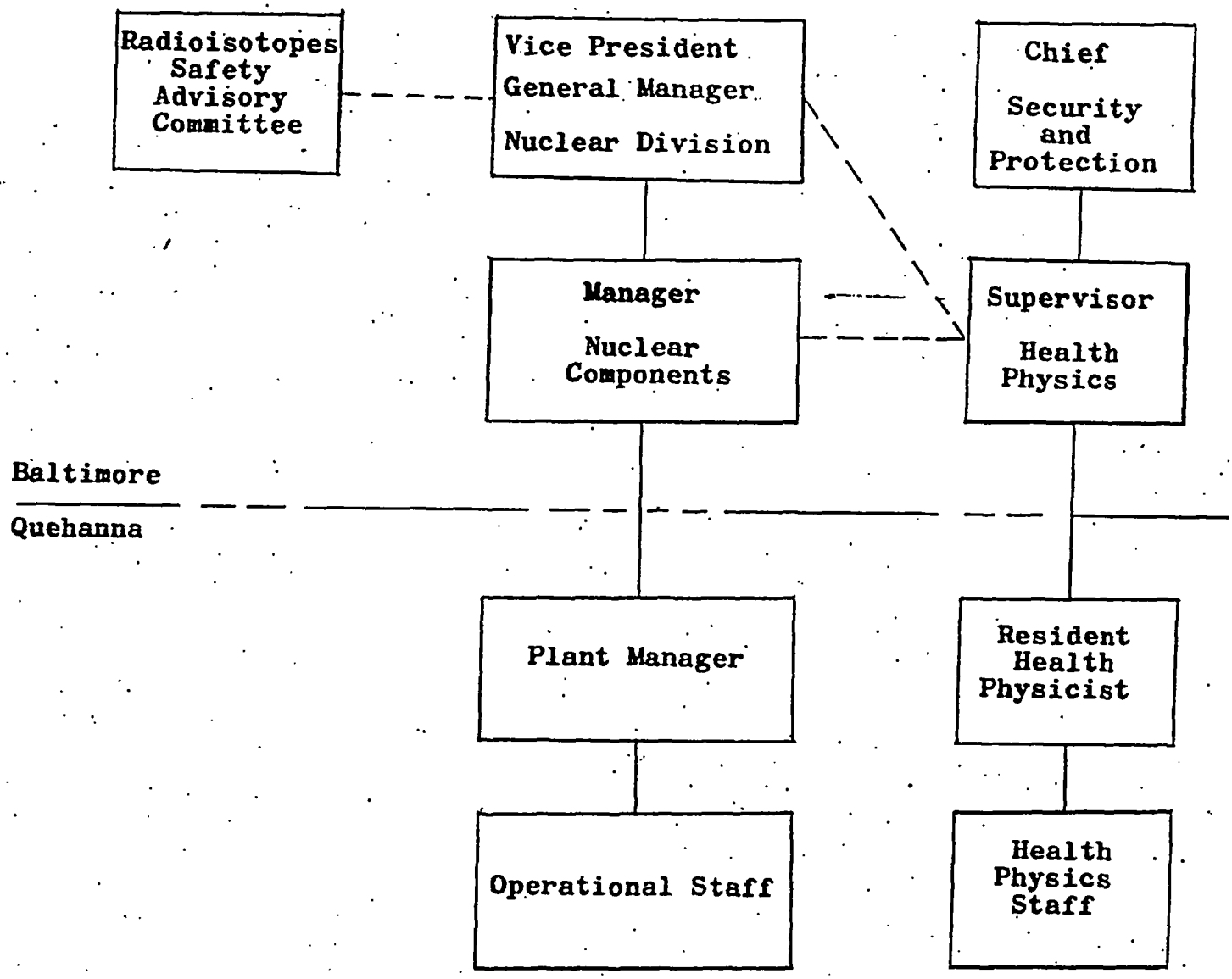


Figure 4.1 Organization Chart

the shift supervisor. Operations are carried out in accordance with previously defined and authorized procedures. The operator will have been trained not only in these specific procedures but also in the basic arts of health physics and radiochemistry with emphasis on proper actions in case of emergency. Apprentice operators will work along with experienced operators.

The operator will keep a running log of the tasks he performs, recording all pertinent data, e.g., volume of solutions transferred, temperatures of solutions, duration of operations, analytical results. Any evidence of unusual behavior in the process, process equipment or facility equipment will be recorded and brought immediately to the attention of the shift supervisor.

No deviations from the defined, normal operating procedures will be made by any operator unless authorized by his shift supervisor. Such deviations must be noted and emphasized in the log. The operations log is the basic record of all operations at the facility.

4.1.2 Shift Supervisor

The shift supervisor is responsible for conducting scheduled operations in accordance with the authorized procedures and instructions, and for directing and assisting his assigned operators in their work. He will receive written and oral instructions from the Supervisor of Process and Quality

Control defining the operations to be performed on his shift. Third shift supervisor will usually receive only written instructions, with oral instructions transmitted to the second shift supervisor. In order to cope with minor deviations in the process, the shift supervisor will be authorized to improvise manipulative changes to correct the aberrations. He is encouraged to delineate facts and make recommendations, but he will not make any changes involving additions of chemicals or alterations in process conditions without review and approval by higher authority.

The activities of the shift will be summarized in the operations log by the shift supervisor. He will note the transfer of radioactive material from one location to another and from one form to another, unusual occurrences in process or facility, and unusual maintenance requirements. He will examine and initial his instruction log book and bring the next shift supervisor up to date on the facility status and production situation.

4.1.3 Process and Quality Control Supervisor

The Supervisor, Process and Quality Control, is responsible for planning production operations, improving operational techniques and maintaining the quality of product. He will make daily assignments of operating orders and check housekeeping through daily personal surveillance and review of

the shift operations log.

Through coordination with the Plant Manager, Process Chemist, Licensing Specialist, Process Equipment Engineer and resident Health Physicist, he will insure that all materials are available and requirements met for safe accomplishment of production schedules.

He will review suggestions for process or procedure changes and forward his recommendations to the Plant Manager. He may not authorize any substantive change in established operating procedures without higher approval.

The Supervisor of Process and Quality Control will submit a daily report to the Plant Manager summarizing the information in the operation log and will inlcude his personal observations and comments concerning the achievement of production schedules and the safety of the operations.

4.1.4 Manager, Radioisotope Pilot Plant Section (Plant Manager)

The Plant Manager is responsible for the safe and productive operation of the Quehanna facility. He will direct all operations, approve operating procedures and establish goals consistent with the license for the facility and any further restrictions he deems necessary. He will receive processing requests and funding from other areas of the Nuclear Division. He will coordinate and measure the activities within his section, and will request the support required from other sections through the Manager, Nuclear Components, so that

training, preparation and stockpiling will be achieved on time and in proper degree to meet established goals.

He shall stop, or prevent the start-up, of any operation at the Quehanna facility when, in his judgment, such operation would be in violation of the license, or otherwise be in contradiction to safe practice. He shall take similar action, regardless of his personal judgment, if so ordered by the Manager, Nuclear Components, or the Commission.

He will review the daily reports of the Supervisor, Process and Quality Control, the weekly reports of the resident Health Physicist and make frequent personal inspection of the facility and logs. From these and other data, he will submit a written report to the Manager, Nuclear Components, on a weekly basis, summarizing the status of the facility and the week's activities.

He is responsible for anticipating the need for amending or up-dating sections of the license and initiating action. In this regard, he will frequently compare the goals and long range plans for the facility with the license and current practice. From this analysis, he will take action within his section and request support from other sections as required to prepare other reports and data as ordered by the Manager, Nuclear Components.

4.1.5 Manager, Nuclear Components Department (Department Manager)

The Manager, Nuclear Components, is responsible for maintaining a satisfactory Radioisotope Pilot Plant facility, a competent operating staff of adequate size and for assuring safe operation of the facility in accordance with the license. He will review and retain for file in Baltimore the weekly summary reports by the Plant Manager, make personal inspections of the facility and logs at 4 to 6 week intervals, and take whatever other action he deems necessary to assure himself that the facility and operations are maintained in accordance with the license. He has the authority to order the cessation of any operation he deems unsafe. He will advise the General Manager of the Nuclear Division of the status at Quehanna on a weekly basis. He will provide, or take necessary action to provide, the required support activities for Quehanna. He will cooperate with the Radioisotope Safety Advisory Committee, providing reports and data requested and assisting the Committee in its investigations.

4.2 Administrative Checks

In addition to the control provided in the organization and mode of operation of the Nuclear Components Department, two independent parallel administrative checks have been established. These are the Nuclear Division Radioisotope

Safety Advisory Committee and the administrative participation of the Health Physics organization.

4.2.1 Health Physics

The organization and responsibilities of Health Physics are presented in Chapter 10. In addition to its conventional duties the Health Physics organization participates in the administrative control of the Radioisotopes Production Pilot Plant. As an ultimate check, the resident Health Physicist may stop any operation at the facility which he feels is being carried out in a manner contrary to safety regulations and constituting a definite hazard to the facility personnel and to the public.

4.2.2 Radioisotopes Safety Advisory Committee

The Radioisotopes Safety Advisory Committee has been constituted for the purpose of increasing assurance of the safe use and possession of radioisotopes within the Nuclear Division. It reviews the criteria that are generated by line organizations to ensure the safe operation of any activities utilizing radioisotopes. It carries out periodic surveillance of such operations. The chairman of the Committee reports directly to the General Manager and Vice-President of the Nuclear Division.

4.3 Fire Prevention and Control

The unusual nature of the plant operations with the potential hazard of radioisotopic contamination and nuclear radiation, and the isolated location of the Quehanna facility have caused considerations of fire prevention and control to be of particular concern. This leads to the requirement of frequent inspections and special training in fire fighting.

4.3.1 Inspections

Monthly inspections are made by the Quehanna Radioisotope Pilot Plant personnel accompanied by the representative of the Pennsylvania State University. Findings of these inspections are distributed to officials at Pennsylvania State University and the Plant Manager for action.

4.3.2 Training Program

All male personnel at the Quehanna site are trained in fire fighting. The training program is described in Chapter II, Summary of Emergency Control Measures.

4.4 Qualifications of Personnel

4.4.1 Operating Personnel

The following categories of personnel are actively engaged in the handling and/or control of radioactive materials at the pilot plant. The minimum acceptable qualifications for each category are:

4.4.1.1 Hot Cell Operator

4.4.1.1.1 Operator C (trainee)

High school education and at least 4 years experience of a general mechanical nature.

2 years of college--2 years of college may be substituted for the general experience and non-diploma technical courses may be substituted for experience in some cases.

Each employee must be of such character as to permit obtaining an AEC Q clearance.

4.4.1.1.2 Operator B (intermediate)

All qualifications listed above plus (1) successful completion of a radiation protection training course of at least 16 hours duration, (2) demonstrated competence in each mainpulative operation involved in processing, and (3) at least 18 months experience in handling radioactive materials.

4.4.1.1.3 Operator A (journeyman)

All qualifications listed above plus (1) at least 36 months experience in handling radioactive materials, (2) an understanding of each phase of all operations and a demonstrated ability to explain the operation to others, and (3) understanding and awareness of the radiation hazard in any operation with radioactive materials and a demonstrated record of safety.

4.4.1.2 Shift Supervisor

(1) all qualifications of an A operator, (2) demonstrated initiative and organizational ability, (3) at least 5 years experience in the nuclear field, of which at least 2 years must have been spent as an A operator or equivalent.

4.4.1.3 Supervisor, Production and Quality Control

Education--BS, Chemistry or Chemical Engineering. Directly applicable experience in the field may be substituted on the basis of 2 years experience for 1 year of college.

Experience--at least 8 years of high level radioactive chemical experience required, of which at least 3 years must have been in a supervisory capacity.

4.4.1.4 Manager, Quehanna Pilot Plant

Education--BS, Chemistry, Chemical Engineering or Nuclear Engineering.

Experience--8 years experience handling high level high specific activity radioactive materials. Advanced schooling in radiochemistry, nuclear engineering or radiation protection may be substituted on a year-for-year basis for up to 3 years experience. A minimum of 2 years supervisory experience in the nuclear field is required.

4.4.2 Health Physics Personnel

4.4.2.1 Resident Health Physicist

The following minimum requirements are necessary for the position of Resident Health Physicist:

Education: B.S. in Physics, Chemistry or equivalent.

Experience: Two (2) years experience in Health Physics administration and control procedures with particular emphasis being placed on personnel possessing high level hot cell experience.

4.4.2.2 Health Physics Technician

The following minimum requirements are necessary for the position of Health Physics Technician.

Education: High School graduate or equivalent plus specialized training in radiological protection, electronics, or laboratory techniques.

Experience: Six months experience in Health Physics or related work to become familiar with radiological monitoring and laboratory methods and procedures. In addition will require an apprenticeship period at the facility working along with experienced Health Physics Technicians. The length of on-the-job training will be governed by an individual's ability, experience and educational background.

4.5 Summary

In recapitulation, the Martin Company has set up an administrative system that provides safety in the handling of multi-kilocurie amounts of radioisotopes. This system is based upon the following elements:

4.5.1 A physical plant providing for control of radioactive material in normal and conceivable emergency circumstances.

4.5.2 Experienced personnel well-trained and indoctrinated in requirements for safe handling of radioisotopes.

4.5.3 A system of supervisory progression within the line group providing for overlapping responsibilities and checks upon the standard operating procedures.

4.5.4 A system of records and reports which provide complete awareness of the status of the facility and its contained radioactive materials at any time.

4.5.5 An independent staff function through Health Physics which provides a continuous check upon the operations of the line group and the safety of the facility.

4.5.6 A second independent staff function through the Radioisotopes Safety Advisory Committee which advises the General Manager in matters related to safe operation of facilities.

4.5.7 A special concern for indoctrination and good training in fire prevention and control.

CHAPTER 5

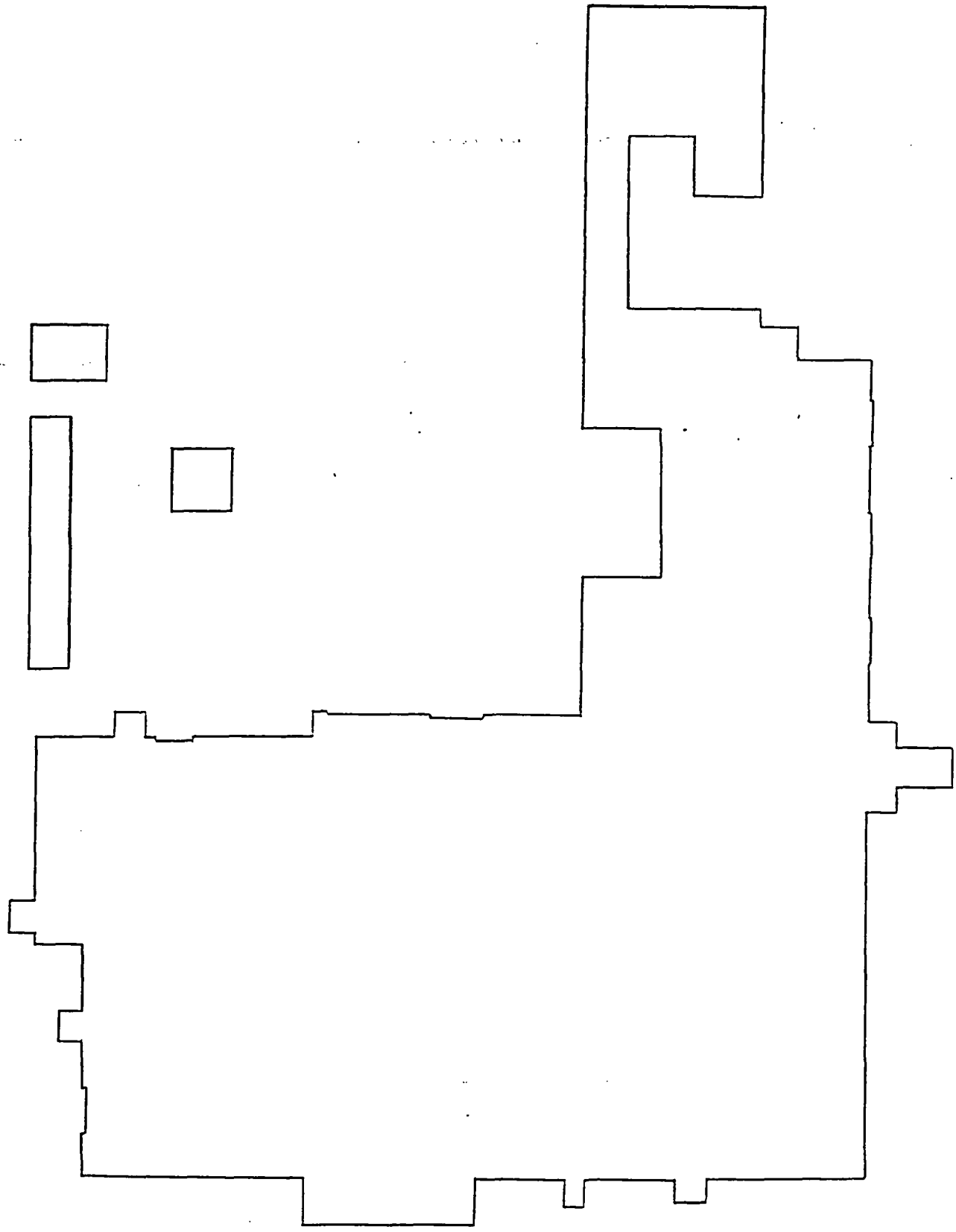
PLANT DESCRIPTION

5.1 Description and Arrangement

5.1.1 General

A view of the exterior of the facility building is shown in the frontispiece. The exterior, of simplified contemporary design, consists largely of insulated aluminum curtain walls applied to the steel frame. The two large bays housing the reactor and the hot cell service area are evident. The reactor area is isolated from the cell service area, except for a large truck door and a pedestrian door, both of which will normally be closed and locked. The general layout of the site (frontispiece) shows the relative position of the main plant, radioactive waste treatment plant, storage buildings, and underground holdup and storage tanks.

The 24,700 square foot reactor and hot lab building is basically a one-story structure. The main floor plan and the basement floor plan are shown in Figures 5.1 and 5.2. The Martin Radioisotopes Pilot Plant includes all areas encompassed by the heavy line on the vellum overlay. The plant has been designed to provide as positive separation as possible between radioactively contaminated and radioactively clean areas. Those areas which are maintained free of contamination include



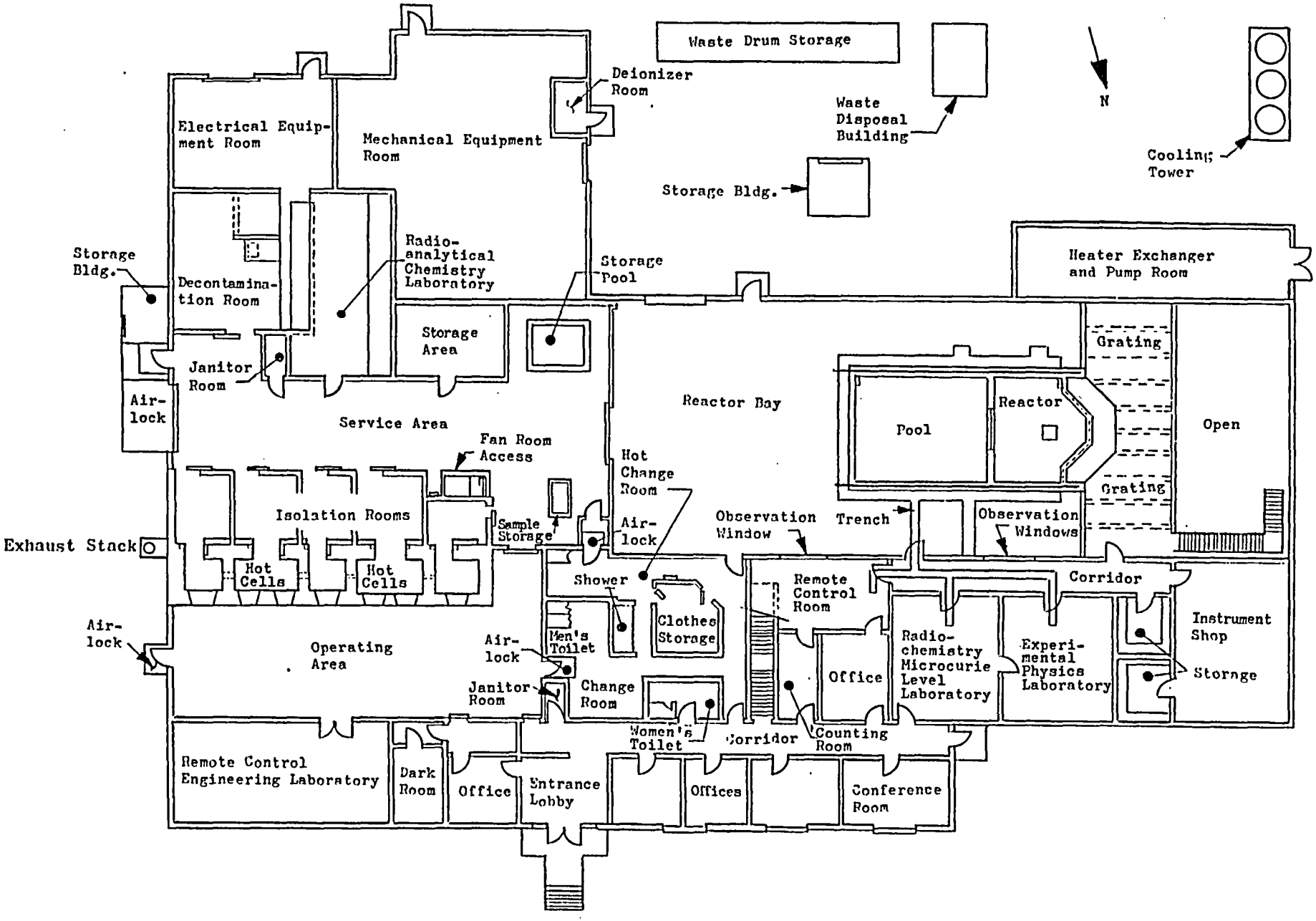


Figure 5.1 Main Floor Plan of Quchanna Nuclear Facility, Showing Radioisotope Pilot Plant in Heavy Outline

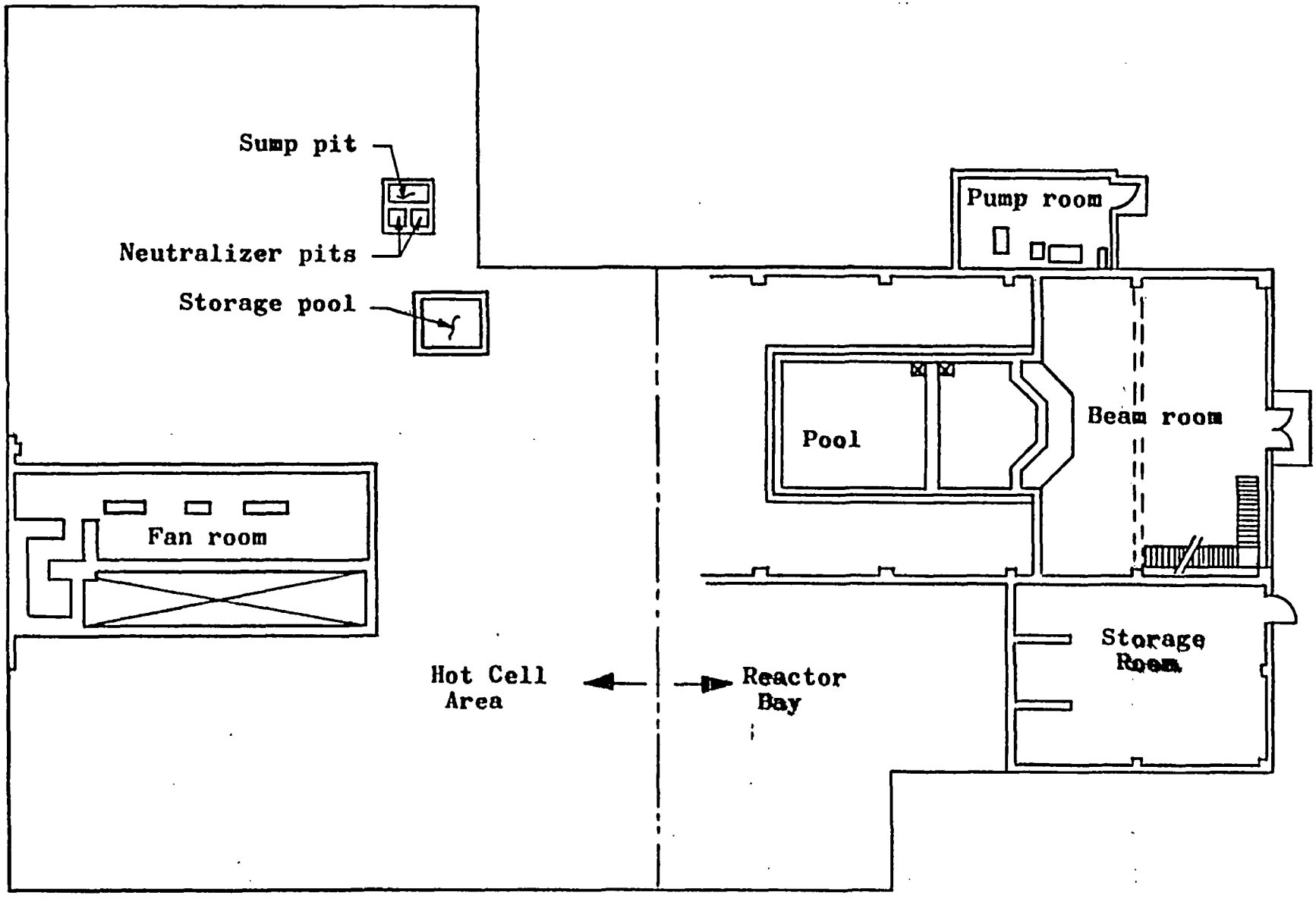


Figure 5.2. Basement Floor Plan of the Quehanna Nuclear Pilot Plant

offices, dark room, staff laboratory, and reactor area. As reference to Figure 5.1 reveals, the only normal access between clean and contaminated areas is via the change room. The large access door between the operating and service areas is normally closed and locked. Because of the relative isolation of the controlled areas, an intercommunication system connecting all parts of the building has been installed.

A more detailed description of that portion of the building with which this report is concerned, the hot cell area, is covered in the following pages. This area, enclosed by the heavy lines in Figure 5.1, includes hot cells, isolation rooms, operating area, service area, radioactive materials storage area, decontamination room, analytical radiochemistry laboratory, and change room and other associated cold areas such as offices and conference rooms. To provide for expansion of the plant in the future, the building was laid out with the entire east wall unobstructed. Additions can be made simply by building additional laboratory space or hot cells in line and extending the operating and service areas.

5.1.2 Philosophy of Multiple Containment

The concept of multiple containment is applied in handling multikilocurie amounts of beta-, and gamma-emitting isotopes of high specific activity. This technique consists of confining the radioisotopes within at least two containment

enclosures. This approach has successfully been used at this facility since July 1962, to prevent the release of particulate activity to the external environment.

The Radioisotopes Pilot Plant is divided into two parts: the administrative area and the hot working area. The operating area is usually maintained in an uncontaminated condition. It is normally accessible only through the change room. The flow of air is progressively from uncontaminated areas to those of increasing likelihood of contamination.

The Martin philosophy of multiple containment is evident throughout the process. Four distinct containment barriers exist:

(a) Process equipment

(b) Steel and plastic process box

(c) Hot cell structure and ventilation system

(d) Building

The first containment barrier is the process equipment itself located within the stainless steel process box inside the hot cells. The process equipment, such as tanks, precipitator, etc., is vented directly through the process box exhaust system.

The second, and most positive, containment barrier is the process box. The box is designed to have the lowest air pressure in the system and is protected by both

absolute type inlet and outlet air filters. In addition, it is designed to have as small an air flow as possible, consistent with a safe operating pressure drop from the cell environment.

The third containment barrier is the hot cell, which also has absolute type filters on both inlet and outlet air streams. The operating air pressure in the cells is higher than that in the process box but lower than that in the operating area. The transfer of material to or from the process box is accomplished by employing a Stationary Overhead Transfer System (SOTS) which prevents the box atmosphere from direct connection to any regions other than the immediate section of the SOTS.

5.2 Area Descriptions

5.2.1 Hot Cells

This facility is comprised of five cells with physical configurations as indicated in Table 5.1.

Table 5.1

HOT CELL DIMENSIONS

Cell No.	Floor Size (ft)	Ceiling Height (ft)	Wall Thickness (ft)
1	6x7	12	3
2	6x12	15	3
3	6x7	12	3
4	8x12	12	2
5	8x8	12	2

Each of these cells is provided with manipulator ports for the use of Model 8 manipulators. In addition, a Kollmorgen periscope may be used. Cells 2 and 4 have two pairs of manipulator port openings so the entire floor area of the process box may be reached. With slight revisions to the port holes, as many as 23 different manipulator locations are possible throughout the five cells. A side elevation of a typical cell is shown in Figure 5.3. A detailed plan view of the cell block appears in Figure 5.4.

The shielding walls of the cells, which reach to a height of 9½ feet above the floor, are constructed of ferrophosphorous concrete with a minimum density of 280 lb/ft^3. Above 9½ feet, the walls are of ordinary concrete, having a minimum density of approximately 150 lb/ft^3. All dense concrete was poured with 1/4-inch steel plate forms which remained in place to form the inner and outer cell wall surfaces. The steel plates simplify decontamination of the cells, afford a good base for attaching fixtures to the interior or exterior, and prevent chipping of the concrete around plugs, drawers, and access ports.

The radiation shielding windows are oil-filled units of 3.6 gm/cm^3 density glass. Each window is roughly the same thickness as the 4.5 gm/cm^3 density wall in which it is installed so that, in comparison to the wall, it is undershielded. This undershielding can be compensated by using an additional

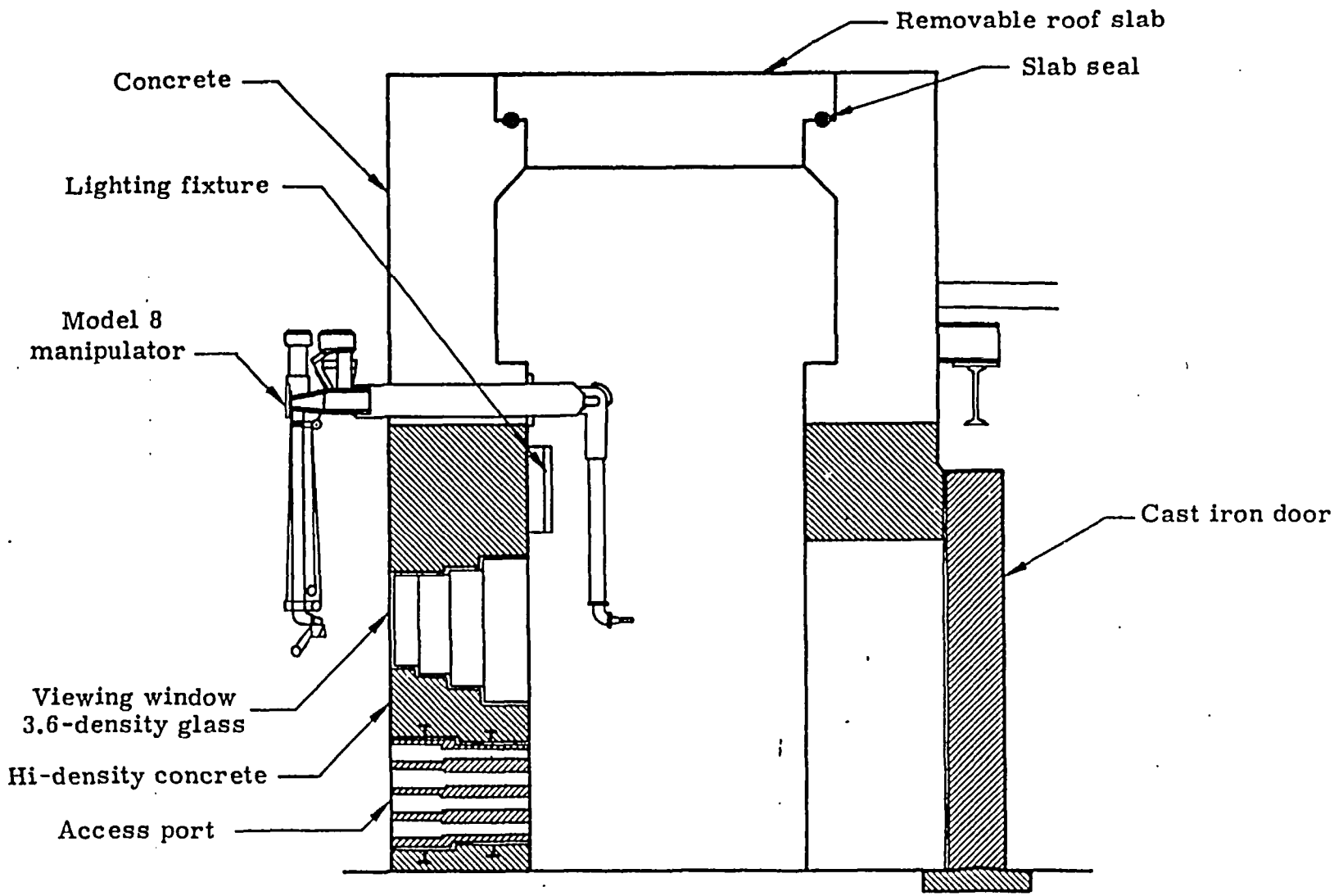


Figure 5.3 Side Elevation--Typical Cell

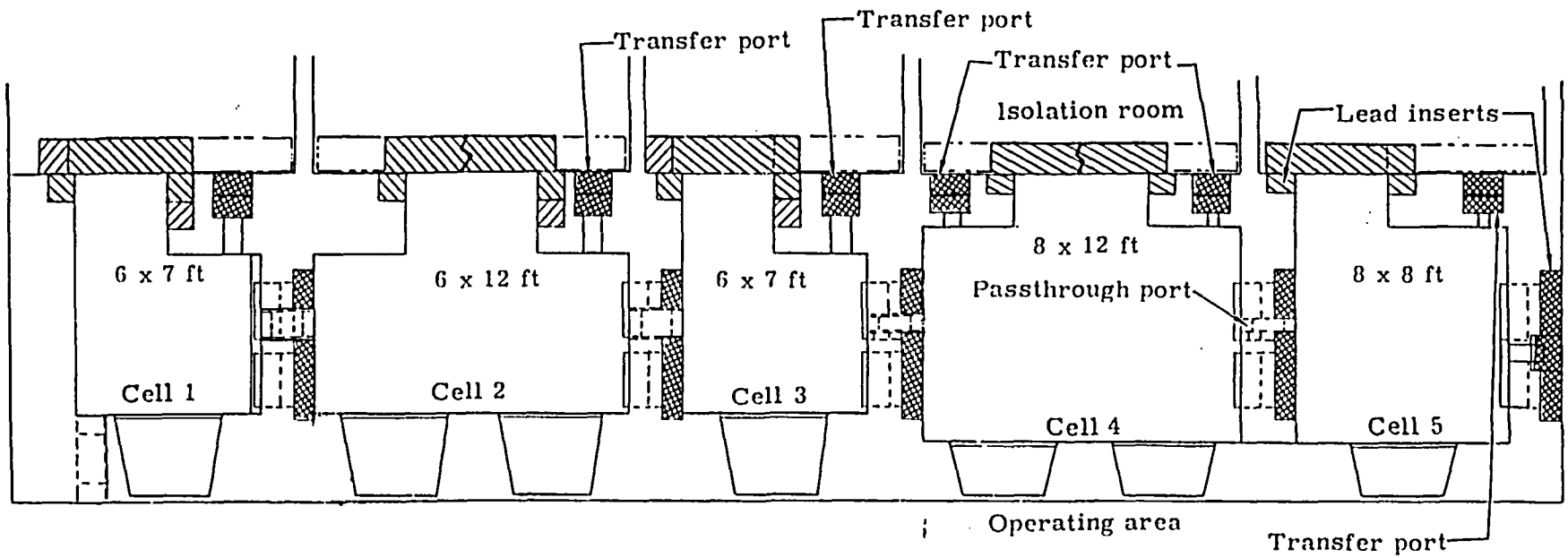


Figure 5.4 Plan View of Hot Cells

slab of 6.2 gm/cm^3 density glass, four inches thick, when additional shielding is required. There are seven windows; two in each of the larger cells and one in each of the remaining three cells. The windows measure 36x48 inches on the hot face, and by virtue of the high refraction index of the glass, permit one to view almost the entire cell area.

The cells may be entered through doors at the rear which open into the isolation room. Details of the door arrangement may be seen in Figure 5.5. As reference to Figure 5.4 reveals, the openings are so placed, and are of such size, that modular equipment tables covering one half (or in the case of the larger cells, one third) of the floor area can easily be removed or rearranged within the cell. This is true of all the cells except Cell 4 where the redesigned isolation room limits access to the cell so that SOTS (see Paragraph 9.2.3) is the only opening for large equipment. Equipment which is too large to pass through the doors (on all cells except 4) may be placed in the cell by removing one or more of the two-foot thick slabs which form the cell roof. By using the 15-ton bridge crane to remove these slabs, the entire cell area may be uncovered if necessary.

Commercial flood lamps supply the cells and process box with the required lighting. Standby or emergency lighting is supplied in all cells so that lamp failures wil not

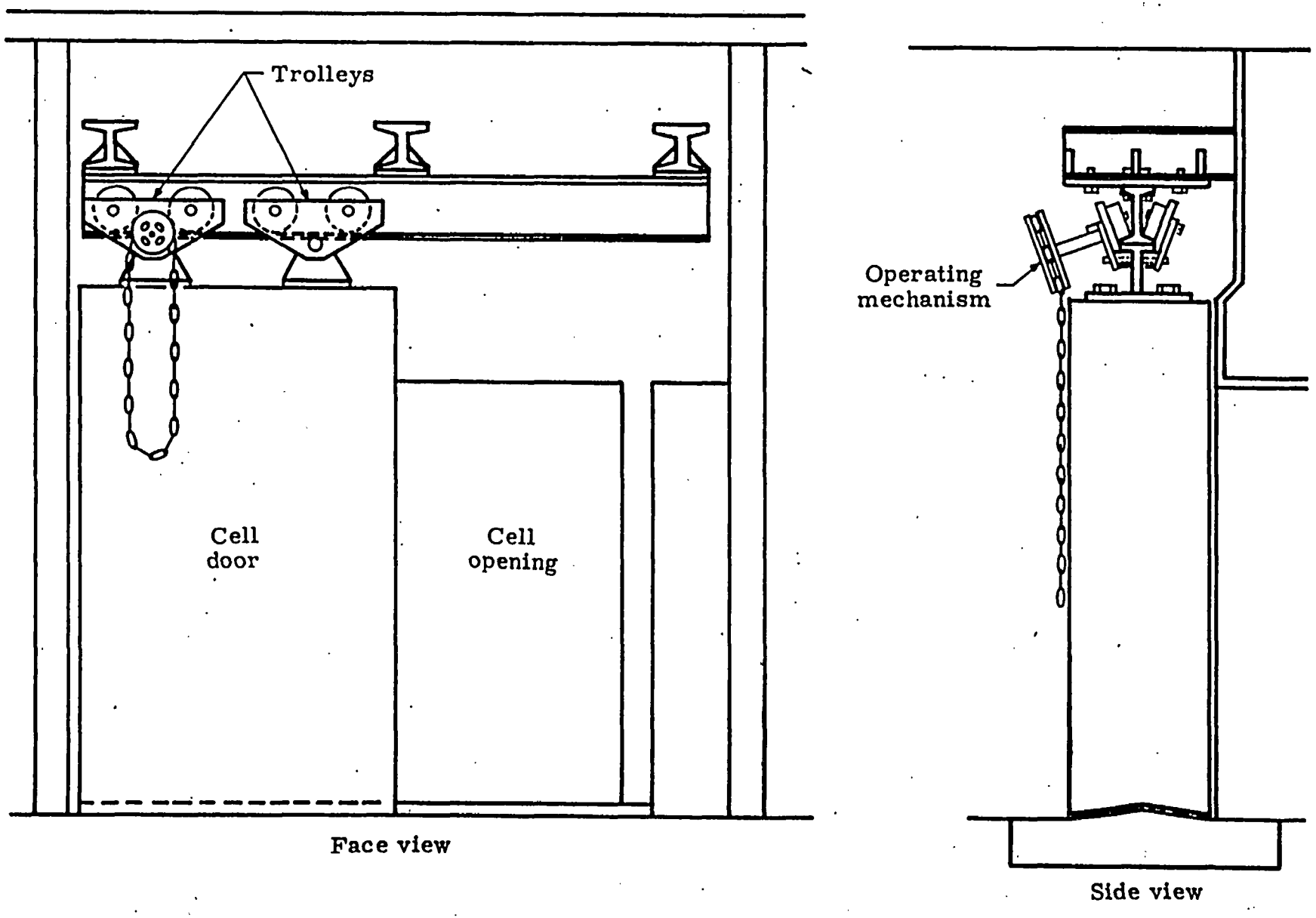


Figure 5.5 Cell Door Detail

cause shutdown. A propane-fueled motor-generator set supplies sufficient power to continue operation of the cell ventilating and lighting systems in case of electrical failure.

The operating faces of the cells are liberally supplied with access ports arranged as shown in Figure 5.6. Many of them have been placed in rectangular drawers or inserts which can be removed and replaced with drawers having plugs designed for specific applications. Individual intercommunication systems connect the operating face and the isolation rooms. There are penetrations from the isolation rooms to the cells and between cells, through which piping and wiring may be passed. All standard services are available in a trench immediately in front of the cell face so that they may be extended through the wall as needed. Channel-through plugs carrying services into the cells are bent so that there is no direct path for radiation from the cell to the operating area. Only a few 110-volt electrical lines are permanently installed within the cells.

5.2.2 Isolation Areas

Figure 5.1 indicates the location of the isolation rooms in reference to the hot cells and the rest of the facility. Table 5.2 indicates the physical configurations.

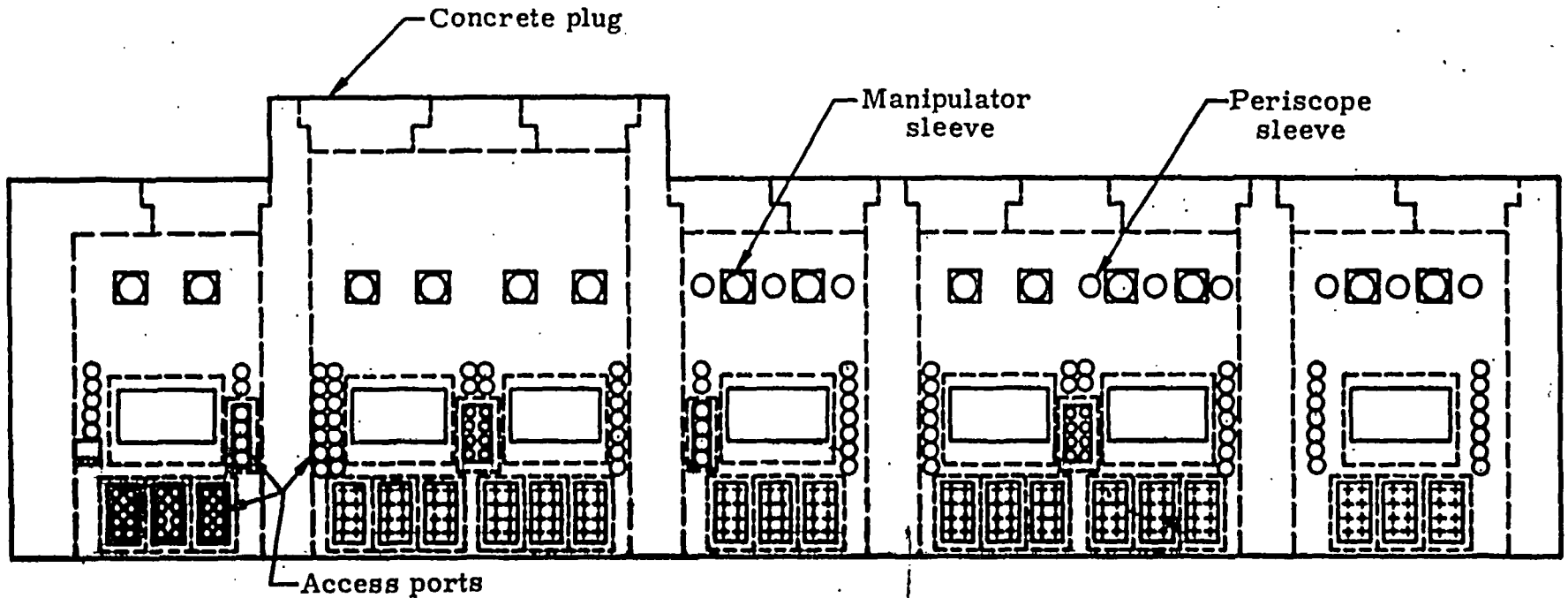


Figure 5.6 Front View of Cells

Table 5.2

ISOLATION ROOM DIMENSIONS

Cell No.	Floor Size (ft)	Wall Thickness (inches)	Ceiling Height (ft)
1	10x14	8	10.67
2	12x14	8	10.67
3	10x14	8	10.67
4	12x14	8	10.67
5	10x10	8	10.67

The walls and ceiling of the isolation rooms are made of precast reinforced concrete. The walls are 8 inches thick and the ceiling 5 inches thick. There are no penetrations in the isolation room surfaces except for the door to the service area and the hot cell door plus sealed conduit pipe for required services.

5.2.3 Operating Area

The operating area is immediately adjacent to the front of the hot cells (Figure 5.1). The walls that form the operating area boundaries are the hot cell walls, the machine shop and metallographic laboratory, the change room, and the exterior wall of the facility. The only normal access to the 20 by 66 foot operating area is through air locks to the change room and to the outside. The door to the outside is part of the integral locking system.

5.2.4 Service Area

The service area is adjacent to the isolation rooms at the back of the cells. The walls that form the service area boundaries (Figure 5.1) are the isolation room, the decontamination room and radiochemistry laboratory and cask storage room, the exterior wall to the facility, and the wall separating the reactor bay from the hot cell area. The only normal personnel access to the service area is again the change room and the outside by way of air locks. The door to the outside is again part of the integral locking system.

5.2.5 Decontamination Room

The decontamination room is adjacent to the service area (see Figure 5.1) and is bounded on the other three walls by the radiochemistry lab, the electrical equipment room, and the outside wall of the facility. The walls to the service area and the electrical equipment room are made of 8-inch concrete blocks and the wall to the radiochemistry lab is a 2-foot thick precast concrete wall. The only access to the 20 by 25 foot room is through the service area.

5.2.6 Radiochemistry Laborstory

The radiochemistry lab is next to the decontamination room and adjacent to the service area (Figure 5.1). Aside from the 2-foot thick precast concrete wall between the radiochemistry lab and the decontamination room, all walls are made of 8-inch concrete blocks. The only access to the 18 by 34 foot room is through the service area.

5.2.7 Storage Area

The storage area (Figure 5.1) is adjacent to the service area and all four walls are of concrete block construction 8 inches thick, approximately 8 feet high, and open at the top. Again the only access to the room is through the service area.

5.2.8 Change Room and Cold Areas

The change room, as mentioned above, is the only way to leave or enter the hot cell area (Figure 5.1). In the change room area are the showers, clothes storage, and the cold area men's toilets. All the walls in this area are 3/4 inch Cemesto board on 2 x 6 inch wood studs. The office area walls are regular construction plaster board on 2 x 4 inch studs. The outside wall of the facility is generally made of insulated aluminum siding applied on a steel frame.

5.2.9 Waste Storage Building

The waste storage building is located about 50 feet south of the plant (Figure 5.1). The prefabricated building, 20 feet by 60 feet, is made of aluminum siding on a steel frame. The building has two roll-up garage type doors which are locked. About one-third of the building has concrete block shielding provided so that the waste drums containing a high level of activity may be stored in this area.

5.2.10 Liquid Waste Treatment Building

The liquid waste treatment building is located about 50 feet south of the plant (Figure 5.1). The 25 x 30 feet building is made of aluminum siding on a steel frame. The building has two doors, which may be locked, one for personnel and one for delivery of supplies and equipment. The building is equipped with a vacuum evaporator system and complete laundry facilities.

5.2.11 Fan Room

The room is located on the lower level, directly under isolation rooms 1-5, (Figure 5.2). The room is 14 ft wide, 57 feet long and 13 feet high. The only entrance is from the service area. Equipment in this area consists of normal, auxiliary and process box exhaust fans and controls, double filter plenum boxes, vacuum pumps and air samples.

5.2.12 Sub-cell (Cell 6)

This room is located on the lower level adjacent to the fan room, directly under Cell 1. It is a heavily shielded room with 2 to 3 foot concrete walls. It is 6 feet, by 6 feet, by 13 feet high with access corridors 3 feet wide. The entire floor area is covered with stainless steel. The only entrances are from the service area through the fan room and through the Cell 1 floor blocks. The entrance door is normally locked and is part of the integral locking system (Paragraph 10.4.3).

5.3 Area Work Assignments

5.3.1 General

The facility has been designed to provide as positive separation as possible between radioactively contaminated and radioactively clean areas. Those areas which will remain free of contamination include offices, dark room, staff laboratory, and reactor area. Potentially contaminated areas include the change room, hot cells, isolation rooms, cell operating area, service area, radioactive materials storage area, decontamination room and storage area. The only normal access between clean and controlled areas is via the change room.

5.3.2 Specific

	Location	Work Assignment
(1)	Cell 1, 2	Being rehabilitated; to be submitted later.
(2)	Cell 3	Solid waste bag-out station.
(3)	Cell 4	Entire fuel processing from precipitation to encapsulation.
(4)	Cell 5	Generator loading, decontamination, thermal output measurement, and capsule storage.

(5)	Isolation Room	Cell 3 - Waste handling Cell 4 - Dissolution of cask feed material; feed storage; feed sampling; and measurement of process tank levels.
(6)	Operating Area	Remote handling of materials and process computations and controls.
(7)	Service Area	Material storage in pool, cask transfer, and cell service.
(8)	Decontamination Room	Decontamination of portable equipment and materials.
(9)	Radiochemistry Lab	Analysis of curie-level quantities of radioisotopes.
(10)	Storage Area	Temporary storage, process water tanks and Health Physics survey equipment.
(11)	Change Room	Personnel change area.

(12)	Office Area	Administration area.
(13)	Waste Storage Building	Temporary storage of waste drums.
(14)	Liquid Waste Treatment Building	Liquid waste processing.
(15)	Fan Room	Ventilation equipment
(16)	Cell 6 (Sub-cell)	Not used

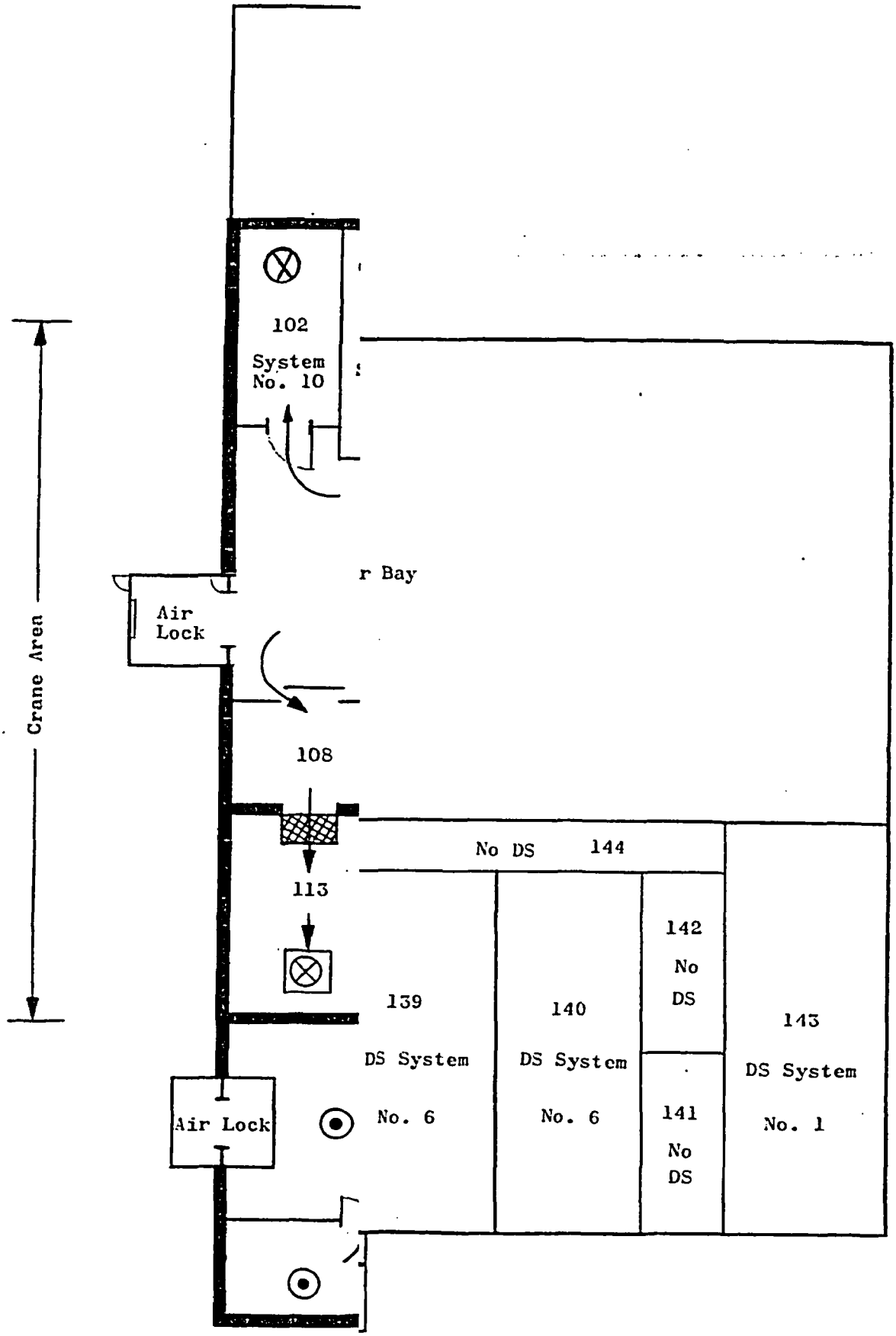
CHAPTER 6

AIR HANDLING SYSTEM

6.1 General Description

Figure 6.1 indicates the areas described in this section and the air flow patterns for these areas. The areas outlined on this drawing include Rooms 102, 103, 105, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118 and 119. All are considered to be in the contained area. All admission to this area is through air locks from outside the building or from adjoining areas.

The contained area is divided into three sub-areas of controlled ventilation served by Supply Air Systems 3, 5 and 7. The areas outside the contained area are served by separate supply and exhaust systems. The airflow pattern within the contained facility is from the machine shop (119) to operation area (118), operation area (118) to service area (107), service area (107) to isolation area (108-112), isolation area (108-112) to cells (113-117), and cells to dry boxes. Most air supplied to the service area is exhausted through the cells, through at least two absolute filters in series, and then to the outside through the main stack. During normal operation, the operation area is at atmospheric pressure or marginally positive, the service area slightly negative, and increasingly more negative pressures in the isolation room, cell and dry


102
System
No. 10
r Bay
Air
Lock
Crane Aren
108
No DS 144
113
142
No
DS
139
DS System
No. 6
140
DS System
No. 6
143
DS System
No. 1
Air Lock
141
No
DS

box, in that order. The cell in which unsealed fuel is handled has, in addition to the shielding door an absolute type filter to allow airflow into the cell.

The areas outside the contained area are served by separate supply and exhaust systems. For example, system 10, serving the decontamination room, receives its air supply from the service area and discharges to the atmosphere through its own fan and set of high efficiency filters. System 7, which serves the radiochemistry laboratory, has its own outside air supply fan and its own exhaust fan.

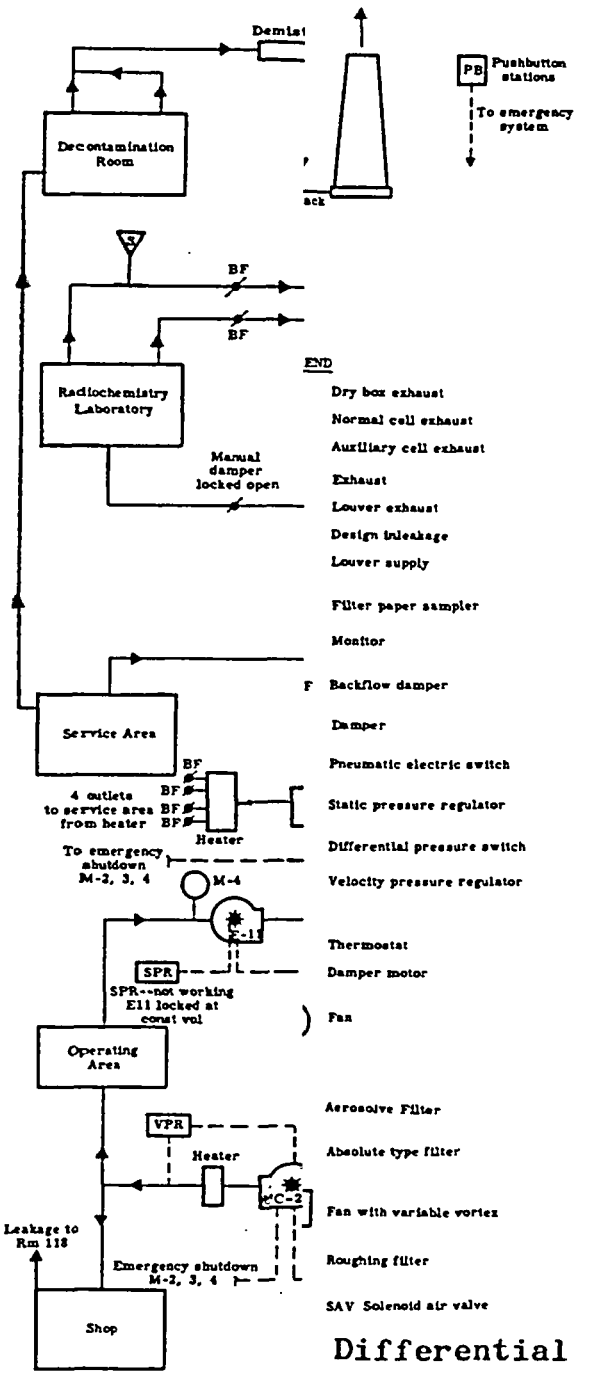
Emergency control systems may be actuated manually or automatically. Three emergency buttons will shut off all contained area supply fans. They are located in the service area, operating area and outside the main entrance. Continuous air monitors provide constant monitoring of the air of various areas (see Paragraph 10.5.3.2). Upon alarm of these, control mechanisms are automatically brought into play.

6.2 Ventilation Subsystems Description

Descriptions of the following systems are found on Figure 6.2, Table 6.1 and Table 6.2.

6.2.1 System 3 - Service Area Air Supply

The oil-fired space heater SH-2 located in room 107, the service area, is set to provide a constant supply of outside air. A pneumatic backdraft damper opens and closes



Differential Pressure Gage

nly in Cells Where
nencapsulated Fuel
s Present

·e 6.2 Air Ventilation System

TABLE 6.1

SUMMARY OF VENTILATION SYSTEMS FOR HOT CELL AREA

System No.	Fan No.	Function
3	SH-2	Supplies outside air to the service area.
5	UC-2, E-11	Supplies outside air to the machine shop and exhausts to operations area.
7	UV-2, E-12	Supplies outside air to radiochemistry laboratory and exhausts to outside.
8	E-4 through E-10	Exhausts air to stack from cells.
9	E-13, E-14	Exhausts air from process box to stack.
10	E-15	Exhausts air from the decontamination room.

TABLE 6.2

VENTILATION SYSTEM TYPICAL VOLUME FLOWS

Legend

CL = Controlled Leakage

DS = Direct Supply

EB = Process Box Exhaust

EN = Normal Cell Exhaust

EV = Auxiliary Cell Exhaust

FE = Filtered Exhaust

IL = Design Leakage

LE = Louver Exhaust

LS = Louver Supply

Room	Volume Flow in cfm
2	CL = 440 FE = 440
102	LS = 3080 FE = 3080
103	DS = 2586 FE = 2586
107	DS = 6812
108	CL = 758 FE = 758
109	CL = 1200 FE = 1200
110	CL = 900 FE = 900

111	CL = 1366 FE = 1366
112	CL = 1055 FE = 1055
113	EN = 658 IL = 758 EB = 100 EV = 1285
114	EN = 1100 IL = 1200 EB = 100 EV = 1285
115	EN = 800 IL = 900 EB = 100 EV = 1285
116	EN = 1266 IL = 1366 EB = 100 EV = 1285
117	EN = 955 IL = 1055 EB = 100 EV = 1285
118	DS = 5050 FE = 5987
119	DS = 937 LE = 937

Return air to 118 and 119 = 4755 cfm

as the fan is started and stopped. From the heater, air passes through four outlet ducts, each equipped with a backdraft damper. Under an emergency condition, this fan will shut down, the outside air damper will close (intake side of SH-2) and the four weighted backflow dampers on the positive side of SH-2 will close. As soon as the emergency has cleared, SH-2 will return to normal automatically when the activating monitor is reset. Most of the air exhausted from the service area is eventually exhausted through the cells; the remainder is exhausted through the decontamination room (102).

6.2.2 System 5 - Machine Shop and Operating Area

Supply fan UC-2 supplies a mixture of outside and recirculated air to the operating area and machine shop. Thermostatically controlled dampers located in the intake duct for UC-2 and the return duct from exhaust fan E-11 regulate the air supplied to UC-2. A pneumatically operated damper opens and closes as the fan is started and stopped. A static pressure regulator modulates the inlet damper to fan UC-2 to maintain a constant air supply to the supplied areas.

Air from the operating area is monitored (M-4) as it enters the exhaust duct, serviced by fan E-11. The inlet vanes to this fan are locked wide open to provide maximum air exhaust from the operating area. Air which is not recirculated leaves the building through an exhaust stack provided with a backflow damper.

6.2.3 System 7 - Radio Chemistry Laboratory

Supply fan UV-2 furnishes only outside air to the radio chemistry laboratory. Air from this laboratory is exhausted to roughing and high efficiency filters through fan E-12 to the outside of the facility. Two backflow dampers are provided in the exhaust duct to prevent air from being drawn into the room from the hoods under emergency conditions. On a drop in space temperature, the room thermostat will control the face and by-pass dampers to maintain 70°F. When room temperature rises, the face damper will close. The low limit in the fan discharge may take command away from the room thermostat and open the face damper to prevent the temperature from dropping below 60°F. When the fan is not operating, the face damper will remain closed. A filter paper sampler is located downstream of E-12 and a final backflow damper is located in the exhaust stack.

6.2.4 System 8 - Hot Cell Exhaust

6.2.4.1 Main Cell Exhaust

The main exhaust system from each cell takes air from the service area through the isolation rooms into the cells (see Figure 6.3). The air leaving the cell passes through a roughing filter, two high efficiency filters in series through the main cell exhaust fan, to a common header and finally to the stack. The static pressure regulator for each cell will

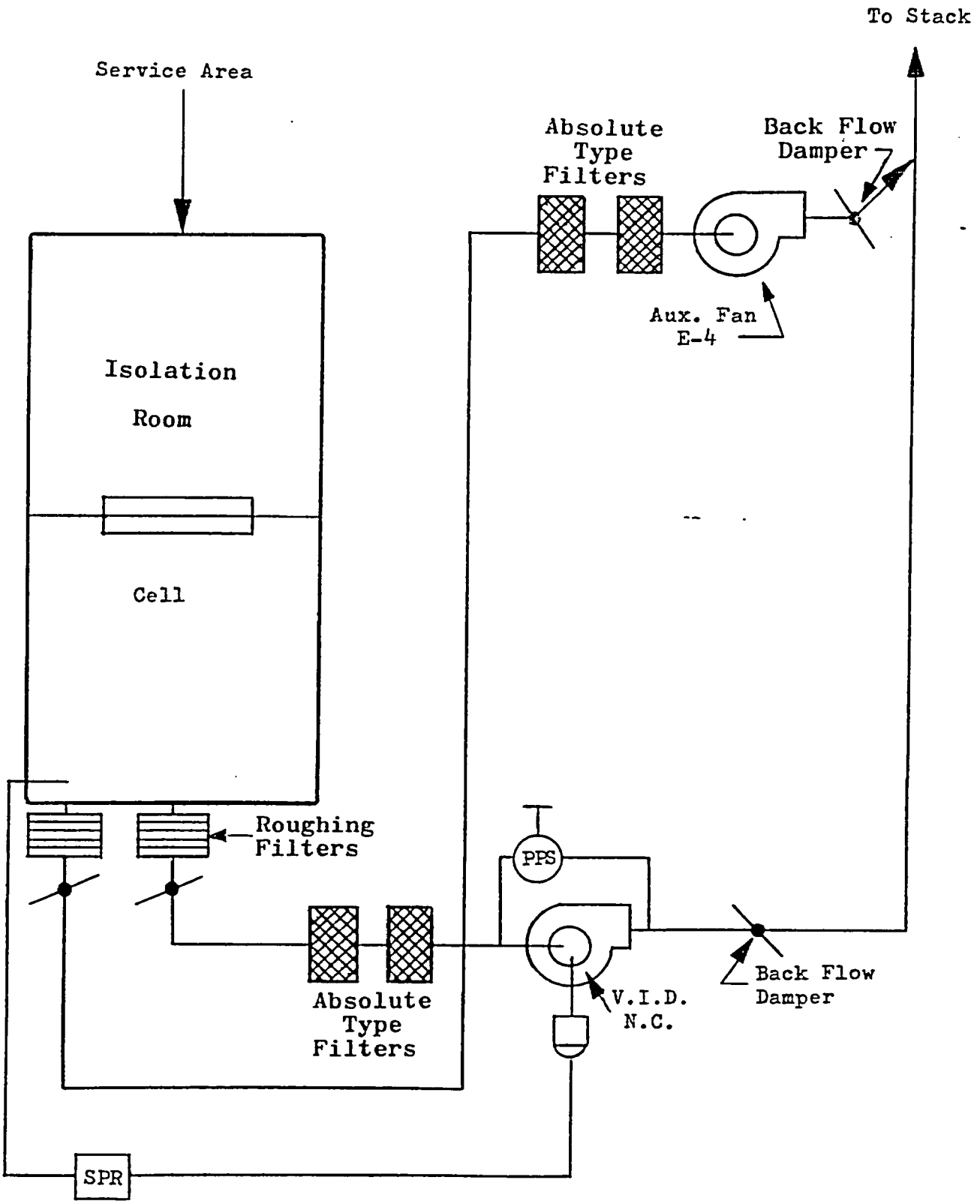


Figure 6.3 Typical Hot Cell Exhaust

modulate the vane inlet damper of the main cell exhaust fan to maintain the required static pressure. If the static pressure rises above the throttling range of the regulator, the auxiliary exhaust fan E-4 will operate and the auxiliary cell intake damper will open. There is about one complete air change per minute in all cells.

6.2.4.2 Auxiliary Cell Exhaust

Usually the normal exhaust fan will be in operation with its intake damper open. However, if the pressure difference across this fan decreases, indicating the possibility of a failure, fan E-4 will start, the auxiliary damper will spring open and the main damper will be motor closed. Air is then exhausted from the cell through a roughing filter and two high efficiency filters in series in the auxiliary exhaust system.

6.2.5 System 9 - Process Box

The air supply to the process box is taken from the cell. (Figures 6.4, 6.5 and 6.6). A differential pressure switch indicates differential pressure across fan E-13. Dampers are adjusted to maintain the box at a negative pressure with respect to the cell. The pressure differentials are given in Table 6.3 and the air velocities associated with the differential pressures are given in Table 6.4. The supply air enters the box through a manifold with two high efficiency filters in parallel. Valves enable use of one filter at a time, the other filter being a spare.

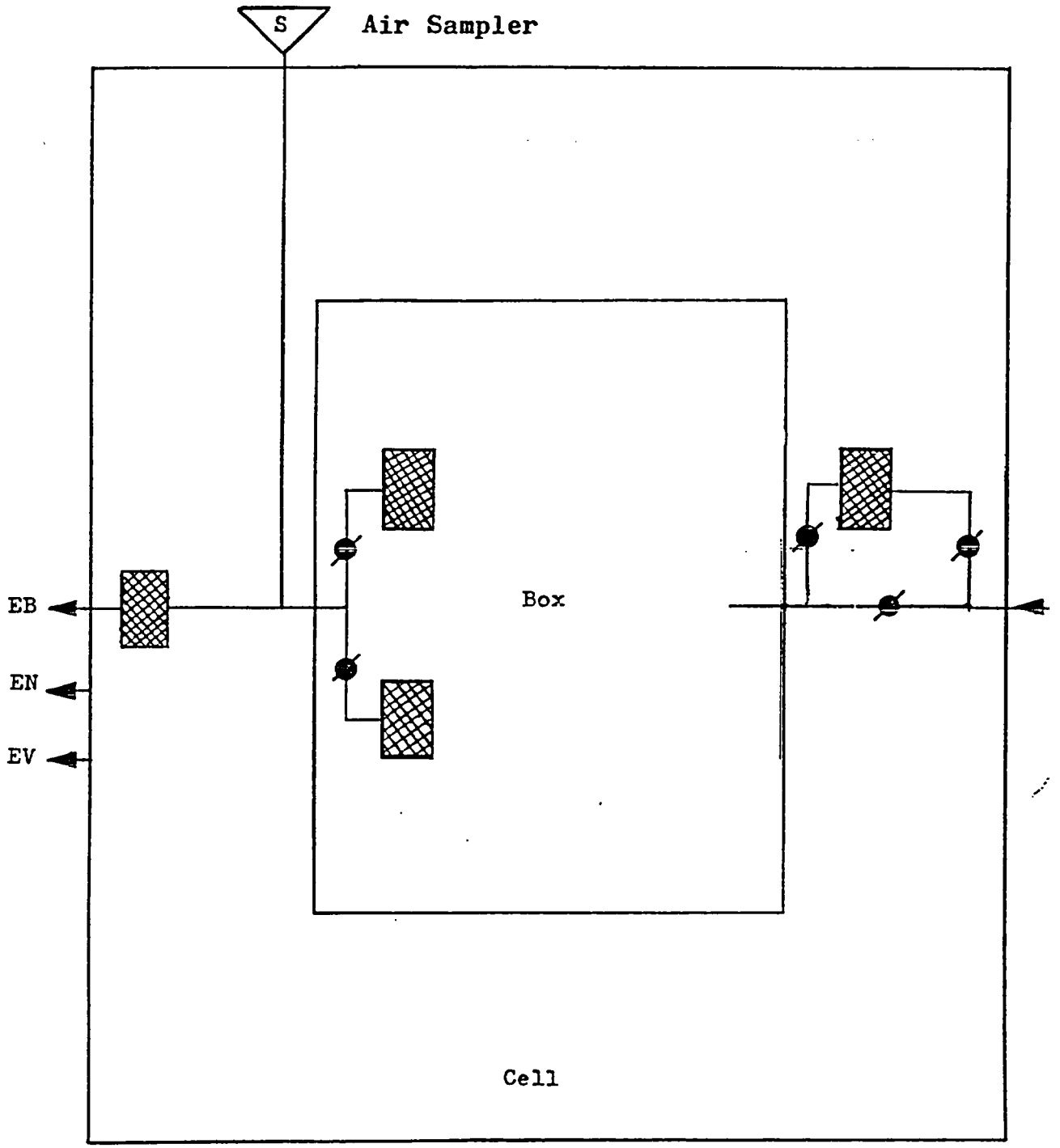


Figure 6.4 Schematic of Ventilation System of Cell Process Box

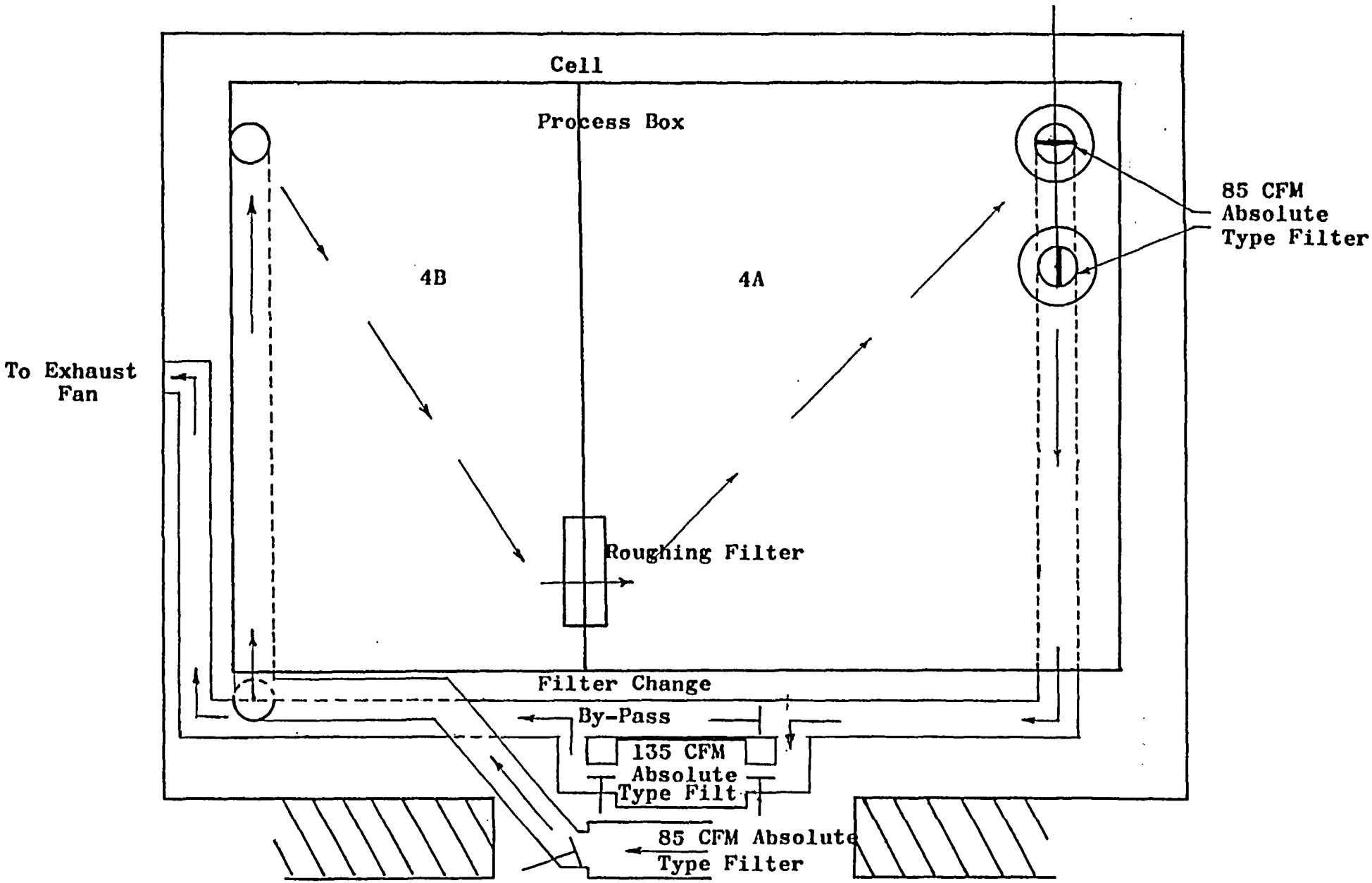


Figure 6.5 Hot Cell and Process Box Ventilation

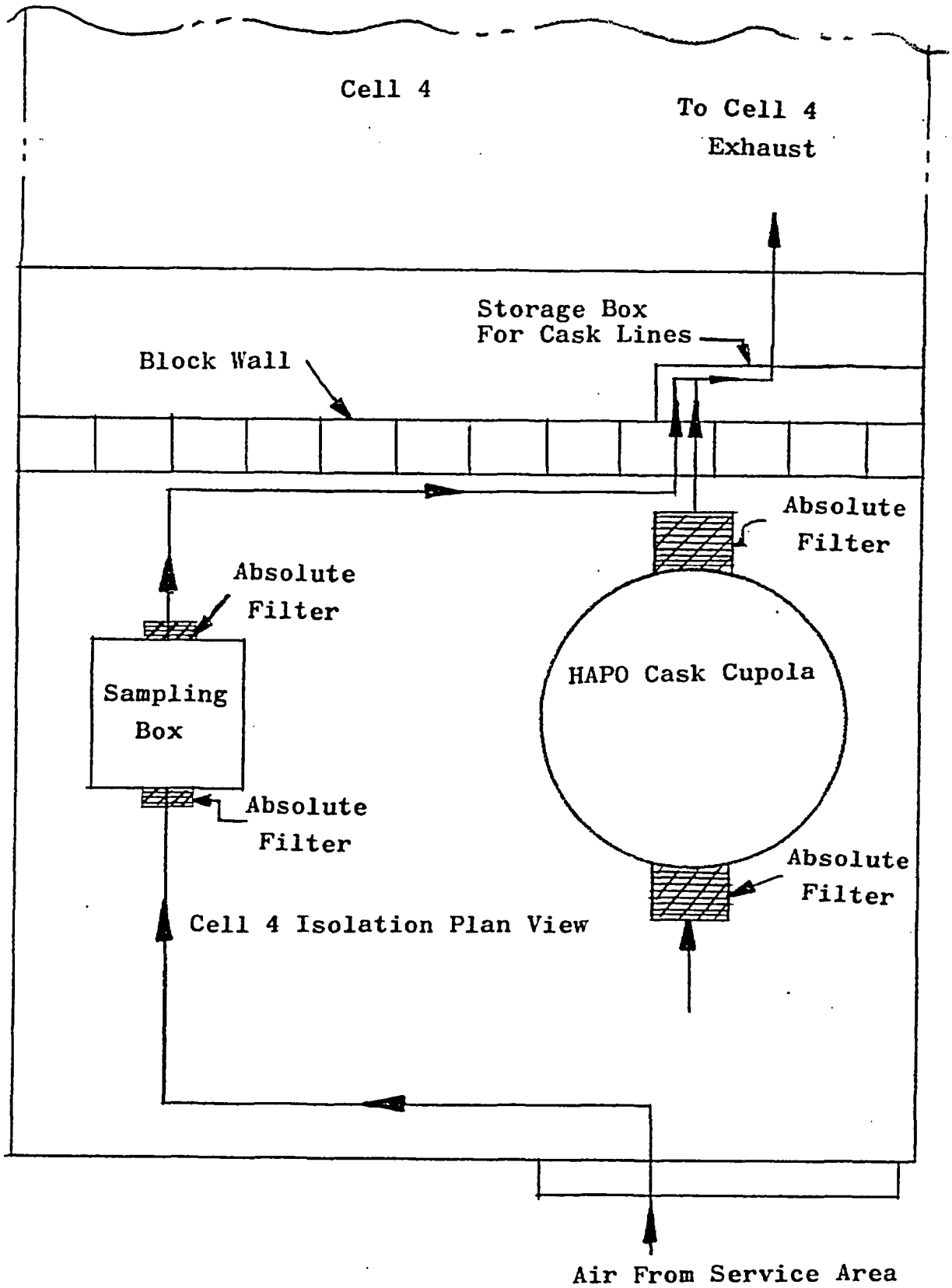


Figure 6.6 Cell 4 Isolation Room Ventilation

TABLE 6.3

PRESSURE DIFFERENTIALS

	READING	GAGE-ACCURACY	MINIMUM
1.	Operations Area to Cell 4	Hays ± .02	0.5
2.	Operations Area to Other Cells	Hays ± .02	0.4
3.	Cell 4 to Process Box	Magnehelic (0-.5) ± .01	0.1
4.	Service Area to Isolation Room 4	Hays ± .02	0.2
5.	Service Area to Other Isolation Rooms	Hays ± .02	0.4
6.	Isolation Room 4 to Cell 4	Hays ± .02	0.2
7.	Isolation Rooms to Other Cells	Hays ± .02	0.0
8.	Operations Area to Outer SOTS	Magnehelic (0-2) ± .04	0.4
9.	Outer to Inner SOTS	Magnehelic (0-.5) ± .01	0.1*
10.	Inner SOTS to 4B (Process Box)		0.05

NOTE: (a) All readings, in inches of water.
(b) Cell 4 always negative with respect to outer SOTS.
(c) Above pressure differentials apply with isolation room door closed.
*Due to structural requirements the maximum is 0.5

TABLE 6.4

MINIMUM AIR VELOCITIES (NORMAL OPERATION)

		VELOCITY (feet/second)
1.	Operations Area to Cell 4	47.1
2.	Operations Area to Other Cells	42.3
3.	Cell 4 to Process Box	21.1
4.	Service Area to Isolation Room 4	29.0
5.	Service Area to Other Isolation Rooms	42.3
6.	Isolation Room 4 to Cell 4	29.0
7.	Isolation Rooms to Other Cells	0.0
8.	Operations Area to Outer SOTS	42.3*
9.	Outer to Inner SOTS	21.1*
10.	Inner SOTS to 4B (Process Box)	14.9
11.	4B to 4A (in Process Box)	3.77

*If leakage in the SOTS walls occurs

The box has dual exhaust ducts installed in parallel. Each duct has a high efficiency filter. The exhaust air, after leaving the box, passes through an additional high efficiency filter which is located at the rear of the box inside the cell door. The filter is accessible for changing. The box exhaust then enters the permanent system, passes through two high efficiency filters, through E-13 or E-14 and then to the stack.

Normally the fan E-13 will be in operation with the fan E-14 acting as a standby.

With fan E-13 in operation, the intake damper is open. If the differential pressure switch senses a loss in pressure differential across the exhaust fan E-13, relay R-30 contact will open, causing the control circuit for fan E-13 to be de-energized, making a circuit to exhaust fan E-14 and causing it to start, opening its intake damper, and breaking an interlock so that the exhaust fan E-14 will continue to run and E-13 will not try to restart even through the correct pressure difference has been re-established. An alarm will sound to indicate that all the foregoing has taken place.

6.2.6 System 10 - Decontamination Room

Supply air is drawn into room 102 by fan E-15 from the service area through louvers in the door and exhausted to the outside through roughing filters and high efficiency

filters. A backflow damper is provided to prevent leakage back into the hood during emergency conditions.

The velocity pressure regulator VPR-1 will modulate the vane inlet damper motor DM-16 to maintain velocity pressure.

6.3 Normal Operations of Cell Exhaust

The cell exhaust systems are started by one push button located in the motor control center. Fans E-4 through E-10 have individual resets located in the motor control center. This main starter button starts fans E-5 through E-10 with a time delay (15 seconds) before fan ~~8E-2~~ starts.

A time delay on the differential pressure switch on fans E-5 through E-10 prevents operation of the auxiliary exhaust fan E-4 before the system stabilizes.

There is a differential pressure switch across each cell exhaust fan. On loss of differential pressure due to fan failure, the pressure switch causes the normal damper to close (motorized damper prior to first high efficiency filter) and the weighted back draft damper beyond the fan will close. The auxiliary damper will spring open on that particular cell and auxiliary fan E-4 will start. An alarm sounds, indicating that cell pressure has been lost and the auxiliary fan E-4 has started.

A static pressure regulator connected between each hot cell and the outside atmosphere maintains a negative pressure by modulating the variable inlet vanes at the fan. If the fan is unable to maintain this negative pressure by vane modulation because of an open door or a dirty filter, a pneumatic electric switch will start auxiliary fan E-4 and open the associated auxiliary duct damper on that particular cell. Both the normal cell fans and the auxiliary fan are thus exhausting that cell.

6.4 Method of Operations

With all supply air fans (E-15, SH-2, UC-2, E-11, UV-2, E-12) in operation, and all cell fans (E-5 through E-10 and E-13) operating normally, the auxiliary fan E-4 and E-14 should be stopped.

As previously stated, the main manual push button to control this system is located in the motor control center. Therefore, for any initial start-up this button should be in the OFF position and all switches on the control board shall be turned to AUTOMATIC. The system can now be properly operated by switching the button in the motor control center to ON. All cell fans will start and after a 15 second delay the supply fans will start.

6.4.1 Static Pressure Regulator

The static pressure regulator senses the static pressure differential between the cells and operating area. It provides contacts which begin corrective actions in case the cell static pressure is lost. Gauges associated with the static pressure regulator are normally set at 5 psi or lower operating pressure. Upon loss of cell static pressure, these gauges rise to about 11 psi or a little higher. This pressure actuates the E-4 (auxiliary fan) switch, fan E-4 starts and the associated cell auxiliary duct damper opens.

6.4.2 E-4 Switch

The E-4 switch is connected to the static pressure regulator and, upon activation, causes fan E-4 to start and associated cell auxiliary duct damper to open.

6.4.3 Pneumatic Electrical Switch Reset

When cell static pressure has built up to normal again and can be maintained by the normal cell fan, pushing the pneumatic electrical switch reset turns off fan E-4 and closes the associated cell auxiliary duct damper returning the cell ventilation systems to normal.

6.4.4 Differential Pressure Switch

Any loss of differential pressure across the normal fans is sensed by this differential pressure switch in the basement fan room. In case of fan failure, it closes the

associated normal cell duct damper, opens the associated cell auxiliary duct damper and causes fan E-4 to start. Such action is displayed on the annunciator panel.

6.4.5 Differential Pressure Switch Reset

Upon establishment of pressure differential across a fan, pushing the differential pressure switch reset causes fan E-4 to stop, the normal cell damper to open and the associated cell auxiliary duct damper to close, returning the cell ventilation condition to normal.

6.4.6 Hays Gauges

(a) Gauge A displays differential pressure across the first high efficiency filter in the normal cell exhaust duct.

(b) Gauge B displays differential across the cell auxiliary pre-filter.

(c) Gauge C displays differential pressure across the normal cell pre-filter.

(d) Gauge D displays differential pressure across the second high efficiency filter in the normal cell exhaust.

There is no automatic corrective action associated with these differential pressure gauges.

6.4.7 Process Box Control Section

(a) The process box control section of the panel contains the same type of Hays gauges as the rest of the panel to measure the pressure differential across the two final high efficiency filters.

(b) Three magnehelic vacuum gauges are located here to display the operating conditions of three vacuum pumps located in the fan room. These pumps supply vacuum for a filter paper sampling system integrated with the ventilation system.

6.4.8 Auxiliary Fan Control Section

(a) The auxiliary fan control section contains two Hays gauges which display the pressure differential across the two associated high efficiency filters.

(b) It contains one differential pressure switch reset controlling resetting of fan E-13.

(c) It contains one alarm contact, connected to the annunciator panel, which makes contact and sounds an alarm whenever fan E-4 is actuated.

6.5 Emergency System Control

6.5.1 Manual

In the event of any gross contamination within the contained area, all supply air must be shut down insuring that the pressure will remain lower than that of the other areas and the direction of air flow is always toward areas of increasing contamination.

There are three manually operated push button emergency stations; one is located in the service area air exit (east end of building), one is in the operating area at the air lock to the change room and a third button is located on the outside of the main entrance doors.

Activation of any of these manual buttons will stop all fans supplying the contained area. The specific fans involved are:

(1) E-15 - Exhaust air from Decontamination Room 102

(2) SH-2 - Air to Room 107 - Service Area (overhead oil burner)

(3) UC-2 - Air to Machine Shop and Operating Area

(4) E-11 - Air to exhaust from Machine Shop and Operating Areas

(5) UV-2 - Air to Radiochemistry (103)

(6) E-12 - Air exhaust from Radiochemistry (103)

To restart the air supply system the same manual button that was activated will have to be reset. After resetting this manual button, all fans will start automatically except for the following:

(1) UC-2, E-11 - Reset on equipment mezzanine

(2) E-15 - Reset on mezzanine above Decontamination Room 103

(3) Reset on all pneumatic electrical switches and differential pressure switches - Buttons on control panel board

A weighted backflow damper is located in the wall between Rooms 118 - Operating Area and 107 - Service Area. Under normal conditions, this damper will be closed. Under emergency conditions, this damper will be open to purge the operating area.

6.5.2 Monitoring Systems and Controls

Constant air monitors control the air handling systems to assist in the prevention of the spread of contamination. The details of their operation are found in Paragraph 10.5.3.2.

6.6 Stationary Overhead Transfer System Ventilation Plan

6.6.1 Secondary Inlet Air

A 500 cfm absolute type filter will be placed in Cell 3 with a manual 6-inch damper on the inlet which can be operated from the face of the cell. A 6-inch diameter tube will lead from the filter, through the top of Cell 3 into the SOTS secondary containment near Cell 3. That will insure that the secondary containment will be held at a pressure approximately equal to, or less than, the pressure in Cell 3.

6.6.2 Primary Inlet Air

An automatic damper will be installed behind a roughing filter between the primary and secondary SOTS containment near the Cell 3 downcomer door in a manner to make both the filter and damper accessible.

The above damper-filter will be designed to control the pressure drop across the two stages of containment.

6.6.3 Primary Air Exhaust

The inner SOTS containment will be exhausted through filters of at least 100 cfm capacity to the Cell 3 box exhaust system.

The SOTS exhaust duct will originate at a spot high in the inner containment with a 4-inch diameter duct coming down between the two containment barriers and through the Cell 3 roof area. Filters will be set up in parallel with a damper system to permit filter changes while maintaining an uninterrupted air flow.

6.6.4 Pressure Differential - Measurement

Two differential pressure gauges will be installed on the cell face for SOTS. One will indicate the differential between the outer containment and operations and the other will show the differential between the inner containment and operations. A similar system will be provided for the Cell 4 process box.

6.6.5 Ventilation During Transfers

6.6.5.1 Attachment of Drum Liner

The drum and new drum liner will be attached to the SOTS Cell 3 downcomer. A bleed valve will be provided on the downcomer to permit air from the cell to enter the downcomer and a magnehelic gauge will be provided on the downcomer proper to permit visual determination of negative pressure. The internal downcomer pressure will be reduced to permit correct attachment of the drum liner.

6.6.5.2 Pressure Equalization

The Cell 3 SOTS door would be opened and the waste container taken up to SOTS and the Cell 3 door would be closed. At this point, the SOTS inlet damper would be partially closed and the pressure in SOTS would be lowered until the inner pressure reached 0.05 to 0.1 inch water gauge positive with respect to the process box; the box door would then be opened and the transfer made. At no time will SOTS be allowed to become negative with respect to the box, nor will more than one of the SOTS doors be open at one time.

CHAPTER 7

WASTE DISPOSAL SYSTEM

7.1 Description of Facilities

Facilities are available for the control, treatment and disposal of airborne, liquid and solid radioactive wastes.

7.1.1 Solid Wastes

As far as possible, all wastes are converted to solid form and suitably packaged for shipment and ultimate disposal by land burial. Airborne particulates are removed by filtration. When the accumulated solids on the filter begin to impair its flow capacity or reach a radiation level designated as the maximum for operation, the filter is replaced. The old, contaminated filter is removed from the system and packaged in a disposal container for shipment and burial. In similiar fashion, concentrated radioactive liquid process wastes, after neutralization, are absorbed in a suitable medium, such as Flor-co, a commercial product which can absorb about 4 times its own weight of liquid, in the proper proportion to form a monolithic solid. The absorbing mixture is preloaded in the disposal container; after the liquid waste has been added, the container can simply be sealed for shipment.

The disposal containers, which are approved by the Bureau of Explosives, consist of steel drums (see Paragraph 9.1.3.2). For disposal of solids, the inner cavity is filled to

capacity (dictated by either mass of material or radiation level), the inner cover put on, the top cavity filled with concrete, and the outer drum cover put on. For disposal of liquids, the inner drum cavity is preloaded with Flor-co and the cover with valved inlet and vacuum line put in place. When the waste liquid has been added, the valves are then closed and the line to the waste storage tank disconnected. Concrete is poured into the top cavity and the top cover put in place. Thus, for liquid process waste disposal, it is necessary only to drain the liquid into the previously prepared drum. The drum for liquid waste is located in the isolation room of Cell 3 and connected to the process lines by appropriate plumbing. For removal of the loaded drum to storage and shipment, the isolation room is entered, the drum removed, and a new drum connected in place.

The solid wastes are removed from the process boxes in specially designed transfer boxes (see Paragraph 9.1.2.4 for specifications) which are transported to Cell 3 by SOTS. The waste is placed in drums using the solid waste bag-out system (see Paragraph 9.1.5.1).

7.1.2 Liquid Wastes

The previous section indicated how high level liquid process wastes are transposed to solids for ultimate disposal. This is practical for the relatively small volume of liquids handled in the process. There are relatively large volumes of low level liquid wastes generated in operations auxiliary to the

process, for which the previously described liquid treatment is too costly. A liquid waste treatment plant is available for disposal of this latter category of waste. In this plant, the low level wastes are tested for activity by a Pennsylvania State University Health Physics representative. If a reasonable amount of dilution will lower the activity level to within the specified limits of 10CFR20, the wastes are diluted and discarded to the stream system (see Figure 7.1). If this method is not possible, the liquid is vacuum evaporated to provide a condensate of sufficiently low level contamination for discharge to the streams. The high level residual liquid remaining in the evaporator is disposed of by the above described method of conversion to a solid.

The plant for treatment of low level liquid wastes is housed in a separate building about 50 feet from the main building. The capacity of this plant is based on an estimated flow of 300 gal/day, of which about 10% might actually require evaporation treatment. In actual experience the plant has safely and efficiently processed 15 gal/hr. by evaporation.

Figure 7.2 shows that wastes flow to the treatment plant by way of two collection systems. The low level waste system originates in areas of potential radioactive liquid wastes and contamination such as the radio-chemistry laboratory drains and the fume hoods in the decontamination room. Drains from areas of unlikely, but possible, radioactive contamination

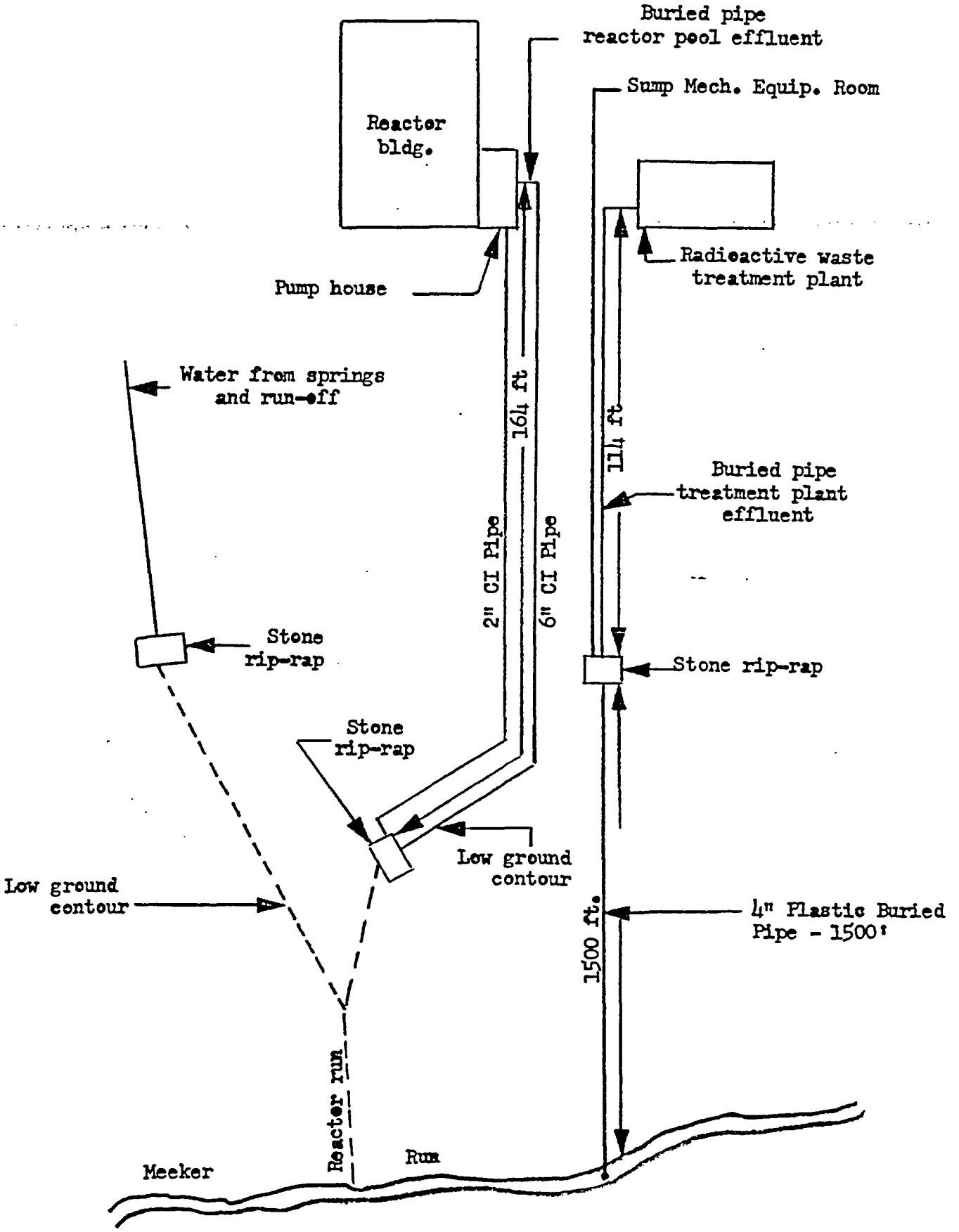


Fig. 7.1 Waste Treatment Runoff

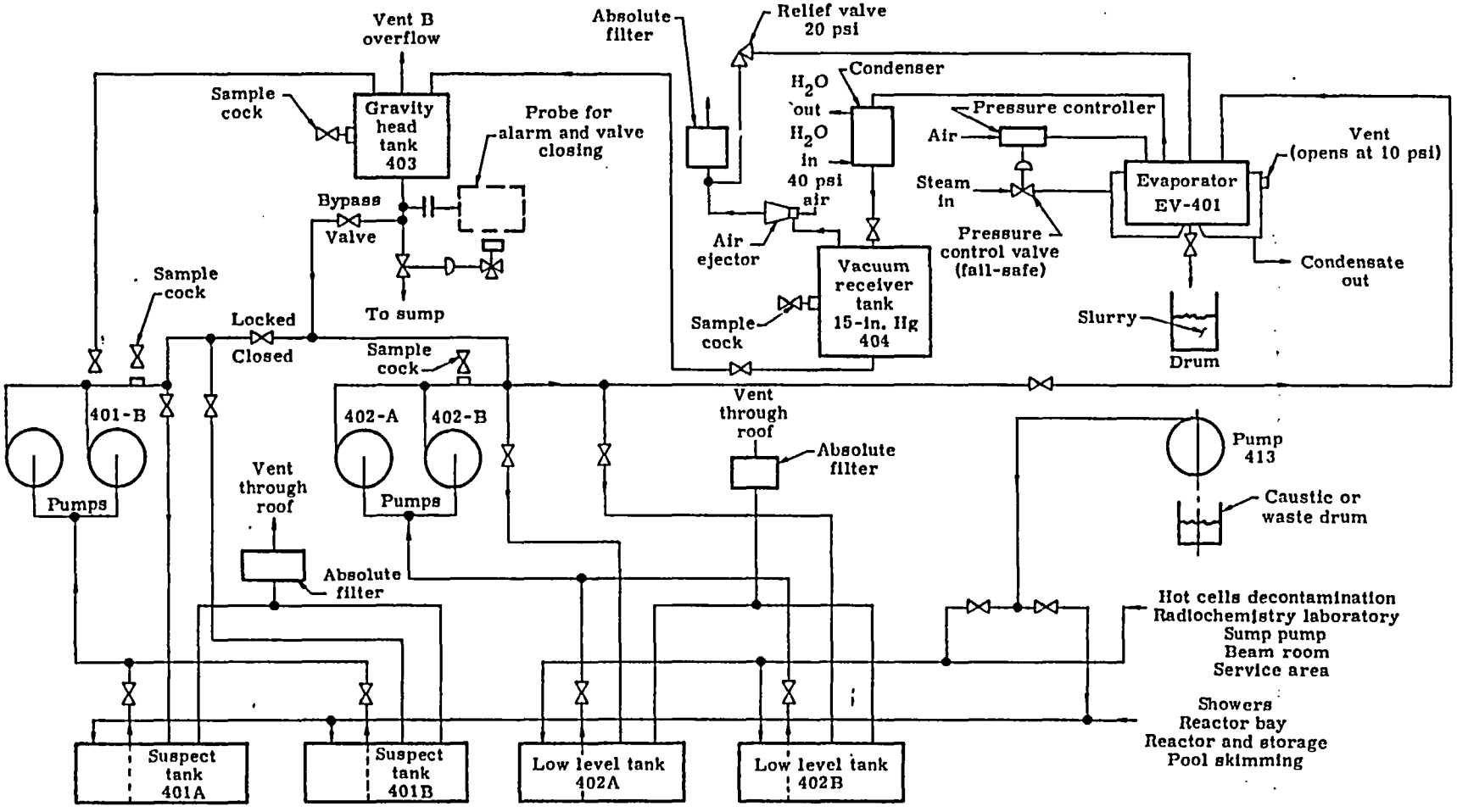


Figure 7.2 Waste Treatment Plant

lead to a "suspect" waste system and originate from such places as the change room showers, reactor area and the personnel decontamination sink in the change room. Each system may be terminated in either of two 3000-gallon underground tanks. When one tank in one system is full, the other tank in the same system may receive drainage.

There are two pumps for each system: one in each system operates when required, with the second used as a standby. When a tank is full, the contents are mixed by circulation through the pump and back to the tank. A sample is then taken from the sampling cock on the pressure side of the pump and an analysis made for radioactivity content. If the activity concentration is below the maximum permissible level for release, the contents of the tank are pumped out for disposal directly to the stream. If the activity concentration is above the permissible level, the contents of the tank are either diluted or pumped to the evaporator.

Following evaporation, the sludge is drained to drums which are shipped offsite for ultimate disposal as mentioned above. The water vapor from the evaporator passes through a heat exchanger-type condenser, and the condensate flows into the 100 gallon vacuum receiver tank and is then transferred to the 1000 gallon gravity head tank where it is analyzed for activity concentration by Pennsylvania State University Health Physics representatives. If the activity is within disposal limits it can

be dumped directly into the Meeker Run, 1500 feet from the facility, via 4 inch plastic pipe. If the activity is too high, it can be again put through the evaporator. Active sludge is drained from the evaporator through a 3-inch valve and pipe into a 55-gallon drum which is preloaded with Flor-co. Figure 7.3 is a sketch of the evaporator and preloaded drum system.

A station has been provided for the addition of caustic to any storage tank for acid neutralization. This station may also be used for the transfer of radioactive waste solutions from other laboratories to one of the storage tanks.

Each group of two storage tanks is vented above roof level through absolute type filters.

The system has been designed to be flexible. The following operations are possible:

(1) The contents of any storage tank can be pumped to the evaporator.

(2) The contents of any storage tank can be pumped to the gravity head tank.

(3) The contents of any storage tank can be pumped to any other storage tank.

(4) The contents of the gravity head tank can be routed to any storage tank.

A complete facility for laundering potentially contaminated clothing is also included in the building housing the liquid waste treatment plant. The effluent from the laundry

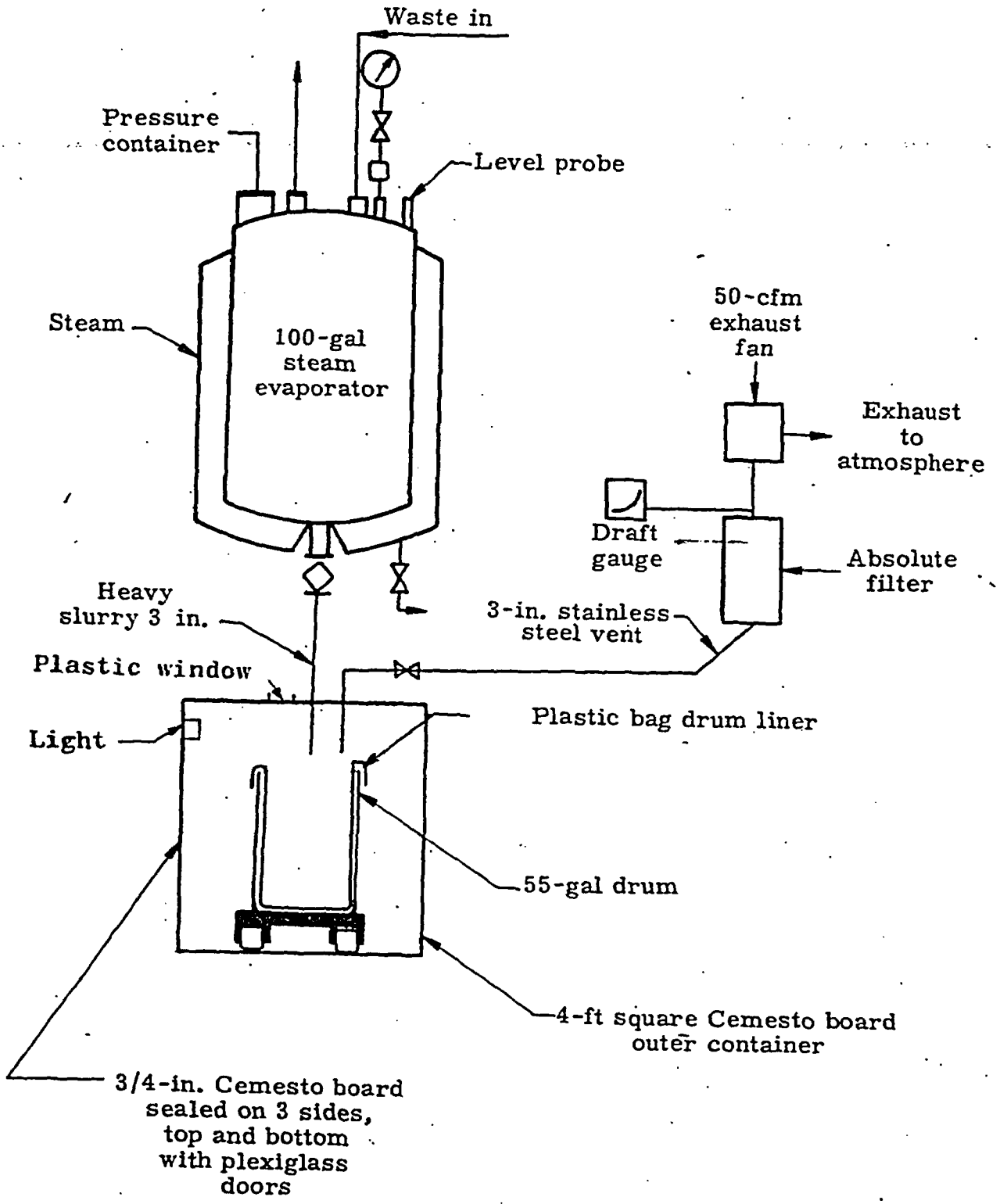


Figure 7.3 Waste Treatment--Sludge Removal

facility drains to the waste storage tank. Under normal operations, this facility is not utilized. The normal procedure is described in Paragraph 10.8.3.

7.1.3 Gaseous System

No radioactive gases or vapors are present in the Strontium-90 process. There is therefore no problem in disposal of gaseous wastes.

Airborne radioactive particulate matter, on the other hand, poses a serious problem. The solution to this problem is achieved through the principle of, and design for, multiple containment. This system includes a barrier of multiple absolute filters in series through which the air must pass before discharge to the stack. The airborne radioactive wastes are collected on filters, and the filter assembly disposed of when the collected particles are sufficient to significantly impair the flow, or the radiation level of the filter is sufficient to dictate replacement.

7.2 Quantities of Wastes

7.2.1 Solids

The principal sources of solid waste are solidified liquids, used filters, contaminated equipment, and the actual solid wastes from the process box. All solid waste is packaged and put in containers for shipment.

Since used filters and contaminated equipment vary in size and shape, it is usually the volume of the drum rather than activity which dictates the amount placed in each drum.

Most of the activity placed in drums comes from the solid waste products of the pellet-making process. Since this waste is of relatively high activity the amount of this waste per drum is dictated by the activity and not the volume. The Bureau of Explosives has approved shipment of drums containing up to 100 curies each. Up to 500 drums can be stored adequately in the waste storage building.

Shipments of waste offsite for burial are at about two-month intervals. Each shipment is 1000-3000 curies, or about 125 drums. These figures are for 10,000 curie batches. The new 25,000 curie batches precipitated will result in more waste but the increase is not anticipated to be large.

7.2.2 Liquids

As mentioned above, the high level liquid wastes from the process are directly converted to solids and shipped as solid waste. Each 10,000 curie batch produces 12 to 20 liters of liquid waste about 40 liters are placed in each drum.

The larger quantity of low level liquid wastes is processed in the waste disposal plant. In the past, the suspect system (very low activity) has collected about 1500 gal/month to be processed. Most of this was diluted with water and discharged to the streams. The low level system has collected about 1000 gal/month. Some of this was run through the vacuum evaporator system and the low level condensate discharged to the streams. The residual liquid was converted to a solid and shipped offsite. The solidified liquid drums are included in the above solid waste quantities.

CHAPTER 8

UTILITIES AND SERVICES

8.1 Introduction

This section covers the normal and emergency utilities and services that are installed at the Quehanna facility. In any radioactive installation it is necessary that provisions be made to supply adequate emergency facilities that will be able to operate critical equipment in the event of a power failure, etc.

8.2 Electricity

8.2.1 Source

Electric power is supplied to the Quehanna Facility by the Pennsylvania Electric Corporation that has a large generating station at Shawville, about 12 miles away. A 13,200-volt power line leads to a substation consisting of two 500-kva, 13,200-volt, 480/277-volt transformers. One of these transformers supplies control and instrument power for the Hot Laboratory and Reactor building sections. The second 500 kva transformer services all heavy electrical motors and equipment in order to control power surges. There are automatic switch-over provisions so that in case either transformer fails the other unit can carry the load. This provision ensures the availability of at least one transformer with power to operate the essential ventilating equipment in the hot cell area. The 440-volt power input is reduced to 208/120-volt service as required for lighting and other services throughout the Radio-isotopes Pilot Plant.

8.2.2 Emergency Power

In the facility, the main emergency power system consists of a generator rated as follows: 43.75-kva, 35-kw, 0.8 pf, 227/480-volt, 3-phase, 4-wire, 60-cycle. The generator is driven by a propane gas-fueled engine delivering a rated output of 81.5 hp at a speed of 1800 rpm. The propane is obtained from the building gas system. An automatic transfer panel transfers the load from the normal source to the emergency source when the normal line voltage fails below 85% and returns the load to normal when all normal line voltages have been restored to 95% or more. Time delay relays are incorporated in the transfer switch to permit the emergency unit to reach rated voltage and speed before the transfer is effected. This takes approximately 10 seconds. When normal power is again available, the system must remain at steady state on the normal bus for 15 minutes before the critical load is automatically transferred from emergency to normal power. The automatic transfer switch is electrically and mechanically interlocked so that there is no feedback from the normal bus to the emergency generator, or vice-versa. Full relay protection guards against phase failure. A built-in test switch to simulate power failure is provided for maintenance checks and testing. A four-position control switch on the control panel permits selection of four operating positions marked STOP, HANDCRANK, TEST and AUTOMATIC.

During a power failure, it is necessary to provide emergency lighting, instrumentation, heating and ventilation for the hot cells. Emergency lighting is supplied in most rooms in the building, and consists mainly of one fluorescent fixture per room. In the hot cells, 50% emergency lighting is provided so that an experiment which is at a critical stage when the normal power fails may continue.

It is necessary to keep the hot cells and process boxes at a negative air pressure with respect to the surrounding areas at all times to prevent leakage of contaminated air into these areas. The following equipment is therefore connected to the emergency power supply:

(1) Exhaust fans E-4 to E-10 and E-13 and E-14
(2) Instrument air compressor (fan controls)
(3) The pneumatic electric switches which cause E-4 to operate in case of an exhaust fan failure
(4) Constant air monitor (CAM)
(5) Remote area radiation monitors (RAM)
(6) Model 8 manipulators
(7) Emergency lighting
(8) Instrumentation power panel

It may be seen that failure of both the normal and emergency power supplies, while most improbable, could cause a potential hazard so emergency exit lights are fed by an independent battery unit. When the normal power is restored, the

emergency exit lights are automatically returned to the normal power circuits.

The entire fire alarm system will operate from the normal power bus. In case of a power failure, the system will automatically switch over to a 24-volt d-c supply obtained from storage batteries. Trickle chargers ensure that all batteries are fully charged when not in use.

8.3 Water Supply

8.3.1 General

Water is provided to the facility from a dam on Meeker Run, upstream from the waste disposal discharge point. A float control in the facility reservoir controls the 100-gpm submersible pump located in the Meeker Run Dam. The surface storage reservoir (see Figure 8.1), covered by an aluminum structure, holds not less than 135,000 gallons of usable water when the surface is not frozen. The domestic water suction line removes water from a higher elevation in the reservoir than the fire protection suction line so that, in case of a water drawdown, there will always be 50,000 gallons of water available for fire protection.

These sources provide water for the following general services: hot and cold sanitary water, steam, process cooling water at 50°F, closed loop process water, and hot process water at 180°F. In addition to these standard services, deionized water is available for filling the source storage pool as well as for any other chemical uses that may be required.

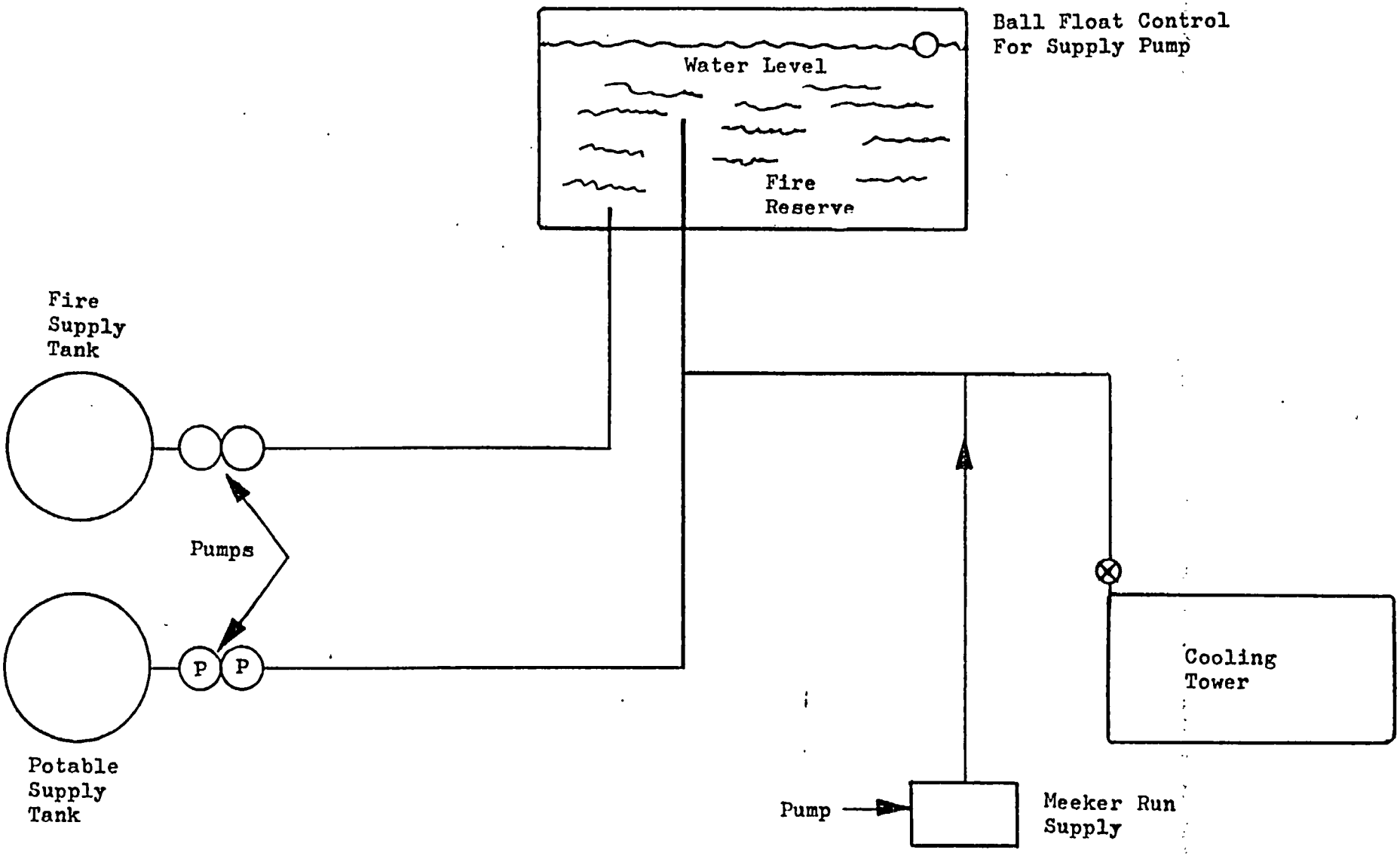


Figure 8.1 Storage Reservoir System

8.3.2 Storage Pool Supply

A deionizing system, installed primarily for the purpose of providing water for the reactor pool, provides deionized water in quite large quantities and ensures a sufficient amount for maintaining the level in the storage pool, even if a leak should develop. The rated capacity of this system is approximately 140,000 gal/day. Figure 8.2 is a block diagram of the system. The storage pool recirculation system is shown in Figure 8.3.

8.3.3 Water for Fire Protection

Three fire hydrants are located outside of the building. The first is approximately 60 feet from the northeast corner of the building, the second about 100 feet from the northwest corner, and the third, a pumper hydrant, on the south side of the building. Each unit is enclosed in a hydrant and hose-reel house which contains 200 feet of 2 1/2 - inch hose and 300 feet of 1 1/2 - inch hose which is sufficiently long to reach any section of the building.

An electrically driven pressure pump on the fire protection pumping system starts at 95 psig and stops at 100 psig and will supply 500 gpm at 100 psig. A booster pump cuts in if the pressure in the fire lines drops to 85 psig and cuts out again when the pressure reaches 110 psig. In case of an electric power failure, a propane-fueled engine-driven pump

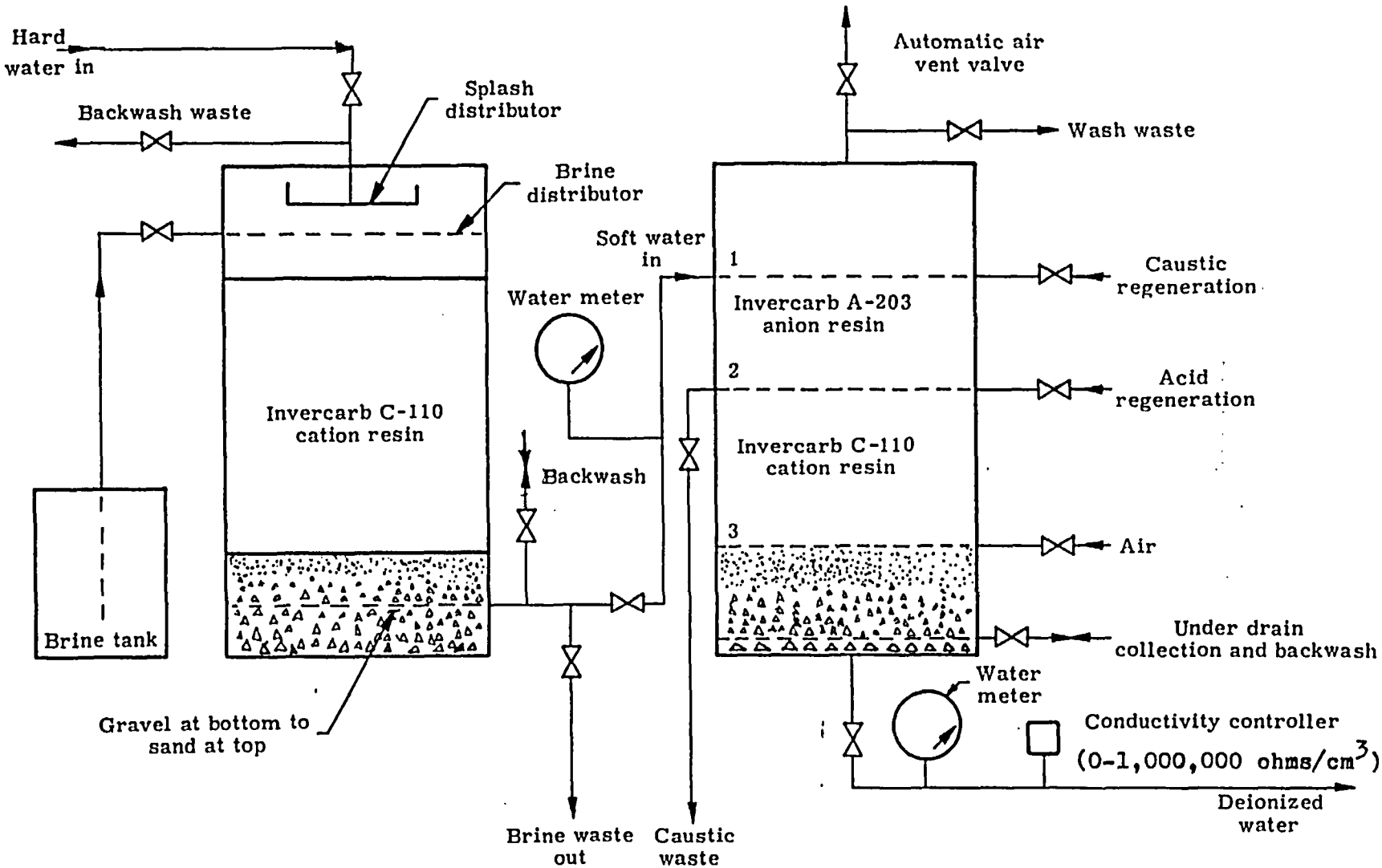


Fig. 8.2 Pool Water Supply System

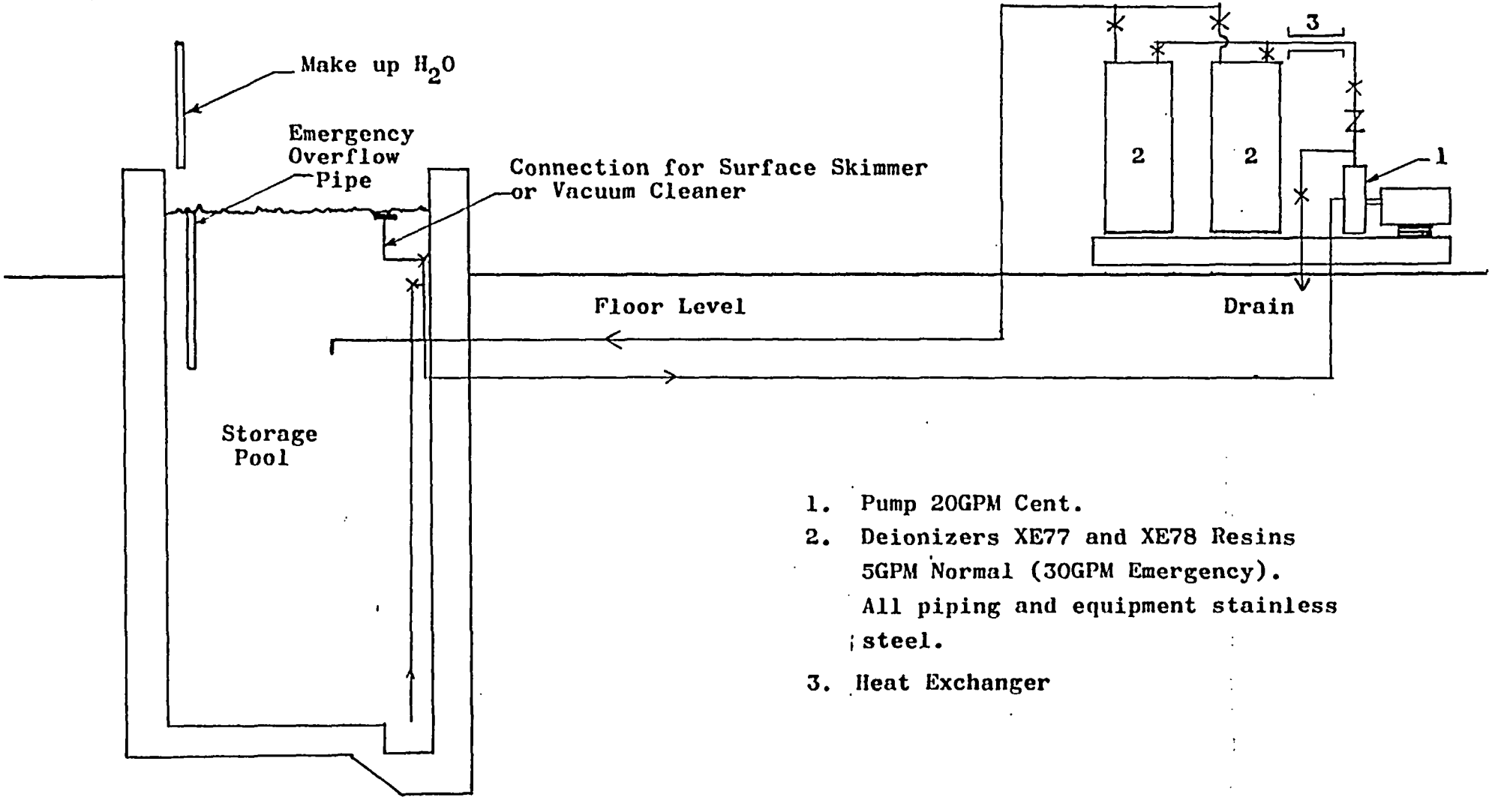


Fig. 8.3 Storage Pool Recirculation System

will cut in automatically when the water pressure drops to 75 psig; however, the pump must be stopped manually.

8.4 Services

The Quehanna Facility is equipped to provide the following services:

(1) Compressed air at 125 psig obtained from an air compressor located in the machanical equipment room.

(2) Propane gas for general distribution supplied by a 1600 gallon tank located on the north side of the facility.

(3) Fuel oil for the boiler and other equipment obtained from a 15,000 gallon underground tank near the propane tank.

(4) Steam provided by the boiler in the mechanical equipment room.

(5) Plant sewerage facilities with a 2,500 gallon septic tank located underground outside the north fence.

CHAPTER 9

DESCRIPTION OF EQUIPMENT

The equipment used in a facility which processes radioactive material must be adequate to protect health and to minimize danger to life and property. This chapter of the report describes the equipment used at the Quehanna Facility. There are three main categories to be considered here; containers, devices and instruments.

9.1 Containers

9.1.1 General Description

Anything that functions to retain radioactive material and/or serves as a barrier against the dispersal of contamination may be classified as a container. Included in this category are transport storage containers, work enclosures and product vessels.

9.1.2 Transport Containers

9.1.2.1 HAPO Shipping Casks

Purified strontium-90 feed material is shipped to the Quehanna site from the Hanford Works in special casks (see Figure 9.1) designed and built for this purpose. Upon arrival at Quehanna, the cask is transferred into the isolation room of Cell 4. There are two sizes of casks used, HAPO-I and HAPO-II.

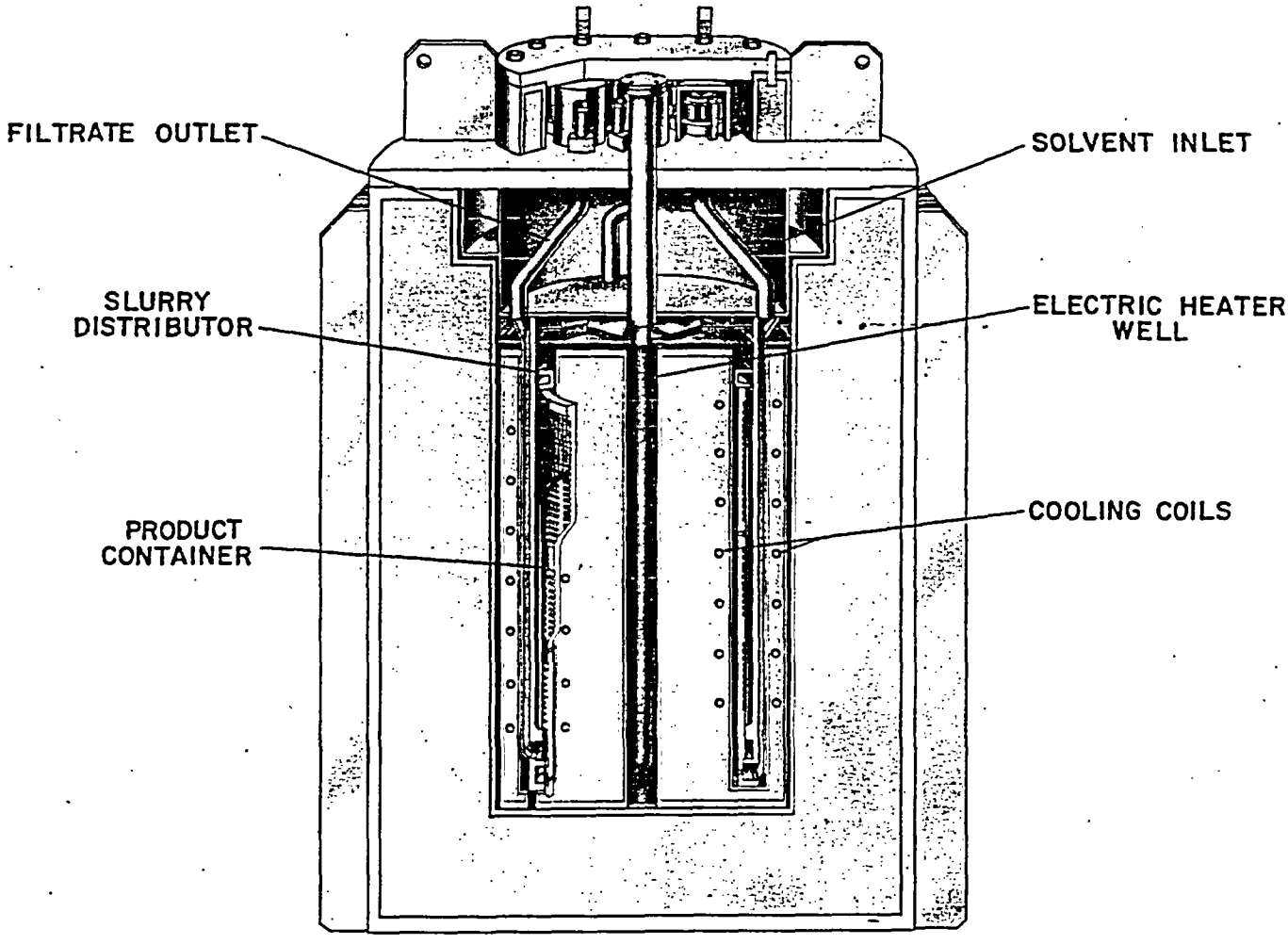


Figure 9.1 HAPO Cask

HAPO-I, the larger of the two sizes of casks, has a capacity of about 500 kilocuries of strontium-90 plus the attendant impurities. Most of the shipments to Quehanna will be made in the HAPO-I casks. The design and accident analysis for both casks are found in reports issued by General Electric Company, Hanford Atomic Products Operation (HW 77963).

HAPO-II, the smaller of the two sizes of casks, has a capacity of about 170 kilocuries of strontium-90 plus the attendant impurities.

9.1.2.2 HAPO Cask Cupola

The cupola (Figure 9.2) is fitted to the top of the HAPO shipping cask before the removal of the strontium fuel is started. Although the cupolas used do not actually hold any strontium fuel, they do serve as protective barriers to dispersal of contaminants during the dissolution procedure. Since it is made of transparent polyvinylchloride, the fittings for the feed solution, etc., may be connected while the cupola is on the cask by using the glove ports and tool port. The procedure for connection of the cupola is described in Paragraph 3.2.2.

After each cask is unloaded, the cupola is bagged and put into a waste drum for disposal. Thus each cask has a clean cupola and no decontamination of the cupola is required.

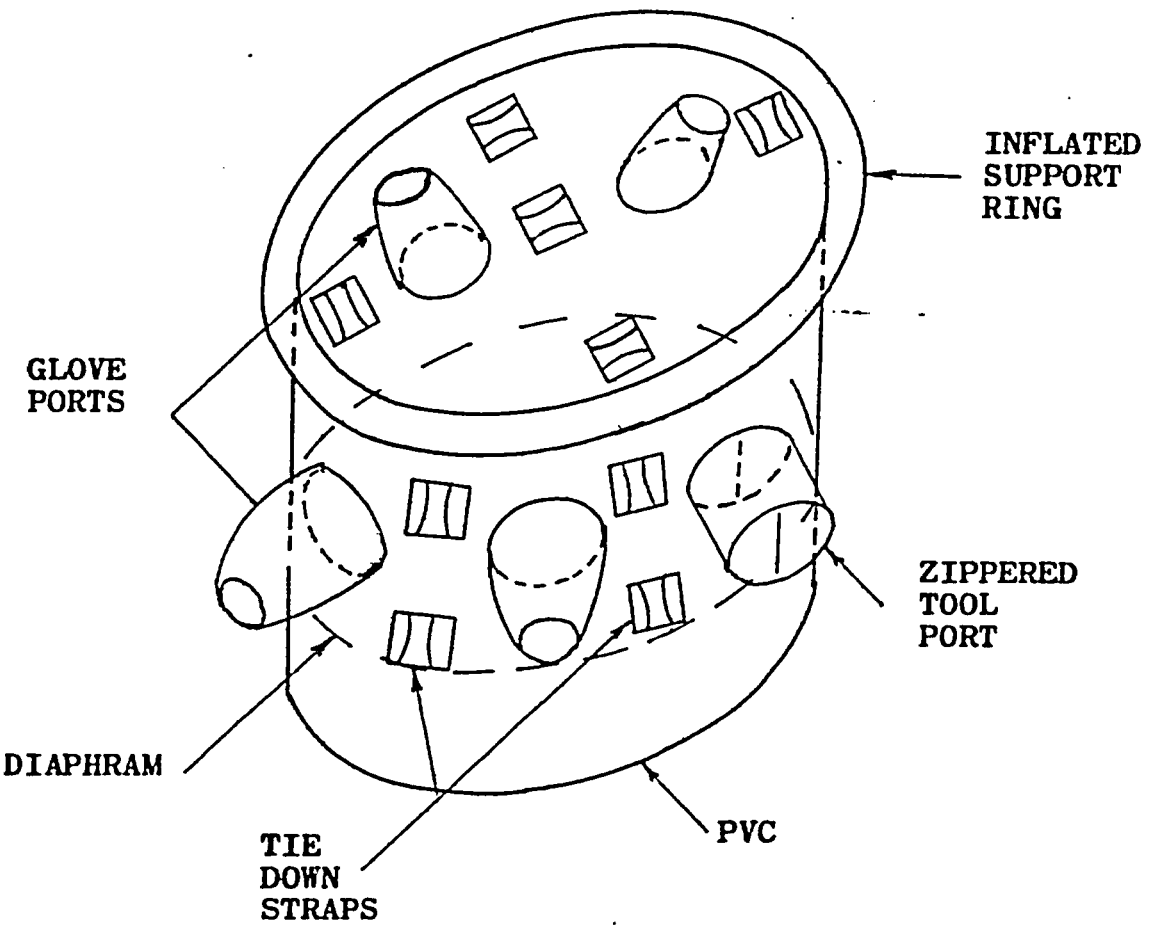


Figure 9.2 Cask Cupola

9.1.2.3 Capsule Transfer Cask

A shielded cask is used to move capsules from the Cell 5 storage to the storage pool. The description of the procedure for transfer is found in Section 3.4.

A typical cask is shown in Figure 9.3. It has 3 inches of lead shielding and is designed for transfer of one capsule at a time. A half-inch steel pin locks the cover in place and serves as a radial support in the event the cask is dropped. Any cask used will be sufficiently shielded for the safe transfer of capsules from Cell 5 to the storage pool.

9.1.2.4 Transfer Box

The transfer box is used to transport small amounts of solid waste and equipment from the process box of Cell 4 to the waste bag-out station in Cell 3. The transfer is made by using the Stationary Overhead Transfer System (SOTS).

Since the box is only used within the confines of the cells and SOTS, no independent shielding is required. The box is made of fire-retardent plywood which is approved by the Underwriters Laboratories, Inc. If equipment larger than this box has to be moved from Cell 4, a new box is made out of fire-retardent plywood or other suitable material.

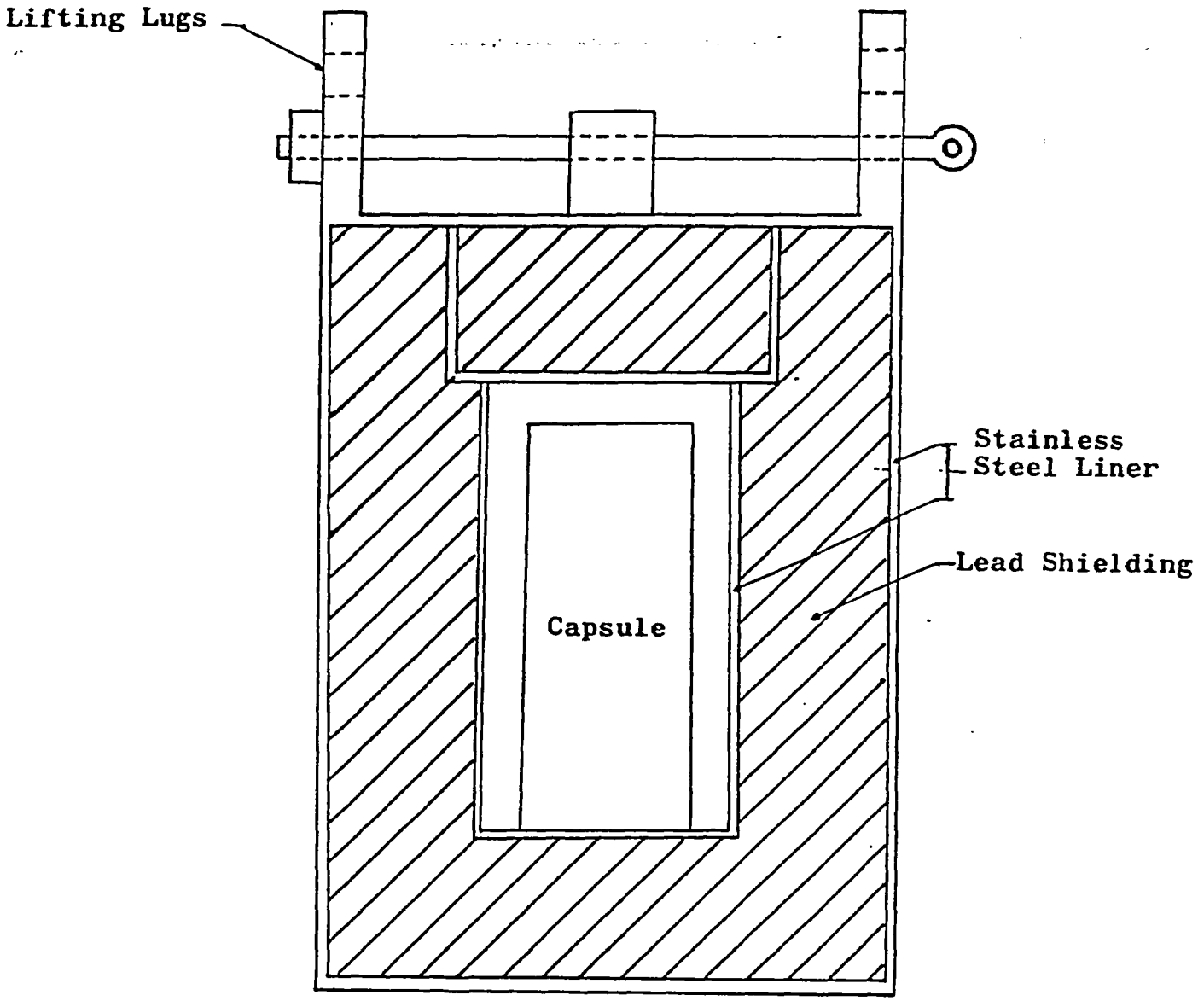


Figure 9.3 Transfer Cask

9.1.3 Storage Containers

9.1.3.1 Storage Pool

Figure 5.1 shows the location of the storage pool in the service area. Capsules are to be stored in the pool, which provides cooling. The pool is 8 feet wide, 10 feet long and 16 feet deep. Its reinforced concrete walls extend 3 feet above the service area floor. The pool is equipped with an expanded metal cover which can be locked in place. The pool is spanned by a bridge which runs on tracks mounted lengthwise atop each 10 foot wall. The bridge is positioned by hand and is used as a platform when samples are moved underwater through the use of long handling tools. The cask used to transfer the capsules (see Paragraph 9.1.2.3) is handled by the service area crane and lowered into the pool, where the capsules are removed for storage. The cask is then lifted above water level, drained, surveyed by Health Physics and removed for further use.

The storage pool is filled from the pool water supply system as described in Section 8.4 of this report. An overflow pipe which terminates one foot below the top of the pool wall leads to the suspect waste system which has a high-level alarm. Paragraph 7.1.2 describes the suspect waste system. The water in the pool passes continuously through a purification system. It is circulated at a nominal flow rate of 20 gpm from a sump sunk below the pool floor level. Then it

goes through a single pump and one of a pair of deionizer tanks and then back to the pool where it is released about five feet below the top of the pool wall. A heat exchanger is added to the system when there are more than 1,000,000 curies stored.

Each of the deionizer tanks contains a removable cartridge made up of mixed anion and cation resins. No attempt is made to regenerate the resins; once then become exhausted, the spent cartridge is removed and replaced with a fresh one. The effluent from the deionizer normally contains less than 1.0 ppm total solids. A portable conductivity meter makes it possible to determine when the resins are exhausted. The deionizer units are located in the mechanical equipment room and are surrounded on 3 sides by a concrete block wall. The fourth side of the enclosure is the outside wall of the building. It is not expected that the deionizers will become sufficiently radioactive to require additional shielding; however, under emergency conditions, a shielded drum would be required for disposal of the resin cartridges.

Processed Sr-90 fuel is to be stored in the form of pellets and powder in double encapsulation, each container being separately welded and leak checked.-

9.1.3.2 Waste Containers

All solid wastes, including equipment, solidified liquid, used filters, etc., are placed in containers for shipment for burial offsite . The loading procedure is given

in paragraph 7.1.1. The containers normally used are standard 55-gallon steel drums. Nested in them are 30-gallon steel drums with the space filled with concrete for shielding. The resulting concrete shield is normally sufficient to lower the radiation level to the specified maximum of 200 mr/hr at the surface, but occasionally additional shielding is required. The drums are approved by the Bureau of Explosives.

9.1.3.3 Cell 5 Fuel Storage

The encapsulated fuel is stored in a chamber which has 8 inches of lead shielding. The chamber has a remotely operated motorized door. The inner basket, in which the capsules are placed, can hold up to 49 capsules. Cooling air is drawn over the capsules by the normal and auxiliary cell exhaust at least 100 cfm.

9.1.4 Work Enclosures

9.1.4.1 Fume Hoods

There are three standard radioisotope hoods grouped along one wall of the analytical radiochemistry laboratory. There is also a stainless steel laboratory sink and stainless steel-topped work bench. Dimensions of the hoods are: width, 6 feet; depth, 3 feet; height, 4 feet. The hood interiors are fabricated of stainless steel and all working surfaces are ground and polished for easy decontamination. The hood exteriors are of mild steel with a baked enamel finish. Services for air, gas, vacuum and water are provided and are remotely controlled from outside the hoods.

The hoods are of the "airflow" type, containing double-wall end panels to achieve streamlined entrance shapes. A single removable baffle is provided at the rear of the hoods with fixed openings at top and bottom for exhausting air from within the hoods. An automatic air bypass at the top of the sash opening limits the maximum air velocity through the face of the hoods and provides for removing a constant volume of air through the hoods. The exhaust fans for the room draw the exhaust through the hoods and are running at all times. The sash opening is adjusted for safe, efficient operation at a minimum air velocity of 100 linear feet per minute (Lfpm). The maximum velocity attained through the hood opening with the sash lowered is 225 Lfpm. The exhaust system for the fume hoods is described in Paragraph 6.2.3.

9.1.4.2 Analytical Glove Box

The radiochemistry laboratory is also equipped with a glove box of stainless steel with 2 inches of lead shielding. The box sits on a stainless steel-topped bench 25 feet long, 3 feet wide, and 3 feet high, placed along the east concrete wall of the laboratory. An air exhaust hood is suspended from the wall and the ceiling, directly over the bench. After the inlet air is filtered through an absolute-type filter it enters the box and exits through the exhaust hood. The exhaust leads through an absolute-type filter and is rejected to the fume hood exhaust system described above in 9.1.4.1. The analytical glove box is used for millicurie-level analytical work.

9.1.5 Product Vessels

9.1.5.1 Solid Waste Bag-out System

The solid wastes are transferred using SOTS to Cell 3 where they are placed in drums for disposal. The solid waste bag-out system consists mainly of a 10 mil polyethelene drum liner, SOTS, and the waste drum. The drum liner is placed in the drum and the open top of the liner is taped to the SOTS downcomer. Then the solid waste, carried to Cell 3 by SOTS, is lowered into the liner and thus into the drum. When the drum is filled, the liner is necked down, closed with tape and sheared off so that the drum and SOTS are sealed and isolated. The drum is then closed and capped with concrete. By this method, wastes are rarely exposed directly to the atmosphere.

9.1.5.2 Process Box

The process box in Cell 4 is divided into two compartments: 4A and 4B. The walls and top of each is 1/8 inch stainless steel and the floors are made of 1/4 inch stainless steel. The greater part of the processing operations are carried out within this box.

9.2 Devices

9.2.1 Manipulators and Periscope

Standard Model 8 Master-slave manipulators are used in all five cells. The larger cells, Cells 2 and 4, are designed for four manipulators each; the small cells accept two

manipulators each. All four manipulators in Cell 4 operate inside the process box, two in each of 4A and 4B.

Special booting is required for the manipulators in Cell 4. The boots consist of a mounting ring that forms an air-tight seal in a special tube on the wall of the process box, a plastic sleeve covering the entire slave arm and full gauntlet over the slave hand (Figure 9.4). The mounting ring is a unique design employing spring steel and flat springs to permit installation through the manipulator port in the cell wall. When installed, the ring occupies a very small annular space and leaves a clear opening for insertion of the manipulator. The boot sleeve is polyvinylchloride reinforced with dacron mesh or equivalent material. The gauntlet is made of heavy polyvinylchloride or similar radiation resistant material.

9.2.2 Service Area Crane

The service area crane is a 15-ton capacity Detroit unit. It is capable of being maneuvered to any location in the service area or above the cells and will clear the SOTS.

9.2.3 Stationary Overhead Transfer System

The Stationary Overhead Transfer System consists of a series of structures which when assembled form doubly-contained airtight compartments connecting the process box 4A and 4B to the bag-out station in Cell 3.

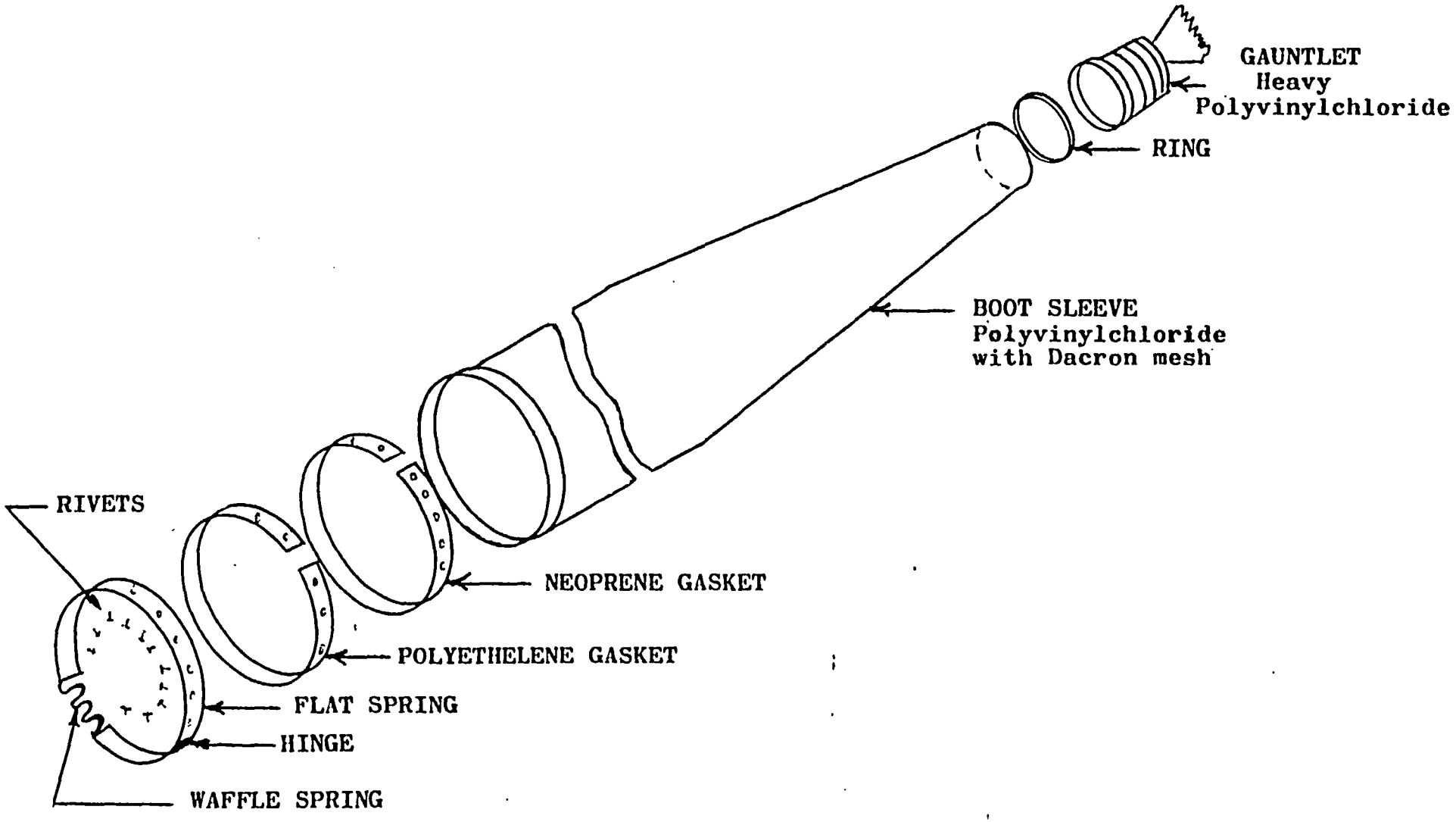


Figure 9.4 Manipulator Boot Assembly

The inner containment unit is approximately 5 ft wide, 7 ft high and 20 ft long and is fabricated of 1/16 inch aluminum. This unit has sealed, bolt-on end plates with windows so that it can be extended in either direction at a later date, and is equipped with a remote operated 2-ton hoist so that material can be moved in or out of Cells 3 and 4. The three doors from process box 4A and 4B and Cell 3 are shielded and motorized (see Figure 9.5).

The secondary containment barrier and main support for the 2-ton hoist is a concrete block wall around the inner barrier approximately 9 ft wide, 7 ft high and 22 ft long. The top has I-beams to support the hoist and is covered with an aluminum leaktight top. Ventilation details are described in Chapter 6. SOTS is equipped with two spray bars which run lengthwise between Cells 3 and 4. These facilitate washdown of the interior. The floor is tilted to provide adequate drainage into a liquid waste disposal container.

9.2.4 Fork Lift Trucks

The fork lift trucks can be used to move the waste drums. One truck is a Clark, propane powered, high-lift model with a capacity of 3,000 pounds. The other is a Raymond Electric with the same capacity.

9.2.5 Pallet Truck

The pallet truck which has been used to transport the HAPO-II casks to and from the isolation room of Cell 4 is an electric powered Automatic Transporter truck with a capacity of 15,000 pounds.

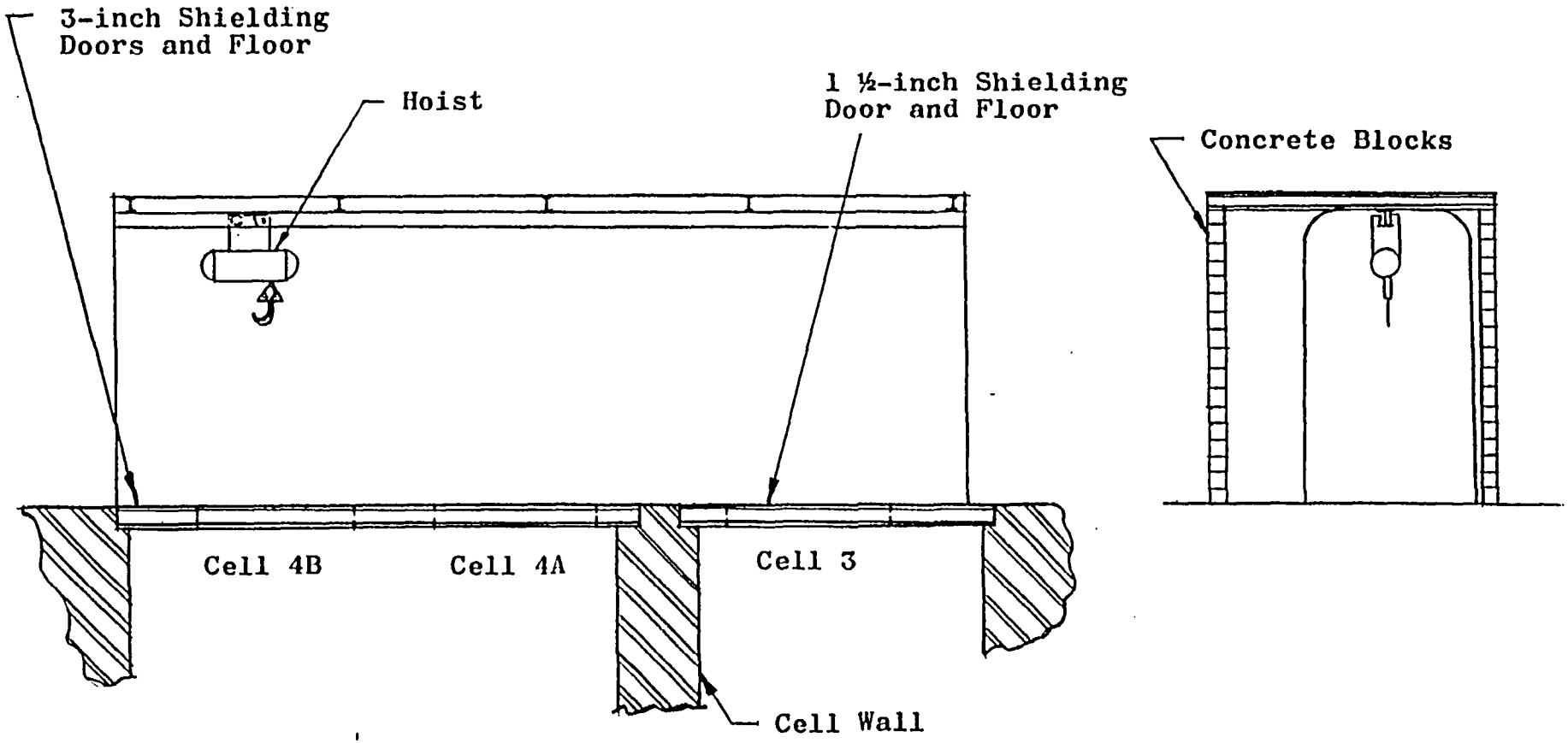


Figure 9.5 Stationary Overhead Transfer System

9.2.6 Flat-bed Truck

The flat-bed truck (see Figure 9.6) is designed to move HAPO-I or HAPO-II casks from outside the building into the isolation room of Cell 4. The four-wheeled, steerable, steel truck is 54 inches wide, 96 inches long and is capable of carrying 40,000 pounds.

9.2.7 Remote Area T.V.

A remote operated television will be installed in isolation room 4. It will be used to monitor the HAPO cask dissolution, read liquid level instruments and observe the sample box and cask cupola. It is a Model ARM 14 R Kin-tel.

9.2.8 Furnace

The Marshall electric furnace used has twelve glo-bars and six thermocouples and is remotely controlled from the operations area. The effective heating volume is 7 inches wide, 13-3/4 inches high and 16 inches long. The upper temperature limit is 1500°C and the furnace is water cooled.

9.2.9 Blender

The blender is used to mix the fuel powder so that an even consistency of powder is available for pellet pressing. The blender may be either a commercial Waring or a Y-type unit.

9.2.10 Pellet Press

The press used is a Modern Hydraulics 250-ton unit with a 12-inch ram and a 6-inch stroke.

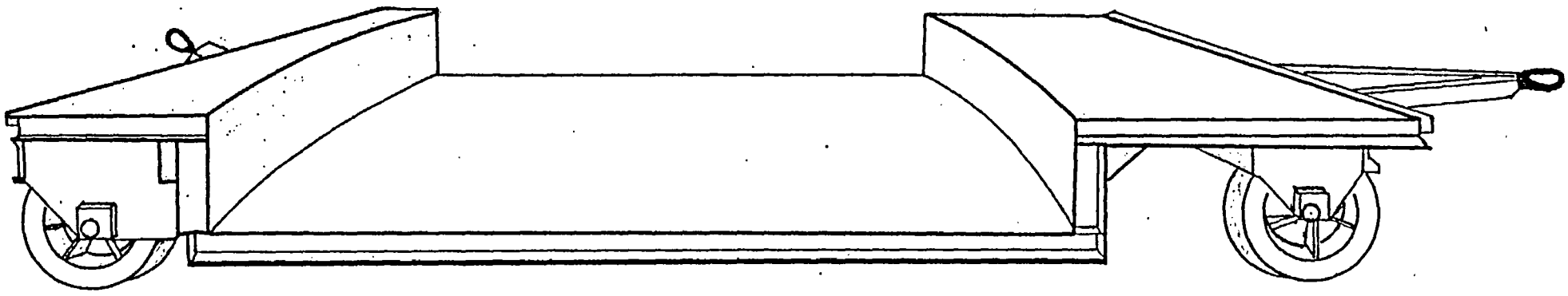


Figure 9.6 Flat-bed Truck for Transporting HAPO Cask

9.2.11 Capsule Welder

The capsule welder is a remote controlled, motorized unit using inert gas in a Heliarc process. The unit is Martin fabricated and is powered by a Harnisohfeger P and H power supply.

9.2.12 Capsule Leak Detector

The capsule leak detector is a Vacuum Electronics Corporation (Veeco) mass spectrometer unit.

9.3 Instrumentation

The following is a typical list of instruments used to control the process:

Use	Qty.	Make & Model No.	Type
Connects tanks and recorder for liquid level measurements	5	Foxboro Model 13A	Differential pressure cell transmitter w/316 S.S. bodies and diaphrams
Records liquid levels of tanks	5	Foxboro Model 5410-S	Liquid level recorder pneumatic single pen
Supplies air to pneumatic system	5	Foxboro IAS-FE	Indicating air set w/fixed pressure reducer and filter
Charts for various ranges on recorder	3	Foxboro Special Scales	Scale variation by separate charts

Use	Qty.	Make & Model No.	Type
Measure air flow	10	Foxboro Standard Model	Rotometer for air flow
Regulates pressure for air ventilation system	2	Foxboro Standard Model	Pressure regulator
Controls Indicating Receiver	1	Foxboro Model 41E	Indicating receiver controller w/high level contacts
Furnace Control	1	Brown	Controller recorder
Hydraulic Press Control	1	Modern Hydraulics	Electric motor, pump and pressure indicator
Welder Control	2	Harnischfeger, P & H	Heliarc, inert atmosphere
Leak Testing	2	Veeco	Mass spectrometer

CHAPTER 10

HEALTH PHYSICS PROGRAM

10.1 Introduction

The radiological safety program for the Martin Radioisotope Pilot Plant has been developed to assure maximum safety. The overall objectives of the program are to protect facility personnel and the general public.

The definition of responsibilities relative to radiological safety is essential to the safe conduct of all operations involving potential radiological hazards. All parties concerned with any activity which may involve a radiological hazard must be cognizant of their obligations. Overall responsibility for radiological safety, as for any other health or safety matter, rests with management and is discharged through management's representatives.

10.2 Health Physics Organization

The Health Physics Group at Quehanna consists of a resident Health Physicist and Health Physics technicians staffed on a level-of-effort-basis. This group is supervised by the Supervisor, Health Physics Section, Baltimore, who reports to the Director of Support Services for the Baltimore complex of the Martin Marietta Corporation.

10.3 Overall Health Physics Responsibility

It is the responsibility of the Health Physics Group to provide the radiological protection program required to support operational activities conducted at the Martin Radio-isotope Pilot Plant.

10.3.1 Supervisor, Health Physics Section - Baltimore

The Supervisor, Health Physics Section is responsible for continuous surveillance of the performance of the Health Physics Group at the Quehanna Pilot Plant. He routinely visits the site to personally evaluate conditions. In addition, he investigates any anomalies in the weekly summaries or any unresolved condition mentioned in any special incident report provided by the resident Health Physicist. He discusses these special situations by phone with persons at the site who can effect correction. If deemed necessary, he makes an immediate trip to the site to attempt to resolve the problem. Furthermore, it is his duty to inform management regarding abnormal situations. He has complete freedom to cross organizational lines and discuss matters pertaining to radiation safety with any person.

10.3.2 Resident Health Physicist

Technical direction of the radiological protection program is the responsibility of the resident Health Physicist. This responsibility includes items such as: development

of safe practice rules; review of daily Health Physics and operations log books; facilities, operations and environmental monitoring; surveillance and documentation of personnel exposures; instrument calibration and calibration source control; decontamination and waste disposal consulation and supervision, radiological safety indoctrination; emergency radiological capability; review of facility and equipment design or modification, furthermore, he submits a weekly written summary of Health Physics activities to the Supervisor, Health Physics Section - Baltimore. This summary contains a detailed resume of radiation and contamination conditions resulting from operations, and is supplemented by special reports made via telephone.

10.3.3 Health Physics Technician

Currently a Health Physics Technician is assigned to support each operating shift. His responsibility includes: conducting and documenting radiation-- contamination surveys; notifying supervision of survey results and personnel exposures; inspecting to see that operations are conducted in accordance with approved practices; recommending protective equipment requirements; notifying and consulting with the resident Health Physicist regarding non-routine operations or conditions; calibrating Health Physics instrumentation.

10.4 Control of Access to Radiation Areas

10.4.1 Radiation Area

The sections of the facility which are included in the radiation area are: Operations Area, Service Area, Hot Cells, Cell Isolation Rooms, Radiochemical Laboratory, Decontamination Room, Storage Area, Fan Room, and the Machine Shop. Normal access to the areas listed above is through the change room complex. All entrances to this area other than through the change room are kept locked at all times, using the lock system described in Paragraph 10.4.3.

10.4.2 High Radiation Areas

Certain hot cells, and isolation rooms are normally high radiation areas. Whenever radiation reaches a level such that a major portion of the body could receive more than 100 mrem/hr, the area is marked as a high radiation area and is suitably restricted. High radiation areas are controlled with a special absolute integrity locking system in lieu of the control device specified in 10CFR20.

10.4.3 Lock System

The lock system used is manufactured by Best Universal Lock Company, Indianapolis, Indiana. This system is utilized at several AEC installations and is designed for maximum security. Significant features which make it suitable for controlling "high radiation" and/or "radiation" areas are:

10.4.3.1 Key blanks are of a special design and are not obtainable by unauthorized personnel, therefore, it is not possible to have a key duplicated without proper authorization.

10.4.3.2 The manufacturer will supply locks, keys, and combinations for keys only upon the written authorization of the person who has been designated to control the system.

10.4.3.3 The hardware is very sturdily constructed.

10.4.3.4 The combinated core of any lock in the system can be changed immediately by the person controlling the system. This makes it possible to restrict access to those persons holding a particular key or to prevent access completely. It also allows immediate renewal of the locking system integrity should any key be last.

10.4.4 Administration of the Locking System

The integrity of the locking system is maintained by the following administrative steps:

10.4.4.1 The authority to procure locks, cores, keys, or combinations is restricted absolutely to the Supervisor, Health Physics Section.

10.4.4.2 Alteration of the system installation or removal of locks, or issuance of keys is done by the resident Health Physicist only under a written order from the Plant Manager. A complete record of key receipts and issuances is kept by the resident Health Physicist. All keys and cores are accounted

for and an audit of keys including a check of the keys in the possession of the users is conducted quarterly by the resident Health Physicist. The results of the inventory are reported to the Plant Manager and the Supervisor, Health Physics Section - Baltimore.

10.4.4.3 Radiation areas are divided into four categories for controlling access:

10.4.4.3.1 Areas where radiatior levels are less than 100 mr/hr - access by facility operation and support personnel.

10.4.4.3.2 Areas where radiation levels are greater than 100 mr/hr but less than 25 r/hr - access by shift supervisor.

10.4.4.3.3 Areas where radiation levels are greater than 25 r/hr - these areas are locked with two separate locks, one of which is controlled by the shift supervisor and one by the Health Physics representative on duty. Both locks must be unlocked in order to gain access.

10.4.4.3.4 Areas requiring special control - access to these areas requires the concurrence of the Plant Manager or the resident Health Physicist with their physical presence.

10.4.5 Radiation Work permit

All activities in "Radiation or High Radiation Areas" are performed in accordance with standard operating procedures. Work performed in these areas requires special authorization in the form of a Radiation Work Permit (RWP).

The RWP is a written instruction sheet that is issued prior to the start of an operation in radiation areas and includes items such as: description of the job, results of the most recent surveys, maximum work time for locations within the area, required protective equipment and personnel monitoring devices, special instructions, approval to start work, signatures of the shift supervisor and the Health Physics representative. The operations supervisor is responsible for initiating the RWP. Health Physics is then notified for pertinent instructions,, preoperational surveys and approval. Once the RWP is in effect, the Health Physics representative provides on-the-job monitoring, as required, depending upon the type of operation and sees that no one enters the work area other than authorized personnel. The RWP becomes void at the conclusion of each job and is returned to the operation Supervisor for filing and retention.

10.4.6 Summary of Operations Requiring Health Physics Monitoring

Survey and control procedures are utilized to effectively limit personnel exposures. Surveys are made to determine external dose rates, the presence or absence of surface contamination and airborne concentrations in work or occupancy areas. Typical operations that require monitoring include: receipt of HAPO cask, HAPO cask installation for dissolution, removal of HAPO cask and preparation of empty cask for

return to Hanford, process Sr-90 feed materials, feed sample analysis, radioactive waste handling and shipment, intercell transfer, storage of encapsulated fuel, generator loading operations, and shipment of fueled generators.

10.5 Description of Survey Techniques

Health Physics conducts daily radiation - contamination surveys in the facility. A variety of instruments are available capable of monitoring all ranges of contamination and/or radiation encountered. Any unusual levels are reported to supervision and proper precautions are taken to reduce personnel exposures. The shift supervisor initiates decontamination procedures, and a resurvey of the area is conducted when decontamination is completed. Additional radiation surveys are performed as required to support operational activities.

The individual conducting the survey wears the required protective clothing and equipment as described in 10.7.4 and personnel monitoring equipment described in 10.6.2 and proceeds to make measurements of external radiation and airborne, loose or fixed contamination. The Health Physics representative provides continuous evaluation of the radiological conditions while the job is in progress.

10.5.1 External Radiation Measurements

The measurement of external radiation levels is performed with portable monitoring instruments. A list of

the instruments available is contained in Table 10.1 including their detection range and specific uses. Portable instruments are frequently checked in the field utilizing a reference source. Malfunctions are reported to the instrument repair technician.

10.5.1.1 Minimum Routine Survey Schedule

Location	Radiation	Contamination
Operating - Shop Area	Weekly	Daily
Service Area	Weekly	Twice Weekly
Cell Faces	Weekly	Weekly
Iso Rooms	Upon Entry	End-of-Operation
Radio Chem. Lab	Weekly	Twice Weekly
Decon Room	Weekly	Weekly
Change Room	-	Daily
Liquid Waste Bldg.	Weekly	Weekly
Waste Storage Bldg.	Weekly	Weekly
Office Areas	-	Weekly
Lunch Room	Twice Weekly	Twice Weekly

10.5.1.2 Posting Areas

All radiation and high radiation areas are posted with the appropriate warning signs. These areas are surveyed periodically in order to update or change the signs depending on conditions.

TABLE 10.1

Type of Instrument	No. Avail.	Radiation Detected	Window Material and Thickness	Sensitivity Range	Use
NMC AM22R Particulate Monitor	4	Alpha, Beta-Gamma	Gas flow proportional 1/4 mil mylar less than 2 mg/cm^2	10^{-12} uc/ml alpha or beta-gamma	Monitoring and Measuring
NMC AM2A Air Particulate Monitor	1	Beta-gamma	Gas flow proportional 1/4 mil mylar less than 2 mg/cm^2	10^{-12} uc/ml beta-gamma	Monitoring and Measuring
Area Radiation Monitoring System-Jordan Rams II Ion Chambers Md. 50 LS and 1 LS	1	Gamma	Metal wall ionization chamber	3 stations 1-1000 mr/hr 2 stations 10 - 10,000 mr/hr	Monitoring
Gas flow proportional detectors: NMC Md PCC10	2	Alpha, Beta-Gamma	Gas flow proportional 1/4 mil mylar less than 2 mg/cm^2	1 to 10^6 dpm	With scaling assembly for measuring
Eberline MD RC4-4	1				
Geiger Tube Detectors: End window tubes mounted in lead shields	3	Beta-Gamma	Mica end window 1.4 mg/cm^2	10 to 10^6 dpm	With scaling assembly for measuring
Scaling Assemblies: Baird Atomic Md 1050 Tracerlab Md SC 73 Eberline MD PC-6	6			10^6 cpm	With detectors for measuring

TABLE 10.1 (Cont.)

Type of Instrument	No. Avail.	Radiation Detected	Window Material and Thickness	Sensitivity Range	Use
Count rate meters G.M. Tracerlab SU-3D	2	Beta-gamma	Mica End Window 1.4 mg/cm^2	0-20,000 cpm	Monitoring and Measuring
Count Rate Meters, G.M. Eberline RM-3	3	Beta-gamma	30 mg/cm^2 Metal Wall	0-50,000 cpm	Monitoring and Measuring
Victoreen Thyac G.M. Md. 489	2	Beta-gamma	30 mg/cm^2 Metal Wall	0-20 mr/hr (0-80,000 cpm)	Monitoring and Surveying
Victoreen Md 740 Cutie Pie Ion Chamber	1	Beta-gamma	1/4 mil mylar less than 2 mg/	0-10,000 mr/hr	Monitoring and Surveying
Eberline E-500 B G.M Meter	4	Beta-gamma	30 mg/cm^2 Metal Wall	0-2000 mr/hr	Monitoring and Surveying
NuCor CS-40 Ionization Chamber Meter	1	Beta-gamma	75 mg/cm^2 plastic wall	0-20,000 mrad/ hr	Monitoring and Surveying
NuCor CS-40A ionizt1on chamber meter	4	Beta-gamma	75 mg/cm^2 plastic wall	0-50,000 mrad/hr	Monitoring and Surveying
Technical Associates CP-TP-1A ionization Chamber Meter (extended prove)	1	Beta-gamma	6 mg/cm^2 window 432 mg/cm^2 wall bakelite	0-500 rad/hr	Surveying

TABLE 10.1 (Cont.)

Type of Instrument	No. Avail.	Radiation Detected	Window Material and Thickness	Sensitivity Range	Use
NuCor DA-3 (R) ionization chamber meter (extended probe)	1	Gamma Beta-gamma	Aluminum Chamber Paper chamber, less than 10 mg/cm^2 Savannah River Modification	0-5000 r/hr 0-5000 rad/hr	Surveying Surveying
Technical Associated Model ALM-2 Hand-Foot Counter Geiger Tubes	1	Beta-gamma	30 mg/cm^2 Metal Wall	0-2,000 cpm	Monitoring
Victoreen Model 570 Condenser R-Meter Chambers #651, 228, 552, 576 Calibrated at NBS	1	Beta-gamma	7 to 450 mg/cm^2 Kodapak, Bakelite, Nylon	250 mr to 250 r	Measurement (Secondary Calibration Standard)
EMERGENCY EQUIPMENT LOCATED OUTSIDE THE FACILITY					
G-M Detector Scaler Assembly B.A. 1050 Scaler	1	Beta-gamma	MICA End Window 14 mg/cm^2	10-10^6 dpm	Measuring - Emergency
Count-ratemeter GM Tube NCA Model DMID	1	Beta-gamma	30 mg/cm^2 Metal Wall	0-10^5 cpm	Monitoring and Surveying-Emergency

EMERGENCY EQUIPMENT LOCATED OUTSIDE THE FACILITY
(Cont.)

Type of Instrument	No. Avail.	Radiation Detected	Window Material and Thickness	Sensitivity Range	Use
Victoreen C-D Model 720C Ionization Chamber	3	Beta-gamma	Aluminum 30 mg/cm^2	0-500 r/hr	Monitoring and Surveying
Victoreen Thyac G.M. Tube	1	Beta-gamma	30 mg/cm^2 Metal Wall	0-20 mr/hr 0-80,000 cpm	Monitoring and Surveying - Emergency
Bendix Dosimeters Models 862 and 611 + Charger	12	Gamma		0-200 mr 0-5 r	Monitoring - Emergency
Film Packets	15	Beta-gamma		5 mr - 600 r	Monitoring - Emergency

10.5.2 Fixed Area Radiation Monitoring System

Overlapping high and low level area radiation monitoring systems are installed. The low level system consists of three detector units with ranges from 1 mr/hr to 1 r/hr located in the operating area, service area, and the radiochemistry laboratory. These units are set to alarm above 10 mr/hr and are connected into a central annunciator panel which activates both a horn and light. The two high level units, with ranges from 10 mr/hr to 10 r/hr, are located in the operating and service areas. These units are connected into the building evacuation alarm siren and are set to alarm above 1 r/hr.

10.5.3 Facility Contamination Measurements

Contamination of areas falls into two broad categories; namely, surface and airborne contamination. Surface contamination in turn is classified as fixed and loose. Separate measurements are necessary to fully evaluate the degree of hazard.

10.5.3.1 Monitoring for Surface Contamination

Smears are used for monitoring loose surface contamination. Geiger-Mueller survey meters, are generally used for detecting and measuring fixed contamination.

10.5.3.1.1 Procedure for Monitoring Loose Surface Contamination

A dry porous paper (smear) is wiped over a standard area (approximately 100 cm^2) of surface being monitored. Precautionary measures are employed when smearing areas

where a high degree of contamination is suspected. Used smears are placed in paper smear holders to prevent cross contamination. The smears are monitored for gross contamination with a G. M. count ratemeter unit before they are taken to the counting room for a more refined analysis. Care is exercised in order to avoid contaminating counting equipment.

10.5.3.1.1.1 Counting Smears

Smears are counted for beta-gamma activity utilizing a Geiger tube detector/scaler assembly. The length of count depends upon the activity present on the smear and the counting accuracy required. Most smears are counted for one minute. A diagram indicating location of the smear, instrument reading and contamination level is given to the shift supervisor who initiates decontamination as required. Areas that cannot be immediately decontaminated are marked accordingly and entrance is restricted to authorized personnel wearing the specified protective equipment.

10.5.3.1.2 Procedure for Monitoring Fixed and Loose Surface Contamination. Monitoring for fixed beta-gamma contamination is performed using a G. M. survey meter. The activity indicated is a measure of both fixed and loose surface contamination unless the loose contamination has already been removed. Measurements are made holding the G. M. probe approximately one-half inch above the surface being assayed. The fixed beta-gamma contamination levels are generally expressed in terms of mrad per hour.

10.5.3.2 Monitoring for Particulate Contamination in Air

Continuous air monitors and fixed filter air samplers are used to determine the concentration of airborne radioactivity. Sampling for airborne radioactivity is accomplished by drawing a known volume of air through a filter paper capable of entrapping extremely small particles. The paper used is greater than 99% efficient for particulates greater than 0.3 microns in diameter. The filter paper is then removed from the air sampler or continuous air monitor, scanned for approximate degree of activity, then placed in a gas proportional detector/scaler assembly to precisely measure the degree of radioactivity collected. A calculation is then performed to determine the airborne concentration. This method is capable of detecting less than 1×10^{-11} uc/ml.

10.5.3.2.1 Continuously Monitored Filter Paper Samplers

Filter paper samplers with gas flow proportional detectors and count rate displays are used to continously monitor air exhausted from the processing areas, work areas and the facility exhaust system. Four of these units monitor both alpha and beta-gamma activity in the air and alarm upon a change in ratio between the alpha and the alpha-plus-beta-gamma count rate.

10.5.3.2.1.1 Continuous Air Monitor Sample Locations, Controls and Interlocks

Four continuous air monitors sample and control the air handling systems to minimize dispersal of

radioactive contamination from the cell areas to other parts of the facility. Reference Figure 6.2 Air Handling System.

10.5.3.2.1.1.1 Monitor No. 1. (M-1)

This unit monitors the air in the combined discharge duct from the process box exhaust fan and on indication starts Fan E-14 and stops the normal Fan E-13, at the same time the individual dampers are activated and an alarm is sounded on the alarm panelboard in the operating area.

10.5.3.2.1.1.2 Monitor No. 2 (M-2)

This unit monitors the air in the combined cell exhaust duct and on indication starts auxiliary Fan E-4, opens auxiliary motorized exhaust dampers, stops all normal cell exhaust Fans E-5 through E-10 and closes all normal exhaust dampers. At the same time, air supply Fans SH-2, UC-2 and exhaust Fan E-11 are shut down.

10.5.3.2.1.1.3 Monitor No. 3 (M-3)

This unit monitors the air in the service area and on indication stops air supply Fans SH-2, UC-2 and exhaust Fan E-11.

10.5.3.2.1.1.4 Monitor No. 4 (M-4)

This unit monitors the air entering the recirculating duct in the operating area, and on indication stops air supply Fans SH-2, UC-2 and exhaust Fan E-11.

10.5.3.2.1.1.5 Monitor No. 5 (M-5)

This unit is used to monitor for sudden changes in airborne contamination during various operations in the service area, isolation rooms, radiochemical laboratory or decontamination area. Since the unit is transportable, it is not interlocked to any particular system and is moved to the best sampling locations to monitor individual operations in progress.

10.5.3.2.2 Fixed Filter Paper Samplers

A central vacuum system adjusted to sample at a rate of 1 cfm per sampling point, is used to collect samples from various locations in the air handling system to evaluate the performance of the ventilation system filters. (Reference Figure 6.2 Air Handling System). These filter paper air samples are normally changed and radioassayed daily from approximately thirty different locations making it possible to detect ventilation system filter deterioration so that corrective action can be taken before a serious problem develops. Small low volume air pumps are used to collect fixed filter paper air samples from each stack discharging to atmosphere. In addition, another unit is used to sample outside air.

10.5.3.2.2.1 High Volume Air Samples

Grab samples of air are collected prior to, during, and after various operations which may produce airborne contamination. A small high rpm motor is used to draw a high volume (up to 20 cfm) of air through a four inch diameter filter

paper. These samples are evaluated in order to determine the airborne contamination levels. Sample times for the collection of high volume air samples vary from 5 to 20 minutes.

10.5.3.2.3 Counting Air Samples

Filter papers used to collect samples of particulate airborne radioactivity are counted utilizing gas flow proportional detector/scaler assemblies. High volume air samples are counted in a large area gas flow proportional detector which is capable of accepting the entire filter paper.

10.5.3.3 Monitoring for Liquid Contamination.

Water samples are collected and analyzed for gross beta-gamma activity from the potable water supply, the source storage pool, nearby streams and liquid waste holdup tanks.

10.5.3.3.1 Description of Water Sample Preparation and Counting

A 500 to 1,000 ml water sample is evaporated to approximately 10 ml; transferred to a planchet and evaporated to dryness. The planchet is counted for gross beta-gamma activity in a gas flow proportional detector/scaler assembly. Results of sample analysis are recorded in μc/ml. The procedures utilized allow detection of less than 1×10^{-8} μc/ml.

10.5.4 Records

Radiation and contamination survey results are recorded on sketches of the areas where the survey was performed and are filed in the Health Physics Office.

Air samples results are recorded on air sampling record forms and also filed in the Health Physics Office.

Liquid sample results are also maintained in the Health Physics Office with the exception that Pennsylvania State University maintains the original copy of the results of liquid radioactive waste discharged to the environs.

10.6 Personnel Monitoring

Individuals entering the facility are provided with a personnel monitoring device(s) for determinating radiation exposure. Knowledge of general dose rate and exposure time gives an estimate of personnel exposure, but a more accurate determination is made utilizing personnel monitoring equipment.

10.6.1 Analysis of Exposures

Correlation of job assignments with doses received by individuals sometimes indicates a need for revision of certain job procedures or further training of personnel in the interest of minimizing radiation exposures.

10.6.2 Types of Personnel Monitoring Devices

Two types of personnel monitoring devices, namely film badges and pocket dosimeters, are currently used to provide information regarding personnel exposure.

10.6.3 Description of Film Badge and Film

The film badge currently used at the facility can accommodate two film packets, but is used to hold one Dupont Type 558 film packet for X, beta and gamma radiation detection. The front portion of the badge contains a metallic filter and clear plastic windows used for photon energy determination and distinguishing between beta and gamma radiation. The film is dated adjacent to the clear plastic window to indicate the wearing period. The wearer's name, and identification number are conspicuously displayed on the front of the badge.

10.6.3.1 X, Beta and Gamma Film

Dupont Type 558, or equivalent personnel monitoring film, is used to measure exposures at this facility. This packet contains the sensitive type 508 and the insensitive type 1290 giving a useful dose range up to 600 rem.

10.6.4 Wearing Film Badges

All personnel requiring access to or working in posted radiation areas, or handling radioactive or contaminated materials in or adjacent to the facility are required to wear film badges. These badges are normally worn clipped to outer clothing. During operations where contamination is likely to be present, film badges are worn on innermost clothing to avoid contamination of the badge.

10.6.5 Loss of Film Badge

Any person who loses his badge has been instructed to immediately notify Health Physics to obtain a replacement. Any lost or damaged film badges would be investigated by Health Physics to determine the exposure for the unmonitored period and a report would be written for the personnel monitoring records.

10.6.6 Issuance and Frequency of Film Badge Exchange

The loaded film badges, along with control badges, are placed on racks at a convenient point for their distribution. Operating personnel have been cautioned to occasionally check to see that they are wearing their assigned badge.

At the termination of the work period, all personnel are responsible for returning their badges to the distribution rack. Personnel have been instructed not to take their badge with them when leaving the site.

The frequency of film badge exchange is established by Health Physics and is based upon type of the work being done and anticipated exposures. The normal exchange period is one week, however it is not anticipated to extend it beyond two weeks. At the end of the prescribed wearing period, the used badges are replaced and are submitted for evaluation.

10.6.7 Film Processing

All film badges are checked for contamination prior to submitting the film for processing. Any evidence of contamination is noted and an attempt is made to decontaminate the badge and determine the true exposure. Film badges may be submitted at any time for evaluation. The film processor currently retained under contract is Health Physics Services, Baltimore, Md.

10.6.8 Reports and Records

When film has been processed and the exposure evaluated, the completed radiation report form is sent to the resident Health Physicist; a duplicate copy is sent to the Baltimore Health Physics Office. The current exposure information is transposed to the individual's own exposure report form where a cumulative exposure record is brought up to date. A record of all personnel exposures is kept on file for a period in accordance with 10CFR20.

A comprehensive report of all statutory overexposure incidents will be submitted to management by Health Physics. This report will include an analysis of the cause, and when possible recommendations to prevent recurrence of the incident. Copies of this report will be submitted to the Commission in accordance with the requirements as set forth in 10CRF20.

10.6.9 Other Uses for Film Badges

Film badges are used for area monitoring, monitoring of personnel extremities, and checking film badge service evaluation.

10.6.10 Use of Pocket Dosimeters

Pocket dosimeters are available in the ranges of 0-200 mr, 0-1r and 0-5r, and are worn in accordance with instructions from the Health Physics representative on duty. Usually one low range and one high range dosimeter are worn when conducting work in radiation areas.

10.6.10.1 Issuance and Handling of Pocket Dosimeters

Pocket dosimeters are charged and issued by Health Physics personnel. Each person receiving a dosimeter is instructed to read it periodically and to report the reading to his supervisor or the Health Physics representative on duty. At the end of the work period, the dosimeters are returned to Health Physics and the readings are recorded in the Health Physics log book.

10.6.11 Medical Examination

All employees are required to submit to a medical examination prior to work in areas where ionizing radiation exposure may be involved and routine examinations are conducted periodically thereafter. Special medical examinations are required in the event of unusual or suspect exposures. Arrangements have been made for a nuclear medical

consultant to perform these special examinations. Copies of records of all medical exams are retained by the medical department in Baltimore.

10.6.12 Bioassays

Bioassay samples are submitted for analysis by all personnel working with radioactivity. During the early months of hot operations bioassay samples were collected and analyzed on a frequent schedule, and the results were used to establish the present sampling schedule. The exact sampling schedule is governed by the type of work performed and the potential for internal contamination based upon surveys. In any event, all persons working with or exposed to radioactive material are sampled at least quarterly. If an individual is known or suspected to have been exposed to radioactive contamination in such a manner that internal deposition is likely, an estimate is made of the internal dose for inclusion in the individual's radiation exposure record. If in a more accurate determination of the body burden is required, arrangements shall be made to utilize a total body counter.

10.6.13 Records

Records of all bicassay results are maintained at Quehanna and Baltimore and are posted in each individual's file.

10.7 Personnel Protective Clothing and Equipment

Any equipment which aids in preventing the deposition of radioactive contaminants onto or within the body may be considered anti-contamination protection. Protective clothing provided by the company is worn when access to a contaminated area is required, or there is a possibility of the release of contamination as the result of some operation. The Health Physics representative on duty shall specify the minimum type and items of protective clothing to be worn and shall inspect their use. This equipment is stored in the change room and is donned prior to entry into contaminated areas.

10.7.1 Protective Clothing

10.7.1.1 Plastic and/or rubber shoe coverings are worn whenever contamination is expected. Coveralls are tucked into the shoe covers and taped prior to entering highly contaminated areas.

10.7.1.2 Gloves are normally worn in areas where contamination may be present. The gloves are taped to the sleeves prior to entering highly contaminated areas. Rubber gloves are always worn when dealing with contaminated liquid.

10.7.1.3 Hoods or caps are used to prevent contamination of the head. Plastic hoods are used in cases where liquid contaminants may be present.

10.7.1.4 Cotton coveralls are issued for protection of the whole body against dry contamination. Coveralls are rarely worn over personal clothing except undergarments.

10.7.1.5 Plastic suits are worn over the coveralls whenever liquid contamination is anticipated or suspected and also worn as outer garments over coveralls when entering highly contaminated areas.

10.7.2 Breathing Equipment

The following types of respiratory protective equipment are available:

(a) Full Face Respirator - Mechanical Filter Type

(b) Scott Pressure Damand Hose Line Equipment

(c) Supplied Air Plastic Hood - Continuous Flow Type

(d) Scott Air Paks - Positive Pressure Facepiece

(e) MSA - Chemox

} Maintained as part of the emergency equipment.

All personnel receive instructions on the proper use of respiratory protective equipment. Such aspects as the proper fitting of filter elements, damage to filter elements, proper fit of the mask to the face, etc. are emphasized. Personnel are instructed to wear mechanical filter type full face respiratory equipment whenever a potential exists for

airborne contamination. The efficiency of the respirator filter units are checked by the manufacturer before shipment. All respiratory equipment is inspected by Health Physics before use for mechanical integrity. It is felt that careful inspection and use is adequate to guarantee the effectiveness of the mechanical filter type respirators since they are not used where air concentrations could result in serious overexposure to the wearer.

Scott pressure demand hose line equipment or supplied air-plastic hoods are used when the preoperational survey indicates air contamination in excess of MPC or the concentration is expected to be highly variable. Scott pressure demand hose line equipment consists of a full facepiece, short length of flexible tubing, an air flow control device designed to maintain a slight positive pressure in the facepiece, an air supply hose equipped with quick disconnect fittings, pressure reducing regulator and compressed air supply.

Supplied air plastic hoods consist of either a plastic hood fastened at the chest and back and worn beneath the upper portion of a two piece plastic suit with the hood taped at the collar of the plastic jacket, or a hooded plastic blouse. The hood being an integral part of the upper portion of the plastic suit. The plastic air supply hose is introduced through the back at the waist and extends upwards through the hose retaining channel in the hood and terminates above the forehead.

The hose is fastened at the top of the hood and at the waist to prevent accidental removal. The plastic air supply hose used is a continuous piece equipped with a quick disconnect fitting connected to an air flow regulator and subsequent air supply. During use, the air supply is adjusted to maintain a minimum flow rate of 6 cfm through the hood. Currently the compressed air supply, used exclusively for breathing air, consists of a bank of cylinders interconnected to allow exchange of cylinders during use without interuption of air supply. This air supply is located outside the work area and is continuously attended when in use.

10.7.3 Classification of Protective Clothing and Equipment

Table 10.2 presents the protective equipment classifications currently utilized at the facility. The Health Physics representative on duty specifies the class of protective clothing to be worn by individuals entering contaminated areas. The protective equipment prescribed is determined on the basis of the preoperational survey or prior operational experience.

10.7.4 Description of Entry Into Radiation - Contamination Areas

10.7.4.1 The protective equipment specified by the RWP is obtained in the change room area. Certain items of equipment are donned in the change room.

TABLE 10.2

CLASSES OF PROTECTIVE CLOTHING

Class	Cover-Alls	Head Cover	Shoe Cover	Gloves	Plastic Jacket and Trousers	Full-Face Respirator	Plastic Hood Supplied Air or Airline Respirator	Surface Contamination Level	Potential for Airborne Contamination Due to Nature of Work
1	Coveralls or Lab Coats		X	Depends upon work				< 500 dpm	None
2	X	Cap	2 pr	X				> 500 dpm < 5000 dpm	Measured <MPC not expected to exceed MPC
3	X	Plastic Hood	2 pr	2 pr	X	X		> 5000 dpm	Measured <MPC may exceed MPC but <50X
4	2 pr	Plastic Hood	2 pr	2 pr	X		X	> 5000 dpm	Measured >MPC variable and could be >50X

10.7.4.2 Personnel monitoring equipment, including any supplementary film badges, wrist badges and dosimeters as specified, is attached in the change room.

10.7.4.3 Personnel proceed to the general work area and assemble all necessary equipment such as tools, meters, decontamination supplies, etc. required to perform the job.

10.7.4.4 Additional protective equipment is donned prior to entering the specific work area.

10.7.4.5 Personnel proceed to the job site and perform the task in accordance with specific operating procedures.

10.7.4.6 When applicable, the Health Physics representative notifies the personnel when their time limit has expired and the personnel leave the job site.

10.7.5 Description of Egress from Radiation - Contaminated Areas

10.7.5.1 Upon completion of the work task or expiration of time limit, personnel leave the specific job site.

10.7.5.2 Monitor and remove outer protective equipment as required to minimize the spread of contamination. Place contaminated equipment in containers provided near the job site.

10.7.5.3 At the completion of the job, all tools and equipment are placed in clean plastic bags at the job site and stored or placed in the decontamination room for survey and/or decontamination.

10.7.5.4 Personnel proceed to the change room to remove their remaining protective equipment, place it in designed containers, and perform personal monitoring utilizing the G.M. count ratemeter.

10.8 Decontamination

Decontamination is the process of removing contaminants by physical or chemical means. Survey techniques for contamination measurements were previously described in 10.5.3.

10.8.1 Decontamination of Areas

Decontamination of areas is carried out as soon as possible after detection. This not only reduces the possibility of airborne contamination hazards, but the contamination is more easily removed before it has a chance to become fixed. The protective clothing requirements for personnel performing decontamination are established by Health Physics based upon the results of surveys. Many areas where contamination is expected to result from a job are covered prior to performing any work. Coverings include paper, polyethylene, metal foil, and strippable paints.

10.8.1.1 Removal of Contaminated Coverings

Contaminated coverings are normally taken up by rolling the contaminated side in on itself. Care is exercised when handling contaminated materials to prevent the contamination from becoming airborne. Strippable painted coverings are recovred

with additional paint prior to removal. This step tends to fix the contamination and reduces the airborne hazard.

10.8.1.2 Wiping Contaminated Surfaces with Dust Absorbing Cloths

"Masslin" or other treated dust-retaining cloths may be used to wipe smooth surface areas which require decontamination. For large areas, such as floors, the cloths are mounted on long handled fixtures and gently pushed across the floor. For smaller areas and equipment, the cloths are held in the gloved hand. The cloth is frequently turned to present a clean surface to the area being decontaminated. The cloth is also frequently surveyed to detect the degree of contamination being removed. Contaminated cloths are discarded in the radioactive waste containers.

10.8.2 Decontamination of Equipment

Decontamination of equipment is accomplished in the decontamination room, isolation rooms, or other areas suitably prepared to handle potential contamination arising from decontamination operations.

10.8.2.1 Washing and Scrubbing

Washing and scrubbing with detergents and other chemical agents such as acids, alkalis, and chelating agents are generally effective for removing dirt and grease along with contamination from surfaces. This method is employed where small

pieces of equipment are to be decontaminated. Manipulator wrists and similar equipment are immersed in buckets of detergent solution and scrubbed under water to loosen small particles of contamination. They are withdrawn from the detergent solution, dried with rags and reoiled immediately to prevent corrosive galling. Waste rags and liquid are discarded as radioactive waste.

10.8.2.2 Steam Cleaning

Where possible, large pieces of contaminated equipment are steam cleaned. Precautions are taken to avoid plugging and subsequent damage of the ventilation system filters and to collect the steam condensate in containers for treatment as liquid radioactive waste. This method of decontamination is quite effective, especially when detergents are mixed with the steam, however, since facilities for handling large quantities of liquid waste are limited, it is rarely used.

10.8.2.3 Ultrasonic Decontamination

This specialized method of decontamination is normally used to decontaminate small parts. Ultrasonic decontamination tanks are installed in the process box for decontaminating fuel capsules.

10.8.3 Decontamination of Protective Clothing

All protective clothing is monitored and segregated into two groups according to the quantity of contamination

present. Group A consists of items indicating less than 6 mrad/hr and Group B more than 6 mrad/hr, but less than 12 mrad/hr average contamination over the entire garment when read at one inch from the surface of the item with a G.M. survey meter. These items are placed in plastic bags, tagged according to radiation level, placed in a shipping container and shipped in compliance with I.C.C. regulations to an approved off site laundry decontamination service. This service is currently being provided by Nuclear Laundry Service, Jeannette, Pa. Items of protective clothing, contaminated above 50 mrad/hr are discarded as radioactive waste.

10.8.4 Decontamination of Breathing Equipment

Breathing equipment is surveyed by Health Physics after completion of jobs where this equipment was used. Noncontaminated equipment is either returned to individuals to which it was assigned, or is stored in the equipment issue area after cleaning. Contaminated equipment is handled as follows:

10.8.4.1 Contaminated face pieces are washed with a detergent in warm water, thoroughly rinsed in warm water, dried surveyed and packaged in a plastic bag.

10.8.4.2 Used respirator filters are discarded.

10.8.4.3 Metal parts of supplied air breathing equipment are washed with warm soapy water and/or wiped with "Masslin" or other suitable contamination removing cloths. Persistent

contamination is removed by scrubbing in mild chemical solutions. The items are dried and surveyed prior to storage.

10.8.4.4 Strap webbing is washed in warm soapy water, dried and surveyed.

10.8.4.5 Airlines are discarded after use.

10.8.4.6 Plastic hoods worn in conjunction with supplied air are discarded after use.

10.8.5 Decontamination of Personnel

10.8.5.1 General Washing Procedure

Thorough washing with mild soap and tepid water is the best general method for removing contaminants from the hands or body. If the contamination is localized, it is often more practical to mask off the affected area and cleanse with swabs, before risking the danger of spreading the contaminants. Repeated washings and rinsings may be necessary, however, care should be exercised not to abrade the skin. Applications of lanolin or hand cream may be desirable to prevent chapping after repeating washings. If contamination persists, the following method may be used under Health Physics supervision: Apply a 10% solution of potassium permanganate, rinse in warm water and apply a freshly prepared solution of sodium bisulfite. Rinse thoroughly and wash with a mild soap.

CAUTION: These solutions should not be allowed to remain in contact with the skin for more than 2 minutes per washing.

In the event that contamination cannot be removed by employing these methods, additional decontamination shall be attempted under the direction of the resident Health Physicist with the advice of a consulting physician.

10.8.5.2 Decontamination of Injured Personnel

Decontamination of superficial wounds shall be performed under the supervision of the resident Health Physicist. Services of a consulting physician will be utilized based upon the degree of injury. Arrangements have been made with local physicians and the Clearfield Hospital to provide any necessary medical assistance. In addition, a Nuclear Medical Consultant from the University of Pittsburgh Graduate School of Public Health has been contacted to provide professional services when required.

10.8.6 Decontamination of Liquids

Information regarding liquid waste handling methods is described in Chapter 7.

10.8.7 Decontamination of Air (Air Handling System)

Filters are installed in the air handling system to remove particulate radioactivity resulting from process operations prior to discharge to the environs. A description of the air handling system is presented in Chapter 6.

10.8.8 Storage and Control of Contaminated Material and Equipment

Equipment that cannot be decontaminated immediately is sealed in plastic and stored in the decontamination room. Items of equipment which are used only in contaminated areas on a periodic basis are also sealed in plastic and stored in the decontamination room when not in use.

Pieces of equipment presenting a serious radiation hazard due to the amount of contamination present are decontaminated or discarded as radioactive waste.

10.9 Waste Disposal Monitoring

A description of the methods employed for the disposal of radioactive wastes is presented in Chapter 7.

10.9.1 Monitoring Solid Waste Disposal Containers during Filling and Removal from the Facility

During the removal of solid radioactive waste from the cells and process box, a Health Physics representative monitors for external radiation, surface and airborne contamination. The waste containers are surveyed for surface contamination prior to removal from the cell isolation room after sealing the disposal container. Contaminated containers are decontaminated prior to removal to the waste storage area. All containers of radioactive waste are labeled and tagged in accordance with the applicable regulations.

10.9.2 Monitoring the Solid Waste Disposal Container Storage Area

Sealed radioactive waste disposal containers are moved from the facility to the waste storage building where they are stored until shipped to an approved disposal site. The radioactive waste storage area is monitored at least weekly for external radiation. The general radiation level is posted at a location where it can be observed by personnel entering the area. The storage area is posted with radiation signs in accordance with applicable regulations.

10.9.3 Monitoring Shipping Vehicles

Vehicles used to ship radioactive waste containers to the disposal site are monitored during loading operations. Containers are arranged so that those emitting the maximum radiation levels are shielded by those of lower radiation levels. The exterior of the shipping vehicle is monitored and posted to assure compliance with shipping regulations prior to leaving the site.

10.9.4 Records

Any entry is made in a Solid Radioactive Waste Disposal Log Book after waste containers have been transferred to the waste storage area. This entry includes the radiation level at the surface of the container, the level at one meter from the container surface, an indication of the curie content

of the container, results of surface contamination surveys and container weight. These records are maintained by both Health Physics and the administration and are used when loading trucks for waste shipments.

10.9.5 Monitoring Liquid Radioactive Waste

Process liquids are absorbed and treated as solid radioactive waste as described in Chapter 7. Low level liquid waste is monitored by Pennsylvania State University personnel who are responsible for the discharge of liquid waste to the facility environs. Liquid waste samples are collected and analyzed by Penn State personnel under the supervision of the University Health Physics officer. Dilution factors, as required, are supplied by Pennsylvania State University to facility operations personnel, who adjust the flow of dilution liquid so the waste discharge is conducted in compliance with applicable regulations.

10.9.6 Monitoring Liquid Waste Treatment Facilities

Health Physics conducts periodic radiation and contamination surveys in the liquid waste treatment facility. The frequency of surveys is governed by facility utilization. Results of these surveys are recorded and reported to the Plant Manager.

10.9.7 Liquid Waste Discharge Records

Records of the activity of liquid waste discharged to the environs are maintained by the Pennsylvania State University Health Physics Office. Duplicates of these records are also retained in the Health Physics files at the facility.

10.10 Health Physics Instrumentation

An adequate supply of instruments, capable of detecting and measuring ionizing radiation throughout the facility, are maintained as Health Physics equipment. Table 10.1 presents a list of the typical instruments.

10.10.1 Description of Instrumentation Check and/or Calibration Method and Frequency

10.10.1.1 Air Particulate Monitors

The continuous air monitors are functionally checked at least once every 3 months or after each servicing. This check includes utilization of a calibrated strontium-90 reference source placed in view of the detector. If the instrument reading varies beyond ± 20% from the known value of the source, the instrument is adjusted and/or repaired. In addition, the air flow is measured using a calibrated rotameter and adjusted to 4 cfm.

10.10.1.2 Area Radiation Monitoring System

The area radiation monitoring detectors are functionally checked at least once every 3 months or after each

servicing. This check includes utilization of a 25 mg radium source placed at varying distances from the detector in order to check the reponse of the detector. If the meter reading varies beyond 20% from the true reading, the equipment is adjusted and/or repaired.

10.10.1.3 Detector/Scaler Counting Assemblies

All counting room instrumentation is checked daily for background and statistical accuracy. A calibrated strontium-90 source is placed in each detector and counted for a preset time. The background and total count is recorded in a log. If the instrument readings vary greater than the calculated statical error, it is recalibrated and/or repaired.

10.10.1.4 Count ratemeters - Hand and Foot Counter

The count ratemeters are functionally checked at least once every three months or after each servicing. This check includes utilization of a calibrated strontium-90 source placed in view of the detector. If the instrument readings vary beyond ± 20% from the known value of the source, the instrument is adjusted and/or repaired.

10.10.1.5 Portable Radiation Detection Instruments

The portable survey meters are calibrated at least once every three months or after each servicing. This calibration includes utilization of a 25 mg radium source and a Martin custom encapsulated 7-curie strontium-90 titanate pellet.

If the instrument readings vary beyond ± 20 from the known dose rate established with a R-meter, the instrument is adjusted and/or repaired.

10.10.2 Instrument Maintenance and Records

Minor instrument repairs and calibrations are performed by Health Physics personnel. Major repairs are performed by the facility instrument technician.

Health Physics maintains permanent records of all instrument calibrations and repair records are maintained by the instrument technician. Each instrument is tagged indicating the calibration date.

10.11 Environmental Monitoring Program

Effluent monitoring data collected since plant startup indicates that during normal operation, no radioactivity in excess of the limits set forth in 10CFR20 is released to the environs.

A practical environmental monitoring program has been developed for the Quehanna site. Consideration has been given to the geographic, geological, hydrological and meterological aspects of the site, as well as to the influence of low population density and the operational activities conducted at the Martin Radioisotope Pilot Plant. The purpose of this program is to obtain data on the normal variations in background radiation which can be used to assess the effect of an accidental release of radioactive material to the environs.

This program includes collection and analysis of: stream water, silt, soil and vegetation, and environmental air.

10.11.1 Samples Location and Frequency

Samples of the environs (refer to Figure 10.1) are collected as accessibility to the sample locations permit on the following schedule:

LOCATION	SAMPLE	FREQUENCY
#1	Water	Monthly
	Soil and Vegetation	Twice per Year
#2	Water	Monthly
	Silt	Twice per Year
#3	Water	Monthly
#4 & 5	Water	Monthly
	Silt	Twice per Year
#6 & 7	Soil and Vegetation	Twice per Year
#8	Environmental Air	Daily
#9	Water (Facility Potable Water)	Daily
#10, 11, 12	Soil and Vegetation	Twice per Year
#13, 14	Water	Monthly
	Silt	Twice per Year

10.11.2 Sample Size and Analysis

One liter of water, approximately 10 gms of vegetation and one pound of soil are collected and analyzed for gross beta-gamma activity. Selected proportions of the samples collected are analyzed for strontium. Records of analysis are maintained by Health Physics.

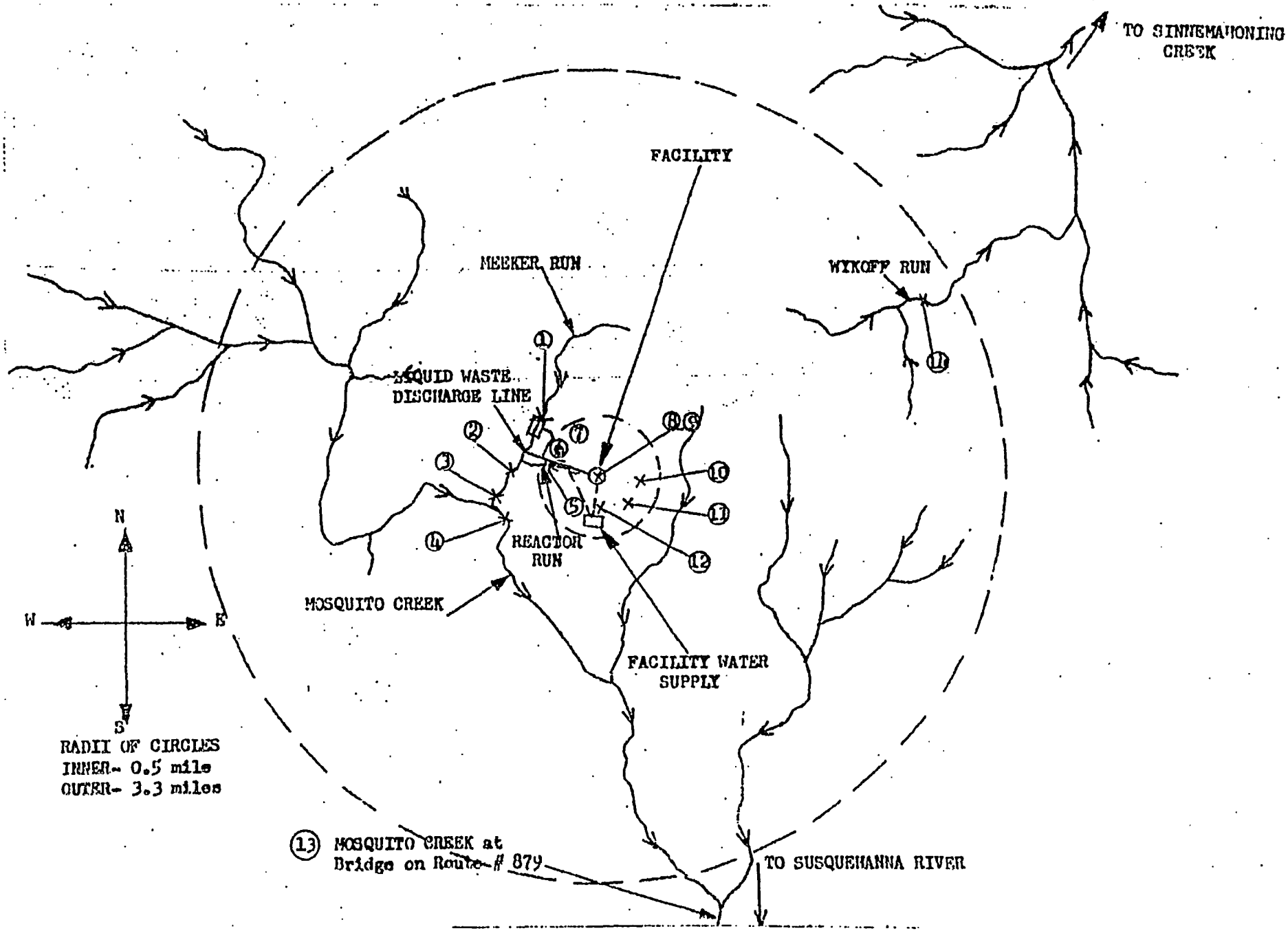


FIGURE 10.1 ENVIRONMENTAL SAMPLING POINTS

CHAPTER 11

SUMMARY OF EMERGENCY CONTROL MEASURES

11.1 Introduction

The Quehanna Radioisotope Production Facility has processed kilocurie quantities of $SrTiO_2$ since July 1962 and much valuable operating experience has been gained. This valuable information has influenced the design of new equipment and the planning of a safe operation. This section presents a summary of the available means for dealing with emergencies. While it is not possible to predict all the accidents that may occur, it is felt that the equipment provided, combined with intelligent understanding of the facility and careful preplanning, make it possible to deal with any emergency that may arise. Detailed emergency that may arise. Detailed emergency procedures are outlined in the Standard Operating Procedures.

11.2 Local Assistance

Pennsylvania state and local police, Pennsylvania State Health Department, hospital and civil defense authorities have been contacted and arrangements completed for mutual assistance in the event of an emergency. These officials are aware of the facility operations and an efficient system for emergency assistance has been agreed upon. Local volunteer fire departments have visited the facility and are familiar with the plant fire fighting equipment.

11.3 Organization

The Plant Manager supervises the emergency control procedures. He issues any alternative procedures which he may feel necessary to cope with a particular situation. It is also his responsibility to report an emergency incident to responsible authorities of Martin, the facility owner (Pennsylvania State University), and the AEC in accordance with the requirements as set forth in 10CFR20. In the absence of the Plant Manager, the shift foreman will assume the responsibility of evacuation coordinator until the Plant Manager arrives on the site.

11.4 Health Physics

The resident Health Physicist acts as consultant on radiation and contamination problems and reports the hazards to the evacuation coordinator. Detailed duties are covered in the Standard Operating Procedures.

11.5 Off-Hour Coverage

During processing of radioactive material, at least two persons will be in attendance at all times. In case of any emergency, the Plant Manager and the resident Health Physicist will be notified.

11.6 Equipment

In addition to the support equipment, ventilation air monitoring systems and controls, the facility maintains and operates an emergency vehicle and trailer outfitted with equipment

for detecting and measuring air contamination and radiation levels in the site environs. The unit also contains protective clothing and equipment, decontamination supplies, an emergency generator and other items necessary for handling emergency situations.

11.7 Emergency Drills

Drills are held periodically in order to train the personnel in the proper procedures to follow in case of a radiation or particulate release alarm. All personnel evacuate the facility at the sound of the alarm and congregate in the parking lot. In the event of a real alarm, they will remain in the lot until the Plant Manager and the Health Physicist can determine the cause of the alarm and plan immediate action.

Dosimetry and follow-up procedures are conducted on all personnel who may have become contaminated or exposed. (Reference Chapter 10 - Health Physics).

11.8 Internal Emergencies

11.8.1 Liquid and Dry Spills

In case of major contamination due to a spill or other accident within the building, the contaminated area is marked by Health Physics and decontamination procedures are initiated. Appropriate protective clothing is worn during this time (see Paragraph 10.7.3).

11.8.2 High Air Contamination

The room constant air monitors have a set and an alarm point. In case of an air monitor alarm, all personnel immediately don protective respiratory gear and Health Physics evaluates conditions and advises regarding the course of action. In the event of an evacuation the emergency coordinator and the senior health physicist don respiratory protective and evaluate building conditions. Ventilation is adjusted to minimize the spread of contamination and decontamination procedures are initiated utilizing appropriate protective equipment.

11.8.3 High Radiation Levels

The ventilation system sample filters are changed daily and in case a filter becomes unduly contaminated. While the contaminated filter is being changed, an emergency fan is started and the flow by-passes the contaminated filter.

11.8.4 Leaking Capsule in Pool

If a leak should occur in one of the fuel capsules in the storage pool, it will be detected by either Health Physics analyses of the water or the continuous water monitor. The process by which the leaking capsule is isolated entails the use of a hollow, siphon-fitted can which, when placed around the suspect capsule, draws water to be sampled for excess activity. In addition to water samples, the deionizers which service the storage pool through a continuous recirculating system are monitored on

a regular basis. When a capsule is removed from the pool, smears are taken at the earliest convenient time.

11.8.5 Pool Leakage

The following action is taken if the storage pool should leak: the pool water supply is increased to maintain shielding over the fuel capsules; environmental monitoring is initiated to measure the radiation in the area. The cause of the leak is determined by the Plant Manager and Health Physics, and repairs and preventive remedies are initiated.

11.9 External Release

11.9.1 Airborne

If contaminated air should be released to the environment, a survey will be conducted to determine the extent. A high volume air sample mounted on the facility emergency trailer will be used for sample collection and radiation levels will be recorded.

11.9.2 Water Contamination

Contamination of the environmental water system could result from accidental release of high level liquid waste from the waste treatment plant. In this event Health Physics is made aware of the situation via the alarm systems. Water samples of local streams will be collected. After a period of time following an incident, silt samples from the streams will be collected. The proper agencies throughout the area will be notified.

11.10 Fire Fighting

11.10.1 Fire Fighting Plan

In addition to the general problems involved in in fighting fires, the Quehanna Pilot Plant is faced with two special problem areas. These problems are:

(1) Fighting laboratory fires involving acids, gases, chemical processing apparatus, electrical equipment and other hazardous materials normally found in a laboratory.

(2) All of the above, plus the added hazard that radioactive materials may be present in the area or disseminated in the atmosphere.

A training program is designed to provide a general background and experience (through field demonstrations) in fighting fires, with emphasis on the special precautions required by virtue of the special conditions.

The design of the facility lends itself readily to the establishment of a three-area control system. The areas in which a fire would produce the most serious consequences are the hot cells. In the event of such a fire all efforts will be made to confine the radioactivity to the area while putting out the fire. The second area is the isolation room. If necessary to put out the fire, and if it cannot be confined to the hot cell, radioactivity may be allowed to spread, under control, to the isolation room. The service area provides a third region, the

cold area, from which the fire may be approached. If at all possible, radioactive contamination will be kept from this area.

The facility has highly trained personnel, competent in matters pertaining to radiation and radioactive materials control. Most of the training is therefore directed to those problems associated with the proper use of equipment, techniques, philosophy of the three area control and location of emergency supplies. The Pennsylvania State University Fire Marshal and a representative of the NEPIA Agency are available as consultants. Both individuals make periodic inspections and inform the Plant Manager of any deficiencies in the equipment, or new techniques that may be incorporated in the protection plan.

11.10.2 Fire Alarms and Equipment

Fire fighting equipment is installed in and about the building in accordance with the requirements of the National Board of Fire Underwriters. Most sections of the building in which radioactive work is not carried on are protected by an automatic sprinkler system. When any part of this sprinkler system is actuated, an alarm will sound throughout the building. It is also arranged that an alarm will sound if the water pressure in the sprinkler system drops below a preset level.

It is not practical to use sprinkler systems in most areas where chemical and radioactive work take place because the reagent which should be used to put out the fire depends

largely on the burning material and other materials in the laboratory. Sprinkler systems also tend to spread radioactive contamination. In such areas, therefore, automatic fire detectors have been installed. If the temperature in one of these areas rises above a preset limit, it will result in the continuous ringing of all fire alarm bells throughout the building. Automatic detectors are located in the reactor bay, remote control room, reactor pump room, mezzanine fan rooms, operating area, above the isolation rooms, the service area, decontamination room, and the analytical radiochemistry lavoratory.

The entire fire alarm system will operate from the normal power bus. In case of power failure, the system will automatically switch over to storage batteries. Provisions are made for the system to be connected to a future central fire station.

In the areas in which only fire detectors are installed, it will be necessary to combat fires with locally available fire extinguishing apparatus. The extinguishing reagents include water, foam, carbon dioxide, and powdered sodium carbonate. The reagent to be used depends upon the type of fire.

There is no provision for fixed sprinkler or automatic fire detector equipment in the hot cells. Each experimental installation is evaluated individually for an associated fire hazard, and appropriate alarm and/or fire extinguishing apparatus is installed with the experimental equipment as required.

11.10.3 The Training Program

Because of the relatively small staff at the Quehanna Radioisotope Pilot Plant, all men are members of the Fire Brigade and will receive fire fighting training. Three hours of preliminary training will be provided in the course of training programs related to Health Physics and the strontium-90 titanate process. The special hazards caused by the particular systems at the facility and the chemical systems to be operated will be reviewed, and techniques for emergency action presented and practiced. Additional classroom training of one hour per quarter will cover such items as alarm code instruction, evacuation procedures, emergency treatment, familiarization with equipment and other related topics. During favorable weather, the fire fighting equipment will be tested in these classes. Field exercises will include techniques of handling high pressure hose and various types of extinguishers. Proper maintenance of hose and equipment after use will be learned. Classes will be conducted by the plant Fire Marshal although any member of the staff or the aforementioned consultants may provide the actual instruction. The following reports will be required reading and will serve as texts for the instruction:

1. Living with Radiation - Volume II
   Fire Service Problems
   U. S. Atomic Energy Commission

2. The Hazard of Radioisotopes under Fire Conditions

Factory Insurance Association

3. Recommended Fire Protection Practices for Nuclear Reactors,

NFPA 802

As part of the training already given, fire hoses are checked periodically.

11.10.4 Specific Emergency Procedures

11.10.4.1 Fires or Explosions in Process Box—

11.10.4.1.1 Detection

Flammable materials are rarely used in the processing box and the only other possibility is an electric motor becoming overheated. Since the facility is never left unattended visual detection of fires and subsequent remedial action is possible.

11.10.4.1.2 Standard Procedure

The cell operator must do the following things in the event of a fire or explosions:

a. Sound fire alarm if not already done.

b. Don respiratory protection device.

c. Use extinguishing chemicals and reduce air flow via manual damper control.

d. Leave the area if radiation or evacuation alarm sounds.

The emergency coordinator is required to:

a. Check performance of cell operator and assist if necessary.

b. Assure safety of all personnal.

c. Coordinate and direct all emergency measures

d. Inform his superiors.

The Health Physicist in case of fire or explosion is responsible for:

a. Detecting spread of contamination, if any. Initiating radiation-contamination surveys if necessary.

b. Advising emergency coordinator as required.

c. Insuring the wearing of necessary protective equipment.

d. Checking personnel for possible contamination and information regarding radiation exposure.

e. Assisting coordinator as required in making a thorough post-emergency evaluation.

f. Initiating personnel decontamination and administering first aid if necessary.

All the other personnel in the area will report to the parking lot area and await instructions.

11.10.4.2 Fires in Low Hazard Area

11.10.4.2.1 Detection

Non-radiation areas are protected by sprinklers. Radiation areas, with the exception of the cells, are protected by heat detector alarms. Manual fire alarm stations are provided in each area.

11.10.4.2.2 Standard Procedure

A cell operator is required to do the following:

a. Sound the alarm, if not already done.

b. Bring the work in the process cell to a point where it is safe to leave if necessary.

c. After putting on respiratory equipment, assist to extinguish fire if nearby.

d. Check operation of ventilation system.

e. Remain in operation area, alert for problems until instructed otherwise.

The emergency coordinator is required to:

a. Determine location of alarm.

b. Don respiratory protective device.

c. Instruct others to extinguish fire or assist as required.

d. Check with Health Physics.

The Health Physics representative must:

a. Don respiratory equipment.

b. Proceed to fire location.

c. Evaluate hazard.

d. Assist as required

Others persons, if in the vicinity of the fire, must sound the alarm, don respiratory equipment and extinguish the fire. If in another location, they should report to the assembly area to be available to assist.

11.11 Storms

11.11.1 Wind Damage

Under normal conditions, the average wind speed in the area does not affect the building ventilation system. However, if wind speeds should increase to such a degree that they cause a perturbation of the system by varying the static pressure of the building, corrective action will be taken when necessary; i.e., supply air will be reduced to increase negative pressure in the cells and dry boxes, open or close doors and/or dampers to rebalance air system in the operating and service areas. Questionable air flow and pressures will be measured with hot wire anemometer, velometer or smoke tubes.

11.11.2 Flooding

The facility is located on a plateau approximately 1900 feet above sea level. As drainage flows away from the site to lower altitudes, the possibility of flood damage within the facility is quite remote.

11.12 Power Failures

Power failures in the past occasionally have occured. When the power fails, an emergency power system is

automatically operated. Transfer from the main source of power to the emergency power system takes place through time delay relays which permit the emergency unit to reach rated speed and voltage in approximately 10 seconds.

CHAPTER 12

SAFETY EVALUATION

12.1 Introduction

The design and operating philosophy of this facility is based on the principle of multiple containment barriers of radioactive materials at all times. In essence, this means that a minimum of two containment structures must fail in order to allow the release of radioactive material to the atmosphere. The criterion of safety emphasized throughout the analysis is reasonable assurance that the general population in areas surrounding the facility and operating personnel will not receive overdoses of radiation as defined by 10CFR20 and the recommendations of the ICRP.

A shielding analysis has been carried out to assure that direct radiation doses to operating personnel do not exceed acceptable limits.

A complete safety evaluation has been performed to determine the radiobiological consequences of accidental activity releases. All cases in which the possibility of primary containment failure exists were analyzed. The results indicate that activity releases due to containment failure are highly improbable. A very conservative approach was assumed in the postulation of a series of failures that might cause the release of

activity from the secondary containment to the surrounding environment or to operating areas of the facility. This approach is emphasized particularly in the examination of the maximum credible accident.

In addition to accidental activity releases, all of the chemical processing steps and other operational procedures have been studied to ensure their safety with respect to operating personnel and the general public.

12.2 Shielding Analysis

An analysis has been made of the shielding requirements for the strontium-90 production process. The effectiveness of the cells and auxiliary process equipment shields for shielding against the maximum calculated radiation intensity has been established.

12.2.1 Cell Walls

12.2.1.1 Dose Rate from Strontium-90

An analysis of the shielding value of the hot cell walls and windows has shown that dose rates are extremely low for the anticipated amounts of strontium-90 to be processed and handled in the cells. Dose rate calculations were for a curie strength of 250,000 curies and two forms (solution and solid titanate). The dose rate varies practically linearly with the activity.

Dose rates were calculated at points located in the front of the cell outside the walls and windows, at a point on top of the cells, at a point in back of the cells outside the cast iron door but inside the isolation room, and at a point in back of the cell outside the isolation room but shielded by the cast iron door only. These points are shown in Figures 12.1 and 12.2 and the dose rates are given in Table 12.1. The results are conservative since they neglect self-absorption, the shielding effect of structural materials, and the effect of any localized shielding which may be used for personnel entry into the cell.

12.2.1.2 Effect of Cerium-144 on Cell Wall Analysis

It is estimated that the Cerium-144 content may be as high as 2 to 3 millicuries per curie of strontium-90. Table 12.2 shows the increase in dose rates for selected situations around the hot cells. It should be noted that the shielding of the cells is still adequate with this amount of cerium.

The significant bremsstrahlung associated with the decay of Cerium-Praseodymium-144 arise from the approximately 3-mev beta particle of Praseodymium-144. In addition, there are high energy decay gammas associated with Praseodymium-144. As a result, the average energy of the gammas for Cerium-Praseodymium-144 is higher than those from Strontium-Yttrium-90. In terms of shielding, this means that the Cerium-Praseodymium-144 gamma rays become relatively more important and contribute an increasing fraction to the total dose rate as shielding thickness is increased.

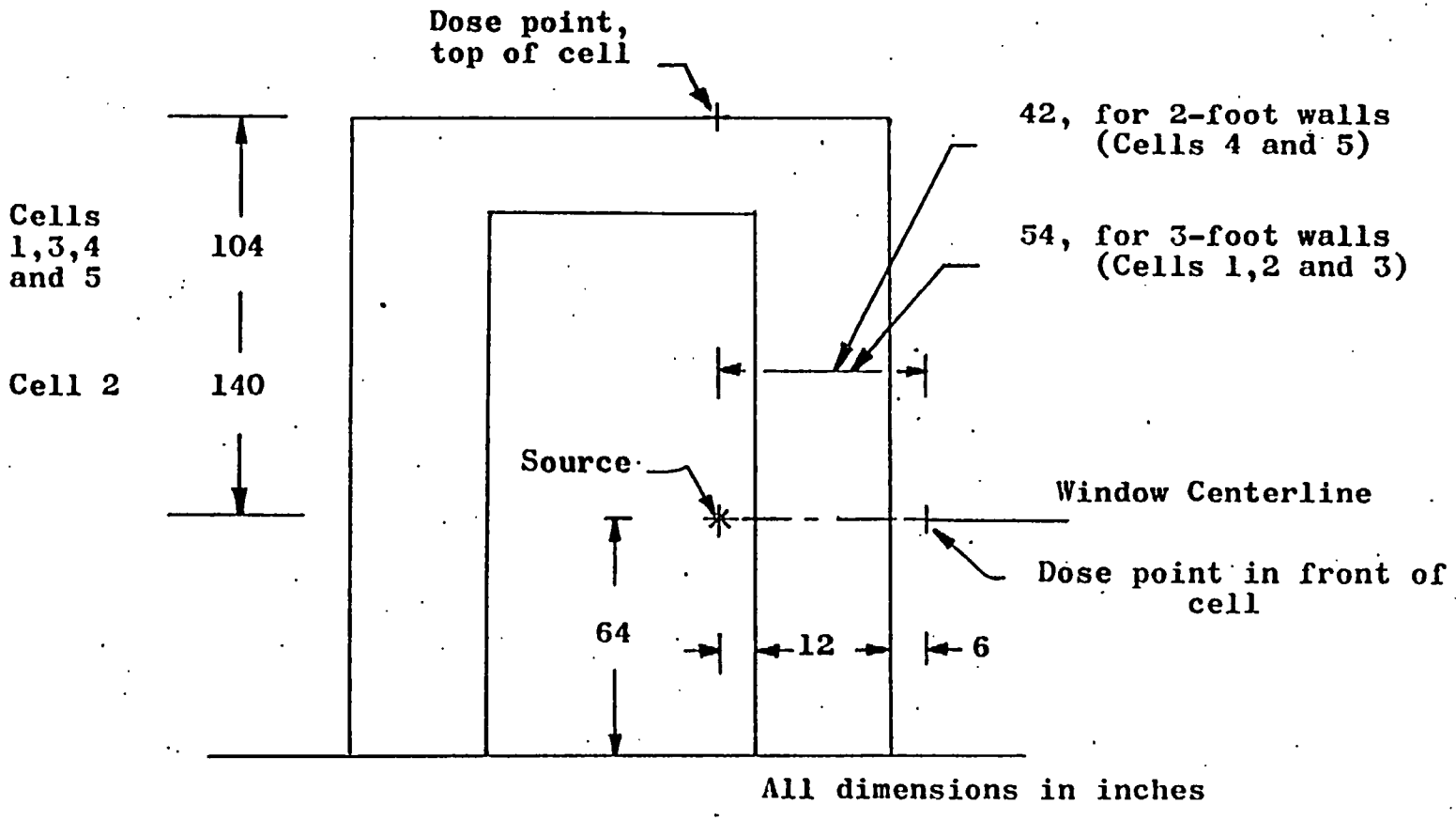


Figure 12.1 Configuration Used for Shielding Analysis of Strontium-90 Processing Cell

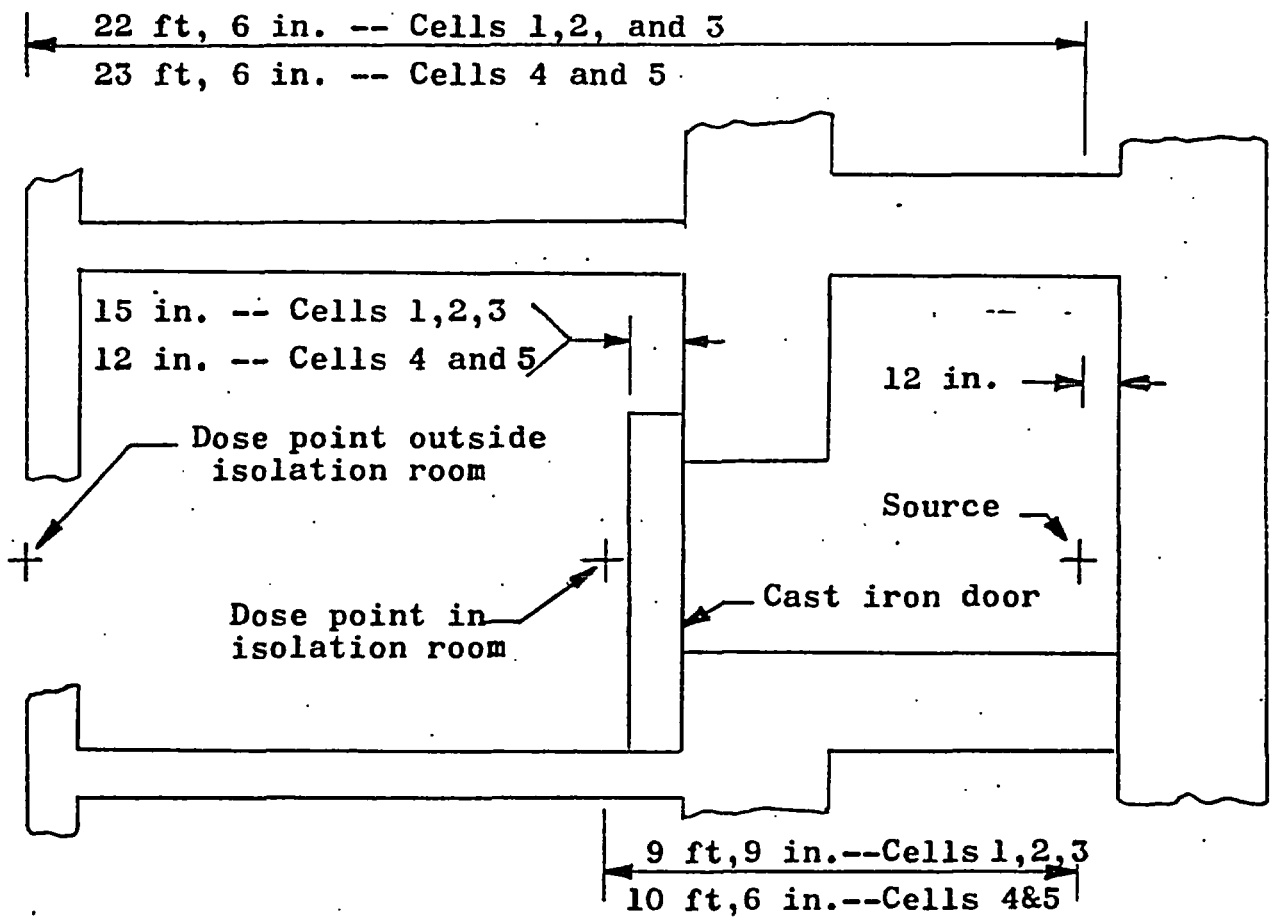


Figure 12.2 Configuration for Shielding Analysis of Rear of Cell

TABLE 12.1

STRONTIUM-90 PROCESSING; DOSE RATES (mr/hr)

For 250,000 curies in hot cell

Form of Strontium

	Front of Cell	
	Cells 1,2,3 3-foot wall	Cells 4,5 2-foot wall
Solution	2.75×10^{-5}	0.12
Titanate	7.5×10^{-5}	0.15
	3-foot window	2-foot window
Solution	0.04	8.5
Titanate	0.11	22.5

	Rear of Cell In Isolation Room		
	Cells 1,2,3 15-inch door	Cell 4	Cell 5 12-inch door
Solution	0.073	------	0.80
Titanate	0.19	1.66	2.10
	Outside Isolation Room		
Solution	0.014	------	.1625
Titanate	0.35	.03	.425

	Top of Cell			
	Cells 1,2 2 ft concrete	Cell 3 1.5 in. steel	Cell 4 2 in. steel 1 in. Al	Cell 5 2 ft concrete
Solution	17.0	------	----------	31.25
Titanate	45.0	5800	5000	80.0

TABLE 12.2

Efect of 2.5 Millicuries of Cerium-144 per Curie of Strontium-90 on Dose Rate (mr/hr)

Isotope	Activity curies	Walls 2-ft	Windows 2-ft	Roof	Isolation Room 12-in. door
Sr-90	250,000	0.148	22.25	80.0	2.08
Ce-144	625	0.200	9.00	14.0	0.45
Total		0.348	31.25	94.0	2.53

12.2.2 Feed Storage Tank

The feed storage tank, T-31 and it's shielding, are located in the cell annex of Cell 4. In the determination of the effectiveness of the shielding it was assumed that 750,000 curies, the maximum activity, was distributed uniformly throughout the tank. The points at which the dose rates were determined and the dose rates are shown in Figures 12.3, 12.4 and 12.5. Figure 12.3 is a plan view with the dose rates given for an horizontal plane taken through the middle of the tank. Figure 12.4 and 12.5 are for orthogonal vertical planes.

These tank T-31 dose rate calculations were performed by integrating the Green's function for the dose weighted by the homogeneous source throughout the tank. To accomplish these calculations IBM 7094 Program SPEND was used. Due to the assumptions made and the method of calculation, the calculated dose rates could be high by as much as a factor of two.

Using the maximum possible activity of 750,000 curies, the dose rates are low enough to allow for short periods of work in the vicinity of the tank.

12.2.3 Dose Rates Through the Shine Shield from the Process Box

To determine the amount of radiation from the process box, a point source of 100,000 curies was used. The

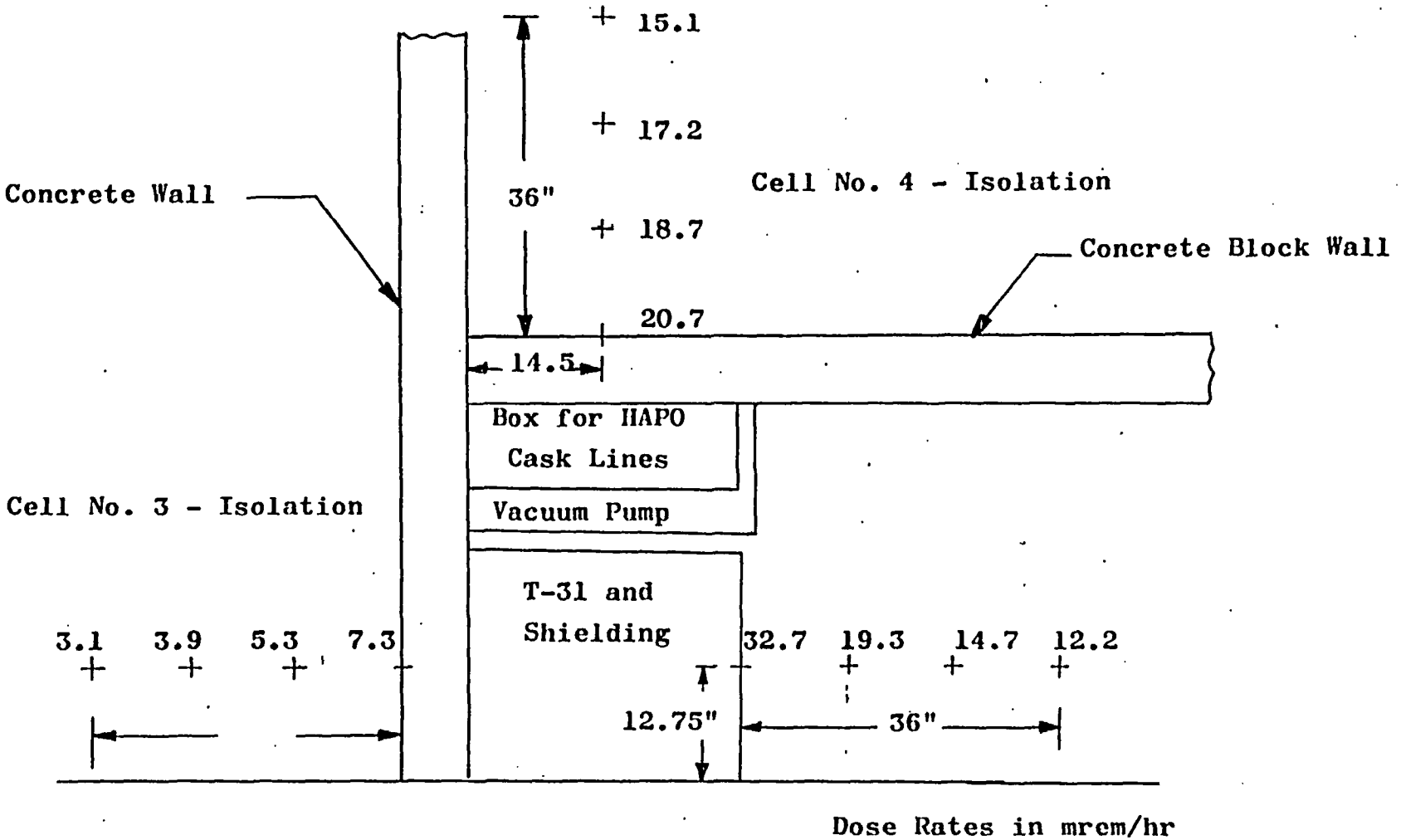


Figure 12.3 Dose Rates from Strontium-90 Storage Tank T-31
Horizontal Plane through Middle of Tank

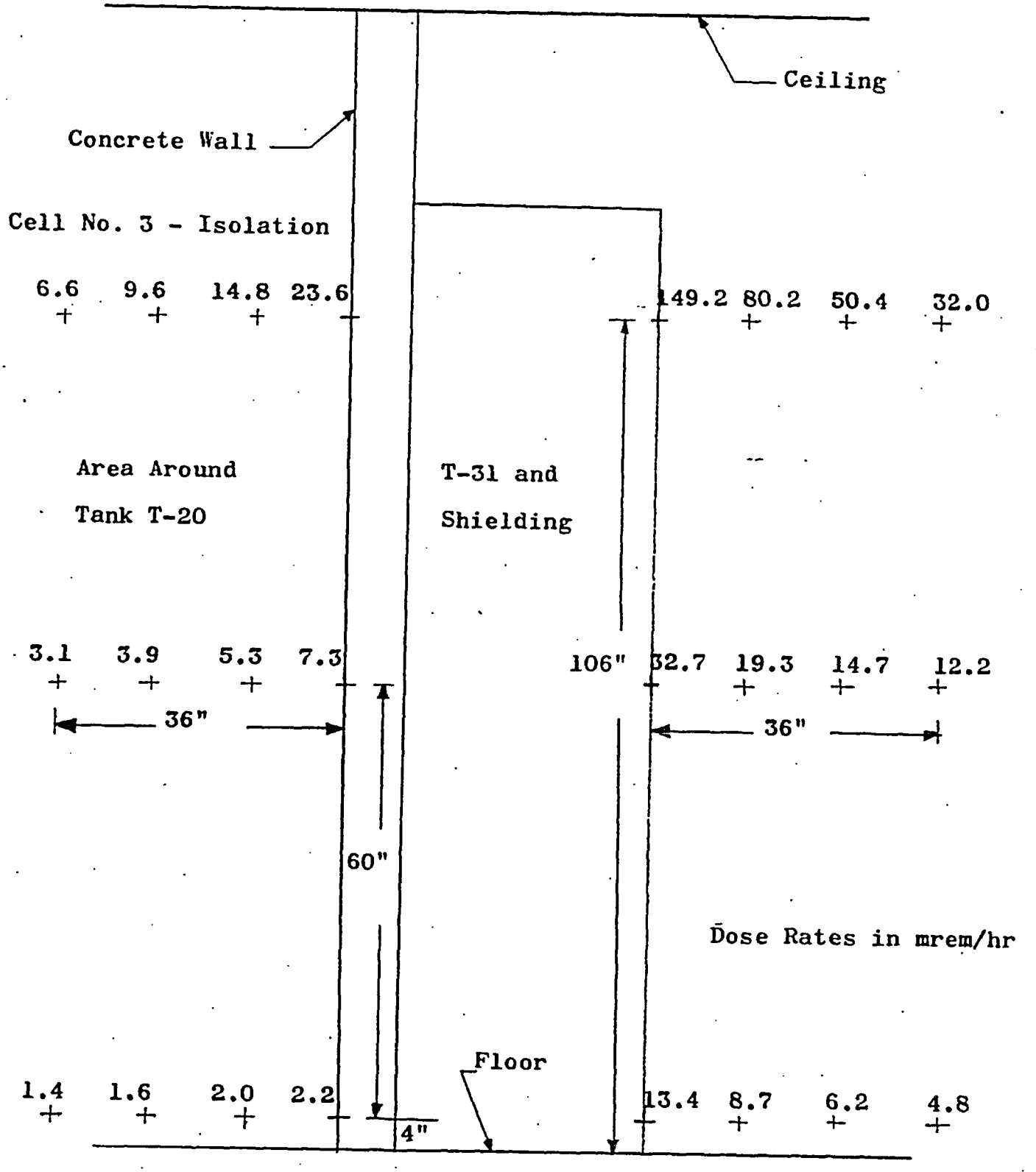


Figure 12.4 Dose Rates from Strontium-90 Storage Tank T-31 Vertical Section Perpendicular to Cell 3 Isolation Room Wall

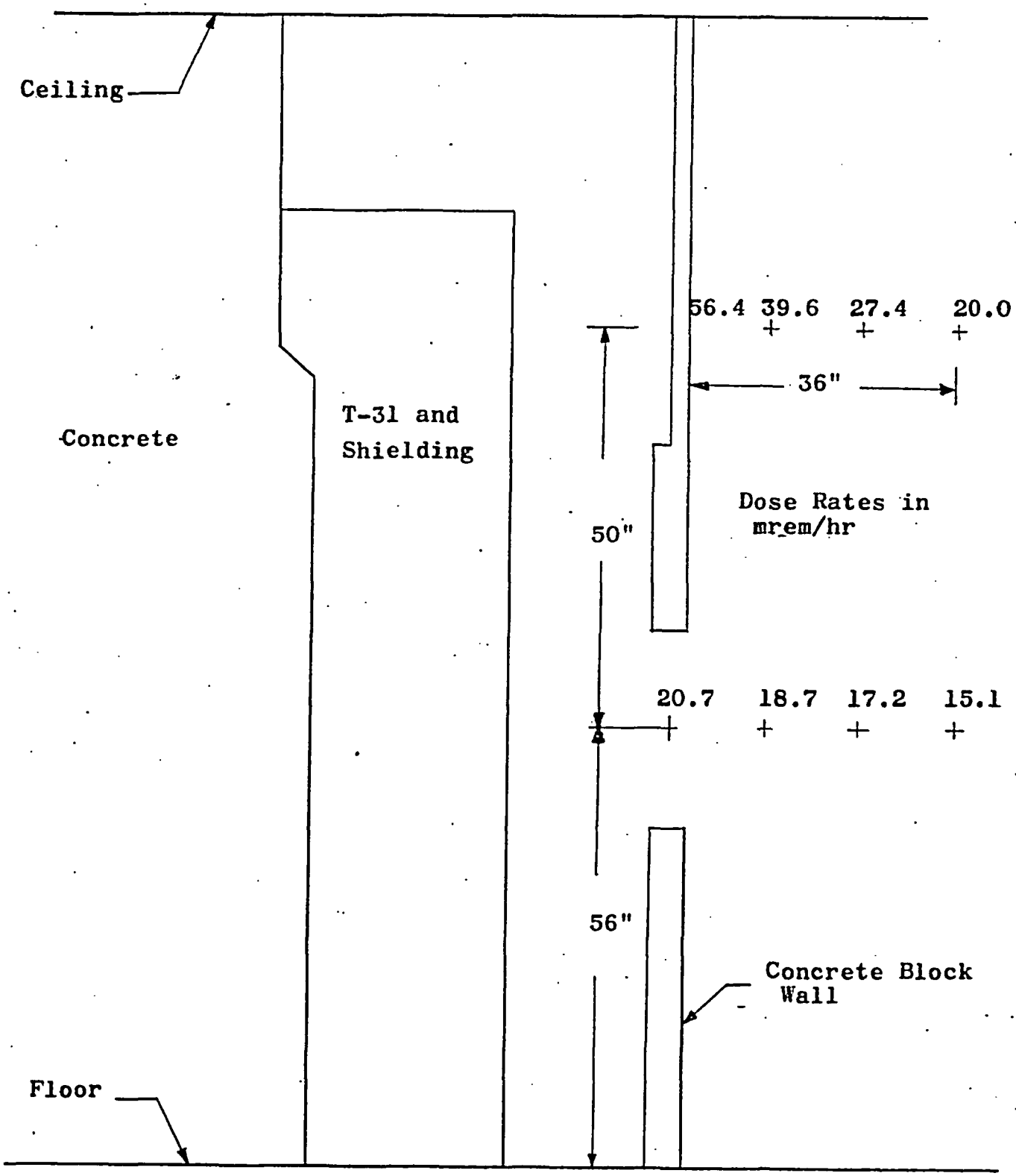


Figure 12.5 Dose Rates from Strontium-90 Storage Tank T-31
Vertical Section Perpendicular to Cell 4 Wall

source was located at a point in the process box closest to the shine shield. Thus the values obtained are conservative.

The calculations were carried out with the 12-inch iron cell door open so that the physical attenuation was due entirely to the shine shield. At a distance of 51 inches from the source the dose rate is 1.66 millrem per hour. Figures 12.6 and 12.7 locate the source and dose points.

It is clear that the shine shield is adequate shielding for the process box. The dose rates are low enough to permit personnel to do necessary maintenance at the closest possible position to the shine shield.

An area which may cause concern is that of the filter plenum. At times when strontium is in the furnace, which is situated in the process box of Cell 4, the dose rate from this source combined with that from tank T-31 and the activity retained by the filter may be high enough to warrant special procedures for changing the filter. Considering only the storage tank T-31 and 25,000 curies in the furnace, dose rates of approximately 25 to 30 millirem per hour are possible.

12.2.4 Temporary Shielding

A curve was prepared for use in estimating temporary shielding for various amounts of strontium-90. Figure 12.8 is a curve of activity versus thickness of lead shielding required to reduce the dose rate to 10 mr/hr at one meter

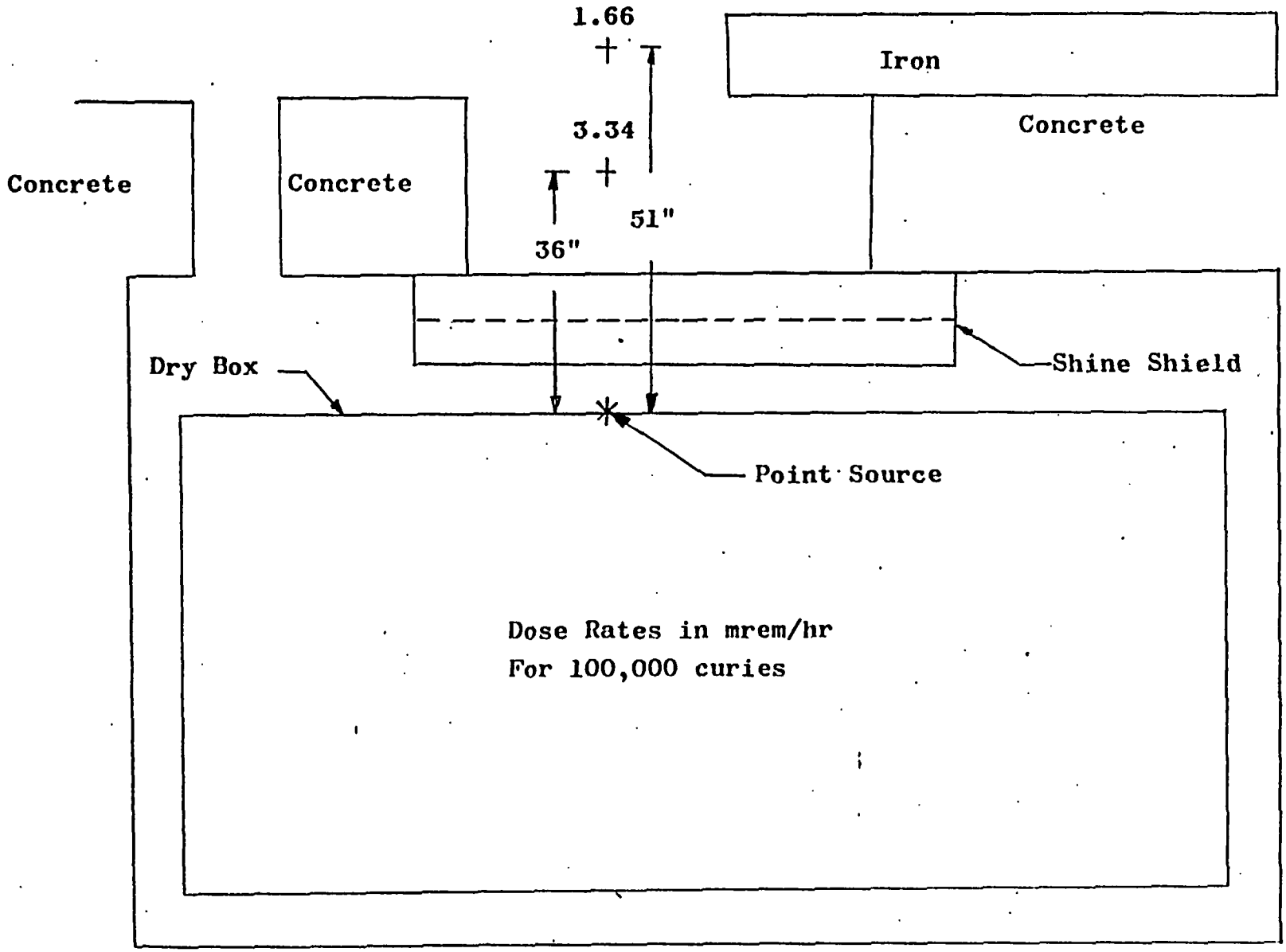


Figure 12.6 Dose Rates from Cell Four Dry Box
Horizontal Section

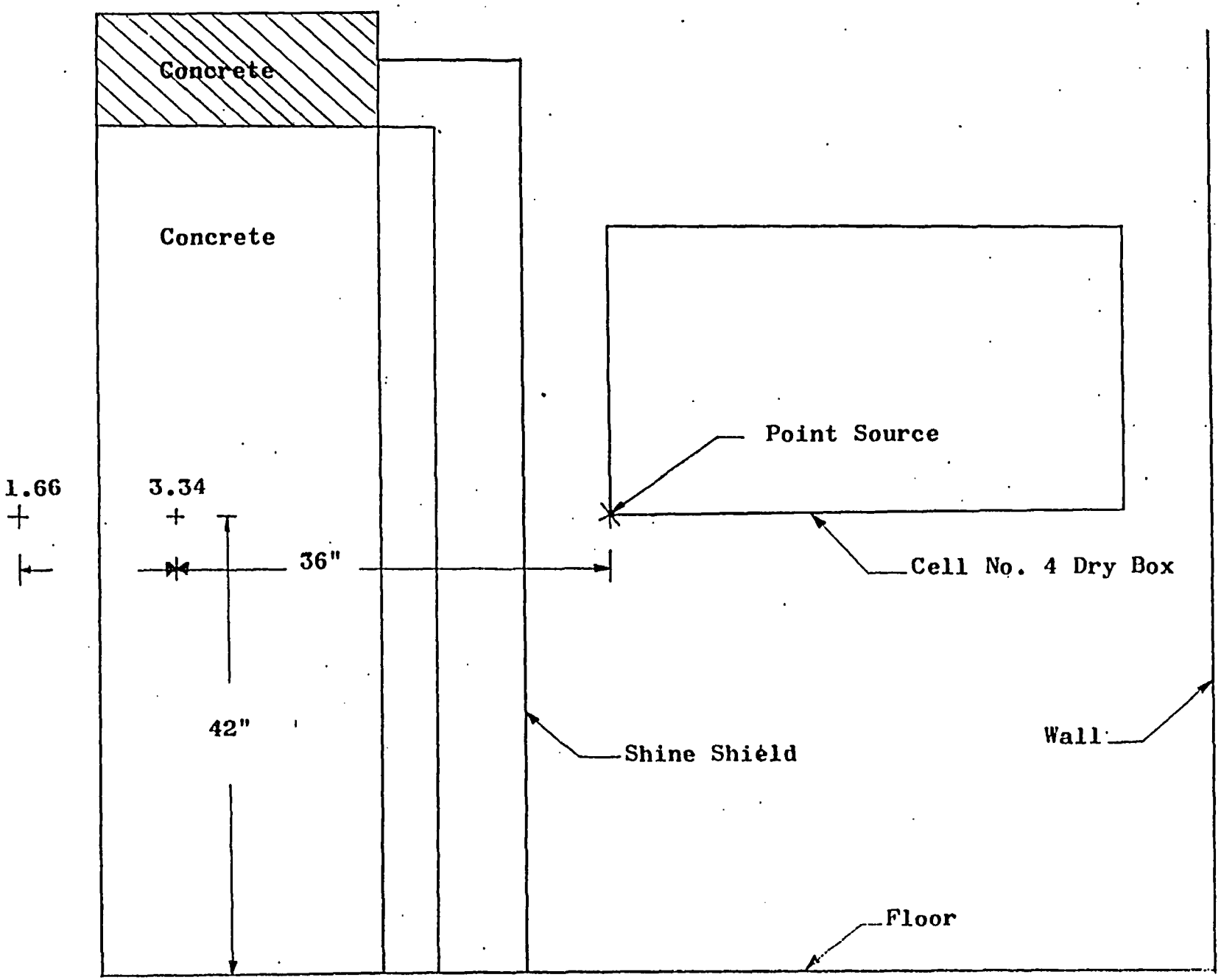


Figure 12.7 Dose Rates from Cell Four Dry Box

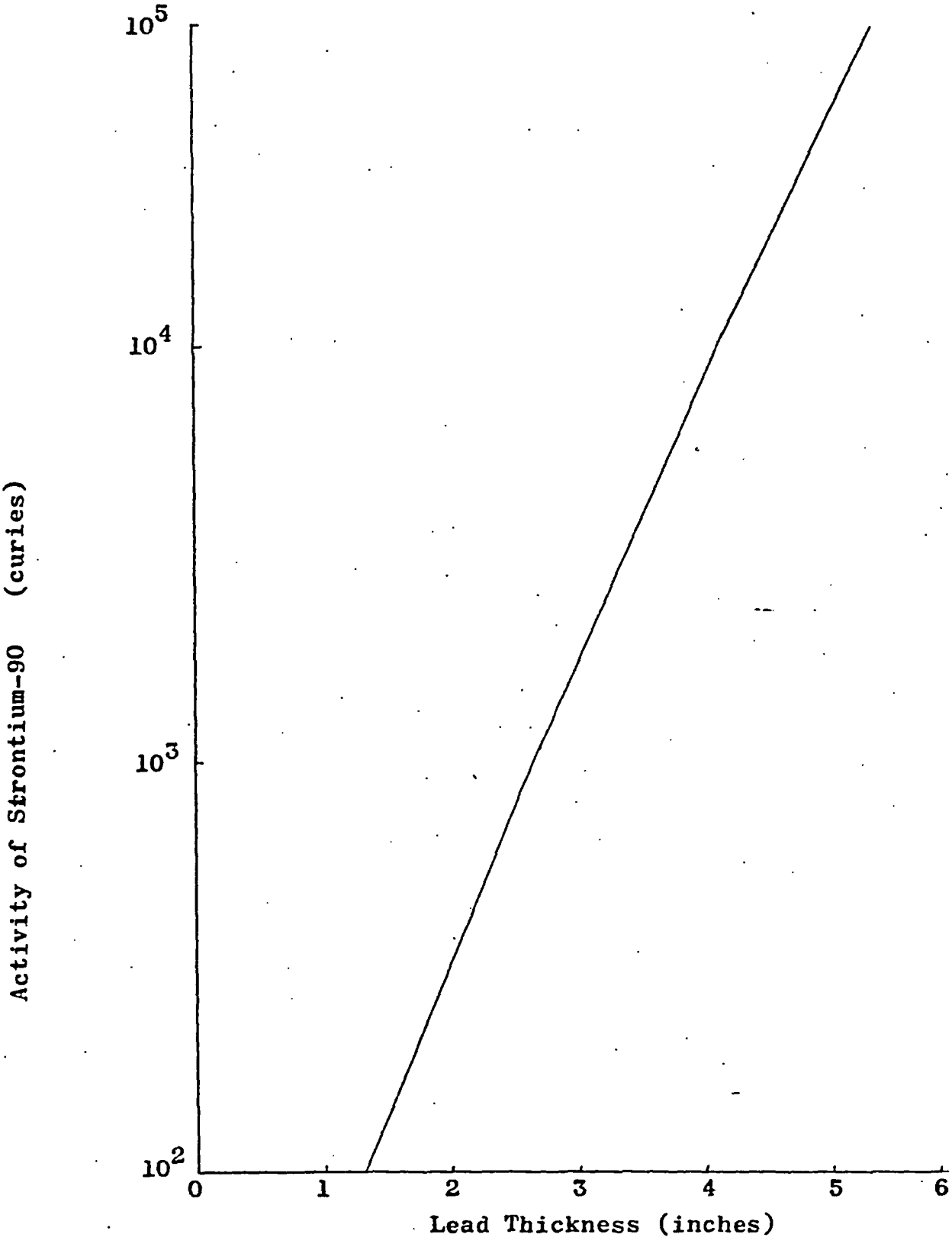


Figure 12.8 Shielding Required to Limit Dose Rate to 10 mr/hr at One Meter from Center of Source

12.3 Chemical Hazards

12.3.1 Radiolysis of $Sr(NO_3)_2$ Solution

12.3.1.1 Hydrogen Formation

The feed storage tank may contain up to 750 kilocuries of strontium-90 in 250 liters. Assuming conservatively that 100% of the radiation energy emitted is involved in decomposition of the solution, the rate of hydrogen evolution from the solution is calculated to be 78.0 cc/min. (STP). The G value of 0.028 (molecules per 100 electron volts) was calculated from an expression given by Sowden (Reference 12.7) for the effect of high nitrate ion concentrations on the radiolytic formation of hydrogen, assuming a nitrate concentration of 1.27M (0.075M excess HNO_3). The rate of hydrogen evolution varies in inverse fashion with increasing nitrate concentration. For example, increasing nitrate ion molarity of 1.95 (0.77M excess HNO_3) suppresses hydrogen evolution to 16.1 cc/min. (STP). The excess of HNO_3 maintained in the feed tank is normally 0.4 to 0.6M.

In the usual course of operations the 250-liter feed storage tank will have a maximum filling of two-thirds, by transfer from a HAPO-I cask, and will consequently have 500 kilocuries and a void space of about 83 liters. Hydrogen evolution at a proportional rate could theoretically bring the composition of the gas in the void space to the lower flammability limit of

4.1 volume percent in about an hour and to the lower detonation limit of 19% in about five hours. (References 12.8 and 12.9). The opportunity for igniting the gas within the tank is negligible since no access to the tank interior is possible, no electrical connections are made to it and it is not exposed to any flame. In addition, the tank is vented to the process box where dilution occurs before the air is exhausted through the air handling system.

The feed storage tank is air sparged at a rate of about 3 liters/minute when it is first filled, and before any subsequent withdrawals. At this time the hydrogen is diluted and carried away through the air handling system.

If, for some inadvertent or unknown reason, the vent and vacuum connections to the tank should be closed for a substantial period of time, it might first be assumed that the hydrogen evolution would cause pressure build-up in the free volume. Theoretically, it would require about 18 hours to raise the pressure to 15 psig. However, it is more logical to assume that in a sealed vessel, hydrogen produced by radiolysis recombines with the other radiolysis products so that no net hydrogen is produced. Allen (Reference 12.11) has commented on this phenomenon at length. In any event, the tank is capable of withstanding internal pressures of at least 100 psig and has been tested to that figure in conformance with the Uniform Unfired Pressure Vessel Code.

12.3.1.2 Nitrite Formation

Another radiolytic reaction is expected to occur in the storage tank, namely the reduction of nitrate ion to nitrite ion, with attendent consumption of hydrogen ion. The G value depends on the nitrate ion concentration and is computed to be 1.95 for the case at hand (Reference 12.12), giving a maximum nitrite ion formation rate of 3.03 gram-mole/hr. No safety considerations are apparent, in the formation of nitrite ion, since strontium nitrite is reported to exhibit essentially the same solubility as the nitrate and has no unusual chemical properties.

12.3.1.3 Oxygen and Peroxide Formation

As far as can be determined by an examination of the literature the formation of oxygen gas or of hydrogen peroxide should not occur to any significant extent in the feed solution.

12.3.2 Chemical Energy Production

12.3.2.1 Heat of Neutralization of Excess Acid

Excess HNO_3 added during the dissolution step is neutralized during the course of carbonate precipitation in Cell 4. The concentration of the excess acid is measured and will not exceed 1M and is usually held to about 0.5M. If the volume of solution aliquoted for precipitation is 9 liters it may contain 9 moles of excess HNO_3. Based on a heat of

neutralization of 13.1 kcal/mol, 118 kcal may be liberated during the neutralization step. This can produce a temperature rise of about 10°F but cannot result in any excessive release of energy.

12.3.2.2 Heat of Reaction of Carbonate Precipitation

From data readily available on the heats of formation of the various chemical species involved in the reaction by which strontium carbonate is precipitated, it is found that the reaction is slightly endothermic (Reference 12.13):

$$Sr(NO_3)_2(aq) + Na_2CO_3(aq) \rightarrow SrCO_3(s) + 2\ NaNO_3(aq)$$

Heat of formation:	229.82	276.18	291.28	214.66

$$H = +\ .06 \text{ kcal/mole}$$

Since a batch size of 25,000 curies of Sr-90 precipitated at a time amounts to about 40 mol of reactive cations, this reaction is of no great concern from an energy release or absorption point of view. The reaction of the calcium present is ignored for purposes of this study since the amount is small and this reaction also involves only a small quantity of heat. The TiO_2 present at the time of carbonate precipitation does not react chemically with the other reagents present.

12.3.2.3 Stability of $SrCO_3$ - TiO_2 Mixture

The mixture of $SrCO_3$ and TiO_2 which is separated by filtration from its supernatant liquid is permitted to dry

partially by self-heating before it is processed further. The batch generates heat at the rate of 160 watts. This heat is expanded principally in evaporating the water held in the precipitated mixture.

Following evaporation of the water, the temperature of the cake will rise to an equilibrium figure whose value is determined by various factors unless it is placed within a water-cooled receptacle available for that purpose. In no event can the self-heating of the cake cause a temperature rise sufficient to cause reaction between the $SrCO_3$ and TiO_2, since the reaction rate has been conclusively demonstrated to become significant only above 925°C. It is thought that the reaction between $SrCO_3$ and TiO_2 is perhaps endothermic, but the heat of formation of $SrTiO_3$ has not been determined. The experimental evidence shows that the evolution of heat is, at most, quite small. The reaction is consequently not contributory to any significant energy release during the process.

12.3.2.4 Fires

Neither the material being processed nor any of the reagents used are flammable and it has been shown above that energy releases in the process reactions are quite moderate. No open flames are used. The only combustible materials to be found in the process box at any time are the required electric

insulation, manipulator boots, polyethylene reagent bottles and cloth swabs used for minor decontamination. These are present in very small quantities, generally have high ignition temperatures, are non-explosive and even if any of them could become ignited the total energy production is not great.

12.3.3 Radiolysis of Pool Water

The storage of the encapsulated sources in the pool will result in some radiolysis of the pool water. The beta energy of the strontium-90-yttrium-90 chain is entirely dissipated within the capsules, but gamma energy produced as bremsstralung enters the water. In the following calculation, correction has been made for self-absorption within the capsule. A G factor of 0.25 molecules per electron volt has been used.

The total bremsstrahlung energy generated per curie per hour is obtained by integrating the energy yield spectrum:

E	Yield Photons/dis	E	Mev/dis
2.2-1.98	7.42×10^{-7}	2.1	1.56×10^{-6}
1.98-1.76	6.75×10^{-6}	1.87	1.26×10^{-5}
1.76-1.54	2.89×10^{-5}	1.65	4.76×10^{-5}
1.54-1.32	8.51×10^{-5}	1.43	1.22×10^{-4}
1.32-1.10	2.09×10^{-4}	1.21	2.53×10^{-4}
1.10-.88	4.37×10^{-4}	.99	4.32×10^{-4}
.88-.66	8.87×10^{-4}	.77	6.84×10^{-4}
.66-.44	1.82×10^{-3}	.55	1.0×10^{-3}
.44-.22	4.12×10^{-3}	.33	1.36×10^{-3}
.22-0	1.65×10^{-2}	.11	1.81×10^{-3}

$$\int E\nu(E)dE = 5.7 \times 10^{-3} \text{ Mev/dis}$$

For one curie: $2.1 \times 10^{+8}$ Mev/curie sec, or 2.1×10^{14} ev/curie sec

For one megacurie: 2.1×10^{20} ev/curie sec

$$\text{gm moles/sec} = \frac{2.1 \times 10^{20} \text{ ev/sec} \times 0.25 \text{ molecules/ev}}{6.02 \text{ gm moles/molecule}}$$

$$= 8.7 \times 10^{-5} \text{ gm moles/sec or } 8.14 \times 10^{-1} \text{ gm moles/hr}$$

or, 7 liters/hr

This rate of hydrogen generation is not high enough to present a hazard. The pool is covered by an expanded metal cover, and also by a sheet of transparent plastic. The latter is elevated so that air can circulate under it. The air circulation in this area of the facility is good so that there can be no accumulation of hydrogen.

12.4 Transfer Accidents

12.4.1 Cupola Rupture

The purpose of the cupola is to provide secondary containment of the HAPO cask connections during and subsequent to the transferal of the feed solution from the cask to the feed storage tank. The operator, wearing full protective clothing (Section 10.7) and an independent air supply, removes all lines and the thermocouple by working through the glove ports. If the cupola should be torn away during this process, any spilled or otherwise deposited feed solution would remain in the well of the cask. Even though the operator is safe in the absense of the cupola, its presence is justified by the fact that it does, if intact, prevent any release to the surrounding area, that would require cleaning up.

12.4.2 Feedline Breakage

As stated in the process description, subsequent to the connection of all lines and the thermocouple to the HAPO cask, no personnel are in the isolation room. The process from dissolution on is carried out remotely. The strontium solution is vacuum drawn to the feed storage tank through the feed line. Unless the supports fail and the line breaks simultaneously, only a minor spill can occur, the major portion of the solution running back into the cask or being drawn to the feed storage tank. If the feedline should break at the point where it goes into the isolation room wall and if, in addition, the line supports

should fail, allowing the line to fall to the floor, then worst-case conditions would be realized. The greatest length that could extend from the HAPO cask to the floor is 8 feet. The inside diameter of the line is 0.275 inch and the solution concentration is a maximum of about 3 curies/cm^3. Thus a maximum of

$$(\pi r^2 h\ cm^3)(3\ curies/cm^3) = \pi(0.1375)^2(8 \times 12)in^3 \times 16.39\ \frac{cm^3}{in^3}$$

$$\times 3\ curies/cm^3 = 280\ curies$$

is released to the floor of the isolation room. As the process is TV monitored, any such release and its extent could be immediately determined. If the maximum release occurs, water dilution will be necessary before manual clean-up (as described in waste hold tank leak section) is initiated.

12.4.3 Capsule Transfer from Cell 5 Storage to Storage Pool

12.4.3.1 Cask or Capsule Rupture During Transfer from Cell to Pool

During transfer of the cask, on a dolly, the dolly will be pushed and guided by trained operators over a smooth, uninterupted, concrete floor from Cell 5 to the service area.

During transfer of the cask by the 15 ton capacity service area crane, the cask will be suspended not more than 15 feet or less above the service room floor as it moves across the service area to the pool. While all handling and movement will be performed by skilled operators, a human error or

mechanical failure could result in the dropping of the cask in the area between Cell 5 and the pool.

This cask will be constructed with a steel inner and outer jacket. The inner jacket will be at least 1/4 inch thick and be bonded to the lead so that significant deformation cannot occur if the cask is dropped. The cask cover will be secured to the cask body by a steel pin of at least 1/2 inch diameter to prevent disassembly in case of impact. Thus it is considered incredible for a capsule to become dislodged and crushed or significantly deformed by the cask.

Having established the above criteria for the transfer cask, it is apparent that the maximum load on a capsule will be its own impact force. While the cask will be fastened in a manner to preclude disassembly, the components of the cask will probably not be rigidly connected. Each component will react essentially, as an independently impacting body. So, similarly, will the capsules react. This means that except for the differences in material characteristics between the cask and the floor the impact loads on a capsule impacted within the cask would be the same as the impact loads on a capsule dropped independently. In practice, the bottom of the cask will probably be a better energy absorbing medium than the floor, so that a capsule contained in the cask will be subjected to less stress than one dropped separately.

Using $v = \sqrt{2as}$ it is calculated that a capsule dropped from 15 feet will impact with a velocity of 31 ft/sec. The average weight of a powder capsule is about 5.21 pounds so that its kinetic energy at impact is very nearly 80 ft-lb. The lack of engineering data and correlations for the analysis of containers under impulsive loads precludes a detailed analysis of the stress imposed on the capsule for all attitudes of impact. That the capsule will not rupture under 80 ft-lb impact can be inferred, however, from a calculation of the total energy which the outer container can absorb without rupture. This is simply the area under a standard tensile stress-strain diagram for the container material multiplied by the container volume. The area under the stress-strain curve for AISI-316 steel is 47,000 in. lbs/in^3 and the outer container volume is 6.095 in^3. The container should be capable of absorbing up to approximately 20,000 ft-lbs without rupturing. Since the impact energy under question is only 80 ft-lbs it is clear that the capsule would not be ruptured by a 15 foot drop onto a concrete floor.

12.4.3.2 Capsule or Pool Damage by the Cask

Dropping the cask into the pool would impose approximately the same load on the capsules in the cask as dropping on the service room floor and is, therefore, no more hazardous. Dropping of the cask upon capsules already in the pool is not credible since the capsules will be stored around the periphery on three sides of the pool with the fourth side being

kept free of capsules. The cask will always be transferred across this side of the pool.

It has not been possible to determine if a dropped cask would crack the pool floor. Consensus of opinion, based on the pool design, is that it would not. If the floor were to crack, however, it is believed that the resultant leakage rate would be small and, therefore, not represent a hazardous condition.

12.4.3.3 Capsule Melting

The total weight of strontium fuel and steel in each capsule is less than 6 lb. The specific heat of fuel and capsule is approximately 0.12 BTU/lb.°F. The temperature rise, assuming adiabatic conditions would be:

$$t = \frac{7.4 \text{ BTU/min}}{6 \text{ lb} \times 0.12 \text{ BTU/lb°F}} = 10°\text{F/min.}$$

This is well below a rate of rise that could cause thermal shock.

An alternate cask is available in which six capsules may be transferred. The most severe heating will occur with six capsules contained in the cask. The maximum heat output per capsule is 130 watts and the cask will be approximately 10 inches ID by 30 inches OD. If the cask is taken as lead only, the inner surface will be raised only a few degrees Fahrenheit above ambient. Assume only radiation loss of heat by the capsules (conservative, since convection will also remove heat). If one-half the lateral surface of the six capsules is taken as the radiative surface and an emissivity of 0.3 is assumed for

capsule and inner cask surface, the maximum surface temperature achieved on the capsule is less than 100°F. Since this is well below the melting point of stainless steel (2550°F), there is no danger of capsule melting.

12.5 Storage Accidents

12.5.1 Cell 5 Storage

The capsules that are stored in Cell 5 are cooled by the cell air flow. Since there is an auxiliary cell exhaust system, it is not considered credible that the capsules would be without cooling. If the normal exhaust system should fail, it could be repaired while the auxiliary system maintained the air flow.

The analysis of the accidental dropping of a capsule (Paragraph 12.4.3.1) showed that a capsule could not be damaged by a fall from 15 feet so, since the cell has a 12 foot ceiling, a drop in the cell could not damage a capsule.

12.5.2 Pool Storage

12.5.2.1 Capsule Leakage During Storage in the Pool

Every capsule is doubly contained and leak-checked before removal from Cell 5. However, if both the inner liner and outer container of a capsule are damaged during transfer or installation in the pool, a leak could develop. Such a situation is extremely improbable but is remotely credible.

The presence of a breached capsule would be promptly detected during one of the frequent gross beta count

analyses of the pool water and/or as a result of detection by the continuous liquid flow type monitor probe. Furthermore, a device which is capable of locating the leaking capsule is a permanent part of the storage facility. This device consists of a can, open at one end, which fits over the fuel capsule. Flexible tubing, attached to the other end, is connected to a pump which draws water from immediately around the capsule through a liquid flow counter. Available liquid flow counters of the continuously monitoring type are capable of detecting concentrations as low as 10^{-7} µc/cc.

The pool is filled from the 2-inch main pool water supply system. A 2-inch overflow pipe terminates one foot below the top of the pool and connects with the suspect drain system. Thus, it is not possible for any water from the pool to enter uncontrolled drainage or sewage systems.

12.5.2.2 Failure of the Pool Water Circulation System

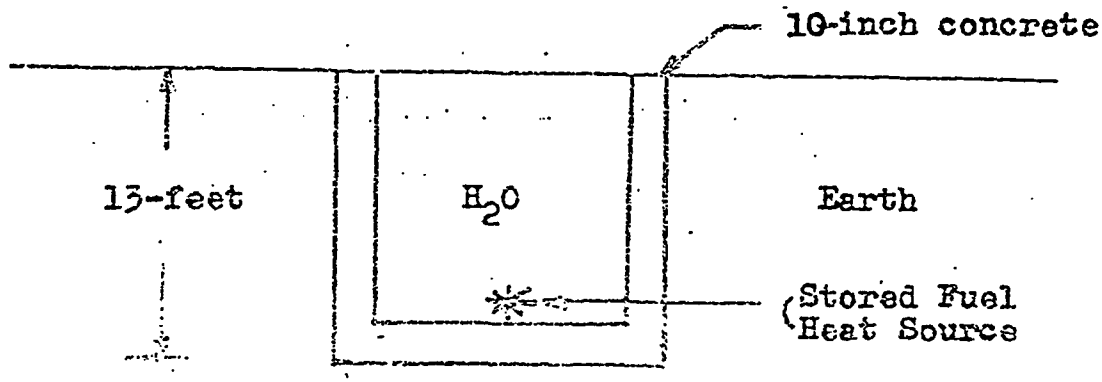
The clean up system for the gamma pool consists of a stainless steel closed circuit system which runs from the gamma pool four and one-half feet underground to a shielded room in the mechanical equipment room. Access to this room is through a separate locked door. The pool water recirculating system is enclosed by three walls of concrete blocks, the building outside wall making up the enclosure. The 3/4-inch plywood top and concrete block walls have a smooth nonporous finish painted with Phenoline 300 or its equivalent. Equipment in the cleanup

room consists of two circulating pumps rated at 5 and 20 gpm and two resin beds and two 10-micron filters in parallel. Each of these resin beds is so designed that the valves may be closed to one bed and the complete filter unit, if necessary, can be removed and replaced. Only the resin may be replaced if desired.

If the water circulation system for the storage pool fails, the temperature of the water will increase, since there will be heat transferred out of the pool through the walls and to the air above the pool, an equilibrium temperature will be reached that depends on the activity stored in it.

The storage pool at Quehanna is 13 feet deep with surface dimensions of 8 x 10 feet. The walls are made of 10 inches of concrete. The stored material acts as a constant heat source to the water. Heat is lost from the water in two ways.

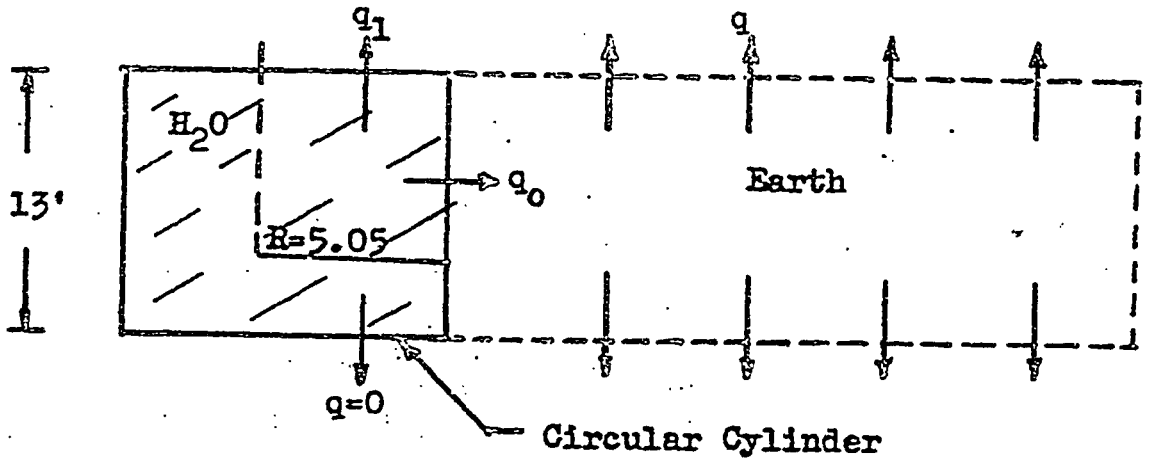
1. Heat is conducted through the concrete walls and into the surrounding earth.
2. Heat is transferred by convection from the upper surface of the water to the air above the pool.



The analytical model chosen to solve the heat transfer problem is that of a circular cylinder. The dimensions of the cylinder are chosen so the surface area of the cylinder is the same as that of the actual pool and the depth is the same.

The assumptions used to simplify the problem are:

1. The air above the pool is still. It is at atmospheric pressure with a temperature of 70°F.
2. Since there will be natural mixing of the heated water, the water is assumed to be the same temperature throughout.
3. No heat is lost through the bottom of the pool.
4. The thermal conductivity of the earth is K = 1.1 BTU/hr ft°F (Reference 12.10). This is the conductivity of the sandstone which is found in the Quehanna area.
5. The cooling affect of the evaporation of water from the surface is neglected.
6. The heat loss through the walls is approximated by calculating the heat loss from an infinitely long fin of earth extending radially from the pool. The fin shape is that of an annular disk.



The results of this calculation are shown in Figure 12.9. It is found that for about 800000 curies stored in the pool the equilibrium temperature reached is 150°F. At this temperature the maximum evaporation rate is about 10 gal/hr. A heat exchanger will prevent the temperature from exceeding 150°F even with 5 megacuries stored in the pool.

A second calculation was made for the rate of evaporation with air circulation over the pool.

The results of the calculations are:

Velocity of Air (ft/min.)	Water Loss (gal/hr.)
0	6.62
10	6.88
60	8.35
120	10.00 = maximum

12.5.2.3 Total Loss of Pool Water

A total loss of pool water, resulting from any sequence of events, is not considered to be credible. The entire water purification and circulation system is in a closed cycle, physically located above the normal water level of the pool. The slow loss of water through a crack in the concrete is

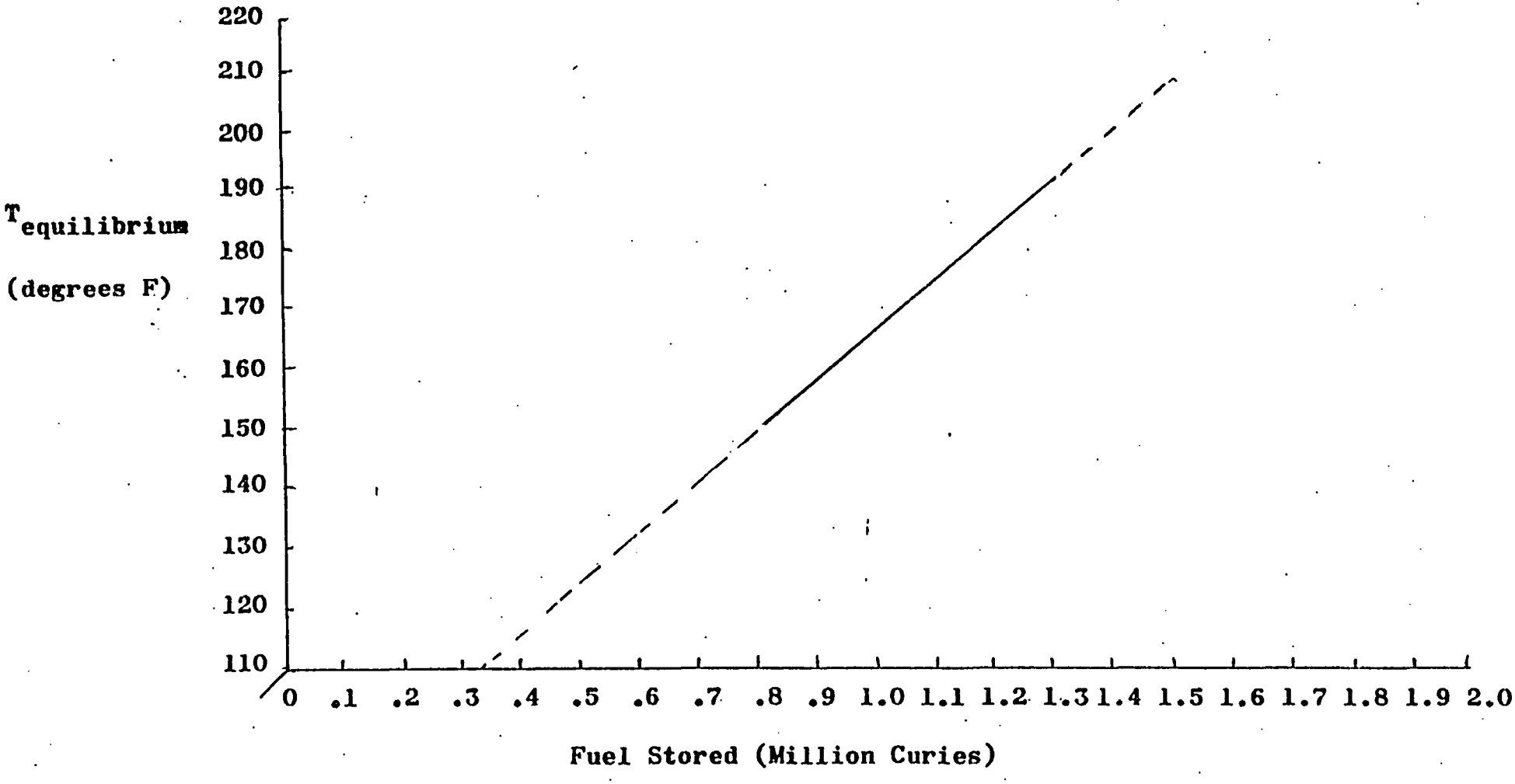


Figure 12.9 Equilibrium Temperature vs. Fuel Stored

possible. The area and the pool are under 24-hour surveillance by facility personnel. In addition, demineralized water is made and is available adjacent to the pool. Thus, the pool water level will be maintained at proper level and immediate response would be given to correction of the source of leak.

12.5.2.4 Accidental Falls into the Pool

The probability of such an accident is extremely remote. A three-foot high concrete rail surrounds the pool and it is covered except during actual transfer and leak testing operations.

12.6 Air Handling Analysis

After considering the possible malfunctions of the ventilation system which might occur during the operation of the plant, the following two cases were taken as representative. They include situations which arise from a malfunction of instruments and the operating error of the personnel.

12.6.1 Instrument Malfunction

In examining the possible ways for a pressure reversal to occur due to instrument malfunction, the following case was considered.

The normal exhaust fan for Cell 4 (E-6) was considered to have failed. This would only present a problem if the differential pressure switch across this fan would malfunction. Normally, the loss of pressure change across the fan would automatically close the damper in the normal cell exhaust

duct, open the damper in the auxiliary cell exhaust duct, start the auxiliary cell exhaust fan and an alarm would signify the stopping of the normal exhaust fan (see Figure 6.2). Also, the loss of air flow in the normal exhaust duct would cause the gravity backflow damper to close in that duct. It was considered that the differential pressure switch failed to acknowlege the loss of pressure change across the normal exhaust fan E-6. The auxiliary cell exhaust system would not come on, nor would the motorized damper in the normal cell exhaust duct close. Also consider that the gravity backflow damper had stuck in the open position. The result of this series of highly unlikely failures of equipment would be that the cell exhaust duct from Cell 4 would be open and no fan would be operating in that duct.

The back pressure from the friction and inertia losses in the stack was calculated to be 0.151 inches of water. This back pressure plus the higher pressure in the exhaust duct on the way to the stack from the other cells would cause a nominal backflow toward Cell 4 along the normal cell exhaust duct. The pressure drops across the two absolute type filters and one roughing filter in series in this duct would reduce the back pressure seen by the cell. The backflow would cause the pressure in Cell 4 to slowly start to rise. The gauges measuring the pressure difference between the cell and the operations area would show the pressure differential reduction and the auxiliary cell exhaust system would be started.

The result would be, even after the highly unlikely series of instrument failures, that the auxiliary cell exhaust system would return the pressure differential to normal with no resulting pressure reversal. The operating personnel would immediately check the normal cell exhaust fan and damper system since, even though the instruments did not show the reduction in pressure differential across the fan, the starting auxiliary exhaust system would indicate that the normal exhaust fan was not in operation.

12.6.2 Operating Personnel Error

In examining the possible hazards created by operator errors, the following case was considered.

To change a manipulator boot the manipulator must be removed from the cell wall. While the manipulator is out of the cell wall there is an 8-inch opening which leads from the operations area into the cell. During a normal boot change, the old boot is left in place while the new boot is pushed through the opening. Therefore the 8-inch opening is covered at the process box end by the old boot. A special tool is used to hold the flat spring (see Figure 9.4) compressed while the new boot is moved through the cell opening. When the new boot is lined up, the old boot is pushed off and the flat spring is released so that the new boot is in place. If the operator should accidently misjudge the alignment or somehow drop the new boot as well as the old boot into the process box, there would

be an open path leading directly into the process box.

The resulting air velocity through this opening was calculated to be over 3800 feet per minute when the cell and process box exhaust systems are in operation. If, for some unlikely reason, both the normal and auxiliary cell exhaust systems should fail leaving only the process box exhaust in operation, the velocity is over 280 feet per minute. These velocities are high enough to insure that no upstream diffusion of contamination could occur.

12.7 Process Vessel Leaks

12.7.1 Feed Storage Tank Leak

The feed storage is located in the cell annex of Cell 4 flush against Cell 3 isolation room wall and Cell 4 wall. The tank is designed with a safety factor of five or more. It is leak tested at a pressure of 100 psi for 4 hours. All seams are Heliarc welded and the chance for a leak is indeed remote. If, however, a leak should occur, in keeping with the practice of double containment, a watertight chamber which is constructed of 1/4-inch stainless steel surrounds the feed storage tank. The stainless steel chamber will have a capacity greater than the feed storage tank. A stainless steel line (normally capped at termination) runs from the bottom of this chamber into the cell. It would be used to carry the spilled feed solution into the cell in the event of a leak. Another line is provided to make possible the washing of the feed storage

tank exterior.

Cooling the liquid presents no problem as the stainless steel cooling coils spiral about the exterior of the tank and are in direct contact with the liquid. If the cooling from one set of coils is insufficient, a second set parallel to the first can be operated in addition. The release of activity-bearing vapor resulting from such an occurrence is the maximum credible accident and is considered later.

12.7.2 Waste Hold Tank

The waste hold tank is located in the isolation room of Cell 3. Before any solution is transferred to the waste hold tank it is sampled and tested to be sure the activity is low (see Paragraph 3.1.4). This assures that a minimum of fuel material is lost to waste, and that the activity level of the waste hold tank is low.

The waste hold tank is made of 1/4 inch stainless steel and all seams are Heliarc welded. The tank has been pressure tested to 100 psi for 4 hours.

The waste contained in the tank is of low enough activity to allow manual clean-up in case of a release. The operator would don full protective clothing as described in Section 10.7 and mop up the spill using long-handled tongs and an absorbent material. The contaminated absorber is deposited in a shielded container and the container is stored in the waste storage building. As in the case in any type of accident,

the area is sealed off and the Health Physicist conducts a survey to determine the extent of the contamination.

12.7.3 In Cell Tank Leaks

Cell 4 contains the filtrate tank, capacity 75 liters; the vacuum surge tank, 50 liters; the metering tank, 5 liters; and the precipitation vessel, 50 liters. The latter two are in the process box. All of these tanks are constructed of stainless steel, are Heliarc welded and have been tested to 100 psi for four hours. Leakage of any of these is improbable but in case it should take place the shielding due to the cell wall prevents any direct radiation hazard. Clean-up, decontamination and repair within the process box would be carried out by use of the manipulators. The tanks that are not in the process box cannot be reached by the manipulators so repair would be carried out by other remote means.

12.7.4 Hydraulic Oil Leakage

The hydraulic fluid used in the press is Monsanto Pydraul which is composed of phosphate esters and chlorinated hydrocarbons. These liquids have open cup flash point temperatures of approximately 470°C and fire point temperatures of 675 - 725°C. Therefore, in order for the fluid to flash, it must be completely vaporized and must be subjected to a temperature of at least 700°C.

If a minute hole should form in the hydraulic pressure line during the power stroke of the press, it is conceivable

that a portion of the hydraulic fluid could be sprayed out in a vaporized mist. The furnace is the only object in the process box which will even approach the required temperature for flashing the oil. The furnace is surrounded on five sides with panel coil coolers so that the only point of access for oil spray would be the 13-inch high cut out on one panel which is used for the electrical connections for the furnace. However, this area is protected since the hydraulic lines, which are designed with a high margin of safety, enter the 4A section of the process box on the side away from the furnace. The placement of these lines is such that should the line break or spring a small high velocity leak at the weakest point, the connector, the precipitation tank (T-33) would be between the break and the exposed portion of the furnace. For the above reasons the burning of the hydraulic fluid in the process box is not considered to be credible.

12.8 Activity Releases

12.8.1 General

12.8.1.1 Meteorological Models

Sutton's diffusion equations (Reference 12.1) have been used in previous analyses of potential release hazards for the Quehanna site (References 12.2, 12.3) and their use is continued in this study.

The equation for the concentration of a radioactive plume for a continuous point source release is

$$X = \frac{2Q}{\pi u C_y C_z d^{2-n}} \exp\left[-\frac{1}{d^{2-n}}\left(\frac{y^2}{C_y^2} + \frac{z^2}{C_z^2}\right)\right]$$

where

X = cloud concentration at ground level curie/meter^3, equivalent to μc/cc)

Q = activity release (curie/sec)

C_y = cross-wind diffusion coefficient (meters$^{n/2}$)

C_z = vertical diffusion coefficient (meters$^{n/2}$)

u = wind velocity (meters/sec)

d = distance from release point (meters)

n = atmospheric stability parameter

y = crosswind distance from centerline of cloud (meters)

z = vertical distance from ground to centerline of cloud (meters)

Calculations are usually made for ground level under the centerline of the cloud in which case the y^2/C_y^2 term in the exponential drops out.

Two meteorological situations shown in Chapter 2 to be appropriate to the site have been examined. The first of these which tends to prevail during the day is a neutral condition with approximately adiabatic lapse rate. The second which occurs frequently at night, and in the early morning, is a stable inversion condition. The values of the parameters as used for the two models are:

Parameter	Model	
	Neutral	Inversion
C_y	0.40	0.40
C_z	0.40	0.05
n	0.25	0.55
u	5	3

It has been assumed that any discharge to the environment takes place from the stack which has a height of 15.25 meters (50 ft); consequently this value has been used for z.

12.8.1.2 Inhalation Doses

In an airborne release of radiostrontium the principal dose to a receptor in the cloud path is incurred by inhalation. The activity inhaled is calculated directly.

$$I = XBt$$

where

I = activity inhaled (microcuries)

B = breathing rate (cc/second)

t = exposure time (seconds)

It is assumed that the "standard man" inhales 20,000 liters (2.0×10^7 cc) of air in 24 hours. The average breathing rate is consequently 232 cc/sec. However, it is usually assumed that half of the 20,000 liters is inhaled during the more active 8 hours of the day. The breathing rate during this period is consequently 347 cc/sec (Reference 12.4).

The most significant assessment of the potential radiation hazard from inhalation is obtained by a calculation of the integrated lifetime dose to the critical organ accruing from the activity inhaled. This may be calculated by the method proposed by Burnett (Reference 12.5). The applicable equation is:

$$D' = \frac{73.8\, f_a \Sigma EFE(RBE)n\, T_E}{m}$$

D' = lifetime dose for activity inhaled, (rem/μc)

f_a = fraction of activity inhaled that remains in the critical organ

Σ FE(RBE)n = energy per disintegration delivered to the critical organ, considering the relative biological effectiveness (RBE) of the radiation, and n the relative damage factor for nuclides deposited in the bone (Mev).

T_E = effective half life of the activity in the critical organ (days)

m = mass of the critical organ (grams)

For the inhalation of strontium-90 a distinction should be made between soluble and insoluble forms. The bone is the critical organ for the soluble form and the effective halflife is long. For the insoluble form the lung is the critical organ and the residence time of the activity is relatively short. In the subsequent calculations the values used for the parameters for strontium-90 with its daughter product, yttrium-90, are given below (from Reference 12.4).

Parameter	Insoluble	Soluble
f_a	0.12	0.12
Σ FE(RBE)n	1.1	
T_E	120	6.4×10^3
Critical organ	Lung	Bone (including marrow)
Mass	1000	10000
D' rem/μc	1.18	31.1

12.8.1.3 Areas of Potential Exposures

Calculations have been made for the two selected meteorological models of the plume concentration, activity inhaled and integrated lifetime dose for three distances from the Radioisotope Pilot Plant. The first of these, 4800 meters, is the approximate distance to the nearest point on the perimeter of the exclusion area. This is a point not easily accessible and is not normally occupied; it may be visited occasionally by hunters in season. The nearest approach of unrestricted roads is about 8000 meters. The nearest occupied village or town, Sinnemahoning, is distant about 16,000 meters.

12.8.2 Releases to the Environment

12.8.2.1 Maximum Credible Accident

It is assumed that in the future the Radioisotopes Pilot Plant will receive shipments in the HAPO I cask of 500 kilocuries of Strontium-90 and that up to 750 kilocuries may be held in the feed storage tank. This tank is located in a stainless steel chamber in the cell annex of Cell 4. Refer to Chapter 3 and the detached drawings. This tank is made of stainless steel and has fittings and connecting plumbing for connection to the HAPO Cask and to the metering vessel. A rupture of the feed storage tank permitting a large quantity of the strontium nitrate solution to leak into the stainless steel chamger is highly improbable but will be considered to be credible. The strontium nitrate in solution is not volatile. It is

thought that the dual set of cooling coils is sufficient to maintain the feed solution temperature below boiling. But it is assumed that with boiling due to self-heating a fraction of the activity becomes airborne in aerosol form. This fraction is pessimistically assumed to be 0.1%; thus it is postulated that 750 curies can be released. If there should be a failure of one roughing filter and three absolute type filters this activity could be released into the ventilation system and discharged through the stack. It is estimated that there is essentially a complete change of air in the building in about 13 minutes. The rate of release of activity to the environment is assumed to be a continuous uniform release of the 750 curies in 780 seconds, or Q = 0.962 curie/sec.

Thus the maximum credible accident is postulated to be the result of six sequential or simultaneous and scarcely related accidents of varying credibility.

The plume concentrations, activity inhaled and lifetime dose for various distances and the two selected meteorological models are presented in the following table. The greatest dose received, that at 4800 meters under inversion conditions, is 187 rems. This is, of course, a significant radiation dose, but it should be emphasized that this is the total integrated dose received over many years. The

	NEUTRAL CONDITIONS			INVERSION CONDITIONS		
Distance	Plume Conc.	Activity Inhaled	Lifetime Dose	Plume Conc.	Activity Inhaled	Lifetime Dose
d	X	I		X	I	
meters	μc/cc	μc	rem	μc/cc	μc	rem
4800	2.76×10^{-7}	5.05×10^{-2}	1.57	3.29×10^{-5}	6.01	187
8000	1.130×10^{-7}	2.04×10^{-2}	0.635	1.960×10^{-5}	3.54	110
16000	3.37×10^{-8}	6.09×10^{-3}	0.19	8.18×10^{-6}	1.48	46

dose received during the first year is 3.95% of the total, or 7.4 rem, and this quantity decreases progressively each year. It is not expected that clinical symptons would ever be observed in an individual with this exposure.

It should be emphasized that if even one absolute-type filter in the system remained inviolate the plume concentrations at all points would be decreased by a factor of at least 100.

12.8.2.2 Other Accidents

It is assumed that the largest quantity of the strontium nitrate that will be withdrawn from the feed storage tank for batch processing is 25,000 curies. This quantity will be measured in the metering tank and transferred to the process vessels. These transfers are by suction so that any failures due to line leakage or rupture would release only minimal quantities of liquid. After transfer to the process cess vessel there is multiple containment, i.e. the process vessel, process box and cell. It is difficult to conceive of any accident in the processing of the material whereby any large fraction of the activity in the solution could become airborne. For release to the environment there would have to be simultaneous or sequential failure of four absolute type filters. Even if there could be release of as much as 1% of the material, the activity released would be 250 curies and the consequences would be less severe than for the maximum credible accident examined above.

12.8.3 Releases Within the Building

12.8.3.1 General Consideration

The greatest potential hazard to the operating personnel of the Pilot Plant arises from accidents that might release airborne particulate material into the operations area. The situation that appears to be credible is the rupture of a manipulator boot. This hypothetical accident will be discussed in the following analysis.

It is assumed that the largest quantity of strontium titanate powder (or other fuel form) that may be in process in the process box 4A at one time is 150,000 curies. Of this quantity not more than 50,000 curies will be in a loose form subject to becoming airborne. The remainder will have been pelletized, or at least compressed in the way of producing a pellet.

The alundum filter crucible serves as the container in the furnace so that the only pouring of dry powder is into the pellet press.

It is extremely difficult to make a estimate of the quantity of dry powder that could become airborne in the worst circumstances. Various approaches consider the mass concentration of known aerosols and the ratio of exposed surface to the mass of the powder. Postulation of 0.1% as the maximum quantity to become airborne appears to be highly pessimistic. Thus if 50 curies become airborne in process box 4A that has a volume of 9.15m^3 (323 ft^3) the concentration is 5.46 uc/cc.

12.8.3.2 Rupture of Manipulator Boot

A 1/2 inch annular gap exists between the manipulator support tube and the device which clamps the manipulator boot to the wall of the process box. This gap permits the boot to breathe cell air internally as the manipulator is moved in and out. If the pressure in the boot, or in the process box if the boot is ruptured, is considered as rising above the cell pressure, than air is expelled through the gap into the cell.

If a manipulator boot is torn, it is conceivable that, if the manipulator is pushed rapidly into the box, the boot will be filled to some extent with contaminated air from the box, although in practice most of this air will come from the air at higher pressure in the cell. If the manipulator is now withdrawn rapidly, portions of the contaminated air will be expelled into the cell and into the operating area, and a portion will be returned to the box. For the purposes of this analysis, the worst possible case is assumed: the boot is filled only with contaminated air and, once filled, the boot expels the contaminated air only to the cell and operating area. The largest boot employed varies uniformly in average diameter from 10 inches to 4 inches and has a maximum working stroke of 45 inches. It encloses a manipulator arm 4 inches in diameter. Thus, the maximum volume of air pumped is 0.74 $ft.^3$ Based on the steady state flow rate figures computed on the basis of relative opening areas, about 90% of this will flow into the cell

and 10% into the operating area if the manipulator can be moved quickly enough to raise the pressure in the boot to greater than the operating area pressure. This would be almost impossible to achieve in practice, but again for the purposes of the analysis it is assumed to occur. Therefore, 0.074 ft^3 of air would be expelled into the operating area. This 0.074 ft^3, or 2100 cc would contain 1.15×10^4 microcuries. If it is assumed that this activity becomes uniformly dispersed through the volume of the operating area, 18,930 ft^3 or 536 m^3, the concentration becomes 2.24×10^{-5} μc/cc. This is a factor of 4500 times the occupational MPC for insoluble strontium-90. The area monitoring system is capable of detecting levels of the order of the MPC in about one or two minutes, and thus the release of the stated amount of activity would be detected almost immediately, the alarm would be sounded and face masks would be donned. If it is further assumed that the cell operators would breathe the contaminated air for 20 seconds at the 347 cc/sec rate, before the alarm is sounded, the activity inhaled is 0.155 microcuries. The corresponding lifetime dose due to strontium-90 in the insoluble form is 0.185 rem. In contrast to the inhalation of the soluble form, as previously discussed, this dose would be received substantially in the first year. Even if the dispersion of the activity is only into one-tenth of the volume of the operating room, the situation is still tolerable. If this postulated dry release were

of a soluble form, the corresponding lifetime dose would be about 4.8 rem.

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STRUCTURAL AND THERMAL EVALUATION OF SENTINEL 100F

INSD-3080

JUNE 1985

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PREFACE

R4

This report consists of a consolidation of relevant material originally submitted by Teledyne Energy Systems (TES) over the period August 10, 1971 through January 19, 1972 for purposes of obtaining a transport license for the SENTINEL-100 F Radioisotope Thermoelectric Generator (RTG). By this submittal, TES requests an extension of Certificate of Compliance No. 5862 for transport of the SENTINEL-100F unit.

This consolidated report was prepared in accordance with current U. S. Nuclear Regulatory Commission requirements for a single consolidated report. The information contained herein is that originally submitted over the above cited time froma (1971-1972) which addresses the specific requirements for the transport package of that period. No new analysis is presented. Text added in this issue (designated R4), including this preface, is provided only for purposes of explanation or clarification.

References on the current Certificate of Compliances (dated September 6, 1983) are as follows.

Isotopes, Inc., application dated August 10, 1971. Supplements dated:

a. September 24, 1971
b. October 22, 1971
c. November 30, 1971
d. December 20, 1971
e. January 19, 1972

Supplements (a) and (b) provided revised and additional structural analyses. These revisions are indicated by designations R1, R2, and R3 in the text of the report. In particular, Appendix C provides additional analysis requested by the licensing agency regarding loading of the bolts which attach the shield lid to the body of the biological shield given impact from the 30 foot drop. The analysis is provided to show that the heat source (consisting of the fuel capsule, shield body and lid) will remain intact under this environment. An explanatory note (R4) has been added to this appendix.

Supplements (c), (d) and (e) provide additional thermal information. TES documents related to the original licensing effort indicate that the licensing agency intended to have a third agency (ORNL) conduct separate thermal response analysis for the standard fire. Apparently, the additional thermal information of these supplements was provided in support of this intent. All relevent information in these supplements along with the letter requesting the information have been added to Appendix B of this report. Supplement (d) included a copy of the users manual for the thermal analyzer program used by TES for the thermal analysis reported in Appendix D - namely: INSD-3084, "User's Manual for the Thermal Analyzer Program TAP-3," compiled and edited by R. Hannah, November 1971, Teledyne Isotopes. This 55 page report has not been included with this submittal. The report is available at TES and may be furnished on request.

Construction drawings which define the transport package (as listed on the current Certificate of Compliance) have been included with the report. The included drawings are listed in Appendix D.

To reiterate, the current version of the report consists of a complilation of relevant information originally submitted over the period August 10, 1971 through January 19, 1972. Editorial remarks have been included for clarification. No new analysis is presented. The report addresses the USAEC, IAEA and DOT regulations which were in effect in the late 1971, early 1972 time period for transport of a Type B ( ) package. These conditions and requirements are summarized in the body of the report.

I. INTRODUCTION

The objective of this report is to substantiate the safety aspect of possessing and transporting a designated SENTINEL 100F Terrestrial Radioisotopic powered generator. The approach used to achieve the above objective was initiated with the listing of the safety design criteria as given in Chapter II. This is followed by a general description of the SENTINEL generator and a more detail description of the major components. The interstate regulations and conditions, dictated by the United States Atomic Energy Commission Title 10 and the Federal Register Title 49, which must be satisfied are delineated in Chapter IV. The response of the SENTINEL system (the generator and shipping pallet and/or the fuel capsule) to these requirements and conditions is given in Chapter V.

The regulations and conditions regarding the international transport of the SENTINEL generator were taken from IAEA Safety Series 6 and are discussed in Chapter VI along with the systems response to these additional requirements. Chapter VII summarizes the conclusions reached as a result of this study. Some analyses were conducted which were not required to satisfy any of the regulations or conditions but were made available as supplemental support data. The results obtained from these analyses can be found in Chapter VIII. The details of the structural analyses and thermal analyses are presented in Appendix A and B, respectively.

II. DESIGN CRITERIA

Safety design criteria were established for the operation, storage and transport of the SENTINEL 100F generator. These design criteria to which the generator package or fuel capsule (where specified) were designed are as follows:

(1) Ambient air temperature -40° F to + 130° F.

(2) The fuel capsule shall be capable of sustaining a hydrostatic pressure of 14,500 psi.

(3) Any combination of natural atmospheric pressure and humidity.

(4) The generator housing must have the structural capacity to sustain a seawater pressure at a depth of 2000 feet.

(5) The requirements imposed by U. S. A. E. C. Title 10 and D. O. T. Title 49.

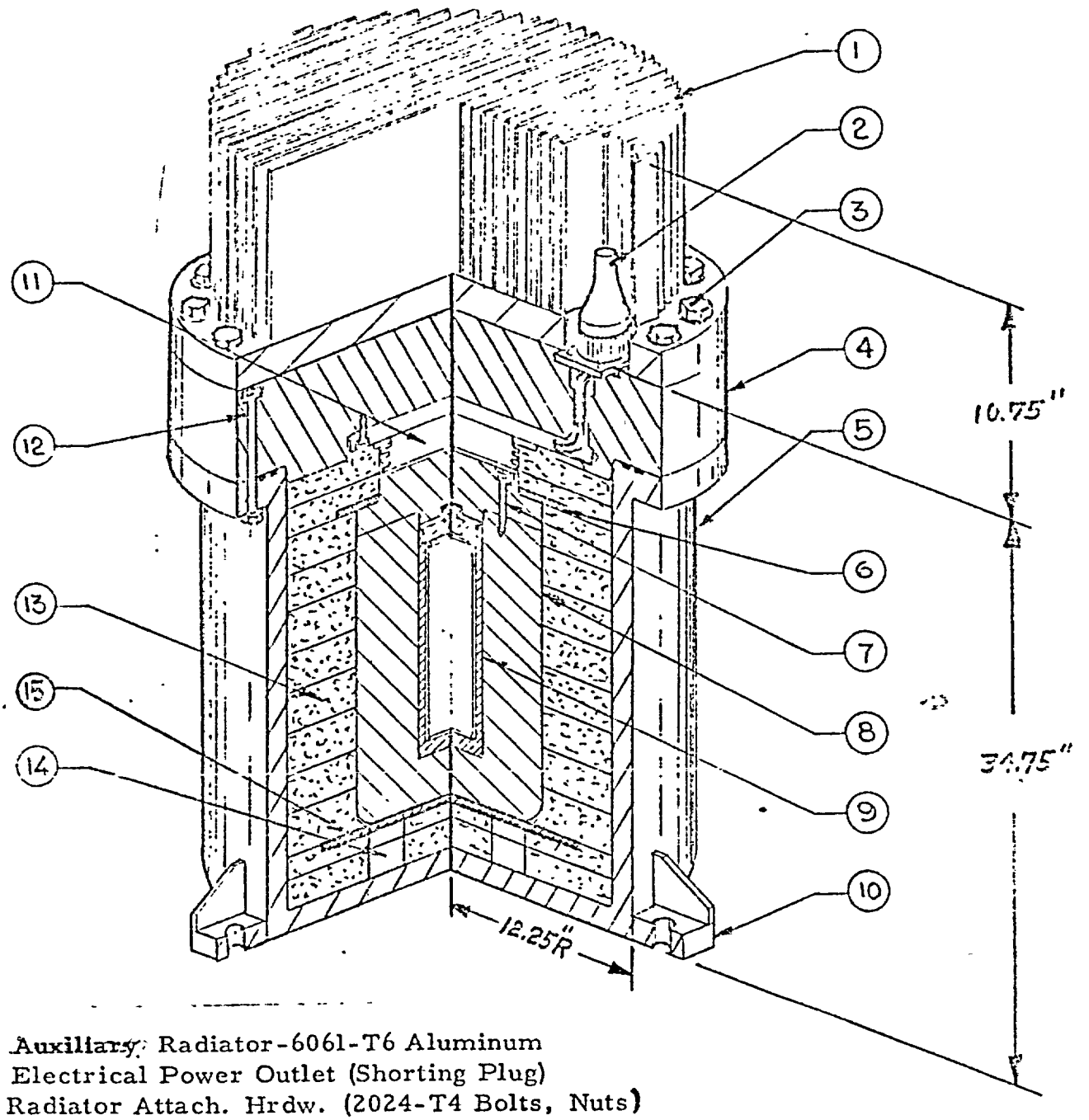
(6) Certification of conformance with applicable requirements of IAEA Safety Series 6.

III. GENERATOR DESCRIPTION

The SENTINEL 100F radioisotopic powered generator is shown in the cutaway sketch in Figure III-1. This design is basically an enlarged version of the SENTINEL 25F with minor modifications. The minor modifications consist of a larger size, a different material for the retaining ring (Inconel) and the addition of a load plate under the tungsten biological shield.

The SENTINEL 100F, as shown in Figure III-1, is 45.5 inches in height and has a base diameter of 24.5 inches (not including the mounting pads). The generator weighs approximately 2600 pounds. Details of the generator can be found on the top assembly drawing (Reference 1). The strontium 90 titanate pellets are housed in a stainless steel liner. The liner is contained by the fuel capsule which provides a positive seal. The fuel capsule is inserted into the tungsten biological shield and the shield plug is bolted into place. The load plate distributes the weight of the tungsten shield over the Min-K 1301 thermal insulation and the load bearing Glasrock. The tungsten shield is held in the horizontal position by the Min-K which is sized to fit within the aluminum housing. The retaining ring is used to preload the Min-K and dampen any vibration loads.

The generator is bolted to the pallet for transportation using four 3/4-inch bolts. A cage is provided which fits over the generator and attaches to the pallet. The cage precludes physical contact with the generator during transportation and storage. It is not required to meet structural requirements since safe transport is not dependent on the integrity of the cage.



1. Auxiliary Radiator-6061-T6 Aluminum
2. Electrical Power Outlet (Shorting Plug)
3. Radiator Attach. Hrdw. (2024-T4 Bolts, Nuts)
4. Lid Assembly-6061 T6 Aluminum
5. Housing Assembly-6061 T6 Aluminum
6. Retaining Ring - Inconel
7. Shield Bolt-CRES-A-286 (Plated)
8. Biological Shield-Tungsten Alloy
9. Fuel Capsule Assembly
10. Mounting Pad-6061 T6 Aluminum
11. Thermoelectric Module Assy
12. Lid Attach. Hrdw (2024-T4 Bolts, Nuts)
13. Thermal Insulation (Min-K 1301)
14. Load Bearing Insulation (Glasrock)
15. Load Plate - Inconel

FIGURE III-1, SENTINEL 100F GENERATOR

A. FUEL CAPSULE

The fuel capsule consists of a liner and strength member which were designed to contain the strontium 90 titanate fuel form under normal operational and specified accident conditions. The fuel capsule assembly along with dimensions are shown on Figure III-2. Details of the capsule assembly and components can be seen in Reference 2.

The liner, which houses the strontium fuel, is constructed from stainless steel tubing. The sole purpose of the liner is to facilitate handling of the fuel and may be eliminated at the discretion of the fueling facility. No credit is taken for any additional protection offered by the liner.

The fuel capsule structural member which houses the liner is machined out of bar stock. The liner is loaded into the fuel capsule and the cap is fusion-welded to give a positive seal. The fuel capsule material is Hastelloy C, Hastelloy C-276, or Uniloy HC to material specification AMS-5750. The details of the fuel, materials and assembly are covered in the SENTINEL 100 fuel and encapsulation specification, (Reference 3).

B. HEAT SOURCE

The heat source consists of the fuel, fuel capsule and a tungsten biological shield. The heat source measures 13.837 inches in diameter and has a length of 19.705 inches. The tungsten biological shield is given a hard chromium plating (4 - 6 mils thick) using a dip process prior to assembly. After the fuel capsule is inserted into the biological shield, the shield plug is put in place and securely fastened to the shield housing

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE III-2, FUEL CAPSULE ASSEMBLY

INSD-3080

with 3-1/2-20 UNF bolts (A-286) steel. The purpose of the tungsten shield is to provide uniform heat distribution and the radiation shielding required to meet the radiation safety standards. Details of the biological shield are shown in Reference 4.

C. GENERATOR HOUSING

The 6061 aluminum housing (T6 condition) forms the outer protective shell of the generator. Prior to the generator assembly the housing, heat sink and finned head are anodized and the housing and heat sink are finished with epoxy paint. The base of the generator housing has four aluminum 6061-T6 mounting pads for attachment to the shipping pallet.

D. SHIPPING PALLET AND CAGE

The shipping pallet used for the SENTINEL 100F is the same as was used previously with generators weighing approximately 4000 pounds. The pallet overall dimensions are 43 inches by 50.76 inches and is constructed from square structural steel tubing. Each of four bolts which attach the generator to the pallet is rated for 33,730 pounds tensile yield and 33,150 pounds single shear. Details of the shipping pallet can be found in Reference 5.

The shipping cage fits over the generator and assures physical separation from the generator. The shipping cage frame is constructed from 2 by 4 inch, No. 1 fir or pine. Wire mesh screen (2 by 2 inch) is attached

to the frame to prevent access to the generator. The base of the cage measures approximately 48 by 48 inches and has a height of 51 inches. A detailed description of the shipping cage can be found in Reference 6.

Specifically, use of the shipping cage provides a package which limits the exterior surface temperatures --- see Section IV, page 17. Its use is only required when the package is shipped as general cargo. R4

IV. INTERSTATE SHIPPING SAFETY STANDARDS

To transport the SENTINEL 100F specific conditions and requirements have to be satisfied. The SENTINEL 100F is considered a type B package and falls under the Group II classification as a special form material. The conditions and requirements the package must satisfy are covered by the following documents.

(1) Title 49 Code of Federal Register

(2) Title 10 Code of Federal Regulations

(3) International Atomic Energy Agency Safety Series 6

Covered in these documents are the normal transport conditions, special form requirements, shielding standards and hypothetical accident conditions. A study was made of the specific conditions which must be satisfied. Those which were found to be the governing cases or more severe events were selected for evaluation and are shown in Table IV-1.

TABLE IV-1, CONDITIONS OF TRANSPORT

Environment	Post Test Conditions
A. Normal Transport Conditions (Type B Package)	
1. Direct sunlight at an ambient temperature of 130°F in still air. 2. Cold - An ambient temperature of -40°F in still air and shade. 3. Pressure - Atmospheric pressure of 0.5 times standard atmospheric pressure. 4. Vibration - Vibration normally incident to transportation. 5. Water Spray - Keep entire surface (except bottom) wet for a 30 minute period. 6. Drop Test - 4 foot drop onto an unyielding surface at package critical angle. 7. Penetration - 40 inch drop of a 1-1/2 inch diameter steel cylinder weighing 13 pounds. Long axis of cylinder is perpendicular to the most vulnerable part of package. 8. Compression - A compression load equal to 5 times the package weight or 2 psi times the maximum horizontal cross section, whichever is greater. Load is applied at top and bottom of package in normal shipping position for 24 hours. 9. Meet the hypothetical accident conditions.	1. The reduction of shielding would not be enough to increase the radiation dose rate at 3 feet from the external surface of the package to more than 1,000 millirem per hour. 2. No radioactive material would be released from packages containing Type B quantities of radioactive material. The allowable release of radioactivity from packages containing large quantities of radioactive material is limited to gases and contaminated coolant containing total radioactivity of the package contents nor 0.10 curie of Group I radionuclides, 0.5 curie of Group II radionuclides, and 10 curies of Groups III and IV radionuclides, except that for inert gases the limit is 1,000 curies.
B. Hypothetical Accident Conditions	
1. Drop test - 30 foot drop onto unyielding surface at critical angle. 2. Puncture - 40 inch drop at critical angle onto vertical cylinder = 8 inches long, 6 inches in diameter with flat impacting surface whose edge radius is 1/2 inch or less. Cylinder is mounted on an unyielding base. 3. Thermal - 1475°F fire for 30 minutes with an emissivity coefficient of 0.9 and a package absorption coefficient of 0.8. Package shall not be cooled artificially for 3 hours.	1. The reduction of shielding would not be sufficient to increase the external radiation dose rate to more than 1,000 millirems per hour at 3 feet from the external surface of the package. 2. No radioactive material would be released from the package except for gases and contaminated coolant containing total radioactivity exceeding neither (i) 0.1 percent of the total radioactivity of the package contents; nor (ii) 0.01 curie of Group I radionuclides, 0.5 curie of Group II radionuclides, 10 curies of Group III radionuclides, 10 curies of Group IV radionuclides, and 1,000 curies of inert gases irrespective of transport group.

TABLE IV-1, CONDITIONS OF TRANSPORT (Continued)

C. Special Form

1. Drop Test - 30 foot drop onto a flat unyielding surface at critical angle.
2. Percussion - impact of a flat cylinder rod (1 inch diameter) weighing 3 pounds from a height of 40 inches onto the capsule which is supported by a lead sheet (Vickers #3.5 to 4.5) not more than one inch thick, supported by an unyielding surface.
3. Heating - 1475°F in air for 10 minutes.
4. Immersion - 24 hours in water at room temperature. PH6-PH8 water with a maximum conductivity of 10 micromhos/centimeter.

The capsule must retain its contents when subjected to all the performance tests prescribed in this section, and must not melt, sublime, or ignite at temperature below 1,475°F.

D. Shielding Standards

1. 200 mr/hr (maximum) at any point on surface of package.
2. 10 mr/hr at 3 feet from surface of the package.

E. Package Standards

1. The package lifting devices shall be capable of supporting 3 times the weight of the loaded package without exceeding the materials yield strength.
2. Failure at the lifting devices under heavy load shall not impair the containment or shielding properties of the package.
3. Tiedown devices - Without exceeding the yield strength of the package material, apply a static force to the center of gravity of the package with a vertical component equal to 2 times the weight of the package, a horizontal component along the direction the vehicle travels of 10 times the weight of the package and a horizontal component in the transverse direction of 5 times the weight of the package.
4. Load resistance - Simple beam supported at ends along any major axis, package shall be capable of withstanding a static load normal to and uniformly distributed along its length, equal to 5 times its fully loaded weight without exceeding the yield strength of the package.
5. External pressure - Containment vessel will suffer no loss of contents when subjected to an external pressure of 25 psig.

V. ENVIRONMENTAL RESPONSE

In the preceeding section, the environments were described according to (1) Normal test condition, (2) Hypothetical accident condition, (3) Special form material, (4) Shielding standards, and (5) Package standards. The purpose of this section is to show by analysis, test or relation to a more severe environment, that the fuel will be contained and radiation does not exceed 1000 millirem at 3 feet from the surface under all specified conditions.

The following describes the response of the generator to the environments in the sequence given in Table IV-1.

A. NORMAL TRANSPORT CONDITIONS

1. The environment on which this analysis was based (Item A.1) consisted of the generator on short circuit in direct sunlight at ambient temperature of 130°F in still air. Exposure of the generator to this environment results in a maximum temperature of 1493°F for the capsule structural member and 1279°F for the biological shield (see Appendix B). These temperatures will not cause any adverse effects on the safety aspects of the system.

2. The design of the generator and materials used eliminate any detrimental safety effects occurring by having the generator exposed to a -40°F temperature in still air and shade as described in Item A.2.

3. An atmospheric pressure 0.5 times the standard atmospheric pressure (Item A. 3) is far less severe than the case analyzed for the external pressure case given in Appendix A.

4. The vibration loads normally incident to transportation (Item A. 4) were not specified. In view of the far more severe requirements given in Table IV-1 and particularly the requirement given for the tiedown case, the vibration requirement was taken as a less severe condition.

5. The requirement given in Item A. 5 is of no concern since the generator was designed to sustain a seawater pressure at a depth of 2000 feet (See Appendix A).

6. A drop of four feet at the package critical angle on an unyielding surface as stated in Item A. 6 would not cause any damage which would effect the containment of the fuel or reduction in the biological shield (See Appendix A).

7. The energy available from a 13 pound cylinder dropping through a distance of 40 inches (520 inch-pounds) as described in Item A. 7 would at most cause a slight dent in the aluminum housing. The other impact cases are of a higher energy magnitude.

8. A compression load equal to five times the package weight applied to both the top and bottom of the package was found to be a less severe environment than the hydrostatic requirement (1300 psi) analyzed in Appendix A.

9. See section V-B for hypothetical accident cases.

B. HYPOTHETICAL ACCIDENT CONDITIONS

1. An analysis was conducted for the generator dropping 30 feet onto an unyielding surface at the generator's critical angle. The approach used was considered conservative in that no credit was taken for the impact capability of the generator aluminum housing. The results showed that the total energy capability of the insulation and shield (705,000 inch-pounds) is greater than that available from impact of the generator (620,000 inch-pounds) (see analysis in Appendix A). Additional analysis provided in Appendix C showed that stresses at impact on the shield lid attaching bolts are below their yield value. Therefore, failure of the heat shield will not occur nor will the biological shielding characteristics of the heat shield be impaired. R4

2. A 40 inch drop of the generator onto a 6 inch diameter cylinder would result in the load being spread over the thick walled aluminum housing. This case is of a much lower energy level than the previous case. Release of fuel or reduction in the radiation shield will not occur.

3. The 1475°F fire as described in Section IV will not cause fuel release or effect the radiation shielding characteristics of the heat shield. The analysis described in Appendix B was considered conservative in that the initial conditions were taken from the results obtained from the nominal test conditions (Item A. 1). The resulting maximum temperature prior to a 3 hour elapse time was approximately 1400°F for the shield and 1580°F for the capsule. This temperature will not effect the heat shield or capsule.

C. SPECIAL FORM MATERIAL

1. Impact of the fuel capsule from 30 feet results in an impact velocity of 43.5 fps. The critical impact velocity for the fuel capsule was calculated to be 248 fps. (See Appendix A). Failure of the fuel capsule will not occur.

2. The Puncture Case (hypothetical accident conditions) as discussed in case 2 above was found to be more severe.

3. The thermal environment analyzed above (1475 ^{o}F) was far more severe.

4. The SENTINEL 100F was designed to sustain seawater pressure at a depth of 2000 feet. A structural analysis was conducted (Appendix A) using an external pressure of 11300 psi. The results of this analysis showed that the generator would retain its integrity. The capsule was evaluated using an external pressure of 14,500 psi. The results given in Appendix A show the capsule will retain its integrity. Immersion in water for 24 hours is a far less severe condition.

D. SHIELDING STANDARDS

The tungsten biological shield was designed to meet the AEC radiation standards as given in Table IV-1. Analysis have shown that these standards will be satisfied.

E. PACKAGE STANDARDS

1. The package lifting device will be proof tested to 10,500 pounds as per Reference 7.

2. Failure of the lifting devices will not impair the containment or shielding properties of the package. Failure of the lifting devices would result in a far less severe environment than that described in Chapter IV. B. 1.

3. The structural analysis given in Appendix A showed that for the environment described in Item E. 3. the generator tiedowns would be capable of handling greater loads.

4. The loading described in Item E.4 was found to be far less severe than the 1300 psi external environment analyzed in Appendix A.

5. The generator and capsule were evaluated under far more severe external pressure environments.

VI. IAEA TRANSPORT REGULATIONS - SAFETY SERIES 6

The preceeding chapters covered the requirements for interstate transport of the SENTINEL 100F generator. This chapter is concerned with the additional requirements which must be satisfied in order to obtain the international transport permit.

Most of the requirements set forth in Safety Series No. 6 were covered by the interstate safety standards covered in Chapter IV. Minor variations required for shipment as general cargo are:

(1) In still air and direct sunlight at ambient temperature (38°C), the package surface temperature may not exceed 122°F.

(2) Radiation originating from the package shall not exceed 200 mr/hr on the surface and 10 mr/hr at a distance of one meter from the center of the package.

The first requirement is assured by the protective cage over the generator, but there is no generator safety problem in any case. The radiation level at one meter from the center is marginal, but should it exceed 10 mr, the generator can still be shipped by observing special handling requirements.

Safety Series 6, C-6.2.3, also lists specific requirements regarding the package design. These were reviewed and the following resolutions established.

(1) An analysis was conducted which showed that the generator would retain its integrity under all of the requirements of Annex IV, I-2, I-4 and C-2.3.1(a).

(2) No filters are used in the SENTINEL 100F design.

(3) No vents are provided or required in this design.

(4) Cooling is accomplished within the basic passive design. Even complete loss of cooling fins would not present a hazard.

(5) The fuel capsule does not require a pressure relief system. A seal weld assures positive containment.

(6) The containment vessel is designed to withstand much higher pressures.

(7) The generator and capsule were designed to take into account any build-up of internal pressure. Actually, external operating pressures will be more severe.

(8) Heat transfer is through metallic components in all cases.

(9) Not applicable to this design.

(10) Not applicable to this design.

(11) Not applicable to this design.

VII. CONCLUSIONS

This report describes all requirements pertinent to the interstate or international transport of the SENTINEL 100F. By means of analysis test or by comparison to a less severe requirement, all requirements have been satisfied. In view of the conservatism used in the analysis and past experience in transporting SENTINEL generators, there appears to be no reason why the SENTINEL 100F cannot be safely transported.

REFERENCES - SECTION I THROUGH VII

1. Generator Top Assembly Drawing No. 010-F10000
2. Fuel Capsule Assembly Drawing No. 010-20000
3. SENTINEL 100 Fuel and Encapsulation Specification Drawing No. 010-80000
4. Biological Shield Drawing No. 010-70003 and Drawing No. 010-70004
5. Shipping Pallet Drawing No. 001-90039
6. Shipping Cage Drawing No. 001-900064

VIII. ADDITIONAL SUPPORT DATA

Although not specifically required for obtaining either the interstate or international licenses, some additional studies were conducted. As part of the design criteria, the generator housing was evaluated (Appendix A) in an external pressure environment of 1300 psi. The analytical results showed that the generator housing has the capability of sustaining this external pressure. The design criteria also specified that the fuel capsule would retain its integrity in a 14,500 psi external pressure envieonment. The results given in Appendix A verify the fuel capsule's capability to meet the criteria.

An analysis was conducted to evaluate the thermal shock capability of the fuel capsule (Appendix A). The capsule was taken as being at its operating temperature and then plunged into water at 0° C for a duration of 10 minutes. The results show that the fuel capsule will retain its integrity.

APPENDIX A

STRUCTURAL ANALYSES

I. INTRODUCTION

The following analyses present an evaluation of the SENTINEL 100F thermoelectric generator and/or fuel capsule. Based upon the requirements described in Chapter IV, the following conditions were analyzed.

A. GENERATOR

1. Free drop through a distance of four feet onto a flat unyielding surface.
2. Forty inch drop of a vertical steel cylinder 1-1/4 inches in diameter and weighing 13 pounds. Impact occurs on most vulnerable area of package.
3. Nine meter drop onto unyielding surface at critical angle.
4. Forty inch drop of generator onto a 6 inch diameter steel bar supported by an unyielding surface. The bar length is 8 inches with the edges of the flat end being rounded to a maximum radius of 1/4 inch.
5. Exposure of the generator housing to an external hydrostatic pressure of 1300 psi.
6. Without exceeding the yield strength of the package tie downs, apply a static force through the package center of gravity of two times the package weight vertically, 10 times the weight horizontally and five times the weight of the package in the transverse direction.

B. FUEL CAPSULE

1. Response to an external pressure of 10,000 psi to meet design requirements.
2. Response to an external pressure of 14,500 psi.

3. Response to an impact resulting from a nine meter drop onto a non-yielding surface.

4. Response of dropping a steel rod weighing seven kilograms from a height of one meter.

5. Thermal shock capability of the fuel capsule.

II. SUPPORT DATA

Figure A-1 provides a sketch of the generator cross-section and the pertinent dimensions and data used in the above analyses.

In support of these analyses, structural properties of the various components at temperature are required. The shield is fabricated from a tungsten alloy where the operational soak temperature is ~1130°F. Minimum values of strength and elongation at 1300°F given in Reference A-1 are as follows:

Ultimate Strength	30,000 psi
Compression Yield (@0.2%)	25,500 psi
Elongation	4%

In addition, the density is 0.61 lbs/in^3 and the elastic modulus at 1300°F is 38 x 10^6 psi.

With reference to Figure A-1, the upper ring and lower plate are employed to increase the volume of effective crushable thermal insulation under impact conditions. These components are fabricated from Inconel 700 or equivalent. The operating temperature is ~1100°F. At this temperature, the following structural properties are provided (Reference A-2).

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE A1

SENTINEL 100 F

ıate Strength	145,000 psi
ı Strength	95,000 psi
tic Modulus	27×10^6 psi
gation	25%

ıaterials are utilized, Min-K 1301 and Glasrock Foam

ılus of Min-K 1301 is ~5400 psi and the stress-strain

ı and unrestrained Min-K are provided in Attachment 1.

the crushing capability of Glasrock is 1000 psi.

I. GENERATOR ANALYSES

impact analysis for the generator falling through a dis-

to a rigid surface, the structural capability is based

eld and the surrounding insulation. For conservatism,

ıbility of the aluminum housing is neglected.

e shield, capsule and fuel is ~1750 pounds.* Thus, for

gy becomes 1750 (9)(39.37) or 620,000 inch-pounds.

ed with this drop height is,

$$\sqrt{2gh}$$

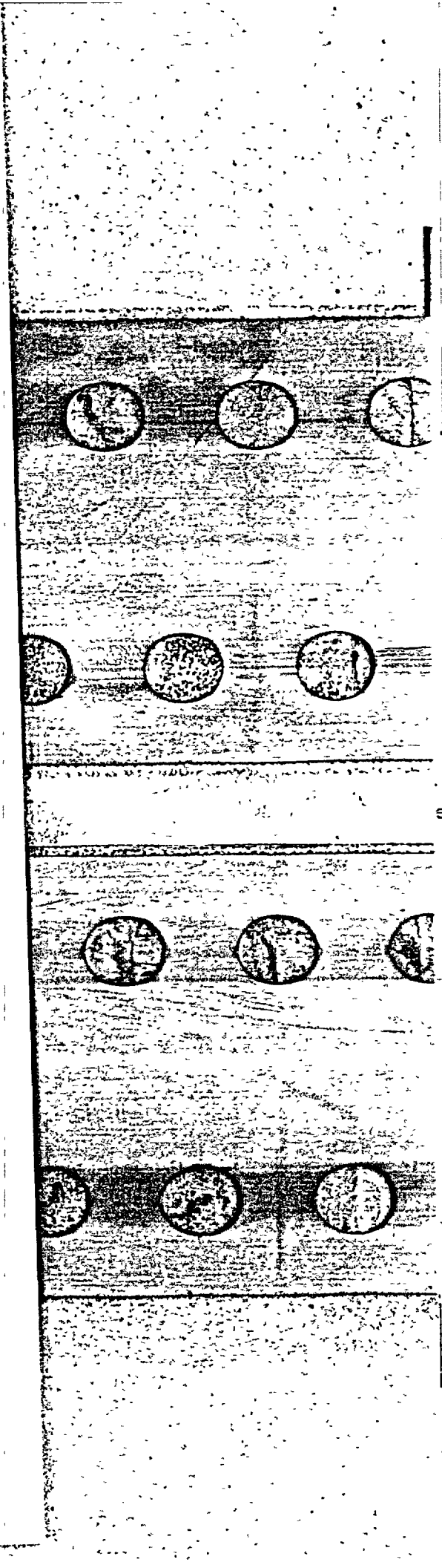
$$[2(386)(9)(39.37)]^{\frac{1}{2}} = 524 \text{ in/sec.}$$

· the shield may be derived from the wave equation,

$$\ddot{} = \frac{\partial \sigma}{\partial x}$$

-e displacement and σ is the stress magnitude.

*. Actual design weight is 1604 pounds. R4



Assuming a bilinear stress-strain curve for the material of interest, a critical impact velocity associated with stress wave propagation can be derived. This derivation is provided in Attachment 2. The critical velocity becomes,

$$V_{cr} = \frac{\sigma_y}{\sqrt{\rho E}} + \frac{\sigma_u - \sigma_y}{\sqrt{\rho F}}$$

where: E = elastic modulus

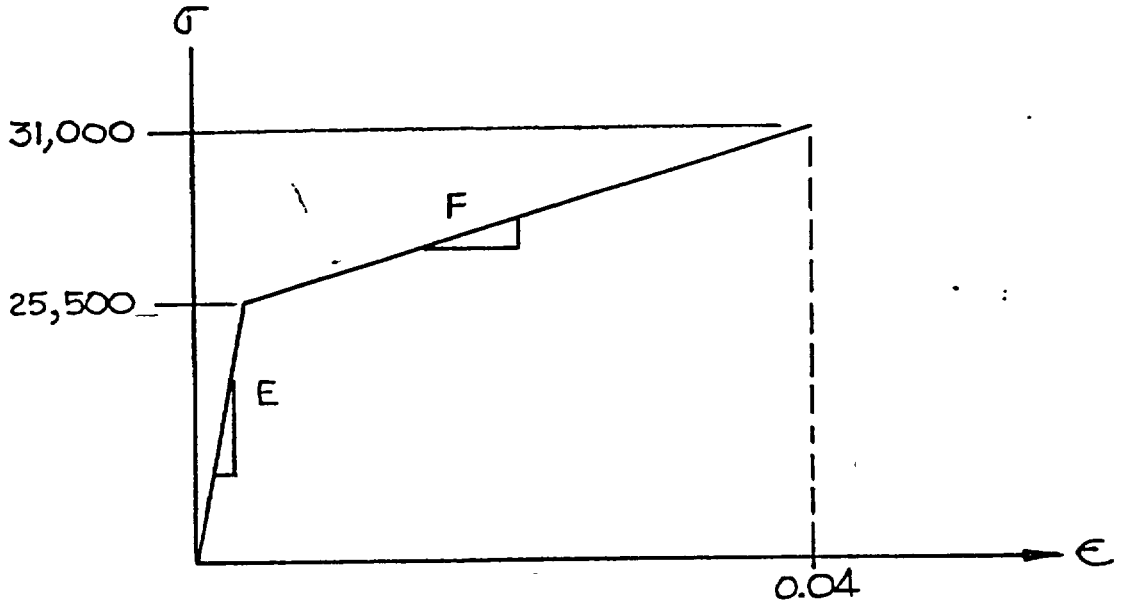
F = plastic modulus

ρ = mass density of material

σ_y = yield strength

σ_u = ultimate strength

For Kennestrium W-10 at temperature, the following stress-strain curve is obtained.



The plastic modulus or slope of the strain-hardening portion is derived from the curve geometry.

$$\therefore F = \frac{31000 - 25500}{.04 - \frac{25500}{38 \times 10^6}} = 14.0 \times 10^4 \text{ psi}$$

The elastic modulus and material density are 38×10^6 psi and 0.61 lb/in^3, respectively. Substituting into the equation for critical velocity,

$$V'_{cr} = \frac{25500}{\sqrt{\left(\frac{.61}{386}\right)\left(38 \times 10^6\right)}} + \frac{31000 - 25500}{\sqrt{\left(\frac{.61}{386}\right)\left(14 \times 10^4\right)}}$$

$$= 474 \text{ in/sec.}$$

The equivalent energy is,

$$E = 1/2\ mV^2 = \frac{1750}{2(386)} (474)^2 = 5.09 \times 10^5 \text{ in-lbs.}$$

A substantial amount of available energy is absorbed by the compressibility of the insulation. For the impact of the generator in the upright orientation, the lower plate of 16.38 inch OD becomes an effective load path to an equivalent area of insulation. The plate is effective to the limit of its structural capability where abnormal deflection would take place. The loading would be nearly a uniform pressure load reacted by an annular simple support at 8.84 inch shield diameter (See Figure A-2).

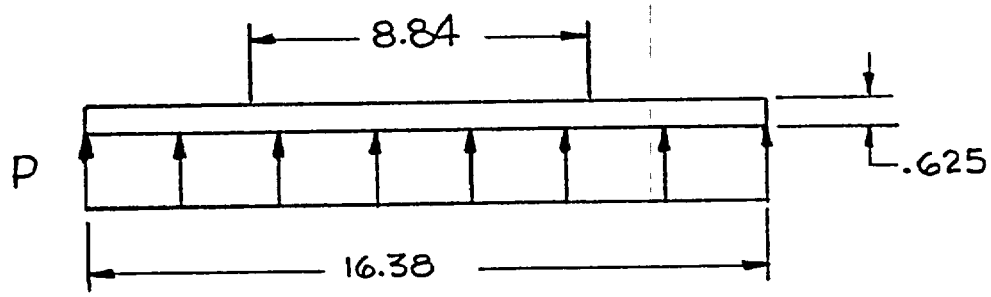


FIGURE A-2 ANNULAR SIMPLE SUPPORT

From Reference A-4, the radial and tangential bending moments are given by,

At r = o:

$$M_r = M_t = \frac{pa^2}{16}(3+\nu) - \frac{W}{4\pi}(1+\nu)\left[\frac{1}{2}\left(\frac{1-\nu}{1+\nu}\right)\left(1-\frac{b^2}{a^2}\right) + \text{In}\ \frac{a}{b}\right]$$

At $a \geq r \geq b$:

$$M_r = \frac{pa^2}{16}(3+\nu)\left(1-\frac{r^2}{a^2}\right) - \frac{W}{4\pi}(1+\nu)\left[\frac{1}{2}\left(\frac{1-\nu}{1+\nu}\right)\left(\frac{b^2}{r^2}-\frac{b^2}{a^2}\right)+\text{In}\ \frac{a}{r}\right]$$

$$M_t = \frac{pa^2}{16}(3+\nu)\left[1-\left(\frac{1+3\nu}{3+\nu}\right)\frac{r^2}{a^2}\right] - \frac{W}{4\pi}(1+\nu)\left[\frac{1}{2}\left(\frac{1-\nu}{1+\nu}\right)\left(2-\frac{b^2}{r^2}-\frac{b^2}{a^2}\right)+\text{In}\ \frac{a}{r}\right]$$

where: $W = \pi pa^2$

a = outer radius = 8.19"

b = support radius = 4.42"

The maximum bending moment occurs in the radial direction at r = 4.42. In a unit pressure and $\nu = 0.3$ the maximum moment becomes,

$$M_{max} = 7.808 \text{ in-lbs./inch.}$$

The stress-moment relationship is,

$$\sigma = \frac{6M}{t^2}$$

With a bending factor of 1.5, a yield stress at temperature of 95,000 psi for Inconel 700 and a plate thickness of 0.625 inches, the equivalent pressure loading is,

$$p = \frac{1.5\,(\sigma_y)t^2}{6(7.808)} = \frac{1.5\,(95000)(.625)^2}{6(7.808)}$$

$$= 1188 \text{ psi.}$$

This represents a conservative loading since in a bending mode the plate rigidity and capability is above yielding.

The majority of available energy would be taken up by the Min-K insulation rather than the Glasrock. The total volume of insulation under the plate is,

$$v = \pi(4)(8.19)^2 = 841 \text{ cu. in.}$$

The strain energy capability per unit volume of the insulation is represented by the area under the stress-strain curve. With a limit load of 1188 psi, the area under the stress-strain curve is obtained from Figure 1A of Attachment 1. The area is ~233 in-lbs./in^3. For 841 cubic inches, the total available energy is,

$$E = 841 \text{ in}^3 \ (233 \text{ in-lbs/in}^3)$$

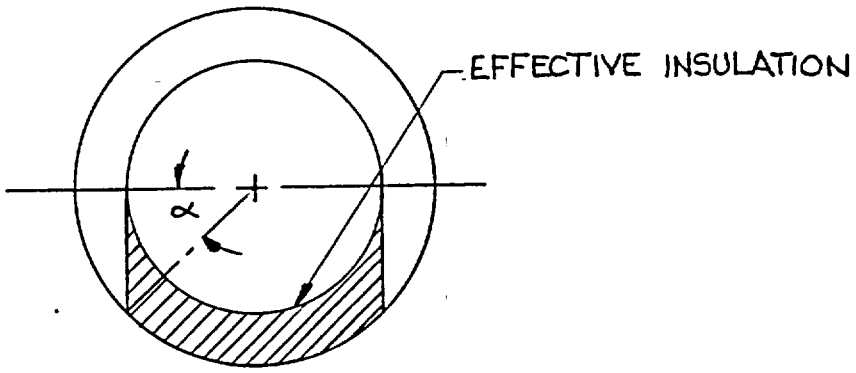
$$= 196,000 \text{ in-lbs.}$$

The total energy capability of the insulation and shield for the vertical drop is 196,000 and 509,000 in-lbs., respectively, for a total of 705,000 in-lbs. This value is greater than the 620,000 in-lbs. of available energy associated with the nine meter drop. In other words, the shield will decelerate through the insulation and the impact velocity of the shield will not exceed the 474 in/sec limit.

A far more conservative approach is to apply only the Min-K insulation where the volume is 450 in^3; 450(233) equals 105,000 inch-pounds. This value coupled with the 509,000 inch-pounds associated with the shielding yields a total of 614,000 inch-pounds. Certainly the large volume of Glasrock will absorb much more than the 6000 inch-pounds remaining.

Secondly, the 233 inch-pounds per cubic inch of Min-K is conservative. In reality, the shield enclosed within the insulation would never see a "hard" impact (high g-level).

When considering impact on the side of the generator, it can be shown that the effective volume of insulation is considerably higher than for any other impact orientation.



For every inch of shield length, the effective crushable insulation volume is,

$$v_I = \frac{1}{2}\left[\frac{\pi}{4} D_o^2 - \frac{\pi}{4} D_1^2 - \left(\frac{D_o}{2}\right)^2 (2\alpha - \sin 2\alpha)\right]$$

$$= \frac{1}{2}\left[\frac{\pi (20.63)^2}{4} - \frac{\pi (13.84)^2}{4} - (10.315)^2 (1.676 - .994)\right]$$

$$= 55.7 \text{ in}^3$$

Hence, for a shield of ~19.7 inches in length, the total effective insulation is 1097 cubic inches.

For an impact where the generator is inverted, the upper ring (17.5"OD, 13.03" ID) is applied as a load path to crushable insulation. Its limit load in bending is derived from the equation,

$$\sigma_{max} = K\rho \frac{a^2}{t^2}$$ (Reference A-5)

Where 'a' is the outer radius of the plate and t is the plate thickness. For $a/b = (\frac{17.5}{2})(\frac{2}{13.03}) = 1.34$, $k \cong 0.90$. Applying a similar analysis as performed for the lower plate, the limit load becomes,

$$P = \frac{1.5\,\sigma_y\,t^2}{k\,a^2} = \frac{1.5\,(95000)(.75)^2}{.90\,(8.75)^2}$$

$$= 1164 \text{ psi.}$$

The volume of effective insulation is,

$$v = 3.88(\tfrac{\pi}{4})\left[(17.5)^2 - (13.03)^2\right] + \frac{\pi}{4}(13.5)^2(0.6) = 501 \text{ in.}^3$$

The strain energy associated with this loading and volume of Min-K 1301 is,

$$E \cong 501\,(233) = 116,700 \text{ in-lbs.}$$

Similarly,

$$509,000 + 116,700 = 625,700 \text{ in-lbs.} > 620,000 \text{ in-lbs available.}$$

The above comparison between strain energy capability and available energy from a nine meter drop is not marginal. The energy absorbed by the compression of the module springs and the energy absorbed by the housing were conservatively omitted from the analysis. The latter is certainly significant.

The other impact conditions defined in the beginning of this report are not significant. A free drop through a distance of four feet to a rigid surface defines an energy level below that previously evaluated. The condition of a 40 inch free drop onto a six inch diameter bar pertains to a lower available energy. The diameter of the bar is of a magnitude where local bending would take place as opposed to penetration. The shield will not see any local loading effect. The thick walled housing will effectively spread the load such that only energy levels need be compared.

A similar argument may be used for the percussion condition where a 13 pound steel cylinder goes through a drop height of 40 inches. Hence, we have only 13(40) or 520 inch-pounds; a negligible energy that should provide no more damage than causing a slight dent in the housing surface.

IV. HOUSING ANALYSES

The following delineates a structural evaluation of the SENTINEL 100F RTG housing under conditions of external hydrostatic pressure. A sketch of the housing is provided in Figure A-3 per INSD Drawings 010-40000 and 010-70000. The external proof pressure is 1300 psi where the housing lid deflection is limited to .020 inches.

The generator housing (23.88" OD and 20.62" ID) is fabricated from 6061-T6 aluminum alloy with the following minimum structural properties per Reference A-6 for parent material and weld test data:

Parent Material	Weld Material
F_{tu} = 42000 psi	F_{tu} = 25000 psi
F_{ty} = 35000 psi	F_a = 16600 psi
$E = 9.9 \times 10^6$ psi.	

The maximum stress in the cylindrical shell occurs at the inner surface in the circumferential direction. This stress is given by,

$$\sigma_{\theta m} = \frac{2pb^2}{b^2 - a^2}$$

For an external pressure of 1300 psi (the proof pressure),

$$\sigma_{\theta m} = \frac{2(-1300)(11.94)^2}{(11.94)^2 - (10.31)^2} = -10,200$$

This value is well below the 35000 psi yield strength.

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE A3

SENTINEL 100F HOUSING

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE A3

SENTINEL 100F HOUSING

Solving for Q_o and M_o,

$$Q_o = 3.784 \text{ lbs/in.}$$

$$M_o = -8.523 \text{ in-lbs/in.}$$

The combined stresses are given by the following expressions:

$$\sigma_x = \frac{-a^2}{b^2 - a^2} \pm \frac{6}{t_c^2} \left[M_o \phi + \frac{1}{\beta} Q_o \Omega \right]$$

where upper sign indicates inside surface and lower sign the outside surface.

$$\sigma_\theta \text{ (inside)} = \frac{-2b^2}{b^2-a^2} + \left[2\beta^2 \frac{R}{t_c} \psi + \frac{6\nu}{t_c^2} \phi \right] M_o + \left[\frac{2\beta R}{t_c} \theta + \frac{6\nu}{\beta t_c^2} \Omega \right] Q_o$$

$$\sigma_\theta \text{ (outside)} = \frac{-(a^2 + b^2)}{b^2-a^2} + \left[2\beta^2 \frac{R}{t_c} \psi - \frac{6\nu}{t_c^2} \phi \right] M_o + \left[\frac{2\beta R}{t_c} \theta - \frac{6\nu}{\beta t_c^2} \Omega \right] Q_o$$

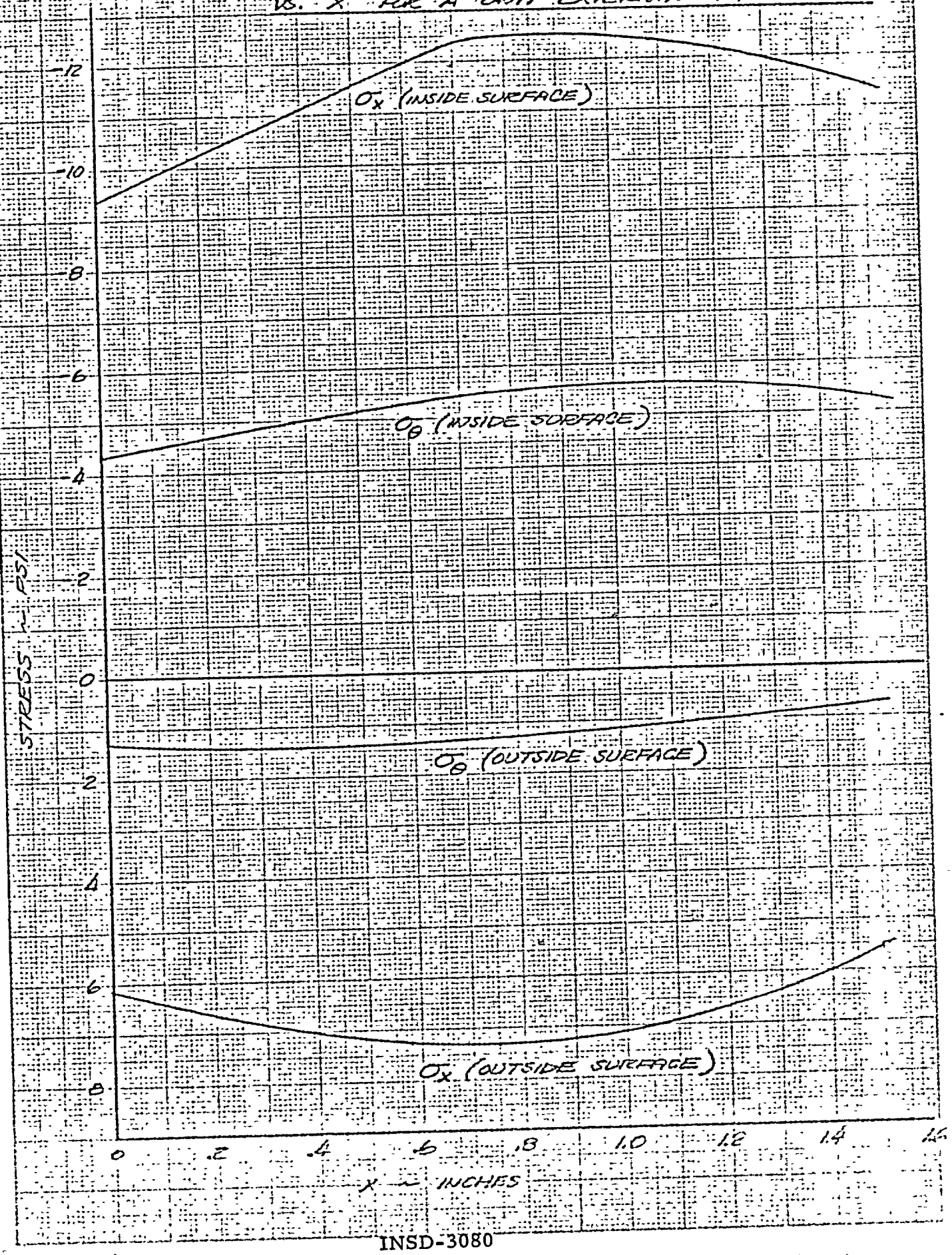
where $\beta = \frac{3(1 - \nu^2)^{\frac{1}{4}}}{R^2 t_c^2} = 0.302$

θ, Ω, ψ and ϕ are functions of x (per Figure A-4) and the attenuation length $1/\beta$. These functions are found in graphical form in Reference A-7. Substituting into the above equations, the combined stresses on both surfaces and in both directions can be obtained for the unit external pressure. The results as a function of x are shown in Figure A-5.

The maximum stress per Figure A-5 is ~ 12.5 psi per unit pressure. This occurs in the axial direction at the inside surface. For the proof pressure of 1300 psi, the resulting peak stress is 1300 (12.5) or 16250 psi which is below the allowable stress in the weld material.

FIGURE A-5

COMBINED MEMBRANE & DISCONTINUITY STRESSES VS. X FOR A UNIT EXTERNAL PRESSURE



The closure head is essentially a clamped circular plate where its edge fixity is dependent upon the moment M_o. From Reference A-8, the stress at the center of the plate becomes,

$$\sigma_r = \frac{3W}{8\pi mt^2}(3m + 1) - \frac{6M_o}{t^2}$$

where $W = \pi pR^2$ and $m = \frac{1}{\nu}$. In this instance the effective plate radius is 11.125 inches. Therefore,

$$\sigma_r = \frac{3(\pi)(1300)(11.125)^2(11)}{8\pi(3.33)(3.25)^2} - \frac{6(1300)(8.53)}{(3.25)^2}$$

$$= 18850 - 6300 = 12,550 \text{ psi.}$$

At the edge (with increased thickness), the radial stress is simply $6\ M_o/t^2$ where t = 3.5 inches.

$$\therefore \sigma_r = \frac{6(8.53)(1300)}{(3.5)^2} = 5430 \text{ psi}$$

The housing lid is also fabricated from 6061-T6 aluminum alloy with an effective diameter and thickness of 20.38 and 4.517 inches respectively. The lid is held to the housing shell by eighteen 5/8" diameter aluminum bolts on a 25.625 inch bolt circle. As was previously stated, the design of the lid or cover is based upon a maximum permissible deflection of .020 inches from an external proof pressure of 1300 psi.

From the eighteen lid bolts, the boundary condition for the circular lid is between clamped and simply supported. The bolts are relatively wide spaced such that the fixity tends toward the latter condition. Secondly, it is conservative to obtain the center deflection on the simply supported assumption. The maximum deflection for a simply supported circular

plate is given by the equation (Reference 3),

$$y_{max} = \frac{3W(M-1)(5m+1)R^2}{16\pi E m^2 t^3}$$

Therefore, for 1300 psi,

$$y_{max} = \frac{3(1300)(\pi)(10.31)^2(2.33)(17.67)(10.31)^2}{16\pi(9.9 \times 10^6)(3.33)^2(4.517)^3}$$

$$= .0112 \text{ inches} < .020 \text{ inches}$$

The stresses in the plate in the radial and tangential directions are also conservative with the simple support assumption. The maximum stress which would occur at the center of the plate is,

$$\sigma_{max} = \frac{3W(3m+1)}{8\pi mt^2}$$

$$= \frac{3(1300)(\pi)(10.31)^2(11)}{8\pi(3.33)(4.517)^2} = 8400 \text{ psi.}$$

This magnitude is also well below the yeild capability of 35,000 psi.

The stress in the bolts is limited to the potential deflection of the lid at the bolt circle. If the lid was simply supported, the slope of the lid at the 10.31 inch radius would be,

$$\theta = \frac{3W(m-1)R}{2\pi E mt^3}$$

$$= \frac{3(1300)(\pi)(10.31)^2(2.33)(10.31)}{2\pi(9.9 \times 10^6)(3.33)(4.517)^3} = .00164 \text{ radians.}$$

Since the angle is small, $\theta \cong \sin\theta \cong \tan\theta$. The distance between the shell ID and the bolt circle is 12.813 - 10.310 or 2.503 inches. Thus, the maximum possible bolt elongation is,

$$\delta = 2.503\ (.00164) = .00411 \text{ inch.}$$

The effective bolt length is ~ 6.12 inches and hence the strain becomes,

$$\epsilon = \frac{.00411}{6.12} = .000672 \text{ in/in.}$$

The bolts are 2024-T4 aluminum having an elastic modulus of 10.5×10^6 psi. Therefore,

$$\sigma = E\epsilon = 10.5 \times 10^6\ (.000672)$$

$$= 7050 \text{ psi.}$$

The yield strength of 2024-T4 is 42000 psi (minimum).

V. STRUCTURAL ANALYSIS - TIE DOWN FITTINGS

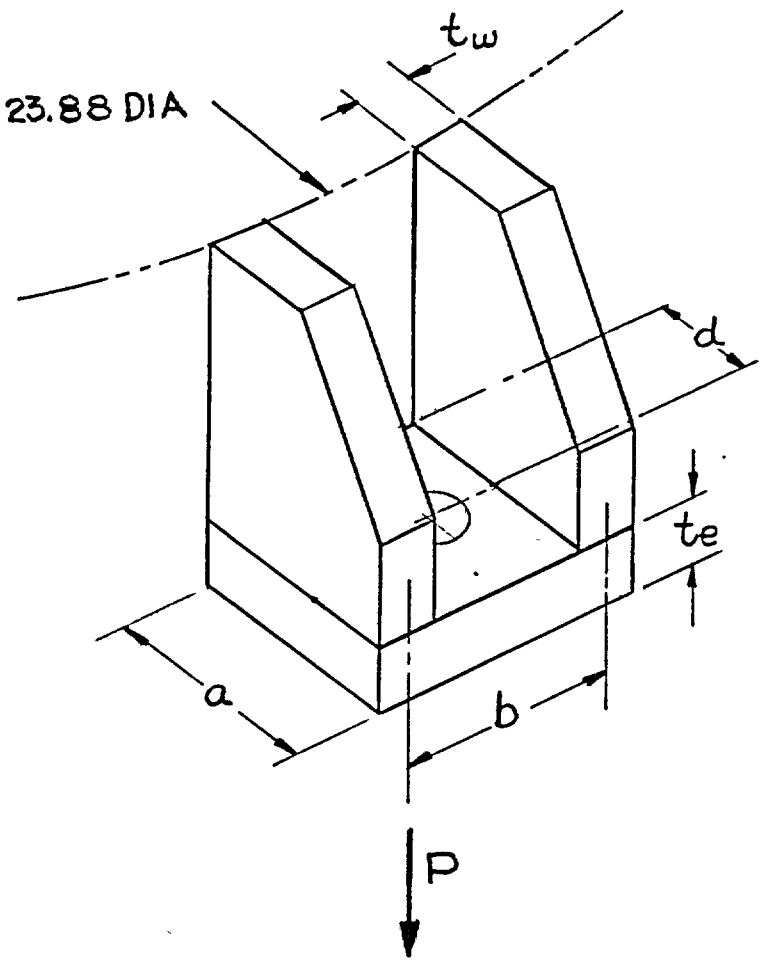
Four channel fittings as illustrated in Figure A-6 provide a tie down capability to the generator pallet. The fittings of 6061-T6 aluminum alloy are welded to the base periphery of the housing with a generous weld bead at all interface surfaces such that the critical area is in the parent material.

An analysis of end pad bending is based upon the approach given in Reference A-9 for tension type fittings.

$$\frac{r_i}{a} = \frac{.531}{3.25} = .1635$$

$$\frac{b}{a} = \frac{4.75}{3.25} = 1.462$$

$$\rightarrow K \cong 0.76$$



r_i = hole radius = .531"
te = 1.0" minimum
b = 4.75"
t_w = .75"
d = 1.747"
$a \approx 3.25$"

FIGURE A6

CHANNEL FITTING

The bending stress is,

$$\sigma_b = \frac{2P\,d\,K}{a t_e^2}$$

where P is the applied load.

Neglecting the bending form factor the load to yield the material is derived where the yield strength is 35,000 psi minimum.

$$\therefore P_y = \frac{\sigma_y\, a\, t_e^2}{2\,d\,K}$$

$$= \frac{35000(3.25)(1.0)^2}{2(1.747)(0.76)} = 42,800 \text{ pounds.}$$

The ultimate shear stress for 6061 heat treated to the T6 condition is 27000 psi (Reference 6). Assuming that an approximate shear yield can be derived from the ratio between ultimate and yield in tension,

$$\tau_y \cong 27000 \left(\frac{35000}{42000}\right) = 22,500 \text{ psi}$$

The minimum shear area is,

$$A_s = 2(3.25)(.75) + 5.5\,(1) = 10.375 \text{ in}^2$$

The associated load becomes,

$$P = 22500\,(10.375) = 233,000 \text{ pounds.}$$

The weight of the SENTINEL 100F generator is approximately 2600 pounds. Conservatively taking 42,800 pounds as a design limit load for each lug, this is equivalent to the following g-loading in the vertical direction:

$$G = \frac{4(42,800)}{2600} \cong 66 \text{ g's}$$

The shipping and handling conditions are next examined where the design g-loads are:

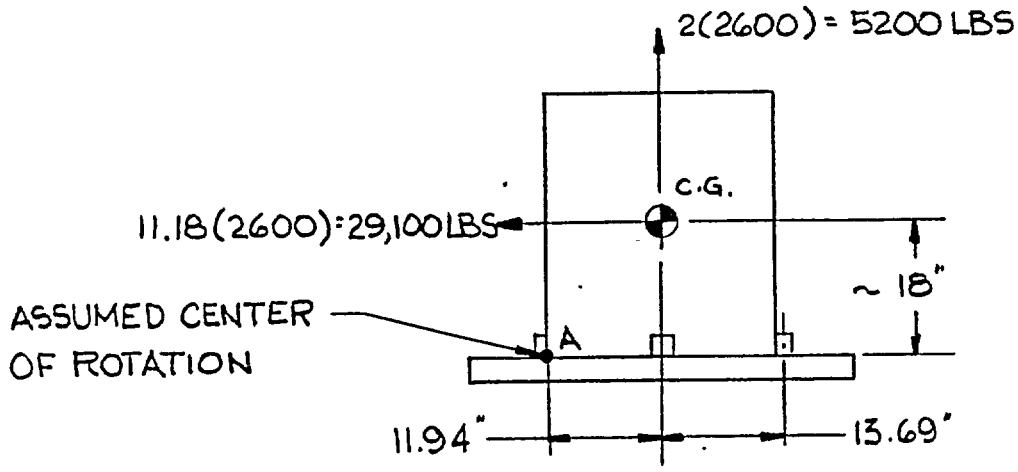
2 g's = vertical

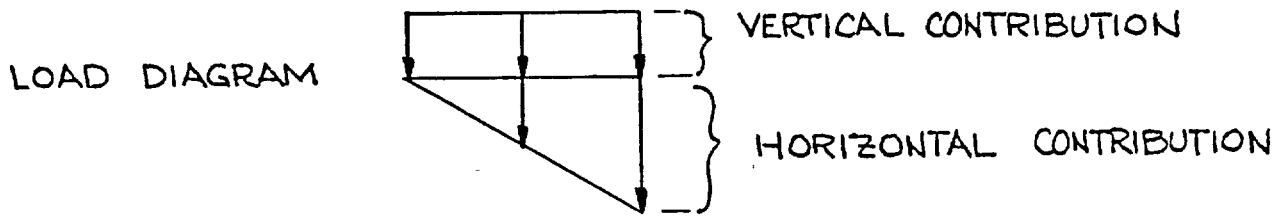
5 g's - lateral

10 g's - fore and aft.

The C. G. of the generator is approximately 18 inches above the pallet. Combining the lateral and longitudinal g-loads, the maximum g-load vector in the horizontal plane becomes,

$$G_H = \sqrt{(5)^2 + (10)^2} = 11.18 \text{ g's}$$





Taking summation of moments about point A for the horizontal load contribution, the maximum lug load is derived.

$$18(29100) = P_1 (13.69 + 11.94) + P_1 (11.94)$$

$$\therefore P_1 \doteq 13,930 \text{ pounds.}$$

The contribution from the vertical force is,

$$P_2 = \frac{5200}{4} = 1300 \text{ pounds.}$$

Superimposing, the maximum lug load becomes,

$$P_{max} = P_1 + P_2 = 13930 + 1300$$

$$= 15,200 \text{ pounds.}$$

This loading is far below the 42,800 pound limit load. Additional loadings can be evaluated as a function of generator-pallet orientation. However, the ratio of lug capability to lug load is very high and further examination is not justified.

VI. FUEL CAPSULE ANALYSES

A. EXTERNAL HYDROSTATIC PRESSURE OF 10,000 PSI

For an external hydrostatic design pressure of 10,000 psi, the calculated stresses must meet the following criteria:

$$\sigma \text{ (primary membrane)} \leq 0.9 F_{ty}$$

$$\sigma \text{ (load primary membrane)} \leq 1.35 F_{ty}$$

$$\sigma \text{ (secondary membrane)} \leq 2.7 F_{ty}$$

$$\sigma \text{ (buckling)} \leq 0.5 \sigma_{cr}$$

From Reference 10, the following room temperature structural properties are given for solution heat treated Hastelloy C. All values are guaranteed minimums.

Tensile strength, F_{tu} = 100,000 psi

Yield strength, F_{ty} = 46,000 psi

Elongation, ℓ = 20% in two inches

Elastic modulus, E = 28.5×10^6 psi

The wall thickness and inside radius of the capsule are 0.668 and 2.1125 inches, respectively. Assuming the Mises criterion for ductile materials, the maximum circumferential stress, occurring at the inner surface is given by the equation:

$$\sigma_\theta = \frac{1.732\, p r_o^2}{r_o^2 - r_i^2}$$ Reference A-8

where $r_o = r_i + t$

substituting,

$$\sigma_\theta = \frac{1.732(10,000)(2.790)^2}{(2.790)^2 - (2.1225)^2} = 41,115 \text{ psi}$$ R_1

$$\underline{\text{M.S.}} = \frac{0.9(46,000)}{41115} - 1 = .007$$ R_1

In order to investigate buckling capability, the critical buckling stress per Reference 11 is utilized where the effective cylindrical shell length is ~10.0 inches and R is the mean radius.

$$\frac{L^2}{Rt} = \frac{(10)^2}{2.4565\,(.668)} = 60.94$$ R_1

∴ Cylinder is of short or transition length.

For hydrostatic pressure, the critical buckling stress is:

$$\sigma_{cr} = \frac{K \pi^2 E t^2}{12(1 - \nu^2)L^2}$$ R_1

where K is a constant: $K = f(L, R, t)$; $\nu = 0.3$

$$Z_L = \frac{L^2}{Rt}(1 - \nu^2)^{\frac{1}{2}} = 60.94\,(.955) = 58.2$$ R_1

∴ $K \cong 8$

∴ $\sigma_{cr} = \frac{8(\pi)^2(28.5 \times 10^6)(.668)^2}{12(.91)(10)^2} = 0.917 \times 10^6$ psi

Rather than iterate with a tangent or reduced modulus to obtain an exact solution based upon stress-modulus compatibility, it is evident that the capsule would yield long before it would fail from instability.

Discontinuity stresses at the closure head-cylinder interface are next examined. As a result of a pressure loading on the capsule and a requirement for strain compatibility at the head-cylinder junction, a discontinuity moment M_o and shear Q_o must be superimposed with the general membrane solution. From Reference A-7,

$$M_o = -\frac{R^2 p}{8\lambda_c}\left\{\frac{2C^3\lambda_c^3 + 0.7C^4\lambda_c^2 + 4.42}{2C^3\lambda_c^2 + [.7C^4 + 1.3]\lambda_c + .91C}\right\}$$

$$Q_o = \frac{Rp}{4}\left\{\frac{C^3\lambda_c^3 + 3.4C^3\lambda_c + 4.42}{2C^3\lambda_c^2 + [.7C^4 + 1.3]\lambda_c + .91C}\right\}$$

where R= mean radius = 2.4565 inches | R_1

$$C = \frac{t_c}{t_h} = \frac{.668}{1.0} = .668$$

$$\lambda_c = \left[\frac{3(1-\nu^2)R^2}{t_c^2}\right]^{\frac{1}{4}} = 2.465 \quad | R_1$$

Solving for the discontinuity forces,

$M_o = -5585$ | R_1

$Q_o = 9000$ | R_1

The resulting stresses at the interface for the longitudinal and circumferential directions are,

$$\sigma_x = \pm \frac{6M_o}{t_c^2} - \frac{pR}{2t_c} = \begin{cases} -93487 \text{ psi} \\ +56713 \text{ psi} \end{cases} \quad | R_1$$

Margin of Safety (M. S.) = $\frac{2.7(46,000)}{93487} - 1 = 0.328$ | R_1

$$\sigma_\theta = \left[\frac{2\beta^2 R}{t_c} \pm \frac{1.8}{t_c^2}\right] M_o + \frac{2\beta R Q_o}{t_c} - \frac{pR}{t_c}$$

where $\beta = \left[\frac{3(1-\nu^2)}{R^2 t_c^2}\right]^{\frac{1}{4}} = 1.0138$ | R_1

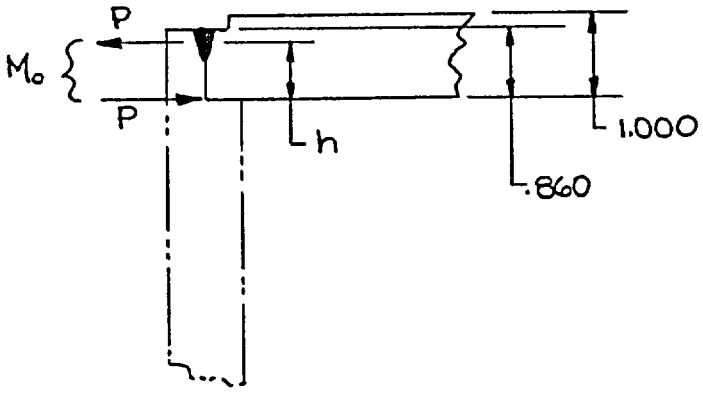
$$\therefore \sigma_\theta = \left[\frac{2(1.0138)^2(2.4565)}{.668} \pm \frac{1.8}{(.668)^2}\right](-5585) \quad | R_1$$

$$+ \frac{2(1.0138)(2.4565)(9000)}{.668} - \frac{10,000(2.4565)}{.668} \quad | R_1$$

$$= \begin{cases} -34,415 \text{ psi} \\ +10,644 \text{ psi} \end{cases} \quad | R_1$$

$$\text{M. S.} = \frac{1.35(46,000)}{34,415} - 1 = 0.804 \quad | R_1$$

An investigation of the fusion weld for the capsule lid makes use of the discontinuity moment M_o as shown below where the weld is in tension.



$M_o = hP = 5585$ in-lbs/in. | R_1

weld length (min.) = .180 in.

$h = .860 - \frac{.180}{2} = .770$ in.

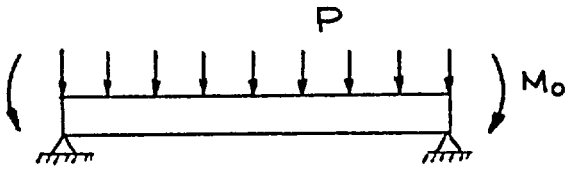
$$\therefore P = \frac{5585}{.770} = 7253 \text{ lbs/in.} \quad | R_1$$

The stress becomes,

$$\sigma = \frac{P}{A} = \frac{7253}{.180} = 40,294 \text{ psi} \quad \left| R_1 \right.$$

$$\text{M. S.} = \frac{.90(46,000)}{40,294} - 1 = 0.027 \quad \left| R_1 \right.$$

The lower closure is loaded as shown below



t = 1.0 in.

The bending stress at the edge is,

$$\sigma_b/\text{edge} = \frac{6\,M_o}{t^2} = \frac{6(5585)}{(1)^2} = 33,510 \text{ psi} \quad \left| R_1 \right.$$

At the center per Reference A-7.

$$\sigma_b/\text{center} = \frac{3W}{8\,\pi\,mt^2}\,(3m + 1) - \frac{6\,M_o}{t^2}$$

where: $W = \rho\,\pi R^2$

$$= 10,000\,\pi\,(2.4565)^2 = 189,576 \text{ pounds} \quad \left| R_1 \right.$$

$$m = \frac{1}{\nu} = \frac{1}{0.3} = 3.333$$

$$\sigma_b/\text{center} = \frac{3(189,576)(10)}{8\,\pi\,(3.333)(1)^2} - 33,300 = 34,594 \text{ psi} \quad \left| R_1 \right.$$

$$\text{M. S.} = \frac{1.35(46,000)}{34,594} - 1 = 0.795 \quad \left| R_1 \right.$$

A similar state of stress occurs at the upper closure or lid. The bending stress in the center is 34,594 psi and the stress across the weld was found to be 40,294 psi. $\left| R_1 \right.$

B. EXTERNAL HYDROSTATIC PRESSURE OF 14,500 PSI

An elastic-plastic analysis was performed for a similar capsule per Reference A-12 where the pressure was derived to initiate a plastic "front" on the inside surface in the circumferential direction.

$$\rho^* = \frac{\sigma_o}{2}\left(1 - \frac{r_i^2}{r_o^2}\right)$$

An estimate of the wall capability is obtained by letting σ_o equal the ultimate strength of 100,000 psi. Thus, the failure pressure becomes,

$$\rho_{ult.} = \frac{100,000}{2}\left[1 - \frac{(2.1225)^2}{(2.790)^2}\right] = 21,063 \text{ psi} \quad \left|R_1\right.$$

This value is significantly higher than the requirement of 14,500 psi and is conservative for at least two reasons.

(1) The 100,000 psi ultimate strength is a minimum guaranteed value. Actual material strength should be somewhat higher.

(2) The capsule is allowed to deform until it contacts the fuel, hence achieving an elastic foundation restricting elongation.

The maximum stress in the system occurs at the closure-cylinder interface in the axial direction due to membrane and discontinuity loads.

This stress becomes,

$$\sigma = \frac{14,500}{10,000}(93487) = 135,556 \text{ psi} \quad \left|R_1\right.$$

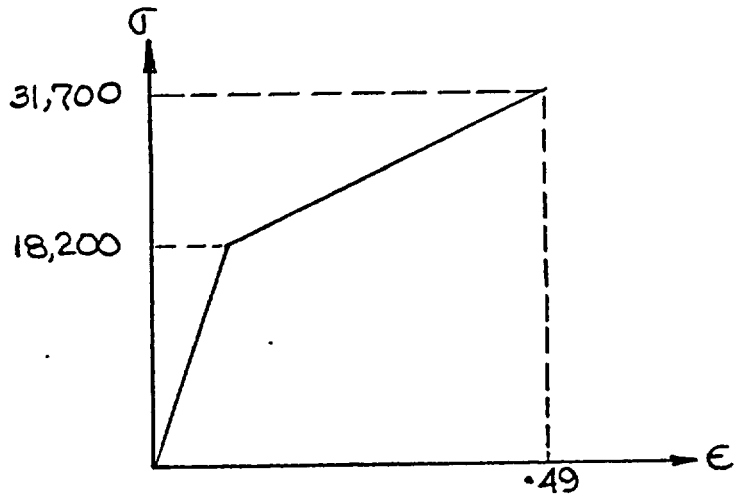
Applying a 1.5 bending form factor, the ultimate capability is 1.5(100,000) = 150,000 psi (minimum).

C. CAPSULE IMPACT

The fuel capsule must survive an impact consisting of a nine meter drop onto a hard surface. The shock resistance shall be determined on the basis of a critical impact velocity as a function of stress wave propagation. The environment of the capsule is conservatively assumed at ~1800°F. The critical impact velocity from Attachment 2 is,

$$\sigma_{cr} = \frac{\sigma_y}{\sqrt{\rho E}} + \frac{\sigma_u - \sigma_y}{\sqrt{\rho F}}$$

where E is the elastic modulus and F is the plastic modulus. The idealized linear strain hardening stress-strain curve for Hastelloy C at 1800°F is shown below (Reference A-13).



At 1800°F, $E = 15 \times 10^6$. The plastic modulus, F, is obtained by stress-strain curve geometry.

$$F = \frac{31700 - 18200}{.49 - \frac{18200}{15 \times 10^6}} = 27630 \text{ psi}$$

The mass density ρ is,

$$\rho = .323 \left(\frac{1}{386}\right) = 0.837 \times 10^{-3} \text{ lb-sec}^2/\text{in}^4$$

Solving for the critical impact velocity,

$$V_{cr} = \frac{18200}{\sqrt{(.837 \times 10^{-3})(15 \times 10^6)}} + \frac{135}{\sqrt{(.837 \times 10^{-3})(27630)}}$$

$$= 2975 \text{ in/sec} = 248 \text{ ft/sec.}$$

From 9 meters or 29.5 feet, the velocity at impact is,

$$V = \sqrt{2gh} = \sqrt{2(32.16)(29.5)} = 43.5 \text{ ft/sec.}$$

Since $V_{cr} > 43.5$ ft/sec, no capsule failure should result.

D. PERCUSSION

The capsule should maintain its structural integrity after an impact where seven kilograms of steel fall through a distance of one meter. The flat face of the falling body is 2.5 centimeters in diameter.

Since the diameter is 2.5 centimeters or approximately one inch in diameter, the falling body is of the same dimensional magnitude as the capsule. Hence, it does not fall in the category associated with a penetrating medium nor is there a significant concentrated load to cause adverse deflection or deformation. The response of the capsule should be the same as that resulting from a capsule impacting a flat surface. In order to evaluate the structural integrity of the capsule to withstand a percussion test, the energy available from the seven kilogram weight will be compared to the impact energy capability derived previously.

For seven kilograms through a distance of one meter, the available energy becomes,

$$E_{avail} = 1\left(\frac{39.37}{12}\right)\left(\frac{7000}{451}\right) = 50.9 \text{ ft.-lbs.}$$

From the impact analysis of Section B, the critical impact velocity was found to be 248 ft/sec. With a capsule weight of 68.6 pounds, the equivalent energy is,

$$E_{cr} = \frac{1}{2}\left(\frac{68.6}{32.16}\right)(248)^2 = 6.56 \times 10^4 \text{ ft-lbs.}$$

$$\therefore \quad E_{cr} >> E_{avail}$$

E. THERMAL SHOCK

When investigating the capability of ductile materials to thermal shock, ultimate failure is dependent upon the mechanism of thermal fatigue. That is, for materials such as Hastelloy C, failure from thermal shock only occurs after N cycles where N is quite large. The capsule is thick walled; therefore, there is no possibility of distortion or thermal buckling.

Assuming a ΔT of 1800 -32 or 1768°F, the maximum strain is,

$$\epsilon_{max} = \frac{\alpha \Delta T}{1 - \lambda}$$

$$= \frac{8.5 \times 10^{-6}(1768)}{1-0.3} = .0215 \text{ in/in.}$$

A strain of .0215 in/in is at least one magnitude below the strain to failure for Hastelloy C. It is also important to note that the solution heat treatment for Hastelloy C is a water quench where the material is heated to approximately 2200°F.

ATTACHMENT 1

COMPRESSION AND IMPACT CAPABILITY

MIN-K 1301

Min-K 1301 not only represents an effective thermal insulator but has desirable structural characteristics to protect RTG components from shock and impact environments. When evaluating impact conditions the strain energy capability of Min-K is useful to apply since the area under the stress-strain curve represents the energy capability per unit volume of material. Data available in the literature (Reference A-14 and others) has been limited to a stress level of approximately 300 psi. In reality, the material has a useful capability at considerably higher stress levels. In support of this statement two test programs were conducted to stress levels in the vicinity of 1000 psi.

The first test program involved the compression of three quasi-unrestrained samples of Min-K 1301. The samples were cylindrical disks of four inches in diameter and averaged about two inches in height. The ID of the test chamber was four inches with a piston diameter of 3.75 inches. Hence, the geometry and amount of restraint was simulated to the application of interest. Loads were applied in increments over a range from zero to 12,000 pounds. The resulting data is presented in the stress-strain form in Figure A-7.

During April of this year, two additional cylindrical specimens were tested in a fully restrained condition. The length and diameter were one inch and .943 inch, respectively. A hydraulic press and a Dillon mechanical

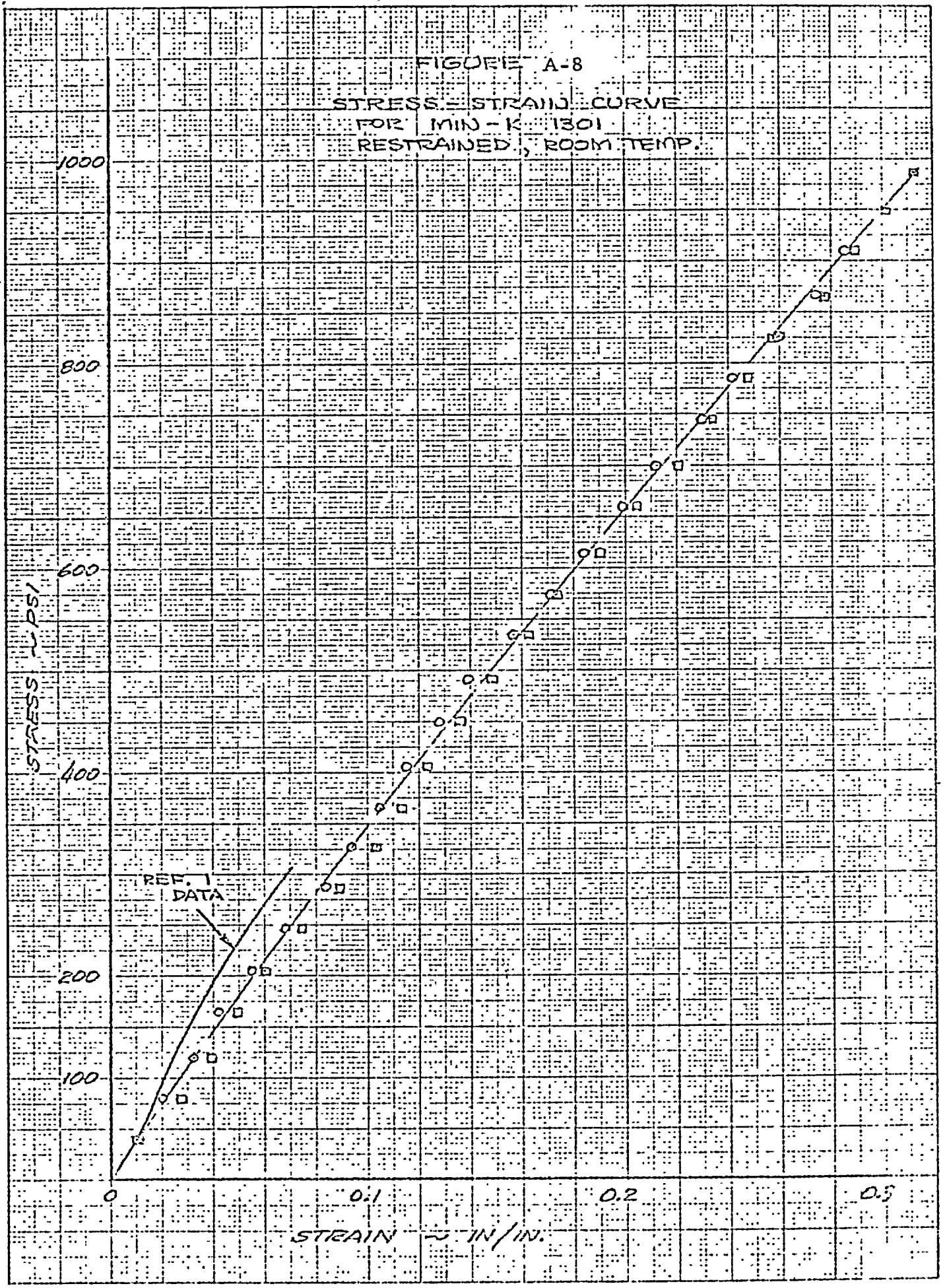
force gauge were utilized. The resulting stress-strain curve is shown in Figure A-8. Load was applied in steps of approximately 28 pounds. Beyond approximately 140 psi, a load relaxation was observed during the interval of time (5 - 10 seconds) required to obtain the displacement readings. However, for dynamic or impact evaluations, this load relaxation should have little or no significance. All tests were performed at room temperature.

FIGURE A-7

STRESS ~ STRAIN CURVE FOR MIN-K-1301 UNRESTRAINED, ROOM TEMP.

FIGURE A-8

STRESS-STRAIN CURVE FOR MIN-K 1301 RESTRAINED, ROOM TEMP.



KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1512 10 X 10 TO THE CENTIMETER 10 X 25 CM.

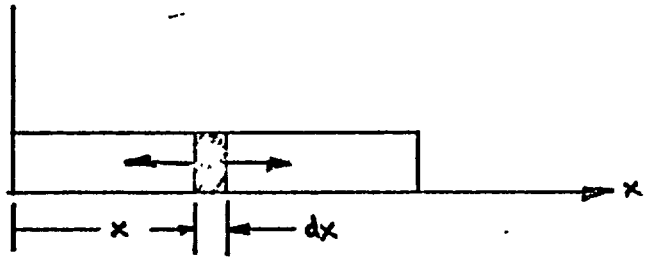
ATTACHMENT 2

IMPACT - STRESS WAVE PROPAGATION

Development of the One-Dimensional GDE (Elastic):

Dependent Variables : σ, ϵ , v

Independent Variables : x, t



Consider the prismatical bar shown of uniform cross-section. The force at x is,

$$F\Big|_x = \sigma A$$

At x + dx, the force is,

$$F\Big|_{x+dx} = \sigma A + \frac{\partial \sigma A}{\partial x} dx$$

$$= A\left[\sigma + \frac{\partial \sigma}{\partial x} dx\right]$$

Equating the net force equal to the element inertia,

$$A\left[\sigma + \frac{\partial \sigma}{\partial x} dx\right] - \sigma A = (\rho A\, dx)\frac{\partial^2 u}{\partial_t{}^2}$$

$$\therefore \frac{\partial \sigma}{\partial x} = \rho \frac{\partial^2 u}{\partial_t{}^2}$$

From Hookes' Law and the definition of strain,

$$\sigma = E\epsilon \qquad \epsilon = \frac{\partial u}{\partial x}$$

Therefore,

$$E \frac{\partial \epsilon}{\partial x} = \rho \frac{\partial^2 u}{\partial_t^2}$$

$$E \frac{\partial\left(\frac{\partial u}{\partial x}\right)}{\partial x} = \rho \frac{\partial^2 u}{\partial_t^2}$$

$$\frac{\partial^2 u}{\partial_x^2} = \frac{\rho}{E} \frac{\partial^2 u}{\partial_t^2}$$

However, the speed of sound within the material is defined as $c = \sqrt{\frac{E}{\rho}}$. Thus, the general differential equation becomes the wave equation,

$$\boxed{\frac{\partial^2 u}{\partial_t^2} = c^2 \frac{\partial^2 u}{\partial_x^2}}$$

The general solution has the form,

$$u = f(x + ct) + f_1(x-ct)$$

This represents two waves traveling along the x axis in opposite directions with constant velocity c. f and f_1 are determined by initial condition at t = o.

Example:

Initial conditions: $u\Big|_{t=o} = F(x)$

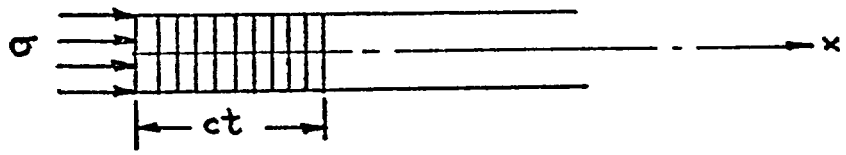
$$\frac{\partial u}{\partial t}\Big|_{t=o} = o$$

$$u\Big|_{t=o} = f(x) + f_1(x) = F(x)$$

$$\frac{\partial u}{\partial t}\Big|_{t=o} = c\,[f'(x) - f_1'(x)] = o$$

$$\therefore f(x) = f_1(x) = \frac{1}{2} F(x)$$

The initial displacement will be split into halves and propagated as waves in two opposite directions.



For the shaded zone, the decrease in lengths is $\epsilon\,(ct)$.

Particle velocity is distance/time.

$$\therefore v = \frac{\epsilon\,(ct)}{t} = \epsilon c.$$

Derivation of c:

Momentum of shaded portion of bar $= A\,c\,t\rho v$

Impulse of shaded portion of bar $= A\,\sigma t$

Equating impulse and momentum, (Ft = mv)

$$A\sigma t = A c t\, v$$

$$\sigma = c\rho v$$

$$\frac{Ev}{c} = c\rho v$$

$$\Longrightarrow \quad c = \sqrt{\frac{E}{\rho}}$$

Stain energy = $\frac{A c t \sigma^2}{2E}$

Kinetic energy = $\frac{A c t \rho v^2}{2} = \frac{A c t \sigma^2}{2E}$

Obviously strain energy = kinetic energy.

Wave propagation:

At a free end, a compressive wave is reflected as a similar tension wave.

At a fixed end, a wave is reflected entirely unchanged.

Impact Critical Velocity

From Hooke's Law, the relationship of stress and strain is given by,

$$\sigma = E\epsilon = \frac{\partial \sigma}{\partial \varepsilon}\,\epsilon$$

However, $v = \epsilon c$

$$\therefore \sigma = \frac{\partial \sigma}{\partial \epsilon}\,\frac{v}{c} = E \cdot \frac{v}{\sqrt{\frac{E}{\rho}}} \qquad \text{(elastic)}$$

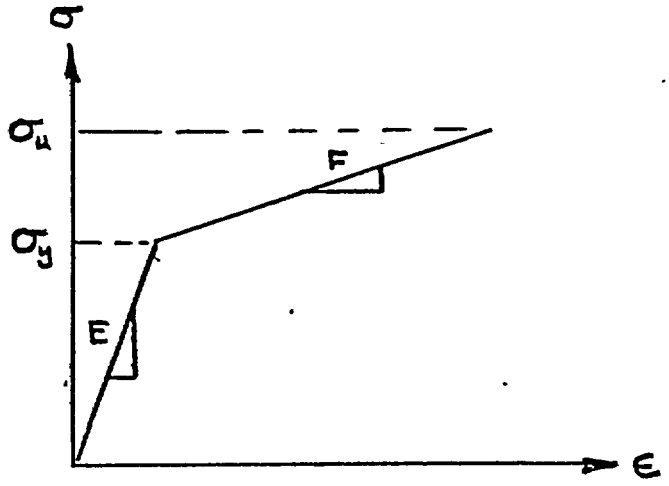
For elastic or plastic ranges,

$$\sigma = \frac{\partial \sigma}{\partial \epsilon}\,\frac{v}{\sqrt{\frac{\partial \sigma}{\partial \epsilon}/\rho}}$$

Thus, the particle velocity is,

$$v = \frac{\sigma}{\frac{\partial \sigma}{\partial \epsilon}} \sqrt{\frac{\partial \sigma / \partial \epsilon}{\rho}}$$

Consider an elastic linear strain hardening material where the elastic modulus is E and the plastic modulus is F as shown below.



The velocity may be subdivided into two parts, elastic velocity up to yield and plastic velocity.

$$v = V_E + v_o$$

$$\therefore \quad v = \frac{\sigma_y}{E}\sqrt{\frac{E}{\rho}} + \frac{\sigma_u - \sigma_y}{F}\sqrt{\frac{F}{\rho}}$$

$$\boxed{v = \frac{\sigma_y}{\sqrt{\rho E}} + \frac{\sigma_u - \sigma_y}{\sqrt{\rho F}}}$$

When taken to failure, σ_u then $v = v_{cr.}$ where $v_{cr.}$ is the critical impact velocity.

Another approach begins with the definition of wave velocity where,

$$c = \sqrt{\frac{\partial \sigma}{\partial \epsilon / \rho}}$$

Also $v = \epsilon c$

$$\therefore v = \epsilon \sqrt{\frac{\partial \sigma}{\partial \epsilon / \rho}}$$

$$= \int_o^{\epsilon} \sqrt{\frac{\partial o}{\partial \epsilon / \rho}}\, d\epsilon$$

When $v = v_{cr.}$, a plot of ϵ vs $\frac{\partial o}{\partial \epsilon / \rho}$ will produce an area under the curve. The area between o and ϵ_u represents the critical velocity.

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APPENDIX B

THERMAL ANALYSIS

I. HYPOTHETICAL ACCIDENT FIRE ANALYSIS

A. SUMMARY

The SENTINEL 100F generator is shown to be capable of experiencing a standard transportation fire without impairing its basic structural integrity. The biological shield and fuel capsule will remain intact and at temperatures well below their respective melt temperatures for at least a period of three hours after a standard one-half hour transportation fire accident. Although the internal temperatures are still slowly rising three hours after the fire, fuel containment is assured for an indefinite period even without artificial external cooling.

The analyses presented herein gives predicted temperatures for normal operation, operation on short circuit in a 130°F ambient with solar load, and operation on open circuit in a standard transportation fire for two cases. The two fire cases presented include one in which the heat of fusion of the aluminum housing is included and one in which it is neglected. Critical component temperatures are compared in Table B-1.

One additional case (Case 4) was examined. This case consisted of the finned head of the generator being buried in the earth as a consequence of an accident. No credit was taken for heat transfer to the ground. For the conditions given for Case 4, the resulting steady state temperature for the fuel capsule was calculated to be 1724°F.

TABLE B-1

PREDICTED VS CRITICAL** COMPONENT TEMPERATURES

Component	Critical Temp.(°F)	Predicted Temperatures * Case 3a(°F)	Case 3b(°F)
Fuel Liner	2550	1812	1832
Fuel Capsule	2320	1606	1645
Biological Shield	6170	1416	1456

* 3 hours after a one-half hour fire

** The liner is not a critical component. It is used at the discretion of the fueling facility. If not used, the fuel capsule temperatures shown on Table B-1 will not be appreciably affected.

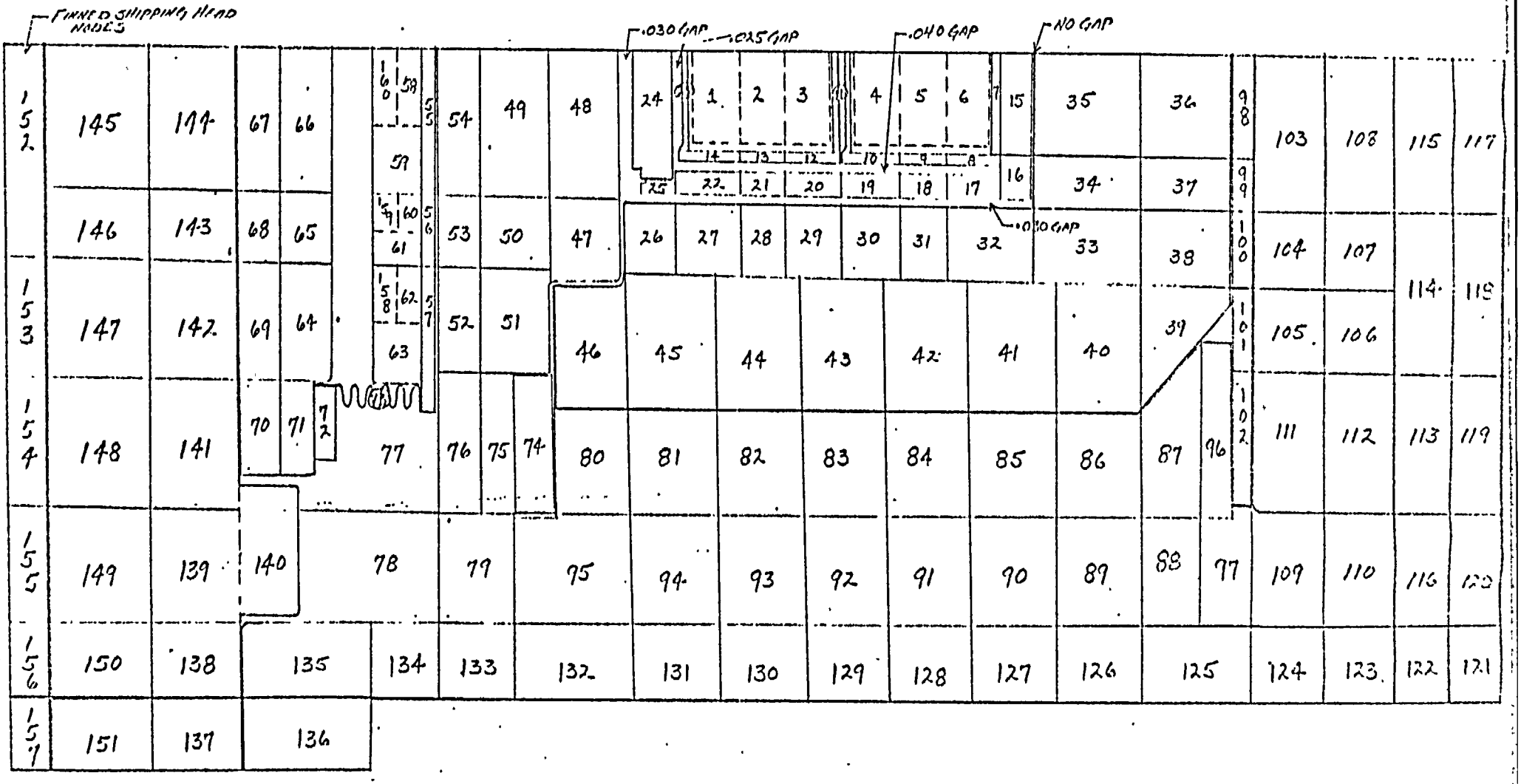
NOTE: Case 3a - includes heat of fusion of aluminum housing

Case 3b - neglects heat of fusion of aluminum housing

B. DESCRIPTION OF ANALYSIS

1. Thermal Model

The thermal model nodal map used for computer analysis of the SENTINEL 100F generator is presented in Figure B-1. Assuming symmetry about the cylindrical axis the generator is divided into 160 nodes plus node 161 which is used to represent the ambient heat sink. The thermoelectric module is approximated by nine nodes, six represent the thermoelectric elements and three represent the module insulation. The conductance values of the 96 thermoelectric elements are "dummied" to agree with the results of Teledyne Isotopes' thermoelectric code runs for these type elements. Conductances at key interfaces such as the biological shield-to-module hot plate interface, the hot plate-to-hot junction interfaces, cold junction-to-module heat sink interfaces and module heat sink-to-generator head interface are based on previous experience with SENTINEL generators utilizing hardware of similar design. To be conservative maximum gaps between the biological shield and the capsule outer wall, and between the capsule inner wall and the liner outer wall were assumed. Heat transfer through these gaps is considered to be by radiation and conduction through the argon gas. The inert gas in all gaps, insulation, and the module is assumed to be 100 percent argon. Radiation and natural convection are assumed at all external surfaces. For convection and radiation from the finned shipping head, the heat transfer coefficients used are based on the results of heat rejection tests conducted at Teledyne Isotopes on a typical finned head configuration.



161 = SINK NODE

SENTINEL 100F. NODAL MAP

FIG. B1

2. Conditions Analyzed

In order to insure the validity of the thermal model, the generator steady state temperature map and heat balance was determined for normal operating conditions as follows:

Case 1 - Normal Operation

Nominal Fuel Inventory	2100 watts
Electrical Power Output	150 watts
Ambient Temperature	75°F

No Solar Load

Finned Shipping Head in Place

The nodal temperatures obtained from this analysis are presented in Attachment 3, case 1, for comparison with the results of the transient fire accident analysis.

The second case analyzed consisted of determining the nodal temperature map and heat balance for the generator under typical shipping conditions which would exist prior to an accidental fire. In this case, the generator is normally on short circuit and the ambient temperature may be as high as 130°F. For additional conservatism it was assumed that the fuel inventory was 2500 watts which represents a practical limit to the inventory which could be loaded into this size capsule if a higher power density fuel form were to be used. The conditions thus assumed for the pre-fire case are as follows:

Case 2 - Pre-Fire Condition

Fuel Inventory	2500 watts
Short Circuit Condition, $P_{(e)} \neq 0$	
Ambient temperature	$130^{\circ}F$
Solar Load (uniform)	65 BTU/hr-ft^2
Finned Shipping Head in Place	

The resulting equilibrium nodal temperatures from the above case were used as input conditions for the fire accident analysis.

The final case analyzed was the hypothetical accidental fire condition. For this case, it is assumed that the thermoelectric module is immediately on an open circuit condition. The heat flux to all external surfaces of the generator was assumed to be that radiated from a $1475^{\circ}F$ source having an emittance of 0.9 for a period of 30 minutes. During the 30 minute fire simulation, reradiation from the exposed surfaces at an assumed emittance of 0.8 was permitted but convective cooling was assumed to be zero. At the end of the 30 minute fire, natural convection to a $130^{\circ}F$ ambient sink is restored, and a solar load is applied to all external surfaces. The nodal temperatures are then determined for a subsequent three hour period following the fire. The conditions used for the fire accident analyses were as follows:

Case 3 - Transportation Fire Accident

Fuel Inventory 2500 watts.

Open Circuit Operation, P(e) = 0

Fire: 1475°F radiation source, emissivity = 0.9

uniform impingement on all external surfaces

Exposure to Fire = 30 minutes

External Surfaces - Emittance = 0.8

Post Fire: Ambient Temperature = 130°F

Solar Load (uniform) 65 BTU/hr-ft^2

Three (3) Hour Period of Exposure

Case 4 was defined as a result of a transport accident where the finned head of the generator is embedded into the ground. The conditions used for this analysis were as follows:

Case 4 - Partial Burial Condition

Fuel Inventory = 2300 watts

Open Circuit Condition, P(e) = 0

Ambient Temperature = 130°F

Solar Load (uniform) = 65 BTU/hr-ft^2

Finned Head Buried

3. Computer Code

The four cases discussed above were analyzed using Teledyne Isotopes Thermal Analyzer Program called TAP 3. The TAP 3 program is a digital computer code (Fortran extended) which solves three-dimensional

transient heat transfer problems through the use of networks of conductors and capacitors. Steady state problems are also readily solved using this program by assigning zero values to the capacitors and running the transient calculation until a heat balance is achieved.

This code is extremely flexible for heat transfer problems in that each of the parameters (i.e., temperature, internal or external heat generation, capacity, and conductance) can be made to depend upon time or any of the other parameters in the network in any desired manner. This makes possible the solution of problems involving variable material properties, phase changes, ablation, convection and radiation. A programming feature within the code allows the automatic removal of melted or ablated surface nodes and automatic switching of external heat inputs, radiation and convection functions to the nodes beneath the removed ones. The code solves the heat diffusion equation by a forward finite difference technique.

The code is a descendant of the Lockheed Thermal Analyzer Program, and has been used in various forms throughout the Industry by companies such as Lockheed, North American Aviation, Atomics International, S&ID, and Rocketdyne Divisions. (See References B-1, B-2 and B-3.) Teledyne Isotopes' version of the code was originally obtained from the Atomics International Division of NAA, Inc. and has been revised and improved since that time.

The material properties used for the analysis described herein are presented in Attachment 4, along with other pertinent assumptions.

4. Discussion of Results of Transport Fire and Burial Analysis

Analysis of the fire accident case is complicated by the presence of the aluminum housing in the SENTINEL 100F design. The aluminum surface nodes possess considerable heat capacity in the form of latent heat of fusion. Since previous analyses have often neglected this energy absorbing potential of the housing under the assumption that it is conservative, it was decided to conduct the analyses of the SENTINEL 100F unit both ways to determine if this actually was a conservative approach. It was felt that the immediate removal of surface nodes upon their reaching melting temperature removes a large reservoir of thermal energy from the external nodes. The inclusion of this reservoir in the analysis, it was felt, might actually drive the internal temperatures higher during the post-fire-soak period if not removed. Therefore for the first fire case analyzed (see Case 3a, Attachment 3, and Figure B-2), only those nodes which completed their phase change were removed from the problem. The results of this analysis show that only one node (Node 121), a corner node, actually completely melted. This node melts because the fire heat flux is assumed to be uniformly impinging on all external surfaces (very conservative) and the corner node is thus exposed to the heat flux on two sides (sides and bottom). This fact coupled with the fact that it cannot conduct the heat away from this corner as readily as, for example, the upper corner node (Node 157) is able to, results in a complete melt of this node. As shown in Attachment 3 all the external aluminum nodes reach melt temperature and partially melt

during the one-half hour fire period except three of the finned head nodes. For the finned head nodes, the volume of the fins was neglected in determining the heat capacity of these nodes during the fire. Table B-1 presents a comparison of the predicted maximum temperatures (three hours after the fire) of certain critical materials of the generator with their melt temperatures. Three hours after the end of the fire, the external surface nodes are cooling down but the majority of the internal nodes are still slowly rising. Figure B-2 presents a temperature history of some pertinent nodal temperatures for this case.

The second fire case analysis, Case 3b, was conducted by removing the aluminum nodes from the problem as soon as they reached a melt temperature of 1140°F. The first nodes reached melt temperature about 18+ minutes into the fire period for the model shown in Figure B-1. Although most of the exterior aluminum nodes reached melt temperature during the fire period and were removed from the problem, very few of the second layer of aluminum nodes actually reached melt temperature except the bottom nodes 113 through 116. At the end of the fire period, housing nodes 138 through 150, nodes 152 through 154 and the module heat sink nodes 64 through 71 had not reached melt temperature. Figure B-3 presents a temperature history of some pertinent nodal temperatures for Case 3b. It should be noted that this case resulted in internal component temperatures after three and one-half hours (i.e., liner, capsule and biological shield) which are from 20 to 40°F higher than the first case,

SENTINEL 100F GENERATOR
HYPOTHETICAL FIRE ACCIDENT
CASE (α) – HT. OF FUSION INCLUDED
PRE-FIRE CONDITIONS:
Q INV = 2500 W
SHORT CIRCUIT *
SOLAR LOAD
130°F AMBIENT
* THERMAL OR OPEN CIRCUIT UPON INITIATION OF FIRE
T_{T2} LINER (MAX)
T_{122} HOUSING (MAX)
T_{T20} CAPSULE (MAX)
T_{46} MODULE HEAT SINK (MAX)
T_{35} BIO-SHIELD (MAX)
T_{9L} MIN-K (MAX)
END OF FIRE
TIME FROM START OF FIRE, MINUTES
TEMPERATURE (°F)
SCALE (A) : ○, △, □, ◇
(A)
(B)
(B)
(B

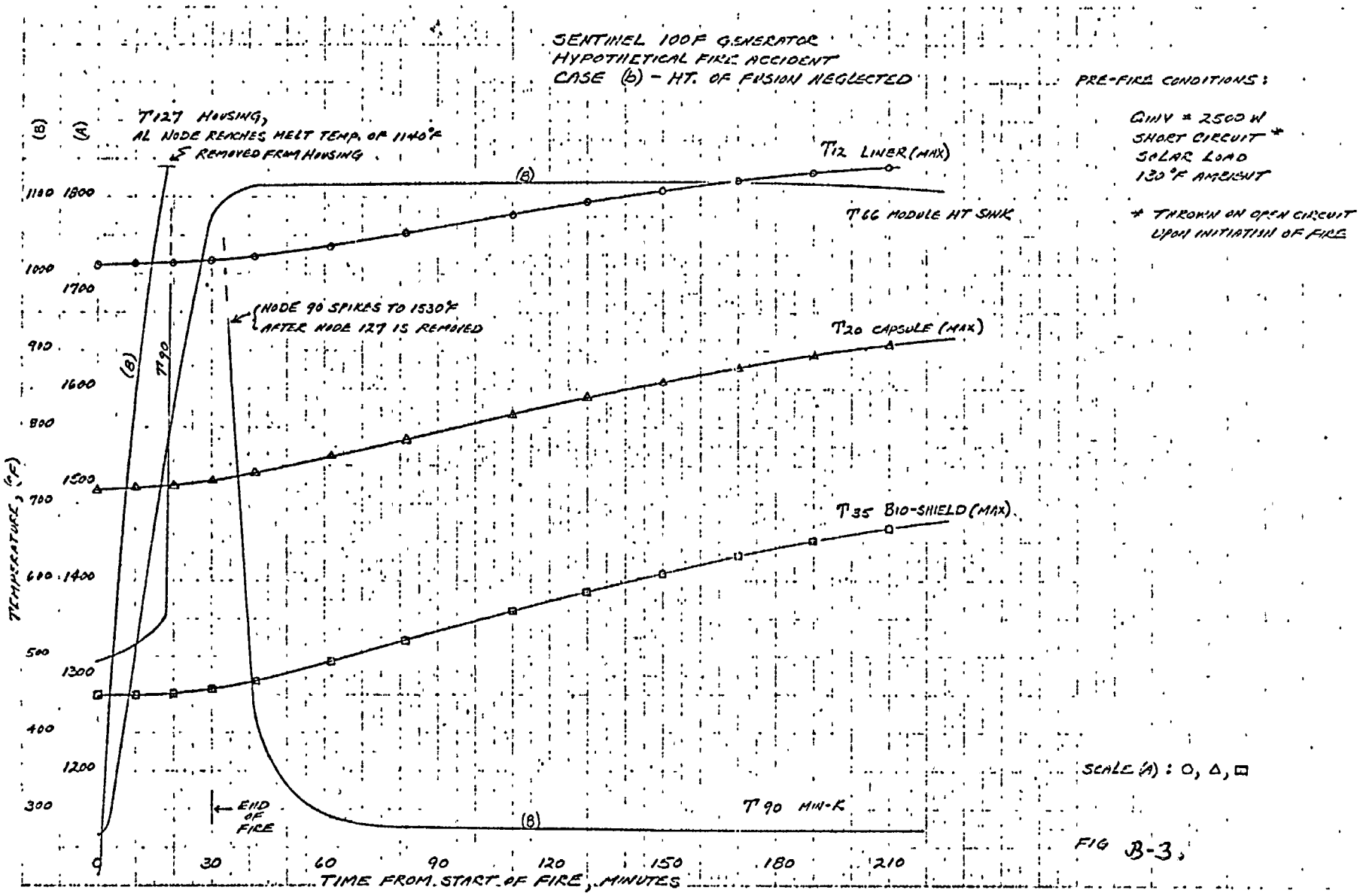

SENTINEL 100F GENERATOR
HYPOTHETICAL FIRE ACCIDENT
CASE (b) - HT. OF FUSION NEGLECTED
PRE-FIRE CONDITIONS:
QINV = 2500 W
SHORT CIRCUIT *
SOLAR LOAD
130°F AMBIENT
* THROWN ON OPEN CIRCUIT UPON INITIATION OF FIRE
T127 HOUSING, AL NODE REACHES MELT TEMP. OF 1140°F & REMOVED FROM HOUSING
T12 LINER (MAX)
T66 MODULE HT SINK
(NODE 90 SPIKES TO 1530°F AFTER NODE 127 IS REMOVED
T20 CAPSULE (MAX)
T90
T35 BIO-SHIELD (MAX)
T90 MIN-K
END OF FIRE
SCALE (A): ○, △, □
TEMPERATURE, (°F)
TIME FROM START OF FIRE, MINUTES
0
30
60
90
120
150
180
210
1100
1000
900
800
700
600
500
400
300
1800
1700
1600
1500
1400
1300
1200

FIG B-3.

Case 3a. Therefore, it appears that, for all practical purposes, from a safety standpoint, the assumption of either case is justified for this type of analysis.

The burial case resulted in a steady state temperature of 1724°F (max.) for the fuel capsule. The fuel capsule was used since its melt temperature is ~2500°F compared to ~6000°F for the shield. It should be noted that the initial conditions, such as no credit taken for heat transfer to the ground and the maximum inventory being used, represent a conservative approach.

5. Conclusions

It is concluded that the SENTINEL 100F generator is capable of surviving a standard transportation fire without damage to either the biological shield or the fuel capsule and thus fuel containment is assured.

REFERENCES

B-1. Abrahams, R.S. and Fick, J.L., "Engineering Utiliqation Manual -- Thermal Network Analyzer Program -- IBM 709-7090 Computer," Lockheed Aircraft Corp. Missiles and Space Div. TM-59-24-1, April 28, 1961.

B-2. Baughn, J. and Elliott, R., "Thermal Analyzer Program (TAP), NAA-SR-TDR 7710, September 10, 1962.

B-3. Segard, R.O. and Alexander, H.V., "Thermal Network Analyzer Program," NAA S&ID, SID 63-332, 30 April 1963.

ATTACHMENT 3

PREDICTED SENTINEL 100 RTG TEMPERATURES

(NOTE: Fractions of Degrees Not Shown)

	NODE	CASE 1	CASE 2	CASE 3a(3 hrs. aft. 30 min. transportation fire accident)	CASE 4
		Normal 2100w INV. P(e)=150w AMB=75°F No Solar	Short Circuit 2500w INV. P(e) = 0 AMB = 130°F Solar Load	Open Circuit 2500w INV. P(e) = 0 AMB = 130°F Solar Load	Open Circuit 2300w INV. P(e) = 0 AMB = 130°F Solar Load Head Buried
1	Fuel	1763 °F	1915 °F	2005	2069
2		1927	2112	2199	2254
3		1952	2141	2225	2281
4		1906	2092	2182	2246
5		1829	2012	2112	2190
6		1518	1729	1843	1951
7	Liner	1321	1423	1545	1677
8		1362	1466	1579	1702
9		1493	1602	1697	1798
10		1533	1641	1730	1823
11		1876	2048	2133	2195
12		1613	1729	1812	1895
13		1554	1662	1748	1833
14		1494	1595	1687	1775
15	Capsule	1262	1359	1486	1627
16		1226	1318	1449	1595
17		1273	1370	1494	1633
18		1328	1431	1549	1677
19		1361	1465	1579	1701
20		1386	1493	1606	1724
21		1369	1472	1586	1700
22		1338	1436	1554	1667
23	Liner	1564	1673	1762	1840
24	Capsule	1334	1431	1554	1663
25	Capsule	1310	1403	1526	1640
26	Bioshield	1124	1203	1362	1501
27		1135	1216	1371	1513
28		1146	1228	1380	1525
29		1154	1238	1387	1533
30		1160	1245	1391	1539

NODE		CASE 1	CASE 2	CASE 3a	CASE 4
31	Bioshield	1164 °F	1250 °F	1394 °F	1544
32		1168	1254	1395	1547
33		1174	1261	1399	1551
34		1181	1268	1406	1558
35		1190	1279	1416	1567
36		1180	1268	1404	1557
37		1176	1263	1400	1553
38		1173	1260	1397	1550
39		1170	1257	1394	1547
40		1169	1256	1394	1547
41		1166	1252	1393	1545
42		1161	1246	1389	1540
43		1153	1236	1384	1532
44		1141	1223	1375	1519
45		1127	1206	1363	1504
46		1114	1191	1353	1491
47		113	1190	1353	1490
48		1109	1185	1351	1486
49		1100	1174	1342	1475
50		1102	1177	1344	1478
51		1104	1179	1345	1480
52		1094	1167	1337	1468
53		1090	1163	1334	1464
54		1088	1160	1333	1463
55	Hot Plate	1060	1127	1311	1432
56		1062	1130	1312	1434
57		1076	1146	1323	1448
58	Hot Junction	996	1054	1267	1374
59	Module Min-k	685	758	977	997
60	Hot Junction	998	1057	1269	1377
61	Module Min-k	684	756	976	996
62	Hot Junction	1011	1071	1278	1390
63	Module Min-k	691	764	981	1003
64	Module Ht. Sink	172	254	541	369
65		179	262	546	377
66		185	269	550	384

NODE		CASE 1	CASE 2	CASE 3a	CASE 4
67	Module Ht. Sink	178 °F	260 °F	545°F	376
68		173	254	542	370
69		168	248	538	364
70		162	241	533	357
71		163	242	534	358
72	Module Ring	163	243	535	359
73	Bellows	619	694	929	944
74	Holo Down Ring	1112	1188	1348	1489
75	Gen.Min-k	1008	1083	1230	1415
76		818	892	1056	1167
77		397	473	738	756
78		196	273	608	440
79		310	385	676	510
80		878	954	1110	1222
81		872	949	1099	1216
82		873	952	1099	1214
83		880	961	1107	1222
84		887	967	1115	1229
85		895	979	1125	1238
86		919	1003	1146	1265
87		974	1059	1179	1328
88		489	568	913	724
89		438	516	863	662
90		416	494	824	637
91		410	488	800	632
92		408	485	782	633
93		405	481	766	631
94		396	472	750	624
95		332	407	699	545
96		1038	1123	1243	1401
97		595	674	974	855
98	Shield Support Plate	1185	1275	1403	1556
99		1175	1262	1399	1552
100		1172	1259	1396	1549
101		1162	1248	1382	1536

NODE		CASE 1	CASE 2	CASE 3a Time Node Reaches Melt Temp. Seconds	CASE 4
102	Shield Plate Support	1129 °F	1214 °F	1345 °F	1502
103	Gen.Min-k	940	1023	1158	1309
104		927	1010	1146	1285
105		914	998	1137	1251
106		440	520	948	655
107		450	530	930	668
108		460	550	924	680
109		649	726	951	915
110		358	434	924	545
111	Glass Rock Support	888	964	1155	1199
112		430	514	1002	643
113	Aluminum Housing	135	213	991	268
114		135	213	976	267
115		135	213	970	267
116		135	213	1007	267
117		135	213	966 * (1343)	267
118		135	213	972 * (1332)	267
119		1135	213	985 * (1300)	267
120		135	212.5	993 * (1265)	267
121		135	212	Completely Melted @ 1793 Sec. (1194)	267
122		1135	212	1031 * (1220)	268
123		135.5	212	955 * (1174)	269
124		1366	213	883 * (1138)	271
125		137	214	812 * (1112)	275
126		138	215	750 * (1100)	279
127		138	216	702 * (1100)	283
128		139	217	663 * (1112)	287
129		141	218	630 * (1141)	292
130		142	219	603 * (1200)	298
131		143	220	581 * (1303)	305
132		145	222	562 * (1493)	313
133		147	224	546 * (1639)	322
134		148	225	537 * (1773)	328
135		150	226	529	336
136		150	226	525 * (1730)	336

* Indicates partially melted nodes

NODE	CASE 1	CASE 2	CASE 3a Time Node Reaches Melt Temp. Seconds	CASE 4
137 Aluminum Housing	150 °F	227 °F	522 °F * (1739)	339
138	151	227	524	341
139	152	229	526	344
140	152	228	527 °	341
141	157	235	529	352
142	162	241	533	358
143	165	244	535	362
144	168	248	538	367
145	161	239	532	360
146	159	237	530	358
147	157	234	529	354
148	154	231	526	350
149	151	228	524	345
150	150	226	522	342
151	150	226	520 * (1730)	341
152 Alum. Finned Head	156	226	529	358
153	153	233	525	353
154	151	230	523	349
155	149	227	521 * (1785)	345
156	148	225	519 * (1724)	343
157	149	225	517 * (1645)	342
158 Cold Junction	214	306	572	414
159	220	313	577	421
160	225	319	581	427
161 Ambient	75	130	130	130

* Indicates partially melted nodes (NOTE: Fire ends at 1805 seconds)

ATTACHMENT 4

MATERIAL PROPERTY DATA

TABLE	TEMPERATURE(°F)	PROPERTY VALUES	MATERIAL/PROPERTY TYPE (UNITS)
1	440.	5.43E-04	FUEL COND. VS TEMP. (BTU / FT-SEC-F) $Sr_2 T_1 O_4$
	890.	5.153E-04	
	1340.	4.90E-04	
	2240.	4.465E-04	
	3140.	4.10E-04	
2	200.	2.594E-03	LINER COND. VS TEMP. 304SS
	500.	2.985E-03	
	800.	3.375E-03	
	1200.	3.894E-03	
	1600.	4.416E-03	
	2000.	4.939E-03	
	2400.	5.460E-03	
3	400.	2.053E-03	CAPSULE COND VS TEMP. Hastelloy C
	800.	2.612E-03	
	1200.	3.171E-03	
	1600.	3.730E-03	
	2000.	4.289E-03	
	2400.	4.848E-03	
4	500.	2.222E-02	BIO-SHIELD COND VS TEMP. Tungsten
	1000.	2.028E-02	
	1540.	1.889E-02	
	2000.	1.722E-02	
	3040.	1.661E-02	
5	100.	3.630E-06	MIN-K COND. VS TEMP. J-M 1301
	500.	4.755E-06	
	800.	5.614E-06	
	1100.	6.580E-06	
	1300.	7.480E-06	
	1600.	9.620E-06	
6	75.	2.686E-02	ALUMINUM COND. VS TEMP. 6061 T-6
	212.	2.778E-02	
	572.	3.000E-02	
	932.	3.139E-02	
	1200.	3.222E-02	
7	75.	1.407E-05	GLASSROCK COND. VS TEMP. GR # 50
	300.	1.900E-05	
	500.	2.300E-05	
	800.	3.000E-05	
	1000.	3.200E-05	
	1300.	3.500E-05	
	1600.	4.200E-05	
	1800.	4.900E-05	
	2000.	6.500E-05	
8	50.	2.500E-04	T/E ELEM COND. 2N-TAGS
	1500.	2.500E-04	

TABLE	TEMP. (°F)	VALUE	MATERIAL TYPE
9	440.	41.586	
	890.	43.72	FUEL HT CAP. TIMES RHO
	1340.	45.15	
	2240.	47.49	
	3140.	49.64	(BTU / CU.FT.-F)
10	0.0	60.0	
	200.	62.12	
	500.	67.13	
	800.	71.39	LINER CP TIMES RHO
	1200.	75.90	
	1600.	79.76	
	2000.	83.40	
	2400.	87.67	
11	200.	61.38	
	600.	73.10	CAPSULE CP TIMES RHO
	1000.	84.81	
	1400.	96.53	
	1800.	108.25	
	2200.	119.97	
12	400.	42.15	
	800.	43.96	SHIELD CP TIMES RHO
	1200.	45.767	
	1600.	48.17	
	2400.	52.39	
	3200.	55.89	
13	100.	3.80	
	200.	4.02	MIN-K CP TIMES RHO
	400.	4.40	
	600.	4.68	
	800.	4.92	
	1000.	5.12	
	1400.	5.38	
	1800.	5.60	
	2000.	5.68	
14	32.	35.59	
	212.	37.60	
	392.	39.61	ALUM. CP TIMES RHO
	572.	41.625	
	752.	43.636	
	932.	45.664	
	1112.	47.675	
	1200.	43.77	
15	75.	9.0	
	300.	9.9	GLASSROCK CP TIMES RHO (50)
	500.	10.8	
	800.	11.7	
	1000.	12.15	
	1300.	12.6	
	1600.	13.05	
	1800.	13.275	
	2000.	13.50	
16	100.	18.64	
	300.	20.04	T/E ELEMENTS CP TIMES RHO
	500.	21.44	
	700.	22.834	
	900.	24.23	
	1100.	25.63	
	1300.	27.03	
	1500.	28.43	

TABLE	TEMP. (°F)	VALUE	MATERIAL TYPE
17	200.	0.44	LINER
	600.	0.492	EMISS. VS TEMP.
	1000.	0.544	
	1400.	0.596	
	1800.	0.648	
	2000.	0.674	
	2400.	0.726	
18	200.	0.50	
	600.	0.567	CAPSULE EMISS.
	1000.	0.634	VS TEMP.
	1400.	0.701	
	1800.	0.768	
	2200.	0.835	
19	400.	0.188	
	800.	0.210	SHIELD EMISS.
	1200.	0.232	VS TEMP.
	1600.	0.254	
	2400.	0.298	
	3200.	0.342	
20	75.	0.55	
	100.	0.57	ALUM. EMISS.
	225.	0.60	VS TEMP.
	300.	0.80	
	600.	0.80	
	1200.	0.80	
21	0.0	0.0	FIRE HT FLUX
	5.0	6.0037	
	1800.	6.0037	
	1805.	0.018	SOLAR HT FLUX
	14400.	0.018	
23	0.0	0.8	MIN-K E VS
	1500.	0.8	TEMP.
24	0.	1.805E-03	BASE PLATE, HOLD DOWN
	400.	2.22E-03	RING - COND . VS TEMP.
	800.	2.83E-03	(BTU/FT-SEC-°F)
	1200.	3.47E-03	INCONEL 750
	1600.	4.305E-03	
25	0.0	51.5	BASE PLATE, HDR
	400.	59.23	HT.CAP.TIMES RHO
	800.	65.4	(BTU/FT^3°F)
	1200.	71.06	
	1600.	90.12	
	1800.	101.45	

NODE	MELT TEMP(°F)	BTU PER NODE	
113	1140.	2915.	HT OF FUSION (Aluminium)
114	1140.	2691.4	HT OF FUSION
115	1140.	675.4	HT OF FUSION
116	1140.	2743.3	HT OF FUSION
117	1140.	675.4	HT OF FUSION
118	1140.	2691.4	HT OF FUSION
119	1140.	2915.	HT OF FUSION
120	1140.	2743.3	HT OF FUSION
121	1140.	3069.	HT OF FUSION
122	1140.	3069.	HT OF FUSION
123	1140.	3774.	HT OF FUSION
124	1140.	3774.	HT OF FUSION
125	1140.	4189.2	HT OF FUSION
126	1140.	3085.3	HT OF FUSION
127	1140.	4717.6	HT OF FUSION
128	1140.	4717.6	HT OF FUSION
129	1140.	4717.6	HT OF FUSION
130	1140.	4717.6	HT OF FUSION
131	1140.	4717.6	HT OF FUSION
132	1140.	3396.7	HT OF FUSION
133	1140.	3604.3	HT OF FUSION
134	1140.	1086.	HT OF FUSION
135	1140.	4721.8	HT OF FUSION
136	1140.	6081.	HT OF FUSION
137	1140.	5472.9	HT OF FUSION
138	1140.	3636.1	HT OF FUSION
139	1140.	3248.7	HT OF FUSION
140	1140.	2294.4	HT OF FUSION
141	1140.	4059.5	HT OF FUSION
142	1140.	2467.9	HT OF FUSION
143	1140.	1184.8	HT OF FUSION
144	1140.	935.2	HT OF FUSION
145	1140.	935.2	HT OF FUSION
146	1140.	1184.8	HT OF FUSION
147	1140.	2467.9	HT OF FUSION
148	1140.	4059.5	HT OF FUSION
149	1140.	3248.7	HT OF FUSION
150	1140.	3636.1	HT OF FUSION
151	1140.	5472.9	HT OF FUSION
152	1140.	757.5	HT OF FUSION
153	1140.	822.6	HT OF FUSION
154	1140.	1370.4	HT OF FUSION
155	1140.	1265.3	HT OF FUSION
156	1140.	1416.5	HT OF FUSION
157	1140.	1817.2	HT OF FUSION
64	1140.	670.2	HT OF FUSION
65	1140.	321.5	HT OF FUSION
66	1140.	254.0	HT OF FUSION
67	1140.	270.1	HT OF FUSION
68	1140.	342.3	HT OF FUSION
69	1140.	712.9	HT OF FUSION
70	1140.	873.8	HT OF FUSION
71	1140.	1109.1	HT OF FUSION

INTERFACE	CONDUCTANCE PER UNIT AREA ($BTU/FT^2-HR-°F$)	
Bioshield-To-Hot Plate	575	
Hot Plate-To-Hot Junction	325	
Cold Junction-To-Module Ht.Sink	425	
Module Heat Sink-To-Housing Lid	1500	(greased interface)
T/E Elements (Open Circuit)	20.25	

C. SUPPLEMENTARY THERMAL INFORMATION R4

Included in this section is additional thermal data which was originally supplied as supplements dated November 30 and December 20, 1971 and January 19, 1972 at the request of the licensing agency. For clarity, all written correspondance has been included. The section begins with the request from the licensing agency - letter DML:RHO (19-01398-34) and continues in chronological order with the data submittals and their cover letters. Only Attachment B (TAP 3 User's Manual) of letter TPS-CNY-254 (supplement dated 20 December 1971) has been omitted as explained in the Preface of this report.

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

NOV 15 1971

DML:RHO
(19-01398-34)

Isotopes, Incorporated
Nuclear Systems Division
ATTN: Mr. C. Young
110 West Timonium Road
Timonium, Maryland 21093

Gentlemen:

This refers to your application dated August 10, 1971, pertaining to the Sentinel 100F thermoelectric generator. In connection with our review of this application, please submit the information identified in the enclosure to this letter.

A word of explanation is in order concerning your interpretation of the thermal analysis requirements of Appendix B of Part 71. The transient analysis was followed for only three hours after the end of the thermal test even though the temperatures of the fuel capsule were still rising. These temperatures should have been followed until they started to fall or reached steady state. However, it is true that in this case there is little probability that the fuel capsule temperature will rise much further if indeed the temperature at three hours is only 1646°F.

Apparently, the misinterpretation arose from the statement in Appendix B in 10 CFR 71 which states that a package shall not be cooled artificially until three hours after the test period unless the temperature within the package begins to fall in less than three hours. This statement in the regulation is related to extinguishing the fire on the outside of a package, as from a wooden overpack, and does not relate to cooling of an internal heat source.

Sincerely,

D. A. Nussbaumer

D. A. Nussbaumer, Chief
Fuel Fabrication and
Transportation Branch
Division of Materials Licensing

Enclosure:
As stated

Isotopes, Incorporated
Timonium, Maryland 21093
License Number 19-01398-34
Enclosure to Letter Dated NOV 15 1971

1. References for all relevant thermal properties for all the materials listed on pages 84 through 86. Information concerning the fuel, bioshield, MIN-K, glassrock, and the emissivities of all materials, is essential to our review.

2. Descriptions of experiments, computer code, and calculations used for evaluating the effective thermal properties of the thermoelectric elements.

3. Description of tests and calculations used to evaluate the effective conductances of key interfaces as listed on page 88.

4. Does the effective conductivity of the thermoelectric elements given on page 84 include the interface resistances given on page 88? Please explain.

5. The thermal properties for nodes 55 through 73 and 158 through 160 as a function of temperature.

6. Description of correlations and values used for all the boundary conditions (radiation and natural convection heat transfer coefficients).

7. Description of tests conducted for evaluating the heat transfer from the finned shipping head. Also, state the fin dimensions and calculate the actual external surface area.

8. Justification for the value of 65 $Btu/hr \cdot ft^2$ used for the solar heat load. State the value of solar absorptivity used for the cask surface.

9. Two copies of the latest users manual for the TAP3 computer program. Please indicate and explain all revisions to the program made since the manual was published.

10. Explanation as to how the TAP3 program handles both fire and internal gap radiative heat transfer. The table on page 86 indicates a constant heat flux from 5°F to 1800°F. The fire heat flux is a function of the cask surface temperature and is normally calculated by the program.

TELEDYNE
ISOTOPES

110 WEST TIMONIUM ROAD
TIMONIUM MARYLAND 21093
TELEPHONE. (304) 252-8220
TELEX 87-780

Supplement Dated Nov. 30, 1971

Refer to: TPS-CNY-239
30 November 1971

Mr. D. A. Nussbaumer, Chief
Fuel Fabrication and Transportation Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Gentlemen:

In response to your letter of 15 November 1971, reference DML:RHO (19-01398-34), we are submitting the enclosed data. Each item has been answered individually; but, because of the general nature of some requests, it has been necessary to limit the reply to what we believe to be the pertinent facts. Complete documentation would require a very lengthy report.

The TAP3 Computer Program Users Manual (Item 9 in your letter) is currently being rewritten to incorporate all existing amendments. It is expected that this work will be completed within the next two weeks. Two copies will be forwarded to you as soon as the manual becomes available.

We trust that this data will meet your requirements. If you have further questions, please do not hesitate to ask.

Sincerely,

NUCLEAR SYSTEMS DIVISION

C. N. Young

C. N. Young

/mb

Enclosure

REFERENCES FOR ITEM 1.

(a) "Properties and Fabrication of Curium-244 and Strontium-90 Fuel Forms," by R. E. McHenry, Oak Ridge National Laboratory. Published in Symposium on Materials for Radioisotope Heat Sources 10/2/68, Vol. 14 Nuclear Metallurgy.

(b) ORNL-4043, AEC Research & Development Report, "Strontium-90 Data Sheets," by S. J. Rimshaw and E. E. Ketchen (Conf.)

(c) Aerospace Structural Metals Handbook, ASD-TDR 63-741, Vol's I, II and IIa, March 1967, Air Force Materials Lab., Research and Technology Division, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.

(d) GlasRock Products, Inc. Bulletins dated 1/6/70, GlasRock Products, Inc., 2210 Marietta Boulevard N.W., Atlanta, Georgia 30318.

(e) Johns-Manville Product Bulletins IN-758A and ALO-3633-7, AEC Research and Development Report Phase I Final Report, Oct. 2, 1967, by J. O. Collins, J. M. Research and Engineering Center.

(f) Johns-Manville Product Bulletin IN-502A.

(g) Thermophysical Properties of Matter, The TPRC Data Series Vol. 7, Thermal Radiative Properties, Metallic Elements and Alloys, by Y. S. Touloukian and D. P. Dewitt, IFI/Plenum NY-Wash. 1970.

1. References for all relevant thermal properties for all the materials listed on pages 84 through 86. Information concerning the fuel, bioshield, MIN-K, glassrock, and the emissivities of all materials, is essential to our review.

Material	Property	Reference
(1) FUEL ($SR_2T_1O_4$) (4.93 g/cm^3)	Conductivity	(a)
	Specific Heat	(b)
(2) LINER (304SS) (8.029 g/cm^3)	Conductivity	(c) Vol. I.
	Specific Heat	(c) Vol. I.
	Emissivity	(c) Vol. I.
(3) CAPSULE (Hastelloy-C) (8.492 g/cm^3)	Conductivity	(c) Vol. II.a.
	Specific Heat	(c) Vol. II.a.
	Emissivity	(c) Vol. II.a.
(4) BIO-SHIELD (Tungsten) (19.3 g/cc)	Conductivity	(c) Vol. II.a.
	Specific Heat	(c) Vol. II.a.
	Emissivity**	(g)
(5) INSULATION (Johns-Manville) (Min-K 1301) (20 lbs/ft^3)	Conductivity*	(e)
	Specific Heat	(f)
(6) HOUSING, HEAT SINK, SHIPPING HEAD (6061-T-6 Aluminum) (169 lbs/ft^3)	Conductivity	(c) Vol. II.
	Specific Heat	(c) Vol. II.
	Emissivity**	**Specified as .8 for fire analysis
(7) SHIELD SUPPORT INSULATION (Glass Rock #50) (45 lbs/ft^3)	Conductivity	(d)
	Specific Heat	(d)
(8) SHIELD BASE PLATE & HOLD DOWN RING (Inconel 750) (8.253 g/cm^3)	Conductivity	(c) Vol. II.a.
	Specific Heat	(c) Vol. II.a.

* Thermal conductivity is modified to account for our experience with argon gas filled Min-K formulations. Analysis of RTG performance data indicates R-values should be about 10% higher than published values.

** The tungsten biological shield is chrome plated on all inner & outer surfaces.

2. Descriptions of experiments, computer code, and calculations used for evaluating the effective thermal properties of the thermoelectric elements.

The thermoelectric code used by Teledyne Isotopes NSD is called "VINCE-TOM" and is based upon the evaluation of the following differential equation for the temperature distribution through the T/E elements:

$$\frac{d}{dx}\left(k A \frac{dT}{dx}\right) + \frac{I^2 \rho}{A} + \tau I \frac{dT}{dx} = 0$$

This equation considers all heat transport effects including conduction, Joule heating and Thompson heating and is solved by the code for both elements of the couple. The code also calculates the heat required for the thermoelectric elements, and the electrical power output for any number of couples in any series, parallel or series-parallel configuration for any external load situation. The major inputs to the code are couple geometry and material properties. The property data for the 2N/TAGS/SnTe materials system used in the SENTINEL 100F module is well known and documented. These materials have been utilized in a number of the SNAP 19, Viking and Pioneer space generators, and in the SNAP 29 generators. Numerous tests and correlations of generator and couple performance have established the validity of the thermoelectric property data and the ability of the code to predict their performance.

The 2N/TAGS/SnTe couple used in the SENTINEL 100F is a single doped N-element and a segmented P-element. Since the thermal conductivity of these three materials exhibit different shaped curves as a function of temperature, the only practical way to define the conductance for the thermal code is to use the predicted heat flow and ΔT_{HJ-CJ} from the T/E code; i.e.,

$$C = \frac{Q_{T/E}}{\Delta T_{HJ-CJ}}$$

3. Description of tests and calculations used to evaluate the effective conductances of key interfaces as listed on page 88.

The interfaces listed on page 88 exist on nearly every SENTINEL and SNAP generator built by Teledyne Isotopes and this includes some 25 SENTINEL types and a dozen SNAP type generators.

The hardware in each is practically identical except for size. The properties of the thermoelectric materials are well know using

these in our thermoelectric code, good agreement is found between the electrical power generated and predicted at measured hot and cold junction temperatures in a generator configuration. Therefore, the heat flow through the thermoelectric elements is known. Since we also measure hot plate temperature and fin root temperature on our generators, the interface conductances are readily calculated.

In the past, we have conducted heat transfer tests on instrumented cold end hardware and these were found to be in good agreement with values measured in the generator configuration. Currently, we have been testing a partial mock up of the SENTINEL 100F T/E module. This module is fully instrumented to provide cold end temperature drops using the exact hardware that will exist in the SENTINEL 100F module. Analysis of this data indicates that the cold end conductance will be even higher than assumed for the fire analysis so the initial internal temperatures will be lower than those presented.

In addition to the above, an in-house program was conducted about six months ago in which the effective conductance of various generator type interfaces were evaluated. These tests included evaluations of dry interfaces and interfaces employing various types of thermal greases or compounds. The grease currently being employed is Dow Corning DC-340 thermal compound.

4. Does the effective conductivity of the thermoelectric elements given on page 84 include the interface resistances given on page 88? Please explain.

No, it represents the effective conductivity of the T/E elements on open circuit. The interface resistances presented on page 88 represent our experience with the various hardware interfaces presented. The conductances are based on either the common area between the nodes involved or on the element area in the case of the hot plate-to-hot junction and cold junction-to-module heat sink conductances.

5. The thermal properties for nodes 55 through 73 and 158 through 160 as a function of temperature.

Nodes (55, 56, 57), 72 and 73 are the module hot plate, bellows and lower ring of bellows assembly and are 300 series stainless steel. Properties are given in tables presented in INSD-3080 attachment 4. Nodes 58, 60, 62 and 158, 159, 160 represent the thermoelectric elements. Nodes 58, 60 and 62 are the hot junctions and 158, 159 and 160 are the cold junctions. Nodes 59, 61 and 63 represent the Min-K insulation (inside the sealed module) which surrounds the thermoelectric elements and is argon gas filled as is the Min-K insulation in the generator.

For normal operation; i.e., steady state, with electrical power being generated, the conductance of the thermoelectric elements and the electrical power generation is varied until a match is obtained between the results of the thermoelectric code runs and the thermal code runs. The electrical power is removed at the cold junction in the thermal model since this is thermal energy which has been converted to electrical energy. The flow of current through the thermoelectric elements increases the effective conductance of the elements so it is not possible to use straight conductivity values for the elements under normal operation. For the fire analysis, open circuit is assumed so there are no current effects.

6. Description of correlations and values used for all the boundary conditions (radiation and natural convection heat transfer coefficients).

For natural convection from the exterior surfaces of the housing, the following correlations were used:

$$h = C \left(\frac{\Delta T}{L}\right)^n$$

where C = .12 for downward facing and horizontal surfaces
C = .29 for vertical surfaces and upward facing horizontal surfaces
n = 0.25

These equations were programmed into the code runs. Natural convection was only assumed for the steady state runs and for the transient periods after the fire.

The radiation heat transfer from the external surfaces was calculated by the code using the tabular values of emissivity and radiating to 130°F ambient in the case of the fire analysis.

7. Description of tests conducted for evaluating the heat transfer from the finned shipping head. Also, state the fin dimensions and calculate the actual external surface area.

This question is not pertinent to the fire analysis but only to the steady state cases which were analyzed. In the case of the fire analysis, the volume of the fins was neglected as stated in INSD-3080. The justification for this is that because of the very large exposed surface area of the fins, the fins will reach melt temperature in about 30 seconds if the fire heat flux is assumed to impinge uniformly on their total surface area. Therefore for the fire analysis only the base of the finned shipping head was included in the model.

For the steady state analyses, the performance of the finned head was based on the results of tests of a typical finned head configuration over a range of fin root temperatures. For this test, the test apparatus consisted of a finned shipping head electrically heated under the base by an insulated heater plate about the size of the module. The parasitic losses were determined and found to be a very small percentage (approximately 0.8 percent) of the total electrical heat input. The test results were analyzed and it was determined that the effective heat transfer coefficient over the range of fin root temperatures of interest (100 to 225°F) could be expressed as $h_{eff} = 0.11 (T_{FR} - T_{AMB})^{0.34}$ BTU/HR-°F-Ft^2. This equation was programmed into the steady state code runs to simulate the performance of the finned shipping head. The fin configuration consists of 48 anodized aluminum fins, 10 inches high and 1/8 inch thick, located in a 24.25" diameter area and having a total surface area of 125 square feet.

8. Justification for the value of 65 Btu/hr· ft^2 used for the solar heat load. State the value of solar absorptivity used for the cask surface.

The solar heat load was determined as follows. From Reference (1)*, a conservative value of direct solar irradiation on a surface normal to the sun's rays at the earth's surface on a cloudless day was selected as 320 BTU/HR-Ft^2. Since no more than half of the total generator surface area (actually less) can be exposed to the direct rays of the sun this irradiation was reduced to one-half or 160 BUT/HR-Ft^2. A value of absorptance for solar radiation of 0.4** for the surface was assumed.

$$\frac{Q_{solar}}{A} = 320\ (.5)(.4) \cong 65 \text{ BTU/HR-Ft}^2 \text{ absorbed}$$

* Reference (1): Heat and Mass Transfer, E. R. G. Eckert & R. M. Drake, Jr., McGraw-Hill Book Co., Inc. 1959.

** The SENTINEL 100F housing is protected by an epoxy-polyamide coating system.

9. Two copies of the latest users manual for the TAP3 computer program. Please indicate and explain all revisions to the program made since the manual was published.

To be forwarded under separate enclosure.

10. Explanation as to how the TAP3 program handles both fire and internal gap radiative heat transfer. The table on page 86 indicates a constant heat flux from 5°F to 1800°F. The fire heat flux is a function of the cask surface temperature and is normally calculated by the program.

The table on page 86; i.e., Table 21, which specifies the fire heat flux in BTU/Ft^{2}Sec should have the abscissa labeled as time instead of temperature. The time is given in seconds and defines the fire as starting at 5 seconds and continuing until 1800 seconds. From 1800 to 1805 the fire heat flux is assumed to decay to the solar heat flux. These tables were spliced together from the computer print out and the time label for this table was inadvertently left out. The abscissa for all the other tables given on pages 84 to 86 is temperature as indicated.

The fire heat flux shown in Table 21 is the heat flux impinging on the exterior surfaces. In the TAP3 program, this heat input is handled by assuming that this heat is internally generated in the surface nodes. The net heat flux is of course a function of the housing surface temperature and is calculated by the program. As can be seen, this method of handling the fire heat input is conservative.

The method by which TAP3 handles internal gap radiative heat transfer is controlled by the programmer. For the analyses presented, equations are programmed into the code which evaluate the emissivity of each of the two surfaces from the tabular input data as a function of their respective temperatures, combine these into an effective emittance or overall exchange factor as desired, and calculate the radiation heat transfer in the normal manner; i.e.,

$$Q_{rad} = F_{12}A_1 \quad \sigma(T_1^4 - T_2^4)$$

where F_{12} is the overall interchange factor.

Supplement Dated December 20, 1971

TELEDYNE ISOTOPES
110 WEST TIMONIUM ROAD
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TELEPHONE (301) 252-9220
TELEX 87-780

Refer to: TPS-CNY-254
20 December 1971

U.S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. D. A. Nussbaumer, Chief
Fuel Fabrication and Transportation Branch

Gentlemen:

This letter is intended to furnish further data in support of our SENTINEL 100F license application. Please refer to the following references:

a. DML:RHO (19-01398-34) dated 11/15/71, letter U.S. Atomic Energy Commission to Isotopes, Inc.
b. TPS-CNY-239 dated 11/30/71, letter Isotopes, Inc. to U.S. Atomic Energy Commission.

Attachment A amplifies our answers to questions 2 and 3 of reference a. The test data referenced has been taken largely from a special module evaluation test conducted especially for the SENTINEL 100F and therefore is directly applicable to this application. Data from the SENTINEL 8S program is also presented as further correlation between the code analysis and generator performance. Except for thermal and electrical power, the generators are quite similar. The Dow Corning thermal grease is used to reduce the gradients across the thermal interfaces. As mentioned, we have considerable operating experience with this compound.

Attachment B is a copy of the users manual for the TAP-3 computer program as promised in reference b.

Sincerely,

NUCLEAR SYSTEMS DIVISION

C. N. Young
Project Engineer
Terrestrial Power Systems Division

/mb

Enclosures: (2)

ATTACHMENT A

ADDITIONAL DATA FOR QUESTION 2 & QUESTION 3 OF REFERENCE a:

In order to elaborate further on the ability of the thermoelectric computer code used by INSD to predict the performance of the thermoelectric module, the following data is offered. Six of the couples fabricated for the SENTINEL 100F module were drawn from the production run and assembled and bonded into a 6-couple module for performance and life testing. The 6-couple module was designed to be tested in an electrically heated test fixture specifically tailored for this test. The module itself was fully instrumented, having four hot junction thermocouples, three cold junction thermocouples as well as voltage taps on every element. The test fixture was provided with cold end hardware identical to that being utilized in the 100F module; i.e., pistons, springs and aluminum heat sink. The cold end hardware was also instrumented with thermocouples on the pistons and the heat sink so that the cold end hardware temperature drop could be measured directly. Prior to installation of the module, the parasitic heat losses through the fixture were determined experimentally so that the heat flow through the thermoelectric elements could also be determined from the test data. Parametric testing of this module was performed some months ago and since then it has been on a life test. Arbitrarily selecting one of the parametric data points, it was shown that the performance measured could be predicted by the code. The measured data point for example is shown below:

Hot junction temperature (avg.)	993°F
Cold junction temperature (avg.)	226°F
Current	20.08a
Load Voltage	0.486 VDC
Open circuit voltage	1.016 VDC
Load resistance	24.203 mΩ
Internal resistance	26.394mΩ
Electrical power output	9.76 w(e)
Electrical heat input	157 w(th)
Piston temperature (avg.)	213°F
Heat sink (avg.)	208°F
∴Cold end $\Delta T_{CJ-H/S}$	18°F
Heat to T/E elements (based on parasitic heat loss curve)	122.0 w(th)

When the boundary conditions shown above; i.e., hot and cold junction temperatures and external load are used as inputs to the T/E code, the predicted heat flow to the T/E elements is 121.1 watts which is within less than 1% of the measured heat flow. The conductance of the T/E elements of the module is thus established by computing the ratio of the heat flow to the thermoelectric elements to the temperature drop from the hot-to-cold junction.

The SENTINEL 100F was designed to produce 150 w(e) at B. O. L. when operating at hot junction/cold junction of 1000/225°F. At these conditions, the predicted heat flow to the thermoelectrics at the matched load condition is 1800 watts thermal. Thus the conductance is 7.932 Btu/hr-°F. Since the conductance is essentially $\frac{kA}{L}$, any combination of these parameters which give the proper conductance can be used in the thermal model. For the analyses presented, we elected to hold the conductivity constant (in the tables) and vary the A/L ratio and the electrical power output for the different operating conditions. The electrical power output is dumped to a heat sink at the cold junction in the thermal model. As a general rule, the effective conductance of the elements on short circuit (Pe = 0) and on open circuit (Pe = 0) is between 20 - 30% higher and lower respectively than when on load.

ADDITIONAL INTERFACE DATA

a. Cold End - As can be noted from the measured data presented earlier, the cold-end temperature drop (i.e., from the cold junction to the heat sink) is 18°F. The heat flowing through this cold end hardware is the heat to the thermoelectrics less the electrical power output or 122 - 10 watts = 122 watts. The conductance per unit area based on element area is thus

$$\frac{112\ (3.4152)(144)}{(18)(2.9316)} = \frac{Q}{\Delta T\ (Ael)} = 1044 \text{ Btu/hr-ft}^2\text{-}^\circ\text{F}.$$

Although conductances this high have been measured on some SENTINEL generators in the past, the fabrication tolerances of the parts making up the cold end hardware causes variations in cold end conductances. Therefore for the SENTINEL 100F analyses we elected to choose a more conservative (and more typical) value of cold end conductance of 425 Btu/ft^2-hr-°F as shown in INSD-3080, page 88.

b. Module Heat Sink-To Housing Lid Interface - This interface is an aluminum-to-aluminum interface with Dow Corning 340 grease in the interface. Interface tests were conducted at INSD in March and April of 1971 using a calibrated test apparatus on the effects of various types of thermal greases or compounds on the conductance of aluminum-to-aluminum interfaces when compared with a dry interface. The test apparatus was designed to measure the heat flow through the interface and the temperature drops. The tests were conducted using plain silicon grease, aluminum grease, Dow Corning 340 grease and others and were conducted over a range of interface heat fluxes and interface temperatures. The Dow Corning 340 grease, which is also utilized in our standard TELAN generators, was found to be as good as any of the compounds tested and better than most. The value of conductance shown in INSD-3080, page 88, of 1500 Btu/hr-ft^2-°F is typical of measurements

made during these tests. The tests encompassed interface heat fluxes as high as 45 watts/in^2 which are considerably higher than anticipated for this interface. The interface pressure (mechanical) for the tests was low and of the order of 25 - 30 psi which is typical for these interfaces. This data is also applicable to the interface between the finned shipping head and the housing lid.

c. Biological Shield - This path encompasses four interfaces as well as the module hot plate. These are the interface between the biological shield and hot plate, hot plate and getter, getter and mica, and the mica to hot shoe interface. The exact breakdown of the total temperature drop between the biological shield and hot junction is not known, but the overall effect has been measured on several generators. For example, the SENTINEL 8S electrically heated generator was instrumented with thermocouples on the biological shield, hot junction, cold junction, etc. and was tested extensively. The table shown below compares the data taken on the SENTINEL 8S with the assumptions used in the thermal model for the SENTINEL 100F (see case 1, INSD-3080).

	8S	100F
Q_{inv}(w)	301	2100
Biological Shield T(^{o}F)	959	1090.6
Hot Juntion (^{o}F)	900	1001.6
Total ΔT (^{o}F)	59	89
Interface Q(w)	250	1873
Common Area (in^2)	25.967	132.733
Effective Btu/hr-ft^2-^{o}F nonductance	80.25	78

The conductances shown in INSD-3080, page 88, for the module hot plate-to-hot junction and biological shield-to-hot plate inteffaces are obtained by making allowances for the conductances of the hot plate and biological shield portion of the path (based on published data), and assuming the individual interface ΔT to be one quarter of the total interface ΔT. As shown in the table above, the net result is to give an effective conductance close to that measured for the SENTINEL 8S.

d. Other Tests - In addition to the previous test data, each thermoelectric module is tested in a thermally calibrated electrically heated test fixture prior to installation in a fueled generator. This test is primarily intended to check the electrical performance without the restrictions required when using a radioactive heat source. However, it is instrumented for thermal evaluation also and, in fact, is verification for the radioactive fuel inventory selection.

Supplement Dated January 19, 1972

TELEDYNE ISOTOPES
110 WEST TIMONIUM ROAD
TIMONIUM, MARYLAND 21093
TELEPHONE. (301) 252-8220

Refer to: TPS-CNY-262
19 January 1972

71-5862

U. S. Atomic Energy Commission
Division of Materials Licensing
Washingtin, D. C. 20545

Attention: Mr. D. A. Nussbaumer, Chief
Fuel Fabrication and Transportation Branch

Gentlemen:

This letter is to confirm thermal property data as relayed to Mr. R. Odegaarden by telephone as of this date. This data is in reference to Teledyne Isotopes' application for a SENTINEL 100F license, and amplifies our letter TPS-CNY-254 dated 12/20/71.

The thermal conductivity of the thermoelectric elements varies not only as a function of temperature but is also dependent upon the current flow through the elements. The current flow is a function of the mode of operation, and the effective conductivity for each mode is shown below.

Mode of Operation	Effective Conductivity of Elements Btu/ft-hr-°F
Normal	0.90
Short Circuit	1.2182
Open Circuit	0.8333

Sincerely,

NUCLEAR SYSTEMS DIVISION

C. N. Young
Project Engineer
Terrestrial Power Systems

/mb

COPIES SENT TO COMPLIANCE

393

APPENDIX C

ANALYSIS OF SHIELD LID ATTACHING BOLTS

R3, R4

This appendix provides analysis which addresses the loading of the bolts used to attach the shield lid to the body of the tungsten biological shield under conditions of impact froma 30 foot drop. The evaluation assumes the most critical angle of impact. Under highly conservative assumptions, the analysis shows a positive safety margin when the resultant stress is compared to the yield stress of the bolts. Thus, the analysis shows that the shield body, lid and fuel capsule configuration will remain intact given the drop environment. The balance of this appendix is as per Revision 3, dated October 22, 1971.

R4

ANALYSIS OF SHIELD LID ATTACHING BOLTS

It is assumed that the shield assembly impacts on the edge of the lid (Point 0) with the center of gravity of the shield body in line with the path of motion as shown in Figure 1. Although the edge of the shield plug has been cut back as shown, the point of impact may be considered to lie on the line AO. This is because the shield plug is immediately against the Min-K insulation which will allow the sharp edges to sink in making the effective point of impact on the line of action.

In the following analysis the shield plug is treated as a free body as shown in Figure 1. The analysis is based on static equilibrium, since the distribution is proportional for higher G loadings. In order for tension, T, to exist in the bolt there must be a separation between the body and the lid such that contact exists only at point C.

$OA = 13.17$ inches

$F_1 = 1267$ pounds

$F_2 = 263$ pounds

$F_3 = 73.4 \left(\frac{11.21}{13.17}\right)^2 = 53.2$ pounds

Solve for F_4 by taking moments about point O.

$$M_o = (1267)(1.067) - 263\,(5.022) - 53.2\,(3.940) + F_4\,(9.251)$$

$$F_4 = +19.30 \text{ pounds}$$

The positive sign indicates that the bolt is indeed in tension, and it is necessary to apply the proper G loading to determine if the bolts are adequate.

FIGURE WITHHELD UNDER 10 CFR 2.390

FIGURE C-1, SHIELD GEOMETRY

The G loading is given by the following equation.*

$$G = \frac{72}{t}\sqrt{h}$$

G = acceleration, g

t = shock rise time, milliseconds

h = drop height, inches.

The most severe condition given is for rigid steel against concrete, which, for a point (corner) impact, has a rise time of two milliseconds. The case under consideration is more like the condition of product case against one inch felt which has a rise time of 30 milliseconds for a point contact. The shield under consideration actually has three to four inches of fibrous insulation to cushion the impact. Looking at the worst case,

$$G = \frac{72}{2}\sqrt{(30)(12)} = 683 \text{ g}$$

Multiplying the g loading by the static loading in the bolt yields the potential loading in the bolt at impact.

$$P = (19.30)(683) = 13,182 \text{ pounds.}$$

The bolt is a 1/2-20 which has a tensile area, A, of 0.1597 square inch. The stress is:

$$S = \frac{P}{A} = \frac{13,182}{0.1597} = 82,542 \text{ psi}$$

The bolts are made from A-286 which has the following properties at 1000°F:

Ultimate stress	131,000 psi
Yield stress	88,000 psi

*Magner, R.T., "Design for Shock Resistances," Product Engineering Magazine

The margin of safety is:

$$MS = \frac{88,000}{82,542} - 1 = 0.066$$

Further, it should be noted that this analysis is highly conservative in that a very fast shock rise time has been used, and that the load has been reacted entirely in one bolt.

APPENDIX D

LIST OF DRAWINGS

R4

The following drawings are included with this report as part of the license application. These drawings are the current versions (as of June 1985). The packaging is constructed in accordance with these drawings:

010F10000	Sheets 1-3 (Rev. C), Generator Assembly 100F
010F20000	Sheets 1-2 (Rev. B), Fuel Capsule Assembly
010F70003	(Rev. A), Shield Body
010F70004	(Rev. A), Shield Plug
001-90064	Sheets 1-2, (Rev. A), Shipping Crate Sentinel RTG
001-90039	Sheets 1-4, (Rev. J), Pallet Assembly

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED: DWG. NO. 010F10000 GENERATOR ASSEMBLY SENTINEL 100F SHEET 1 OF 3 WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER: 010F10000

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D-6

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THAT CAN BE VIEWED AT THE RECORD TITLED: DWG. NO. 001-90064 SHIPPING CRATE SENTINEL RTG SHEET 1 OF 2 WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER: 001-90064

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

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THAT CAN BE VIEWED AT THE RECORD TITLED:
DWG. NO. 001-90039
PALLET ASSY
SHEET 1 OF 4
WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER:
001-90039

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THAT CAN BE VIEWED AT THE RECORD TITLED:
DWG. NO. 001-90039
PALLET ASSY
SHEET 2 OF 4
WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER:
001-90039

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NRC FORM 464 Part I (6-1998) | U.S. NUCLEAR REGULATORY COMMISSION

RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) / PRIVACY ACT (PA) REQUEST

FOIA/PA: ML073400251 2008-0006 | RESPONSE NUMBER: 1

RESPONSE TYPE: ☐ FINAL ☑ PARTIAL

REQUESTER: Amy Stattel

DATE: NOV 23 2007

PART I. -- INFORMATION RELEASED

☐ No additional agency records subject to the request have been located.

☐ Requested records are available through another public distribution program. See Comments section.

☑ APPENDICES A — Agency records subject to the request that are identified in the listed appendices are already available for public inspection and copying at the NRC Public Document Room.

☑ APPENDICES B & C — Agency records subject to the request that are identified in the listed appendices are being made available for public inspection and copying at the NRC Public Document Room.

☑ Enclosed is information on how you may obtain access to and the charges for copying records located at the NRC Public Document Room, 11555 Rockville Pike, Rockville, MD 20852-2738.

☑ APPENDICES B & C — Agency records subject to the request are enclosed.

☐ Records subject to the request that contain information originated by or of interest to another Federal agency have been referred to that agency (see comments section) for a disclosure determination and direct response to you.

☑ We are continuing to process your request.

☐ See Comments.

PART I.A -- FEES

AMOUNT * $

* See comments for details

☐ You will be billed by NRC for the amount listed.

☐ You will receive a refund for the amount listed.

☐ None. Minimum fee threshold not met.

☐ Fees waived.

PART I.B -- INFORMATION NOT LOCATED OR WITHHELD FROM DISCLOSURE

☐ No agency records subject to the request have been located.

☑ Certain information in the requested records is being withheld from disclosure pursuant to the exemptions described in and for the reasons stated in Part II.

☑ This determination may be appealed within 30 days by writing to the FOIA/PA Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Clearly state on the envelope and in the letter that it is a "FOIA/PA Appeal."

PART I.C COMMENTS (Use attached Comments continuation page if required)

The records identified on enclosed Appendix A are already publicly available in the NRC Public Document Room (PDR). We have enclosed a notice which provides procedures for obtaining records from the PDR. You may contact the PDR on (301) 415-4737, or toll free on (800) 397-4209.

SIGNATURE - FREEDOM OF INFORMATION ACT AND PRIVACY ACT OFFICER

Russell A. Nichols Russell A. Nichols

NRC FORM 464 Part II (3-2006) U.S. NUCLEAR REGULATORY COMMISSION	FOIA/PA	DATE
RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) / PRIVACY ACT (PA) REQUEST	2008-0006	NOV 2 3 2007

PART II.A -- APPLICABLE EXEMPTIONS

APPENDICES: C

Records subject to the request that are described in the enclosed Appendices are being withheld in their entirety or in part under the Exemption No.(s) of the PA and/or the FOIA as indicated below (5 U.S.C. 552a and/or 5 U.S.C. 552(b)).

- ☐ Exemption 1: The withheld information is properly classified pursuant to Executive Order 12958.
- ☐ Exemption 2: The withheld information relates solely to the internal personnel rules and procedures of NRC.
- ☐ Exemption 3: The withheld information is specifically exempted from public disclosure by statute indicated.
  - ☐ Sections 141-145 of the Atomic Energy Act, which prohibits the disclosure of Restricted Data or Formerly Restricted Data (42 U.S.C. 2161-2165).
  - ☐ Section 147 of the Atomic Energy Act, which prohibits the disclosure of Unclassified Safeguards Information (42 U.S.C. 2167).
  - ☐ 41 U.S.C., Section 253b, subsection (m)(1), prohibits the disclosure of contractor proposals in the possession and control of an executive agency to any person under section 552 of Title 5, U.S.C. (the FOIA), except when incorporated into the contract between the agency and the submitter of the proposal.
- ☐ Exemption 4: The withheld information is a trade secret or commercial or financial information that is being withheld for the reason(s) indicated.
  - ☐ The information is considered to be confidential business (proprietary) information.
  - ☐ The information is considered to be proprietary because it concerns a licensee's or applicant's physical protection or material control and accounting program for special nuclear material pursuant to 10 CFR 2.390(d)(1).
  - ☐ The information was submitted by a foreign source and received in confidence pursuant to 10 CFR 2.390(d)(2).
- ☐ Exemption 5: The withheld information consists of interagency or intraagency records that are not available through discovery during litigation. Applicable privileges:
  - ☐ Deliberative process: Disclosure of predecisional information would tend to inhibit the open and frank exchange of ideas essential to the deliberative process. Where records are withheld in their entirety, the facts are inextricably intertwined with the predecisional information. There also are no reasonably segregable factual portions because the release of the facts would permit an indirect inquiry into the predecisional process of the agency.
  - ☐ Attorney work-product privilege. (Documents prepared by an attorney in contemplation of litigation)
  - ☐ Attorney-client privilege. (Confidential communications between an attorney and his/her client)
- ☑ Exemption 6: The withheld information is exempted from public disclosure because its disclosure would result in a clearly unwarranted invasion of personal privacy.
- ☐ Exemption 7: The withheld information consists of records compiled for law enforcement purposes and is being withheld for the reason(s) indicated.
  - ☐ (A) Disclosure could reasonably be expected to interfere with an enforcement proceeding (e.g., it would reveal the scope, direction, and focus of enforcement efforts, and thus could possibly allow recipients to take action to shield potential wrongdoing or a violation of NRC requirements from investigators).
  - ☐ (C) Disclosure would constitute an unwarranted invasion of personal privacy.
  - ☐ (D) The information consists of names of individuals and other information the disclosure of which could reasonably be expected to reveal identities of confidential sources.
  - ☐ (E) Disclosure would reveal techniques and procedures for law enforcement investigations or prosecutions, or guidelines that could reasonably be expected to risk circumvention of the law.
  - ☐ (F) Disclosure could reasonably be expected to endanger the life or physical safety of an individual.
- ☐ OTHER (Specify)

PART II.B -- DENYING OFFICIALS

Pursuant to 10 CFR 9.25(g), 9.25(h), and/or 9.65(b) of the U.S. Nuclear Regulatory Commission regulations, it has been determined that the information withheld is exempt from production or disclosure, and that its production or disclosure is contrary to the public interest. The person responsible for the denial are those officials identified below as denying officials and the FOIA/PA Officer for any denials that may be appealed to the Executive Director for Operations (EDO).

DENYING OFFICIAL	TITLE/OFFICE	RECORDS DENIED	APPELLATE OFFICIAL		
			EDO	SECY	IG
Samuel J. Collins	**Regional Administrator, Region 1**	**Appendix C**	✓		

Appeal must be made in writing within 30 days of receipt of this response. Appeals should be mailed to the FOIA/Privacy Act Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, for action by the appropriate appellate official(s). You should clearly state on the envelope and letter that it is a "FOIA/PA Appeal."

APPENDIX A
RECORDS ALREADY PUBLICLY AVAILABLE

NO.	DATE	ACCESSION NUMBER	DESCRIPTION/(PAGE COUNT)
1.	06/06/1964	9106210237	Ack receipt of 640414 ltr advising of appointment of CW Keller as nuclear accountability & licensing representative for Nuclear Div,Martin Co.. (1 page)
2.	04/01/1991	9106120324	Responds to FOIA request for documents re license numbers R-36,issued in 1958,license R-72 issued in Dec 1960 & license 19-01398-29. (13 pages)
3.	07/08/1991	9203120243	Responds to 901123 request for documents re Quehanna Nuclear Reactor Facility including,records re License R-36, R-72 & various byproduct matls licenses.Forwards documents listed on App F & G.Search for addl records underway (18 pages)
4.	06/13/1994	9406220079	Informs,for dockets 7000014,7000058 & 7000908,that addl info necessary to determine whether previously licensed facilities suitable for release for unrestricted use or currently licensed by active NRC or State of MD license. (7 pages)
5.	01/23/1995	9501310052	Insp repts 40-3296/94-01 & 70-0058/94-01 on 941103.No violations noted.Major areas inspected:bldgs C & D at Martin-Marietta Middle River facility & bldgs KJ & KC at Martin State Airport (6 pages)
6.	01/25/1995	9501310046	Forwards insp repts 40-3296/94-01 & 70-0058/94-01 on 941103. No violations noted.Informs that listed sites suitable for unrestricted use. (3 pages)
7.	01/25/1995	9501310129	Forwards insp repts 40-3296/94-01 & 70-0058/94-01 on 941103. No violations noted.Informs that listed sites suitable for unrestricted use (3 pages)
8.	09/23/1982	8209300294	Forwards IE Insp Repts 40-2308/82-01 & 40-3296/82-01 on 820305-0615.No noncompliance noted (2 pages)

APPENDIX B
RECORDS BEING RELEASED IN THEIR ENTIRETY
(If copyrighted identify with *)

NO.	DATE	DESCRIPTION/(PAGE COUNT)
1.	01/23/1995	ORNL Sites - Summary, License No. 19-01398-32 (2 pages)
2.	01/23/1995	ORNL Sites - Summary, License No. SMN-00011 (2 pages)
3.	03/10/1995	ORNL Sites - Summary, License No. SNM-00053 (2 pages)
4.	01/23/1995	ORNL Sites - Summary, License No. STB-00187 (2 pages)
5.	Undated	Handwritten notes regarding License SNM-1192 (6 pages)
6.	02/03/1970	Ltr from D. Nussbaumer of USAEC to E. Chennault of Martin Marietta Corporation, regarding licensing requirements (1 page)
7.	04/24/1970	Ltr from R. Mccaulay of Martin Marietta Corporation to D. Nussbaumer of USAEC, regarding application and work procedure for license (1 page)
8.	05/01/1970	Ltr from E. Chenault of Martin Marietta Corporation to R. Woolsey of USAEC, regarding supplementary attachments 1 and 2 (16 pages)
9.	05/15/1970	Ltr from E. Chenault of Martin Marietta Corporation to R. Woolsey of USAEC, regarding supplemental data (2 pages)
10.	05/22/1970	Ltr from D. Nussbaumer of USAEC to R. Macauley of Martin Marietta Corporation, regarding AEC Material License No. SNM-1192 (7 pages)
11.	06/24/1970	Ltr from E. Chenault of Martin Marietta Corporation to R. Woolsey of USAEC, regarding current status of decontamination program (2 page)
12.	06/24/1970	Ltr from E. Chenault of Martin Marietta Corporation to R. Woolsey of USAEC, regarding current status of decontamination program (2 page)
13.	07/15/1970	Ltr from E. Chenault of Martin Marietta Corporation to D. Nussbaumer of USAEC, regarding decontamination program (1 page)
14.	07/30/1970	Ltr from C. Keller of Department of Health of the State of Maryland to R. Kirkman of USAEC, regarding Martin Marietta Coporation's Special Materials License No. 1192 (1 page)
15.	09/22/1970	Ltr from E. Chenault of Martin Marietta Corporation to R. Woolsey of USAEC, regarding comprehensive radiation survey report (1 page)
16.	10/07/1970	Ltr from R. Woolsey of USAEC to B. Youngblood of USAEC,

		regarding Decontamination - Martin Marietta Corporation - Baltimore Plant - Docket No. 70-58 (1 page)
17.	11/10/1970	USAEC Health and Safety Laboratory Sample Req. D 4736-4741 (6 pages)
18.	12/29/1970	Ltr from D. Nussbaumer of USAEC to E. Chenault of Martin Marietta Corporation, regarding final survey of Middle River, Maryland facilities (1 page)
19.	04/13/1971	USAEC Compliance Statistical Data Input Report No. 71-1, License No. SNM-1192 (1 page)
20.	08/11/1992	Expert System License Evaluation Report for License SNM-01192 (2 pages)
21.	01/23/1995	ORNL Sites - Summary, License No. SNM-01192 (2 pages)

APPENDIX C
RECORDS BEING WITHHELD IN PART

NO.	DATE	DESCRIPTION/(PAGE COUNT))/EXEMPTIONS
1.	04/12/1971	Ltr from P. Nelson of USAEC to W. Roy of USAEC, regarding Martin Marietta Corporation (1 page)
	03/25/1971	Close-OUt Survey for Licensee Martin Marietta Corporation, date of Inspection 11/10/1970 (3 pages)
	Undated	Martin Marietta Aerospace Group, Comprehensive Radiation Survey Report for the Release of Decontaminated Premises for Unrestricted Use (64 pages) / Exemption 6
2.	08/02/1982	IE Insp Repts 40-2308/82-01 & 40-3296/82-01 on 820305-0615. No noncompliance noted.Major areas inspected:review of records to determine whether Middle River,MD facility meets unrestricted use criteria(30 pages) / Exemption 6

ML073400518

ORNL SITES - SUMMARY

License No.:	19-01398-32	ORNL Score:	1,061
Docket No.:	none		
Licensee:	Martin-Marietta Isotopes, Inc.	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s)	19-01398-20, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01150, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		
Review Abstract:	License No. 19-01389-32 authorized research and development work with unsealed byproduct material in Building D at Middle River, Maryland. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.		
Recommendations:	None.		

Summary: License No. 19-01398-32 was issued on December 9, 1964 authorizing research and development work with a variety of unsealed byproduct materials in Building D at the Martin Company's Middle River, Maryland facility. On September 4, 1968, License No. 19-01398-32 was transferred to Isotopes, Incorporated. The license was terminated on March 20, 1969; however, no record of a termination or confirmatory survey, transfer of material, etc., could be located. It appears that Building D was returned to Martin-Marietta at that time.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to

be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 1/23/95

Approved by: _____ **Date** 1/23/95

ML073400522

ORNL SITES - SUMMARY

License No.:	SNM-00011	ORNL Score:	1,811
Docket No.:	070-00014		
Licensee:	The Martin Company	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s):	19-01398-20, 19-01398-32, SNM-000053, SNM-00849, SNM-00907, SNM-01150, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		

Review Abstract: License No. SNM-00011 authorized research and development work with U-235 in Building D at Middle River, Maryland. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.

Recommendations: None.

Summary: License No. SNM-00011 authorized the possession and use of 2 kilograms of U-235 in enriched uranium for fuel element research and development to be used in the licensee's Nuclear Materials Laboratory in Building D, Plant I. The licensee's letter dated September 19, 1957 requested that certain special operations in the fabrication of fuel bundles be permitted in the pilot manufacturing facility and in other buildings at Plant I. The licensee specified that only fully clad uranium fuel tubes or plates would be used in these other buildings. The license expired on May 31, 1961 and was not renewed. On April 7, 1961, the licensee ceritifed that all material possessed under the license had been disposed of prior to expiration of the license.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small

area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 01/23/95

Approved by: _____ **Date** 1/23/95

ML73400526

ORNL SITES - SUMMARY

License No.:	SNM-00053	ORNL Score:	70,494
Docket No.:	070-00058		
Licensee:	The Martin Company Isotopes, Inc.	Review Status:	Complete 1/13 ~~File Reviewed~~
Site Address(es):	Middle River, Maryland 110 West Timonium Road Timonium, Maryland 21093		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s):	19-01398-20, 19-01398-32, SNM-00011, SNM-00849, SNM-00907, SNM-01150, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		

Review Abstract: License No. SNM-00053 authorized the possession of special nuclear material in Building D at Middle River, Maryland and at Timonium, Maryland. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.

Licensee, NRC, and Maryland State surveys indicate that the Timonium site is suitable for unrestricted use.

Recommendations: NONE

Summary: License No. SNM-00053 authorized possession and use of up to 1,000 kilograms of uranium enriched in U-235 as UO_2 and metal and 160 grams of plutonium in the form of a plutonium-beryllium source. Licensed activities included fuel element development and fabrication at the Middle River facility. On September 23, 1969 License No. SNM-01150 was issued pursuant to an amendment to License No. SNM-00053 to permit the transfer and use of up to 100 grams of U-235, at any enrichment and in any chemical form, for research and development activity, and 171 grams of Pu-235 for neutron and alpha instrument calibration sources, from the Middle River facility to the Timonium facility. Concurrently, SNM-00053 was amended in its entirety to authorize the storage of U-235 in the form of contamination in Building D at Middle River. License No. SNM-00053 (Teledyne-Isotopes) was terminated May 26, 1970. There is no termination or confirmatory survey for License No. SNM-01150.

March 10, 1995

B/3

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License Nos. SNM-1192 and SNM-01150 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Licensee letter dated March 25, 1975 documents a survey of the Timonium site consisting of 67 wipes and a portable instrument alpha/beta/gamma survey of "all areas that had been subject to use of radioactive materials" which identified no residual contamination. An NRC letter dated April 15, 1975 of an inspection to confirm disposition of license material under License No. SNM-0849 and an examination of the licensees contamination survey reported that "no items of noncompliance were observed". The State of Maryland terminated License MD-05-014-01 (formerly USNRC License No. 19-01398-34) covering the whole site after performing a confirmatory survey on July 19, 1993 of the licensee's termination survey of June 8 and 9, 1993. The site is suitable for unrestricted use.

Reviewed by: Stephen W Holmes **Date** 10 MARCH 95

Approved by: [signature] **Date** 3/10/95

ML073400529

ORNL SITES - SUMMARY

License No.:	STB-00187	ORNL Score:	17
Docket No.:	040-03296		
Licensee:	The Martin Company Martin-Marietta	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	no		
SDMP Site:	no		
Related License(s):	19-01398-20; 19-01398-32, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01150, SNM-01192; [C-04283: NOT ON LIST]		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		
Review Abstract:	License No. STB-00187 authorized the possession and use of large amounts of thorium alloy in Building D at Middle River, Maryland from 1961 to 1964. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.		
Recommendations:	None.		

Summary: License No. STB-00187, which superseded C-04283 on January 1, 1961, authorized possession of up to 100,000 pounds of thorium-magnesium alloy (4 percent thorium) for fabrication of missile components. The license was terminated on March 20, 1964 at the request of the licensee. Region I Inspection Report No. 40-3296/82-01 documents that all work under License No. STB-00187 was conducted in Building D at the Middle River facility.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey,

leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 01/23/95

Approved by: _____ **Date** 1/23/95

ORNL SITES - SUMMARY

License No.:	SNM-01192	ORNL Score:	0.57
Docket No.:	070-00058		
Licensee:	Martin Marietta	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s):	19-01398-20, 19-01398-32, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01150, STB-00187		
NRC Reviewer:	David F. Limroth, Stephan W. Holmes		
Review Abstract:	License No. SNM-01192 was issued for the decontamination of Building D at the Middle River facility. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.		
Recommendations:	None.		

Summary: License No. SNM-01192 was issued for the decontamination of Building D at the Middle River (Chesapeake Park) facility. Operations authorized under various licenses had been conducted at this location.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the

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site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 01/22/95

Approved by: _____ **Date** 1/23/95

3962

APR 12 1971

Gen W. Roy, Chief, Materials and Fuel Facilities
Branch, Division of Compliance, HQ

MARTIN MARIETTA CORPORATION
AEROSPACE HEADQUARTERS
FRIENDSHIP INTERNATIONAL AIRPORT
BALTIMORE, MARYLAND
LICENSE NO. SNM-1192, DOCKET NO. 70-58

Transmitted herewith, for your information, is a report of a close-out survey of the subject licensee's facilities showing that the radiation and contamination levels were found to be less than the AEC deminimus criteria. The substance of this report was commmunicated, by telephone, to Roger T. Woolsey, DML, in December, 1970, and the license was terminated December 29, 1970.

Paul R. Nelson
Senior Radiation Specialist

Enclosure:
1. Inspection Report
~~2. Form AEC-766~~

Information in this record was deleted
in accordance with the Freedom of Information
Act, exemptions 6
FOIA- 2005-00006

C/1

OFFICE ▶	CO					
SURNAME ▶	Lorenz/nvk	Nelson				
DATE ▶	4/2/71					

Form AEC-318 (Rev. 9-53) AECM 0240 ☆ U. S. GOVERNMENT PRINTING OFFICE: 1968 O—320-507

CLOSE-OUT SURVEY

Region I, Division of Compliance
Newark, New Jersey

1. Licensee:

   Martin Marietta Corporation
   Aerospace Headquarters
   Friendship International
   Airport
   Baltimore, Maryland

2. Date of Inspection: November 10, 1970

3. Type of Inspection: Close-out survey

4. License No. SNM-1192
   Docket No. 70-58

5. Date of Previous Inspection: N/A

6. There is no company confidential information contained in this report.

7. Scope of Inspection:

   To determine if the residual contamination levels in the licensee's facilities were such that they could be released for nonlicensed activities.

8. Inspected by: _____ March 5, 1971
   Walter R. Lorenz, Radiation Specialist — Date of Report

   Reviewed by : _____ March 25, 1971
   Paul R. Nelson, Sr. Radiation Specialist — Date

Summary

The close-out survey showed that the operational area defined in the licensee's report, "Comprehensive Radiation Survey Report for the Release of Decontaminated Premises for Unrestricted Use", (see copy enclosed as Exhibit A), had been decontaminated below the level defined in that publication, in the section entitled, "USAEC Radioactivity Contamination Limits for Abandonment of Facilities and Equipment". In December, 1970, Walter R. Lorenz informed R. T. Woolsey, [redacted], of his survey findings.

History

The facility at Middle River, Maryland, was formerly licensed for use with special nuclear materials, source materials, and byproduct materials. Source and special nuclear materials were converted from the oxides to ceramic pellets and then loaded into fuel bundles. R&D was also performed in support of the fuel processing. Byproduct material was used on an R&D basis and SNAP generators were assembled at the facility. The facility was licensed for greater than ten years.

Exhibit "A"

Exhibit "A" contains a summary of the health physics coverage given personnel and the resultant exposure personnel received during the decontamination work. From the results reported, it appears that no persons were overexposed, in fact, it appears that personnel received only minimal exposure both internally and externally.

Exhibit "A" gives only minimal data as to meeting the deminimus criteria for abandonment of a facility as set out in Section V, Page 11 of their safety procedures (an enclosure to Exhibit "A"), which are referenced by License Condition 9. To supplement this, the inspector obtained a more detailed record of the licensee's survey results confirming that the AEC deminimus criteria had been achieved. This data is included as Exhibit "B" of this report.

Observations During Inspection

An inspection of this multiroom facility in the basement of a huge airport hanger was made. It was observed that the rooms were almost completely stripped of all operational equipment. Ducts, false ceilings, all

equipment, ducts, etc., were removed, packaged, loaded onto Nuclear Engineering Inc., trucks and shipped for burial. The inspector, having prior knowledge of the facility, paid specific attention to areas that were known to have been contaminated. The radiography room, where the wall was contaminated with Sr-90, was noted to have been decontaminated by use of a jack hammer. No contamination was evident in the radiography room, per the inspector's survey, both by smearing and direct surveying with an end-window GM survey meter. The UO_2 powder handling room was observed to have been completely gutted, including electrical switches, false ceiling and two of the four walls which had been completely removed. Floor tiling had been removed in the chemistry labs where known floor contamination had existed.

Inspector's Survey Results

Approximately 50 smears at various locations were taken by the inspector using Whatman No. 42 filter paper. These smears were taken on floors, walls, fixtures, drains, etc., where, in the inspector's opinion, contamination, if present, would most likely be found. These smears were counted at HASL using an alpha scintillation counting system, having a 37% efficiency for Pu-239, and a low background beta scintillation counting system, having a 25% efficiency for Sr-90. The maximum alpha activity detected was 270 d/m/100 cm^2 and the majority of the smears showed less than 10 d/m/100 cm^2. The maximum beta activity detected was 40 d/m/100 cm^2.

Direct surveys were made in the various areas using an Eberline PAC-1SA (50% efficient and 69 cm^2 area) and an Eberline E-120 end-window beta-gamma survey meter having a window thickness of 1.2 mg/cm^2. Direct alpha surveys were made in all rooms and areas where material was handled. The maximum result noted was found in the inlet side of an absolute filter bank plenum; 6000 d/m. Only the duct and framing remained. All else had been removed for burial, including the blower. Other maximum alpha survey results in other rooms and areas were at 2000 d/m and 3000 d/m. The average fixed alpha radiation levels were less than 500 d/m.

The maximum beta-gamma radiation level noted by the inspector was .4 mrad/hr. This level was also found on the inlet side of the absolute filter bank framing. All other levels noted were less than 0.1 mrad/hr, including the wall where Sr-90 fixed contamination was known to have been embedded.

COMPREHENSIVE RADIATION SURVEY REPORT
FOR THE RELEASE OF
DECONTAMINATED PREMISES FOR UNRESTRICTED I

CHESAPEAKE PARK, INC., BALTIMORE, MARYLAI
MARTIN MARIETTA CORPORATION
BALTIMORE, MARYLAND

MARTIN MARIETTA AEROSPACE GROUP

POST OFFICE BOX 179, DENVER, COLORADO 80201

EXHIBIT "A"

COMPREHENSIVE RADIATION SURVEY REPORT FOR THE RELEASE OF DECONTAMINATED PREMISES FOR UNRESTRICTED USE

CHESAPEAKE PARK, INC., BALTIMORE, MARYLAND
MARTIN MARIETTA CORPORATION
BALTIMORE, MARYLAND

Prepared by

E. M. Chenault
Sr. Health Physicist
Martin Marietta Corporation

and

Stanley J. Waligora, Jr.
Consultant Health Physicist
Eberline Instrument Corporation
Santa Fe, New Mexico

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4. Bioassay Samples

a. Positive Nose Swipes

b. Urine Analysis

I. INTRODUCTION

Purpose: This radiation survey report is prepared as one of the conditions provided for in U.S.A.E.C. Material License No. SNM-1192 issued to the Martin Marietta Corporation for the decontamination of nuclear laboratories at Baltimore, Maryland.

Since the subject nuclear laboratories are no longer used for radioisotopes operations and/or special nuclear materials processes and have been decontaminated in accordance with U.S.A.E.C. guidelines, it is requested the above named facilities be released for unrestricted use.

On June 3, 1970, the decontamination program at the Martin Marietta Corporation, Baltimore Division, commenced and it was completed on September 2, 1970. The radioactive materials involved in the decontamination program consisted primarily of U^{235} and U^{238} in a residual oxide form.

The work was performed by a crew consisting of 8 trained operators from the Martin Marietta Corporation, two health physicists from Eberline Instrument Corporation, and one health physicist from Martin Marietta Corporation. The removal of the radioactive material from equipment and facilities was achieved primarily through the use of high vacuum systems, with the operators wearing U.S. Bureau of Mines air supplied respirators. Full protective clothing and footwear were provided the workers.

Air samples were collected throughout the general area during the decontamination program and were counted for gross alpha emitters. The results of all air samples collected were below the MPC, with the exception of 4 samples. One sample was collected in the Radioisotopes Laboratory while chipping SR^{90} from a concrete wall. The result was reported as 2.4×10^{-10} uCi/CC. The second sample was collected in the Spheroidizing Room while removing ventilation ducts. The results of the air samples are given in Appendix C-1.

It should be noted that air supply respirators were worn by the operators during the time the air dust concentrations were measured. Urine specimens were submitted by personnel assigned to the program prior to working in the contaminated areas, in order to provide a base line study. Nasal swipes of all men working in the contaminated areas were performed twice daily. The results of all nasal swipes were low to negligible and did show proper use of respiratory protective equipment.

Water samples were collected of all liquid effluent, analyzed prior to release, and records of all sample analysis and personnel dosimetry reports are maintained in the office of the Martin Marietta Corporation's health physicist.

II. LOCATION AND IDENTIFICATION OF FACILITIES

The subject nuclear laboratories that were decontaminated are located at Chesapeake Park and are owned by Martin Marietta Corporation at Baltimore, Maryland. The decontaminated laboratories encompass an area of approximately 40,000 FT^2, located in the basement area of building "D". The total area was subdivided into small separate rooms where various types of nuclear activity were performed. Most of the small rooms were of the laboratory-type, and equipment included ventilation hoods, glove boxes, filtration medias, laboratory benches and laboratory glassware. False ceilings were also a part of some laboratories, and each ceiling was surveyed and removed, where necessary.

For the most part, the radioactivity was confined to glove boxes, ventilation hoods, ducts and filtration medias contained in each laboratory. The radioactive materials removed were in the form of residual uranium oxides, with the exception of a minor amount of SR^{90} found on a wall.

Some of the laboratories contained sinks, floor drains and sumps used to control liquid effluent containing radioactive materials. The floor drains, traps and sumps were carefully monitored to determine the contamination level, if any, and the termination location of each drain line and sump line.

III. HEALTH PHYSICS TECHNICAL APPROACH

The removal of residual contamination was accomplished through the direction and guidance of three health physicists, two from Eberline Instrument Corporation and one from Martin Marietta Corporation. The work crew consisted of eight qualified workers trained in the radiological health aspect of nuclear decontamination.

The contamination, for the most part, was not found to be tightly bonded or sealed to the surfaces of the facilities and therefore most of it was removed by the use of high vacuum systems with absolute filters. One wall and several floor areas showed evidence of bonded alpha activity and, therefore, it became necessary to use pneumatic tools to remove the contamination and reduce radiation levels to acceptable levels. Contamination that was found to be fixed on equipment, such as ventilation hoods, ducts and glove boxes, was allowed to remain fixed, and the equipment was properly packaged, identified and shipped by truck carrier to burial grounds in Moorehead, Kentucky. The transportation and burial of all contaminated equipment was provided by the Nuclear Engineering Company, Moorehead, Kentucky.

IV. SCOPE OF SURVEY AND GENERAL PROCEDURES FOLLOWED

Radiation detection equipment used during the effort included several gas proportional alpha counters, one floor alpha monitor, RM-15 (soft gamma measurement), one beta plus gamma counter, TLD badges and film badge dosimetry.

Swipe samples by the use of whatman filter paper were collected from all surface areas where it was thought to be necessary. The filter paper samples were then counted for any gross alpha contamination. All loose radioactive material was removed from the facilities. Equipment that was heavily contaminated, such as glove boxes and ventilation hoods, were properly packaged and shipped by carrier truck for burial.

There were no areas detected whereby radioactive materials had been sealed by painting or by other means, and there was no attempt to seal any areas containing fixed radioactive materials.

The general procedure followed to accomplish the decontamination effort is entitled "The Health and Safety Procedure for the Decontamination of Building "D", Martin Marietta Corporation, Baltimore, Maryland." The procedure is presently on file in the office of the U.S.A.E.C. Division of Materials Licensing. The procedure provided the basic guidelines for performing the decontamination in a safe manner. "The Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use" was closely adhered to by the Martin Marietta Corporation decontamination work crew.

V. FINDINGS OF THE DECONTAMINATION SURVEY

The floors, walls and ceilings of all laboratories where nuclear activity was conducted were monitored and recleaned. Some areas did not show evidence of contamination. Those areas where contamination was found were vacuumed and sprayed with a jet-x cleaning device to remove any material that could not be vacuumed. The use of water was controlled and kept to a minimum to prevent water contamination and pollution.

During the initial phase of the decontamination inspection survey, six items or areas were found which required correction (letter to E. M. Chenault from S. J. Waligora, Jr., dated September 3, 1970) and all, with the exception of the floor drains, were corrected.

All floor drains were monitored and decontaminated as much as possible. Water samples were taken from the five drains indicating residual activity and all results showed low concentrations. (See Appendix C-2) The residual activity remaining in the six drains was estimated through the use of a 2" x 2" NaI(TR) crystal in conjunction with a single channel analyzer. With the detection system calibrated for ^{235}U gamma rays, the following estimates were established:

Drain No.	^{235}U(uCi)
39	1.0
46	1.0
52	15.0
55	6.0
56	6.0
Total	29.0

Water samples taken from these drains showed very low concentrations. As a further check, water was flushed continuously through these five drains while a two liter water sample was taken from the sanitary sewer sump servicing that portion of the building. Samples were submitted for analysis and showed 0.003 pCi/ml (MPC 30.0 pCi/ml).

All drains have been left open for inspection. With approval from the U.S. Atomic Energy Commission, we propose to seal the five drains with cement, thereby permanently inactivating the total of 29 uCi of ^{235}U. This measure would appear to be a feasible alternative to tearing out the concrete floor in order to remove the drains and associated pipe.

As a result of the final survey, all other areas were reduced to within limits prescribed by the U.S. Atomic Energy Commission. All walls, ceilings, and floors had been washed thoroughly or removed. The average alpha emitter contamination (^{235}U and/or ^{238}U only) is much less than 500 dpm/100 cm^2. Areas with remaining fixed alpha emitter contamination average less than 2,000 dpm/100 cm^2. Beta-gamma contamination is essentially nonexistent; ^{90}Sr-Y contamination which had been present in the Radioisotopes Laboratory has been completely removed with the exception of one minute area with fixed contamination measuring 0.5 mRad/hr.

This area of Building "D" will soon be renovated by Chesapeake Park and any remaining fixed contamination will be further enclosed with replastering, retiling of floors, and repainting. Following the renovation, any fixed residual contamination should be so well fixed that there should be no evidence of even trace quantities during the remaining life of the structure.

VI. PACKAGING, TRANSPORTATION AND DISPOSAL OF CONTAMINATED EQUIPMENT

All contaminated equipment, such as glove boxes, ventilation hoods and duct work, were properly packaged and identified in accordance with the Department of Transportation rules and regulations and sent by truck carrier to Moorehead, Kentucky, for burial. A total of nineteen (19) truckloads of equipment were sent to the burial grounds, with each truckload encompassing approximately 1,920 cubic feet.

APPENDIX B - SUMMARY OF DECONTAMINATION OPERATIONS

The following is a chronological task summary of decontamination operations from June 1 through September 3, 1970, and represents approximately 2400 man hours of labor.

1. Organization of people, equipment, supplies, and facilities; establishment of procedures and policies.
2. Removal of exhaust ducts from furnace room.
3. Samples taken from areas with potential for tritium and for cobalt 60 contamination.
4. Machinery and equipment removed from furnace room.
5. Areas expected to be clean were monitored and any anomalies entered to the work plan.
6. Arrangements were made for special disposal of nonradioactive but hazardous wastes (acids, alkalis, solvents, nitrates, peroxides, etc.)
7. Removed parafin shielding from neutron generator area.
8. Removed equipment from laundry area.
9. Surveyed dehydrator rooms and segregated areas and equipment.
10. Cleaned nine rooms which required general decontamination, but which posed no problems due to presence of contaminated equipment, exhaust ducts, absolute filters, etc.
11. Laundry area cleaned including removal of construction blocks and floor tiles.
12. Cleaned powder room - highly contaminated.
13. Discovered "contamination" in heat plant boiler room which analyses showed to be naturally occurring thorium.
14. Fire (primarily smoke) as the result of torches used during duct removal on outside of building by a local contractor. This duct work was past the absolute filter bands and there was no attendant

15. General cleaning accomplished in five additional rooms.

16. Vault decontaminated and bird cages removed.

17. Chipped concrete walls contaminated with ^{90}Sr-Y in Radioisotopes Laboratory.

18. Ductwork removal and clean-up in two additional rooms.

19. Removed glove boxes and other contaminated equipment from Spheroidizing Room; proceeded with remainder of clean-up.

20. Removed installed casework in Inorganic Chemistry Laboratory.

21. Decontaminated restroom floors in supposedly clean area.

22. Cleaned contamination which resulted from clean-up of Spheroidization Room.

23. Inspected Oil Farm Building (remote to Building "D") and removed contaminated equipment that had been stored. Survey showed no further decontamination was necessary.

24. Proceeded with clean-up of Inorganic Chemistry Laboratory.

25. Removed ducts and proceeded with clean-up of Powder Metal Room.

26. Removed duct and proceeding with clean-up of three rooms.

27. Removed duct work and equipment in Ceramics Laboratory and Spheroidization Laboratory.

28. Steamed Pellet Room in preparation to clean-up in order to reduce airborne (resuspended) contamination. Proceeded with clean-up.

29. Powder Room was also steamed prior to clean-up.

30. Removed absolute filters associated with Pellet Room.

31. All drains monitored and cleaned. Five remain contaminated.

32. Removed vertical rolling mill (several tons) from Powder Room. Residual contamination forced removal of two walls, ceilings, and floor tiles.

33. Ceiling and floor tiles removed in Spheroidization Room.

34. Removed absolute filters associated with Vault Room.

35. Final blowers, filters and ducts removed at termination and ventilation exhaust equipment.

36. Removed absolute filters and remainder of equipment associated with the Radioisotopes Laboratory.

37. Proceeded throughout entire facility with final monitoring and removed any contaminated items including floor tile, miscellaneous fixtures. Washed down all remaining ceilings, walls, and floors several times. A detailed swipe survey was performed.

38. Sumps and chip tanks associated with Dehydrator, Laundry Room, and Cleaning Room were decontaminated.

39. Asphalt floor covering in Cleaning Room removed.

40. Final waste shipment (19th truckload) departed. Two additional barrels filled with remaining miscellany for future shipment.

APPENDIX C - SAMPLE ANALYSIS RESULTS

1. Environmental Air Samples

Location	Date	Concentration (uCi/ec)
Radioisotopes Laboratory	7/9/70	$92.3 \pm 0.6 \times 10^{-12}$
Radioisotopes Laboratory	7/9/70	$240.0 \pm 1.0 \times 10^{-12}$
Spheroidizing Room	7/14/70	$68 \pm 2 \times 10^{-12}$
" "	7/15/70	$413 \pm 10 \times 10^{-12}$
Dehydrator Room (during fire)	6/26/70	3.3×10^{-12}
Furnace Room	6/17/70	1.17×10^{-13}
" "	6/17/70	8.5×10^{-13}
" "	6/18/70	2.7×10^{-13}
" "	6/19/70	1.1×10^{-13}
" "	6/22/70	5.36×10^{-13}
" "	6/23/70	3.3×10^{-13}
" "	6/23/70	2.6×10^{-12}
" "	6/23/70	5.3×10^{-12}
" "	6/24/70	2.7×10^{-13}
" "	6/24/70	3.5×10^{-12}
Break Room	6/24/70	2.1×10^{-12}
Furnace Room	6/25/70	5.5×10^{-13}
" "	6/25/70	3.5×10^{-12}
" "	6/26/70	3.5×10^{-12}
" "	6/26/70	2.7×10^{-13}
" "	6/26/70	3.3×10^{-12}
" "	6/26/70	3.5×10^{-12}
" "	6/26/70	2.7×10^{-13}
" "	6/29/70	3.5×10^{-12}
" "	6/29/70	2.6×10^{-12}

Environmental Air Samples (Continued)

Location	Date	Concentration (uCi/ec)
Furnace Room	6/30/70	1.75×10^{-12}
" "	6/30/70	3.6×10^{-13}
" "	7/1/70	1.4×10^{-12}
" "	7/1/70	5.5×10^{-13}
" "	7/6/70	3.5×10^{-12}
" "	7/6/70	1.75×10^{-12}
" "	7/6/70	6.6×10^{-13}
" "	7/7/70	3.3×10^{-13}
" "	7/8/70	1.6×10^{-13}
" "	7/9/70	2.7×10^{-13}
Spheroidizing Room	7/10/70	1.1×10^{-13}
Flame Room #12	7/10/70	2.6×10^{-12}
Inorganic Chemistry Lab	7/13/70	2.5×10^{-12}
" " "	7/13/70	6.2×10^{-12}
Spheroidizing Room	7/13/70	4.0×10^{-12}
Room #11	7/14/70	3.0×10^{-12}
* Spheroidizing Room	7/14/70	6.8×10^{-10}
Room #11	7/15/70	1.6×10^{-12}
* Spheroidizing Room	7/15/70	4.13×10^{-10}
Room #11	7/16/70	7.0×10^{-13}
Spheroidizing Room	7/16/70	6.6×10^{-11}
Spheroidizing Room	7/17/70	7.9×10^{-11}
Furnace Room	7/20/70	5.2×10^{-13}
Inorganic Chemistry Lab	7/21/70	4.4×10^{-12}
Inorganic Chemistry Lab	7/21/70	4.6×10^{-12}
* Spheroidizing Room	7/21/70	1.7×10^{-10}

Environmental Air Samples (Continued)

Location	Date	Concentration (u Ci/ec)
Furnace Room (Shipping Area)	7/22/70	3.9×10^{-13}
Inorganic Chemistry Lab	7/22/70	8.6×10^{-13}
" " "	7/22/70	1.7×10^{-12}
Room #32	7/23/70	1.75×10^{-11}
Room #32	7/23/70	2.6×10^{-12}
Room #57	7/23/70	7.0×10^{-12}
Spheroidizing Room	7/24/70	3.1×10^{-12}
Room #41 (Vault)	7/24/70	1.4×10^{-12}
Room #21 (Powder Metal)	7/24/70	6.3×10^{-12}
Spheroidizing Room	7/27/70	1.47×10^{-11}
" "	7/27/70	2.2×10^{-12}
Room #41 (Vault)	7/27/70	6.0×10^{-12}
Spheroidizing Room	7/28/70	9.9×10^{-11}
Room #41 (Vault)	7/28/70	1.4×10^{-12}
Room #21 (Powder Metal)	7/29/70	1.97×10^{-11}
" " " "	7/29/70	1.18×10^{-11}
Spheroidizing Room	7/29/70	2.1×10^{-12}
Ceramics Lab	7/30/70	7.0×10^{-12}
" "	7/30/70	2.9×10^{-12}
Spheroidizing Room	7/30/70	1.0×10^{-12}
Ceramics Lab	7/31/70	4.2×10^{-12}
Dehydrator Room	7/31/70	7.0×10^{-12}
Spheroidizing Room	7/31/70	4.4×10^{-12}
Furnace Room (Shipping Area)	8/3/70	3.5×10^{-11}
Corrosion Test Lab	8/3/70	1.6×10^{-12}
Spheroidizing Lab	8/4/70	2.2×10^{-11}
Pellet Room	8/4/70	7.0×10^{-12}

Environmental Air Samples (Continued)

Location	Date	Concentration (uCi/ec)
Furnace Room (Shipping Area)	8/4/70	2.4×10^{-12}
Pellet Room	8/5/70	5.3×10^{-12}
" "	8/5/70	9.3×10^{-12}
Furnace Room (Room #11)	8/5/70	1.6×10^{-12}
Pellet Room	8/6/70	9.5×10^{-13}
Furnace Room (Shipping Area)	8/7/70	7.7×10^{-12}
" " " "	8/7/70	8.8×10^{-12}
Furnace Room (Room #11)	8/7/70	3.3×10^{-13}
" " " "	8/10/70	7.0×10^{-12}
Shower Room	8/10/70	1.9×10^{-11}
Furnace Room (Shipping Area)	8/10/70	3.0×10^{-12}
" " " "	8/11/70	2.2×10^{-12}
" " " "	8/12/70	1.1×10^{-12}
" " " "	8/13/70	1.1×10^{-12}
" " " "	8/13/70	1.9×10^{-12}
" " " "	8/14/70	1.1×10^{-12}
" " " "	8/15/70	1.6×10^{-12}
" " " "	8/16/70	1.1×10^{-12}
" " " "	8/17/70	4.5×10^{-12}
" " " "	8/19/70	7.6×10^{-13}
" " " "	8/19/70	2.5×10^{-12}
Dehydrator Room	8/21/70	4.9×10^{-13}
Block House (Mech.Equip.)	8/22/70	1.9×10^{-12}
Dehydrator Room	8/23/70	3.8×10^{-13}
" "	8/24/70	3.2×10^{-13}
Radioisotopes Lab	8/24/70	2.2×10^{-12}

2. Environmental Water Samples

Location	Date	Concentration(pCi/l)
^{60}Co Shielding Pool	6/4/70	> 5
Dehydrator Sump	6/17/70	15.6±2.0
Dehydrator Effluent	6/17/70	2.8±1.0
E. Tunnel Welding Shop (#58)	8/17/70	(236±10 (113± 8
Pellet Room Sump	8/17/70	(318±13 (376±13
Plating Room Chip Tank	8/17/70	(852±21 (916±20
Dyn.Corr.Lab Chip Tank	8/17/70	(112±8 (123±7
Summary Sump	9/1/70	
Summary Sump	9/1/70	

3. Environmental Swipe and Soil Analysis

a. Tritium Swipes (All in Neutron Generator Room)

Location	Date	uCi/100cm^2
Wall Mount	6/4/70	5.5×10^{-5}
Target Box	6/4/70	1.9×10^{-5}
Neutron Generator	6/4/70	1.4×10^{-5}
Lab Room 3	6/4/70	1.6×10^{-4}

b. Soil Samples From South Area Outside Bldg. D

Location	Date	pCi/gm ^{238}U	^{235}U
#1		0.38±0.07	0.13±0.04
#2		0.48±0.08	0.39±0.07
#3		0.56±0.07	0.27±0.05
#4		0.40±0.06	0.48±0.07
#5		24.5±0.12	9.14±0.87
#6		0.68±0.12	0.61±0.11

b. Soil Samples From South Area Outside Bldg. D (Continued)

Location	Date	pCi/gm ^{238}U	pCi/gm ^{235}U
#7		0.64±0.10	0.33±0.07
#8		1.13±0.14	5.27±0.41

c. Firebrick from Boiler Room (Not associated with contaminated area)

Fire Box Residue	6/25/70
Fire Box Bricks	6/25/70
Boiler Fuel	6/25/70

4. Bioassay Sampling

a. Positive Nose Swipes

Name	Date	Total dpm Both Nostrils
(b)(6)	6/12/70 (AM)	200
	6/15/70 (PM)	200
	6/16/70 (PM)	200
	6/16/70 (PM)	200
	6/17/70 (AM)	100
	6/17/70 (PM)	100
	6/17/70 (PM)	100
	6/17/70 (PM)	100
	6/17/70 (PM)	100
	6/18/70 (PM)	100
	6/18/70 (PM)	100
	6/19/70 (PM)	200
	6/19/70 (PM)	100
	6/19/70 (PM)	200
	6/19/70 (PM)	100
	6/22/70 (AM)	100

a. Positive Nose Swipes (Continued)

Name	Date	Total dpm Both Nostrils
(b)(6)	6/22/70 (AM)	100
	6/22/70 (AM)	100
	6/22/70 (PM)	100
	6/23/70 (PM)	100
	6/29/70 (PM)	300
	7/7/70 (AM)	100
	7/7/70 (AM)	100
	7/7/70 (PM)	100
	7/7/70 (PM)	100
	7/10/70 (AM)	100
	7/10/70 (PM)	100
	7/10/70 (PM)	100
	7/13/70 (AM)	100
	7/13/70 (AM)	100
	7/13/70 (PM)	100
	7/13/70 (PM)	200
	7/13/70 (PM)	100
	7/14/70 (AM)	100
	7/14/70 (AM)	100
	7/14/70 (AM)	100
	7/14/70 (AM)	100
	7/28/70 (AM)	200
	7/28/70 (AM)	200
	7/28/70 (AM)	100
	7/28/70 (AM)	200
	7/28/70 (PM)	100

a. Positive Nose Swipes (Continued)

Name	Date	Total dpm Both Nostrils
(b)(6)	7/29/70 (AM)	100
	7/29/70 (AM)	200
	7/29/70 (AM)	100
	8/11/70 (AM)	100
	8/15/70 (AM)	200

b. Urine Sample Results (24-hour sample)

Name	Date	dpm/Sample ^{235}U
(b)(6)	6/20/70	0.00±0.05 dpm
	7/4/70	0.00± 0.03 dpm
	7/4/70	0.00±0.03 dpm
	7/4/70	0.00±0.03 dpm
	7/4/70	0.06±0.03 dpm
	7/4/70	0.00±0.03 dpm
	7/4/70	0.00±0.03 dpm
	7/4/70	0.00±0.03 dpm
	7/4/70	0.00±0.03 dpm
	7/4/70	0.00±0.03 dpm
	7/4/70	0.00±0.03 dpm
	7/4/70	0.00±0.03 dpm
* (Eberline)	7/28/70	2.9±0.7 dpm
* (Eberline)	7/28/70	10±2 dpm
	7/30/70	0.00±0.05 dpm

Results of Occupational Radiation Exposure Report

Film Badge No.	Participant's Name	Radiation Exposure Period June 8-Sept. 2, 1970	(MREM) Beta Gamma Neutron
00055	(b)(6)		.00
00056			.00
00057			.00
00058			.00
00059			.00
00061			.00
00062			.00
00063			.00
00064			.00
854014			.00

DOCKET NO. 70-58

For Div of Compliance



DECONTAMINATION OF BUILDING "D"

UCLEAR ENGINEERING LABORATORIES

EAKE PARK, INC. - BALTIMORE, MARYLA

MARTIN MARIETTA CORPORATION

MARTIN MARIETTA AEROSPACE GROUP

DENVER DIVISION, POST OFFICE BOX 179, DENVER, COLORADO 80201

1254

ENCLOSURE TO EXHIBIT "A"

DOCKET NO. 70 58
For Div of Compliance
Received w/Ltr Dated

THE

HEALTH AND SAFETY PROCEDURE

FOR THE

DECONTAMINATION OF BUILDING "D"

NUCLEAR ENGINEERING LABORATORIES

CHESAPEAKE PARK, INC. - BALTIMORE, MARYLAND

MARTIN MARIETTA CORPORATION

Prepared by

E. M. Chenault
Health Physicist
Martin Marietta Corporation

and

E. L. Geiger
Health Physicist
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I. Introduction

The Martin Marietta Corporation, Denver Division, has demonstrated a history of successful and safe programs utilizing radioactive materials and is presently licensed to handle and process radioactive materials. The health and safety plan described in this volume utilizes the experience and knowledge developed in past programs to guarantee compliance with the health and safety requirements of this program.

This health and safety plan has been prepared by a Health Physicist and Industrial Hygiene Engineer of the Martin Marietta Corporation, Denver Division, and in consultation with U. S. A. E. C. representatives and State Health Department radiological officials. The plan has been reviewed by a certified health physicist.

The place where the decontamination operations will occur is located in the lower level of building "D" designated as the Nuclear Facilities. The area encompasses approximately 40,000 square feet and consists of concrete floors covered with linoleum tile, acoustical false ceiling tile, and wall partitions with painted smooth surfaces. Most of the area has been subdivided into small laboratories that consist of very little equipment, but a considerable number of ventilation hoods, ducts, and a few glove boxes.

The period of time for which the license is requested is six (6) months; however, it is noted that the decontamination activity is planned to require approximately 9 - 10 weeks to complete. The additional time is requested primarily to ensure that adequate time is applied to the license to avoid expiration of license before the job is completed.

The type of special nuclear materials to be removed from equipment and facilities is residual amounts of uranium oxides enriched in isotopes U^{235}. The quantity of U^{235} is small and does not create a criticality hazard. This has been verified with portable scintillation gamma detectors. Most of the uranium is contained in glove boxes and ventillation hoods which will be disassembled, properly packaged, and shipped to an approved waste disposal site. The walls, floors, and permanent fixtures are relatively free of radioactive contamination.

II. Purpose

This procedure has been prepared for submittal to the U. S. Atomic Energy Commission as part of an application for licenses to decontaminate the Nuclear Engineering Laboratories, Building "D", Chesapeake Park, Inc., Baltimore, Maryland.

The attached procedure has been prepared in accordance with the U. S. Atomic Energy Commission Rules and Regulations, Title 10, Parts 70 and 20.

III. The Health Physics and Industrial Hygiene Engineering Technical Approach

The process of decontaminating the nuclear facilities and equipment presents certain health hazards and contamination problems from primarily radioactive dust (U^{238} and U^{235}) and a minor external radiation hazard.

The potential dust sources that present personnel inhalation hazards are:

1. The removal of residual uranium oxides from equipment and facilities,
2. The removal of equipment, filters, ducts, collection systems, etc.,
3. Accidental spills of residual powder,
4. Packaging of dust-laden equipment for burial,
5. Handling of contaminated equipment, and
6. Waste disposal.

Three health physicists and a radiation monitor will provide the necessary radiological health guidance.

The Eberline Instrument Corporation (EIC), Santa Fe, New Mexico, shall provide a certified health physicist to prepare work order packages for each phase of the decontamination. A qualified health physicist and one monitor shall be provided by EIC during the decontamination and packaging of waste to insure adequate health and safety protection of people performing the task, to control contamination, and to insure compliance with the Department of Transportation and U. S. A. E. C. rules and regulations. EIC shall also provide analytical services for radiation dosimetry, air, water, soil, and bioassay samples. EIC shall provide a certified health

physicist for the final survey to certify that the facility meets the criteria for abandonment in Part V of these procedures.

The Martin Marietta Corporation shall provide a qualified health physicist and a trained and experienced work crew consisting of approximately eight (8) men and one supervisor to decontaminate the facilities, equipment, and package contaminated equipment for shipment to approved burial grounds. The work crew assigned to decontaminate the nuclear facilities have had experience working with hazardous materials and have received radiological health indoctrination courses.

The decontamination process shall be systematically conducted and well organized. Each room will be decontaminated by keeping dust generation and liquids use to a minimum according to a work order package prepared for that room. After the room has been decontaminated, it will be surveyed to determine that the level of residual contamination is below the limits in Part V. The room will then be locked and marked as being clean. The entire program will be well planned to achieve maximum performance without incident.

A. Respiratory Equipment

No employee will be permitted to perform work where airborne radioactivity exceeds concentration guides for U^{235}. If operations must be performed for short periods of time in a radioactive dust-laden atmosphere, respiratory protective devices and protective clothing will be used. The respirators will be of the air line or backpack type. Sufficient numbers of these are available. However,

respirators are no substitute for engineering control; therefore, exposure to any level of radioactive dust concentration will be kept to an absolute minumum by engineering means.

B. Protective Clothing

In facilities where contamination is present, personnel will change into anti-contamination clothing that is not removed from the area. Such clothing will be packaged, tagged, identified, and sent out to a special laundry or disposed of as radioactive waste. Such laundry facilities will be approved by local, state, and federal authorities (U.S.A.E.C.) prior to use.

C. Equipment Contaminated

Radioactive powder will be removed from equipment by vacuum or by wiping with a moist cloth prior to being removed from its original location. Protective clothing will be worn by personnel. Respiratory protection will be provided during periods when occupational concentration guides may be exceeded temporarily. Radioactive contaminated rags, paper, clothing, etc., will be deposited in properly identified containers for disposal or cleaning as directed by the Health Physicist.

IV. Specifications for the Decontamination of Fixtures, Facilities and Equipment Contaminated by Radioactive Materials.

The decontamination of all facilities and equipment must be in an orderly, planned fashion and shall not create a health hazard to personnel. Precautions shall be taken to prevent the spread of contamination to sanitary or storm sewer lines and pipes.

A change room will be provided for changing from street clothes into protective (anti-contamination) clothing to prevent spread of contamination to clean area.

Actual work areas shall be posted with signs indicating radiation work in progress, only authorized personnel allowed entry. Temporary barriers will be set up to keep those not working directly with the material at a safe distance.

Coveralls and gloves are required to be worn by all personnel entering contaminated area.

The maintenance of radiation exposure records on each employee engaged in the decontamination operation shall be the responsibility of the Martin Marietta Corporation along with the provision of protective clothing and equipment.

All chemical liquids, equipment, and detergents shall be provided by Martin Marietta.

All equipment, fixtures, and facilities decontaminated must be approved in writing by the U. S. Atomic Energy Commission before said equipment, fixtures, and facilities are accepted by Chesapeake Park, Inc.

All equipment, fixtures, and facilities which have been cleaned and meet the U. S. Atomic Energy Commission decontamination level for safe disposal must be marked or tagged.

Martin Marietta Corporation Health Physicist shall have access to all areas prior to decontamination, during decontamination, and after decontamination. He shall be afforded the opportunity to converse and make recommendations to the EIC health physicist, and monitor any or all equipment and facilities. He shall function as liaison with Martin Marietta Corporation Contractor and Chesapeake Park, Inc.

Emergency Procedure - Fire: Fires involving enriched uranium must be extinguished with a metal-x powder extinguisher. Fire extinguishers, metal-x powder type and dry powder, must be provided by Martin Marietta and available for use during decontamination operation.

The Martin Marietta Corporation crew must decontaminate all equipment, facilities, fixtures, and other equipment to radiation levels acceptable to the U. S. Atomic Energy Commission.

The safe disposal of all radioisotope waste and contaminated equipment and fixtures shall be the responsibility of Martin Marietta, consistent with U. S. Atomic Energy Commission and Department of Transportation regulations.

During decontamination operation, Martin Marietta Corporation crew must ensure that dust, fumes, smoke, vapor, or mist are not generated to create a health hazard to any personnel or to contaminate equipment or facilities.

A decontamination room, designated by Chesapeake Park, Inc., and accepted by the Martin Marietta Corporation Health Physicist, shall be utilized for decontamination of various types of equipment.

The Health Physicist must ensure that personnel returning from the contaminated area observe established control procedures to prevent spreading contamination to clean work areas, eating spaces, offices, and other areas. Each must be monitored as soon as he exits from the contaminated area. Used protective clothing must be placed in proper containers.

V. U. S. A. E. C. Radioactivity Contamination Limits for Abandonment of Facilities and Equipment.

All facilities and equipment contaminated by radioactive materials shall be decontaminated to those limits prescribed by the U. S. A. E. C. and are as follows:

1. The maximum amount of fixed alpha radioactivity in disintegrations per minute per 100 square centimeters on buildings or equipment shall not exceed 25,000.
2. The average amount of fixed alpha radioactivity in disintegrations per minute per 100 square centimeters on buildings or equipment shall not exceed 5,000.
3. The maximum amount of removable (capable of being removed by wiping the surface with a filter paper or soft absorbent paper) alpha radioactivity in disintegrations per minute per 100 square centimeters on buildings or equipment shall not exceed 1,000.
4. The maximum level at one centimeter from the most highly contaminated surface of a building or piece of equipment measured with an open window beta-gamma survey meter through a tissue equivalent absorber of not more than seven milligrams per square centimeter shall not exceed one millirad per hour.

VI. Air Sampling Program for Radioactive Dust Surveys

A. Sampling Instruments

The following photographs (Fig. 1 thru 3) show the type of air dust sampling equipment that will be used to monitor the area for uranium oxides that may present an inhalation hazard to personnel. The instrumentation is suitable for monitoring the environment in-plant as well as out-plant for airborne radioactive dust.

Figure 1 - Shows the air sampler and filter holder that will be used to collect air dust samples at the breathing zone of workers who may be exposed to radioactive dust.

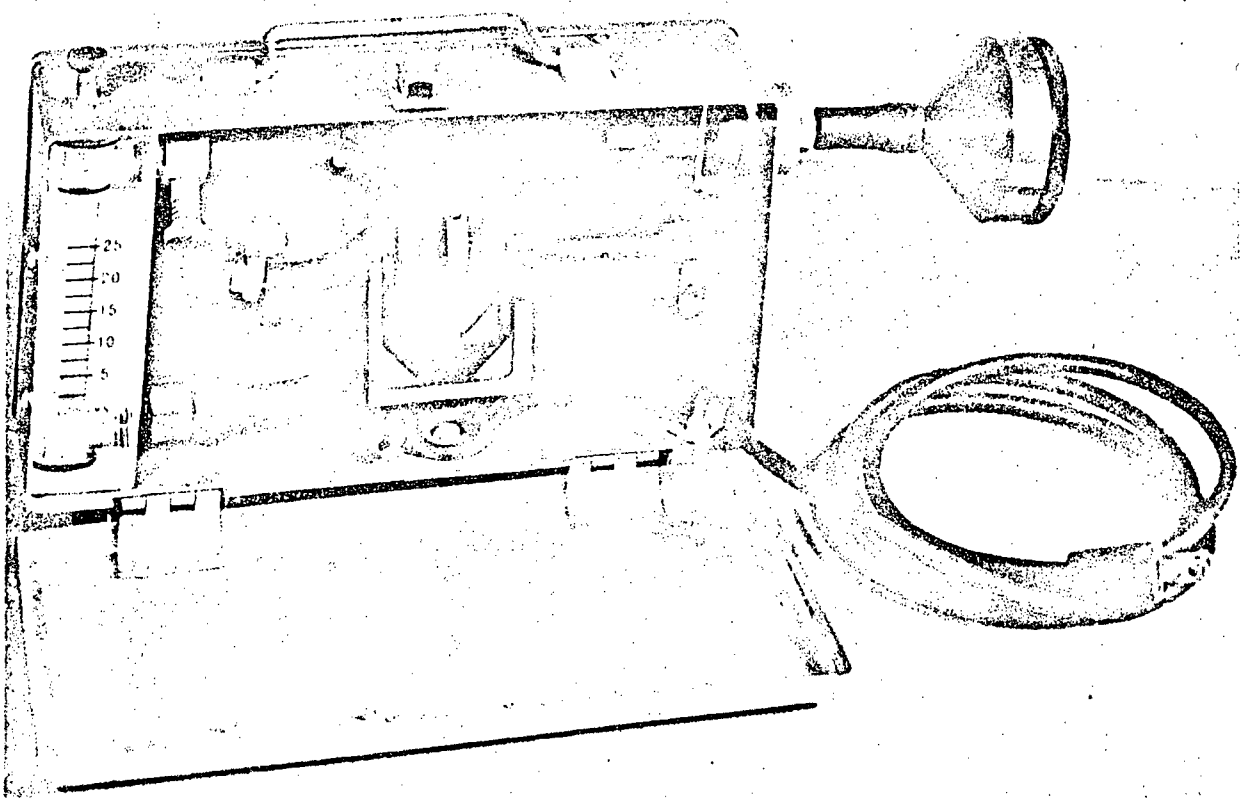


Figure 1

Figure 2 - Shows a combination of air dust samplers equipped with filters that may be used for out-plant sampling as well as in-plant dust sampling.

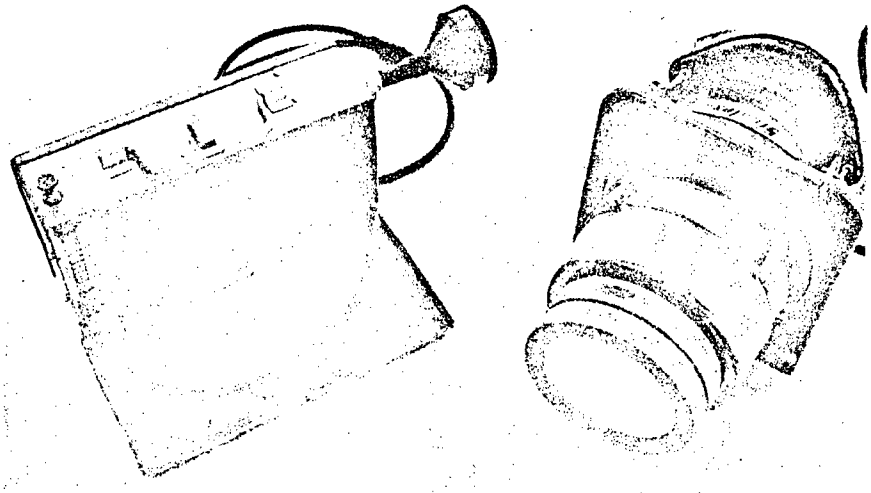


Figure 2

Figure 3 - Shows the high volume sampler capable of pulling 70 cfm of air for dust sampling and can be used for in-plant as well as out-plant dust sampling for radioactive matter.

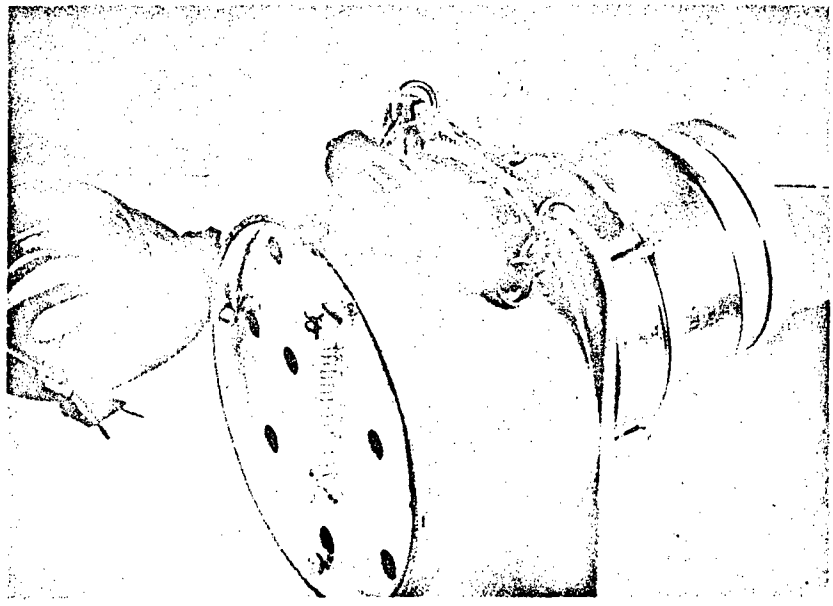
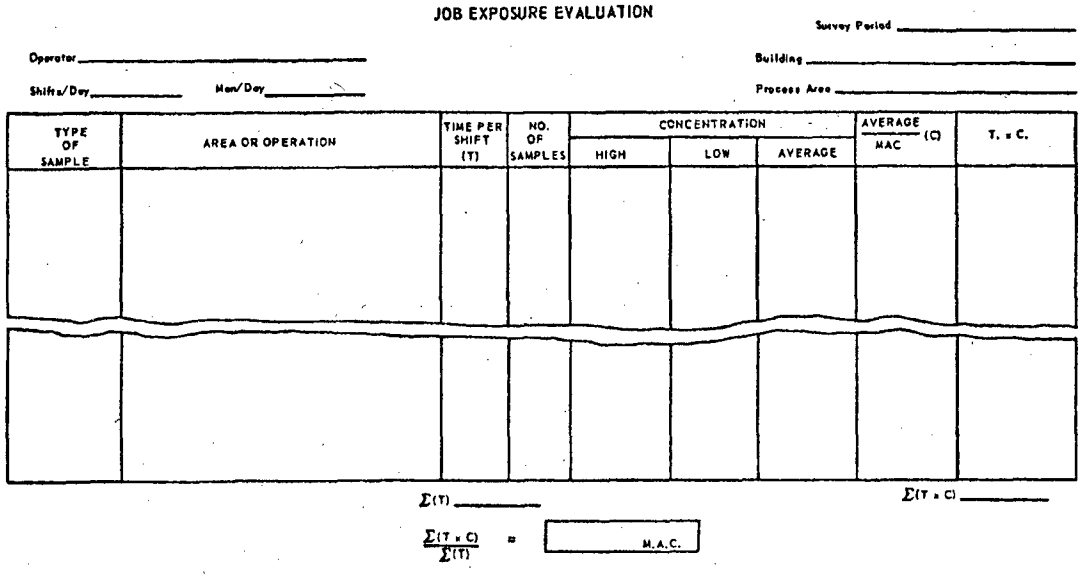


Figure 3

B. Job Exposure Evaluation Data Sheet

The job exposure evaluation data sheets (Fig. 4) will be used to determine the daily weighted exposure of operators involved in the decontamination program. The dust sample results (breathing zone and general area) will be compiled and recorded on the data sheets for daily weighted exposure calculation. Specific job operations will be included on these data sheets.



JOB EXPOSURE EVALUATION

Survey Period _____

Operator _____ Building _____

Shift#/Day _____ Man/Day _____ Process Area _____

TYPE OF SAMPLE	AREA OR OPERATION	TIME PER SHIFT (T)	NO. OF SAMPLES	CONCENTRATION			AVERAGE / MAC (C)	T. x C.
				HIGH	LOW	AVERAGE		

$\Sigma(T)$ _____ $\Sigma(T \times C)$ _____

$\frac{\Sigma(T \times C)}{\Sigma(T)}$ = M.A.C.

Figure 4

C. Industrial Hygiene Survey Reports

The industrial hygiene survey report (Fig. 5) will be used to report environmental conditions as they relate to the decontamination program.

MARTIN COMPANY DENVER DIVISION | MARTIN MARIETTA

INDUSTRIAL HYGIENE SURVEY REPORT

Form DEN 1108-02 (6-64)

DATE

ATTENTION OF

SURVEY BY

TIME

TELEPHONE EXT.

☐ YOUR IMMEDIATE ACTION REQUIRED
☐ CORRECTIVE ACTION MADE AT TIME OF SURVEY
☐ NO ACTION NECESSARY - REASON:

SURVEY REQUESTED BY

☐ SELF INITIATED ☐ HEALTH PROBLEM ☐ UNION INTEREST

NATURE OF PROBLEM

DETERMINED BY

☐ DIRECT READING INSTRUMENTS ☐ VISUAL INVESTIGATION ☐ LABORATORY ANALYSIS

LOCATION:

BUILDING FLOOR AREA

DATES OF PREVIOUS IHSR'S FOR THIS AREA ON THIS SUBJECT

SUMMARY OF FINDINGS

RECOMMENDATIONS

ACTION REQUIRED BY

DATE REQ.

TO

TITLE

DEPT. NO.

MAIL NO.

☐ NO FOLLOW-UP BY I.H. REQUIRED ☐ FOLLOW-UP I.H. INVESTIGATION SCHEDULED FOR

DISTRIBUTION:

Figure 5

D. Industrial Hygiene Analytical Data Sheet

The following analytical data sheet (Fig. 6) will be used to collect air, water and soil samples. A complete description of the samples collected will be written on the data sheet and accompany the samples to the laboratory for analysis. The result of the samples will be recorded on the data sheet and filed after review by the health physicist.

MARTIN MARIETTA CORPORATION

FORM 1

INDUSTRIAL HYGIENE ANALYTICAL DATA SHEET

Sample Nos.	Data Collected	by:	Route to:	ANALYTICAL CHEMISTRY SECTION
				Date received by:
Remarks:				Date reported by:
				Method of Analysis:
				Analyze for:

Sample No.	Hour Collected	Type of Sample BZ-GA-P	Sample Description of Area, Operation and/or Operator	Sample Rate (R)	Sample Time (T)	Quantity of Air Sampled (Q)	Sample Result

Figure 6

VII. External Radiation Survey Program

The following photographs show the type of radiation detection instruments to be used during the decontamination process.

Figure 7 - Shows the gas proportional alpha counter model PAC-3G to be used for alpha activity surveying. There are two available.

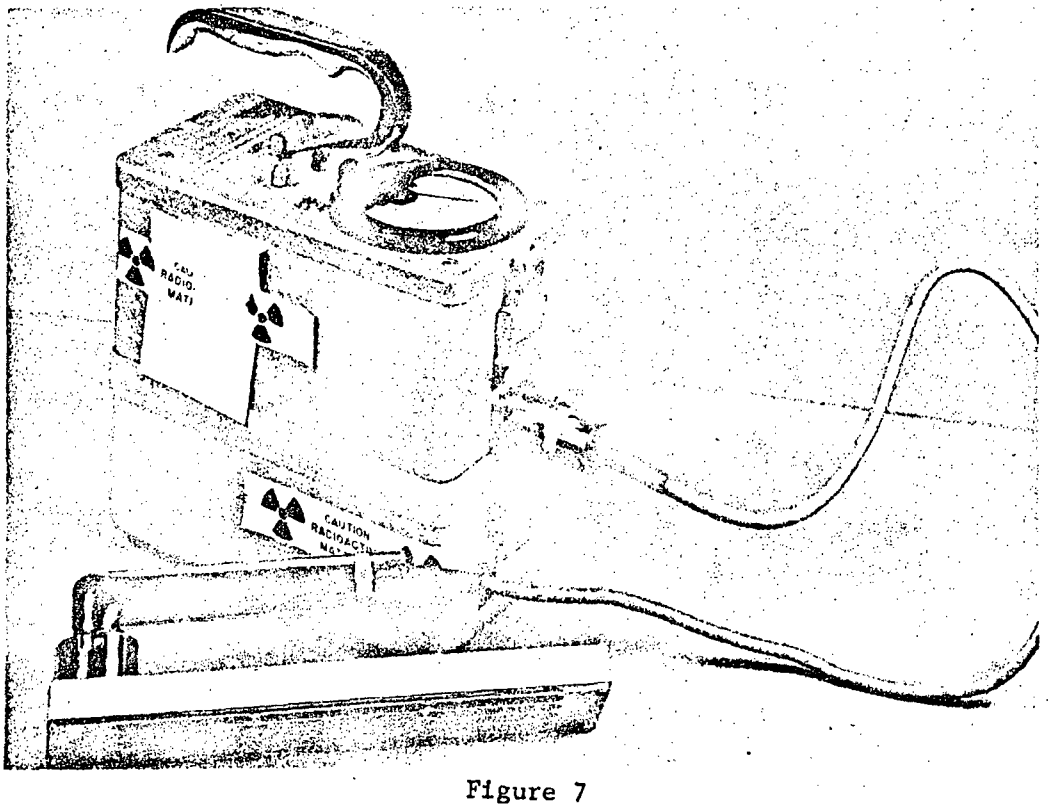


Figure 7

Figure 8 - Shows the beta + gamma survey meter and gas proportional alpha counter model PAC-3G to be used during the monitoring phase.

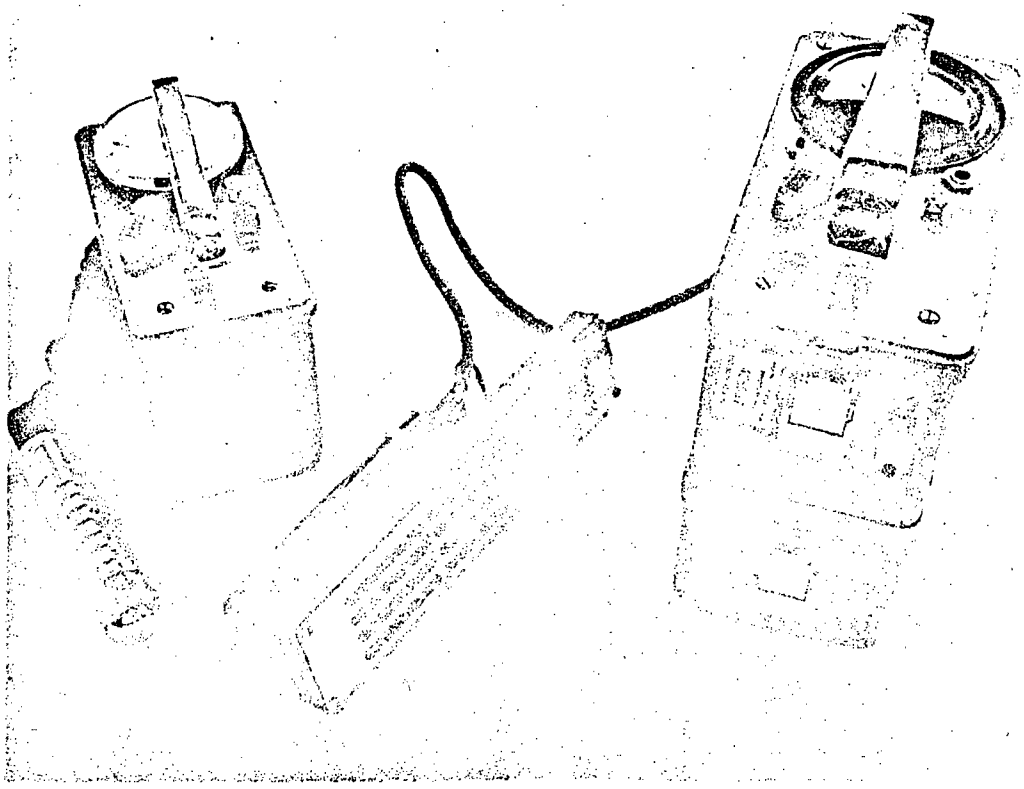


Figure 8

Figure 9 - Shows the dosimetry badges that will be worn by all personnel assigned to the decontamination program.

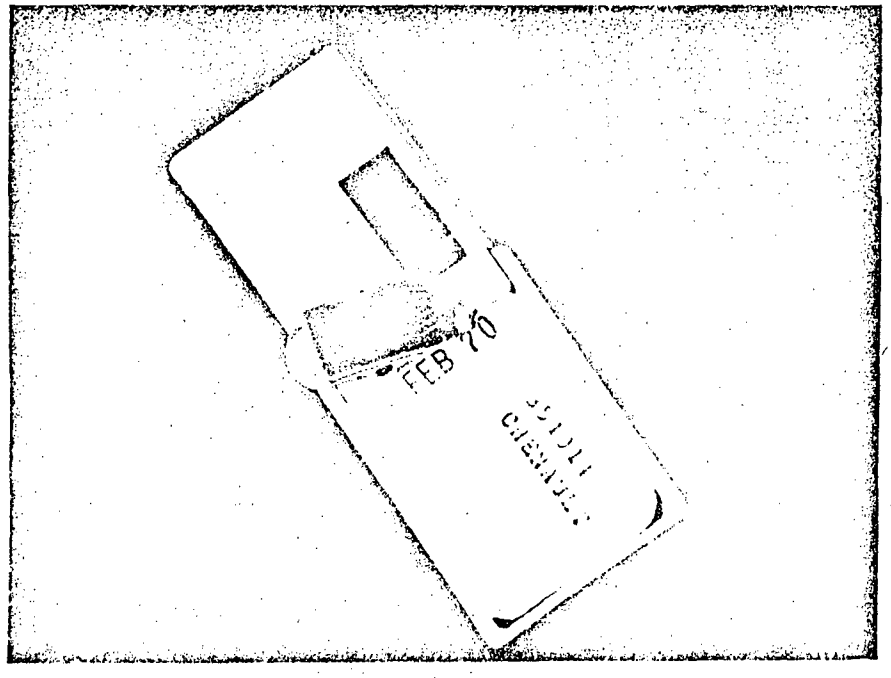


Figure 9

Figure 10 - Shows the pocket dosimeter that will be available to all personnel involved in the decontamination program.

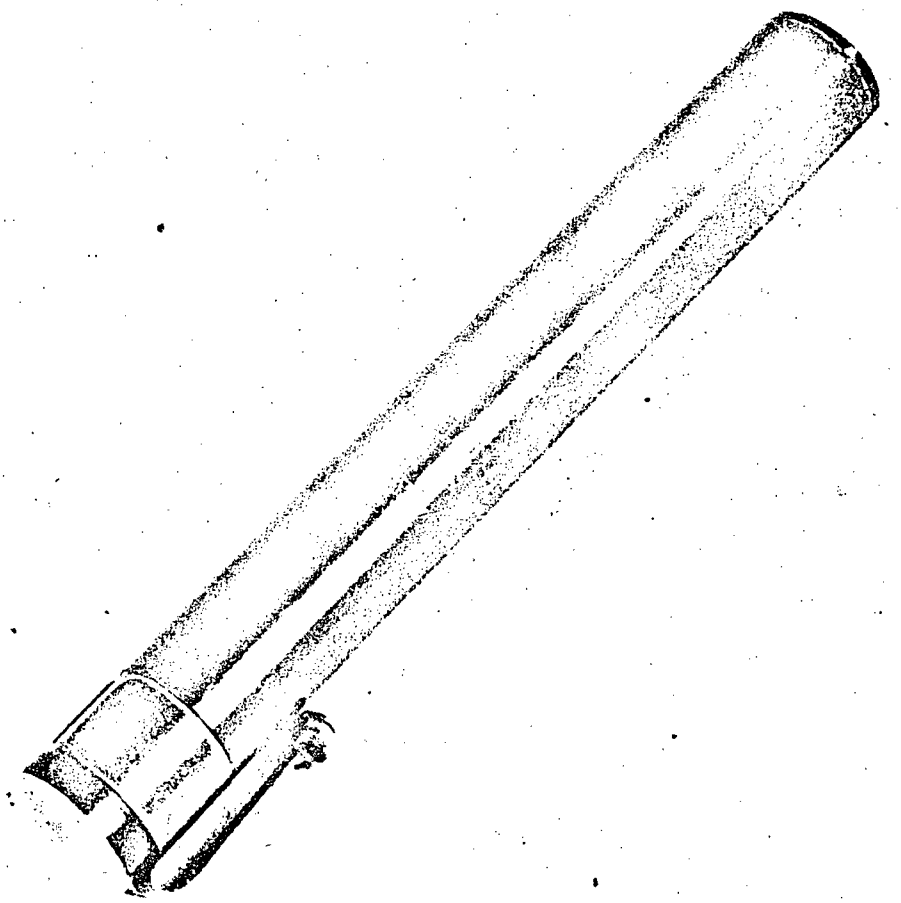


Figure 10

A. Swipe and Smear Sample Equipment

Figure 11 - Shows the swipe and smear sample equipment to be used to determine if suspected contaminated equipment is free of loose or removable contamination.

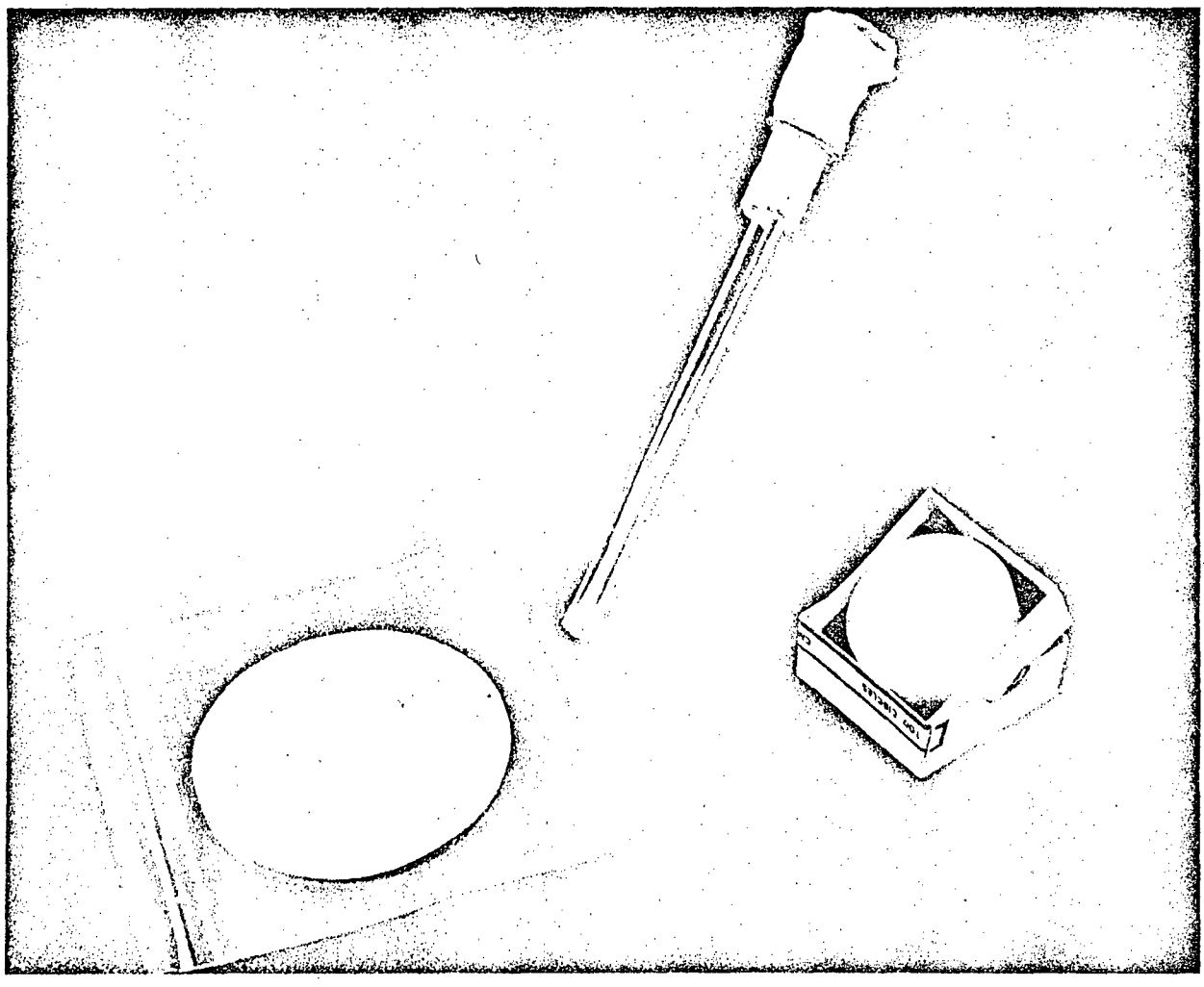


Figure 11

B. Radiation Signs

Figure 12 - Shows the type of signs to be used to identify all contaminated areas and equipment.

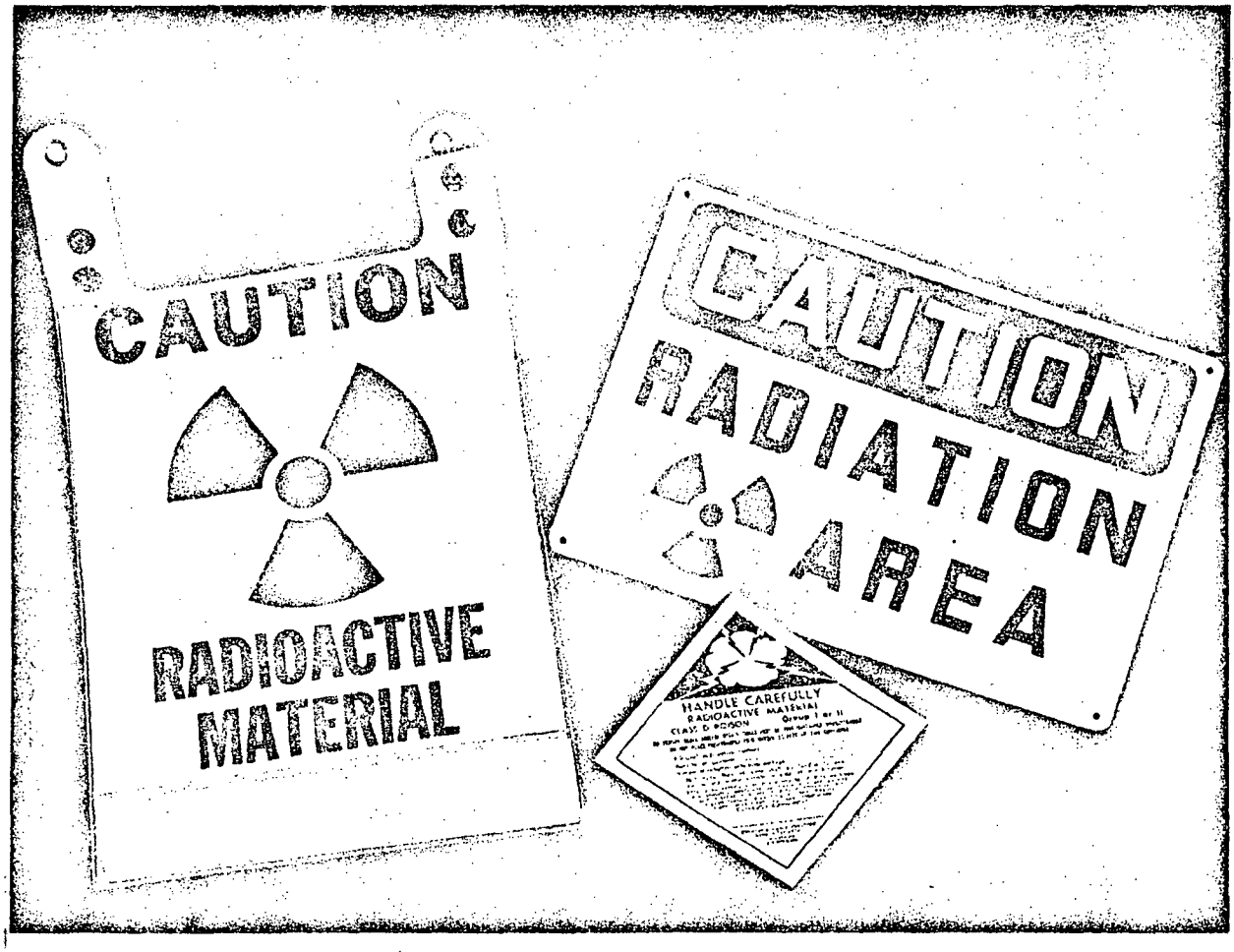
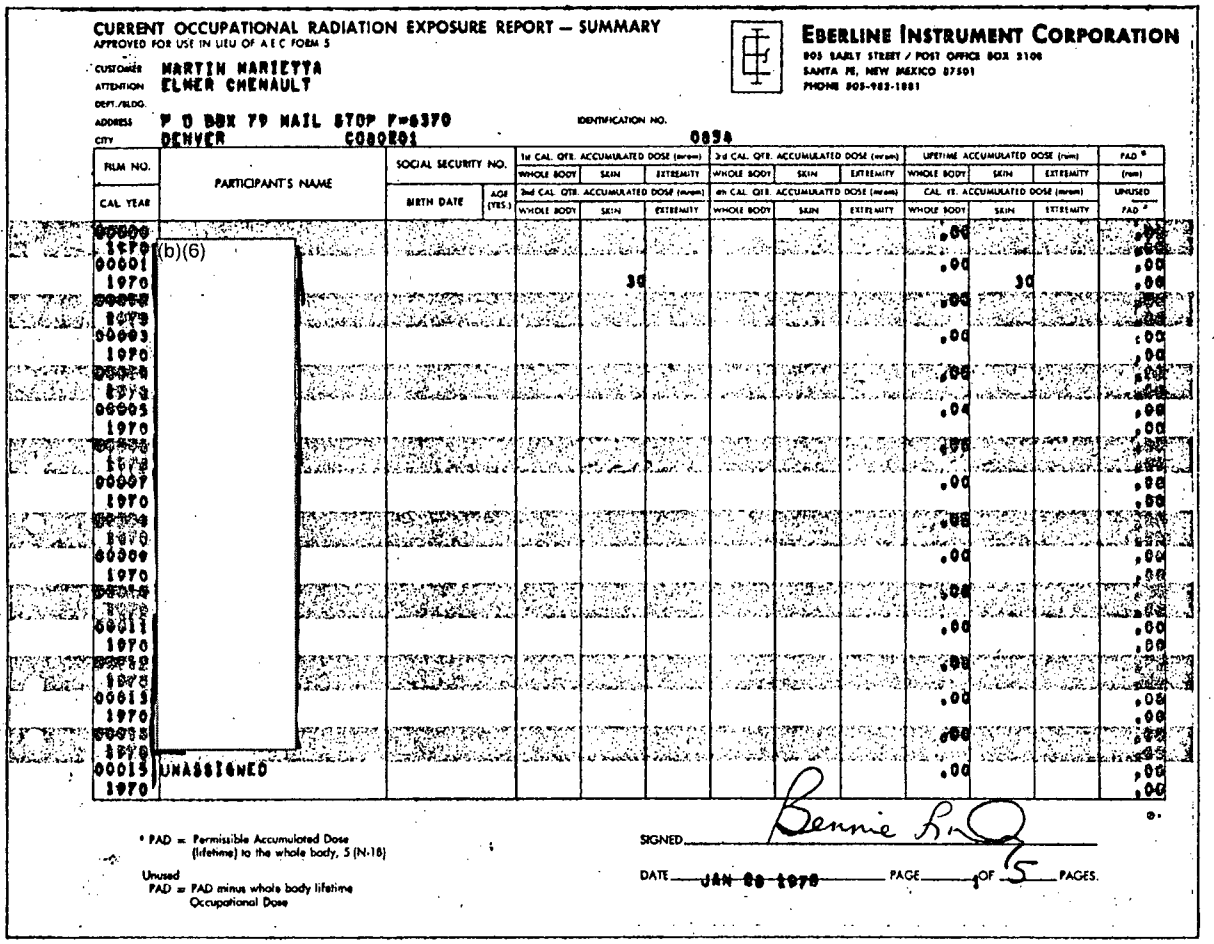


Figure 12

C. Current Occupational Radiation Exposure Report

Figure 13 - Shows the Occupational Radiation Exposure Report which will be used for maintaining individual radiation exposure record.



CURRENT OCCUPATIONAL RADIATION EXPOSURE REPORT – SUMMARY

APPROVED FOR USE IN LIEU OF A E C FORM 5

EBERLINE INSTRUMENT CORPORATION
605 EARLY STREET / POST OFFICE BOX 2108
SANTA FE, NEW MEXICO 87501
PHONE 505-983-1881

CUSTOMER MARTIN MARIETTA
ATTENTION ELMER CHENAULT
DEPT./BLDG.
ADDRESS P O BOX 79 MAIL STOP P-6370
CITY DENVER CO80201
IDENTIFICATION NO. 0034

FILM NO. / CAL YEAR	PARTICIPANT'S NAME	SOCIAL SECURITY NO. / BIRTH DATE	AGE (YRS.)	1st CAL. QTR. ACCUMULATED DOSE (mrem) WHOLE BODY	1st CAL. QTR. ACCUMULATED DOSE (mrem) SKIN	1st CAL. QTR. ACCUMULATED DOSE (mrem) EXTREMITY	2nd CAL. QTR. ACCUMULATED DOSE (mrem) WHOLE BODY	2nd CAL. QTR. ACCUMULATED DOSE (mrem) SKIN	2nd CAL. QTR. ACCUMULATED DOSE (mrem) EXTREMITY	LIFETIME ACCUMULATED DOSE (rem) WHOLE BODY	LIFETIME ACCUMULATED DOSE (rem) SKIN	LIFETIME ACCUMULATED DOSE (rem) EXTREMITY	PAD * (rem) UNUSED PAD *
				2nd CAL. QTR. ACCUMULATED DOSE (mrem) WHOLE BODY	2nd CAL. QTR. ACCUMULATED DOSE (mrem) SKIN	2nd CAL. QTR. ACCUMULATED DOSE (mrem) EXTREMITY	4th CAL. QTR. ACCUMULATED DOSE (mrem) WHOLE BODY	4th CAL. QTR. ACCUMULATED DOSE (mrem) SKIN	4th CAL. QTR. ACCUMULATED DOSE (mrem) EXTREMITY	CAL. YR. ACCUMULATED DOSE (mrem) WHOLE BODY	CAL. YR. ACCUMULATED DOSE (mrem) SKIN	CAL. YR. ACCUMULATED DOSE (mrem) EXTREMITY	
00000	(b)(6)									.00			.00
1970													.00
00001					30					.00	30		.00
1970													.00
00002										.00			.00
1970													.00
00003										.00			.00
1970													.00
00004										.00			.00
1970													.00
00005										.00			.00
1970													.00
00006										.00			.00
1970													.00
00007										.00			.00
1970													.00
00008										.00			.00
1970													.00
00009										.00			.00
1970													.00
00010										.00			.00
1970													.00
00011										.00			.00
1970													.00
00012										.00			.00
1970													.00
00013										.00			.00
1970													.00
00014										.00			.00
1970													.00
00015	UNASSIGNED									.00			.00
1970													.00

* PAD = Permissible Accumulated Dose (lifetime) to the whole body, 5 (N-18)

Unused PAD = PAD minus whole body lifetime Occupational Dose

SIGNED Bennie Ro

DATE JAN 08 1970 PAGE 1 OF 5 PAGES.

Figure 13

VIII. Contamination Control

A. Air

Airborne activity will be kept to a minimum through the use of vacuum machines and damp cloths to remove loose uranium oxides. There shall be no brooms or air hoses used to decontaminate equipment or fixtures containing uranium oxides. Air supply respirators shall be worn by personnel when involved in dust generating activity.

B. Water

There shall be no release of liquid effluent into domestic sewers or storm sewers until water samples have been taken to determine the quality of the effluent and to ensure there is no contamination present, radioactive or chemical.

C. Soil

Soil samples shall be taken whenever it is thought or determined that contamination to the ground has occurred.

D. Personnel

All personnel involved in the decontamination process shall be provided and shall wear full protective clothing and approved respiratory equipment. Showering once per day prior to leaving the facilities is mandatory. There shall be no smoking or eating inside areas designated as contaminated. There shall be access control to the work areas and only those people assigned shall be permitted entry.

IX. Personnel Orientation and Bioassay

A. Personnel Orientation

All personnel assigned to the decontamination program will receive a health and safety lecture regarding radiological health as it relates to the decontamination program.

B. Bioassay

The EIC will provide the bioassay analysis for all bioassay samples regarding uranium. A sample will be collected from each worker prior to start of clean-up activities and at the conclusion of decontamination. Samples in between start and completion may be taken, depending on circumstances.

X. Waste Disposal

The Nuclear Engineering Company, Walnut Creek, California, with burial grounds for radioactive waste in Moorehead, Kentucky, will be chosen as the carrier and receiver of contaminated equipment and radioactive (uranium) waste.

The packaging and shipping of radioactive waste and contaminated equipment shall be in compliance with the Department of Transportation and the U. S. Atomic Energy Commission rules and regulations governing packaging, shipping, and burial.

XI. Resume and Experience of Personnel

A. E. M. Chenault, Health Physicist, Martin Marietta Corporation

E. M. Chenault has sixteen years of experience and training in the fields of health physics and industrial hygiene. He is employed by Martin Marietta Corporation as a health physicist and is responsible for the control of radiological health, industrial hygiene, air and water pollution control. He shall be in charge of the decontamination program for the Chesapeake Park, Inc., facilities. He has held a "Q" clearance with the U. S. Atomic Energy Commission when he worked as a health physicist and industrial hygiene engineer for the National Lead Company of Ohio, which is a prime contractor for the U. S. A. E. C. The National Lead Company is a uranium mill processing plant located in Cincinnati, Ohio.

E. M. Chenault is a graduate of the Far East Chemical College and a former U. S. Army instructor in Chemical, Biological and Radiological Warfare. He holds an associate degree and a bachelor degree in physical sciences and completed advanced study in nuclear radiation, radiological health and instrumentation, and industrial engineering ventilation at Michigan State University. He is an appointee of the Governor of Colorado to the State Air Pollution Control Board and a member of the Colorado State Health Department Ad Hoc Committee on Occupational Health. He has been approved by the Colorado State Department of Public Health, which is an agreement state and the U. S. A. E. C. to serve as a radiation protection officer on nuclear material license. He has written

numerous papers on the subject of radiation and the health aspect of beryllium processing.

STATE OF COLORADO

DEPARTMENT OF PUBLIC HEALTH

RADIOACTIVE MATERIALS LICENSE

Pursuant to the Radiation Control Act Chapter 66, Article 26 CRS 1963, as amended, and the Radiation Control Regulations Part III, and in reliance on statements and representations heretofore made by the licensee designated below, a license is hereby issued authorizing such licensee to transfer, receive, possess and use the radioactive material(s) designated below; and to use such radioactive materials for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations, and orders now or hereafter in effect of the State Department of Public Health and to any conditions specified below.

Licensee	3. License number
1. Name Martin Marietta Corporation	Colo. 12 - 11 S
2. Address P. O. Box 179 Denver, Colorado 80201	4. Expiration date February 28, 1973
	5. Reference number (U.S. A.E.C. - SMB-112)

6. Radioactive materials (element and mass number)	7. Chemical and/or physical form	8. Maximum quantity licensee may possess at any one time
A. Thorium	A. Thorium-magnesium alloy not more than 4% thorium by weight	A. 700 pounds total alloy

CONDITIONS

9. Authorized use. (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.)

A. To be used in accordance with the statements, representations, and procedures contained in application dated January 26, 1970.

10. The radioactive material may only be used at the licensee's Waterton, Colorado facility.

11. The licensee shall comply with the provisions of Part IV, State of Colorado Rules and Regulations Pertaining to Radiation Control, "Standards for Protection Against Radiation".

12. Radioactive material shall be used by, or under the supervision of E. MacDonald Chenault.

13. This license does not authorize welding, melting, chemical milling, pickling, grinding or filing of the material held under this license.

Date February 5, 1970

FOR THE STATE DEPARTMENT OF PUBLIC HEALTH

By .....

AOR-RH-18 (10-67-20)

STATE OF COLORADO

DEPARTMENT OF PUBLIC HEALTH

APPLICATION FOR RADIOACTIVE MATERIAL LICENSE

INSTRUCTIONS — Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: Colorado State Department of Public Health, Radiation Hygiene Section, 4210 E. 11th Ave., Denver, Colorado 80220. Upon approval of this application, the applicant will receive a State of Colorado Radioactive Material License, issued in accordance with the general requirements contained in the State Department of Public Health, Radiation Control Regulations and the State of Colorado Radiation Control Act, Chapter 66, Article 26 CRS 1963, as amended.

NEW APPLICATION ☐ AMENDMENT TO LICENSE ☐

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.) Martin Marietta Corporation P. O. Box 179 Denver, Colorado 80201	(b) STREET ADDRESS(ES) AT WHICH RADIOACTIVE MATERIAL WILL BE USED. (If different from 1 (a).) Martin Marietta Corporation P. O. Box 179 Denver, Colorado 80201
2. DEPARTMENT TO USE RADIOACTIVE MATERIAL. Manufacturing	3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.) SMB-112-USAEC
4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of radioactive materials. Give training and experience in Items 8 and 9.) James Orem Tim Renzio Neither of the above individuals have training and experience with radiation.	5. RADIATION PROTECTION OFFICER. (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9). Elmer M. Chenault Health Physicist (See Attached)
6. (a) RADIOACTIVE MATERIAL. (Elements and mass number of each.) Magnesium - Thorium HM21A-T6l Thorium - 1.5 to 2.5% (4) Pc's 160# ea. Manganese .45 to 1.1%	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM QUANTITY OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.) Metal Plate

7. DESCRIBE PURPOSE FOR WHICH RADIOACTIVE MATERIAL WILL BE USED. (If radioactive material is for "human use," Supplement A (FORM AOR-RH-13) must be completed in lieu of this item. If radioactive material is in the form of sealed sources, include the make and model number of the storage container and/or device in which the source will be stored and/or used.) Attach extra sheets if necessary.

Missile and Spacecraft Structure.

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary).

8. TYPE OF TRAINING E. M. CHENAULT	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	Far East Chemical College Gitu, Japan	1 Yr.	Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	National Lead Co. of Ohio U.S.A.E.C. Contractor Cincinnati, Ohio	9 yrs.	Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity	Univ. of Cincinnati Far East Chemical College	6 mo. 1 yr.	Yes No	Yes No
d. Biological effects of radiation	Univ. of Cincinnati Ohio Civil Defense Authority	1 yr. 1 yr.	Yes No	Yes No

9. EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience).

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
U235	Classified	National Lead Co. of Ohio	9 years	Production
U238	Tons	National Lead Co. of Ohio	9 years	Production
C060	1 Curie	National Lead Co. of Ohio	9 years	Research
Sr90	200 MC	National Lead Co. of Ohio	9 years	Research

10. RADIATION DETECTION INSTRUMENTS (Use supplemental sheets if necessary). SEE ATTACHED

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm^2)	USE (Monitoring, Surveying, Measuring)
				SEE ATTACHED	

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE. SEE ATTACHED

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED (For film badges, specify method of calibrating and processing or name of supplier). SEE ATTACHED

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS SEE ATTACHED

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached (Circle answer). Yes No SEE ATTACHED

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. SEE ATTACHED

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. SEE ATTACHED

CERTIFICATE

(This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH COLORADO STATE DEPARTMENT OF PUBLIC HEALTH RADIATION CONTROL REGULATIONS AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Applicant named in Item 1

Date ..... By: .....

Title of certifying official authorized to act on behalf of the applicant

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary).

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	None	None	Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	None	None	Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity	None	None	Yes No	Yes No
d. Biological effects of radiation	None	None	Yes No	Yes No

9. EXPERIENCE WITH RADIATION (Actual use of radioisotopes or equivalent experience).

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
N/A				

10. RADIATION DETECTION INSTRUMENTS (Use supplemental sheets if necessary).

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, Surveying, Measuring)
Gas Proportional Alpha PAC3G	2	Alpha	N/A in MR/HR	0.85	Surveying, Monitoring
High Volume Air Sampler	2	Airborne Alpha	0-1000 dpm/M3	---	Measuring
Victoreen Radector 500	1	Beta & Gamma	0.5-500	0.87	Surveying

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE. SEE ATTACHED

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED (For film badges, specify method of calibrating and processing or name of supplier). SEE ATTACHED

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached (Circle answer). Yes No SEE ATTACHED

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. SEE ATTACHED

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. SEE ATTACHED

CERTIFICATE

(This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH COLORADO STATE DEPARTMENT OF PUBLIC HEALTH RADIATION CONTROL REGULATIONS AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

.....
Applicant named in Item 1

Date ..... By: .....

.....
Title of certifying official authorized to act on behalf of the applicant

11. Method, Frequency, and Standards Used in Calibrating Instruments

Gas proportional counters are calibrated originally at the Factory utilizing Polonium 210. Thorium 230 alpha source with a ¾" active area and 3500 CPM is used to calibrate instruments prior to each use. The exact value of the source is marked on the face of the source. The source is placed within one quarter inch from the window face for field calibration.

The Victoreen Radector 500 is calibrated with 100 MC CS^{137} gamma radiation source every six months.

The high volume sampler is calibrated against a known volume of CFM flowed through an orifice.

12. Film Badges, Dosimeters, and Bio-Assay Procedures Used

The name of the supplier and processor of the film badges is Eberline Instrument Corporation, P. O. Box 2108, Santa Fe, New Mexico 87501.

13. Facilities and Equipment

The magnesium-thorium metal will be processed and machined on lathes, drills, drill presses, etc. Adequate ventilation will be afforded each operation where magnesium-thorium is processed. All magnesium-thorium will be properly identified, stored and handled in accordance with safety standards.

14. Radiation Protection Program

The radiation protection program is administered by a trained and qualified Health Physicist designated as the Radiation Protection Officer. Radiation surveys are periodically conducted in all areas where radiation exist or is thought to exist. The surveys consist of swipe sampling of all operations utilizing radioactive materials. Film badges are provided to all personnel assigned to the program. A safety orientation is also provided to personnel assigned to the program.

15. Waste Disposal

The disposal of all radioactive waste material shall be in accordance with the State of Colorado rules and regulations pertaining to radiation control. Certificate Disposition of Radioactive Materials, Form AOR-RH-23 (1-68-5) shall be used for proper disposal of radioactive materials.

Form AEC-313
8 64
10 CFR 30

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved
Budget Bureau No 38-R027

INSTRUCTIONS - Complete items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commisson with respect to items 8 through 15 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to U.S. Atomic Energy Commission, Washington, D.C. 20545, Attention: Isotopes Branch, Division of Materials Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1 (a) NAME AND STREET ADDRESS OF APPLICANT (Institution, firm, hospital person, etc. Include ZIP Code.)

Martin Marietta Corporation
Denver Division
Waterton Facility, Box 179
Denver, Colorado 80201

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED (If different from 1 (a) Include ZIP Code.)

Martin Marietta Corporation
Denver Division
Waterton Facility, Box 179
Denver, Colorado 80201

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Propulsion Cold Flow Lab.

3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)

Renewal - License No. 5-3010-4(B67)

4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)

Allen L. Hobbs or individuals designated by Allen L. Hobbs

5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)

Allen L. Hobbs
Elmer N. Chenault

6. (a) BYPRODUCT MATERIAL (Elements and mass number of each)

Cesium -137

(b) CHEMICAL AND OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)

Sealed sources (Ohmart Corporation Model No. Lab - 236 - C1 - 4 700 millicuries) 2 sources of 300 millicuries and 1 source of 100 millicuries.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

To be used in the Ohmart Corporation Model No. SHP-P source holders for detection of gas related to oxidizer tanks.

(Continued on reverse side)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8 TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a Principles and practices of radiation protection	Resume for A. L. Hobbs was sent to E. E. Brinkman, 30 July 1964		Yes No	Yes No
b Radioactivity measurement standardization and monitoring techniques and instruments	For resume of Elmer M. Chenault please reference application for renewal Oct. 1, 1965 of license No. 5-3010-3 (J65)		Yes No	Yes No
c Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d Biological effects of radiation			Yes No	Yes No

9 EXPERIENCE WITH RADIATION *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		Refer to reference of item #8		

10 RADIATION DETECTION INSTRUMENTS *(Use supplemental sheets if necessary)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
	Same as answer to item #8				

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE

Same as answer to #8

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

Same as answer to #8

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13 FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No Same as answer to #8

14 RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

Same as answer to #8

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

Same as answer to #8

CERTIFICATE (This item must be completed by applicant)

16 THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Martin-Marietta Corporation
Applicant named in item 1

Date 24 January 1967

By: M. E. Nelain
assistant counsel
Title of certifying official

WARNING.— 18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—745-381

B. Supervisor - Martin Marietta Corporation

The supervisor assigned to the decontamination program is Mr. H. Kaiser, who has many years' experience working in the area of hazardous materials auch as beryllium, acids, and radioactive matter.

C. Operators - Martin Marietta Corporation

All operators assigned to the program have received a radiological health orientation and are familiar with the health aspect of uranium. Most of the operators have worked with and around various types of hazardous materials.

LORENZ

RADIATION LEVELS
AFTER DECONTAMINATION
BUILDING D, MMC, BALTIMORE, MD.

ROOM and/or AREA	Beta plus Gamma E-112B Instrument	RM-15 Instrument	Alpha PAC-3G Averaged d/m/100cm^2	Remarks
Area 5 Radiation Physics Office	ND	ND	ND	Walls, floor and ceiling nondetectable
Dust Collector Block House	ND	ND	500	Fixed in equipment shell.
Dust Collector Block House floor	ND	ND	< 100	Fixed, non-removable
Dust Collector Block House wall	ND	ND	< 100	
Dust Collector Block House ceiling	ND	ND	< 100	
Area 1 Gama Pool Co.60 Lab	ND	ND	ND	
Area 6 Nuclear Radiation Effect Lab.	ND	ND	ND	
Area 3 Neutron 14 Mev Lab.	ND	ND	ND	
Area 4 and 7 Machine Shop	ND	ND	< 100	Fixed in floor.
Area 22 Thermoelectric Development Lab (Furnace Room)	ND	ND	< 100	Fixed in floor.
Decontamination Building Note: Building will be demolished for needed space and aesthetics.	ND	ND	750-800	Fixed in walls.
Radioisotope Laboratory	0.5mr/hr	ND	350	Fixed in small area 3' x 6'
Area 12-14 Flame Room	ND	ND	450	Fixed in floor.
Area 15 Corrosion Lab Annex				
Floor drain #1	ND	ND	2.0	Fixed in bell area of drai
Floor drain #2	ND	ND	2.5	" " " " " "
Floor drain #3	ND	ND	235.0	" " " " " "
Floor drain #4	ND	ND	520.0	" " " " " "
Floor drain #5	ND	ND	75.0	" " " " " "

EXHIBIT "B"

ROOM and/or AREA	Beta plus Gamma E-112B Instrument	RM-15 Instrument	Alpha PAC-3G Averaged d/m/100cm^2	Remarks
Janitor Room	ND	ND	< 100	Fixed in floor
Area 21 Powder Metal Room	ND	ND	550	Fixed in floor
Area 20 Ceramics Lab.	ND	ND	350	Fixed in floor
Area 23 Autoclave Lab.	ND	ND	275	Fixed in floor
Area 22 Dynamic Corrosion Lab.	ND	ND	< 100	Fixed in floor
Area 32 Inorganic Chemistry Lab.	ND	ND	750	Fixed in floor
Area 30-31 Metallography and Microscope Lab.	ND	ND	450	Fixed in floor
Area 36-37 Plating Lab.	ND	ND	< 100	Fixed in floor
Area 34-35-38 Change Room,	ND	ND	250	Fixed in floor
Shower Room,	ND	ND	175	Fixed in floor
Laundry Rm.	ND	ND	350	Fixed in floor
Area 51-59-65 Shipping Rm.	ND	ND	ND	
Soil samples from surrounding facilities	ND	ND	ND	
Roof of facilities	ND	ND	ND	
Area 58-60 Quality Control Welding Shop	ND	ND	< 100	Fixed in floor, walls & ceiling clear
Area 56 Passageway	ND	ND	< 100	
Area 33 Hallway Entering Radex Area	ND	ND	< 100	
Area 19 Spherodization Lab	ND	ND	750	Fixed in floor
Area 18 Laboratory	ND	ND	< 100	Fixed in floor
Area 25 Module Assy. Room	ND	ND	ND	
Area 26-27-28 Bell Jar Capsule Lab.	ND	ND	ND	
Area 24 Welding Room	ND	ND	ND	
Area 29 Inert Furnace Room	ND	ND	< 100	Natural occurring
Area 8-9-10 T.E. Fabrication	ND	ND	ND	

ROOM and/or AREA	Beta plus Gamma E-112B Instrument	RM-15 Instrument	Alpha PAC-3G Averaged d/m/100cm^2	Remarks
Area 14 Toilet (Rest Rooms)	ND	ND	< 50	Fixed
Area 53 Cleaning Room	ND	ND	ND	
Area 60 Toilet (Rest Rooms)	ND	ND	50	
Area 6 Radiation Effect Lab	ND	ND	ND	
Area 3 Neutron Generator Rm	ND	ND	ND	
Pellet Room	ND	ND	ND	
Vault	ND	ND	ND	
Spherodizing Room	ND	ND	< 100	Fixed in floor
X-Ray Room	ND	ND	ND	
Radiation Physics	ND	ND	ND	
Fabrication	ND	ND	ND	
Ceramics Laboratory	ND	ND	< 100	Fixed in floor
Procurement Area	ND	ND	ND	
Office	ND	ND	1	
Pickling	ND	ND	< 100	Fixed
Powder Room	ND	ND	175	Fixed

NOTE - The monitoring process of each room and/or area encompasses the the floor, wall, ceiling and any drain lines, if present.

ND = Nondetectable.

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DOCKET NO. 70-58
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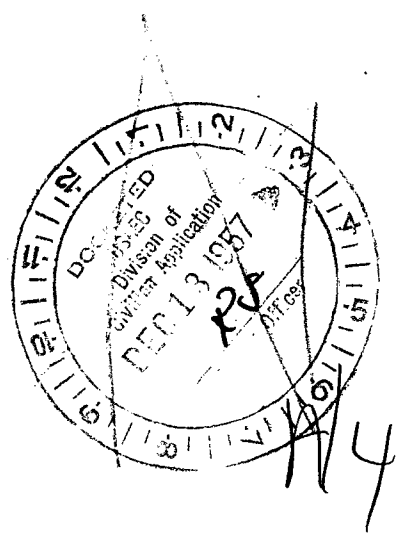
THE MARTIN COMPANY
APPLICATION FOR GENERAL LICENSE TO RECEIVE,
POSSESS, USE AND TRANSFER SPECIAL NUCLEAR
MATERIAL (PART 70, CFR 10)



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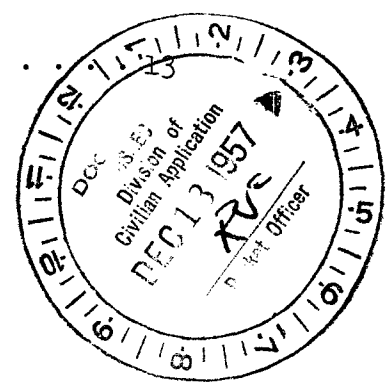

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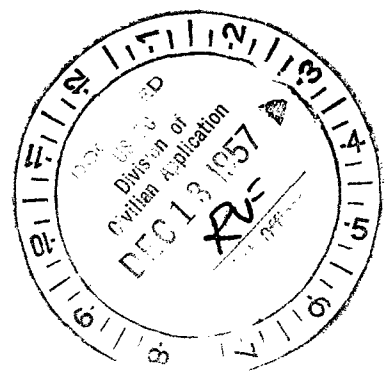


APPLICATION FOR GENERAL LICENSE TO RECEIVE, POSSESS, USE AND TRANSFER SPECIAL NUCLEAR MATERIAL (PART 70, CFR 10)

I. The Martin Company is engaged in design, research, development and construction of nuclear reactors and nuclear components at its Middle River Plant near Baltimore, Maryland. For the purpose of development and fabrication of reactor fuel elements, a Nuclear Materials Laboratory and a Pilot Manufacturing Plant have been constructed in the basement of "D" Building at Plant I. A critical experiment facility for zero power testing of proto-type reactor cores is in the final stage of completion. This facility is located near the Martin airport some two thousand feet southeast of Plant I.

Research and development work on fuel elements is conducted under Special Nuclear Material License No. 11, as amended, in accordance with procedures described in the Company's applications of May 22, 1957 and September 19, 1957. The most recent revision of this license permits special operations involving fully clad fuel elements to be performed in the pilot manufacturing plant and in other buildings at Plant I in addition to the laboratory areas.

Initial operation of the Pilot Manufacturing Plant involves fabrication of stainless steel tubular elements containing highly enriched UO_2, for a proto-type MPR core to be tested to zero power for the Atomic Energy Commission under Contract AT (30-3)-277. Government-owned fuel has been handled through Accountability Station MND, which was authorized by the Schenectady Operations Office after approval of the Martin Nuclear Division's procedures regarding criticality control, accountability, health and safety, and security.

In addition to MPR type tubular elements, The Martin Company plans to fabricate other fuel element types in the Pilot Manufacturing Plant. Certain special operations will be performed in other buildings at Plant I. Some of the work to be undertaken will be on a commercial basis and therefore must be done under a Special Nuclear Material License issued by the Commission. In this connection, note is made that the Commission issued SNM License 53 to The Martin Company on November 26, 1956 permitting receipt and possession of fifty (50) kilograms of UO_2 enriched to over 90% in the isotope U235.

Several types of fuel elements including rods, tubes and plates will be manufactured. These elements will utilize uranium metal or uranium dioxide in a fuel marrow clad with such materials as stainless steel, aluminum alloys and zirconium alloys.

DOCKETED USAEC Division of Civilian Application DEC 13 1957 Docket Officer

In view of these varied contemplated activities, The Martin Company pursuant to Part 70, CFR 10 hereby applies for a general license to receive, possess and use up to five hundred kilograms of contained U235 in special nuclear materials at its Middle River facilities, including uses in the Critical Experiment Facility other than activities licensed under Part 50, CFR 10. Application is made for a license extending for three years from date of issuance. The experience gained by the Nuclear Division during the past three years in safe handling of nuclear materials is reflected in the general procedures outlined in this application in sections which follow.

II. Information required pursuant to Section 70.22, Title 10, Chapter 1, CFR:

(1) Applicant is The Martin Company, Baltimore 3, Maryland incorporated in the State of Maryland and having its principal plant and place of business at Middle River, Maryland.

Principal officers are:

G. M. Bunker, President, The Martin Company, Baltimore 3, Maryland - USA

W. B. Bergen, Executive Vice President, The Martin Company, Baltimore 3, Maryland - USA

W. L. Lucas, Secretary and Treasurer, The Martin Company, Baltimore 3, Maryland - USA

The Martin Company is not owned, controlled, or dominated by an alien, a foreign corporation, or foreign government. The applicant is the real party in interest and is not making this application as an agent for any undisclosed principal.

(2) Activities:

Attached for reference are plans of the nuclear facilities at the Martin Middle River plant showing work areas and quantities of special nuclear material (in terms of contained isotope U235) permitted in each work area:

Plate 1 - Plan of Engineering Materials Laboratory
Plate 2 - Plan of Pilot Manufacturing Plant
Plate 3 - Plan of Critical Experiment Facility located near Martin airport.

General procedures in connection with activities contemplated are:

(a) Receiving -

SNM will be received at Gate 5 of Plant I by the Accountability Representative. After monitoring by Health Physics Services for radiation hazards, shipments will be conveyed to Vault Annex Room, (Work Area IB) or Vault, (Work Area IA) for unpacking and weighing of special nuclear material.

(b) Storage -

The storage vault is a fully enclosed room, 22'8" by 13'9" by 11'0" high. It is designed to hold up to 600 kilograms of enriched uranium in powders, foils, elements or ingots stored in birdcage devices approximately 12" x 12" to 17" x 17" in cross-section. Walls, ceiling, and floor are constructed of a minimum of 9 inches of reinforced concrete. Sole entrance to the vault is through a $1\frac{1}{2}$" steel door equipped with a three-way combination lock. There are no water or service piping or drains within the vault.

Materials will be stored in separate containers containing quantities which are less than the theoretical critical masses calculated for optimum conditions with respect to geometry of container, moderators, and reflector according to the calculating procedures outlined in the Martin Criticality Precautions Manual, MND-1063 (Appendix A) and its reference "A Guide to the Calculation of Criticality Limits for Enriched Uranium" by Dr. Chernick. Each container will be at least 12" x 12" in cross-section with a length about 12" longer than the material to be held. Containers and birdcages will vary in design according to the form of the material. For example:

Uranium dioxide powders will be stored in metal bottles of approximately 150 cubic centimeters capacity. No more than 600 grams of uranium dioxide enriched to over 90% in the isotope U235 or more than 550 grams of contained isotope U235 will be stored in each metal bottle. One and only one bottle will be suspended inside a cubical "birdcage" type structure of welded metal construction having dimensions of 16 5/8" x 16 5/8" x 21 3/8".

Uranium metal foil will be stored in birdcages 12" x 12" x 34" with bundles of foil each containing no more than 1000 grams of U235 held roughly in the center by inserts.

Fuel elements, tubular or plate, will be held in cradles in storage devices or similar dimensions (12" x 12" x 30-40"). Each cradle will hold a prescribed number of tubes or plates, the total U235 content of which will be within the allowable limits established for the particular form of material involved.

Solid scrap will be stored in metal boxes 9 1/2" x 11 3/4" x 26", each held in a birdcage 12" by 12" x 40" long.

Insofar as it is practical, all birdcages will be placed in rows along the walls of the vault to permit easy access. The lowest rows will be placed on platforms about 17 inches above the floor to prevent accidental contact with water. Even if flooding occurred above the height of 22" required to reach any special nuclear material, no hazard would exist since (1) all materials will be in latched birdcages in amounts less than the theoretical critical limits and (2) powders will be in water-tight metallic containers within the birdcages.

All material will be stored during non-work hours either in the vault or in locked repository safes in the manufacturing area.

When special nuclear material must be taken from the nuclear facilities to other areas within the Martin plant, it will always be in the custody of a "Q" cleared accountability designee.

(c) Forms of material -

Forms with corresponding allowable limits in contained U235 have been established as shown on the following two pages.

(d) Work Areas and Criticality Control -

Reference is made to Plates 1, 2 and 3 and to the Martin Criticality Precautions Manual, MND-1063, filed with the AEC, April 22, 1957. A revised copy of this manual is attached as Appendix A. The manufacturing area and the critical experiment area have been divided into Work Areas for purposes of control of criticality. The laboratory except for a few designated work areas is considered to be one integral work area. Limits (in terms of U235) are shown on the plates for the various

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
Ia	all enrichments	UO_2 powder, density when loose approx. 5 gr/cc	800 grams
Ib	all enrichments	UO_2 powder, pressed and sintered shapes density approx. 10 gr/cc	800 grams
Ic	0.72% to 20.0%	UO_2 and ThO_2, powder and sintered shapes	* grams
IIa	highly enriched	UO_2 and stainless steel mixture, density approx. 8.4 gr/cc	1600 grams
IIb	highly enriched	Sintered cermet of UO_2 and stainless steel density approx. 8.4 gr/cc	1850 grams
III	all enrichments	Uranium in aqueous solution	2 grams/liter (1)
IV	highly enriched	Stainless steel clad tubes, with Form IIb as fuel marrow	2000 grams
V	over 20.0%	Stainless steel clad plates with uranium metal as fuel marrow	1600 grams
VIa	over 20.0%	Uranium metal in thin forms; ribbon, foil wire, etc.	500 grams
VIb	over 20.0%	Uranium metal in fine cuttings, dust., etc.	500 grams
VIIa	all enrichments	UO_2 and powdered Al mixture, approx. density 2.5 gr/cc	800 grams
VIIb	all enrichments	Pressed or sintered UO_2 and Al mixture in (VIIa) approx. density 5.0 gr/cc	800 grams

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
VIIIa	all enrichments	Aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
VIIIb	all enrichments	Iron-aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
IX	over 20.0%	Uranium metal in buttons, derbies, etc.	10000 grams (2)
X	over 20.0%	Uranium metal in ingots, bars, machined shapes, smallest dimension 70.25 inches	3000 grams
XI	0.72% to 20.0%	Stainless steel clads filled with solid pellets of Form Ib or Ic	2000 grams
XII	over 20.0%	Zirconium, titanium, molybdenum and other "special" alloy-clad plates with uranium metal fuel marrow	grams (3)
XIII	over 20.0%	Uranium-thorium molybdenum alloys	grams (3)

(1) Except when total amount in any one container in all forms is less than 400 grams of U235

(2) Subject to review with regard to minimum dimensions and reflecters

(3) To be determined

forms of SNM (pages 5 and 6) which can be present in each work area at any one time. In the event that several forms are present at one time in a work area, the lowest allowable limit for U235 applies to all materials present.

All transfers between work areas are made by the courier acting as a designee of the Accountability Representative. Enforcement of criticality procedures within work areas is a responsibility of each facility supervisor. Material, under close weighing control, is transported to an "Off-Spot" in work boxes in "carrier" devices. Amounts present in each work area are shown on prominent signs posted by the Accountability Representative.

(e) Manufacturing -

Fabrication of fuel elements will be performed in the pilot shop located in "D" Building.

A few special operations such as brazing of fully clad tubes to end castings will be done in other buildings at Plant I.

Processes, either developed or being developed include:

(1) Fabrication of stainless steel clad plates enclosing uranium metal foil (Form I)

(2) Stainless steel clad tubes enclosing fuel marrow of enriched uranium dioxide-stainless steel cermet (Form IV)

(3) Aluminum and aluminum alloy clad tubes enclosing pressed uranium dioxide-aluminum blended compacts as fuel marrow (Form VIII)

(4) Stainless steel clads filled with solid compacts of uranium dioxide or uranium dioxide and thoria (Form XI)

General descriptions of these processes are outlined in Appendix B with corresponding manufacturing flow charts shown in Appendix C.

(f) Accountability -

The Martin Nuclear Division accountability procedures for strict control of valuable special nuclear materials

apply to both government-furnished SNM and to licensed SNM. Each lot received is assigned a ledger number. All material withdrawn is kept separate from other lots throughout processing. Scrap is kept segregated by contract or project. Thus there is no risk of intermingling materials or several contracts or of different enrichments.

(g) Security -

All facilities are controlled areas with only authorized personnel permitted access. An escort-control pass system is applied to authorized visitors.

Materials are given security protection in accord with the categories outlined in the AEC manual.

(h) Transport to Critical Experiment Facility -

Finished fuel tubes, plates or rods are moved to the facility in "birdcage" transporting devices in a guard-escorted motor vehicle. No more than 800 grams of U235 contained in sealed elements are allowed per "birdcage" device. These birdcage devices are 12" by 12" by 34" and retain in a center position wooden cradles 9 1/2" by 11 3/4" by 23 3/4" which hold the fuel tubes or plates.

(i) Receipt and Storage at Critical Experiment Facility -

After verification by the Accountability Designee of the Facility of the number of tubes or plates delivered the birdcages will be placed in the storage vault. The vault is of similar construction to the vault in the pilot manufacturing plant and has a floor area of 175 square feet. It is accessible only through a 1 1/2" steel door equipped with a three-way combination lock.

(j) Assembly at Critical Experiment Facility -

Tubes or plates are assembled into experimental bundles in Work Area 102, adjacent to the Storage Vault and Test Cells.

Following assembly, the fuel elements (bundles or boxes) will be placed in wooden cradles which are held in the birdcage storage devices. The dimensions of the cradle holding a bundle of thirty-seven (37) MPR tubes are 9 1/2" by 11 3/4" by 23 3/4".

The birdcage devices are then transferred to the storage vault for retention until withdrawal for experimental work authorized by a Class 104 c license.

(k) Shipping procedures -

Shipments of special nuclear material to the Commission or to other licensees will be made as follows:

(1) If the shipment contains no more than 100 grams of U235, the material will be securely packed in a container with resilient material between this container and the outside package. In addition, the parcel will be checked for possible radiation hazards and marked in accordance with ICC regulations.

No more than one package containing up to 100 grams of contained U235 will be transported or delivered to a carrier in any one shipment.

(2) If the shipment contains over 100 grams of U235, the material, depending on its form, will be packed in a container in either one of the Martin "birdcage" devices described in part 2(b) or an equivalent device to be furnished by the shipper. The quantity of U235 in any shipping device will be within the allowable limits for various forms shown on pages 7 and 8 of the manual, MND-1063.

(3) A general license is requested for a period of three years.

(4) Special Nuclear Material will be used in the forms shown in section 2(c). The general categories are:

Uranium dioxide powder; low-enrichment to over 90% enriched in isotope U235
Uranium metal foil, ribbon and wire; low-enrichment to over 90% enriched in isotope U235
Uranium metal ingots, slugs, billets, bars, derbies; all enrichments.

It is not possible to estimate amounts of each type required. However, a total requirement at one time of up to 500 kilograms of contained U235 in SNM is foreseen.

(5) The contemplated requirements for Special Nuclear Material for the last quarter of 1957 and the first quarter of 1958 are shown on the next page.

(6) The Martin Nuclear Division has been engaged in handling special nuclear materials for over two years in research and development of fuel elements. The new laboratory and pilot manufacturing plant have been in operation since June, 1957.

Several new concepts of fuel elements have been developed including the highly-enriched stainless steel clad, UO_2 cermet marrow tubular type. The first core loading of 1700 of these tubes will be completed in November. The technical staff of the Nuclear Division includes some 200 engineers. The manufacturing plant supervisor has had fifteen years of precision shop experience. Health Physics personnel include two senior health physicists each with over 5 years of training at AEC and industrial installations. The Accountability Representative is a public accountant with 10 years experience including 9 months in the handling of nuclear materials.

(7) Equipment and facilities used to protect health and safety -

Storage facilities are described in (2b) and (2i). The manufacturing and laboratory areas are under negative pressure with respect to adjacent working areas of "D" Building. Air flow is from non-contaminated areas to slightly-contaminated areas to more-contaminated areas, with the highest ventilation rates in those rooms or areas where the greatest air-borne contamination is possible.

Exhaust air that may contain appreciable radioactive particulate matter (that is from the hoods or dry boxes) is passed through absolute filters before being released to the atmosphere.

Hoods are used for handling uranium dioxide powders. These hoods, exhausting ducts and glove boxes are equipped with absolute filters. Machining of uranium metal will be done using an oil bath.

A partial list of available instruments and equipment appears as Appendix D.

MATERIAL	ENRICHMENT	QUANTITY ON HAND	4TH QUARTER 1957		1ST QUARTER 1958	
			Receipts	Returns	Receipts	Returns
UO_2 Powder	20%	5 kg	-	3	-	2
UO_2 Powder	over 90%	50 kg	20	25	10	25
Uranium foil	over 90%	0.5 kg	-	-	-	-
Uranium foil	over 90%	-	31	-	-	-
Uranium metal ingot	31%	-			40	40
Uranium metal ingot	over 90%	-			100	100

(8) Health and Safety measures -

Personnel working with radioactive materials (including SNM) or in radiation areas are routinely monitored for external radiation exposure by means of film badges and pocket chambers. Contamination is controlled by surveying likely objects or areas with appropriate detecting instruments or by making filter paper smears (which must be counted with an appropriate detector), recording results, and informing proper supervision. All operating personnel must be constantly alert to contamination possibilities involved in their operations and must continually strive to keep contamination to a minimum. Health Physics takes air samples in areas where airborne contamination is possible (frequency of sampling depends on operation). A tolerance of no more than 5×10^{-11} microcuries per milliliter air is established. If this tolerance is approached all personnel in the area affected are required to wear respirators. Uranium urinalyses and blood tests will be made every three months to check on internal deposition on people assigned to work in these areas.

From receipt of material to shipping or storage, Health Physics will be concerned with contamination and radiation levels from the SNM. External radiation measurements will be made on the received package and recorded. The Accountability Representative will open these packages. Health Physics shall assist in examination for breakage or other damage and subsequent contamination control in case of damage. During weighings of received SNM, Health Physics will make necessary smear checks. Samples to be sent for outside laboratory analysis will be packaged to conform with all pertinent ICC regulations.

Contamination control effectiveness will be checked by Health Physics throughout the operations in the laboratory and in the pilot manufacturing plant.

Protective clothing will be used to reduce personnel contamination.

Disposal of radioactive wastes: There will be no radioactive gaseous effluent from the Martin facilities. The incineration of radioactive combustible materials will be controlled by monitoring the exhaust stack of the incinerator.

Liquid wastes will be stored in polyethelene lined 55 gallon drums until ready for concentration. Batches containing no more than 400 grams of U235 will be reduced nearly to dry salt and these residues will be sent to AEC installations for recovery.

Solid wastes such as incinerator ashes will be mixed with a prepared cement mix before disposal by land or sea burials in accordance with Part 20, CFR 10.

The large volumes of slightly contaminated liquid wastes from the Decontamination Laundry will be held in collecting sumps until filtered, sampled, and counted for radioactivity before discharge to the sanitary sewer. Tap water dilution will be used, if necessary, to reduce the concentration to the levels required by 10 CFR Part 20.

(9) Emergency procedures -

An outline of the procedures to be followed in case of incidents involving nuclear materials is contained in the Criticality Precautions Manual, MND-1063, pages 5 and 5a.

(10) Financial Qualifications -

The Martin Company has done business under its present charter in the State of Maryland for a period of over twenty-five years. Total current assets on December 31, 1956 were $96,000,000 and sales for the year totalled about $360,000,000. The Nuclear Division, headed by a General Manager, is part of the company organization and draws its budgetary support therefrom.

The Martin Company will assume financial responsibility for all special nuclear materials received and will pay to the Commission the presented use charge based on the value of the material until the material is returned to the latter.

A copy of the 1956 Annual Report of the Company is attached as Appendix E.

III. Pursuant to Section 70.32, The Martin Company stipulates that:

(1) Title to all special nuclear material shall at all times be in the United States.

(2) No right to the special nuclear material shall be conferred by the license except as defined by the license.

(3) Neither the license nor any right under the license shall be assigned or otherwise transferred in violation of the provisions of the act.

(4) All special nuclear material shall be subject to the right of recapture or control reserved by section 108 and to all other provisions of the act.

(5) No special nuclear material may be used in any utilization or production facility except in accordance with the provisions of the act.

(6) The licensee shall not use the special nuclear material to construct an atomic weapon or any component of an atomic weapon.

(7) The licensee will hold the United States and the Commission harmless from any damages resulting from the use or possession of special nuclear material by the licensee.

(8) The license shall be subject to, and the licensee shall observe, all applicable rules, regulations, and orders of the Commission.

I certify that the statements made in this application and its attachments are true, complete and correct to the best of my knowledge and belief, and are made in good faith.

THE MARTIN COMPANY

BY: Tibor F. Nagey

Tibor F. Nagey
General Manager
Nuclear Division
Baltimore 3, Maryland

Subscribed and sworn to before me this 6th day of December, 1957.

Henrietta Marie Peters
Notary Public

My commission expires May 4, 1959.

APPENDIX B

DESCRIPTION OF PROCESSES EITHER DEVELOPED OR BEING DEVELOPED

(1) Stainless steel clad plates enclosing enriched uranium metal foil, Form V.

The process is diagrammed in the flow sheet for Form V, Appendix B. Material is received from processor in clean flat strips of foil, (Form VI) cut to size and enclosed in polyethylene bags. It is stored in birdcage boxes, 12" x 12" x 34" in lots not exceeding 1000 grams of U235 per container. Batches not exceeding 500 grams of contained U235 are withdrawn from storage vault, (Work Area 1a) and transferred by courier to Work Area 10 for assembly between stainless steel plates. Assembly is seam welded, evacuated at a low temperature and a final end seam weld made in Work Area 10. After radiography in Work Area 7, batches of plates will be autoclaved in Work Area 22 to determine porosity reliability.

Destructive and non-destructive testing will be performed on selected plates in Work Area 11.

(2) Stainless steel clad tubes enclosing fuel marrow of enriched uranium dioxide-stainless steel cermet (Form IV).

A description of the process is contained in the confidential manual, MND-1069 which is furnished as a supporting document to this application, (Appendix F). A flow sheet for the process is also included in Appendix C.

(3) Aluminum and aluminum alloy clad tubes enclosing pressed UO_2 -Al blended compacts (Form VIII).

Enriched uranium dioxide is blended with three parts by volume of powdered aluminum in Work Area 2. This blend is compacted to pressed bushings in Work Area 5. The bushings are assembled on a tube of aluminum or aluminum alloy and a second tube is passed over the bushings to complete the assembly. The assembly is swaged and drawn in Work Area 4 and then annealed to complete the metallurgical bonding in Work Area 5. Cleaning of the finished tubes is accomplished in Work Area 9. After radiography in Work Area 7, the assembly is sheared to size (Work Area 4) and the ends seam-welded in Work Area 10. Radiography, non-destructive testing, and porosity testing are done in Work Areas 7, 11 and 20 respectively to complete the tube manufacturing process. Brazing and welding of sealed tubes into bundles will be done in other facilities at Plant I under security and health safety safeguards required.

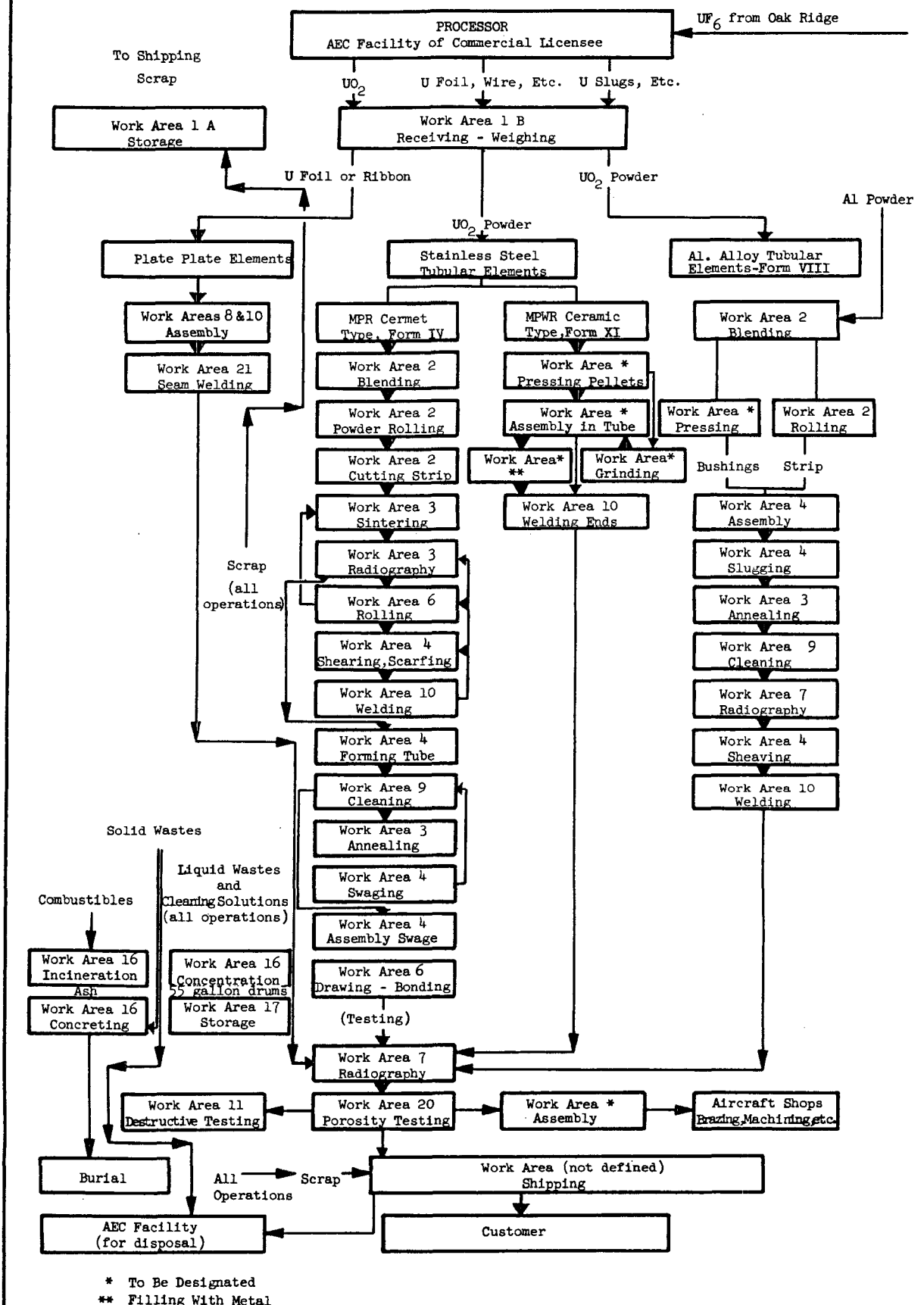
(4) Stainless steel cladsfilled with pressed compacts of uranium dioxide or uranium dioxide and thoria (Form XI).

Uranium dioxide powder of low enrichment in the isotope U235 is pressed into pellets. These pellets are assembled in stainless steel tubes and the interstices filled with a liquid metal to provide for efficient heat transfer between the fuel and the outside tube.

(An alternate method using ground pellets fitting to close tolerances in the tube may be used.)

The ends of the tubes are welded in Work Area 10 and the completed tubes are radiographed, porosity tested and cleaned.

MANUFACTURING FLOW CHARTS



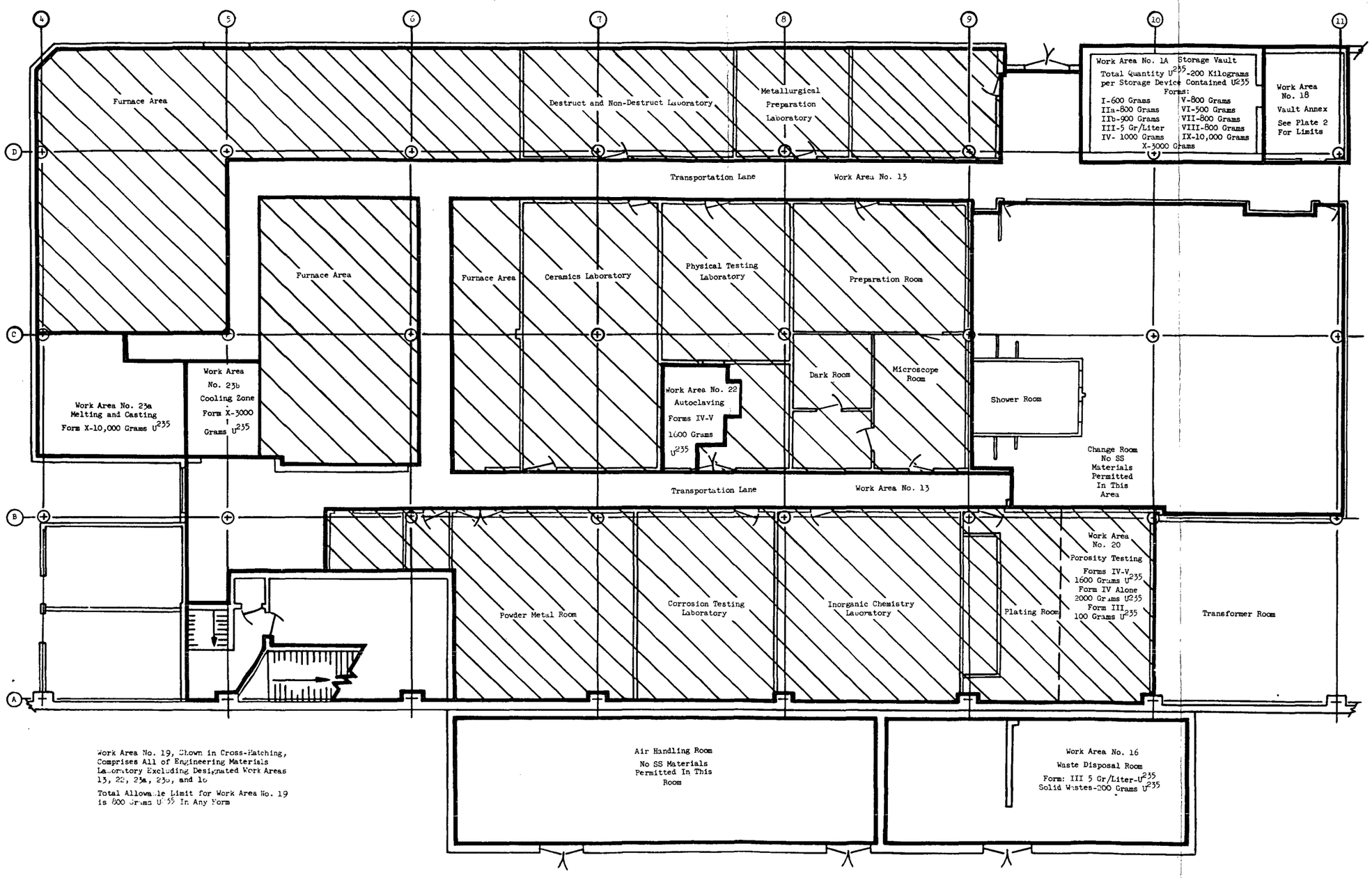
APPENDIX D

List of Health Physics Instruments

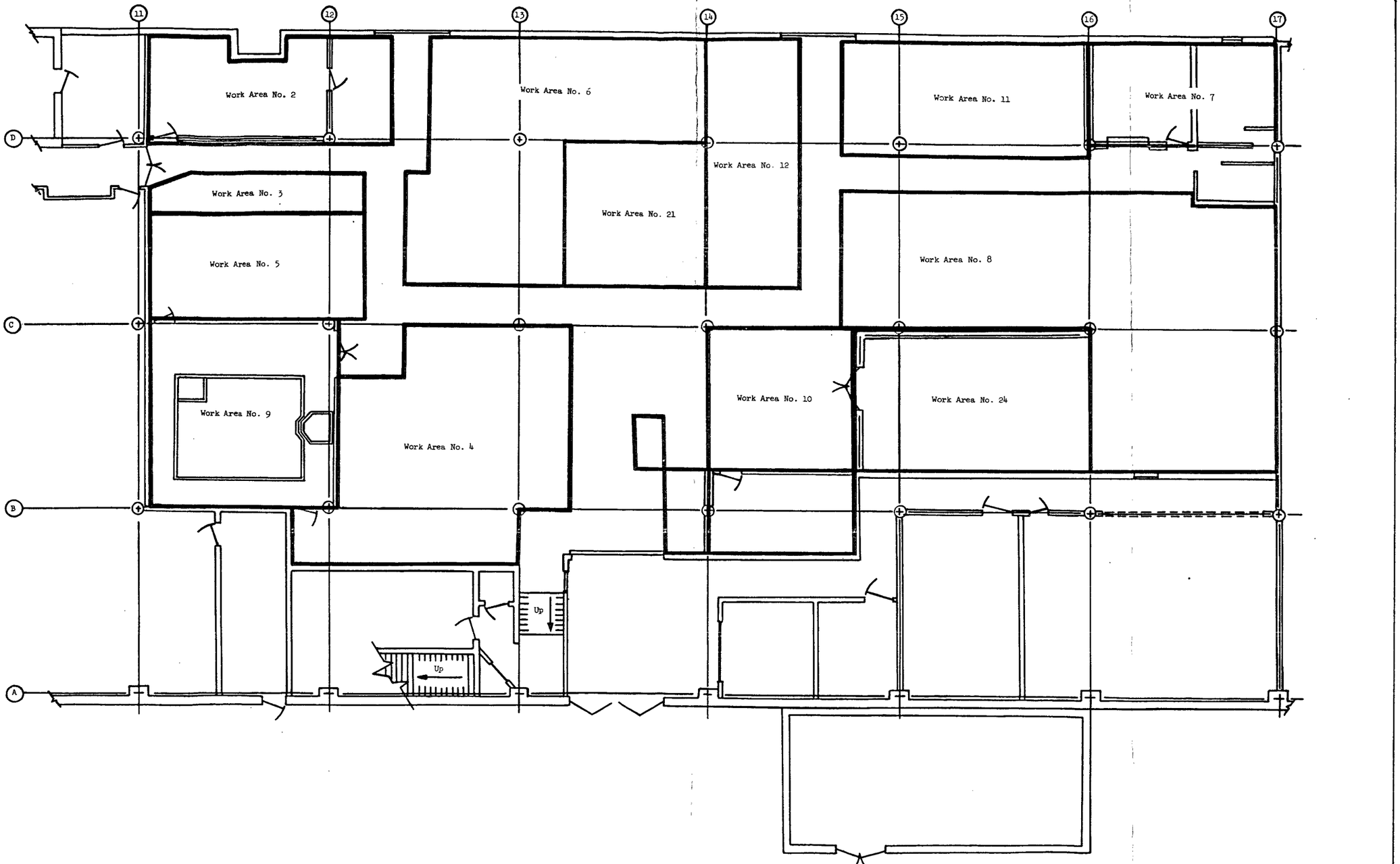
No.	Type of Instrument	Manufacturer	Model No.
4	Alpha Survey Meters	Nuclear-Chicago	2112
1	" " -Samson	NED Instrument Co.	D-6
2	Alpha Probes	Nuclear-Chicago	AP-4
1	G.M. Survey Meter	Berkley	2750
4	" " Meters	Victoreen	592
5	" " Meters	Nuclear-Chicago	2612
3	"Cutie Pie" Survey Meters	Nuclear-Chicago	2586
2	" " " "	Tracerlab	SU-1H
2	" " " "	NRD Instrument Co.	CS-40
4	Count Rate Meters	Tracerlab	SU-3C
1	" " "	Nuclear-Chicago	1619
2	" " "	" "	1615-B
1	" " "	" "	1613-A
1	" " "	Nuclear Instrument and Chemical Corporation	MR-10
1	" " "	Nuclear Measurements Corp.	LCRM-2M
1	Pee Wee	Nuclear-Chicago	2111
1	Fast Neutron Counter	NRD Instrument Co.	E-1A
1	" " " Probe	" " "	F-1
1	Poppy Probe	General Electric	
1	Scaler	Nuclear-Chicago	1310
2	Scalers	" "	161-A
1	Scaler	Radiation Instrument Lab.	1201-T
1	Scaling Unit	Nuclear-Chicago	183
1	Ultra Scaler	Nuclear-Chicago	192
1	Scaler-Decade	Radiation Counter Lab. Mark 13	10-D
1	Proportional Counter	Nuclear Measurements Corp.	PC-1
1	" " Converter	" "	PC-16

List of Health Physics Instruments Cont'd

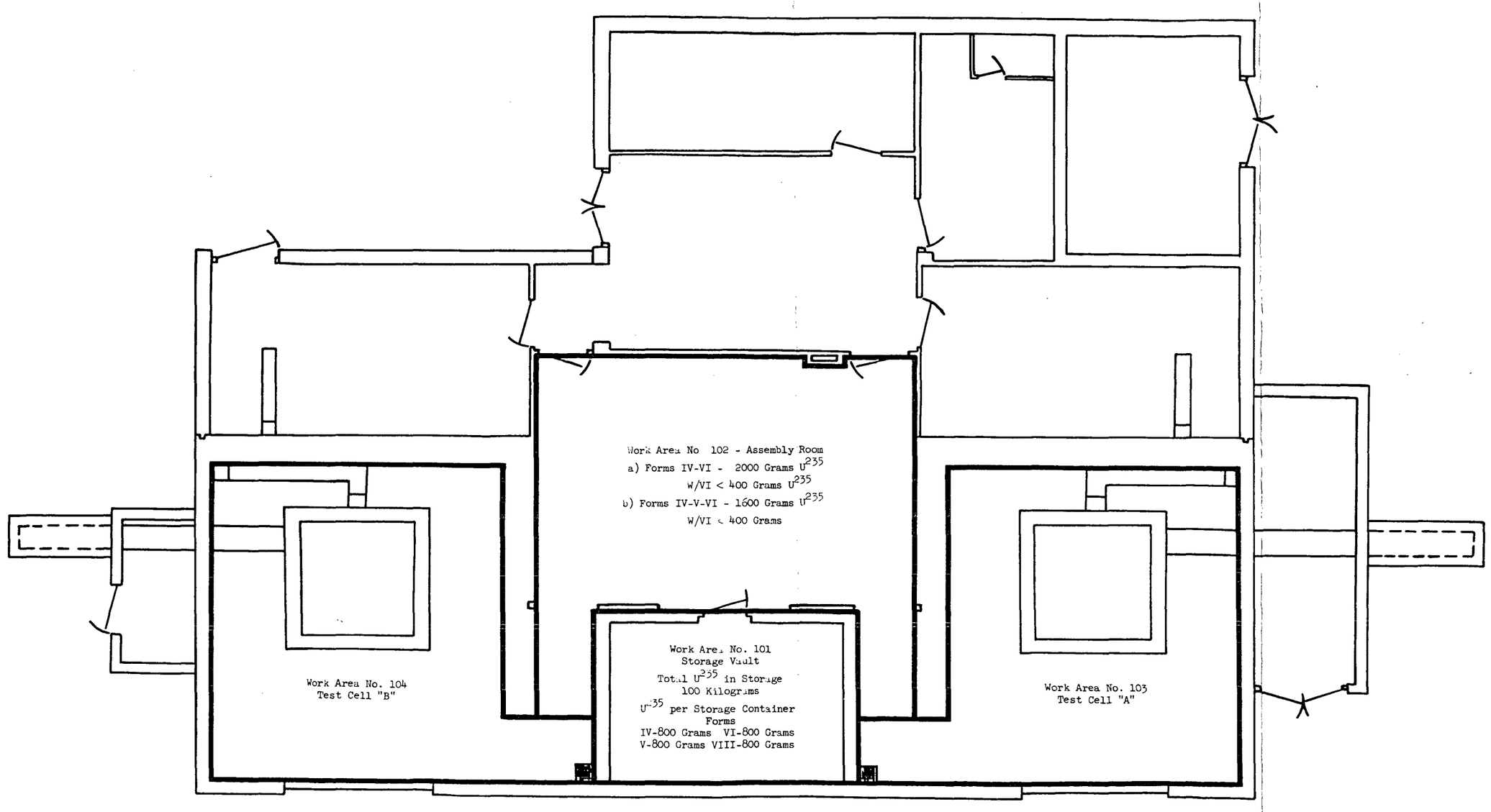
No.	Type of Instrument	Manufacturer	Model No.
1	Scintillation Probe	Radiation Counter Labs	Used with Decade Scaler Model #10-D
1	Alpha Scintillation Detector	Tracerlab	P-12
2	Air Samplers	Millipore	
2	Air Monitors	"	S44AK-978
1	" "	Staplex	TF-1A
1	Fluorimeter	Jarrell-Ash Company	JA-2600
2	Jordan RAMS Systems	Jordan Electronics, Inc.	
1	Decade Scaler used with P10 A Proportional Counter	Tracerlab	
1	Gamma Survey Meter K-350B	Tracerlab	
1	Neutron Probe N-C Model DN3 for NC-2112 Unit	Nuclear-Chicago	
2	BF_3 Probes	Radiation-Counter Laboratories	
1	Mobile Continuous Air Monitor NMC Model AM-2A	Nuclear Measurements Corp.	



Martin Nuclear Division Engineering Materials Laboratory
Criticality Work Areas Plate 1



Martin Nuclear Division Criticality Work Areas
Pilot Manufacturing Plant

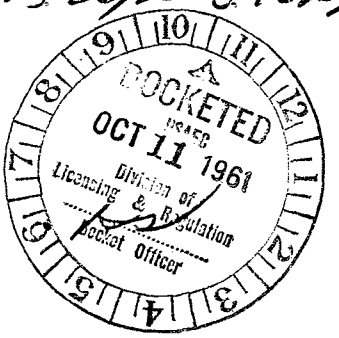


Martin Critical Experiment Facility Criticality Work Area Plate 3

40-397
40-577
DOCKET NO. 40-3296
filing
Trans w/ltr 10-10-61

THE MARTIN COMPANY

DOCKETED
USAEC
OCT 11 1961
Division of Licensing & Regulation
Docket Officer



Notice of Special Meeting of Stockholders

TO THE STOCKHOLDERS:

Notice is hereby given that a Special Meeting of the stockholders of The Martin Company will be held on October 9, 1961 at 11:00 o'clock a.m., Eastern Daylight Saving Time, at the offices of the Company, Middle River, Baltimore County, Maryland, for the following purposes:

(1) To consider and take action upon the proposed Articles and Plan of Consolidation (the Plan) of The Martin Company with American-Marietta Company, an Illinois corporation, declared advisable by the Board of Directors, pursuant to which a new corporation to be designated Martin-Marietta Corporation will be formed under the laws of the State of Maryland. The new corporation when so formed will issue shares of its stock to stockholders of The Martin Company and American-Marietta Company in accordance with the Plan, and will succeed to all of the assets of The Martin Company and American-Marietta Company and assume all of their respective liabilities.

(2) To transact such other business as may properly come before the meeting.

Only stockholders of record at the close of business on August 30, 1961, the record date fixed by the Board of Directors, will be entitled to vote at the Special Meeting.

By Order of the Board of Directors

W. L. LUCAS, *Secretary*

Middle River, Maryland

August 30, 1960

Approval by the holders of a majority of the total number of shares outstanding on August 30, 1961 is required to approve the proposed consolidation. Whether or not you plan to attend the Special Meeting of the stockholders, you are requested to sign and return at once the accompanying Proxy. If you do attend the meeting, you may vote there in person should you so desire.

A/69

PROXY STATEMENT
FOR SPECIAL MEETING OF STOCKHOLDERS
TO BE HELD OCTOBER 9, 1961

There is enclosed herewith a Notice of a Special Meeting of Stockholders of The Martin Company (herein called "Martin") to be held at the offices of the Company, Middle River, Baltimore County, Maryland, at 11 o'clock A.M. Eastern Daylight Saving Time October 9, 1961, and a proxy for the special meeting. The meeting has been called to take action on the proposed consolidation of Martin with American-Marietta Company (herein called "American-Marietta"), an Illinois corporation, into a new corporation to be designated Martin-Marietta Corporation (herein called the "Consolidated Company") which will be formed under the laws of the State of Maryland, the Consolidated Company to succeed to all of the assets of Martin and American-Marietta and assume all of their respective liabilities.

At the Special Meeting Articles and Plan of Consolidation will be submitted to the stockholders for adoption.

REASONS FOR CONSOLIDATION

During the past decade, Martin has experienced rapid growth in the fields of missiles, aerospace and allied electronics and nucleonics activities. The management of Martin is confident that it has the technological capability to remain in the forefront of these activities.

Martin management feels that it now has reached the size and financial position where, for the long term, it should broaden the base of its operations to include major participation in the industrial and commercial growth of the economy. Diversification now and new growth areas for the future are the primary factors which influenced the directors of both companies to approve the proposed consolidation.* American-Marietta's sales in the past decade have grown from $66 million to $368 million and its profits have increased from $2.8 million to $24 million. It is a leading factor in a number of basic growth industries, including paints, industrial finishes, household cleaning products, synthetic resins and adhesives, chemicals as more fully described below, cement, printing inks and a wide variety of building and construction materials. The proposed consolidation offers a unique opportunity to establish a broadly diversified company and there are additional benefits mentioned below that Martin's management believes will result from the consolidation.

Research and New Markets

Both Martin and American-Marietta maintain strong research programs in the development of new materials and products, but to date, Martin because of its lack of commercial outlets, has not been able to translate the application of its technical activities in the commercial market. Its management envisages new opportunities in research and product dvelopment that should result in the application of some of Martin's technical developments for civilian application. There can be no assurance, however, that the consolidation will enable Martin to find commercially profitable outlets for the application of its technical activities. Likewise, American-Marietta's improvements in materials and structural design may fill some of the complex needs of aerospace technology.

Depth of Management

It is believed there is strength and depth of management in both companies—each fully competent in its primary fields of activity and each able to complement the other in achieving the objectives of the Consolidated Company. Under the leadership of Mr. Grover M. Hermann, American-Marietta management has accomplished the growth set forth above.

In the organization and operating structure of the Consolidated Company, it is contemplated that Martin and American-Marietta will each maintain its identity with respect to the management, conduct of its business and customer relations. It is presently contemplated that all of the executive officers of each company will be retained in an executive or administrative capacity and that the various divisions of each of the companies will continue to be operated as separate divisions under the supervision of

* Announcement of these approvals on June 23, 1961 was the first public disclosure of the proposed consolidation.

the persons presently charged with primary responsibility for the conduct of the same. The existing employment agreements between Martin and Messrs. George M. Bunker and Clarence W. Miles (hereinafter on page 22 more fully described) will be assumed by the Consolidated Company which becomes responsible for the compliance with the terms and conditions thereof.

Stronger Corporate Structure

The financial structure of the Consolidated Company, with estimated annual sales based on present operations in excess of $1 billion and total assets of over $500 million, will provide a strong base for such future activities as may be desirable to permit the further growth of the company's business. In addition, the consolidation will generate a cash flow of sizeable proportion, a total of $68 million for the two companies in 1960.

Benefits To Martin Stockholders

Under the terms of the consolidation, Martin stockholders would receive 1.3 shares of common stock of the Consolidated Company for each share presently held, and American-Marietta common stockholders would receive a share-for-share exchange. In arriving at such exchange ratios, consideration was given to the diversity of the businesses of the constituent companies, the earnings of each company for the current and preceding five (5) years, the market values of the shares of each company prevailing during the said period, the book value of each company's common stock and the prospective earnings for each company for 1961 and 1962. Such consideration resulted in the conclusion by the respective managements of the two companies that the aforementioned basis of exchange was an equitable one. (See pages 17-19 hereof with respect to Per Share Earnings, Book Value of Common Stocks and Price Range of Common Stocks). The American-Marietta Class B stock would be eliminated and its holders would receive 4½% Cumulative Preferred Stock (non-convertible) of the Consolidated Company. The book value of such stock at November 30, 1960 was $13.09 per share or an aggregate book value of $42,106,637. It was the best judgment of the respective managements of the two companies, having in mind the dividend limitation (See page 24) and the lack of a market for the Class B Common Shares, as well as the probability that the 4½% Cumulative Preferred Stock to be issued would have a market value less than the par value thereof, that a fair and equitable basis of exchange would be one whereby holders of Class B Common Shares would receive shares of 4½% Cumulative Preferred Stock (non-convertible) of the Consolidated Company representing approximately 90% of the book value of said Class B Common Shares or $38,000,000. This basis of exchange represents approximately 12/100ths of a share of the new preferred stock for each Class B Common Share. American-Marietta will redeem its outstanding 5% Cumulative Preferred Shares prior to the consolidation.

The effect of the consolidation at the outset would be a reduction in Martin's anticipated per-share earnings for 1961 to about the level of last year's per-share earnings which reflected an increase of 70 per cent over the past five years. However, the consolidation would provide Martin stockholders with an immediate 30 per cent increase in cash dividends based on the recent historical dividend record of both of the constituent companies, increased book value and prospects of long-term stability through immediate diversification and possible future expansion into new growth areas. Payment of dividends by the Consolidated Company is, of course, subject to future business conditions, the Company's earnings and financial condition.

It is the considered opinion of Martin's directors and management that the consolidation is in the best interest of all stockholders.

SUMMARY OF THE PLAN

At meetings held on August 3, 1961, the Boards of Directors of Martin and American-Marietta approved and recommended an Agreement of Consolidation dated as of August 1, 1961 (the Agreement), pursuant to which Martin and American-Marietta (the constituent companies) will be consolidated into a new Maryland corporation to be known as Martin-Marietta Corporation. At the same meeting the Martin Board of Directors adopted a resolution approving proposed Articles and Plan of Consolidation of the constituent companies (the Articles), setting forth the terms of such consolidation and declaring that the proposed consolidation is advisable substantially upon the terms and conditions set forth in the Articles. Copies of the Agreement and the Articles are attached hereto and marked

as Appendix 1 and Exhibit A to Appendix 1, respectively. The American-Marietta Board has approved the Agreement and the Articles.

Briefly stated, the Agreement provides that the title to all of the assets of the constituent companies will devolve upon the Consolidated Company, and the Consolidated Company will assume all of the liabilities of the constituent companies. The Consolidated Company will issue new shares of its capital stock to the holders of the common stock of the constituent companies. The presently outstanding 5% Cumulative Preferred Shares of American-Marietta will be redeemed and retired prior to the consolidation.

Capital Stock Outstanding before and after the Consolidation

On July 31, 1961 Martin had outstanding 6,258,829 shares of Common Stock without par value, which will be converted (on a 1.3 for 1 basis) into 8,136,478 shares of Common Stock of the par value of $1 per share of the Consolidated Company. Arrangements will be made for the matching and combination or the purchase and sale of fractional interests in respect of Martin certificates surrendered for exchange within 60 days after the consolidation becomes effective.

On July 31, 1961, American-Marietta had outstanding: (a) 200,599 5% Cumulative Preferred Shares, $100 par value per share. These shares will be redeemed. (b) 3,191,189 Class B Common Shares, $2 par value. It is anticipated that prior to the consummation of the consolidation but after the approval thereof by the stockholders of the constituent companies, 70,314 of these shares will be converted into an equal number of Common Shares and simultaneously therewith 70,314 of the outstanding Common Shares of American-Marietta will be surrendered to it as a capital contribution, with the result that there will be no net increase in the number of American-Marietta Common Shares outstanding. The remaining 3,120,875 Class B Common Shares will be converted into 380,000 shares of 4½% Cumulative Preferred Stock, $100 par value of the Consolidated Company. (c) 13,199,875 Common Shares, $2 par value, which will be converted into a like number of shares of Common Stock, $1 par value of the Consolidated Company.

The preferred stock to be issued by the Consolidated Company will not be convertible into shares of Common Stock. The terms, conditions and provisions of the 4½% Cumulative Preferred Stock are fully set forth in Article IV, subdivision SIXTH, of the Articles hereto attached.

Warrants and Stock Options

Holders of Warrant Certificates issued by Martin pursuant to its Indenture dated as of November 1, 1958, to Fidelity-Baltimore National Bank, as Trustee, will be entitled to subscribe for shares of Common Stock of the Consolidated Company in accordance with the terms of the Indenture.

Each Warrant upon the consolidation becoming effective will entitle the holder to subscribe for 2.73 shares of Common Stock of the Consolidated Company for $40 to and including November 1, 1963, and for $45 thereafter and to and including November 1, 1968. Shares of Common Stock will be reserved by the Consolidated Company for issuance upon the exercise of such Warrants.

Holders of stock options granted by Martin, upon the consolidation becoming effective, will be entitled to purchase from the Company 1.3 shares of Common Stock of the Consolidated Company in the place and stead of each share of Common Stock without par value of Martin which such holder was entitled to purchase immediately prior to the consolidation, subject, however, to such minor adjustment as may be necessary to preserve the "restricted" status of the stock options under the United States Internal Revenue Code. Shares of Common Stock will be reserved by the Consolidated Company for issuance upon the exercise of such stock options.

Effective Date

The consolidation will become effective after approval by the stockholders of the constituent companies at the special meetings to be held on October 9, 1961, and upon compliance with the laws of the States of Maryland and Illinois in relation to the filing of the Articles with the public authorities in those states.

Termination and Abandonment of the Consolidation

The Agreement may be terminated and the consolidation abandoned by resolution of the Board of Directors of either of the constituent companies if certain conditions of that company's obligations set forth in the Agreement are not satisfied. The Agreement may be terminated and the consolidation abandoned by the two constituent companies (each acting by its Board of Directors) by mutual consent, at any time before the consolidation becomes effective. In the event of any termination of the Agreement and abandonment of the consolidation, neither of the constituent companies shall have any liability to the other for costs, expenses, loss of anticipated profits, or otherwise, in connection with the Agreement.

It is not contemplated that the Agreement will be terminated or abandoned for any reason other than the failure on the part of either of the constituent companies to comply with its covenants and obligations thereunder.

BUSINESS AND PROPERTIES OF AMERICAN-MARIETTA

American-Marietta is engaged directly and through subsidiaries in the production, manufacture and sale of construction materials and products, a wide variety of chemicals and chemical products sold to numerous industries, and other miscellaneous products, all as more fully described below. The approximate percentage contribution of these three groups to consolidated net sales for the fiscal year ended November 30, 1960 were as follows: construction materials—44%, chemicals and chemical products—41%, miscellaneous products—15%. The number of persons employed by American-Marietta as of June 30, 1961 was 16,247.

Construction Materials

Cement. Portland cement is widely used in many types of construction. It is sold in bulk to ready-mix concrete producers and to contractors for use in building highways, airports, bridges, dams, waterways, military installations and other structures. Portland cement and mortar cement, used in brick and stone construction, are also sold to independent distributors and dealers.

Cement is produced by the following divisions of American-Marietta: Dragon Cement, with plants in Northampton, Pennsylvania, and Thomaston, Maine; Standard Lime & Cement, with a plant at Martinsburg, West Virginia; Southern Cement, with two plants near Birmingham, Alabama; and Dewey Portland Cement, with plants in Dewey and Tulsa, Oklahoma, and Davenport, Iowa. American- Marietta believes that reserves of limestone and cement rock adjacent to its various plants are sufficient for many years of operations at current levels.

Concrete products. These include machine and precast concrete pipe for sewers, culverts, water mains, irrigation lines and other uses; pre-stressed concrete bridge sections; concrete cribbing; and other structural elements of precast concrete. American-Marietta and its subsidiaries operate a large number of concrete products plants in the United States and Canada. The cement for American-Marietta's concrete products is largely purchased from other suppliers and not from American-Marietta's own plants. The products are generally sold direct to contractors and to states, municipalities and other governmental units.

Aggregates. Aggregates, meaning crushed stone, sand and gravel, are used in building highways, in other types of heavy construction and in making concrete. American-Marietta's principal quarries and crushing plants for producing these products are in North Carolina and Iowa.

Other construction materials and products. These include common and face brick; hollow and drain tiles; aluminum and architectural products and electrical construction products of American-Marietta's subsidiary, Steel City Electric Company, such as electrical outlet and switch boxes, floor boxes, conduit and cable fittings, and pipe and conduit hangers. The Master Builders Company division produces "Pozzolith", an additive to promote dispersion in concrete, which American-Marietta classifies as a chemical product.

Chemicals and Chemical Products

Paint, finishes and coatings. These products include primers, surfacers and finishes for use on automobiles, trucks, buses, farm machinery, railroad cars, prefabricated houses, office equipment, furni-

ture and appliances; heavy duty maintenance paint for industrial use; and chemical coatings made by the Stoner-Mudge division for lining cans and other metal containers for foods and beverages. A large part of the products in this group are produced to customers' specifications and sold directly to manufacturers, not only in the United States and Canada but also to a limited extent in France, Holland and other foreign countries.

Chemical lime, refractories and silica sand. The Standard Lime & Cement and Southern Cement divisions produce chemical lime, which is sold to the chemical and paper industries and to municipalities and industries for water and waste treatment; fluxing lime, crushed stone and magnesite for the steel industry; and clinkered dolomite used in refractories. Other divisions produce silica sand used in the manufacture of glass and for other purposes. As in the case of cement, American-Marietta believes that its reserves of raw materials for these products are adequate for many years of operations.

Printing inks. Many types of printing inks are manufactured by the Sinclair and Valentine division for use in printing and packaging. This division has numerous plants in the United States, a number in Canada, and operations in Mexico, Germany, Switzerland and South America.

Adhesives, resins and chemicals. This group of products includes synthetic resins, glues and adhesives which are sold to the plywood, paper and hardboard industries for bonding purposes.

Dyestuffs. The Southern Dyestuff ("SODYECO") division manufactures ready-to-use sulphur and vat dyes and other coloring materials for the textile industry.

Miscellaneous Products

Other industrial products. American-Marietta and its subsidiaries also manufacture sealants for the aircraft, automotive, construction, electrical communications, foundry, and household appliance industries; metallurgical products such as metal powders, pigments, abrasives and alloys used in the aircraft, missile, and automotive and other industries; machinery and equipment used in heavy construction and metal fabrication; and industrial cleaning products.

Consumer Products. Latex, Alkyd and oil base paints for use by consumers are produced and sold under a variety of trade names, including "American-Marietta", "Arco", "Valdura", "Rev Satin", "Jelled Magic", "Sewall", "O.P.W." and "Berry Bros." Sales are principally to jobbers and retail outlets. The O-Cedar division manufactures mops, polishes, waxes and other household institutional cleaning products.

Federal Trade Commission Proceedings

American-Marietta's business in cement, concrete products and aggregates and in lime and limestone products herein described stems originally from its acquisitions of numerous companies engaged in these businesses, although the acquired properties have been substantially enlarged under American-Marietta's ownership. On January 27, 1961 the Federal Trade Commission issued a complaint under Section 7 of the Clayton Act charging that American-Marietta's acquisitions may lessen competition or tend to create a monopoly in the above lines of commerce in various sections of the country and constitute unfair methods of competition under Section 5 of the Federal Trade Commission Act. To date, no hearings have been held, and American-Marietta has advised Martin that it cannot predict the outcome of the proceedings at this time. If the charges in the complaint were sustained, the remedies available to the Commission might include divestiture of certain of the acquired businesses. Under the provisions of American-Marietta's long term notes, if such a divestiture involved sale of a substantial part of the company's assets, the company would have to offer to apply the proceeds to retirement of an equal amount of its long term debt.

Research

American-Marietta puts substantial emphasis on research. New products and product improvements are sought through a program related closely to customer activities and requirements. To implement this program research activity is decentralized in 25 laboratories run by the operating divisions and subsidiaries. The approximate dollar amount spent on reasearch during the 1960 fiscal year was $4,150,000 not including dues paid trade associations, a substantial portion of which is spent on research in their respective industries.

Plants and Facilities

The plants of American-Marietta and its subsidiaries differ greatly in size and importance, depending upon the nature of the product manufactured. Its management considers them to be well maintained and in satisfactory condition. Most of the manufacturing facilities of American-Marietta are owned by it and, for the most part, are unencumbered. However 32 of the printing ink plants, 16 of the concrete products plants, 26 of the aggregates plants and 1 other plant are operated in leased premises. The locations of the principal plants and facilities are listed below.

CONSTRUCTION MATERIALS AND PRODUCTS

Cement

Alabama—North Birmingham and Roberta
Iowa—Davenport
Maine—Thomaston
Oklahoma—Dewey and Tulsa
Pennsylvania—Northampton
West Virginia—Martinsburg

Concrete Products

Alabama 3	Indiana 2	New Jersey 3	Tennessee 5
Alaska 2	Iowa 2	New Mexico 2	Texas 3
Arizona 1	Kentucky 3	New York 9	Vermont 1
California 7	Maryland 2	North Carolina 3	Washington 2
Colorado 1	Michigan 3	Ohio 4	West Virginia 3
Delaware 1	Minnesota 2	Oklahoma 6	Wisconsin 3
Florida 5	Missouri 2	Oregon 1	Ontario, Canada 3
Georgia 1	Nebraska 2	Pennsylvania 5	
Illinois 4	Nevada 2	South Carolina 1	

Aggregates (crushed stone, sand and gravel)

Georgia 1	Kansas 5	Missouri 1	Pennsylvania 6
Iowa 15	Maryland 4	North Carolina 24	Virginia 3
		West Virginia 1	

Brick, Tile and Other Construction Material

Kansas—Coffeyville, Iola and Weir
Missouri—Harrisonville and Vale
Oklahoma—Britton, Collinsville and Tulsa
Canada—Streetsville, Ontario

Electrical Construction Products

California—Los Angeles
Pennsylvania—Pittsburgh

CHEMICALS AND CHEMICAL PRODUCTS

Paint, Finishes and Chemical Coatings

California—Azusa
Illinois—Kankakee
Missouri—Kansas City (2)
North Carolina—High Point
Ohio—Cleveland (2) and Marietta
Pennsylvania—Colebrookdale, Pittsburgh and Rochester
Canada—Ottawa and Walkerville, Ontario

Chemical Lime and Silica Sand:

Alabama 1	Michigan 2	Pennsylvania 1	West Virginia 2
Illinois 3	Missouri 1	Tennessee 1	Wisconsin 1
Indiana 1	Ohio 1	Virginia 1	

Printing Inks

Alabama 2	Georgia 2	Minnesota 1	Oregon 1
Arizona 1	Illinois 1	Missouri 2	Pennsylvania 3
California 3	Louisiana 2	New Jersey 1	Tennessee 2
Colorado 1	Maryland 1	New York 2	Texas 2
Connecticut 2	Massachusetts 2	North Carolina 1	Virginia 2
Florida 4	Michigan 1	Ohio 3	Washington 1

Canada:

Alberta 2	Manitoba 1	Ontario 3	Quebec 1
British Columbia 1			

Adhesives, Resins, Chemicals

California—Richmond
Ohio—Newark
Oregon—Portland
Washington—Seattle
Canada—New Westminster, B.C.; Edmonton, Alberta

Dyestuffs

North Carolina—Mt. Holly

MISCELLANEOUS PRODUCTS

Sealants

California—El Segundo
Illinois—Chicago Heights
Michigan—Jackson
Missouri—St. Louis

Metal Powders and Metallurgical Products

California—Berkeley
Illinois—Wheeling
New Hampshire—Manchester
New Jersey—Summit and Union

BUSINESS AND PROPERTIES OF MARTIN

General

Martin is now primarily engaged in the design, development and production of guided missiles, electronics equipment, communications equipment, aerospace vehicles, and nuclear products.

Martin's military sales and sales to other customers for the past five calendar years and for the first six months of 1961 were as follows:

Year	Military		Other	Total
	Missiles, Electronics and Nuclear	Aircraft		
1956	$126,171,000	$231,869,000	$ 922,000	$358,962,000*
1957	245,796,000	177,054,000	1,075,000	423,925,000
1958	287,347,000	192,390,000	3,907,000	483,644,000
1959	410,125,000	111,083,000	2,499,000	523,707,000
1960	601,306,000	48,676,000	1,246,000	651,228,000
January–June 1961...	398,739,000	8,611,000	843,000	408,193,000

* Before adjustment of $2,387,891 as a result of renegotiation for the year 1956.

Martin's backlog of military and other orders at the end of each of the past five calendar years and at June 30, 1961 were as follows:

Year	Military		Other	Total
	Missiles, Electronics and Nuclear	Aircraft		
1956	$ 521,866,000	$289,148,000	$ 379,000	$ 811,393,000
1957	496,978,000	297,900,000	176,000	795,054,000
1958	597,934,000	232,071,000	1,514,000	831,519,000
1959	814,563,000	85,623,000	368,000	900,554,000
1960	1,004,081,000	22,283,000	414,000	1,026,778,000
June 30, 1961....	996,663,000	14,886,000	705,000	1,012,254,000

As the above tables indicate, missiles, associated equipment, electronic systems and nuclear products accounted for approximately 98% of Martin's total backlog of orders at June 30, 1961.

Martin's missile business includes a variety of products and weapons, those capable of massive destruction and usable as aerospace vehicles, and those capable of use in limited warfare. The missiles include those powered with jet engines, those powered with liquid fueled rockets and those powered with solid fueled rockets.

Mace

The Mace is an outgrowth of the Matador, one of the earliest missiles produced by Martin. The Mace is a highly mobile surface-to-surface tactical missile designed in two types (the Mace A and the Mace B) both of which have self-contained guidance systems. Associated with the Mace is a substantial volume of ground support equipment produced by Martin.

Bullpup

The Bullpup is a short-range, air-to-surface missile first developed and produced by Martin under contracts with the Navy. Versions of the missile are produced for use by the Air Force as well as the Navy, and it is now in operational use with the Navy, Marine Corps and Air Force. The function of the missile is to provide light attack aircraft with greater capability than was formerly available against tactical targets.

Lacrosse

The Lacrosse is a mobile and highly accurate surface-to-surface guided missile developed as a close support weapon for combat troops. The missile and its associated ground equipment have been

in production since 1957. The missile is propelled by a solid fuel rocket motor and is capable of delivering both nuclear and conventional warheads.

Titan

The Titan Intercontinental Ballistic Missile is a two-stage liquid fueled rocket powered missile designed to deliver a thermonuclear warhead to a predetermined point more than 6,000 miles from the launching site. Martin is responsible for the airframe, controls and associated ground support and launching equipment, as well as for the functioning of the system as a whole. Martin holds contracts with the Air Force for two types of the Titan missile. The first type, Titan I, is in production and is undergoing advanced flight tests. The Titan II will be larger than Titan I and will be able to carry a heavier payload over even greater distances than the Titan I. It is designed to utilize storable fuels which will make it possible to maintain the missile in a ready-firing condition for long periods of time at ordinary temperatures. It is also being designed for firing from underground sites.

Pershing

Pershing is the United States Army's selective range, surface-to-surface ballistic missile system having a "built-in" jam-proof guidance system. It consists of two stages employing solid propellants and is lighter, smaller, and more mobile than the Army's Redstone system which it is scheduled to replace. As systems contractor, Martin is responsible for research and development, reliability, testing and production of the missile and associated ground equipment.

Dyna-Soar

Dyna-Soar is an advanced boost-glide space vehicle. The Air Force has retained responsibility for the integration of the complete system. Martin has been selected to build the booster portion of the program and holds a contract for the Dyna-Soar launch rocket. The Titan II design will be modified to meet the requirements of the Dyna-Soar Program.

Electronics

Martin's capability in the field of electronics is founded on intensive research and development work begun during World War II and many years of experience in the design, testing, packaging, manufacture and field support of a wide diversity of electronic systems and components.

Martin's electronics activity is staffed by over three thousand five hundred engineers, supported by a full complement of technicians, apart from manufacturing and field service personnel. The engineers average five years of electronics experience with Martin. Electronic engineers in supervisory capacities average more than ten years of experience with Martin.

Major electronics programs have been conducted at Baltimore since 1946, at the Denver Division since its founding in 1956 and at the Orlando and Cocoa Divisions since 1957. A complete electronics staff and facility has been established in Baltimore.

One of Martin's major programs is the electronic system known as Missile Master, developed, produced and serviced under contract with the Army. The function of the system is the integration of anti-aircraft missile batteries for the air defense of the nation's principal industrial and population centers. Martin has completed delivery of the systems originally ordered, and now has an order for additional systems known as "BIRDIE", more compact but similar to the Missile Master.

Nuclear Activities

Martin's nuclear activities are centered at Baltimore where the Nuclear Division was formed in 1954 to provide emphasis on and control over those activities. Today the Division is organized in five product departments. During 1961 the Nuclear Powerplant Department is scheduled to complete two "packaged powerplants" under contract with the Atomic Energy Commission. The first of those, designated PM-1, will be installed at an Air Force radar station near Sundance, Wyoming. The other, known as PM-3A, will be shipped to McMurdo Sound, Antarctica. The advanced Reactor Systems Department is engaged under contract in research and development for a liquid fluidized bed reactor, the goal of which is to provide basically simpler operating techniques and significantly lower fuel costs than those involved in existing systems. The propulsion Systems Department is at work on several classified government projects, including its contribution to a study contract for the National Aeronautics and Space Agency in the RIFT (Reactor in Flight Test) program, under which plans are

being formulated for the flight testing of the first nuclear rocket engine. The Auxiliary Power Systems Department is producing a variety of direct conversion generators which require no moving parts. SNAP-3, the first such generator to use the decay heat of radioisotopes as a basic energy source, was delivered to the AEC early in 1959. As a result of the pioneer efforts in the development of SNAP-3, the Company has since developed similar generators that have been used in the first nuclear powered satellite (the Transit) and in the world's first radioisotope fueled weather station.

Research and Development

Martin's business depends greatly upon technological progress and great emphasis is placed upon research, engineering, development and testing. Therefore Martin has spent and expects to continue spending substantial sums of money in these areas. In addition to the programs described above, Martin has other research and development programs, some of which are in the very early research stage preparing Martin for future competitions for military products, while other programs have reached the stage of development, including the design and building of prototype military equipment. Among the outgrowths of these research and development efforts are two study contracts received within the past year: Project Apollo, designed to provide the capability for manned reconnaissance flights to the vicinity of the moon; and a contract for a study of SLOMAR, seeking the solution to the problems of providing freight, passenger, maintenance and rescue service for orbiting satellites and space stations.

As a part of its activities in the field of research, Martin's RIAS division is staffed with a selected group of scientists who create and conduct their own programs of research, including both theoretical and experimental studies.

Government Contracts

Substantially all of Martin's contracts with the Government are either the cost reimbursement type (cost-plus-a-fixed-fee) or the fixed priced incentive type.

The cost reimbursement type contract provides for reimbursement of costs (with certain exceptions) incurred in connection with the performance of the contract and a fixed fee specified in each contract. The fixed price incentive type contract provides for participation by Martin and the Government in either savings or excess costs with relation to an established target price.

Under fixed price incentive type contracts, Martin receives progress payments, generally in an amount equal to 70% of costs incurred. Martin's definitive cost reimbursement type contracts now provide for current reimbursement by the Government of 100% of costs incurred, and during the period of negotiation letter contracts provide for reimbursement of 70% of costs incurred.

The Renegotiation Act of 1951 as amended makes subject to renegotiation by the Government substantially all of Martin's profits through June 30, 1962, the present expiration date of the Act. Clearances under the Renegotiation Act have been received through the year 1952 with no refunds being required. Reference is made to Note A to Martin's earnings under "Summaries of Earnings" regarding required refunds and other information with respect to years subsequent to 1952 and for the year 1957.

Property

The Company's principal manufacturing plants are located near Baltimore, Maryland; Denver, Colorado and Orlando, Florida. Corporate offices, the Baltimore Division, and the Nuclear Division are located at Middle River, Maryland, approximately 12 miles east of the center of Baltimore. The facilities there provided comprise approximately 3,240,000 square feet owned by the Company and 157,000 square feet owned by the Government and operated by the Company under a Use Agreement. Property owned by the Government is made available to the Company without payment of rental unless the facilities are used for other than Government purposes. The land at Middle River owned by the Company aggregates approximately 1,000 acres and includes a modern military airport. In addition to the property at Middle River, the Company leases in the Baltimore area approximately 284,000 square feet of space for office and storage purpose. A new Corporate Administrative Headquarters is presently being constructed at Baltimore Friendship International Airport. The building will contain approximately 80,000 square feet.

The Company in 1955 acquired by purchase approximately 3,860 acres of land near Denver, Colorado, which has been improved by the construction of administration, engineering and manufacturing

buildings containing in the aggregate approximately 1,396,000 square feet. The Company leases approximately 2,500 acres of land adjacent to the Denver plant site and also for its activities in the Denver area, office and storage space containing approximately 540,000 square feet. Some 140,000 square feet of government-owned space is used by the Company in the Denver area.

The Company acquired in 1956 by purchase approximately 6,770 acres of land near Orlando, Florida for use of the Orlando Division in the production of guided missiles and electronics. A fully integrated plant containing approximately 760,000 square feet has been completed at this location. In addition to the property owned by the Company, the Orlando Division utilizes for office and storage purposes leased areas containing approximately 371,000 square feet.

Leased offices are maintained at Cocoa Beach, Florida for the Cocoa Division, and at Boston, Massachusetts; Chicago, Illinois; Cleveland and Dayton, Ohio; Los Angeles, California; New York City; Honolulu, Hawaii; Washington, D. C.; Hampton, Virginia; Huntsville, Alabama; Red Bank, New Jersey; Omaha, Nebraska; Rome, New York, and Wiesbaden, Germany, for representatives of the Company in those areas. The Company also leases facilities at Quehanna, Pennsylvania, for the use of its Nuclear Division.

During the five years ended December 31, 1960 the Company and its subsidiaries made gross property additions of $76,492,905 and property retirements aggregating $6,037,814.

Substantially all of the above buildings are of modern fireproof construction and have been maintained in good operating condition.

The Company knows of no material defects in title to any material portions of the properties owned by it nor of any material encumbrances thereon. No special examinations of title to properties have been made in connection with this offering.

CAPITALIZATION

The capitalization of the Constituent Companies (Martin as of June 30, 1961, American-Marietta as of May 31, 1961) and pro-forma of the Consolidated Company based on the combination of the foregoing is as follows:

	(In Thousands)		
	Martin	American-Marietta	Consolidated Company
Long Term Debt (exclusive of amounts payable within one year)			
Unsecured notes held by financial institutions		$ 67,930(1)	$ 67,930
5½% Sinking Fund Debentures due November 1, 1968 held by the public	$ 15,500(2)		15,500
Other		956	956
Preferred Stock			
5% Cumulative, $100 par value, 200,599 shares outstanding		20,060(3)	
4½% Cumulative, $100 par value, 380,000 shares outstanding			38,000(4)
Stockholders' Equity			
Common Stock, No Par value, 6,258,387 shares outstanding	3,129(5)		
Common Stock, $2 par value, 13,200,796 shares outstanding		26,402(6)	
Class "B" Common Stock, $2 par value, 3,191,189 shares outstanding		6,382(7)	
Common Stock, $1 par value, 21,336,699 shares outstanding			21,337
Additional paid-in capital	40,367	88,926	105,869
Earnings reinvested	58,322(8)	94,474(9)	151,793
	$117,318	$305,130	$401,385

NOTES:

(1) Consists of long term debt of American-Marietta, which will be assumed by the Consolidated Company. The interest rates, maturities and payments required in the next five years are shown in the Notes to American-Marietta's balance sheet in this Proxy Statement.

(2) Consists of long term debt of Martin, which will be assumed by the Consolidated Company. The sinking fund requirements are shown in the Notes to Martin's balance sheet in this proxy statement.

(3) To be redeemed prior to consolidation.

(4) The terms of the 4½% Cumulative Preferred Stock provide for an annual sinking fund of $1,150,000 and limit dividends and other payments in respect of the Common Stock to net income subsequent to November 30, 1961 plus $45,000,000.

(5) Each share to be exchanged for 1.3 shares of Common Stock, $1 par value, of the Consolidated Company.

(6) Each share to be exchanged for 1 share of Common Stock, $1 par value, of the Consolidated Company

(7) To be exchanged for 380,000 shares 4½% Cumulative Preferred Stock, $100 par value.

(8) Under the terms of the Debenture Agreement covering the 5½% Sinking Fund Debentures, $13,707,517 of the earnings reinvested are not available for the payment of dividends.

(9) Under the terms of notes payable to financial institutions, payments which may be made for the payment of dividends (other than on preferred shares) and for the acquisition of capital shares were limited to $14,000,000.

(10) The Consolidated Company, by operation of law, will assume the obligations of Martin in respect of the warrants and options described in the Notes to Martin's balance sheet herein. The number of shares of the Consolidated Company's Common Stock covered by the warrants will be 1.3 times the number of Martin's shares now covered. The number covered by the options will be approximately 1.3 times the number now covered, with such adjustment as may be necessary to preserve the "restricted" status for purposes of the Internal Revenue Code. All figures are based on shares outstanding June 30, 1961 as to Martin and May 31, 1961 as to American-Marietta, and would be changed by exercise of options, warrants and conversion rights after those dates.

PRO FORMA COMBINED SUMMARY BALANCE SHEET
(Giving effect to the proposed consolidation of The Martin Company and American-Marietta Company)

The pro forma combined summary balance sheet, giving effect to the proposed consolidation of The Martin Company and American-Marietta Company on a "pooling of interests" basis, combines the balance sheet of Martin and the consolidated balance sheet of American-Marietta and consolidated subsidiaries as of the end of the first six months of each of their respective 1961 fiscal years. The pro forma balance sheet should be read in conjunction with the aforementioned separate balance sheets of Martin and American-Marietta and the related notes to the respective financial statements appearing elsewhere in this proxy statement.

(In Thousands)

	The Martin Company June 30, 1961	American-Marietta Company and Consolidated Subsidiaries May 31, 1961	Pro Forma Adjustments Add (Deduct)	Pro Forma Combined
ASSETS				
CURRENT ASSETS				
Cash and prime commercial paper	$ 28,968	$ 16,126		$ 45,094
Receivables	116,667	56,408		173,075
Inventories	10,142	69,577		79,719
Prepaid expenses	1,278	3,805		5,083
TOTAL CURRENT ASSETS	$157,055	$145,916		$302,971
INVESTMENTS AND OTHER ASSETS	4,659	26,348		31,007
PROPERTY, PLANT AND EQUIPMENT—net	50,391	196,999		247,390
	$212,105	$369,263		$581,368
LIABILITIES AND STOCKHOLDERS' EQUITY				
CURRENT LIABILITIES				
Notes payable to banks		$ 34,000		$ 34,000
Accounts payable and accrued expenses	$ 73,594	19,814		93,408
Taxes on income	13,550	8,189		21,739
Long-term debt—current portion	2,250	2,130		4,380
Preferred stock redemption			$21,063(1)	21,063
TOTAL CURRENT LIABILITIES	$ 89,394	$ 64,133	$21,063	$174,590
RENEGOTIATION REFUND	5,393			5,393
LONG-TERM DEBT	15,500	68,886		84,386
STOCKHOLDERS' EQUITY				
Preferred shares:				
5% cumulative		$ 20,060	$(20,060)(1)	
4½% cumulative			38,000 (2)	$ 38,000
Common shares	$ 3,129	26,402	(8,194)(3)	21,337
Class B Common shares		6,382	(6,382)(2)	
Additional paid-in capital	40,367	88,926	(23,424)(4)	105,869
Earnings reinvested	58,322	94,474	(1,003)(1)	151,793
	$101,818	$236,244	$(21,063)	$316,999
	$212,105	$369,263		$581,368

The pro forma adjustments give effect to the following:

1. Retirement of 5% Cumulative Preferred Shares at $105 per share prior to the consolidation, either from cash on hand and/or proceeds of short term bank loans. The retirement premium of $1,003,000 has been charged to earnings reinvested.

2. Conversion of all of the outstanding American-Marietta Class B Common Shares, $2 par value, for 380,000 new 4½% Cumulative Preferred Stock, $100 par value (aggregate par value $38,000,000), of the Consolidated Company.

3. Conversion (on the basis of 1.3 shares for 1 share) of all of the 6,258,387 outstanding shares of Martin Common Stock, without par value (aggregate stated value $3,129,193), for 8,135,-903 common shares, $1 par value of the Consolidated Company, and conversion (on a 1 for 1 basis) of all of the 13,200,796 outstanding American-Marietta Common Shares, $2 par value (aggregate par value $26,401,592), for 13,200,796 shares of Common Stock, $1 par value of the Consolidated Company. The aggregate par value, $21,336,699, of all of the 21,336,699 shares of Common Stock of the Consolidated Company to be outstanding will be $8,194,086 less than the combined aggregate of the stated value of Martin Common Stock and the par value of American-Marietta Common Shares outstanding.

4. Reduction of additional paid-in capital by $23,423,536, representing the amount by which the combined aggregate par value of the new 4½% Cumulative Preferred Stock and Common Stock of the Consolidated Company exceeds the combined aggregate par value of Martin Common Stock and American-Marietta Common and Class B Common Shares outstanding.

STATEMENTS OF EARNINGS

The Martin Company

The following statement of earnings of the Company for the five years ended December 31, 1960 has been reviewed by Touche, Ross, Bailey & Smart, independent certified public accountants, whose opinion appears elsewhere in this Proxy Statement; the information for the six-month periods ended June 30, 1960, and June 30, 1961, has not been audited. The statement of earnings should be read in conjunction with the financial statements and related notes included elsewhere in this Proxy Statement. The unaudited figures for the six months ended June 30, 1960 and June 30, 1961 include all known adjustments (consisting only of normal recurring accruals) considered necessary for a fair presentation of earnings for the respective periods.

During the period from January 1, 1956 through October 31, 1958 the Company had certain subsidiaries, the operations of which are included in the statement of earnings for the years ended December 31, 1956, 1957 and 1958. All of these subsidiaries were merged into the Company October 31, 1958.

The accompanying earnings statement for the year 1956 has been restated to give effect to the renegotiation refund described in Note A and the effect of such refund upon the federal taxes applicable to that year.

(In thousands)

	Year ended December 31,					(Unaudited) Six months ended	
	1956	1957	1958	1959	1960	June 30, 1960	June 30, 1961
Sales and other income:							
Sales (including costs and fees under cost-plus-fixed-fee contracts) (A)	$356,574	$423,925	$483,644 (B)	$523,707	$651,228	$301,986	$408,193
Other income	1,081	807	694	1,119	1,351	773	750
	$357,655	$424,732	$484,338	$524,826	$652,579	$302,759	$408,943
Costs and expenses:							
Cost of sales, exclusive of depreciation and amortization	$334,869	$397,964	$449,524	$484,129	$604,579	$280,574	$380,706
Depreciation and amortization	1,865	4,738	8,650	9,654	10,619	5,085	5,551
Interest	—	464	1,379	1,831	2,192	1,133	1,196
Other costs and expenses	269	636	859	1,475	535	319	312
	$337,003	$403,802	$460,412	$497,089	$617,925	$287,111	$387,765
Earnings before federal taxes on income (A)	$ 20,652	$ 20,930	$ 23,926	$ 27,737	$ 34,655	$ 15,648	$ 21,178
Provision for federal taxes on income (A)	10,958	11,050	12,200	14,400	17,800	8,000	11,390
Net earnings, before extraordinary profit (A)	$ 9,694	$ 9,880	$ 11,726 (B)	$ 13,337	$ 16,855	$ 7,648	$ 9,788
Profit on sale of investment—net of taxes							3,750
Net earnings (A)	$ 9,694	$ 9,880	$ 11,726 (B)	$ 13,337	$ 16,855	$ 7,648	$ 13,538

NOTES

(A) Under the Renegotiation Act of 1951, the Company has received clearance from The Renegotiation Board for 1952 and prior years and for the year 1957. The Renegotiation Board has made unilateral determinations that the Company's profits were excessive for the years 1953 to 1956. The effect of the Board's actions is summarized below:

	Excessive Profits Determined By Board	Requested Refund, Net of Federal And State Tax Credits	Liability In Accounts As Of Dec. 31, 1960 and June 30, 1961
1953	$3,500,000	$1,526,192	$ (1)
1954	6,250,000	2,816,793	2,816,793
1955	3,500,000	1,430,279	1,430,279
1956	4,796,101	2,008,316	1,146,188 (2)
			$5,393,260

(1) Year 1953 paid under protest—Company has a claim for Federal income tax refundable in the amount of $1,636,567.

(2) Amount provided for 1956 is net of a claim which was before the Armed Services Board of Contract Appeals to recover certain contract costs previously disallowed. The claim has been denied and the requested refund should be correspondingly reduced by The Renegotiation Board.

The Company believes that no excessive profits were realized for the years 1953 to 1956 and has appealed to the Tax Court for a redetermination of the Board's findings for these years. The Renegotiation Act provides that on appeal, if the Tax Court shall find excessive profits were realized, it has the power to determine that the amount of such excessive profits is less than, equal to or greater than that determined by the Board.

The earnings statement for 1956 has been restated to reflect the Board's determination in the accounts, and the federal income taxes for 1956 have been reduced by $1,241,703 to reflect the refundable federal taxes applicable to such renegotiation refund.

Sales and profits for 1958 and subsequent years are also subject to renegotiation. The Company has no basis for anticipating the final actions of The Renegotiation Board and intends to take such actions as may be required to sustain its position that no excessive profits have been realized for any year. Accordingly, no provisions have been made in the accounts for 1958 or subsequent years.

(B) The Company incurred production costs of approximately $92,000,000 to December 31, 1958 (of which $40,000,000 was incurred in the prior year) under a letter contract, originally contemplating a definitive fixed price contract. In subsequent negotiations the Company and the Government agreed that the definitive contract would be of a cost reimbursement type. Accordingly, pursuant to its regular accounting policy in accounting for contracts of this type, during 1958 sales were recorded in the amount of approximately $98,000,000 on which the net income was approximately $3,165,000 of which approximately $1,375,000 relates to costs incurred in the prior year.

(C) The caption Selling, General and Administrative Expenses has been omitted as being inapplicable since substantially all of the Company's costs and expenses are incurred in connection with production under sales contracts and accordingly have been consistently considered to be directly applicable to performance under such contracts and are, therefore, classified in the financial statements as work in process or cost of sales.

(D) Cost of sales includes provisions for Maryland and Colorado State income taxes as follows: years ended December 31, 1956, $718,500; 1957, $605,883; 1958, $717,970; 1959, $523,649; 1960, $744,906, and for the six months ended June 30, 1961, $694,900.

American-Marietta Company and Consolidated Subsidiaries

The following statements of consolidated income of American-Marietta and consolidated subsidiaries for the five (5) years and six (6) months ended May 31, 1961 include the results of operations from dates of acquisitions of companies acquired, except as to companies merged during the years 1956 to 1960 which were treated for accounting purposes as "poolings of interests", the results of operations of which have been included for all periods. In annual reports of American-Marietta to its shareholders for the years 1956 through 1959, the results of operations of these companies have been included only from the beginning of the fiscal year in which the acquisition took place; and to this extent results of operations shown herein differ from those reported in such years.

The statements reflect certain retroactive adjustments relating to earnings of foreign (except Canadian) subsidiaries and to federal income taxes and interest thereon as described in Notes A and B of Notes to Financial Statements on page 41.

The statements have been examined for the five years ended November 30, 1960, by Ernst & Ernst and other independent accountants, whose reports with respect thereto are included elsewhere in this Proxy Statement. The statements for the periods of six months ended May 31, 1960, and May 31, 1961, respectively, are unaudited, but American-Marietta Company believes that they reflect all adjustments (consisting only of normal recurring accruals) necessary to present a fair statement of the results of operations for these periods. The statements should be read in conjunction with the related consolidated financial statements of American-Marietta Company and consolidated subsidiaries and notes thereto included elsewhere in this Proxy Statement.

(In Thousands)

	Year ended November 30					(Unaudited) Six months ended	
	1956	1957	1958	1959	1960	May 31, 1960	May 31, 1961
Net sales—Note 5	$246,943	$259,948	$278,286	$340,173	$368,107	$160,915	$157,230
Other income	3,566	2,805	2,923	3,987	4,049	1,680	2,317
TOTAL INCOME	$250,509	$262,753	$281,209	$344,160	$372,156	$162,595	$159,547
Costs and expenses—Notes F and I:							
Cost of products sold	$157,004	$169,414	$180,454	$222,086	$241,167	$105,791	$104,823
Selling, advertising, administrative, and general expenses	37,148	38,975	41,119	47,771	56,430	27,215	27,426
Depreciation, depletion, and amortization	7,680	9,030	10,685	13,187	16,248	7,591	8,853
Interest	1,383	1,714	1,959	2,525	4,041	1,541	2,397
Other deductions	3,952	3,336	3,963	4,497	4,841	2,245	2,537
	$207,167	$222,469	$238,180	$290,066	$322,727	$144,383	$146,036
INCOME BEFORE TAXES THEREON	$ 43,342	$ 40,284	$ 43,029	$ 54,094	$ 49,429	$ 18,212	$ 13,511
Taxes on income—estimated:							
Federal—Note B	$ 19,842	$ 18,732	$ 19,910	$ 25,642	$ 22,200	$ 8,450	$ 6,600
State and Canadian	1,474	1,657	1,820	2,110	2,800	800	600
	$ 21,316	$ 20,389	$ 21,730	$ 27,752	$ 25,000	$ 9,250	$ 7,200
NET INCOME—Note 5	$ 22,026	$ 19,895	$ 21,299	$ 26,342	$ 24,429	$ 8,962	$ 6,311
Deduct dividends on 5% Cumulative Preferred Shares—Note 2	789	1,053	1,126	1,037	1,004	504	500
NET INCOME APPLICABLE TO COMMON AND CLASS B COMMON SHARES—Note 3	$ 21,237	$ 18,842	$ 20,173	$ 25,305	$ 23,425	$ 8,458	$ 5,811

NOTES:

(1) Alphabetical notes refer to notes to financial statements of American-Marietta Company and consolidated subsidiaries included elsewhere in this proxy statement.

(2) Amounts deducted for dividends on Preferred Shares include an adjustment for Preferred Shares issued in connection with the acquisition of one company which for accounting purposes was treated as a "pooling of interests."

(3) For information as to dividend restrictions on Class B Common Shares and the basis upon which Class B Common Shares may be converted into Common Shares, reference is made to Note D of notes to financial statements.

(4) The annual dividend requirement on Preferred Shares outstanding at November 30, 1960, was $994,860 and at May 31, 1961, $1,002,995.

(5) Net sales and net income for the six months ended May 31, 1961, are not necessarily indicative of the results of operations which may be expected for the entire year ending November 30, 1961.

The decline in net income for the six months ended May 31, 1961, as compared to the six months ended May 31, 1960, is attributable to the deferment of building and road construction activities due to unfavorable weather in the early part of the period and to a decline in the volume of business in certain products. This decline, however, has not continued into the current quarter, and sales and net income in the months of June and July 1961, have been greater than in the corresponding months of 1960.

PRO FORMA COMBINED SUMMARY OF EARNINGS

The following pro forma combined summary of earnings has been prepared by combining amounts shown in separate statements of earnings of Martin and of American-Marietta and consolidated subsidiaries (without regard for differing fiscal periods and before deduction of dividends on preferred shares of American-Marietta) after giving effect in all periods to a 5% interest charge (net of income taxes) which would have been incurred had amounts of debt existed equal to the aggregate par value of the American-Marietta 5% Cumulative Preferred Shares then outstanding. The pro forma combined summary of earnings should be read in conjunction with the separate statements of earnings of Martin and of American-Marietta and consolidated subsidiaries and notes thereto included elsewhere in this Proxy Statement.

	(In Thousands)						
						First Six Months	
	1956	1957	1958	1959	1960	1960	1961
Sales	$603,517	$683,873	$761,930	$863,880	$1,019,335	$462,901	$565,423
Net earnings	31,341	29,270	32,485	39,181	40,802	16,368	19,609(1)
Dividend requirements on proposed 4½% Cumulative Preferred Stock of Consolidated Company	1,710	1,710	1,710	1,710	1,710	855	855
Net earnings applicable to common shares	29,631	27,560	30,775	37,471	39,092	15,513	18,754

(1) Includes extraordinary profit of $3,750,000 from sale of investment.

PER SHARE EARNINGS

The following tabulation, based on the Pro Forma Combined Summary of Earnings set forth above, compares, for the periods indicated, the net earnings per share of Common Stock of Martin and of Common and Class B Common Shares of American-Marietta and pro forma combined. The per share earnings for American-Marietta are based on the average shares outstanding during each period, after adjustment for stock splits of 5 for 4 in 1956, 3 for 2 in 1957 and 5 for 4 in 1959; shares issued in acquisition of companies treated for accounting purposes as "poolings of interests" have been considered outstanding from the beginning of the fiscal years of such companies in 1956. The per share earnings for Martin are based on the number of shares outstanding at the end of the respective periods (changes during the periods are not considered to be material), after adjustment for stock dividends of 5% in 1956 and 1959, and stock split of 2 for 1 in 1961. The per share earnings, pro forma, repre-

sent the earnings for each period which would have been allocable to each share of Martin and American-Marietta respectively had the consolidation become effective at the beginning of the fiscal year 1956.

	The Martin Company		American-Marietta Company	
	Before Consolidation	Pro Forma (Based on 1.3 for 1 Conversion)	Before Consolidation Applicable to Common and Class B Common	Pro Forma (Based on 1 for 1 Conversion of Common)
1956	$1.59	$2.09	$1.54	$1.61
1957	1.61	1.90	1.33	1.46
1958	1.91	2.03	1.34	1.56
1959	2.17	2.38	1.61	1.83
1960	2.71	2.43	1.46	1.87
First six months:				
1960	1.24	.98	.54	.75
1961	1.56(1)	.92(1)(2)	.36(2)	.71(1)(2)

(1) Exclusive of extraordinary profit of $3,750,000 from sale of investment equivalent to $.60 per share of Martin before consolidation, and $.23 per share of Martin and $.18 per share of American-Marietta on the pro forma basis.

(2) Per share earnings for the six months ended May 31, 1961, are not necessarily indicative of the results of operations which may be expected for the entire year ending November 30, 1961. The decline in per share earnings for the six months ended May 31, 1961, as compared to the six months ended May 31, 1960, is attributable to the deferment of building and road construction activities due to unfavorable weather conditions prevailing in the early part of the period and to a decline in the volume of business in certain products.

BOOK VALUE OF COMMON STOCKS

There is set forth below a comparison of book values per share of Common Stock of Martin at June 30, 1961 with Common Shares (including Class B) of American-Marietta as of May 31, 1961 and pro-forma for the Consolidated Company.

	Martin June 30, 1961	American-Marietta May 31, 1961	Consolidated Company (Pro-forma)
Common stock equity	$101,817,926	$216,184,171	$278,999,097
Shares of Common Stock outstanding at end of period	6,258,387	16,391,985	21,336,699
Book value per share of Common stock	$16.27	$13.19	$13.08
Book value per share of Martin common stock based on exchange ratio of 1.3 to 1			$17.00

PRICE RANGE OF COMMON STOCKS

The Common Stock of Martin is listed on the New York, Philadelphia-Baltimore and Pacific Coast Stock Exchanges and it is anticipated that the Common Stock of the Consolidated Company will be similarly listed. The Common Shares of American-Marietta are traded in the Over-the-Counter Markets in New York and Chicago and other financial centers. The high and low sale prices of the Common Stock of Martin on the New York Stock Exchange by quarterly periods during the two years 1959 and 1960, and the six months ended June 30, 1961, and on June 30, 1961, are shown below. Market quotations on the Martin Common Stock are reported on the basis of the published closing sale prices on the New York Stock Exchange; whereas quotations on the American-Marietta Common Shares for the

same periods are reported on the basis of bid and asked prices as reported by the National Quotation Bureau, Incorporated of New York City, as follows:

	Martin (1)		American-Marietta (2)			
			Bid		Asked	
Quarter ended	Low	High	Low	High	Low	High
March 31, 1959	$16.19	$22.69	$32.00	$44.00	$32.20	$44.20
June 30, 1959	21.31	31.38	41.20	46.40	41.60	46.80
September 30, 1959	17.69	26.75	37.25	44.00	37.50	44.50
December 31, 1959	19.00	25.38	37.63	42.00	37.75	42.25
March 31, 1960	18.63	22.13	34.00	38.38	34.13	38.50
June 30, 1960	18.00	24.43	31.75	36.50	32.00	36.75
September 30, 1960	22.56	29.31	28.75	34.38	29.00	34.50
December 31, 1960	24.13	32.69	27.63	34.13	27.88	34.25
March 31, 1961	29.31	37.88	30.88	40.50	31.00	40.75
June 30, 1961	30.50	39.00	29.00	37.00	29.75	37.13
On August 15, 1961	35.63	36.50	30.13	30.38	30.50	31.00

(1) Adjusted to reflect the two-for-one split effected on February 10, 1961, for stockholders of record January 20, 1961.

(2) Adjusted to reflect five-for-four split in July, 1959.

The Class B Common Shares of American-Marietta are not listed on any exchange, and there has been no trading in such shares.

DIVIDENDS

The constituent companies since December 21, 1960 as to Martin and February 1, 1960 as to American-Marietta have paid quarterly cash dividends on their respective Common Stocks at the annual rate of $1 per share. Subject to future business conditions and the financial condition of the Consolidated Company which may change from time to time, the managements contemplate the continuance of quarterly dividends on the Common Stock of the Consolidated Company at the same rate.

A summary of cash dividends paid per share, adjusted for stock dividends and splits, is presented below:

	The Martin Company	American-Marietta Company
1956	$ .73	$ .58
1957	.76	.68
1958	.76	.80
1959	.76	.85
1960	.85	1.00
First six months:		
1960	.40	.50
1961	.50	.50

MANAGEMENT

Directors

When the consolidation becomes effective, the Board of Directors of the Consolidated Company will consist of eighteen members, nine of whom are present Directors of Martin and nine of whom have been designated by the Board of Directors of American-Marietta.

The following information is presented in respect of the Martin Directors who will become Directors of the Consolidated Company* and will serve as such until the annual meeting in April, 1962:

Name	Principal occupation for last five years	Martin Director Since	Shares of Martin Common Stock beneficially owned August 4, 1961
George M. Bunker	Chairman of the Board and Chief Executive Officer of The Martin Company	1952	186,490
William B. Bergen	Executive Officer of The Martin Company	1958	23,418
William A. Burns	President and Director, Trailmobile, Inc. (Manufacturers truck-trailers)	1957	420
Clarence W. Miles	General Counsel of The Martin Company and Partner of Miles & Stockbridge (Attorneys)	1958	20,265
John E. Parker	Independent Business Consultant	1956	4,000
Everett H. Pixley	Vice President, Mellon National Bank and Trust Company (Banking)	1949	256
Alexander B. Royce	Partner of Chadbourne, Park, Whiteside & Wolff (Attorneys)	1953	508
Duncan M. Spencer	Chairman of the Board and Executive Officer, Fiduciary Trust Company of New York (Banking)	1952	1,000
John L. Sullivan	Partner of Sullivan, Shea & Kenney and of Sullivan & Wynot (Attorneys)	1952	20,004

* Mr. Frank F. Russell, a director of Martin for many years, was unable to accept a place on the Board of Directors of the Consolidated Company due to the fact that he is a director of another corporation whose business is competitive in certain respects with that of the Consolidated Company.

The following information is presented in respect of the American-Marietta Directors and officers who will become Directors of the new company and will serve as such until the annual meeting in April, 1962:

Name	Principal occupation for last five years	American-Marietta Director Since	American-Marietta Shares beneficially owned July 20, 1961 (1)	
			Common	Class B
Grover M. Hermann	Chairman of the Board of American-Marietta Company	1930	11,671	2,445,650
Robert E. Pflaumer	President of American-Marietta	1954	15,826	70,314
Harry N. Huntzicker	Executive Vice President of American-Marietta, previously Vice President of United States Gypsum Company	1961	600	
William J. Cabaniss	President of Southern Cement Company, now a division of American-Marietta	1956	30,000	
John F. Donoho	Financial Vice President of American-Marietta	——	1,365	
Leigh R. Gignilliat, Jr.	Vice President of American National Bank & Trust Company of Chicago	1953	1,272	
J. Clifford Knochel	Vice President of American-Marietta, previously Vice President of Devoe & Reynolds, Inc.	1959	1,701	
Ray L. Oughton	Director and Vice Chairman of the Board of American-Marietta until his voluntary resignation April 18, 1961, and since then Divisional President of the Madison Silo Division of American-Marietta.	1934	5,372	
W. Trent Ragland	President of Superior Stone Company, now a division of American-Marietta	1960	87,535	

(1) Except as otherwise indicated, includes shares owned by trusts in which the person named has an interest, but does not include shares owned by members of the family of the person named in which such person has no interest.

(2) Does not include Common Shares and Class B Common Shares owned by trusts for members of Mr. Hermann's family in which Mr. Hermann has no beneficial interest and by a charitable foundation which was created by him.

(3) Before the consolidation becomes effective, Mr. Pflaumer expects to convert his Class B Common Shares into Common Shares. After the consolidation becomes effective, Mr. Pflaumer will have an option to purchase 19,125 shares of Common Stock of the Consolidated Company from certain other stockholders.

Holders of Class B Common Shares of American-Marietta as of July 20, 1961

Beneficial owner	Number of Shares
American National Bank and Trust Company, et al. Trustees for benefit of Shirley Hermann	311,275
American National Bank and Trust Company, et al. Trustees for benefit of Robert Hermann	340,061
Grover M. Hermann	2,445,650
Grover M. Hermann Foundation	11,720
Robert Hermann	12,169
Robert Pflaumer	70,314
Total	3,191,189

Election of Officers of Consolidated Company

It is presently intended that the directors named above will meet promptly after the consolidation becomes effective and will elect the following executive officers:

George M. Bunker, President and Chief Executive Officer
Grover M. Hermann, Chairman of the Board
William B. Bergen, Vice-President
Robert E. Pflaumer, Vice-President
John F. Donoho, Financial Vice-President and Treasurer
William L. Lucas, Secretary

At the same time it is intended that Clarence W. Miles will be designated as General Counsel of the Consolidated Company.

Remuneration of Directors and Officers

The following table shows certain information with respect to remuneration paid by Martin to its officers and Directors during the year 1960:

Name of individual or identity of group and capacity in which remuneration was received	Aggregate remuneration	Premium paid by Martin under Employees' Pension Fund Plan (1)
George M. Bunker, Chairman of the Board	$150,000(2)	$16,009
William B. Bergen, President and Director	100,000	9,209
Clarence W. Miles, General Counsel and Director	80,000(3)	None
George T. Willey, Vice President	57,000	9,872
All officers and directors as a group (including above) ..	848,001(4)	68,901

(1) The annual benefit estimated to be payable under the Employees' Pension Plan upon retirement at normal retirement age for George M. Bunker and William B. Bergen is $25,000 and for George T. Willey is $13,377. Clarence W. Miles is not eligible under the Plan.

(2) As of April 1, 1959, the Company entered into a five-year contract with George M. Bunker. Under the terms of the contract Mr. Bunker will devote substantially his entire business time as chief executive and general manager of the Company at an annual salary of $120,000 subject to such increases and additional payments as may be determined by the Board of Directors. If he should be permanently disabled or die during the term of the contract the compensation provided thereby shall be continued for a period of six months.

(3) On October 1, 1960 the Company entered into an employment agreement with Clarence W. Miles by which Mr. Miles agreed to serve as General Counsel for a term of 10 years at an annual salary of not less than $80,000. Either party has the right to terminate the agreement after the expiration of 5 years in which event it is agreed that Mr. Miles shall serve in a consulting capacity at an annual salary of $30,000. In the event that Mr. Miles shall be permanently disabled the Company may terminate the agreement and thereupon the Company shall be obligated to pay the compensation as General Counsel to Mr. Miles for a period of 6 months or in the event of his death during the 6 months period to his widow or his estate.

(4) Does not include $40,900 paid for legal services to Sullivan, Shea & Kenney, of which firm John L. Sullivan, a Director, is a partner; or $32,142 paid for legal services to Miles & Stockbridge, of which firm Clarence W. Miles is a partner.

The following table shows certain information with respect to remuneration paid by American-Marietta to certain of its officers and Directors who will become Directors of the Consolidated Company, during the fiscal year ended November 30, 1960:

Name	Title	Salaries and Fees	Bonuses	Pension, Profit Sharing and Retirement Benefits: Accrued for Year 1960	Pension, Profit Sharing and Retirement Benefits: Estimated Annual Benefits
Grover M. Hermann	Chairman of Board of Directors	$ 98,333	$ —	—	$ 6,000(1)(2)
Robert E. Pflaumer	President and Director	80,000	40,000	$ 3,917	22,064(1)
William J. Cabaniss	Divisional General Manager and Director	36,000	—	1,718	5,220(1)
John F. Donoho	Financial Vice President	40,000	10,000	—	—
J. Clifford Knochel	Vice President and Director	45,000	5,000	2,168	7,008(1)
All Directors and Officers	Directors and Officers	1,108,503	333,210		

(1) Including benefits from contributions by participants under Company's Salaried Employees' Retirement Plan.
(2) Maximum vested benefits under Company's Salaried Employees' Retirement Plan.

Stock Options of Martin

During the period from January 1, 1960 to August 4, 1961, (i) Mr. Bunker exercised options to purchase 42,000 shares (representing all of his then remaining unexercised options) at $15.89 per share, the closing market value on the date of exercise being $36.63; (ii) Mr. Bergen exercised options to purchase 9,260 shares at $12.15 per share, the market value on the date of exercise being $26.88; (iii) Mr. Miles exercised options to purchase 12,600 shares at $15.89 per share and 7,665 shares (representing all of his then remaining unexercised options), at $19.52 per share, the market value per share on the dates of exercise ranging from $27.88 to $36.63; and (iv) Mr. Willey exercised options to purchase 2,100 shares at $15.89 per share, the market value on the date of exercise being $32.31 per share.

During the same period all officers and directors of Martin as a group, including those previously set forth in detail, exercised options as follows:

Quarter or Period Ended	Shares	Option Price	Market Price on Date Purchased
Sept. 30, 1960	19,032	$12.15—15.89	$26.88—28.13
Dec. 31, 1960	21,000	15.89—19.52	25.94—31.44
Mar. 31 1961	2,100	15.89	32.31
June 30, 1961	14,700	15.89	37.50—38.00
Aug. 4, 1961	45,465	15.89—19.52	36.63
	102,297		

During the same period options expiring April 30, 1968 to purchase 6,000 shares at $19.38 per share and 16,000 shares at $23.13 per share were granted to all officers and directors as a group, the price per share being the market price on the date options were granted.

During February 1961 Mr. Willey sold 1,000 shares of Martin Common Stock, the net proceeds of which sale amounted to $34,555.42. This sale was within less than 6 months of the date when he exercised an option to purchase 1,050 shares (2,100 shares after giving effect to the 2 for 1 stock split effected on February 10, 1961 for stockholders of record January 20, 1961) and under the provisions of Section 16(b) of the Securities Exchange Act of 1934 any profit realized from such sale inures to and is recoverable by the Company. Based on the provisions of Rule X 16B-6 of the Securities and Exchange Commission the profit on the sale amounted to $10,119.82. Appropriate steps are being taken by the Company to recover the short term profit.

The number of shares issued and the price per share have been adjusted for stock dividends subsequent to the issuance of the respective stock options.

Subsequent to June 30, 1961, Martin has granted options or agreed to grant options to 2 employees other than officers and directors, to purchase in the aggregate 10,000 shares of its Common Stock at the closing market price on the date of the grant. After the effective date of the consolidation no further options will be granted under the Stock Option Plans of Martin. No shares of Common Stock will be reserved by the Consolidated Company for issuance upon options in lieu of the 19,000 shares of Common Stock of Martin which were still reserved for the granting of options when its plans terminate on the effective date of the consolidation.

All of the foregoing transactions reflect the 2-for-1 stock split effected on February 10, 1961, for stockholders of record January 20, 1961.

DESCRIPTION OF COMMON STOCK OF MARTIN

The only class of capital stock of Martin authorized and outstanding is the Common Stock without par value which has exclusive voting rights. The holders of Common Stock are entitled to receive such dividends as are declared by the Board of Directors out of any funds of Martin legally available therefor and are entitled to share pro rata in the distributable assets of Martin in the event of any liquidation, dissolution or winding up of Martin. Martin may not declare any dividend or make any distribution on its shares of stock for value, or permit a Subsidiary to purchase, redeem or otherwise acquire or retire for value any shares of stock of Martin, if upon giving effect thereto the aggregate amount expended for such purposes subsequent to December 31, 1957, shall exceed the sum of (a) the accumulated consolidated earnings (or deficit) of Martin and its Subsidiaries earned subsequent

to December 31, 1957 (without taking into consideration any net refunds made by Martin under the Renegotiation Act of 1951, for periods prior to 1958), (b) the aggregate net consideration realized from the sale after December 31, 1957, of stock of Martin, (c) the aggregate net consideration realized from the sale after December 31, 1957, of any indebtedness of Martin which has been converted into shares of stock of Martin subsequent to December 31, 1957, and (d) the sum of $5,000,000. Each holder of Common Stock is entitled to one vote for each share of stock outstanding in his name. Without assent or other action of the stockholders, the Board of Directors may from time to time receive subscriptions for or sell any or all of the then unissued shares of Common Stock, whether the same be any of the originally authorized shares or any increase thereof, and shall be under no obligation to offer the same to existing stockholders. In the opinion of Counsel for Martin, the presently outstanding shares of Common Stock are, and the shares to be issued on exercise of the Warrants to purchase shares of Common Stock issued November 1, 1958, will upon compliance with the terms of the Warrants be fully paid and nonassessable.

DESCRIPTION OF COMMON SHARES AND CLASS B COMMON SHARES OF AMERICAN-MARIETTA

Certain provisions applicable to the Common Shares and the Class B Common Shares of American-Marietta are hereafter summarized. Such summary does not contain all of the terms and provisions applicable to said shares and no summary and no effect is given as to the provisions applicable to the 5% Cumulative Preferred Shares because those shares will be redeemed prior to the special meeting of stockholders of American-Marietta.

Dividends

Dividends may be paid on Common Shares and Class B Common Shares out of any funds legally available for such purpose when and as declared by the Board of Directors, except that no dividends may be declared or paid on Class B Common Shares in any year unless an equal amount plus $2 is paid for that year on the Common Shares, and except that any dividend or distribution on the Common Shares in Common Shares or on the Class B Common Shares in Class B Common Shares may be made only so long as there is no greater proportionate increase in the number of Class B Common Shares outstanding than in the Common Shares outstanding as a result of such dividend or distribution.

The terms of the Unsecured Notes referred to under the caption "Capitalization" of American-Marietta payable to insurance companies set forth certain minimum requirements as to consolidated working capital and restrict the payment of cash dividends and purchases or other retirements of Capital Shares. In this connection, reference is made to Note "C" to Financial Statements.

Voting Rights

The holder of each outstanding share regardless of class is entitled to one vote for each share held on each matter submitted to a vote at a meeting of shareholders and may cumulate votes for the election of directors.

Liquidation Rights

In the event of any dissolution, liquidation or winding up, the remaining assets of the Company shall be distributed to the holders of the Common Shares of both classes, without preference between the holders of the Common Shares and Class B Common Shares. Neither a merger nor consolidation of the Company with or into any other corporation, nor a reorganization, nor a purchase or redemption of all or a part of the outstanding shares of any class, nor the sale of the property and business of the Company substantially as an entirety, shall be considered a liquidation or winding up of the Company.

Preemptive Rights

No holder of any shares of any class of the Company has any right, as such holder, to purchase or otherwise acquire any shares of any class of the Company, now or hereafter authorized, of any se-

curities convertible into any such shares, or warrants or other instruments to subscribe for or otherwise acquire any such share, whether the same be unissued or issued and thereafter acquired by the Company.

Conversion Rights

Under the Articles of Incorporation of the Company, the Class B Common Shares are convertible, subject to the restrictions of such conversion set forth in the Articles of Incorporation, into Common Shares on a share for share basis. The conversion rights of certain of these shares are further restricted by an Agreement dated November 1, 1958, between Grover M. Hermann, Shirley Hermann and Robert Hermann. At this date 340,523 Class B Common Shares are eligible for conversion and the remaining shares are subject to the conversion restrictions of the Agreement and may not be converted until they become eligible for conversion thereunder as follows: 62,500 shares on each January 1 and July 1 to and including July 1, 1969. The conversion restrictions terminate completely on January 1, 1970. The agreement provides that the shares eligible for conversion thereunder shall be proportionately increased in the event of stock dividends, stock splits or other increases in the outstanding Class B Common Shares; that the restrictions of the Agreement shall continue in effect with respect to the shares subject thereto irrespective of any transfers of shares by the original parties; and that the Agreement shall be irrevocable except that it may be amended or terminated with the consent of the holders of not less than ⅔ of the outstanding Class B Common Shares, as a class, and of the holders of not less than ⅔ of the outstanding Common Shares, as a class.

The Agreement further provides that if, as a result of certain mergers or consolidations or acquisitions of assets, the persons who were the shareholders of the Company immediately prior to any such transaction shall not be or become the holders of shares representing at least 60% of the voting power of all shares, and at least 50% of each class of shares (other than Preferred Shares, as defined) of the Company, or of the acquiring or surviving corporation, outstanding immediately after, or issuable as a part of, such transaction, the conversion restrictions imposed by the Agreement may be modified or terminated by the holder or holders of not less than 60% of the then outstanding Class B Common Shares subject to the Agreement.

DESCRIPTION OF STOCK OF CONSOLIDATED COMPANY

Dividends

After cumulative dividends have been paid at the rate of 4½% on the Preferred Stock, dividends may be paid on the Common Stock, when and as declared by the Board of Directors and subject to the limitations provided in the terms of the Preferred Stock and the 5½% Sinking Fund Debentures and in A-M's long term notes. See footnotes to Capitalization of Consolidated Company and to Financial Statements of the Constituent Companies in this Proxy Statement.

Voting Rights

The holders of Common Stock will be entitled to one vote per share, but will not have cumulative voting rights. The holders of Preferred Stock will have no voting rights except as specifically provided by law and except that in the event of default in payment of dividends on the Preferred Stock in an amount equal to four quarterly dividends or in the event of a default in the Sinking Fund provided for the Preferred Stock, the Preferred Stock will have the right to elect one-third of the board of directors.

Liquidation Rights

After payment to the Preferred Stock of $100 per share plus accrued dividends plus $5 per share if the liquidation is voluntary, the Common Stock will be entitled to all remaining assets of the Company properly distributable to stockholders upon any liquidation of the Consolidated Company.

Miscellaneous

The Preferred Stock is subject to redemption as a whole, but not in part, at any time after October 1, 1964, at $105 per share plus accrued dividends. The Preferred Stock is entitled to a sinking fund as set forth under "Capitalization of the Consolidated Company". The Company may not change its stock provisions in certain respects adverse to the Preferred Stock or issue or sell any additional Preferred Stock or stock ranking prior thereto or on a parity therewith without the consent of the holders of two-thirds of the Preferred Stock. There are no preemptive rights.

Reference is made to the stock terms of the Consolidated Company set forth in full in the Articles included in Appendix A.

TAX CONSEQUENCES

In the opinion of counsel for the constituent companies the consolidation will not result in taxable gain to either of the constituent companies and stockholders of the constituent companies will not realize any taxable gain or deductible loss as a result of the conversion of their stock into stock of the Consolidated Company. Gain or loss will be recognized to stockholders who may dissent and receive in cash the value of their stock in appraisal proceedings, and gain, if any, will be recognized to stockholders of Martin with respect to the proceeds of sale of any fractional share interest, but not in excess of the amount received upon such sale.

RIGHTS OF DISSENTING STOCKHOLDERS

Stockholders of Martin who object to the consolidation have such rights as objecting stockholders in respect of the proposed consolidation as are provided by Section 73 of Article 23 of the Annotated Code of Maryland (1957 Edition). Under this Section, objecting stockholders shall be entitled to demand and receive payment of the amount equal to the fair value of their stock. If such stockholders (1) shall prior to, or at, the special meeting of stockholders, file with Martin objection in writing to the proposed consolidation; (2) shall not vote in favor of the consolidation; (3) shall within twenty days after the Articles of Consolidation and Plan have been accepted for record by the Department of Assessments and Taxation of Maryland, make upon the Consolidated Company written demand for payment for his stock, stating the number and class of shares for which payment is demanded. Any stockholder, who fails to comply with the requirements of this Section within the time specified, shall be bound by the terms of the consolidation, merger or transfer. Merely voting against, or a direction in a proxy to vote against, the adoption of the Articles of Consolidation and Plan will not comply with the conditions required of objecting stockholders by Section 73 of Article 23 of the Annotated Code of Maryland (1957 Edition).

The Consolidated Company must deliver or mail to each objecting stockholder written notice of the date of acceptance for record of the Articles of Consolidation and Plan by the Department of Assessments and Taxation of Maryland, and may also deliver or mail to each such stockholder a written offer to pay for his stock at a price deemed to be the fair value thereof.

Within fifty days after the acceptance of the Articles of Consolidation and Plan for record by the Department of Assessments and Taxation of Maryland, either the Consolidated Company or any objecting stockholder who has not received payment for his stock may petition a court of equity in the City of Baltimore to determine the fair value of such stock. If such court finds that any objecting stockholder is entitled to have the value of the stock determined, it shall appoint three disinterested appraisers to determine the fair value of such stock. Such value shall be determined as of the close of business on the day of the stockholder's vote on the Articles of Consolidation and Plan to which objection was made, excluding any appreciation or depreciation, directly or indirectly, consequent upon such action or the proposal thereof. The appraisers are required to file a written report of their findings as to the fair value of the stock of the objecting stockholder, and the statute provides for appropriate action to be taken by the court in relation to such report of the appraisers.

The costs of valuation proceedings, which will include the costs of making the appraisal, are determined by the Court and will be assessed against the Consolidated Company; provided, that all or any part of the costs may be apportioned and assessed as the Court deems equitable against any or

all of the objecting stockholders parties to the proceedings, if, taking into consideration the price which the Consolidated Company offered for such stock, the financial statements and other information furnished, and such other circumstances as the Court deems relevant, the Court finds that the action of the stockholders, in failing to accept the offer was arbitrary and vexatious or not in good faith.

OTHER MATTERS

Vote needed to approve Proposed Consolidation

The affirmative vote of a majority of the outstanding shares is required to authorize the proposed consolidation.

Voting Rights

As of the close of business on July 31, 1961, Martin had outstanding 6,257,739 full shares of Common Stock and Scrip Certificates for 10,901 tenths of a share. Shareholders are entitled to one vote for each full share registered in their names. There are no classes of stock of Martin other than Common Stock. Shareholders of record at the close of business on August 30, 1961, the record date fixed by the Board of Directors, will be entitled to vote at the meeting.

Miscellaneous

The Management knows of no business constituting a proper subject for action by the stockholders which will be presented for consideration at the meeting other than that shown above.

The proxies are solicited by the Management of Martin and the cost of such solicitation has been or will be paid by Martin. In addition to solicitation by mail, arrangements may be made with brokerage houses and other custodians, nominees, and fiduciaries to send proxy material to their principals, and Martin may reimburse them for their expense in so doing. Martin has retained Georgeson and Company of New York City to aid in the solicitation of proxies at a cost estimated to be about $3,000. To the extent necessary in order to assure sufficient representation, officers and regular employees of Martin may request the return of proxies personally, by telephone or telegram. The extent to which this will be necessary depends entirely upon how promptly proxies are received, and stockholders are urged to send in their proxies without delay.

Any proxy given pursuant to this solicitation may be revoked by the person giving it at any time before its exercise. The shares of Martin's outstanding Common Stock represented by each proxy received before the Special Meeting and not revoked will be voted in favor of the proposed Consolidation Agreement and Plan set forth in the accompanying Notice of Special Meeting of Stockholders and in this statement, unless the proxies are instructed in the proxy to do otherwise.

W. L. Lucas, *Secretary*

August 30, 1961

IMPORTANT

TO INSURE REPRESENTATION AT THE SPECIAL MEETING, STOCKHOLDERS ARE REQUESTED TO SIGN AND MAIL PROMPTLY THE ACCOMPANYING PROXY FOR WHICH A RETURN ENVELOPE IS PROVIDED. NO POSTAGE IS REQUIRED IF MAILED IN THE UNITED STATES. IF YOU DO ATTEND THE MEETING, YOU MAY VOTE THERE IN PERSON SHOULD YOU SO DESIRE.

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OPINION OF INDEPENDENT CERTIFIED PUBLIC ACCOUNTANTS

Board of Directors,
The Martin Company,
Baltimore, Maryland

We have examined the balance sheet of The Martin Company as of December 31, 1960, and the related statements of earnings, additional paid-in capital and earnings reinvested for the five years then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances; although we were unable to obtain satisfactory confirmation of accounts receivable from the Government, we satisfied ourselves as to these accounts by other means.

In our opinion, subject to such adjustments (which neither we nor the Company are able to evaluate) as may be required as a result of renegotiation as described in Note A, the accompanying balance sheet and statements of earnings (set forth in the Proxy Statement under the heading "Statement of Earnings"), additional paid-in capital and earnings reinvested present fairly the financial position of The Martin Company at December 31, 1960, and the results of its operations for the five years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

TOUCHE, ROSS, BAILEY & SMART

Baltimore, Maryland
July 24, 1961
As of February 20, 1961

THE MARTIN COMPANY
COMPARATIVE BALANCE SHEETS

ASSETS

	(Unaudited) June 30, 1961	December 31, 1960
CURRENT ASSETS:		
Cash	$ 24,056,497	$ 16,934,296
Prime commercial paper, at cost and accrued interest	4,911,250	
Accounts receivable, including amounts due from the United States Government of $73,339,710 at June 30, 1961 and $98,251,167 at December 31, 1960	75,573,529	99,845,948
Unbilled costs under cost-type contracts	41,093,999	57,885,827
Materials, labor and other costs incurred on contracts in progress (including advances to subcontractors) less estimated costs applied to deliveries—not in excess of realizable value (Note B), less progress payments of $5,836,127 at June 30, 1961 and $6,894,815 at December 31, 1960	10,142,217	8,312,863
Prepaid expenses	1,277,687	906,900
TOTAL CURRENT ASSETS	$157,055,179	$183,885,834
FEDERAL INCOME TAX REFUNDABLE ON RENEGOTIATION PAYMENT FOR 1953 (Note A)	1,636,567	1,636,567
INVESTMENTS—at cost:		
General Precision Equipment Corporation		10,103,002
EPSCO, Incorporated	2,050,000	
Nuclear Corporation of America	972,563	850,776
PROPERTY, PLANT AND EQUIPMENT, at cost:		
Land, including $533,884 not used in operations	3,583,473	3,584,103
Buildings, including $501,899 at June 30, 1961 and $632,941 at December 31, 1960 not used in operations	52,740,530	48,753,961
Machinery and equipment	39,828,289	38,358,380
	$ 96,152,292	$ 90,696,444
Less accumulated depreciation and amortization	45,761,096	40,564,908
	$ 50,391,196	$ 50,131,536
	$212,105,505	$246,607,715

See notes to financial statements.

THE MARTIN COMPANY
COMPARATIVE BALANCE SHEETS

LIABILITIES AND STOCKHOLDERS' EQUITY

	(Unaudited) June 30, 1961	December 31, 1960
CURRENT LIABILITIES:		
Notes payable to banks	$ —	$ 33,000,000
Accounts payable, including amounts repayable under target incentive contracts	42,158,721	65,615,964
Salaries, wages and withheld taxes	26,682,932	19,897,639
Federal taxes on income	13,550,105	11,375,437
Other taxes and miscellaneous	4,752,561	2,980,219
5½% Sinking Fund Debentures—current portion	2,250,000	2,250,000
TOTAL CURRENT LIABILITIES	$ 89,394,319	$135,119,259
RENEGOTIATION REFUND, net of taxes (Note A)	5,393,260	5,393,260
5½% Sinking Fund Debentures, due November 1, 1968, less current portion (Note C)	15,500,000	15,500,000
STOCKHOLDERS' EQUITY:		
Capital stock:		
Authorized 12,000,000 shares of common stock without par value at June 30, 1961, and 6,000,000 shares of $1 par value Capital Stock at December 31, 1960 (Notes D, F)		
Outstanding:		
6,258,387 shares at June 30, 1961	3,129,193	
3,105,217 shares at December 31, 1960		3,105,217
Additional paid-in capital	40,366,775	39,583,769
Earnings reinvested (Note C)	58,321,958	47,906,210
	$101,817,926	$ 90,595,196
	$212,105,505	$246,607,715

See notes to financial statements.

THE MARTIN COMPANY

STATEMENTS OF ADDITIONAL PAID-IN CAPITAL AND EARNINGS REINVESTED

	Year ended December 31,					(Unaudited) Six months ended	
	1956	1957	1958	1959	1960	June 30, 1960	June 30, 1961
ADDITIONAL PAID-IN CAPITAL:							
Balance, beginning of period	$26,631,655	$32,381,899	$32,541,595	$32,575,377	$38,702,716	$38,702,716	$39,583,769
Excess of proceeds over par value of capital stock issued:							
On exercise of stock warrants	14,056			62			195,960
On exercise of stock options	484,740	159,696	33,782	125,041	884,718	65,740	587,046
Excess of amount assigned to stock dividends over par value of stock-transferred from earnings reinvested	5,251,448			6,002,236			
Amount assigned to scrip certificates cancelled-transferred to earnings reinvested					(3,665)		
Balance, end of period	$32,381,899	$32,541,595	$32,575,377	$38,702,716	$39,583,769	$38,768,456	$40,366,775
EARNINGS REINVESTED:							
Balance, beginning of period (Note A)	$21,573,647	$21,533,461	$26,739,106	$33,788,269	$36,294,070	$36,294,070	$47,906,210
Add:							
Net earnings for the period	9,693,468	9,879,638	11,725,555	13,336,981	16,854,540	7,647,710	13,538,418
Cancellation of scrip certificates for 166.6 shares					3,832		
Deduct dividends paid:							
Cash (per share—1956/59, $1.60; 1960, $1.70; 1961, $.50)	4,344,010	4,673,993	4,676,392	4,682,548	5,246,232	2,460,058	3,122,670
Stock (5% in 1956, 138,196 shares; 5% in 1959, 146,396 shares)	5,389,644			6,148,632			
Balance, end of period	$21,533,461	$26,739,106	$33,788,269	$36,294,070	$47,906,210	$41,481,722	$58,321,958

See notes to financial statements

THE MARTIN COMPANY

NOTES TO FINANCIAL STATEMENTS

(A) Renegotiation:

See Note (A) to Statement of Earnings included elsewhere in this Proxy Statement.

(B) Inventories:

Title to inventories in the amount of approximately $7,600,000 at June 30, 1961 and $8,100,000 at December 31, 1960 had passed to the United States Government as consideration for progress payments. Material, labor and other costs incurred on contracts in progress less estimated costs applied to deliveries, not in excess of realizable value, used in determining cost of sales for each of the six years ended December 31, 1960 were, respectively, $82,524,902; $55,610,080; $39,168,843; $43,060,212; $36,374,520; $15,207,678 and for the six months ended June 30, 1961, $15,978,344.

(C) Debentures:

Sinking fund provisions of the Debentures require annual redemptions of $2,250,000. Among other restrictions under the Debenture Agreement, $14,514,499 of the earnings reinvested at December 31, 1960 and $13,707,517 of the earnings reinvested at June 30, 1961 were not available for the payment of dividends.

(D) Shares of capital stock were reserved for issuance as follows:

	12/31/60	6/30/61
(a) At a price of $7.47 per share at December 31, 1960 and $3.74 at June 30, 1961 upon presentation of capital stock purchase warrants expiring April 10, 1962, issued in connection with the sale of Ten-Year 4% Convertible Subordinated Notes	6	12
(b) Upon exercise at $40.00 per unit (consisting of 1.05 shares at December 31, 1960 and 2.10 shares at June 30, 1961) to and including November 1, 1963, and at $45.00 per unit thereafter to and including November 1, 1968, of warrants issued in connection with the Company's 5½% Sinking Fund Debentures	210,000	409,435
(c) Under a restricted stock option plan for officers and other key employees	134,792	232,199
Total	344,798	641,646

(E) Stock Options

In 1952 and 1958 stock option plans for officers and key employees were approved by the stockholders providing for the granting of options to purchase 200,000 and 140,000 shares respectively of the Company's capital stock. The plans provided that the number of shares and the issue price were subject to adjustments as might be necessary to protect the optionee against dilution. Accordingly, because of stock dividends declared and a 2 for 1 stock split subsequent to granting of options, the total number of shares subject to option under the 1952 plan was increased to 225,930 and under the 1958 plan to 265,680, and the effect of such adjustments is reflected in the information presented below. The option price under both plans is the closing price of the Company's stock on the New York Stock Exchange on the day when the particular option is granted; options may not expire more than ten years from the date of grant, nor may they be exercised in less than one year from the date of grant under the 1952 plan nor two years under the 1958 plan.

The number of shares with respect to which options under the plans were granted through June 30, 1961 and the years that such options became or will become exercisable, are as follows:

Date of Grant	Date Exercisable	Number of Shares	Option Price Per Share	Option Price Total	Market Quotations at Date Exercisable Per Share	Market Quotations at Date Exercisable Total
1952	1954–1957	95,877	$ 8.04– 9.75	$ 828,750	$18.63–43.50	$3,412,868
1952	1953	75,675	9.66–10.63	799,531	13.75	1,034,687
1953	1954	18,300	11.03–13.38	215,469	24.88–28.63	418,281
1955	1956	18,048	12.15–28.13	360,000	34.00	456,960
1957	1958	16,030	18.69–39.25	387,113	32.13–33.25	318,419
1958	1960	154,980	15.89–33.10	2,838,375	44.25–56.88	3,973,331
1959	1961	14,700	18.39–46.91	317,500		
1960	1962	64,000	19.00–56.63	1,400,625		
1961	1963	10,000	32.62–38.00	357,750		
		467,610		$7,505,113		

Since inception of the plans through June 30, 1961, options under the plans were exercised as follows:

Year Exercised	Number of Shares	Option Price Per Share	Option Price Total	Market Quotations at the various dates Options were Exercised Per Share	Market Quotations at the various dates Options were Exercised Total
1953	1,350	$10.63	$ 14,344	$14.63–15.88	$ 19,869
1954	89,650	$ 9.75–13.38	951,281	19.38–33.00	2,389,868
1955	16,500	8.86–12.16	152,688	28.13–38.38	486,613
1956	62,948	8.44–11.58	547,688	40.88–43.13	2,578,197
1957	18,742	8.04–25.51	178,438	42.38–46.63	831,457
1958	2,094	11.03–25.51	35,875	31.75–33.25	69,157
1959	4,116	25.51–39.25	129,156	42.75–59.75	219,766
1960	29,985	24.30–39.05	914,700	38.75–63.88	1,681,382
1961	34,026	12.12–31.79	605,738	31.63–65.25	1,342,702
	259,411		$3,529,908		$9,619,011

At June 30, 1961, options not yet exercised under the plans were as follows:

Date of Grant	Date Exercisable	Number of Shares	Option Price Per Share	Option Price Total	Market Quotations at Date of Grant Per Share	Market Quotations at Date of Grant Total
1955	1956	4,524	$12.12	$ 54,844	$12.12	$ 54,844
1957	1958	10,815	$18.69–19.52	205,024	$18.69–19.52	205,024
1958	1960	108,360	15.89–16.55	1,722,837	15.89–16.55	1,722,837
1959	1961	10,500	19.82–23.45	234,125	19.82–23.45	234,125
1960	1962	64,000	19.00–28.31	1,400,625	19.00–28.31	1,400,625
1961	1963	10,000	32.63–38.00	357,750	32.63–38.00	357,750
		208,199		$3,975,205		$3,975,205

Capital stock issued upon exercise of options was recorded at amounts received; no charges have been reflected in income with respect to stock options. Options cancelled have been reflected by reducing the number of shares originally covered by options.

(F) On January 9, 1961 the Certificate of Incorporation was amended to change the previously authorized 6,000,000 shares of capital stock of the Company to 12,000,000 shares of common stock without par value. A 2 for 1 stock split was effected on February 10, 1961 for stockholders of record on January 20, 1961.

(G) Pensions:

A pension plan was established for employees as of July 1, 1943, providing for pension payments and death benefits through an annuity contract with a legal reserve insurance company. Effective May 1, 1951, additional pension plans were established for hourly employees providing maximum benefits, as now amended, of $67.50 per month, reduced by any retirement benefits accrued under the earlier plan. Maximum benefits under the latter plans are payable after 30 years of credited service with the Company and retirement at or after age 65. Disability benefits are likewise provided. Unfunded past service costs under the latter plans estimated to be $5,179,000 at December 31, 1960 and $8,030,000 at June 30, 1961 are being funded over a period not to exceed 30 years. The earlier pension plan has been amended so as to cover salaried employees only, providing at or after age 65 for monthly benefit payments based upon compensation and length of service. The plans are non-contributory. The aggregate cost of these plans for 1960 was $5,209,984 and it is estimated the aggregate cost of these plans for 1961 will be approximately $5,900,000. The Company has the right to discontinue these plans at any time, except that it has agreed not to change or terminate the Pension Plans for hourly paid employees prior to December 31, 1963.

(H) Property, plant and equipment:

The cost of facilities which are owned by the Company, other than those covered by certificates of necessity, is depreciated over estimated useful lives on a straight-line basis for assets acquired prior to January 1, 1954 and on a sum of the years-digits basis for assets acquired after that date, as permitted by the Internal Revenue Code.

These rates may be summarized as follows:

Class of assets	Rate of depreciation
Building and building equipment	2% to 10%
Other land improvements	4% to 11¼%
Machinery and equipment	5% to 25%
Office equipment	6⅔% to 10%
Automobiles, trucks and tractors	25%
Airplanes and boats	20% to 25%

Amortization is computed in accordance with the provisions of the Internal Revenue Code on assets covered by certificates of necessity.

Maintenance and repairs are charged to income as incurred and expenditures for major renewals and betterments are capitalized.

At the disposal or retirement of properties, the difference between the depreciated value of assets and the amount realized is charged against, or credited to, revenue.

Effective with December 31, 1953, fully depreciated property, plant and equipment was eliminated from the accounts.

(I) Supplementary profit and loss information:

	Year Ended December 31,					(Unaudited) 6 Months Ended June 30,
	1956	1957	1958	1959	1960	1961
Maintenance and repairs	$4,727,777	$5,284,499	$5,713,805	$6,156,011	$ 5,794,036	$3,432,504
Depreciation and amortization of property, plant and equipment	$1,864,672	$4,738,304	$8,650,197	$9,654,192	$10,618,657	$5,550,985
Taxes, other than income and excess profits taxes:						
Real estate and personal property, etc.	$ 852,002	$1,512,807	$2,308,548	$2,497,422	$ 2,929,573	$1,131,572
Federal and state social security	2,740,454	3,788,603	4,056,717	5,886,716	7,287,253	6,919,148
	$3,592,456	$5,301,410	$6,365,265	$8,384,138	$10,216,826	$8,050,720
Rents	$1,123,739	$1,897,492	$2,039,383	$2,529,297	$ 3,518,589	$2,567,475
Royalties	729,990	94,750	—	—	—	—
	$1,853,729	$1,992,242	$2,039,383	$2,529,297	$ 3,518,589	$2,567,475

The major portion of the above charges has been charged to cost of sales. Amounts charged to other accounts were not material. There were no management or service contract fees.

ACCOUNTANTS' REPORT

Board of Directors
American-Marietta Company
Chicago, Illinois

We have examined the consolidated balance sheet of American-Marietta Company and consolidated subsidiaries as of November 30, 1960, and the related statements of consolidated income, additional capital and accumulated earnings for the period of five years then ended. Our examinations were made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. The accounts of one company and its subsidiary for the years ended December 31, 1956, 1957, and 1958, and the accounts of another company and its subsidiaries for the years ended December 31, 1956, 1957, 1958, and 1959, were examined by other independent accountants, and the financial statements of these companies have been incorporated in the aforementioned consolidated financial statements in reliance on the reports, included elsewhere in this proxy statement, of such accountants.

In our opinion, based upon our examinations and the reports of the other accountants referred to above, the accompanying balance sheet and statements of income, additional capital and accumulated earnings present fairly the consolidated financial position of American-Marietta Company and consolidated subsidiaries at November 30, 1960, and the consolidated results of their operations for the period of five years then ended (including on a combined basis the operations of the merged companies referred to in Note A to the financial statements) in conformity with generally accepted accounting principles applied on a consistent basis.

ERNST & ERNST

Chicago, Illinois
July 24, 1961
(As of January 16, 1961)

ACCOUNTANTS' REPORT

Board of Directors
American-Marietta Company
Chicago, Illinois

We have examined the statements of consolidated earnings and retained earnings of Dewey Portland Cement Company and subsidiaries for the four years ended December 31, 1959. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We have not examined financial statements of the Company and subsidiaries for any period subsequent to December 31, 1959.

In our opinion, such financial statements (not shown separately herein) present fairly the results of operations of Dewey Portland Cement Company and subsidiaries for the four years ended December 31, 1959, in conformity with generally accepted accounting principles applied on a consistent basis.

PEAT, MARWICK, MITCHELL & CO.

Kansas City, Missouri
July 24, 1961
(As of January 25, 1960)

ACCOUNTANTS' REPORT

Board of Directors
American-Marietta Company
Chicago, Illinois

We have examined the financial statements of Superior Stone Company and subsidiary for the three years ended December 31, 1958. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the statements of income and accumulated earnings of Superior Stone Company and subsidiary (not shown separately herein) present fairly the results of operations of Superior Stone Company and subsidiary for the three years ended December 31, 1958, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

W. M. RUSS & CO.

Raleigh, North Carolina
July 24, 1961
(As of February 19, 1959)

AMERICAN-MARIETTA COMPANY AND CONSOLIDATED SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

ASSETS

	(Unaudited) May 31, 1961	November 30 1960
CURRENT ASSETS		
Cash	$ 16,126,154	$ 26,452,714
Trade receivables, less allowances of $800,000	56,407,937	52,760,689
Inventories—Note E	69,577,416	60,808,475
Prepaid expenses	3,804,582	2,334,683
Total Current Assets	$145,916,089	$142,356,561
INVESTMENTS AND OTHER ASSETS		
Investments in and advances to foreign (except Canadian) subsidiaries—Note A	$ 3,188,688	$ 2,911,643
Intangibles arising upon acquisition of companies, less amortization	14,351,267	13,482,415
Sundry investments and accounts	8,808,414	8,989,576
	$ 26,348,369	$ 25,383,634
PROPERTY, PLANT, AND EQUIPMENT—principally on the basis of cost		
Land, limestone reserves, and other deposits	$ 22,179,538	$ 21,047,562
Buildings and improvements	68,795,687	65,298,907
Machinery and equipment	193,896,296	185,414,330
Construction in progress (estimated additional cost to complete at May 31, 1961—$7,500,000)	31,061,100	23,700,775
	$315,932,621	$295,461,574
Less allowances for depreciation, depletion, and amortization	118,933,936	109,711,346
	$196,998,685	$185,750,228
	$369,263,143	$353,490,423

See notes to financial statements.

AMERICAN-MARIETTA COMPANY AND CONSOLIDATED SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

LIABILITIES AND SHAREOWNERS' INVESTMENT

	(Unaudited) May 31, 1961	November 30, 1960
CURRENT LIABILITIES		
Notes payable to banks	$ 34,000,000	$ –0–
Accounts payable	11,592,812	11,819,356
Accrued compensation and other expenses	8,221,686	11,452,878
Federal, state, and Canadian taxes on income—estimated—Note B	8,188,639	25,589,471
Long-term debt payable within one year	2,130,359	2,160,897
Total Current Liabilities	$ 64,133,496	$ 51,022,602
LONG-TERM DEBT—Note C	68,885,576	69,844,789
SHAREOWNERS' INVESTMENT—Notes C and D		
Capital Shares:		

	Shares Outstanding			
	May 31, 1961	November 30, 1960		
Preferred, 5% cumulative, par value $100 a share—authorized 495,408 shares—Note J	200,599	198,972	$ 20,059,900	$ 19,897,200
Common, par value $2 a share—authorized 25,000,000 shares	13,200,796	13,030,265	26,401,592	26,060,530
Class B Common, par value $2 a share—authorized 4,200,000 shares	3,191,189	3,215,720	6,382,378	6,431,440
			$ 52,843,870	$ 52,389,170
Capital in addition to par value of shares			88,926,235	85,021,379
Accumulated earnings used in the business			94,473,966	95,212,483
			$236,244,071	$232,623,032
			$369,263,143	$353,490,423

See notes to financial statements.

AMERICAN-MARIETTA COMPANY AND CONSOLIDATED SUBSIDIARIES

STATEMENTS OF CONSOLIDATED ADDITIONAL CAPITAL AND ACCUMULATED EARNINGS

	Year Ended November 30					(Unaudited) Six Months Ended
	1956	1957	1958	1959	1960	May 31, 1961
CAPITAL IN ADDITION TO PAR VALUE OF SHARES						
Balance at beginning of period.	$14,256,119	$17,287,198	$27,591,045	$50,536,833	$ 67,847,968	$ 85,021,379
Amounts, in excess of par value, recorded in respect of:						
Common Shares issued in connection with acquisition of companies and investment, less merger costs in 1960	5,069,789	10,143,430	22,925,644	23,022,666	17,148,657	5,104,233
Common Shares issued for cash	161,150	6,740,139	-0-	-0-	-0-	-0-
Credits arising upon repurchase of Preferred Shares	-0-	-0-	20,144	21,344	24,754	623
	$19,487,058	$34,170,767	$50,536,833	$73,580,843	$ 85,021,379	$ 90,126,235
Deduct:						
Cost in excess of par value of reacquired Common Shares	$ -0-	$ -0-	$ -0-	$ -0-	$ -0-	$ 1,200,000
Amounts transferred to capital share accounts in connection with stock splits (1956—5 for 4; 1957—3 for 2; 1959—5 for 4) of Common and Class B Common Shares	2,199,860	6,579,722	-0-	5,732,875	-0-	-0-
	$ 2,199,860	$ 6,579,722	$ -0-	$ 5,732,875	$ -0-	$ 1,200,000
BALANCE AT END OF PERIOD	$17,287,198	$27,591,045	$50,536,833	$67,847,968	$ 85,021,379	$ 88,926,235
ACCUMULATED EARNINGS USED IN THE BUSINESS						
Balance at beginning of period	$42,632,238	$58,033,664	$59,978,915	$70,139,572	$ 84,708,389	$ 95,212,483
Net income for the period	22,025,608	19,895,310	21,299,249	26,341,575	24,429,357	6,310,854
	$64,657,846	$77,928,974	$81,278,164	$96,481,147	$109,137,746	$101,523,337
Deduct:						
Cash dividends:						
On shares of American-Marietta Company:						
Preferred	$ 763,009	$ 1,033,454	$ 1,125,959	$ 1,036,426	$ 1,004,854	$ 500,223
Common	4,171,493	5,790,241	7,791,302	9,184,223	12,563,632	6,549,148
On shares of merged companies prior to acquisition	1,689,680	1,481,046	2,221,331	1,552,109	356,777	-0-
Cost of preferred shares reacquired by subsidiary, less equity in net assets applicable to such shares	-0-	5,185,593	-0-	-0-	-0-	-0-
Amount transferred to capital share accounts of merged company in connection with recapitalization	-0-	4,459,725	-0-	-0-	-0-	-0-
	$ 6,624,182	$17,950,059	$11,138,592	$11,772,758	$ 13,925,263	$ 7,049,371
BALANCE AT END OF PERIOD	$58,033,664	$59,978,915	$70,139,572	$84,708,389	$ 95,212,483	$ 94,473,966

See notes to financial statements.

AMERICAN-MARIETTA COMPANY AND CONSOLIDATED SUBSIDIARIES
NOTES TO FINANCIAL STATEMENTS

Note A—Principles of Consolidation:

In accordance with the policy consistently followed, the consolidated financial statements include on a consolidated basis the accounts of the domestic and Canadian subsidiaries of American-Marietta Company.

Results of operations of companies acquired during the five years and six months covered by the statements of income have been included therein from dates of acquisition, except as to companies merged during the years 1956 to 1960 which were treated for accounting purposes as "poolings of interests," the results of operations of which have been included for all periods and the accumlated earnings accounts of which have been combined with the statements of accumulated earnings of the consolidated companies from the beginning of the periods.

The Company's equity in the underlying net assets of the consolidated subsidiaries as shown by their books exceeded the carrying amount (cost) of the Company's investments therein by $6,676,522 at November 30, 1960, and $7,458,153 at May 31, 1961. The disposition of this difference in the consolidated financial statements was as follows:

	May 31 1961	November 30 1960
Undistributed earnings of the consolidated subsidiaries since acquisition, included in "accumulated earnings used in the business"	$10,360,993	$9,626,640
Cost of investments in excess of amounts ascribed to net tangible assets acquired, included in "intangibles arising upon acquisition of companies"	2,902,840	2,950,118
	$ 7,458,153	$6,676,522

The investments in and advances to foreign (except Canadian) subsidiaries are stated at cost (November 30, 1960—$1,486,649; May 31, 1961—$1,356,938) plus the Company's equity (November 30, 1960—$1,424,994; May 31, 1961—$1,831,750) in accumulated earnings of the subsidiaries. The statements of consolidated income and accumulated earnings have been adjusted to reflect in applicable prior fiscal years the Company's equity in the earnings of the foreign subsidiaries.

Note B—Federal Income Tax:

Federal income tax returns as originally filed by the Company and subsidiaries for the fiscal years 1957 to 1959 reflected percentage depletion allowances for cement and limestone products computed generally in accordance with the principle established in the Dragon Cement Company case.

In 1960, the United States Supreme Court rendered a decision which adversely affected the Company's position with respect to the use of the liberalized percentage depletion method established in prior lower court decisions. Also, in 1960, amendments to the Internal Revenue Code were enacted, requiring a new method for taxable years beginning after December 31, 1960, and permitting taxpayers to elect to recompute percentage depletion deductions for all unsettled prior years by this method. The Company made the election and provision has been made in the accompanying financial statements for the resultant additional tax and interest thereon applicable to prior years.

Note C—Long-Term Debt:

Long-term debt consisted of the following obligations:

Notes payable to insurance companies and banks:

Interest Rate	Maturity	Amount May 31 1961	Amount November 30 1960
4⅜%	August 1, 1978	$25,000,000	$25,000,000
5½%	June 1, 1980	15,000,000	15,000,000
5½%	December 1, 1980	10,000,000	10,000,000
5⅛%	December 1, 1978	9,260,000	9,630,000
4¼%	April 15, 1964	4,500,000	4,500,000
4¾%	December 20, 1971	1,610,000	1,720,000
5¼%	June 1, 1973	1,480,000	1,605,000
4¼%	June 1, 1967	1,080,000	1,320,000
Other indebtedness		955,576	1,069,789
	TOTAL	$68,885,576	$69,844,789

Payments required in the year ending November 30, 1961 (after May 31, 1961) and in the next five fiscal years with respect to long-term debt are as follows: 1961, $1,160,635; 1962, $2,251,792; 1963, $2,926,691; 1964, $7,402,888; 1965, $2,888,952; 1966, $2,822,600.

The terms of the notes payable to insurance companies and banks set forth certain minimum requirements as to consolidated working capital and place restrictions on the payments of cash dividends (other than on Preferred Shares) and purchases or retirements of capital shares. Under the consolidated working capital requirements, the most restrictive of the debt provisions, payments which may be made in respect of cash dividends on Common Shares and for the acquisition of capital shares were limited to approximately $23,000,000 at November 30, 1960 and $14,000,000 at May 31, 1961.

Note D—Capital Shares:

No dividends may be declared or paid on any Class B Common Share in any year unless an equal amount plus $2 a share is paid for that year on the Common Shares. Dividends in excess of $2 a share may be paid on the Common Shares regardless of whether any are paid on Class B Common Shares.

Under the Articles of Incorporation, Class B Common Shares are convertible into Common Shares on a share-for-share basis, with certain limitations. However, holders of substantially all of the Class B Common Shares have entered into an agreement deferring their conversion rights so that 278,023 shares were eligible for conversion as of May 31, 1961, with not to exceed 62,500 additional shares becoming eligible for conversion during each six months cumulatively from July 1, 1961, to January 1, 1970, at which latter date the restrictions terminate.

Holders of Preferred Stock are entitled in liquidation to, and the stock is callable at, $105 a share plus dividends. Provisions of the Articles of Incorporation relating to a sinking fund for the redemption of Preferred Shares require a noncumulative annual payment equal to 3% of consolidated net income for the preceding fiscal year in excess of dividends on such shares, or, if less, 2% of the largest aggregate par value of Preferred Shares outstanding at any time prior to the close of the preceding fiscal year. A sinking fund payment of approximately $430,000 is required to be made prior to November 30, 1961. At November 30, 1960, 16,248 Preferred Shares, and at May 31, 1961, 14,621 Preferred Shares were held in the treasury by the Company, which shares may be used, in lieu of cash, to meet sinking fund requirements.

Note E—Inventories:

The amounts of inventories used in the determination of cost of products sold for the period covered by the statements of income were as follows:

December 1, 1955	$28,745,252
November 30, 1956	38,854,133
November 30, 1957	43,358,883
November 30, 1958	46,954,141
November 30, 1959	59,439,051
November 30, 1960	60,808,475
May 31, 1960	68,857,311
May 31, 1961	69,577,416

The inventories at these dates were priced on the basis of the lower of cost (principally first-in, first-out method) or market (replacement cost or estimated net realizable amount, whichever was appropriate).

At November 30, 1960, the inventories consisted of $37,338,021 finished and in-process products and $23,470,454 raw materials and supplies. It was not practicable to segregate amounts for inventories as between finished and in-process products and raw materials and supplies at May 31, 1961.

Note F—Policies Regarding Depreciation, Depletion, Amortization, Maintenance, and Repairs:

The Company and consolidated subsidiaries have provided for depreciation (generally straight-line method) on a basis calculated to amortize the cost of the various classes of depreciable assets over their estimated useful lives.

The estimated useful lives of the principal classifications of depreciable properties follow:

Buildings and improvements:	
Principally	20 to 40 years
Other	5 to 50 years
Machinery and equipment:	
Principally	7 to 20 years
Other	3 to 33⅓ years
Furniture and fixtures	5 to 20 years
Automobiles and trucks	3 to 5 years

Depletion of limestone and other deposits was computed on a unit rate of production basis applied to the cost of individual properties. Amounts so determined were less than percentage depletion allowances claimed for income tax purposes.

Maintenance and repairs, and expenditures for renewals and betterments not calculated to extend the useful lives or materially increase the productivity of the properties affected, were charged to costs and expenses as incurred. Other renewals and betterments were capitalized. Generally, at the time of sale or abandonment of equipment or building units, the applicable amounts of costs and accumulated depreciation were eliminated from the accounts and the net carrying amounts less proceeds of disposal were charged or credited to income.

Amounts of intangibles arising upon acquisition of companies, representing cost of investments in excess of amounts ascribed to net tangible assets acquired, are being amortized on a straight-line basis over forty years as to approximately 60% of the total and over twenty years as to the remainder.

Note G—Retirement Plans:

The Company and certain subsidiaries have contributory and noncontributory retirement plans, terminable at the option of the companies, for salaried employees. Other retirement plans have been established on behalf of hourly-paid employees.

The estimated annual cost of the plans, based upon present participation, is approximately $2,500,000. Unfunded past service costs were estimated to be approximately $8,000,000 at May 31, 1961.

Note H—Federal Trade Commission Proceedings:

Reference should be made to the paragraph captioned "Federal Trade Commission Proceedings," included in the section "Business and Properties of American-Marietta" elsewhere in this Proxy Statement, for information concerning a Federal Trade Commission complaint pending against the Company.

Note I—Supplementary Income Statement Information:

	(In Thousands)		
	Charged to Cost of Product Sold	Charged to Other Expenses	Total
Year ended November 30, 1956:			
Maintenance and repairs	$ 8,997	$ 106	$ 9,103
Depreciation, depletion, and amortization	7,029	651	7,680
Taxes (other than income taxes):			
Payroll	1,024	324	1,348
Other, principally real estate and personal property	990	669	1,659
Rents	616	571	1,187
Royalties	199	258	457
Year ended November 30, 1957:			
Maintenance and repairs	$10,108	$ 93	$10,201
Depreciation, depletion, and amortization	8,226	804	9,030
Taxes (other than income taxes):			
Payroll	1,254	254	1,508
Other, principally real estate and personal property	1,355	508	1,863
Rents	661	569	1,230
Royalties	109	235	344
Year ended November 30, 1958:			
Maintenance and repairs	$ 9,750	$ 136	$ 9,886
Depreciation, depletion, and amortization	9,565	1,120	10,685
Taxes (other than income taxes):			
Payroll	1,295	328	1,623
Other, principally real estate and personal property	1,488	571	2,059
Rents	791	620	1,411
Royalties	82	254	336
Year ended November 30, 1959:			
Maintenance and repairs	$12,630	$ 271	$12,901
Depreciation, depletion, and amortization	11,908	1,279	13,187
Taxes (other than income taxes):			
Payroll	1,950	457	2,407
Other, principally real estate and personal property	1,803	661	2,464
Rents	1,132	744	1,876
Royalties	179	271	450

Note I—Supplementary Income Statement Information (cont'd):

	(In Thousands)		
	Charged to Cost of Product Sold	Charged to Other Expenses	Total
Year ended November 30, 1960:			
Maintenance and repairs	$13,509	$ 383	$13,892
Depreciation, depletion, and amortization	14,719	1,529	16,248
Taxes (other than income taxes):			
Payroll	2,432	829	3,261
Other, principally real estate and personal property	2,118	940	3,058
Rents	1,789	1,034	2,823
Royalties	540	284	824
Six months ended May 31, 1961 (unaudited):			
Maintenance and repairs	$ 6,831	$ 159	$ 6,990
Depreciation, depletion, and amortization	7,934	919	8,853
Taxes (other than income taxes):			
Payroll	1,441	451	1,892
Other, principally real estate and personal property	1,173	300	1,473
Rents	829	710	1,539
Royalties	211	110	321

Note J—Retirement of 5% Cumulative Preferred Shares:

On August 3, 1961, the Board of Directors authorized the officers and the Executive Committee to take such action as may be necessary or desirable in order to redeem the outstanding 5% Cumulative Preferred Shares of the Company prior to October 9, 1961. The redemption price of the Preferred Shares is $105 per share. The long-term debt restrictions referred to in Note C have been waived with respect to such redemption.

AGREEMENT OF CONSOLIDATION

AGREEMENT dated as of August 1, 1961, between AMERICAN-MARIETTA COMPANY ("A-M"), an Illinois corporation, and THE MARTIN COMPANY ("Martin"), a Maryland corporation, such corporations being hereinafter called the "Constituent Companies."

1. Consolidation

Upon the terms and subject to the conditions hereinafter stated, A-M and Martin will be consolidated into a new Maryland corporation to be known as Martin-Marietta Corporation and hereinafter called the "Consolidated Company." Proposed Articles and Plan of Consolidation complying with the requirements of the Maryland Corporation Law and the Illinois Business Corporation Act are attached as Exhibit A to this Agreement and are hereinafter referred to as the "Articles."

2. Retirement and Conversion of Stock

Before the consolidation, A-M will retire its 5% Cumulative Preferred Shares. In the consolidation the then stock of the Constituent Companies will be converted into stock of the Consolidated Company provided for in the Articles as follows:

Each Share of Each Class of Stock of the Constituent Companies Shown Below	Shall be	The Number of Shares of Stock of the Consolidated Company Shown Below
A-M Stock:		
All Class B Common Shares, $2 par value, outstanding at the effective date	Converted into	380,000 shares of 4½% Cumulative Preferred Stock, $100 par value
Each Common Share, $2 par value	Converted into	1 share of Common Stock, $1 par value
Martin Stock:		
Each Share of Common Stock without par value	Converted into	1.3 shares of the aforesaid Common Stock
Each Warrant to purchase a Current Stock Unit now consisting of 2.10 shares of the aforesaid Common Stock	Shall entitle the holder to purchase	a Current Stock Unit consisting of 2.73 shares of the aforesaid Common Stock

3. Procedure:

This Agreement has been approved by the boards of directors of the Constituent Companies. The A-M Board, by vote of a majority of its members, has approved the Articles as a plan of consolidation under the Illinois Business Corporation Act and has directed that the plan be submitted to a vote at a special meeting of shareholders to be held October 9, 1961. The Martin Board has adopted a resolution declaring that the proposed consolidation is advisable upon the terms and conditions set forth in the Articles as required by the Maryland Corporation Law and has directed that the Articles be submitted for action thereon at a special meeting of the Martin stockholders also to be held October 9, 1961.

If the Articles receive the favorable vote of the holders of two-thirds of the outstanding A-M Common Shares and Class B Common Shares voting together and as separate classes at the A-M meeting and the holders of a majority of the outstanding shares of Martin stock at the Martin meeting, then, on the closing date established under paragraph 4 hereof, articles of consolidation embodying the Articles in substantially the form attached hereto will be delivered to the Secretary of State of Illinois as provided by Illinois law and the Articles in substantially the form attached hereto will be filed with the Department of Assessments and Taxation of Maryland as provided by Maryland law. The consolida-

tion will be effective upon the issuance of a certificate of consolidation by the Secretary of State of Illinois and the acceptance of the Articles for record by the Department of Assessments and Taxation of Maryland, and shall thereupon be deemed to have been in effect as of the first day of the month in which it becomes effective.

The effectuation of the consolidation will not cause any interruption of the business of either Constituent Company. Officers and employees of each Constituent Company on the day on which the consolidation becomes effective will thereupon become employees of corresponding divisions of the Consolidated Company.

4. Closing Date and Closing

The closing date has been initially established as October 10, 1961, but may be postponed up to one week by either Constituent Company if it is unable to satisfy the conditions of the other Company's obligation on that date and may also be postponed in one or more postponements to a date not later than December 31, 1961, by mutual agreements of the boards of directors of both Companies. On the closing date a closing will be held at Baltimore National Bank, Baltimore, Md., at 10:00 A. M., local time, at which the Constituent Companies will exchange opinions of counsel and other documents required to satisfy the conditions of their obligations. Arrangements will be made for the concurrent filing of the Articles in Illinois and Maryland immediately following closing.

5. Proxy Material, Representations and Warranties

Each of the Constituent Companies has supplied to the other for inclusion in the other's proxy statement the information, including financial statements, called for by the rules of the Securities and Exchange Commission applicable to Martin. Each of the Constituent Companies represents and warrants that the proxy information supplied by it is an accurate description of its business and property and does not contain any material misstatement of fact or omit to state any material fact necessary to make the statements therein not misleading; that the financial statements included therein were prepared in conformity with generally accepted accounting principles applied on a consistent basis and present fairly the results of operations and financial position of the Company in question for the periods and at the dates shown; and that the Company has no material liabilities, contingent or otherwise, not disclosed in the proxy information and financial statements supplied by it. In addition, each Constituent Company represents and warrants that

(a) the Company and (in the case of A-M) each of its active subsidiaries is a corporation validly organized and existing in good standing under the laws of the jurisdiction of its incorporation and duly qualified to do business in all states or countries where it owns or leases real property of material importance to its business, maintains a substantial inventory or conducts manufacturing operations;

(b) the Company or (in the case of A-M) one of its subsidiaries has good and marketable title to all assets reflected in the balance sheet included in the proxy information submitted by it except assets disposed of since the balance sheet date in the ordinary course of business and holds such assets free of liens, encumbrances and adverse claims other than (i) those shown on the balance sheet; (ii) such encumbrances as result from taxes not yet due; (iii) easements, rights of way and other minor encumbrances which in the aggregate do not impair the use of the assets in the business; (iv) the Company and (in the case of A-M) each of its active subsidiaries has properly prepared and filed all required tax returns and paid the amounts shown due thereon (except, in the case of Martin, certain state taxes the applicability of which has not been finally determined), the provisions for federal income taxes in the financial statements submitted in its proxy material are adequate to cover such taxes (whether or not disputed), and its federal income tax returns have been examined by the Internal Revenue Service through 1955 in the case of A-M and 1957 in the case of Martin and no deficiency resulting from such examinations has been proposed which has not been paid or settled;

(c) since the date of the balance sheet of the Company included in its proxy material there has been no material adverse change in the business, properties or financial condition of the Company (including, in the case of A-M, the Company and its subsidiaries, considered as a whole), and no material change in its assets or liabilities other than in the ordinary course of business, and

since that date the Company has not (A) issued, sold or purchased any shares of its capital stock or any options, warrants or rights to purchase any such shares (except, in the case of Martin, shares issued upon exercise of options and warrants outstanding on the balance sheet date and options granted under its restricted stock option plans subsequent to such date as shown in its proxy material) or (B) paid or declared any dividend or made any distribution to its stockholders except as set forth in the schedule of dividends in subparagraph (d) below, and neither the Company nor (in the case of A-M) any of its subsidiaries has (C) incurred or agreed to incur any long-term indebtedness for borrowed money, or (D) mortgaged or pledged any of its assets or contracted to do so, or (E) sold or disposed of any material assets or contracted to do so other than in the ordinary course of business, or (F) incurred any material liability or commitment or entered into any material transaction except in the ordinary course of business or in relation to this Agreement, or (G) made any substantial change in the manner of conducting its business; and

(d) between the date hereof and the date when the consolidation actually becomes effective, neither of the Constituent Companies will take any action of the kinds specified in clauses (A) through (G) of subparagraph (c) above without the concurrence of the other, except that (i) A-M may retire its 5% Cumulative Preferred Shares and issue additional Common Shares upon conversion of Class B Common Shares provided that an equal number of Common Shares are surrendered as a capital contribution so that there is no net increase in the number of A-M Common Shares outstanding, (ii) Martin may issue options for a number not to exceed 5,000 shares of its Common Stock under its 1958 Stock Option Plan, and (iii) the dividends listed below may be paid:

A-M dividends:

(a) Regular $1.25 per Preferred Share on or about August 1, 1961

(b) Regular $.25 per Common Share on or about August 1, 1961

(c) Special $.17 per Common Share on or about October 1, 1961 to cover extra two months between A-M's regular dividend date of August 1 and the Consolidated Company's proposed first dividend date of approximately December 31, 1961

Martin dividends:

(a) Regular $.25 per share at end of September 1961.

6. Examinations by Constituent Companies

Before the closing date each Constituent Company may examine the properties and records of the other Constituent Company and (in case of A-M) its subsidiaries (except as such examination may be restricted for security reasons) to determine the accuracy of the other Company's representations and warranties, and each Constituent Company will cause its officers and employees to cooperate in such examination and disclose pertinent and unrestricted information. If for any reason the consolidation does not become effective, information obtained through such examination shall be retained in confidence.

7. Conditions of Constituent Companies' Obligations

The obligation of each Constituent Company to execute and deliver the Articles and make the consolidation effective is subject to the approval of stockholders of both Constituent Companies specified in paragraph 3 and to the satisfaction in all material respects of the following conditions at or before closing; provided, however, that the board of directors of either Company, in its discretion, may waive the failure of the other Company to fulfill any of the conditions set forth below:

(a) The Company's examination shall not have disclosed any inaccuracy in the other Company's representations and warranties set forth in paragraph 5, such representations and warranties shall be correct on and as of the closing date, and the Company shall have received a certificate of the President or a Vice President of the other Company to that effect;

(b) The other Company shall not have defaulted in any obligation hereunder required to be performed by it before closing;

(c) The Company shall have received an opinion of counsel for the other Company (Ballard, Spahr, Andrews & Ingersoll, Philadelphia, Pa. being counsel for A-M, and Miles & Stockbridge, Baltimore, Md. being counsel for Martin) to the effect that:

(i) the Company represented by such counsel and (in the case of A-M) each of its domestic and Canadian subsidiaries holding material property or contributing materially to income (if any) is a duly organized corporation existing in good standing under the laws of its jurisdiction of incorporation with corporate power to own its properties and conduct its business as now conducted and is qualified to transact business and in good standing in jurisdictions where it owns or leases real property of material importance to its business, maintains a substantial inventory or conducts manufacturing operations, and the stock of each such subsidiary owned by its parent is validly issued, fully paid and non-assessable. [In giving such opinion with respect to A-M subsidiaries, Ballard, Spahr, Andrews & Ingersoll may rely on opinions of counsel for such subsidiaries.]

(ii) such counsel does not know or have reason to believe that there is any pending or threatened litigation, proceeding or investigation not disclosed in the proxy information supplied by the Company represented by such counsel which might result in a material adverse change in the business, properties or financial condition of such Company (including, in the case of A-M, the Company and its subsidiaries, considered as a whole), or which questions the validity of this Agreement or the consolidation to be effected hereunder.

(iii) the Company represented by such counsel has full power and authority to become party to the consolidation to be effected hereunder; such consolidation will not be a breach of, or result in a default or any accelerated liability under, such Company's charter or any indenture, loan agreement, pension trust, government contract, or other instrument by which such Company is bound on the closing date; all corporate and other proceedings required to be taken by such Company to authorize this Agreement and the consolidation have been validly taken; and no filing with or consent of any governmental or other authority is required in connection with the consolidation other than the listing of the Consolidated Company's stock and warrants on the appropriate stock exchanges and registration thereof under the Securities Exchange Act of 1934, and such listing and registration will become effective on notice of the effectiveness of the consolidation; and

(iv) the vote of stockholders of the Company represented by such counsel provided for in paragraph 3 operates to authorize the consolidation as far as such Company is concerned and binds all such Company's stockholders except for the statutory right of dissenters to receive the appraised value of their shares.

In giving the foregoing opinion Ballard, Spahr, Andrews & Ingersoll may rely as to Illinois law on the opinion of Illinois counsel satisfactory to them and to Miles & Stockbridge;

(d) At the closing date there shall be no litigation pending or threatened in which an injunction is or may be sought against the consolidation;

(e) The Company shall have received satisfactory assurances that no person deemed to be in control of either of the Constituent Companies within the meaning of the Securities Act of 1933, as amended and the Rules thereunder will make distribution to the public of securities of the Consolidated Company received by him in the consolidation without registration thereof under said Act, except as permitted by paragraph (d) of Rule 133 under said Act.

(f) All proceedings and documents in connection with this Agreement and the consolidation shall have been approved by counsel for the Company in question.

8. Management of Consolidated Company

The directors of the Consolidated Company shall be as set forth in the Articles hereto attached. It is the present intention of the parties that George M. Bunker will be elected President and chief executive officer of the Consolidated Company and that Grover M. Hermann will be elected Chairman of the Board.

9. Termination

This Agreement shall terminate automatically if closing is not held on or before December 31, 1961. Either of the Constituent Companies, by resolution of its board of directors, may terminate this Agree-

ment if the conditions required to be fulfilled by the other Company as specified in paragraph 7 are not satisfied on the closing day. The two Constituent Companies, each acting by its board of directors, may also terminate this Agreement and abandon the consolidation by mutual consent at any time before the consolidation becomes effective. In the event of any termination under this paragraph, neither of the Constituent Companies will have any liability to the other in connection with this Agreement for costs expenses, loss of anticipated profits or otherwise.

10. Issuance of Stock Certificates of the Consolidated Company

After the consolidation becomes effective, holders of certificates for shares of stock of the Constituent Companies will be entitled to receive in exchange therefor certificates for the shares of stock of the Consolidated Company into which their shares of the Constituent Companies have been converted, except that holders of certificates for shares of Martin Common Stock will not be entitled to receive certificates for fractional shares of the Consolidated Company's Common Stock. Arrangements will be made for the matching and combination or the purchase and sale of fractional interests in respect of Martin certificates surrendered for exchange within 60 days after the consolidation becomes effective.

11. Miscellaneous

(a) Each Constituent Company represents that it has not dealt with any broker in connection with this Agreement or the consolidation contemplated hereunder and that, insofar as is known to its management, no broker or other person is entitled to or claiming any commission or finder's fee in connection therewith.

(b) Neither Constituent Company may assign its rights hereunder and nothing herein contained shall confer any rights on any person not a party hereto.

(c) Notices in connection with this Agreement will be sufficiently delivered if delivered or mailed to A-M at 101 East Ontario Street, Chicago 11, Illinois, with a copy to John F. Donoho, Vice President, at 80 Pine Street, New York 5, New York; and to Martin at Friendship International Airport, Maryland, Attention: W. L. Lucas, Secretary, with a copy to Clarence Miles, Esq., Miles & Stockbridge, 10 Light Street, Baltimore 2, Maryland.

(d) This Agreement supersedes all previous negotiations and contains the entire understanding between the parties. It may be modified only in writing signed by the party against which the modification is asserted.

IN WITNESS WHEREOF the Constituent Companies have caused this Agreement to be signed in their names by the Chairmen of their respective Boards of Directors, each thereunto duly authorized, and their corporate seals to be affixed hereto and duly attested.

AMERICAN-MARIETTA COMPANY

[Corporate Seal]

GROVER M. HERMANN

By .....

Chairman of the Board

Attest:

PAUL P. WEBER

.....

Secretary

THE MARTIN COMPANY

[Corporate Seal]

GEORGE M. BUNKER

By .....

Chairman of the Board

Attest:

W. L. LUCAS

.....

Secretary

Exhibit A
to Appendix 1

ARTICLES AND PLAN OF CONSOLIDATION
CONSOLIDATING
THE MARTIN COMPANY AND AMERICAN-MARIETTA COMPANY
TO FORM
MARTIN-MARIETTA CORPORATION

Articles and Plan of Consolidation, entered into this .....day of ....., 19...., between The Martin Company, a Maryland corporation, and American-Marietta Company, an Illinois corporation.

ARTICLE I

The corporations which are parties to these Articles and Plan of Consolidation are The Martin Company (hereinafter called "Martin"), a corporation, having capital stock, organized and existing under the laws of the State of Maryland, and American-Marietta Company (hereinafter called "A-M"), a corporation, having capital stock, organized and existing under the laws of the State of Illinois. Martin and A-M have agreed, pursuant to requisite authority, to consolidate and thereby form a new corporation. The terms and conditions of the consolidation and the mode of carrying the same into effect shall be as herein set forth.

ARTICLE II

The name of the new corporation, resulting from the said consolidation, shall be "Martin-Marietta Corporation" (hereinafter called "Corporation"), and shall be formed under the laws of the State of Maryland.

ARTICLE III

Martin was incorporated on December 5, 1928, under the general statutes of the State of Maryland authorizing the formation of corporations. A-M was incorporated on September 12, 1930, under the general statutes of the State of Illinois, authorizing the formation of business corporations. A-M is qualified to do business in the State of Maryland, having so qualified on November 28, 1955.

ARTICLE IV

The charter of the Corporation shall be as stated in this ARTICLE IV:

FIRST: **Name.** The name of the corporation (which is hereinafter called "Corporation") is Martin-Marietta Corporation.

SECOND: **Period of Duration.** The period of duration of the Corporation is perpetual.

THIRD: **Purposes, Objects and Powers.** The purposes for which the Corporation is formed and the business or objects to be carried on and promoted by it are as follows:

Clause (1). To engage in and carry on the business of creating, developing, manufacturing, testing, transporting and making ready for use all kinds of missiles, electronics, electronic devices and substances, spacecraft, defense equipment and systems, and nuclear reactors and devices, and modifying, repairing, altering, licensing, buying, selling and dealing in all such articles and other property of every kind and character used in connection therewith.

Clause (2). To engage in and carry on the business of manufacturing, repairing altering, using, licensing, buying, selling and dealing in and with vehicles of all kinds, engines, motors, machinery, in-

struments, parts, equipment, appliances, devices, articles and materials of all kinds for use on or in connection therewith and the manufacture thereof.

Clause (3). To manufacture, buy, sell and deal in and with limestone, lime, concrete, concrete admixtures, cement, magnesite, brick, tile, refractories, asphalt, mortar, and products thereof; pipes, tubes, conduits and fittings, building materials and products thereof; chemicals; paints, pigments, coatings, finishes, resins and adhesives; shot, grit and metal powders; agricultural, road building, pipe laying, pulverizing, dust collecting and other machinery and equipment; mops, polishes, cleaners and waxes; and any and all other similar or related products.

Clause (4). To engage in and carry on the business of importing, exporting, manufacturing, producing, buying, selling and otherwise dealing in and with, goods, wares, and merchandise of every class and description.

Clause (5). To engage in and carry on any other business which may conveniently be conducted in conjunction with any of the business of the Corporation.

Clause (6). To buy, quarry, mine, grow, manufacture, process, own, invest in, sell, mortgage, pledge, lease, assign, transfer or otherwise deal in or with goods, wares, merchandise, supplies, materials, trees, crops, minerals, parts, machinery, equipment, products and other personal property of every kind, class and description.

Clause (7). To purchase, lease, hire or otherwise acquire, hold, own, develop, improve and dispose of, and to aid and subscribe toward the acquisition, development or improvement of real and personal property and rights and privileges therein, suitable or convenient for any of the business of the Corporation.

Clause (8). To purchase, lease, hire or otherwise acquire, hold, own, construct, erect, improve, manage and operate, and to aid and subscribe toward the acquisition, construction or improvement of, plants, mills, factories, works, buildings, machinery, equipment and facilities and any other property or appliances which may appertain to or be useful in the conduct of any of the business of the Corporation.

Clause (9). To acquire all or any part of the good will, rights, property and business of any person, firm, association or corporation heretofore or hereafter engaged in any business similar to any business which the Corporation has the power to conduct, and to hold, utilize, enjoy and in any manner dispose of, the whole or any part of the rights, property and business so acquired, and to assume in connection therewith any liabilities of any such person, firm, association or corporation.

Clause (10). To apply for, obtain, purchase, or otherwise acquire, any patents, copyrights, licenses, trade marks, trade names, rights, processes, formulas, and the like, which may seem capable of being used for any of the purposes of the Corporation; and to use, exercise, develop, grant licenses in respect of, sell and otherwise turn to account, the same.

Clause (11). To acquire by purchase, subscription or otherwise, and to hold, sell, assign, transfer, exchange, lease, mortgage, pledge, or otherwise dispose of, any shares of stock of, or voting trust certificates for any shares of stock of, or any bonds or other securities or evidences of indebtedness issued or created by, any other corporation or association, organized under the laws of the State of Maryland or of any other state, territory, district, colony or dependency of the United States of America, or of any foreign country; and while the owner or holder of any such shares of stock, voting trust certificates, bonds, or other obligations, to possess and exercise in respect thereof any and all the rights, powers, and privileges of individual holders, including the right to vote on any shares of stock so held or owned; and upon a distribution of the assets or a division of the profits of the Corporation, to distribute any such shares of stock, voting trust certificates, bonds or other obligations, or the proceeds thereof, among the stockholders of the Corporation.

Clause (12). To issue shares of its stock of any class, in the manner permitted by law, to raise money for any of the purposes of the Corporation, or in payment for property purchased, or for any other lawful consideration.

Clause (13). To borrow or raise money for any of the purposes of the Corporation and to issue bonds, debentures, notes or other obligations of any nature, and in any manner permitted by law, for money so borrowed or in payment for property purchased, or for any other lawful consideration, and to secure the payment thereof and of the interest thereon, by mortgage upon, or pledge or conveyance or assignment in trust of, the whole or any part of the property of the Corporation, real or personal,

including contract rights, whether at the time owned or thereafter acquired, and to sell, pledge, discount or otherwise dispose of such bonds, notes or other obligations of the Corporation for its corporate purposes.

Clause (14). To aid in any manner any corporation or association, any bonds, or other securities or evidences of indebtedness of which, or shares of stock in which, are held by or for the Corporation, or in which, or in the welfare of which, the Corporation shall have any interest, and to do any acts or things designed to protect, preserve, improve, or enhance the value of, any such bonds or other securities or evidences of indebtedness, or such shares of stock, or any property of the Corporation.

Clause (15). To guarantee the payment of dividends upon any shares of stock of, or the performance of any contract by, any other corporation or association and to endorse or otherwise guarantee the payment of the principal and interest, or either, of any bonds, debentures, notes, securities, or other evidences of indebtedness created or issued by any other corporation or association.

Clause (16). To carry out all or any part of the foregoing objects as principal, factor, agent, contractor, or otherwise, either alone or through or in conjunction with any person, firm, association or corporation, and in any part of the world, and, in carrying on its business and for the purpose of attaining or furthering any of its objects and purposes, to make and perform any contracts and to do any acts and things, and to exercise any powers suitable, convenient or proper for the accomplishment of any of the purposes herein enumerated or incidental to the powers herein specified, or which at any time may appear conducive to or expedient for the accomplishment of any of such purposes.

Clause (17). To carry out all or any part of the aforesaid purposes, and to conduct its business in all or any of its branches in any or all states, territories, districts, colonies and dependencies of the United States of America and in foreign countries; and to maintain offices and agencies in any or all states, territories, districts, colonies and dependencies of the United States of America and in foreign countries.

It is the intention that the objects and purposes specified in the foregoing clauses of this subdivision THIRD shall not, unless otherwise specified herein, be in any wise limited or restricted by reference to, or inference from, the terms of any other clause of this or any other article in this charter, but that the objects and purposes specified in each of the clauses of this subdivision THIRD shall be regarded as independent objects and purposes. It is also the intention that said clauses be construed both as purposes and powers; and generally, that the Corporation shall be authorized to exercise and enjoy all other powers, rights, privileges granted to, or conferred upon, corporations of this character, by the laws of the State of Maryland, and the enumeration of certain powers as herein specified is not intended as exclusive of, or as a waiver of, any of the powers, rights or privileges granted or conferred by the laws of said state now or hereinafter in force.

FOURTH: **Principal Office and Resident Agent.** The post office address of the place in which the principal office of the Corporation in the State of Maryland is located is 10 Light Street, Baltimore, Maryland. The Resident Agent of the Corporation is Clarence W. Miles, whose post office address is 10 Light Street, Baltimore, Maryland; said Resident Agent is a citizen of the State of Maryland and actually resides therein.*

FIFTH: **Directors.** The number of Directors of the Corporation shall be eighteen (18), which number may be increased or decreased pursuant to the By-Laws of the Corporation but which never shall be less than five (5); and the names of the directors who shall act until their successors are duly chosen and qualified are: **

William B. Bergen	Leigh R. Gignilliat, Jr.	Clarence W. Miles	Alexander B. Royce
George M. Bunker	Grover M. Hermann	John E. Parker	Duncan M. Spencer
William A. Burns	H. N. Huntzicker	Robert E. Pflaumer	John L. Sullivan
William J. Cabaniss	J. Clifford Knochel	Everett H. Pixley	
John F. Donoho	Ray L. Oughton	W. Trent Ragland, Jr.	

* Differs from form of Articles and Plan of Consolidation attached to executed Agreement of Consolidation in that addresses in FOURTH have been changed.

** Differs from form of Articles and Plan of Consolidation attached to executed Agreement of Consolidation, in that one substitution has been made in the persons listed in FIFTH.

SIXTH: **Authorized Shares of Stock.** The total number of shares of stock of all classes which the Corporation has authority to issue is 40,380,000 shares, divided into 380,000 shares of 4½% Cumulative Preferred Stock of the par value of $100 per share and 40,000,000 shares of Common Stock of the par value of $1 per share. The aggregate par value of all shares having par value of all classes is $78,000,000.

A description of each class with the preferences, conversion and other rights, voting powers, restrictions, limitations as to dividends and qualifications of each class is as follows:

4½% Cumulative Preferred Stock

1. *Dividends.*

The holders of 4½% Cumulative Preferred Stock (hereinafter called "Preferred Stock") shall be entitled to receive, when and as declared by the Board of Directors, dividends at the rate of 4½% of the par value thereof per year, and no more. Such dividends shall be cumulative from the first day of the month in which the Corporation comes into existence and shall be payable quarterly on the first days of January, April, July and October in each year. The Corporation shall not declare or pay any dividend or make any distribution on the Common Stock or on any other class of stock, ranking as to dividends or assets subordinate to the Preferred Stock, other than dividends and distributions (herein called "unrestricted stock dividends and distributions") paid or made solely in Common Stock or another class of stock of the Corporation ranking as to dividends and assets subordinate to the Preferred Stock, and neither the Corporation nor any subsidiary of the Corporation shall make any payment or apply any of its assets to purchase or redeem any Common Stock or any other class of stock of the Corporation ranking as to dividends or assets on a parity with or subordinate to the Preferred Stock, unless at the time dividends for all past quarterly dividend periods and the then current quarterly dividend period on all outstanding shares of Preferred Stock have been paid, or declared and set aside for payment, in full and unless, after giving effect to such action, the sum of

(a) the aggregate amounts declared and paid or payable as dividends or distribution (other than unrestricted stock dividends and distributions) on all shares of stock of all classes of the Corporation subsequent to the date on which it came into existence; plus

(b) the excess of the aggregate amounts applied to ,or set apart for, the purchase or redemption of shares of Common Stock or any other class of stock of the Corporation ranking as to dividends or assets subordinate to the Preferred Stock subsequent to the date on which the Corporation came into existence over the net cash proceeds or fair value (as determined by the Corporation's board of directors) of property received by the Corporation subsequent to that date as consideration for the issuance or delivery of Common Stock or any other class of stock of the Corporation ranking as to dividends and assets subordinate to the Preferred Stock

will not exceed the consolidated net income (determined in accordance with generally accepted accounting principles) of the Corporation and its subsidiaries (if any) subsequent to November 30, 1961 plus $45,000,000.

2. *Liquidation.*

In the event of voluntary or involuntary liquidation, dissolution or winding up of the Corporation, the holders of Preferred Stock shall be entitled to receive in cash from the assets of the Corporation (whether capital or surplus), prior to any payment to the holders of Common Stock or of any other class of stock of the Corporation ranking as to assets subordinate to the Preferred Stock, the sum of $100 for each share thereof, plus an amount equal to accrued and unpaid dividends thereon computed to the date at which payment thereof is made available (whether or not earned or declared), plus, if the liquidation, dissolution or winding up is voluntary, a premium of $5 per share. A consolidation or merger to which the Corporation shall be a party shall not be deemed a liquidation of the Corporation within the meaning of this paragraph.

3. *Redemption and Purchase.*

The Corporation may, at its option, redeem all, but not less than all, the shares of Preferred Stock outstanding at any time after October 1, 1964, at a price equal to $105 per share plus an amount equal to accrued and unpaid dividends thereon computed to the date fixed for redemption (whether or not earned or declared). Notice of such redemption shall be given to the holders of record of the Preferred Stock by mailing such notice at least 30 and not more than 60 days before the redemption date to such holders at their addresses appearing on the books of the Corporation. The Corporation, upon mailing such notice or irrevocably authorizing the bank or trust company hereinafter mentioned to mail the same, may deposit an amount equal to the redemption price with a bank or trust company in Chicago, Illinois having a combined capital and surplus reported in its last published report in excess of $5,000,000 to be held in trust for payment to the holders of Preferred Stock at any time after such deposit. Upon such deposit, or if no deposit is made, then from and after the date fixed for redemption (unless the Corporation shall default in paying the redemption price), the Preferred Stock shall cease to be outstanding and the holders thereof shall cease to be stockholders with respect thereto. All shares of Preferred Stock redeemed or purchased by the Corporation, whether through the sinking fund hereinafter provided for or otherwise, shall be cancelled and shall not be reissued.

4. *Voting Rights.*

The holders of shares of the Preferred Stock shall have no right to vote and shall not be entitled to notice of any meeting of stockholders of the Corporation or to participate in such meeting, except as required by law or as herein otherwise expressly provided. If at any time the Corporation shall have failed (a) to pay, or declare and set apart for payment, dividends on the Preferred Stock and such default (whether or not in respect of consecutive dividends) shall be in an aggregate amount equal to four quarterly dividends on all outstanding shares of Preferred Stock, or (b) to set aside or apply, when required, the sinking fund hereinafter provided for, then in any such event, the number of directors of the Corporation shall forthwith be automatically increased by the smallest number that will be not less than one-third of the total number of directors after giving effect to such increase. The holders of Preferred Stock shall have the right, voting as a class, to elect such additional directors at a special meeting of the holders of Preferred Stock, which shall be called by the Secretary of the Corporation upon demand of the holders of 10% or more of the outstanding shares thereof, and at each subsequent annual meeting of stockholders of the Corporation until such time as dividends payable for all past quarterly dividend periods and the then current quarterly dividend period on all outstanding shares of Preferred Stock shall have been paid, or declared and set apart for payment, in full, and the Corporation shall have set aside an amount equal to all arrearages in the sinking fund and applied the same to the redemption of Preferred Stock as provided in paragraph 7, at which time the terms of the additional directors elected by the holders of Preferred Stock shall terminate, the number of directors shall be correspondingly reduced, and the voting rights of the holders of Preferred Stock shall cease, subject to revesting in the event of each additional default in payment of dividends in an amount equal to four quarterly dividends or in setting aside or applying the sinking fund as aforesaid.

5. *Action by the Corporation Requiring Approval of Preferred Stock.*

The Corporation shall not, without the affirmative vote or written consent of the holders of at least two-thirds of the then outstanding shares of Preferred Stock:

(1) By charter amendment or in a merger or consolidation or in any other manner: (a) increase the number of authorized or outstanding shares of Preferred Stock, or (b) decrease the par value of shares of Preferred Stock, or (c) effect an exchange or reclassification of any outstanding shares of Preferred Stock, or a cancellation of any of such shares except upon purchase or redemption thereof, or (d) change the designations, preferences, qualifications, limitations, restrictions or special or relative rights of the Preferred Stock, or (e) change the outstanding shares of Preferred Stock into the same or a different number of shares of any other class of stock, or (f) create any shares of stock of any other class, or any obligations, exchangeable for or convertible into shares of Preferred Stock, or (g) create or authorize or permit to

be outstanding any kind of stock, or any obligations or other securities exchangeable for or convertible into any kind of stock, having rights or preferences prior or superior to, or on a parity with, the Preferred Stock, or increase the rights or preferences of any class of stock having rights or preferences prior or superior to, or on a parity with, the Preferred Stock, or (h) cancel or otherwise affect dividends on the Preferred Stock which have accrued but have not been paid, or

(2) Issue or sell any shares of Preferred Stock (including shares acquired through the sinking fund) or of any class of stock ranking as to dividends or assets prior to or on a parity with the Preferred Stock or in any other manner increase the number of outstanding shares of Preferred Stock or of any class of stock ranking as to dividends or assets prior thereto or on a parity therewith.

6. *Merger or Consolidation.*

In the event of any merger or consolidation of the Corporation any holder of Preferred Stock shall be entitled to receive payment in cash of the amount to which he would then be entitled upon a voluntary liquidation of the Corporation unless by the terms of the merger or consolidation he is entitled to shares or securities (which may be his shares of Preferred Stock) of the corporation resulting from the merger or consolidation which have a relative position and priority and rights and preferences as to other classes of capital stock of such corporation at least equal to those of the Preferred Stock immediately before the merger or consolidation.

7. *Sinking Fund.*

So long as any shares of Preferred Stock are outstanding, the Corporation shall, not later than October 1 in 1962 and in each year thereafter, set aside as a sinking fund for retirement of the Preferred Stock the amount of $1,150,000; provided, however, that the Corporation may credit against such amount the par value of any shares of Preferred Stock theretofore acquired by it otherwise than through the sinking fund and not previously used as the basis for such a credit, and provided further that the Corporation may omit provision for the sinking fund in any year with written consent of the holders of all shares of Preferred Stock then outstanding. The Corporation shall not declare or pay any dividend or make any distributions on the Common Stock or any other class of stock ranking as to dividends or assets subordinate to the Preferred Stock other than unrestricted stock dividends and distributions, and neither the Corporation nor any subsidiary of the Corporation shall make any payment or apply any of its assets to purchase or redeem any Preferred Stock (other than through the sinking fund) or any Common Stock or any other class of stock of the Corporation ranking as to dividends or assets on parity with or subordinate to the Preferred Stock, at a time when the Corporation is in default in respect of the sinking fund herein provided for.

The Corporation shall apply the sinking fund within 45 days after the setting aside thereof to the redemption of Preferred Stock at a sinking fund redemption price equal to the par value thereof plus an amount equal to accrued and unpaid dividends computed to the date fixed for redemption (whether or not earned or declared). The shares of Preferred Stock to be redeemed through the sinking fund shall be selected by lot or other equitable method; provided, however, that the holder of any share so selected shall have the right, by written notice given to the Corporation prior to the redemption date, to substitute for redemption any other share of Preferred Stock held of record by him on the redemption date; and further provided that the Corporation may, with the written consent of the holders of all shares of Preferred Stock then outstanding, redeem through the sinking fund shares of Preferred Stock which prior to the redemption date are surrendered to it for such redemption without regard to the method or equity of the selection thereof. The procedure for giving notice of redemption and the effect of depositing the redemption price shall be the same in the case of sinking fund redemptions under this paragraph as in the case of an optional redemption under paragraph 3.

Common Stock

Each outstanding share of Common Stock shall be entitled to one vote on each matter submitted to a vote at a meeting of stockholders. In all elections for directors every holder of Common Stock

shall have the right to vote, in person or by proxy, the shares owned of record by him, for as many persons as there are directors to be elected and for whose election he has a right to vote, but he shall have no right to cumulative voting.

SEVENTH: **Provisions Defining, Limiting and Regulating Powers.** The following provisions are hereby adopted for the purpose of defining, limiting and regulating the powers of the Corporation and the Directors and Stockholders, subject, however, to the provisions, conditions and restrictions set forth in subdivision SIXTH hereof:

Clause (1). The Board of Directors of the Corporation is hereby empowered to authorize the issuance from time to time of shares of its stock of any class, whether now or hereafter authorized, and securities convertible into shares of its stock of any class, whether now or hereafter authorized, for such considerations as said Board of Directors may deem advisable, subject to such limitations and restrictions, if any, as may be set forth in the by-laws of the Corporation.

Clause (2). No holders of shares of stock of the Corporation of any class shall have any preemptive or other right to subscribe for or purchase any part of any new or additional issue of stock of any class or of securities convertible into stock of any class, whether now or hereafter authorized or whether issued for money, for a consideration other than money or by way of dividend.

Clause (3). The Board of Directors shall have the power, from time to time, to determine whether any, and if any, what part, of the surplus of the Corporation shall be declared in dividends and paid to the stockholders; and to direct and determine the use and disposition of any of such surplus. The Board of Directors may in its discretion use and apply any of such surplus in purchasing or acquiring any of the shares of the stock of the Corporation, or any of its bonds or other evidences of indebtedness, to such extent and in such manner and upon such lawful terms as the Board of Directors shall deem expedient.

Clause (4). The Corporation reserves the right to make from time to time any amendments of its charter which may now or hereafter be authorized by law, including but not restricted to, any amendments changing the terms of any class of its stock by classification, reclassification or otherwise.

Clause (5). Notwithstanding any provision of law requiring any action to be taken or authorized by the affirmative vote of the holders of a designated proportion of the shares of stock of the Corporation, or to be otherwise taken or authorized by vote of the stockholders, such action shall be effective and valid, except as otherwise required by provisions of this charter relating to the Preferred Stock, if taken or authorized by the affirmative vote, at a meeting, of the holders of a majority of the total number of shares outstanding and entitled to vote thereon.

EIGHTH: **By-Laws.** The Board of Directors shall have the power, at any regular or special meeting thereof, to make and adopt by-laws, or to amend, alter or repeal any by-laws of the Corporation. The by-laws may contain any provision for the regulation and management of the affairs of the Corporation not inconsistent with law or the provisions of this charter.

NINTH: **Inspection of Records by Stockholders.** The Board of Directors shall have power to determine from time to time whether and to what extent and at what times and places and under what conditions and regulations the books, records, accounts, and documents of the Corporation, or any of them, shall be open to the inspection of stockholders, except as otherwise provided by law or by the by-laws; and, except as so provided no stockholders shall have any right to inspect any book, record, account or document of the Corporation unless authorized so to do by resolution of the Board of Directors.

TENTH: **Compensation of Members of Board of Directors and Committees thereof.** The Board of Directors in its discretion may allow, in and by the by-laws of the Corporation or by resolution, the payment of expenses, if any, to members for attendance at each regular or special meeting of the Board of Directors or of any committee thereof, and the payment of reasonable compensation to such members for their services as members of the Board of Directors, or any committee thereof, and shall fix the basis and conditions upon which such expenses and compensation shall be paid. Any member of the Board of Directors or of a committee thereof, also may serve the Corporation in any other capacity and receive compensation therefor in any form.

ELEVENTH: **Indemnification of Officers and Directors.** Each director and each officer of the Corporation, and his heirs, executors and administrators shall be indemnified by the Corporation against all costs and expenses reasonably incurred by him for advice or assistance concerning, or in connection with the defense of, any civil, criminal, administrative, or other claim, action, suit or proceeding in which he may become involved, or with which he may be threatened, by reason of his being, or having been, a director or officer of the Corporation or by reason of his serving or having served any corporation, trust, committee, firm or other organization as director, officer, employee, trustee, member or otherwise at the request of the Corporation, whether or not he continues to be a director or officer at the time of incurring such costs or expenses, except costs and expenses incurred in relation to matters as to which such director or officer shall have been derelict in the performance of his duty as such director or officer.

For the purposes of this subdivision ELEVENTH, a director or officer shall conclusively be deemed not to have been derelict in the performance of his duty as such director or officer

(a) in a matter which shall have been the subject of a claim, suit, action or proceeding to which he was a party disposed of by adjudication on the merits, unless he shall have been finally adjudged in such claim, action, suit or proceeding to have been derelict in the performance of his duty as such director or officer, or

(b) in a matter not falling within (a) next preceding if either all disinterested members of the Board of Directors or a committee of disinterested stockholders of the Corporation (excluding therefrom any director or officer) selected as hereinafter provided, shall determine that he is not derelict.

The selection of the committee of stockholders provided above may be made by unanimous action of the disinterested directors or, if there be no disinterested director or directors, by the chief executive officer of the Corporation, provided that not less than three (3) stockholders shall be selected in any case. A director or stockholder shall be deemed disinterested in a matter if he has no interest therein other than as a director or stockholder of the Corporation, as the case may be. The foregoing shall not constitute exclusive tests as to dereliction and no determination as to dereliction shall be questioned on the ground that it is made otherwise than as provided above. The Corporation may pay the fees and expenses of the stockholders or directors, as the case may be, incurred in connection with making a determination as above provided.

The foregoing indemnification shall include reimbursement of all costs and expenses reasonably incurred in settling any such claim, action, suit or proceeding or in satisfaction of any related judgment, fine or penalty, when the so doing appears to be for the best interests of the Corporation, and shall be in addition to any rights to which any director or officer may otherwise be entitled as a matter of law or otherwise.

TWELFTH: **Informal Action by Board of Directors or Committees thereof.** Any action required or permitted to be taken at any meeting of the Board of Directors, or of any committee thereof, may be taken without a meeting, if a written consent to such action is signed by all members of the Board or of such committee, as the case may be, and such written consent is filed with the minutes of proceedings of the Board or committee.

ARTICLE V

A. The total number of shares of all classes which Martin has authority to issue is 12,000,000 shares of Common Stock without par value.

B. The total number of shares of all classes which A-M has authority to issue is 29,200,000 divided into two classes as follows:

25,000,000 Common Shares of the par value of $2 per share; and

4,200,000 Class B Common Shares of the par value of $2 per share.

The aggregate par value of all such shares is $58,400,000.

ARTICLE VI

Upon the effective date of the consolidation, the authorized Capital Stock of the Corporation shall be 40,380,000 shares divided into 380,000 shares of 4½% Cumulative Preferred Stock of the par value of $100 per share and 40,000,000 shares of Common Stock of the par value of $1 per share. As a result of the consolidation, the Common Stock of Martin and the Common Shares of A-M issued and outstanding on the effective date of the consolidation will be converted into like stock of the Corporation; the Class B Common Shares of A-M issued and outstanding on the effective date of the consolidation will be converted into 380,000 shares of 4½% Cumulative Preferred Stock of the par value of $100 per share; and the holders of the warrants of Martin issued and outstanding on the effective date of the consolidation will be entitled to purchase shares of Common Stock of the Corporation of the par value of $1 per share for each warrant so held, all as hereinafter more specifically set forth:

A. As to the stock and warrants of Martin:

1. Each share of Common Stock, without par value, shall be converted into 1.3 shares of Common Stock of the Corporation, of the par value of $1 per share; provided, however, that holders of certificates of Martin's Common Stock will not be entitled to receive certificates for fractional shares of the Common Stock of the Corporation.

2. Each warrant to purchase a Current Stock Unit, now consisting of 2.10 shares of the said Common Stock of Martin, without par value, shall entitle the holder thereof to purchase a Current Stock Unit consisting of 2.73 shares of Common Stock of the Corporation, of the par value of $1 per share.

B. As to the stock of A-M:

1. The Class B Common Shares outstanding on the effective date of the consolidation shall be converted into 380,000 shares of 4½% Cumulative Preferred Stock of the Corporation of the par value of $100 per share.

2. Each Common Share shall be converted into one share of Common Stock of the Corporation, of the par value of $1 per share.

Except as hereinabove set forth no other consideration shall be paid, transferred or issued by the Corporation for shares of Common Stock and warrants of Martin or for shares of A-M.

ARTICLE VII

The principal office of Martin in the State of Maryland is located in Baltimore County. The principal office of A-M in the State of Maryland is located in Baltimore City, (not located in any county). Martin owns property, the title to which could be affected by the recording of an instrument among the land records in the following counties of the State of Maryland: Baltimore County and Anne Arundel County. A-M owns property, the title to which could be affected by the recording of an instrument among the land records, in the following counties of the State of Maryland: Allegany County, Howard County and Washington County, and in Baltimore City (not located in any county).

ARTICLE VIII

The Articles and Plan of Consolidation were duly advised by the Board of Directors and approved by the stockholders of Martin in the manner and by the vote required by the laws of the State of Maryland and by the charter of Martin.

ARTICLE IX

The Articles and Plan of Consolidation were duly advised, authorized and approved in the manner

and by the vote required by the charter of A-M and by the laws of the State of Illinois, under which A-M was organized.

ARTICLE X

Upon the effective date of the consolidation:

A. The separate existences of Martin and A-M shall cease.

B. All the property, rights, privileges, powers and franchises of Martin and of A-M, of whatever nature and description, of a public as well as of a private nature, shall be transferred to, vest in and devolve upon the Corporation without further act or deed; and all property, rights, privileges, powers and franchises, and all and every other interest of Martin and of A-M shall be thereafter as effectually the property of the Corporation as they were of Martin and of A-M.

ARTICLE XI

On and after the effective date of the consolidation:

A. All debts, obligations, liabilities and duties of Martin and of A-M shall thenceforth attach to the Corporation, and may be enforced against it to the same extent as if said debts, obligations, liabilities and duties had been incurred or contracted by it; and any claim existing or action or proceeding pending by or against either Martin or A-M may be prosecuted to judgment or decree as if the consolidation had not taken place, or the Corporation, upon the motion of the Corporation or of any party, may be substituted as a party in place of Martin or A-M, as the case may be, and any such judgment or decree against Martin or A-M shall constitute a lien upon the property of the Corporation;

B. The title to any real estate shall not revert or be in any way impaired by reason of the consolidation, but all rights of creditors and all liens upon any property of Martin or A-M shall be preserved unimpaired. Nothwithstanding the provisions of Article X hereof, confirmatory deeds, assignments or other like instruments, when deemed desirable to evidence such transfer, vesting or devolution of any property, right, privilege or franchise, may at any time, or from time to time, be made and delivered in the name of Martin or A-M, as the case may be, by the last acting officers thereof, or by the corresponding officers of the Corporation.

ARTICLE XII

Anything herein contained to the contrary notwithstanding, the proposed consolidation herein set forth may be abandoned at any time prior to the effective date of consolidation, (i) by either Martin or A-M, by resolution of its Board of Directors, if the conditions of that Company's obligations, as set forth in the Agreement of Consolidation between the two companies dated as of August 1, 1961, are not satisfied, or (ii) by Martin and A-M, each acting by its Board of Directors, by mutual consent, for any reason; and the proposed consolidation shall be deemed abandoned if the closing provided for in said Agreement of Consolidation is not held on or before December 31, 1961.

ARTICLE XIII

The consolidation referred to herein shall become effective upon the issuance of a certificate of consolidation by the Secretary of State of the State of Illinois and the acceptance of the Articles and Plan of Consolidation for record by the Department of Assessments and Taxation of the State of Maryland.

The corporations party to these Articles and Plan of Consolidation have agreed that, notwithstanding the effective date as hereinabove established, the consolidation, if and when effective under the laws of the States of Maryland and Illinois, shall be effective for accounting purposes only as of the opening of business on October 1, 1961. Appropriate property, financial, accounting, statistical and other corporate records of Martin, A-M and the Corporation shall be adjusted or made, as the case may be, to reflect such effects of the consolidation as of October 1, 1961.

IN WITNESS WHEREOF, Martin and A-M, the parties to the consolidation, have caused these Articles and Plan of Consolidation to be signed in their respective corporate names and on their behalf by their respective President or Vice-President and their respective corporate seals to be hereunto affixed and attested by their respective Secretaries or Assistant-Secretaries, the day and year first above written.

ATTEST: THE MARTIN COMPANY

..... By .....
Secretary President

AMERICAN-MARIETTA COMPANY

..... By .....
Secretary President

STATE OF MARYLAND, COUNTY OF , TO WIT:

On this day of , 1961, before me, the undersigned, a Notary Public of the State and County aforesaid, personally appeared who made oath in due form of law that he is the President of The Martin Company and acknowledged that he executed the foregoing Article and Plan of Consolidation by due authority of said Corporation; at the same time also appeared who made oath in due form of law that he was the Secretary of the meeting duly held by the stockholders of The Martin Company at which the consolidation set forth in the aforegoing Articles and Plan of Consolidation was approved, and that the matters and facts set forth in said Articles and Plan of Consolidation with respect to said authorization and approval are true.

.....
Notary Public

STATE OF , COUNTY OF , TO WIT:

I HEREBY CERTIFY, that on this day of , 1961, before me the undersigned, a Notary Public of the State and County aforesaid, personally appeared who made oath in due form of law that he is the President of American-Marietta Company and acknowledged that he executed the foregoing Articles and Plan of Consolidation by due authority of said Corporation; also personally appeared who made oath in due form of law that he is the Secretary of American-Marietta Company and that the matters and facts set forth in said Articles and Plan of Consolidation with respect to authorization and approval are true.

.....
Notary Public

ML080150518

MARTIN COMPANY

Baltimore,
Maryland
21203

November 18, 1966

Refer to: ACC-518
CWK:845

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Robert E. Brinkman

Subject: Proposed Amendment to Byproduct Material License No. 19-01398-20

Gentlemen:

Three copies of a proposed amendment to Byproduct License No. 19-01398-20 are enclosed. Thank you for your effort in reviewing this application.

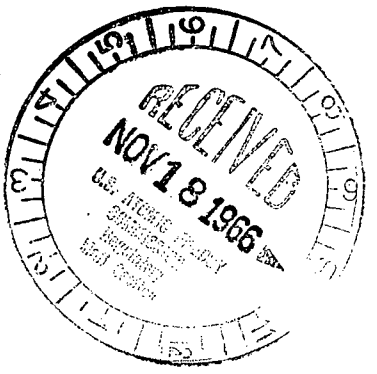
Very truly yours,

Martin Company
MARTIN-MARIETTA CORP.
Baltimore, Maryland

C W Keller

C. W. Keller, Nuclear
Accountability & Licensing
Representative

/plm



A1228

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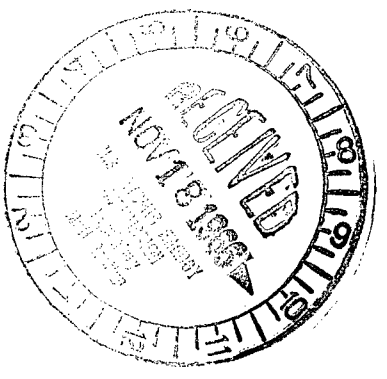
A DIVISION OF MARTIN MARIETTA

APPLICATION FOR AMENDMENT

to

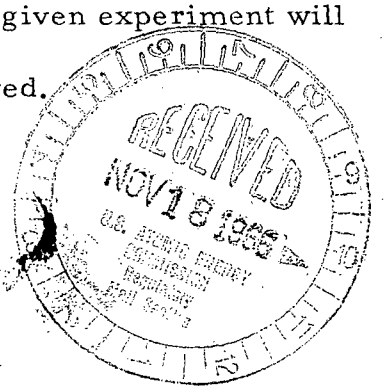
BYPRODUCT MATERIAL LICENSE NO. 19-01398-20



03416

GENERAL DISCUSSION

The Martin Marietta Corporation hereby requests that Byproduct Material License No. 19-01398-20 be amended to include the complete investigation of the physical and chemical properties of materials which has been exposed to neutron and gamma irradiation at ambient temperatures. The research and development program to be performed in the Martin radiochemistry laboratory (KJ Building) in Middle River, Maryland will be limited to 500 millicuries of any byproduct material between atomic numbers 3 and 83 inclusive. Of primary interest at this time is the investigation of the properties of Phosphorous sesquisulfide (P_4S_3), a proposed reactor coolant compound, and the compatibility between P_4S_3 and zircalloy, a proposed containment material. After irradiation at the Wright-Patterson Air Force Base - Nuclear Engineering Test Facility or other off-site location, a sufficient decay period will elapse to assure decay of short life isotopes before receipt at Martin. The radioactive material remaining from irradiation of P_4S_3 and zircalloy are Phosphorus-32, Sulfur-35 and a Zirconium-95: Niobium 95 mixture. The quantity of radioactive material handled in any given experiment will approximate one quarter of the curie amount received.

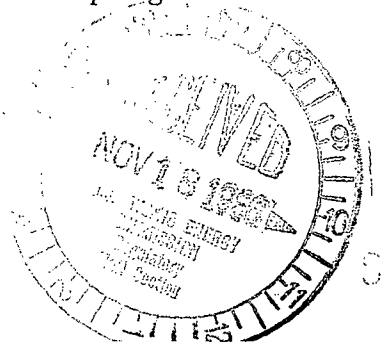


EXPERIMENTAL PROGRAM

The research and development program will include such experiments as the measurement of the inactive gas produced by radioactive decay, the definition of the gamma-beta and infra-red spectrums, and the determination of such physical properties as the melting point, the viscosity and partial dissociation of the material. Metallographic examination of coupons will be performed to define corrosion, to investigate changes in granular structures, and to determine the stress-strain curve. When deemed necessary, experimental techniques will be developed using inactive material prior to performing the experiment with radioactive material. The following discussion details the general steps and precautions to be taken during our experimental program using P_4S_3 and Zircalloy.

(1) Gamma-Beta Spectrums. Each glass vial, containing approximately 2 grams of P_4S_3 and a zircalloy-2 coupon weighing 0.08 grams, will be counted before opening with a multichannel analyzer and a methane-flow beta proportional counter. No activity will be released from the vials since they will remain sealed during these measurements.

(2) Gas Analysis. Each P_4S_3 vial will be broken behind a shielded area inside an open fan exhaust hood and a gas sample will be drawn into an evacuated sample bottle. The non-radioactive gas composition will be analyzed employing a mass-spectrograph. This sampling will be



accomplished with a valve-filter type glass transfer system so that entrainment of P_4S_3 power will be eliminated. Development of this sampling technique will be performed with inactive P_4S_3 prior to analysis of the active P_4S_3.

(3) I. R. Spectrum. Approximately one gram of P_4S_3 will be dissolved and the spectrum of the solution measured on a spectrophotometer. The dissolution will be performed behind the shielded area in an open hood and measurement of the solution will be in a controlled area in the radiochemistry laboratory. The sample of solution will be sealed in a glass vial to eliminate spillage and the transfer of the glass vial will be performed in a container to reduce possibility of breakage. Handling tools will be used to reduce personnel exposure.

(4) Melting Point. The melting point will be determined by the classical capillary tube method behind the shielded area in an open hood. The capillary tube will be sealed and the method of powder transfer to the capillary tube will be developed to reduce dispersal.

(5) Viscosity. The viscosity of the P_4S_3 will be measured in a closed glass system located in a high temperature furnace which is positioned in an exhaust controlled hood provided in case of glass breakage. A satisfactory method of sealing the active P_4S_3 powder in glass has been performed.

(6) P and S Dissociation. The presence of free sulfur and free phosphorous mixed in with the P_4S_3 will be determined by collecting elemental P in the cold end of a heated sealed glass tube and by employ-

ing the solvent extraction method. These experiments will be performed in a shielded area of the open hood.

(7) Metallographic Studies of Zircalloy-2. Determination of the compatibility of zircalloy-2 with P_4S_3 under the influence of neutron and gamma radiation will be made with standard metallographic equipment and methods in a shielded area of the open hood. The methods to be used on active zircalloy-2 coupons will be defined prior to the actual experimentation.

SAFETY CRITERIA

The likelihood of undue radiation exposure and contamination will be minimized by:

1. The radioisotope handling procedures from receipt of the P_4S_3 quartz vials to waste disposal will be under the surveillance of the Martin Company Health Physics Section.
2. The radioisotope laboratory is relatively isolated, has absolute type filtered ventilation, and continuous sampling of the stack effluent. The atmosphere in the work area is continuously sampled for airborne radioactivity by a constant air monitor.
3. All radioisotope handling will take place inside a ventilated hood and behind a shielded area within the hood to reduce personnel exposure.

4. Cold runs of the wet chemistry operations have been made using inactive P_4S_3 as simulated material in order to define the measurement procedures and to establish safe handling methods.

5. The planned radioisotope experiments will be conducted with an anticipated activity of 30 millicuries in order to further refine the handling procedures. Handling tools will be used to minimize exposure where possible.

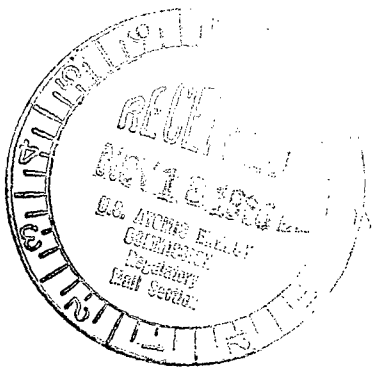
6. Typical wet chemistry operations will involve batches of P_4S_3 containing 0.03 curie of beta emitters. Typical metallographic examination of the zircalloy-2 coupons will require handling of approximately 5×10^{-4} curies of beta and gamma emitters.

RADIOACTIVE WASTE DISPOSAL

Solid radioactive waste generated during property measurements will be removed from the hood utilizing standard packaging techniques, sealed in a plastic bag and placed in a closed I. C. C. approved waste container for ultimate disposal at an approved site. Liquid wastes shall be poured into an absorbing medium in plastic bottles and handled as solids.

HAZARD EVALUATION

Any external radiation hazard arises from the harder components of the bremsstrahlung produced by the P^{32} and S^{35} betas, and from the gammas emitted from the Zr^{95}-Nb^{95} isotopes. The exposure received by the individuals performing the experimental work will be closely monitored by the Health Physics Section. Dose rate measurement of the activated sample has been performed at the surface of a quartz vial containing two grams of P_4S_3 and a zircalloy-2 coupon. After three weeks of decay from the time of reactor shutdown, the dose rate at instrument contact at the surface of the containment vial was 400 mr/hr. It is not anticipated that any major external radiation exposure will occur during the measurement of the physical and chemical characteristics of these radioactive materials since at least an additional 9 weeks of decay time will have elapsed before receipt of the radioactive materials.



Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027.4.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

Martin-Marietta Corporation
Martin Company
Baltimore, Maryland 21203

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Baltimore Division

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Byproduct License 19-1398-20 Renewal

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

James C. Neace
John H. Gray
V. Truscello

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Richard J. Brisson

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

A. Americium-241	Any form	350 curies
B. Curium-242	Any form	20 millicuries
C. Any byproduct material Atomic Nos. 3-83	Any form	80 millicuries total
D. Curium-244	Any form	D 5 millicuries
E. Polonium-210	Any form	E 60 microcuries
F. Cesium-137	Any form	F 30 microcuries
G. Promethium-147	Any form	G 20 microcuries

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

A. Preparation & examination of elements for neutron irradiation.

B. & C. Development of methods for separation of Curium-242 from Americium and fission products. Activation analysis. Spectrum decay and shielding studies.

D. - G. Preparation of plated sources for spectrum and shielding studies.

(Continued on reverse side)

Form AEC–313 (5-58) Page

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB *(Circle answer)*	FORMAL COURS *(Circle answer)*
a. Principles and practices of radiation protection			Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS *(Include make and model number of each)*	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE *(mr/hr)*	WINDOW THICKNESS *(mg/cm²)*	USE *(Monitoring, surveying, measuring)*

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

RECEIVED MAR 31 1966 U.S. ATOMIC ENERGY COMMISSION Headquarters Mail Section

Martin-Marietta Corporation
Applicant named in item 1

Date March 29, 1966

By C. W. Keller
Nuclear Accountability & Licensing Rep.
Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948, 62 Stat. 749, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U.S. GOVERNMENT PRINTING OFFICE : 1961 OF—615965

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1342

MARTIN MARIETTA CORPORATION

AEROSPACE HEADQUARTERS, FRIENDSHIP INTERNATIONAL AIRPORT, MARYLAND 21240

June 11, 1969

U. S. Atomic Energy Commission
Division of Material Licensing
Washington, D. C. 20545

Attention: Dr. J. A. McBride, Director
Division of Material Licensing

Gentlemen:

Re: Request for Release for Public Use of a Facility Formerly Used for Nuclear Activities by the Martin Marietta Corporation

Isotopes' Nuclear Systems Division has recently completed decontamination of the Martin Marietta Corporation Radiochemistry Laboratory ("KJ" Building). This building was formerly used by Martin Marietta for those activities previously authorized under AEC Byproduct Material License Nos. 19-1398-32 and 19-1398-33.

The resultant radioactive wastes have been packaged preparatory to shipment to an authorized disposal site, and the results of the final radiological survey conducted by the Isotopes' health physics staff are transmitted herewith for your information.

Review of the attached survey data indicates that the proposed AEC guides governing the abandonment of nuclear facilities have been met, therefore, the Martin Marietta Corporation hereby requests release of the subject building for future public use.

We would appreciate receiving approval of this request at your earliest convenience. Please contact me directly on 301/761-5200, extension 340 if I can be of assistance in this matter.

Sincerely,

Ross G. Macaulay
Director - Contracts

att.

A1262

"KJ" BUILDING SMEAR SURVEY DATA

The smears were counted in an NMC thin-window gas flow proportional counter. The average alpha background was 1 cpm whereas the average beta-gamma background was 53 cpm. This counting system exhibits 30% efficiency when used for U^{235} alphas and 45% efficiency when used for counting Sr^{90} betas. The results of the smear survey are as follows:

Location*	Smear Number	D/M/100 CM^2	
		α	$\beta\gamma$
Chemistry Lab.	1	< 50	145
Floor	2	< 50	64
Floor	3	< 50	< 50
Floor	4	< 50	468
Floor	5	< 50	280
Floor	6	< 50	< 50
Floor	7	< 50	84
Exhaust Hood	8	< 50	< 50
Exhaust Hood	9	< 50	< 50
Exhaust Hood	10	< 50	108
Exhaust Hood	11	< 50	< 50
Exhaust Hood	12	< 50	< 50
Exhaust Hood	13	< 50	< 50
Floor	14	< 50	< 50
Floor	15	< 50	< 50
Floor	16	< 50	< 50
Floor	17	< 50	240

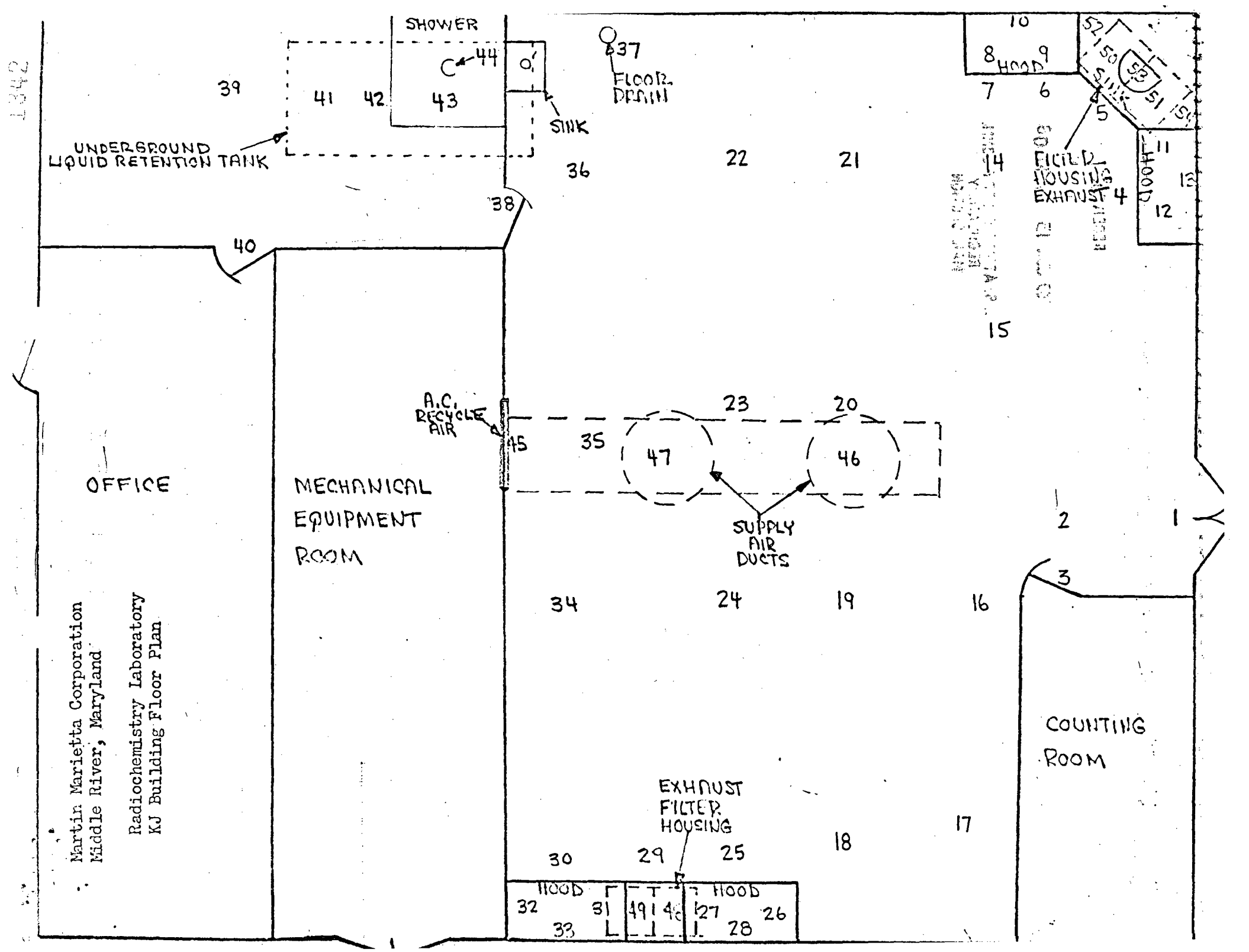
Location *	Smear Number	D/M/100 CM^2 α	D/M/100 CM^2 $B\gamma$
Floor	18	< 50	120
Floor	19	< 50	120
Floor	20	< 50	< 50
Floor	21	< 50	< 50
Floor	22	< 50	< 50
Floor	23	< 50	< 50
Floor	24	< 50	60
Floor	25	< 50	240
Exhaust Hood	26	< 50	48
Exhaust Hood	27	< 50	< 50
Exhaust Hood	28	< 50	< 50
Floor	29	< 50	60
Floor	30	< 50	< 50
Exhaust Hood	31	< 50	240
Exhaust Hood	32	< 50	96
Exhaust Hood	33	< 50	240
Floor	34	< 50	< 50
Floor	35	< 50	< 50
Floor	36	< 50	120
Floor	37	< 50	< 50
Floor	38	< 50	< 50
Floor	39	< 50	252
Floor	40	< 50	< 50
Liquid Waste Hold Tank	41	< 50	< 50

Location*	Smear Number	D/M/100 CM^2 α	D/M/100 CM^2 $B\gamma$
Liquid Waste Hold Tank	42	< 50	< 50
Liquid Waste Hold Tank	43	< 50	< 50
Shower Base	44	< 50	< 50
A. C. Duct	45	< 50	< 50
Anemostat	46	< 50	< 50
Anemostat	47	< 50	< 50
Filter Box	48	< 50	< 50
Filter Box	49	< 50	684
Filter Box	50	< 50	420
Filter Box	51	< 50	672
Sink, S.E. Corner	52	< 50	180
Sink, S.E. Corner	53	< 50	< 50
Sink, S.E. Corner	54	< 50	< 50

* Refer to "KJ" Building floor plan for better orientation.

"KJ" BUILDING INSTRUMENT SURVEY DATA

Fixed contamination-radiation levels were measured employing a modified Eberline PAC-3G adjusted to measure alpha-beta-gamma radiations. Survey of the areas depicted on the "KJ" Building floor plan indicated radiation levels below 0.2 Mrads/hour. The instrument used was standardized employing a Ra^{226} calibration source.


SHOWER
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UNDERGROUND LIQUID RETENTION TANK
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SUPPLY AIR DUCTS
OFFICE
MECHANICAL EQUIPMENT ROOM
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16
COUNTING ROOM
EXHAUST FILTER HOUSING
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HOOD
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Martin Marietta Corporation
Middle River, Maryland
Radiochemistry Laboratory
KJ Building Floor Plan

ML080160093

W14
R&B

ISOTOPES
NUCLEAR SYSTEMS DIVISION
EASTERN BLVD AT MARTIN BLVD N. E.
P. O. BOX 4937
MIDDLE RIVER, MARYLAND 21220
(301) 682-5800 TWX (710) 239-9037

A TELEDYNE COMPANY

17 June 1969

U. S. Atomic Energy Commission
Division of Material Licensing
Isotopes Branch
Washington, D. C. 20545

Attention: Mr. Robert E. Brinkman

Subject: Abandonment of a Facility Formerly Used for Nuclear Activities

Gentlemen:

Isotopes' Nuclear Systems Division has recently completed decontamination of the Martin Marietta Corporation's Radiochemistry Laboratory ("KJ" Building). This building was formerly used for those activities previously authorized under AEC Byproduct Material License No. 19-1398-33. Since we have no immediate need for this facility, we plan to relinquish control of the building so that it can be used by Martin Marietta for general use.

The resultant radioactive wastes have been packaged preparatory to shipment to an authorized disposal site and the results of the final radiological survey are transmitted herewith for your information.

Review of the attached survey data indicates that the proposed AEC guides governing the abandonment of nuclear facilities have been met; therefore, Isotopes, a Teledyne Company, hereby requests release of the subject facility for future public use. Please note that the request contained herein does not involve any change in the currently authorized uses described in Isotopes' AEC Byproduct Material License No. 19-1398-33.

We would appreciate receiving approval of this request at your earliest convenience. Please contact me directly on (301) 682-5800, Ext. 2513 or 7817 if I can be of further assistance in this matter.

Very truly yours,

Peter J. Knapp
Licensing and Accountability
Representative

/ak

cc: R. G. Macaulay (Martin Marietta)
Attachments (3)

A-263
10030

"KJ" BUILDING SMEAR SURVEY DATA

The smears were counted in an NMC thin-window gas flow proportional counter. The average alpha background was 1 cpm whereas the average beta-gamma background was 53 cpm. This counting system exhibits 30% efficiency when used for U^{235} alphas and 45% efficiency when used for counting Sr^{90} betas. The results of the smear survey are as follows:

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		α	$B\gamma$
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Floor	23	< 50	< 50
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Floor	30	< 50	< 50
Exhaust Hood	31	< 50	240
Exhaust Hood	32	< 50	96
Exhaust Hood	33	< 50	240
Floor	34	< 50	< 50
Floor	35	< 50	< 50
Floor	36	< 50	120
Floor	37	< 50	< 50
Floor	38	< 50	< 50
Floor	39	< 50	252
Floor	40	< 50	< 50
Liquid Waste Hold Tank	41	< 50	< 50

10830

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Liquid Waste Hold Tank	42	< 50	< 50
Liquid Waste Hold Tank	43	< 50	< 50
Shower Base	44	< 50	< 50
A. C. Duct	45	< 50	< 50
Anemostat	46	< 50	< 50
Anemostat	47	< 50	< 50
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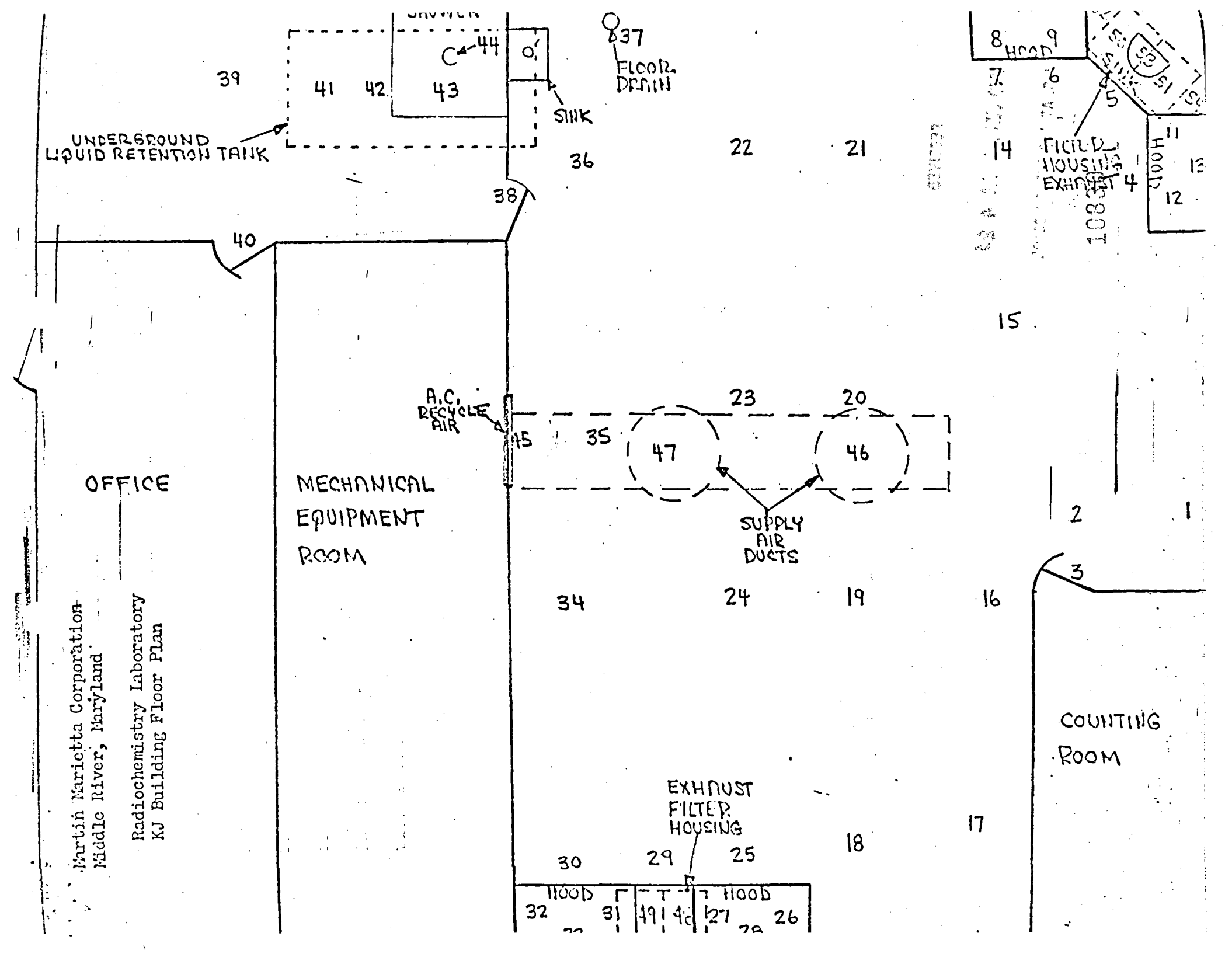
Sink, S.E. Corner	52	< 50	180
Sink, S.E. Corner	53	< 50	< 50
Sink, S.E. Corner	54	< 50	< 50

* Refer to "KJ" Building floor plan for better orientation.

"KJ" BUILDING INSTRUMENT SURVEY DATA

Fixed contamination-radiation levels were measured employing a modified Eberline PAC-3G adjusted to measure alpha-beta-gamma radiations. Survey of the areas depicted on the "KJ" Building floor plan indicated radiation levels below 0.2 Mrads/hour. The instrument used was standardized employing a Ra^{226} calibration source.



Martin Marietta Corporation
Middle River, Maryland

Radiochemistry Laboratory
KJ Building Floor Plan

ML080160324

UNITED STATES
ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
REGION I
970 BROAD STREET
NEWARK, NEW JERSEY 07102

201 645- 3943

July 7, 1969

File

MARTIN MARIETTA CORPORATION
MIDDLE RIVER, MARYLAND
RELEASE FOR PUBLIC USE OF A FACILITY FORMERLY USED FOR NUCLEAR ACTIVITIES BY MARTIN MARIETTA CORPORATION AND ISOTOPES, INC.

Late in 1968, Isotopes, Inc., (Isotopes) of Westwood, N.J. purchased the nuclear facilities of Martin Marietta Corporation (Martin) at Middle River, Maryland. Isotopes continued to conduct their nuclear activities in the building owned by the former licensee and Martin's licenses were transferred to Isotopes. Isotopes has discontinued their nuclear activities (under license 19-1398-33) in the radiochemistry laboratory ("KJ" Building), and has decontaminated the building. Martin plans to use "KJ" Building for non nuclear activities.

Recent radiological surveys of the "KJ" Building done by Isotopes, (under contract with Martin) indicate that the proposed AEC guides governing abandonment of nuclear facilities have been met. The survey results were transmitted to DML in two letters:

a. R. G. Macaulay, Martin Marietta, Corp., to Dr. J. A. Mc Bride, DML, letter dated June 11, 1969.

b. P. J. Knapp, Isotopes, Inc., to R. E. Brinkman, DML, letter dated June 17, 1969.

On June 27, 1969, R. Gilbert of CO:I visited the subject facility to confirm Isotopes' final survey of the "KJ" Building.

Survey instruments used by Gilbert included an Eberline E-120 type GM survey meter, range 0-20 mr/hr., window thickness $< 7.$ mg/cm^2, and an Eberline PAC-1SA alpha survey meter, 59 cm^2 window area.

The area surveyed is as sown on the drawing of the"KJ" Building which was submitted by Martin and Isotopes in their June, 1969 letters. Direct measurements for fixed alpha, beta, and gamma surface contamination were made at locations 2, 3, 5, 9, 13, 18, 20, 26, 32, 37, 40, 41, 45, 48, 49, 53and the sink behind location 37. No evidence of fixed contamination above instrument background was noted.

A1267

Smear surveys were made at location 49 and the filter box. No evidence of removable contamination was noted. Smear samples were monitored with the inspector's instruments.

Mr. P. J. Knapp of Isotopes., Inc., accompanied the inspector during the facility survey.

It is the inspector's opinion that the area can be redesignated as an unrestricted area.

The release of this building for non nuclear use does not involve any change in the currently authorized uses described in Isotopes' AEC byproduct license 19-1398-33.

H. W. Crocker
Senior Fuel Facilities Inspector

ML080160335

JUL 14 1969

DML:IB:REB
(19-01398-33)

Isotopes, Incorporated
Nuclear Systems Division
P. O. Box 4937
Eastern Boulevard at Martin
Boulevard, N.E.
Middle River, Maryland 21220

Attention: Mr. Peter J. Knapp
Licensing and Accountability
Representative

Gentlemen:

This is to acknowledge your letter of June 17, 1969, clarifying that Martin Marietta Corporation Building "KJ" is no longer needed for radioisotope operations under AEC byproduct material License No. 19-01398-33 and has been decontaminated for release. Your survey reports indicate that there is no need to maintain Building "KJ" as a restricted area nor to require a license of subsequent possessors of the building.

Sincerely,

Original signed by
Robert E. Brinkman

Robert E. Brinkman
Isotopes Branch
Division of Materials Licensing

cc: R. G. Macaulay (Martin Marietta)

bcc: St. Br. Dist.
CO, REGION I
DML

A1269

OFFICE ▶	DML:IB					
SURNAME ▶	REBrinkman:eaj					
DATE ▶	7/11/69					

Form AEC-318 (Rev. 9-53) AECM 0240 ☆ U. S. GOVERNMENT PRINTING OFFICE: 1968 O-320-507

ML080160349

614/R&B

ISOTOPES
NUCLEAR SYSTEMS DIVISION
[illegible]
MIDDLE RIVER, MARYLAND [illegible]

15 August 1969

Refer to: PJK:1210:044

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Robert Brinkman, Chief, Isotopes Branch

Subject: Notification of Isotopes' Nuclear Systems Division Move to New Facilities

Reference: (a) Title 10 Code of Federal Regulations, Parts 30.34C and 30.38

Gentlemen:

Isotopes' Nuclear Systems Division has recently completed arrangements to move to new quarters located at:

110 West Timonium Road
Timonium, Maryland 21093

It is presently anticipated that Isotopes will vacate the Middle River facilities by September 30, 1969 and restore operations at the new location on or about that same date.

In view of the foregoing, a thorough review of existing Byproduct Material License has been made. As a result of this review, we are requesting the following actions:

(1) Amendment of BPML No. 19-01398-01 reflecting the change in address. All other terms and conditions of this license to remain unchanged.

(2) BPML No. 19-01398-03 is to remain unchanged since there are no provisions in the new facility for this type irradiator; however, Isotopes is presently negotiating disposition of the Cobalt-60 gamma sources. As soon as disposal arrangements are completed, the license will be terminated. In any event, control of the facility will be retained in accordance with existing license requirements, utilizing Martin Marietta Corporation ADT Systems and Security personnel who are

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instructed to notify Isotopes' Health Physics personnel in the event of an alarm. Since a large quantity of Cobalt-60 is presently stored in the facility as sealed sources under water, it has not been possible to perform a complete survey of the pool surfaces. There is always a possibility that contamination might be found on pool surfaces when the water is drained.

(3) Amendment of BPML No. 19-01398-09 reflecting the change in address. In addition, material control shall be accomplished in accordance with the statements and representations submitted February 3, 1969 supporting request for renewal of BPML No. 19-01398-01. All other terms and conditions of this license to remain unchanged.

(4) Termination of BPML No. 19-01398-19. All radioactive materials formerly possessed under this license have been disposed of in compliance with the provisions of 10 CFR 20 by transfer to a company authorized to receive them.

(5) Termination of BPML No. 19-01398-20. All radioactive materials formerly possessed under this license have been disposed of in compliance with the provisions of 10 CFR 20 by transfer to a licensed waste disposal service.

(6) Amendment of BPML No. 19-01398-21 reflecting the change in address. All other terms and conditions of this license to remain unchanged with the exception of the following:

(a) Amend license condition 16 by deleting from the referenced letter dated June 29, 1969, reference to the following letters:

1. Two letters each dated August 10, 1962.
2. One letter dated July 30, 1963.
3. One letter dated January 11, 1965.

(b) Access to the Timonium location is controlled by personnel during normal working hours, and the plant is locked at all other times.

(7) Termination of BPML No. 19-01398-23. All radioactive materials formerly possessed under this license have been disposed of in compliance with the provisions of 10 CFR 20 by transfer to a licensed waste disposal service.

(8) Termination of BPML No. 19-01398-25. All radioactive material formerly possessed under this license have been disposed of in compliance with the provisions of 10 CFR 20 by transfer to a licensed waste disposal service.

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(9) Amendment of BPML No. 19-01398-31 reflecting the change in address. All other terms and conditions of this license to remain unchanged.

(10) Termination of BPML No. 19-01398-33. All radioactive materials formerly possessed under this license have been disposed of in compliance with the provisions of 10 CFR 20 by transfer to an authorized waste disposal service.

(11) Amendment of BPML No. 19-01398-34 reflecting the change in address. All other terms and conditions of this license to remain unchanged.

(12) Amendment of BPML No. 19-01398-36 reflecting the change in address and also modifying the authorized use for storage only. Presently the only inventory of H^3 (15 C_i) is that which is contained inside the accelerator system, ion pump and target cavity. Isotopes is presently negotiating disposition of this neutron generator. As soon as disposal arrangements are completed, we intend to terminate this license. In any event, control of this unit while in our possession will be retained in accordance with sound radiological practices consistent with the degree of hazard involved.

In order that we achieve our scheduled goal to vacate occupancy of the Middle River Facility by September 30, 1969, we solicit your prompt action in reviewing and granting the requested license changes described herein. If we can be of any assistance to you in this matter, please call on us directly.

Thank you again for your usual assistance and expeditious licensing efforts.

Very truly yours,

Peter J. Knapp
Licensing and Accountability
Representative

PJK:nmb

12039

ML080170042

ORNL SITES - SUMMARY

License No.:	SNM-00053	ORNL Score:	70,494
Docket No.:	070-00058		
Licensee:	The Martin Company Isotopes, Inc.	Review Status:	~~File Reviewed~~ Complete
Site Address(es):	Middle River, Maryland 110 West Timonium Road Timonium, Maryland 21093		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s):	19-01398-20, 19-01398-32, SNM-00011, SNM-00849, SNM-00907, SNM-01150, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		

Review Abstract: License No. SNM-00053 authorized the possession of special nuclear material in Building D at Middle River, Maryland and at Timonium, Maryland. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.

Licensee, NRC, and Maryland State surveys indicate that the Timonium site is suitable for unrestricted use.

Recommendations: NONE

Summary: License No. SNM-00053 authorized possession and use of up to 1,000 kilograms of uranium enriched in U-235 as UO_2 and metal and 160 grams of plutonium in the form of a plutonium-beryllium source. Licensed activities included fuel element development and fabrication at the Middle River facility. On September 23, 1969 License No. SNM-01150 was issued pursuant to an amendment to License No. SNM-00053 to permit the transfer and use of up to 100 grams of U-235, at any enrichment and in any chemical form, for research and development activity, and 171 grams of Pu-235 for neutron and alpha instrument calibration sources, from the Middle River facility to the Timonium facility. Concurrently, SNM-00053 was amended in its entirety to authorize the storage of U-235 in the form of contamination in Building D at Middle River. License No. SNM-00053 (Teledyne-Isotopes) was terminated May 26, 1970. There is no termination or confirmatory survey for License No. SNM-01150.

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March 10, 1995

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License Nos. SNM-1192 and SNM-01150 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Licensee letter dated March 25, 1975 documents a survey of the Timonium site consisting of 67 wipes and a portable instrument alpha/beta/gamma survey of "all areas that had been subject to use of radioactive materials" which identified no residual contamination. An NRC letter dated April 15, 1975 of an inspection to confirm disposition of license material under License No. SNM-0849 and an examination of the licensees contamination survey reported that "no items of noncompliance were observed". The State of Maryland terminated License MD-05-014-01 (formerly USNRC License No. 19-01398-34) covering the whole site after performing a confirmatory survey on July 19, 1993 of the licensee's termination survey of June 8 and 9, 1993. The site is suitable for unrestricted use.

Reviewed by: Stephen W Holmes **Date** 10 MARCH 95

Approved by: [signature] **Date** 3/10/95

ORNL SITES - SUMMARY

License No.:	SNM-01150	ORNL Score:	23
Docket No.:	070-01211		
Licensee:	Isotopes, Inc.	Review Status:	~~File Reviewed~~ Complete RB
Site Location(s):	110 West Timonium Road Timonium, Maryland 21093		**File located with SNM-00053**
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related Licenses:	19-01398-20, 19-01398-32, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		
Review Abstract:	License No. SNM-01150 authorized the transfer and use of small amounts (grams) of special nuclear material from Building 'D' of the Middle River facility to the Timonium facility. There is no termination or confirmatory survey under this license number. Licensee, NRC, and Maryland State surveys indicate that the Timonium site is suitable for unrestricted use.		

Recommendations: NONE

Summary: License No. SNM-01150 was issued September 23, 1969 pursuant to an amendment to License No. SNM-00053 to permit the transfer and use of up to 100 grams of U-235, at any enrichment and in any chemical form, for research and development activity, and 171 grams of Pu-235 for neutron and alpha instrument calibration sources, from the Middle River facility to the Timonium facility.

The license information for License No. SNM-01150 is docketed with License No. SNM-00053. There is no termination or confirmatory survey for this license.

Licensee letter dated March 25, 1975 documents a termination survey of the Timonium site consisting of 67 wipes and a portable instrument alpha/beta/gamma survey of "all areas that had been subject to use of radioactive materials" which identified no residual contamination. An NRC letter dated April 15, 1975 of an inspection to confirm disposition of license material under license SNM-0849 and an examination of the licensee's contamination survey reported that "no items of noncompliance were observed". The State of Maryland terminated License No. MD-05-014-01 (formerly USNRC License No. 19-01398-34), covering the whole site, after performing a confirmatory survey on July 19, 1993 of the licensee's termination survey of June 8 and 9, 1993 which encompassed the entire facility. The site is suitable for unrestricted use.

Reviewed by: Stephen W Holmes **Date** 10 March 95

Approved by: _____ **Date** 3/10/95

ORNL SITES - SUMMARY

License No.:	SNM-01192	ORNL Score:	0.57
Docket No.:	070-00058		
Licensee:	Martin Marietta	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s):	19-01398-20, 19-01398-32, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01150, STB-00187		
NRC Reviewer:	David F. Limroth, Stephan W. Holmes		
Review Abstract:	License No. SNM-01192 was issued for the decontamination of Building D at the Middle River facility. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.		
Recommendations:	None.		

Summary: License No. SNM-01192 was issued for the decontamination of Building D at the Middle River (Chesapeake Park) facility. Operations authorized under various licenses had been conducted at this location.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the

site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 1/22/95

Approved by: _____ **Date** 1/23/95

January 23, 1995

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

William Donald Schaefer
Governor

Robert Perciasepe
Secretary

August 2, 1993

Mr. John Vogt, Radiation Safety Officer
Teledyne Energy Systems
10707 Gilroy Road
Hunt Valley MD 21031

RE: Radioactive Material License Number MD-05-014-01

Dear Mr. Vogt:

On July 19, 1993 the Maryland Department of the Environment's Radiological Health Program completed a confirmatory radiological close-out survey of your facility which is authorized under the above referenced license and located at 110 W. Timonium Road in Timonium, Maryland.

Results of this survey indicate that this facility meets the Department's requirements for future unrestricted use. Should there be any questions concerning this letter, please contact Mr. Raymond Manley or me, at (410) 631-3301.

Sincerely,

Raymond E Manley fm

Carl E. Trump, Jr., Administrator
Radioactive Materials Inspection and Enforcement

CET/REM/dpn

7/6/93 EF1

TELEDYNE
ENERGY SYSTEMS

110 W. TIMONIUM RD.
TIMONIUM, MD 21093-3163
PHONE: (410) 252-8220
TELEX: 8-7780 (TDYENER TIMO)
FAX: (410) 252-5514

6 July 1993
Refer to: RSO-JFV-066

RECEIVED

JUL 7 1993

RADIOLOGICAL
HEALTH PROGRAM

Mr. Carl Trump
Radiation Health Program
Department of the Environment
State of Maryland
2500 Broening Highway
Baltimore, Maryland 21224

Subject: BYPRODUCT LICENSE NO. 05-014-01

Dear Mr. Trump:

Enclosed is the report of the survey conducted to support our request for termination of the subject license.

As I mentioned in my first letter to Mr. Flynn, our plans are to vacate the Timonium facility at the end of this month. If additional information is required, please let me know.

Sincerely,

John F. Vogt
Radiation Safety Officer

JFV:dh

Enclosure: JSB letter dated June 30, 1993, enclosing "Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093"

JSB ASSOCIATES

Mr. John Vogt
Radiation Safety Officer
Teledyne Energy Systems
110 W. Timonium Road
Timonium, MD 21093-3163

June 30, 1993

RE: Results of Radiological Survey of Teledyne Facility
Located at 110 W. Timonium Road, Timonium, MD

Dear Mr. Vogt:

Please find enclosed the report on the results of the radiological survey I performed at your facility on June 8th and 9th, 1993. If you require any editorial changes to the report please let me know as soon as possible.

As I mentioned during our telephone conversation, the issue of the need for a Maryland license to perform surveys appears to be resolved. If you have any questions about the report please do not hesitate to call me. I can be reached at (215) 873-9464. Thank you again for choosing JSB Associates for your radiological consulting needs.

Sincerely,

Joseph W Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant
J. Stewart Bland Associates, Inc.

ATTACHMENT: Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093

Mr. John Vogt
Radiation Safety Officer
Teledyne Energy Systems
110 W. Timonium Road
Timonium, MD 21093-3163

June 15, 1993

RE: Results of Radiological Survey of Teledyne Facility
Located at 110 W. Timonium Road, Timonium, MD

Dear Mr. Vogt:

At the request of your firm, I performed a third party independent radiological survey of the Teledyne facility located at 110 W. Timonium Road, Timonium, MD on June 8th and 9th, 1993.

The extensive direct radiation measurements made at the facility with field instrumentation and analysis of the numerous swipe samples by sensitive laboratory instrumentation confirm that no licensed radioactive materials are detectable above the ambient background level. This being the case, the facility has met the free release criteria as described in NRC Regulatory Guide 1.86, Table I by a wide margin of safety and is therefor suitable for occupation by another leaseholder.

This facility close-out survey was authorized by Teledyne Energy Systems under purchase order 28900 dated May 27, 1993.

All instrumentation used was calibrated under the program authorized by the State of Maryland Department of the Environment license # MD-33-021-01.

I hereby state that I am a Heath Physicist Certified by the American Board of Health Physics with extensive experience in the area of industrial facility contamination assessment and decontamination and am therefor adequately qualified to perform this building close-out survey.

Sincerely,

Joseph W Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant
J. Stewart Bland Associates, Inc.

ATTACHMENT: Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093

CLOSE-OUT RADIOLOGICAL SURVEY OF THE TELEDYNE ENERGY SYSTEMS FACILITY AT 110 W. TIMONIUM ROAD, TIMONIUM, MD 21093

Prepared by:

Joseph W. Moon, CHP

J. Stewart Bland Associates, Inc.

June 30, 1993

CLOSE-OUT RADIOLOGICAL SURVEY OF THE TELEDYNE ENERGY SYSTEMS FACILITY AT 110 W. TIMONIUM ROAD, TIMONIUM, MD 21093

1.0 HISTORICAL PERSPECTIVE AND APPROACH

Only two radionuclides were historically present at the facility. These radionuclides were strontium-90 (Sr-90) and plutonium-238 (Pu-238). Sr-90 was received at the facility already loaded into thermo-electric devices to be performance tested. The actual sealed sources in these devices were never removed from the devices. Pu-238 was received only as sealed sources under Department of Energy (DOE) authorization for loading into thermo-electric devices. The loading of these sources was performed within a glove box containment structure with full radiological control practices applied. At the time these operations were terminated, the containment was shipped to Mound Laboratory. The former Pu-238 containment filtration/exhaust system was renovated to fit a new "glove box" when the old containment structure was removed. At that time all filtration elements were exchanged. The areas of the building where Pu-238 activities had been conducted were surveyed by Teledyne Energy Systems personnel and were found to be free of contamination. All of the thermo-electric devices of both types have been transferred to end users and none remain at the facility.

The licensed radioactive material retained on site consists of sealed sources used for the calibration of radiological survey instrumentation, and a variety of check sources used for the same purpose under the existing license. The integrity of these sources is assured under the licensee's source inventory control program and all of these sources will be either disposed of or transferred to another licensee prior to vacating the current building. With regard to the remaining licensed sources, the scope of this survey has only addressed the possibility of facility contamination around the source storage locations as identified by the facility Radiation Safety Officer. There are various articles (2% thoria welding rods and items composed of magnesium-thoria metal) at the facility containing various amounts of naturally occurring thorium that is not subject to licensed regulation (< 5% thoria) but are nevertheless radioactive. Each of these articles has been identified and will be removed prior to vacating the premises. The close-out survey verified that each of these articles effectively contained the naturally occurring activity such that there is not a possibility that residual radioactive material will remain in the facility when these articles are removed.

It was impractical to dismantle the piping of the old Pu-238 containment exhaust system as it was still in use at the time of the survey. The internal surfaces of this piping were not included in the scope of this survey. Although unlikely considering that only sealed sources were handled, the internal surfaces of this piping below the High Efficiency Particulate Absorber (HEPA) filters are still potentially contaminated. These sections of the piping will be isolated disassembled and removed prior to vacating the premises.

The approach taken for this close-out survey did not assume credit for anticipated conditions but was conducted as though contamination was expected to be present at some detectable level. The scope of the final close-out survey encompassed the entire facility and not just those areas where radioactive sources were handled.

2.0 SELECTION OF SURVEY INSTRUMENTATION

The instrumentation used for this survey was selected specifically for its capacity to detect the radionuclides historically handled at the facility (Pu-238, and Sr-90) but was also suitable to detect naturally occurring thoria compounds. All instrumentation used was calibrated under the program authorized by the State of Maryland Department of the Environment license # MD-33-021-01. Each field survey instrument was source checked both prior to and following use to assure they were properly functioning during the survey. Background readings for each of the instruments used were also determined and recorded. The following is a listing of the field survey instrumentation used to perform this survey.

- Alpha: Ludlum 50 cm^2 zinc-sulfide detector (Model 43-1 Serial Number 020791) attached to a Ludlum count rate meter (Model 3 Serial Number 91842). Calibration Date: 6/3/93
  Efficiency for Pu-238 5.5 MeV alpha - 33% determined by calibration with Am-241 (5.49 MeV)
  Sensitivity: 60 dpm/100 cm^2 fixed contamination
  10 dpm/100 cm^2 loose surface on 300 cm^2 swipe
  Reg. Guide 1.86 Criteria: 200 dpm/100 cm^2 ave. fixed
  300 dpm/100 cm^2 max. fixed
  20 dpm/100 cm^2 loose surface

- Beta/Gamma Bicron Surveyor count rate meter (Serial Number AHS-A198A) with standard 17 cm^2 GM Pancake Probe detector (Serial Number 2081)
  Calibration Date: 5/18/93
  Efficiency for Sr/Y-90 Beta particles - 46%
  Sensitivity (@ equilibrium): 10 dpm/ probe area (60 dpm/100 cm^2)
  Reg. Guide 1.86 Criteria: 5000 dpm/100 cm^2 fixed
  1000 dpm/100 cm^2 loose surface

- Gamma Background Victoreen Pressurized Ion Chamber (Model 450 P/Serial Number 583)
  Calibration Date: 2/24/93
  Sensitivity: 10 μR/hr nominal
  Reg. Guide 1.86 Criteria: None

Remote instrumentation used for swipe analysis in off site laboratory

(RSO, Inc., Laurel, MD)

- Liquid Scintillation counter set-up for Am-241 alpha Beckman LS-6000
  Sensitivity: 50 dpm/swipe area

- Gas Flow Proportional counter (Baird Atomic Model SSC-3)
  10 minute counts (nominal efficiency 46% for Thorium-230 alpha 2 pi geometry)
  Sensitivity: < 10 dpm/swipe area

3.0 SURVEY PLAN

The basis of the survey plan was determined by the nature of operations at the facility. A semi-biased survey was warranted since only sealed sources were handled at the facility with full source inventory and contamination controls in place during operations.

Prior to the initiation of the survey, instrument operability checks (e.g. battery checks and source checks where appropriate) were performed and instrument background readings were made in an area not suspected to be affected by former facility operations.

The criteria used for determining suitability for unrestricted use is that specified in Nuclear Regulatory Commission Regulatory Guide 1.86 unless otherwise specified by the concerned regulatory authorities.

3.1 Preliminary Survey

A preliminary survey was performed and was focused on the areas most likely to contain radioactive contamination from licensed operations conducted at the facility. The purpose of this focus was to determine at an early stage of the survey work the worse case radiological conditions that would be encountered at the facility should any residual radioactivity be detected. The preliminary survey entailed a detailed survey of seven designated "Radioactive Material areas" areas (R.A.M.) identified by the facility Radiation Safety Officer (Mr. John Vogt). In addition, the scope of the preliminary survey included a moderately conservative assessment of the entire former source security control area (the effective Radiological Control Area).

The nature of the seven designated R.A.M. was described as follows:

Area 1 White Room - A room used for the preparation of device subassemblies. Some radioactive Material is known to have been in this room and therefor it was designated as a primary survey area.

Area 2 — Pu-238 Device Assembly Area (Submarine Room) - The Pu-238 sealed sources were loaded into the thermo electric devices inside a containment structure known as the "submarine" located in the room. The containment was maintained under negative pressure by a ventilation system having HEPA filters in line prior to the roof discharge vents. Access and contamination controls were in place during these operations.

Area 3 — Facility Security Vault - The vault located in the administrative area contains a triply contained vessel containing approximately 740 grams of thoria. The container was opened and the integrity of the internal packaging was verified. The area was surveyed solely due to the presence of this material currently in the vault.

Area 4 — Pu-238 Source Storage Area - This area was controlled under heavy security during operations and contained all Pu-238 sealed sources not yet assembled into devices. The area is currently in use as a high security storage area and also contains the 1 mCi Radium source used for instrument calibration.

Area 5 — Pu-238 Source Testing and Measurement Area - This area is basically a floor space designated for the use of testing and measurement of the Assembled devices. The devices were lifted from a pedestal by and overhead crane where they were tested and measured while suspended above the floor.

Area 6 — Strontium Device Testing Area - This area is a sunken truck bay with a roll-up door access to the east end of the facility. The assembled Strontium devices were placed in the truck bay, tested and then repackaged for shipment all in the same area. No strontium containing devices were ever disassembled at the facility.

Area 7 — Source Storage Locker - This area is a locked file cabinet containing various check sources for use with the facility radiation detection instrumentation.

If the results of the preliminary detailed surveys in the seven designated R.A.M. areas and the conservative survey of the remainder of the former source security area did not indicate the presence of residual radioactive material, there would be little probability that the rest of the facility would have been adversely affected by the licensed operations. The survey plan for the rest of the facility would only be cursory in nature with several direct measurements and smears being assessed by field counting in each room or general activity area. The measurements taken in these areas would be focused on high traffic areas where it is likely that contamination, if spread to other sections of the facility, would be present in detectable quantities (see section on survey techniques).

The general plan for those areas designated as RAM locations include an initial gamma background rate measurement followed by local instrument background determinations for the other survey instruments. A detector window integrity test for the zinc sulfide α instrument would the be performed by holding the detector up to a source of fluorescent light. An increase in the background rate would indicate a loss of window integrity and the use of the instrument.

Randomly selected locations on horizontal and vertical surfaces in the rooms with areas of 100 cm^2 would then be measured directly with field instrumentation. At each location where the initial direct measurement is in excess of the background level, the measurement will be recorded. A swipe of each area would then be made to assess the levels of loose contamination on the surface. These swipes would be set aside for a period of 4 hours to allow for the decay of naturally occurring radionuclides (e.g. Radon progeny). After the decay period each swipe would be measured for alpha and beta contamination in a location that is not expected to have been affected by facility operations. A direct measurement of the surface would be made after the swipe was obtained to assess the level of fixed contamination at the location. If the results of any of the surveys presented evidence of unanticipated contamination above the surface contamination release guidelines (NRC Reg. Guide 1.86 criteria) at any of the measured locations, this would be an indication that further assessment would be required to allow a statistical characterization of the areas containing detectable activity. Swipes of the areas would be counted in either a proportional counter (set up for the detection of alpha particle emissions after a minimum decay period of 24 hours) or a liquid scintillation counter set up for the measurement of Pu-238 α emissions. Some portion of the population of swipes taken would be assessed by the proportional counter and some taken near the same locations will be assessed by liquid scintillation counting as a qualitative cross check of instrument reliability. Whereas the sensitivity of the hand held α detector is greater than that of either of the two laboratory instruments, the measurement of large area swipes (not a suitable media for assessment in the lab counters) using this field instrument was considered to be an acceptable alternative to exhaustive swipe collection and analysis if no measurable α activity could be found by direct measurements. Even in the case that no detectable activity would be discovered by field instrumentation on large area swipes, a suitable number of swipes will be analyzed by the laboratory instrumentation to document the status of the targeted R.A.M. areas.

If any of the "RAM" areas were found to be contaminated, a full survey would be performed to characterize the area and any affected adjacent areas until the full extent of the contamination could be determined. If no detectable contamination was found in the "RAM" areas the survey of the adjacent room will focus on common traffic patterns for personnel carrying radioactive material.

Following the surveys instrument operability checks will be repeated to demonstrate operability at the end of the survey.

TELEDYNE ENERGY SYSTEMS

DATE: 7/19

TO: RAY MANLEY

FOR:

☐ ACTION ☐ COMMENT ☐ INFORMATION ☐ SIGNATURE

ATTACHED IS THE DOC-
UMENTATION YOU REQUESTED.
PLEASE CALL ME @
771 8606 IF YOU
HAVE ANY QUESTIONS.

THANKS

J. F. VOGT

3.2 Contingencies and Extended Survey Work

The nature and extent of any additional survey work required (characterization) would only be apparent when the results of the preliminary survey are known.

If long-lived alpha contamination was detected at the facility, provisions for the assessment of samples by alpha spectroscopy could be made to positively identify the contaminant as Plutonium-238.

Extended survey work necessary for the characterization of the contamination in the facility would be performed along the guidelines provided by the Nuclear Regulatory Commission. This type of survey was recommended (NUREG/CR 2082 1981) to document that a facility can be released to perform operations not involving the use of radioactive material and would require a much more extensive framework of area mapping and characterization. This extensive type of survey is meant to be used to document the effectiveness of a decontamination effort when it is known that a facility was at one time contaminated. The focus of the preliminary survey is to demonstrate that the facility has never been contaminated with the material it was licensed to handle.

Areas above any suspended ceilings and inside ventilation duct work would need to be assessed should any unanticipated contamination be found. Access to these areas and other normally inaccessible areas of the facility would be required in this unlikely circumstance.

4.0 SURVEY RESULTS AND SPECIALIZED SURVEY TECHNIQUES

The extensive direct radiation measurements made at the facility with field instrumentation and analysis of the numerous swipe samples by sensitive laboratory instrumentation confirm that no licensed radioactive materials are detectable above the ambient background level. This being the case, the facility has met the free release criteria as described in NRC Regulatory Guide 1.86, Table I by a wide margin of safety and is therefore suitable for occupation by another leaseholder.

Standard radiological survey techniques were employed to avoid cross contamination of swipe samples and to make direct measurements of surface activity (< 0.5" from surface without contact). Initially, small area tack cloth swipes (300 cm^2) of the targeted R.A.M. were taken and measured for both α and β/γ with the field instrumentation to assess the status of an area. These small area swipes would be appropriate in the event an area was found to be contaminated requiring detailed characterization of the distribution of activity on room surfaces. When no detectable radioactive material was found by direct measurements or on the small area tack cloth swipes, large area swipes (> 500 cm^2) were taken of the areas. In all cases these large area swipes were also found to be free of any detectable radioactive material.

The process of collection and analysis of large numbers of swipes (for area characterization) on media suitable for analysis by proportional counter and by liquid scintillation counting in this situation seemed pointless. A suitable number of these type of swipes were then taken in each area to verify the findings of the field instrument assessments and to provide a representative number of measurements of each area to allow an assessment of the radiological conditions in the unlikely event that the field instrument readings were faulty. All of these swipe samples were also measured for detectable α and ß/γ activity prior to being sent to the laboratory for analysis. None of these swipe samples contained any activity detectable with the field instrumentation.

Other survey techniques employed for this survey involved measurements of locations in the facility where radioactive materials if present would have been concentrated. Specifically, drain traps, subfloor piping recesses, surfaces above suspended ceilings, room air exhaust duct work and associated air filtration support members were surveyed. In addition, work station vacuum cleaners, grime accumulations on old fan blade shields, and fume hood exhaust plenums were measured as areas where if loose surface contamination by licensed radioactive material had been present at any time it would be unlikely that these areas would have been affected by subsequent decontamination efforts. No evidence of residual licensed radioactive material was found in any of these locations

The majority of the floor surface of the former source security area including the workshop, shipping and receiving areas, tool cribs and material storage areas was unsealed concrete. Tack cloth was used to acquire large area swipes on these surfaces. No detectable activity either α or ß/γ were detected on any of these swipes. On this type of surface, loose surface activity, if present, would have accumulated in corners and in cracks and crevices in the flooring. Extraction of some of this material from crevices and direct measurement of this material with field instruments would reveal the presence of historical facility contamination if it had been present. No evidence of licensed radioactive material was found in the crud residue excavated from these recesses or on any of the direct measurements made along these crevices.

The horizontal and vertical surfaces of all laboratories where radioactive material was present during facility operations were assessed by direct measurements and by swipe samples for the presence of residual activity. Where new surfaces had been applied since the cessation of radiological operations , the original surfaces were sought out and assessed. No evidence of residual licensed radioactive material was found in any of these measurements.

In the administrative areas of the facility, measurements of large area tack cloth swipes taken along major foot traffic patterns and in the relatively inaccessible areas below the stairwells did not indicate the presence of any residual contamination. Direct measurements of the areas along the bases of the walls and in corners where routine cleaning efforts were noticeably ineffective were also found to be free of residual

radioactive material. In areas where carpeting was installed, direct measurements of high traffic areas indicated by carpet wear, accumulations of sticky grime embedded into carpet fibers, and lower door closure recesses were assessed with no positive indications found.

None of the direct measurements of gamma background made with the pressurized ion chamber in any part of the facility (administrative or security areas) were in excess of 25 μR/hr with most of the measurements falling within the 10 to 20 μR/hr range.

The attached survey maps detail the survey work done in the six primary designated R.A.M. areas. On the maps of areas 1 and 2, the locations where the small area tack cloth wipes were taken are not indicated as they would unnecessarily clutter the diagram and interfere with the documentation of the locations where the proportional and liquid scintillation counter swipes were taken. No small area tack cloth swipes were taken in area 5 where large area swipes were used for the initial assessment. No map is attached for area 7 due to the small area involved. No fixed or loose surface activity was detected on any of the surfaces adjacent to this area (current source storage locker).

Survey performed by:

Joseph W. Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant,
JSB Associates, Inc.

ATTACHMENTS: Six Survey Maps

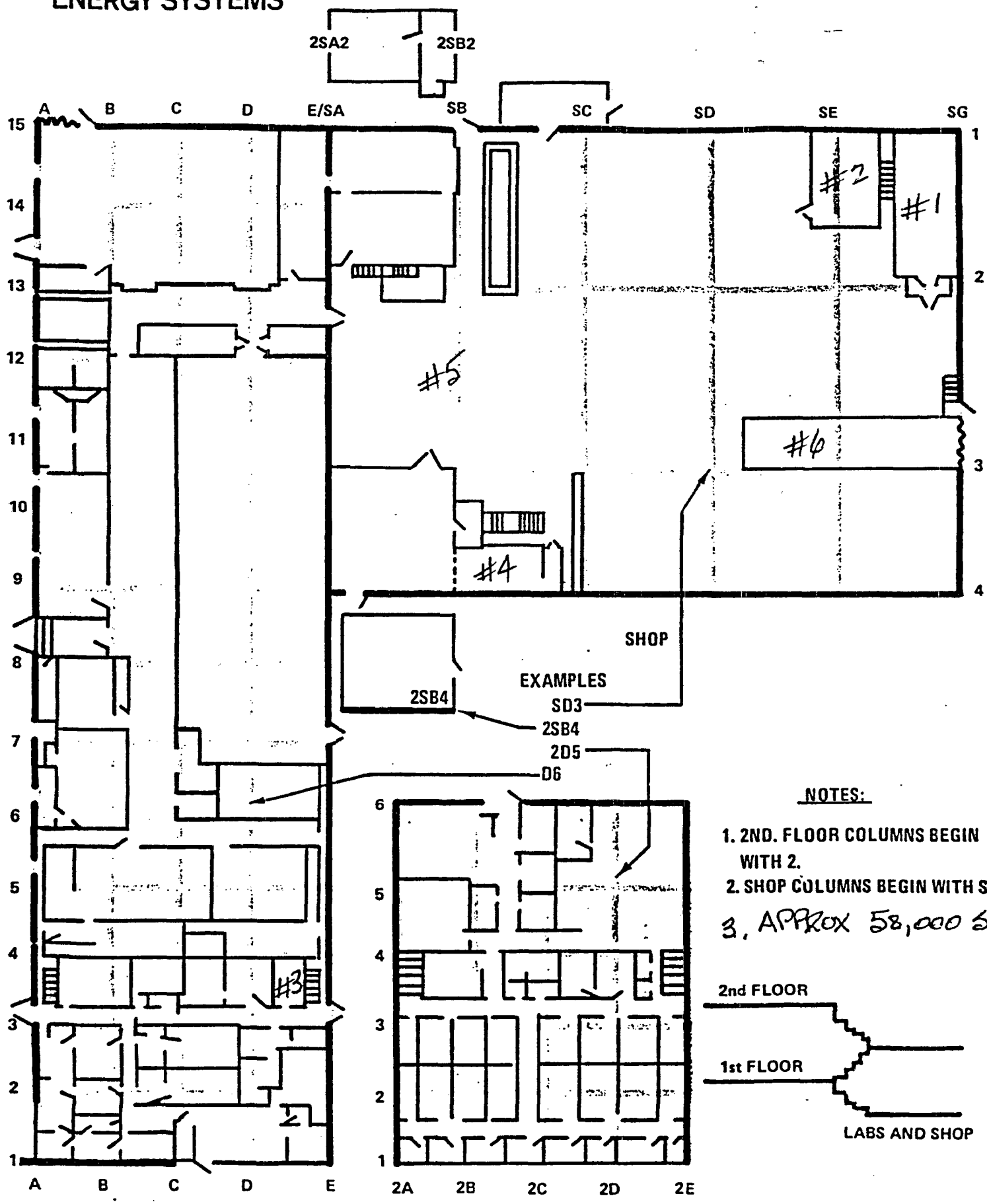
Facility Layout Diagram

Results of Laboratory Analysis of the Swipe Samples performed by RSO, Inc. Maryland Department of the Environment License # MD-33-021-01.

Three Calibration Certificates for Field Instrumentation

TELEDYNE
ENERGY SYSTEMS

BUILDING COLUMN GRID



NOTES:

1. 2ND. FLOOR COLUMNS BEGIN WITH 2.
2. SHOP COLUMNS BEGIN WITH S.
3. APPROX 58,000 SF

1ST. FLOOR

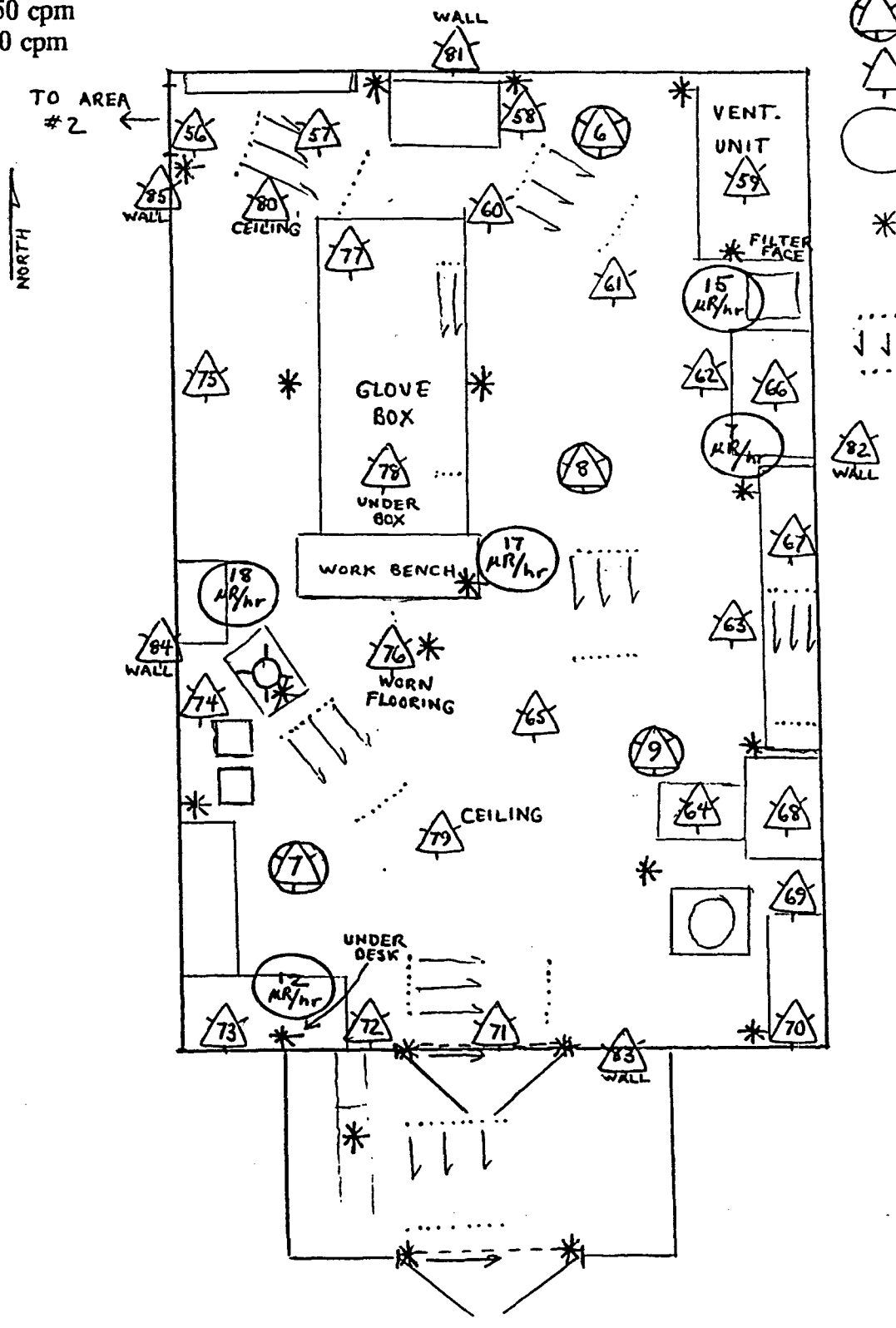
2ND. FLOOR

REVISED 7/10/77

AREA 1 - White Room

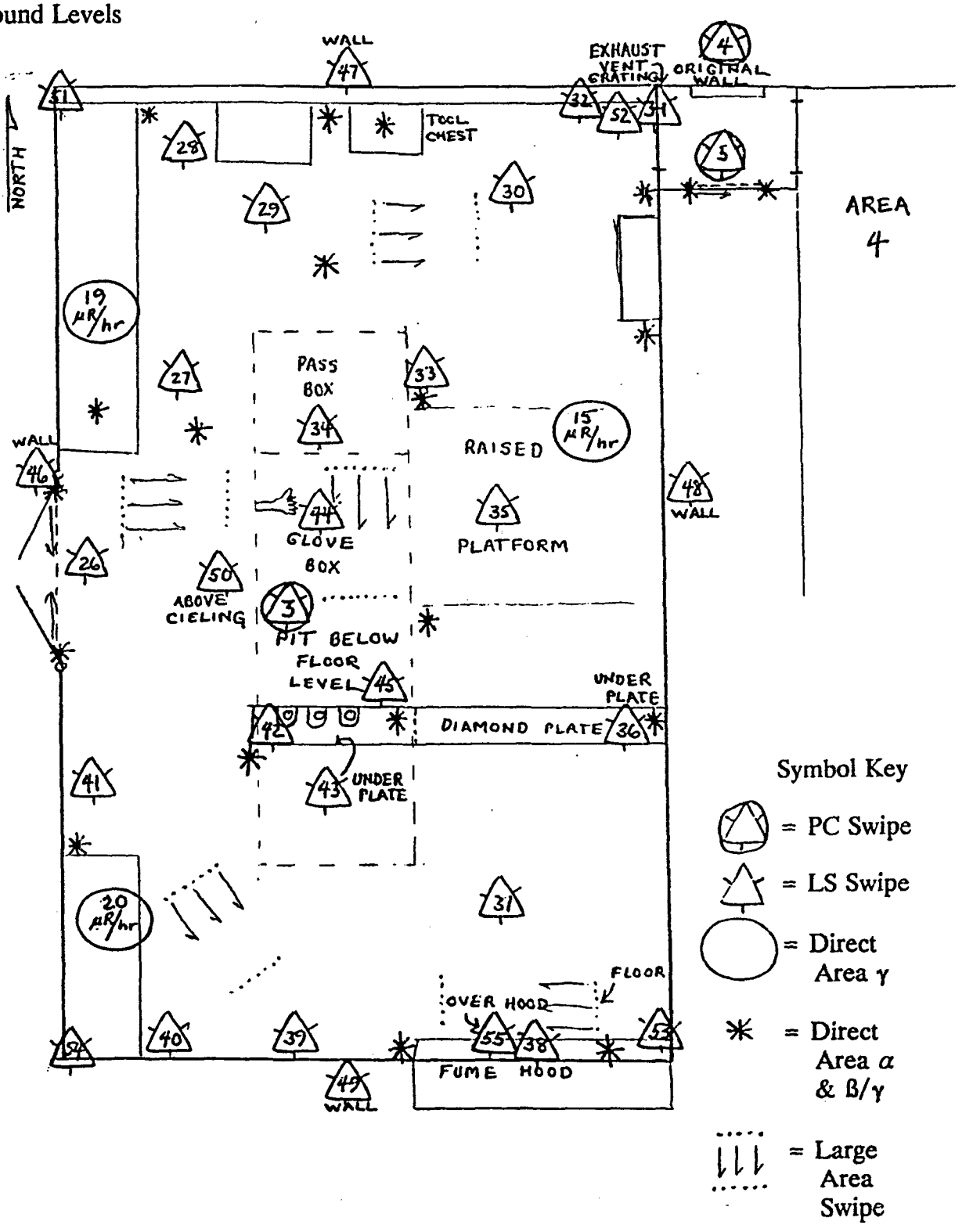
Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm

Symbol Key
= PC Swipe
= LS Swipe
= Direct Area γ
= Direct Area α & β/γ
= Large Area Swipe



AREA 2 - Pu-238 Device Assembly Area

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



Symbol Key

= PC Swipe

= LS Swipe

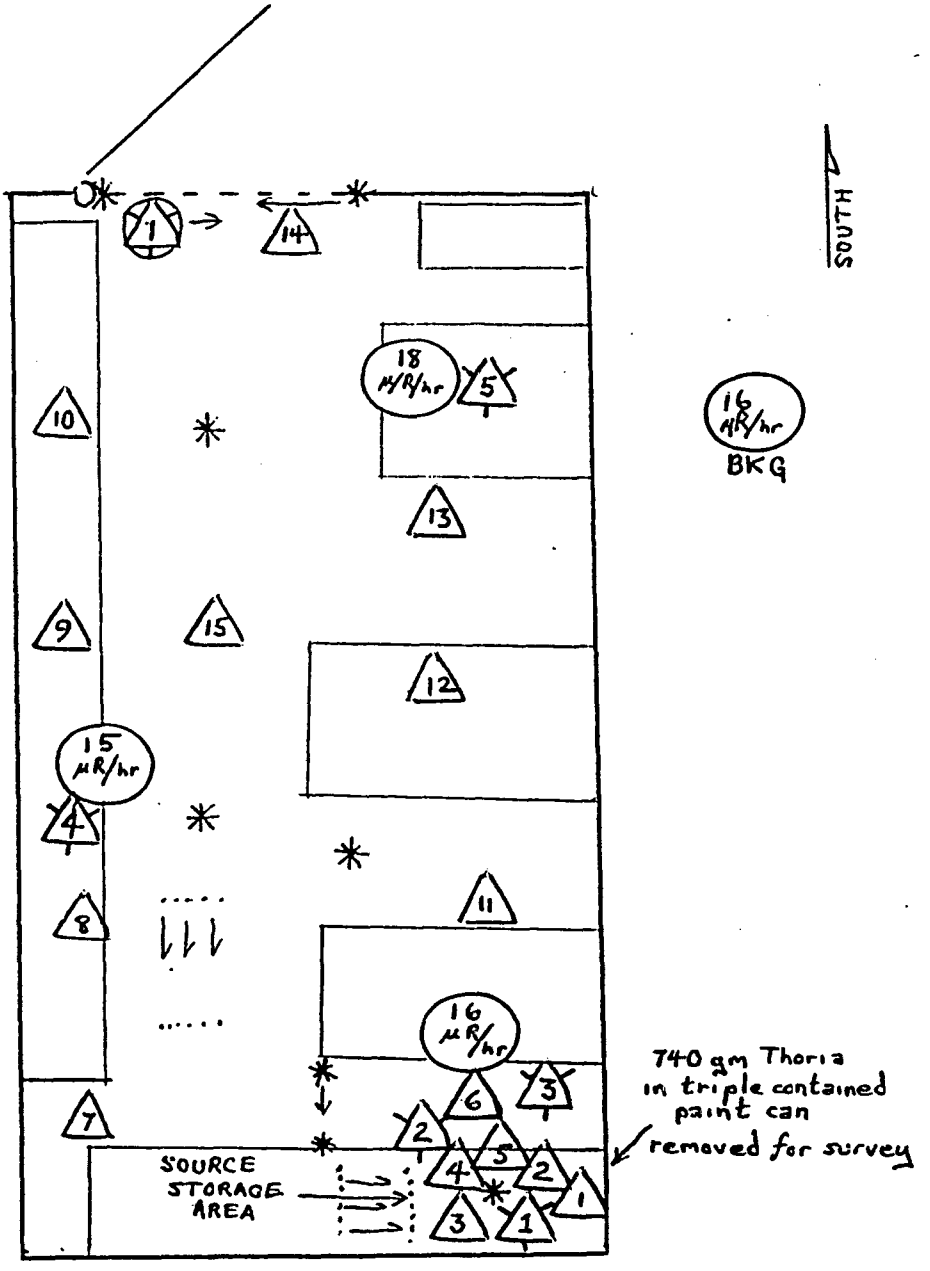
= Direct Area γ

= Direct Area α & β/γ

= Large Area Swipe

AREA 3 - Facility Security Vault

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



Symbol Key

= PC Swipe

= LS Swipe

= Direct Area γ

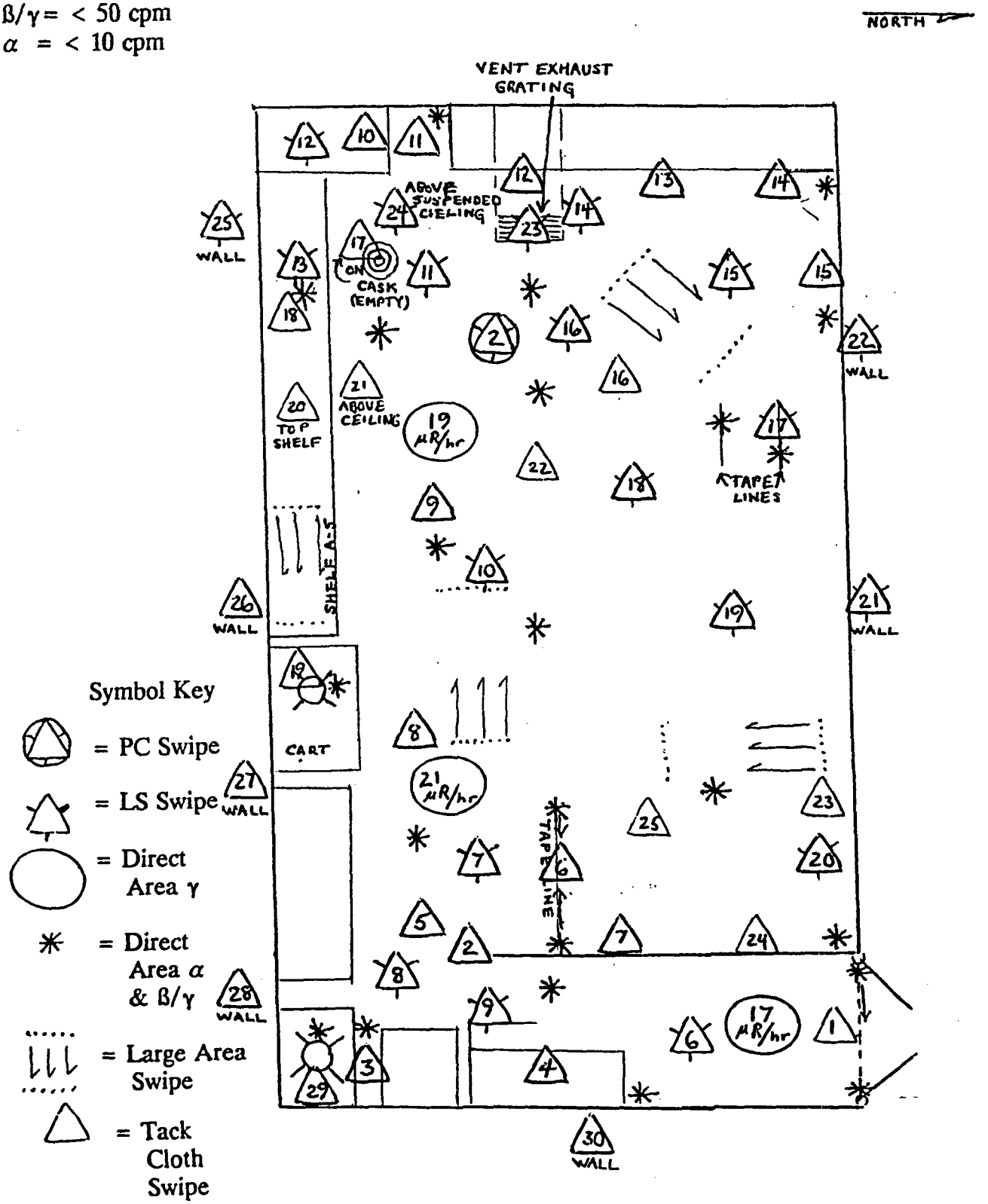
= Direct Area α & β/γ

= Large Area Swipe

= Tack Cloth Swipe

AREA 4 - Pu-238 Source Storage Area

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



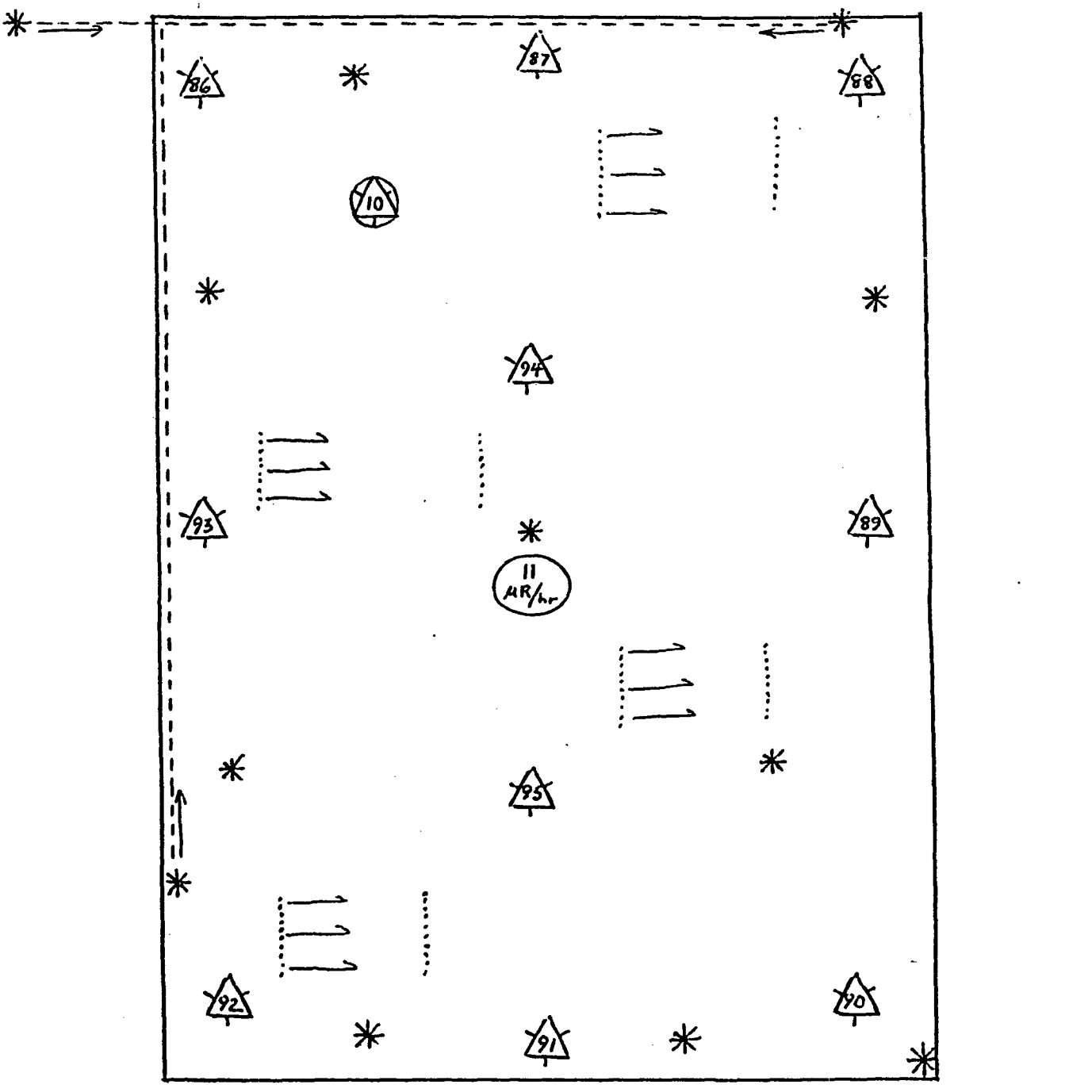
AREA 5 - Pu-238 Source Testing and Measurement Area

Instrument Background Levels
γ = < 20 μR/hr
ß/γ = < 50 cpm
α = < 10 cpm

Symbol Key

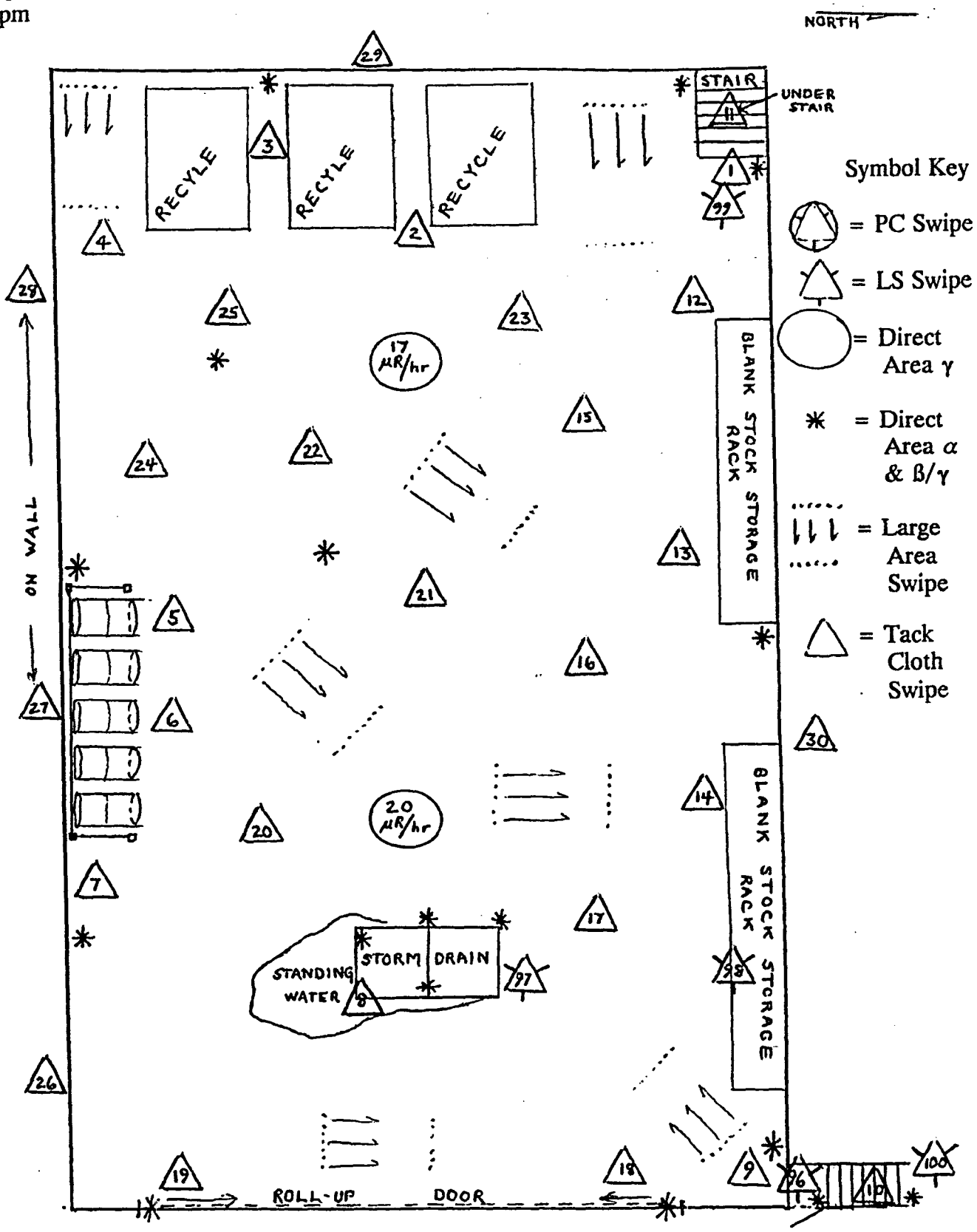
= PC Swipe = LS Swipe = Direct Area γ

= Direct Area α & ß/γ = Large Area Swipe



AREA 6 - Strontium Device Testing Area

Instrument Background Levels
γ = < 20 μR/hr
ß/γ = < 50 cpm
α = < 10 cpm



RSO, Inc.

Radiation Service Organization

June 11, 1993

Joe Moon
J. Stewart Bland Associates, Inc.
133 Defense Highway, Suite 208
Annapolis, MD 21401

Dear Mr. Moon,

Thank you for choosing RSO, Inc. to provide you with radioanalytical services. The results for the 110 samples you recently delivered to our laboratory are summarized below.

The 100 paper wipes were analyzed using a Beckman LS6000 Liquid Scintillation Counter (LSC). The counter was properly calibrated and standardized to identify the alpha emissions of Pu-238. The minimum detectable activity for this analysis was 50 disintegrations per minute (DPM). None of the 100 wipes exceeded 50 DPM.

The 10 adhesive backed wipes were analyzed using a Baird-Atomic Gas Flow Proportional Counter (GFPC). This analysis is not isotope specific, the measurement is for gross alpha activity only. The MDA for this instrument was 2.8 DPM. None of the 10 wipes exceeded 2.8 DPM.

If you have any questions about this report or our analysis protocol, please call me. Thank you again for choosing RSO, Inc.

Respectfully,

Myke Beard
Manager, Laboratory Services

P.O. Box 1526, Laurel, Maryland 20725-1526
Washington (301) 953-2482 Fax (301) 498-3017 Baltimore (410) 792-7444

EXPERT SYSTEM LICENSE EVALUATION
EVALUATION REPORT FOR LICENSE SNM-01150
Licensee: ISOTOPES INCORPORATED
Site of operation: TIMONIUM MARYLAND

The final ranking for SITE CONTAMINATION is: 23

DESCRIPTION OF ACTIVITY OR FACILITY: LABORATORY/RESEARCH

--Type and form of materials licensed--

Material--	--Form--
PU-BE PELLETS	Sealed
SEALED PU-239 SOURCE	Sealed
U-235<500 GMS	Loose material

--For evaluation purposes, amounts of the following materials were obtained--

Material--	--Form--	Amount	Unit	Score
U-235	LOOSE	100.00	GR	~~0.0~~
PU-BE PELLETS	SEALED	159.94	GR	~~0.0~~
SEALED PU-239 SOURCE	SEALED	10.41	GR	0.0

INITIAL SITE SCORE, based on LOOSE material possession limits: 5.0
INITIAL SCORE of the SEALED sources is: 34.57
FINAL SCORE of the SEALED sources is: 0.00

---

1. License included both sealed and loose materials

2. There was at least one sealed source authorized on this license which was not accounted for by the disposition information.

3. Sealed sources or shielding on the license contained large amounts of extremely hazardous materials

4. There was one identifiable site with this license.

5. FIRST SITE: Some likelihood that building onsite could have been left with contamination. Score=score*1.0

6. FIRST SITE: There was NO verifiable decontamination of the site at closeout. Score=score*1.2

7. FIRST SITE: No closeout survey was conducted for this site. Score=score*2.

8. FIRST SITE: There was NOT an NRC FINAL INSPECTION of the facility.

9. FIRST SITE: There was no evidence of releases at this site. Score not changed.

10. Information insufficient to judge frequency of turnover for operation Score not changed

11. FIRST SITE: There was significant generation of waste material in routine cleanup of facility. Score=score*1.5

12. FIRST SITE: Possible inappropriate disposal or abandonment of contaminated material from cleanup. Score=score*1.2

13. FIRST SITE: There was either no documentation of materials disposition or the documentation was inadequate. Score=score*1.2

14. FIRST SITE: There was no available information indicating onsite disposal of material or waste at the site. Score not changed

15. FIRST SITE: There were no verifiable intermediate decontamination efforts. No change in score

16. Class 1 category of license is due primarily to supporting info which indicates that contamination of the site may be present

FINAL DECISION FOR LOOSE MATERIALS:

POTENTIAL SITE CONTAMINATION:
HIGH PRIORITY FOR REVIEW

The final SCORE for SITE CONTAMINATION is: 23

FINAL DECISION FOR SEALED MATERIALS

Category for sealed sources: HAZARDOUS SOURCES UNACCOUNTED FOR

Reviewer's comments concerning license SNM-01150

This license gave permission to possess and use in nuclear programs(at Timonion, MD.) some of the materials which had been in use at the Middle River ffacility. There was no final inspection or survey and the license is assumed to have expired.

EXPERT SYSTEM EVALUATION WAS BASED ON THE INVENTORY RECORD IN JOB 0275, BOX 03

Docket 70-01211

Licensee: ISOTOPES INCORPORATED
Address: TIMONIUM MARYLAND Zip: 21093
State of operation: MD
Site used: TIMONIUM MARYLAND
Disposition information present: NO DISPOSITION INFORMATION GIVEN

This license was listed as expired on 09/30/74
Remarks:ISSUED FOR AMENDMENT OF LIC #SNM-53 ONLY AT TIMONIUM MARYLAND
JOB NUMBER: 0275 BOX NUMBER: 03

Date of last evaluation or revision: 08/11/92

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

William Donald Schaefer
Governor

Robert Perciasepe
Secretary

August 2, 1993

Mr. John Vogt, Radiation Safety Officer
Teledyne Energy Systems
10707 Gilroy Road
Hunt Valley MD 21031

RE: Radioactive Material License Number MD-05-014-01

Dear Mr. Vogt:

On July 19, 1993 the Maryland Department of the Environment's Radiological Health Program completed a confirmatory radiological close-out survey of your facility which is authorized under the above referenced license and located at 110 W. Timonium Road in Timonium, Maryland.

Results of this survey indicate that this facility meets the Department's requirements for future unrestricted use. Should there be any questions concerning this letter, please contact Mr. Raymond Manley or me, at (410) 631-3301.

Sincerely,

Raymond E Manley Jr

Carl E. Trump, Jr., Administrator
Radioactive Materials Inspection and Enforcement

CET/REM/dpn

7/6/93 LET

TELEDYNE
ENERGY SYSTEMS

110 W. TIMONIUM RD.
TIMONIUM, MD 21093-3163
PHONE: (410) 252-8220
TELEX: 8-7780 (TDYENER TIMO)
FAX: (410) 252-5514

6 July 1993
Refer to: RSO-JFV-066

RECEIVED

JUL 7 1993

RADIOLOGICAL
HEALTH PROGRAM

Mr. Carl Trump
Radiation Health Program
Department of the Environment
State of Maryland
2500 Broening Highway
Baltimore, Maryland 21224

Subject: BYPRODUCT LICENSE NO. 05-014-01

Dear Mr. Trump:

Enclosed is the report of the survey conducted to support our request for termination of the subject license.

As I mentioned in my first letter to Mr. Flynn, our plans are to vacate the Timonium facility at the end of this month. If additional information is required, please let me know.

Sincerely,

John F. Vogt
Radiation Safety Officer

JFV:dh

Enclosure: JSB letter dated June 30, 1993, enclosing "Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093"

Mr. John Vogt
Radiation Safety Officer
Teledyne Energy Systems
110 W. Timonium Road
Timonium, MD 21093-3163

June 30, 1993

RE: Results of Radiological Survey of Teledyne Facility
Located at 110 W. Timonium Road, Timonium, MD

Dear Mr. Vogt:

Please find enclosed the report on the results of the radiological survey I performed at your facility on June 8th and 9th, 1993. If you require any editorial changes to the report please let me know as soon as possible.

As I mentioned during our telephone conversation, the issue of the need for a Maryland license to perform surveys appears to be resolved. If you have any questions about the report please do not hesitate to call me. I can be reached at (215) 873-9464. Thank you again for choosing JSB Associates for your radiological consulting needs.

Sincerely,

Joseph W Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant
J. Stewart Bland Associates, Inc.

ATTACHMENT: Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093

JSB ASSOCIATES

Mr. John Vogt
Radiation Safety Officer
Teledyne Energy Systems
110 W. Timonium Road
Timonium, MD 21093-3163

June 15, 1993

RE: Results of Radiological Survey of Teledyne Facility
Located at 110 W. Timonium Road, Timonium, MD

Dear Mr. Vogt:

At the request of your firm, I performed a third party independent radiological survey of the Teledyne facility located at 110 W. Timonium Road, Timonium, MD on June 8th and 9th, 1993.

The extensive direct radiation measurements made at the facility with field instrumentation and analysis of the numerous swipe samples by sensitive laboratory instrumentation confirm that no licensed radioactive materials are detectable above the ambient background level. This being the case, the facility has met the free release criteria as described in NRC Regulatory Guide 1.86, Table I by a wide margin of safety and is therefore suitable for occupation by another leaseholder.

This facility close-out survey was authorized by Teledyne Energy Systems under purchase order 28900 dated May 27, 1993.

All instrumentation used was calibrated under the program authorized by the State of Maryland Department of the Environment license # MD-33-021-01.

I hereby state that I am a Heath Physicist Certified by the American Board of Health Physics with extensive experience in the area of industrial facility contamination assessment and decontamination and am therefor adequately qualified to perform this building close-out survey.

Sincerely,

Joseph W Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant
J. Stewart Bland Associates, Inc.

ATTACHMENT: Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093

CLOSE-OUT RADIOLOGICAL SURVEY OF THE TELEDYNE ENERGY SYSTEMS FACILITY AT 110 W. TIMONIUM ROAD, TIMONIUM, MD 21093

Prepared by:

Joseph W. Moon, CHP

J. Stewart Bland Associates, Inc.

June 30, 1993

CLOSE-OUT RADIOLOGICAL SURVEY OF THE TELEDYNE ENERGY SYSTEMS FACILITY AT 110 W. TIMONIUM ROAD, TIMONIUM, MD 21093

1.0 HISTORICAL PERSPECTIVE AND APPROACH

Only two radionuclides were historically present at the facility. These radionuclides were strontium-90 (Sr-90) and plutonium-238 (Pu-238). Sr-90 was received at the facility already loaded into thermo-electric devices to be performance tested. The actual sealed sources in these devices were never removed from the devices. Pu-238 was received only as sealed sources under Department of Energy (DOE) authorization for loading into thermo-electric devices. The loading of these sources was performed within a glove box containment structure with full radiological control practices applied. At the time these operations were terminated, the containment was shipped to Mound Laboratory. The former Pu-238 containment filtration/exhaust system was renovated to fit a new "glove box" when the old containment structure was removed. At that time all filtration elements were exchanged. The areas of the building where Pu-238 activities had been conducted were surveyed by Teledyne Energy Systems personnel and were found to be free of contamination. All of the thermo-electric devices of both types have been transferred to end users and none remain at the facility.

The licensed radioactive material retained on site consists of sealed sources used for the calibration of radiological survey instrumentation, and a variety of check sources used for the same purpose under the existing license. The integrity of these sources is assured under the licensee's source inventory control program and all of these sources will be either disposed of or transferred to another licensee prior to vacating the current building. With regard to the remaining licensed sources, the scope of this survey has only addressed the possibility of facility contamination around the source storage locations as identified by the facility Radiation Safety Officer. There are various articles (2% thoria welding rods and items composed of magnesium-thoria metal) at the facility containing various amounts of naturally occurring thorium that is not subject to licensed regulation (< 5% thoria) but are nevertheless radioactive. Each of these articles has been identified and will be removed prior to vacating the premises. The close-out survey verified that each of these articles effectively contained the naturally occurring activity such that there is not a possibility that residual radioactive material will remain in the facility when these articles are removed.

It was impractical to dismantle the piping of the old Pu-238 containment exhaust system as it was still in use at the time of the survey. The internal surfaces of this piping were not included in the scope of this survey. Although unlikely considering that only sealed sources were handled, the internal surfaces of this piping below the High Efficiency Particulate Absorber (HEPA) filters are still potentially contaminated. These sections of the piping will be isolated disassembled and removed prior to vacating the premises.

The approach taken for this close-out survey did not assume credit for anticipated conditions but was conducted as though contamination was expected to be present at some detectable level. The scope of the final close-out survey encompassed the entire facility and not just those areas where radioactive sources were handled.

2.0 SELECTION OF SURVEY INSTRUMENTATION

The instrumentation used for this survey was selected specifically for its capacity to detect the radionuclides historically handled at the facility (Pu-238, and Sr-90) but was also suitable to detect naturally occurring thoria compounds. All instrumentation used was calibrated under the program authorized by the State of Maryland Department of the Environment license # MD-33-021-01. Each field survey instrument was source checked both prior to and following use to assure they were properly functioning during the survey. Background readings for each of the instruments used were also determined and recorded. The following is a listing of the field survey instrumentation used to perform this survey.

- Alpha: Ludlum 50 cm^2 zinc-sulfide detector (Model 43-1 Serial Number 020791) attached to a Ludlum count rate meter (Model 3 Serial Number 91842). Calibration Date: 6/3/93
  Efficiency for Pu-238 5.5 MeV alpha - 33% determined by calibration with Am-241 (5.49 MeV)
  Sensitivity: 60 dpm/100 cm^2 fixed contamination
  10 dpm/100 cm^2 loose surface on 300 cm^2 swipe
  Reg. Guide 1.86 Criteria: 200 dpm/100 cm^2 ave. fixed
  300 dpm/100 cm^2 max. fixed
  20 dpm/100 cm^2 loose surface

- Beta/Gamma Bicron Surveyor count rate meter (Serial Number AHS-A198A) with standard 17 cm^2 GM Pancake Probe detector (Serial Number 2081)
  Calibration Date: 5/18/93
  Efficiency for Sr/Y-90 Beta particles - 46%
  Sensitivity (@ equilibrium): 10 dpm/ probe area (60 dpm/100 cm^2)
  Reg. Guide 1.86 Criteria: 5000 dpm/100 cm^2 fixed
  1000 dpm/100 cm^2 loose surface

- Gamma Background Victoreen Pressurized Ion Chamber (Model 450 P/Serial Number 583)
  Calibration Date: 2/24/93
  Sensitivity: 10 μR/hr nominal
  Reg. Guide 1.86 Criteria: None

Remote instrumentation used for swipe analysis in off site laboratory

(RSO, Inc., Laurel, MD)

- Liquid Scintillation counter set-up for Am-241 alpha Beckman LS-6000
  Sensitivity: 50 dpm/swipe area

- Gas Flow Proportional counter (Baird Atomic Model SSC-3)
  10 minute counts (nominal efficiency 46% for Thorium-230 alpha 2 pi geometry)
  Sensitivity: < 10 dpm/swipe area

3.0 SURVEY PLAN

The basis of the survey plan was determined by the nature of operations at the facility. A semi-biased survey was warranted since only sealed sources were handled at the facility with full source inventory and contamination controls in place during operations.

Prior to the initiation of the survey, instrument operability checks (e.g. battery checks and source checks where appropriate) were performed and instrument background readings were made in an area not suspected to be affected by former facility operations.

The criteria used for determining suitability for unrestricted use is that specified in Nuclear Regulatory Commission Regulatory Guide 1.86 unless otherwise specified by the concerned regulatory authorities.

3.1 Preliminary Survey

A preliminary survey was performed and was focused on the areas most likely to contain radioactive contamination from licensed operations conducted at the facility. The purpose of this focus was to determine at an early stage of the survey work the worse case radiological conditions that would be encountered at the facility should any residual radioactivity be detected. The preliminary survey entailed a detailed survey of seven designated "Radioactive Material areas" areas (R.A.M.) identified by the facility Radiation Safety Officer (Mr. John Vogt). In addition, the scope of the preliminary survey included a moderately conservative assessment of the entire former source security control area (the effective Radiological Control Area).

The nature of the seven designated R.A.M. was described as follows:

Area 1 White Room - A room used for the preparation of device subassemblies. Some radioactive Material is known to have been in this room and therefor it was designated as a primary survey area.

Area 2 — Pu-238 Device Assembly Area (Submarine Room) - The Pu-238 sealed sources were loaded into the thermo electric devices inside a containment structure known as the "submarine" located in the room. The containment was maintained under negative pressure by a ventilation system having HEPA filters in line prior to the roof discharge vents. Access and contamination controls were in place during these operations.

Area 3 — Facility Security Vault - The vault located in the administrative area contains a triply contained vessel containing approximately 740 grams of thoria. The container was opened and the integrity of the internal packaging was verified. The area was surveyed solely due to the presence of this material currently in the vault.

Area 4 — Pu-238 Source Storage Area - This area was controlled under heavy security during operations and contained all Pu-238 sealed sources not yet assembled into devices. The area is currently in use as a high security storage area and also contains the 1 mCi Radium source used for instrument calibration.

Area 5 — Pu-238 Source Testing and Measurement Area - This area is basically a floor space designated for the use of testing and measurement of the Assembled devices. The devices were lifted from a pedestal by and overhead crane where they were tested and measured while suspended above the floor.

Area 6 — Strontium Device Testing Area - This area is a sunken truck bay with a roll-up door access to the east end of the facility. The assembled Strontium devices were placed in the truck bay, tested and then repackaged for shipment all in the same area. No strontium containing devices were ever disassembled at the facility.

Area 7 — Source Storage Locker - This area is a locked file cabinet containing various check sources for use with the facility radiation detection instrumentation.

If the results of the preliminary detailed surveys in the seven designated R.A.M. areas and the conservative survey of the remainder of the former source security area did not indicate the presence of residual radioactive material, there would be little probability that the rest of the facility would have been adversely affected by the licensed operations. The survey plan for the rest of the facility would only be cursory in nature with several direct measurements and smears being assessed by field counting in each room or general activity area. The measurements taken in these areas would be focused on high traffic areas where it is likely that contamination, if spread to other sections of the facility, would be present in detectable quantities (see section on survey techniques).

The general plan for those areas designated as RAM locations include an initial gamma background rate measurement followed by local instrument background determinations for the other survey instruments. A detector window integrity test for the zinc sulfide α instrument would the be performed by holding the detector up to a source of fluorescent light. An increase in the background rate would indicate a loss of window integrity and the use of the instrument.

Randomly selected locations on horizontal and vertical surfaces in the rooms with areas of 100 cm^2 would then be measured directly with field instrumentation. At each location where the initial direct measurement is in excess of the background level, the measurement will be recorded. A swipe of each area would then be made to assess the levels of loose contamination on the surface. These swipes would be set aside for a period of 4 hours to allow for the decay of naturally occurring radionuclides (e.g. Radon progeny). After the decay period each swipe would be measured for alpha and beta contamination in a location that is not expected to have been affected by facility operations. A direct measurement of the surface would be made after the swipe was obtained to assess the level of fixed contamination at the location. If the results of any of the surveys presented evidence of unanticipated contamination above the surface contamination release guidelines (NRC Reg. Guide 1.86 criteria) at any of the measured locations, this would be an indication that further assessment would be required to allow a statistical characterization of the areas containing detectable activity. Swipes of the areas would be counted in either a proportional counter (set up for the detection of alpha particle emissions after a minimum decay period of 24 hours) or a liquid scintillation counter set up for the measurement of Pu-238 α emissions. Some portion of the population of swipes taken would be assessed by the proportional counter and some taken near the same locations will be assessed by liquid scintillation counting as a qualitative cross check of instrument reliability. Whereas the sensitivity of the hand held α detector is greater than that of either of the two laboratory instruments, the measurement of large area swipes (not a suitable media for assessment in the lab counters) using this field instrument was considered to be an acceptable alternative to exhaustive swipe collection and analysis if no measurable α activity could be found by direct measurements. Even in the case that no detectable activity would be discovered by field instrumentation on large area swipes, a suitable number of swipes will be analyzed by the laboratory instrumentation to document the status of the targeted R.A.M. areas.

If any of the "RAM" areas were found to be contaminated, a full survey would be performed to characterize the area and any affected adjacent areas until the full extent of the contamination could be determined. If no detectable contamination was found in the "RAM" areas the survey of the adjacent room will focus on common traffic patterns for personnel carrying radioactive material.

Following the surveys instrument operability checks will be repeated to demonstrate operability at the end of the survey.

TELEDYNE ENERGY SYSTEMS

DATE: 7/19

TO: RAY MANLEY

FOR:

☐ ACTION ☐ COMMENT ☐ INFORMATION ☐ SIGNATURE

ATTACHED IS THE DOC-
UMENTATION YOU REQUESTED.
PLEASE CALL ME @
771 8606 IF YOU
HAVE ANY QUESTIONS.

THANKS

J. F. VOGT

3.2 Contingencies and Extended Survey Work

The nature and extent of any additional survey work required (characterization) would only be apparent when the results of the preliminary survey are known.

If long-lived alpha contamination was detected at the facility, provisions for the assessment of samples by alpha spectroscopy could be made to positively identify the contaminant as Plutonium-238.

Extended survey work necessary for the characterization of the contamination in the facility would be performed along the guidelines provided by the Nuclear Regulatory Commission. This type of survey was recommended (NUREG/CR 2082 1981) to document that a facility can be released to perform operations not involving the use of radioactive material and would require a much more extensive framework of area mapping and characterization. This extensive type of survey is meant to be used to document the effectiveness of a decontamination effort when it is known that a facility was at one time contaminated. The focus of the preliminary survey is to demonstrate that the facility has never been contaminated with the material it was licensed to handle.

Areas above any suspended ceilings and inside ventilation duct work would need to be assessed should any unanticipated contamination be found. Access to these areas and other normally inaccessible areas of the facility would be required in this unlikely circumstance.

4.0 SURVEY RESULTS AND SPECIALIZED SURVEY TECHNIQUES

The extensive direct radiation measurements made at the facility with field instrumentation and analysis of the numerous swipe samples by sensitive laboratory instrumentation confirm that no licensed radioactive materials are detectable above the ambient background level. This being the case, the facility has met the free release criteria as described in NRC Regulatory Guide 1.86, Table I by a wide margin of safety and is therefore suitable for occupation by another leaseholder.

Standard radiological survey techniques were employed to avoid cross contamination of swipe samples and to make direct measurements of surface activity (< 0.5" from surface without contact). Initially, small area tack cloth swipes (300 cm^2) of the targeted R.A.M. were taken and measured for both α and $ß/\gamma$ with the field instrumentation to assess the status of an area. These small area swipes would be appropriate in the event an area was found to be contaminated requiring detailed characterization of the distribution of activity on room surfaces. When no detectable radioactive material was found by direct measurements or on the small area tack cloth swipes, large area swipes (> 500 cm^2) were taken of the areas. In all cases these large area swipes were also found to be free of any detectable radioactive material.

The process of collection and analysis of large numbers of swipes (for area characterization) on media suitable for analysis by proportional counter and by liquid scintillation counting in this situation seemed pointless. A suitable number of these type of swipes were then taken in each area to verify the findings of the field instrument assessments and to provide a representative number of measurements of each area to allow an assessment of the radiological conditions in the unlikely event that the field instrument readings were faulty. All of these swipe samples were also measured for detectable α and β/γ activity prior to being sent to the laboratory for analysis. None of these swipe samples contained any activity detectable with the field instrumentation.

Other survey techniques employed for this survey involved measurements of locations in the facility where radioactive materials if present would have been concentrated. Specifically, drain traps, subfloor piping recesses, surfaces above suspended ceilings, room air exhaust duct work and associated air filtration support members were surveyed. In addition, work station vacuum cleaners, grime accumulations on old fan blade shields, and fume hood exhaust plenums were measured as areas where if loose surface contamination by licensed radioactive material had been present at any time it would be unlikely that these areas would have been affected by subsequent decontamination efforts. No evidence of residual licensed radioactive material was found in any of these locations

The majority of the floor surface of the former source security area including the workshop, shipping and receiving areas, tool cribs and material storage areas was unsealed concrete. Tack cloth was used to acquire large area swipes on these surfaces. No detectable activity either α or β/γ were detected on any of these swipes. On this type of surface, loose surface activity, if present, would have accumulated in corners and in cracks and crevices in the flooring. Extraction of some of this material from crevices and direct measurement of this material with field instruments would reveal the presence of historical facility contamination if it had been present. No evidence of licensed radioactive material was found in the crud residue excavated from these recesses or on any of the direct measurements made along these crevices.

The horizontal and vertical surfaces of all laboratories where radioactive material was present during facility operations were assessed by direct measurements and by swipe samples for the presence of residual activity. Where new surfaces had been applied since the cessation of radiological operations , the original surfaces were sought out and assessed. No evidence of residual licensed radioactive material was found in any of these measurements.

In the administrative areas of the facility, measurements of large area tack cloth swipes taken along major foot traffic patterns and in the relatively inaccessible areas below the stairwells did not indicate the presence of any residual contamination. Direct measurements of the areas along the bases of the walls and in corners where routine cleaning efforts were noticeably ineffective were also found to be free of residual

radioactive material. In areas where carpeting was installed, direct measurements of high traffic areas indicated by carpet wear, accumulations of sticky grime embedded into carpet fibers, and lower door closure recesses were assessed with no positive indications found.

None of the direct measurements of gamma background made with the pressurized ion chamber in any part of the facility (administrative or security areas) were in excess of 25 μR/hr with most of the measurements falling within the 10 to 20 μR/hr range.

The attached survey maps detail the survey work done in the six primary designated R.A.M. areas. On the maps of areas 1 and 2, the locations where the small area tack cloth wipes were taken are not indicated as they would unnecessarily clutter the diagram and interfere with the documentation of the locations where the proportional and liquid scintillation counter swipes were taken. No small area tack cloth swipes were taken in area 5 where large area swipes were used for the initial assessment. No map is attached for area 7 due to the small area involved. No fixed or loose surface activity was detected on any of the surfaces adjacent to this area (current source storage locker).

Survey performed by:

Joseph W. Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant,
JSB Associates, Inc.

ATTACHMENTS: Six Survey Maps

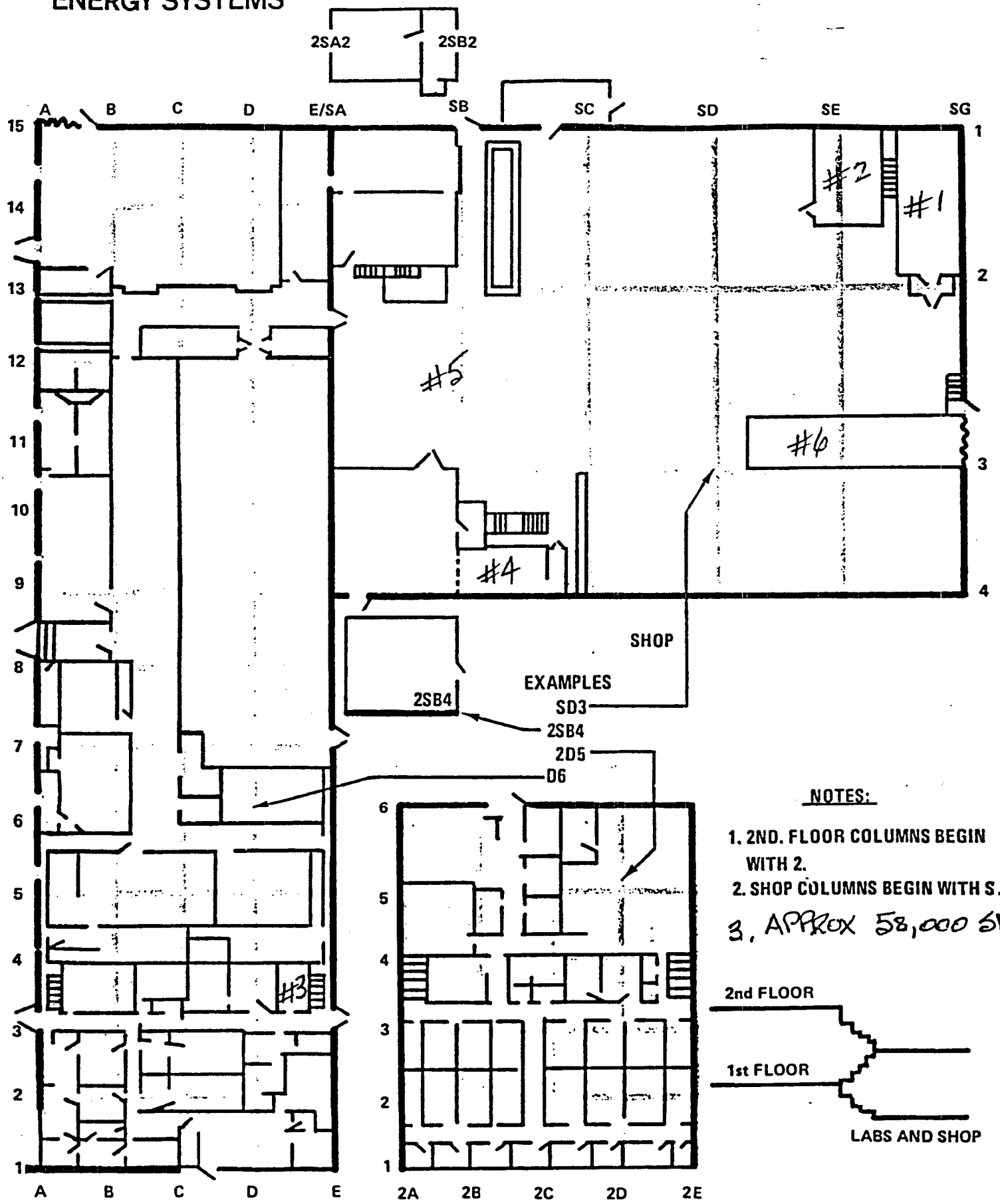
Facility Layout Diagram

Results of Laboratory Analysis of the Swipe Samples performed by RSO, Inc. Maryland Department of the Environment License # MD-33-021-01.

Three Calibration Certificates for Field Instrumentation

TELEDYNE
ENERGY SYSTEMS

BUILDING COLUMN GRID



1ST. FLOOR

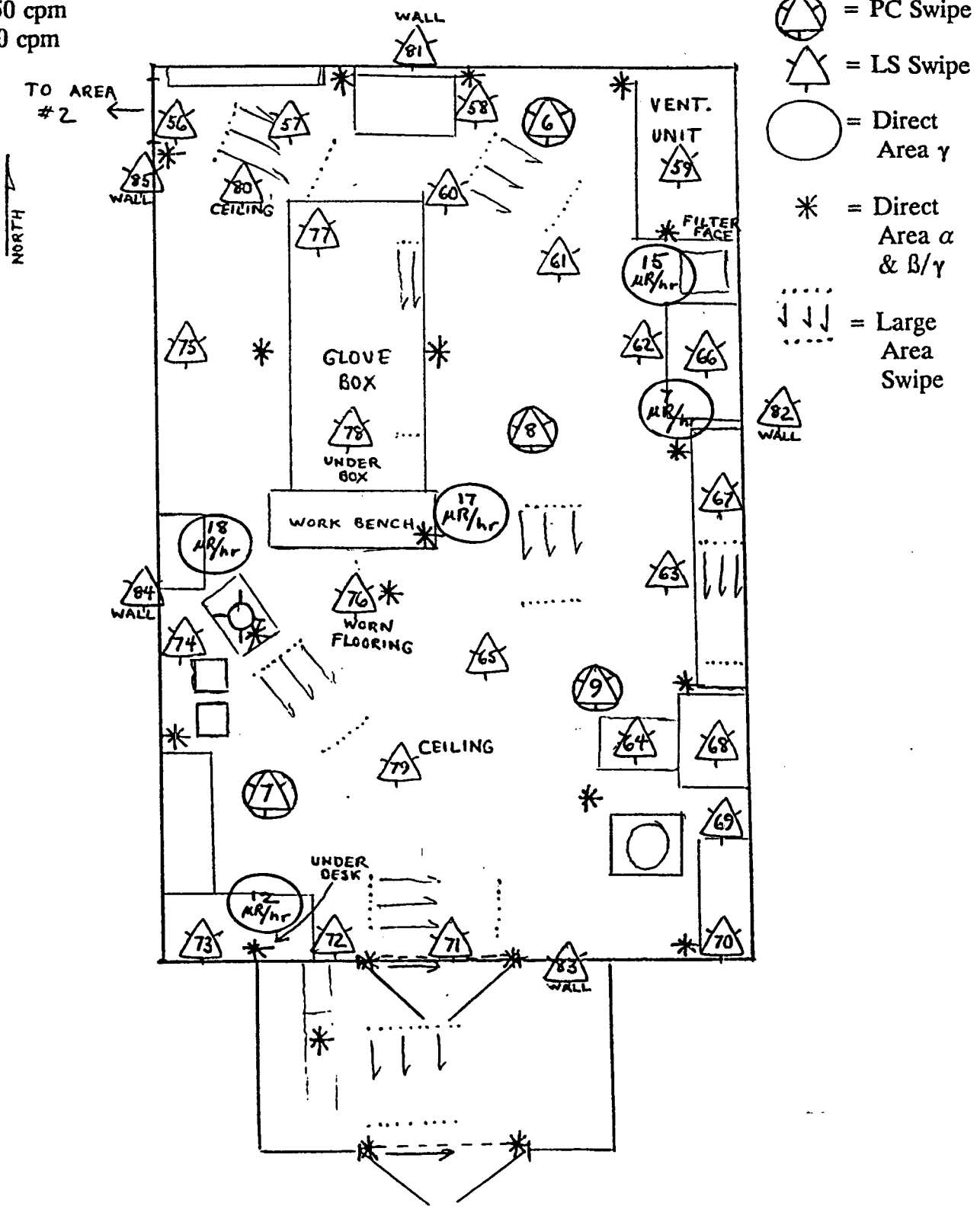
2ND. FLOOR

ES-304

REVISED 7/10/77

AREA 1 - White Room

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



Symbol Key

= PC Swipe

= LS Swipe

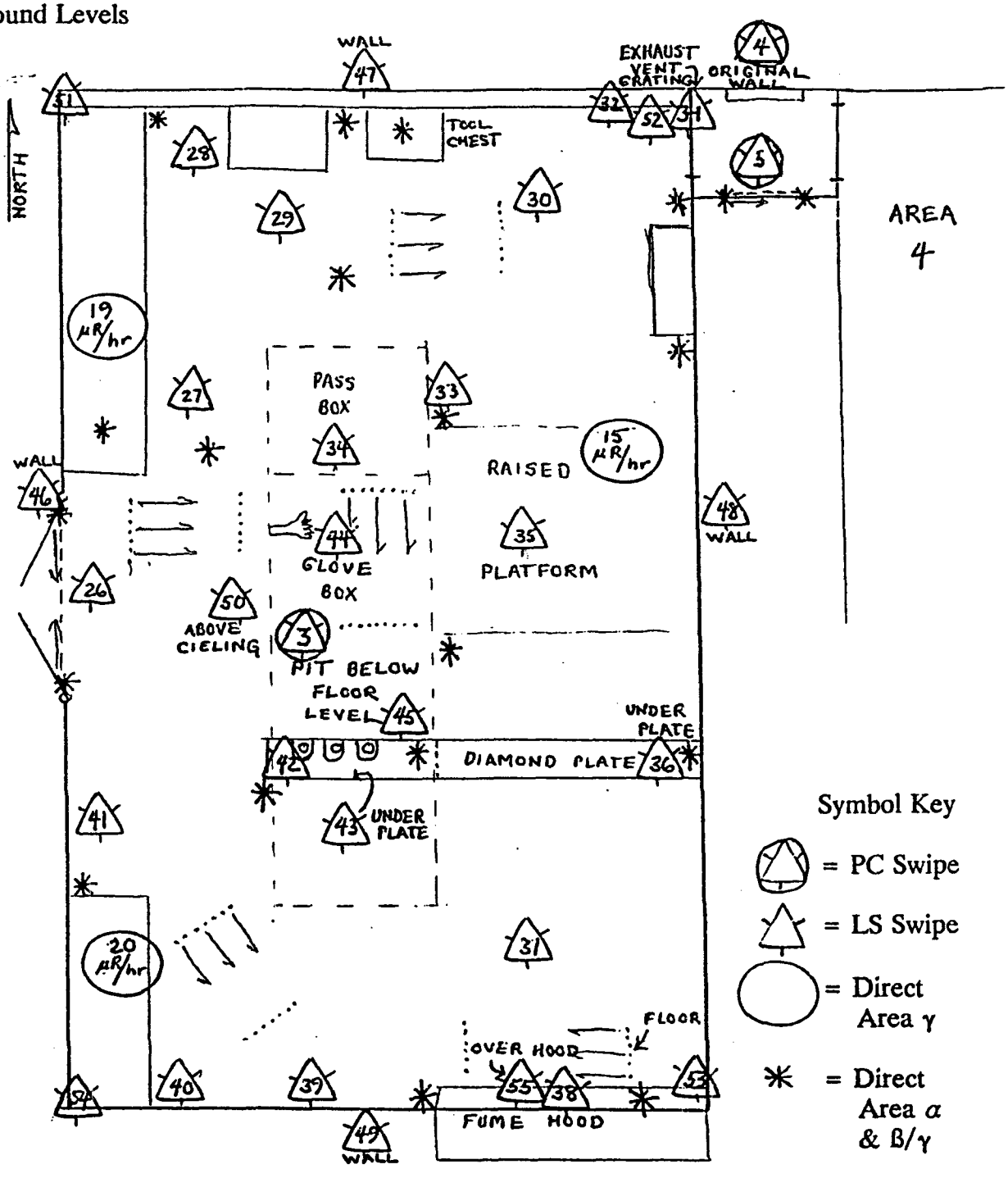
= Direct Area γ

= Direct Area α & β/γ

= Large Area Swipe

AREA 2 - Pu-238 Device Assembly Area

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



Symbol Key

= PC Swipe

= LS Swipe

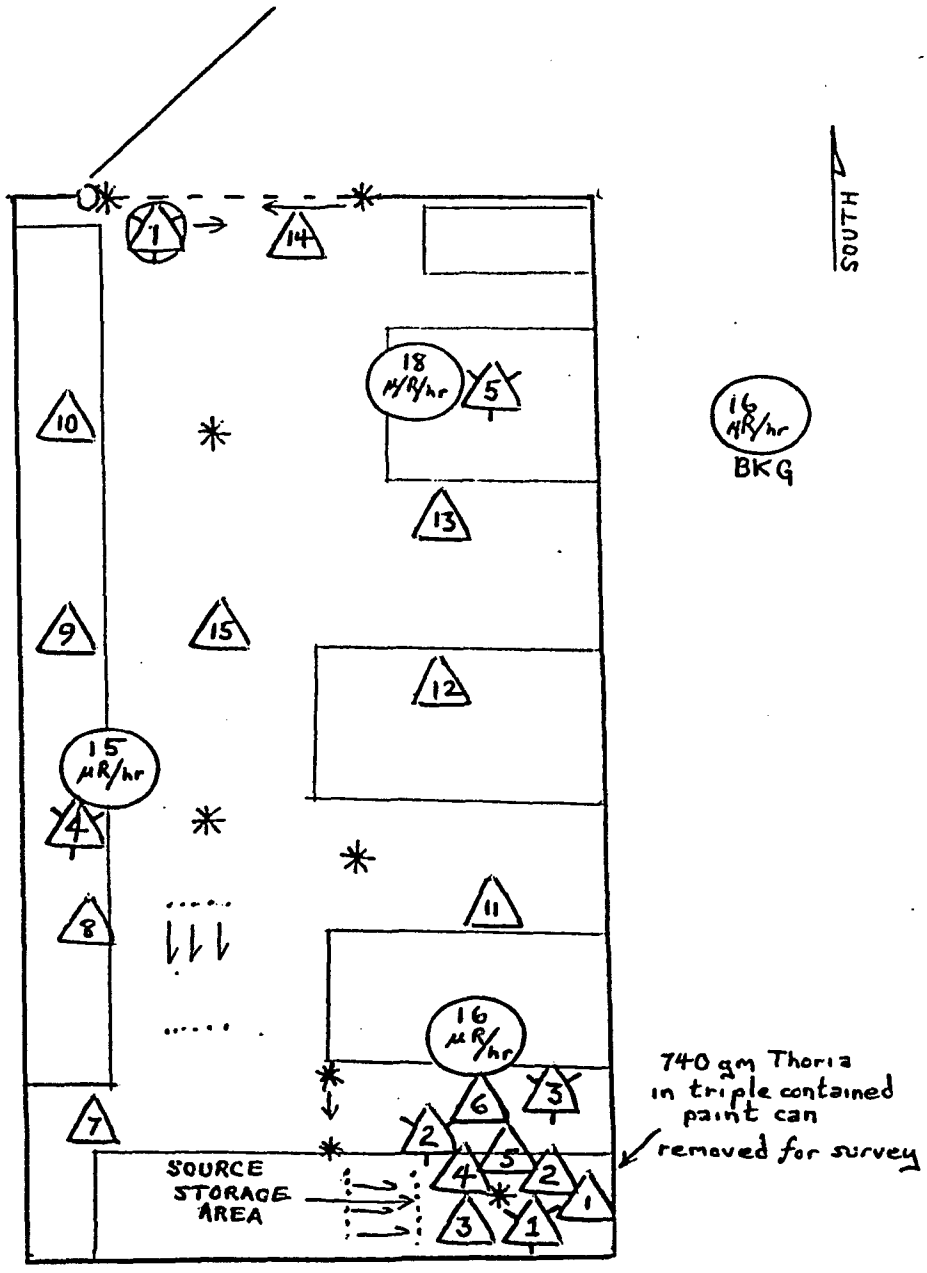
= Direct Area γ

= Direct Area α & β/γ

= Large Area Swipe

AREA 3 - Facility Security Vault

Instrument Background Levels
γ = < 20 μR/hr
ß/γ = < 50 cpm
α = < 10 cpm



Symbol Key

= PC Swipe

= LS Swipe

= Direct Area γ

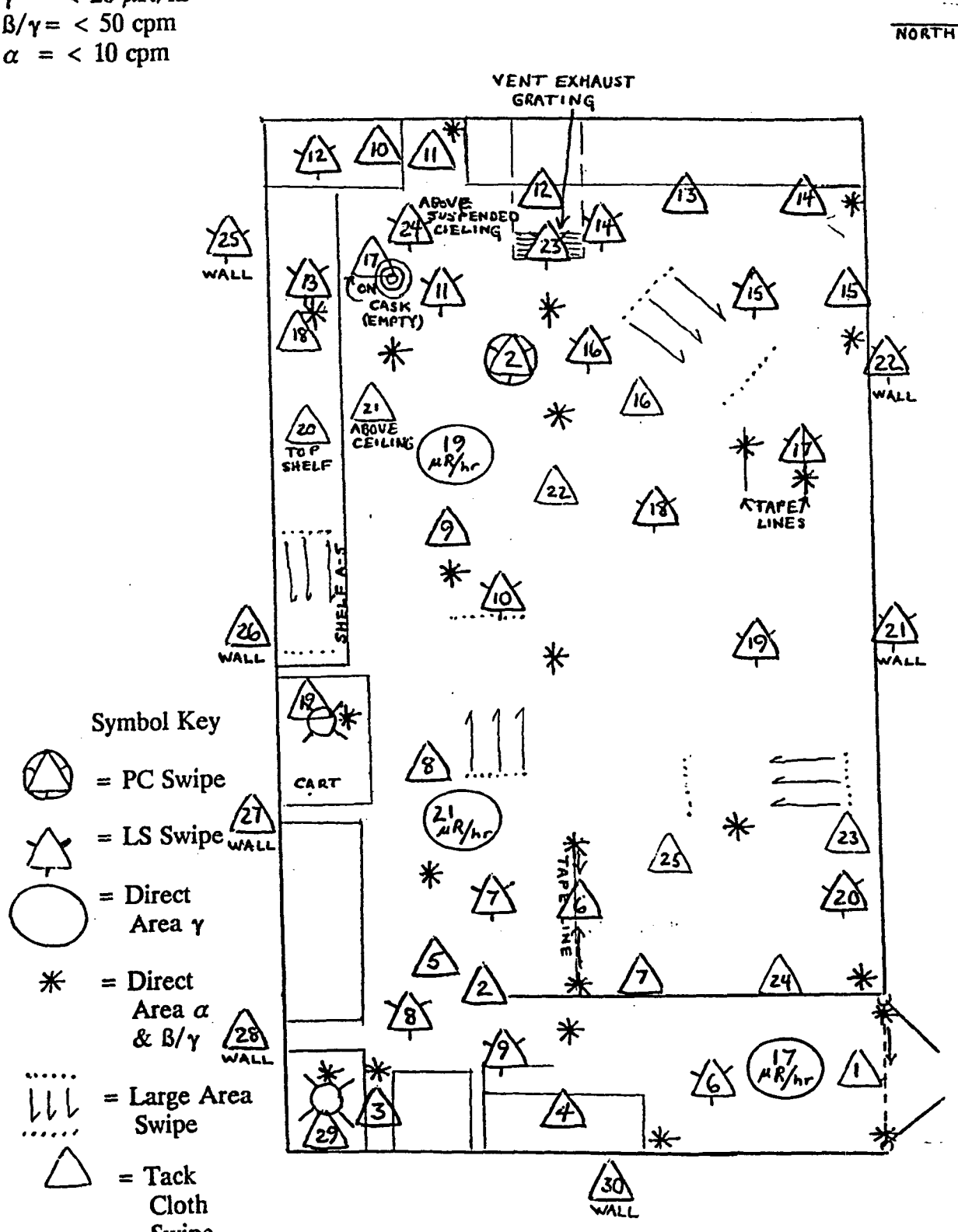
= Direct Area α & ß/γ

= Large Area Swipe

= Tack Cloth Swipe

AREA 4 - Pu-238 Source Storage Area

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



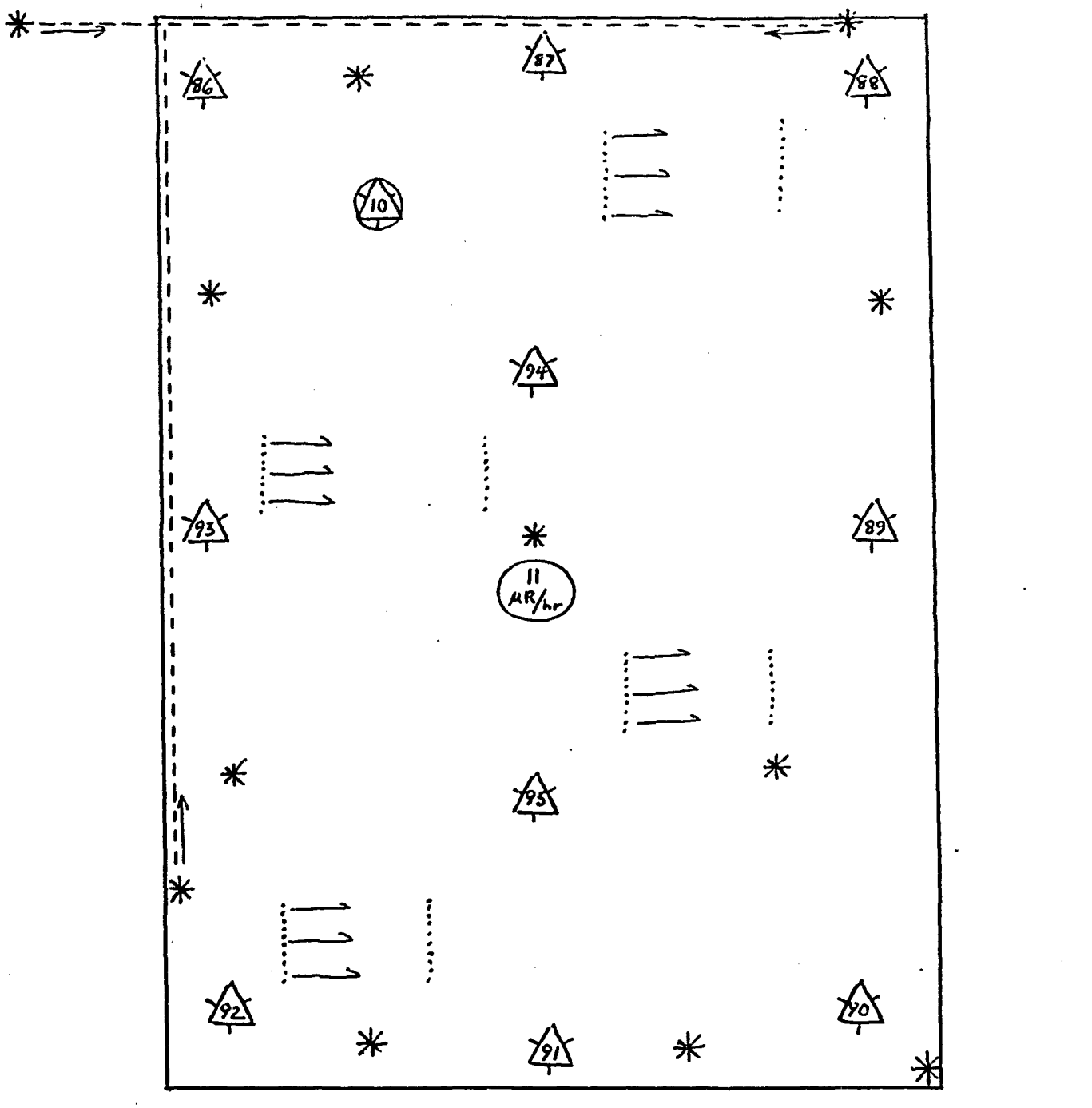
AREA 5 - Pu-238 Source Testing and Measurement Area

Instrument Background Levels
γ = < 20 μR/hr
ß/γ = < 50 cpm
α = < 10 cpm

Symbol Key

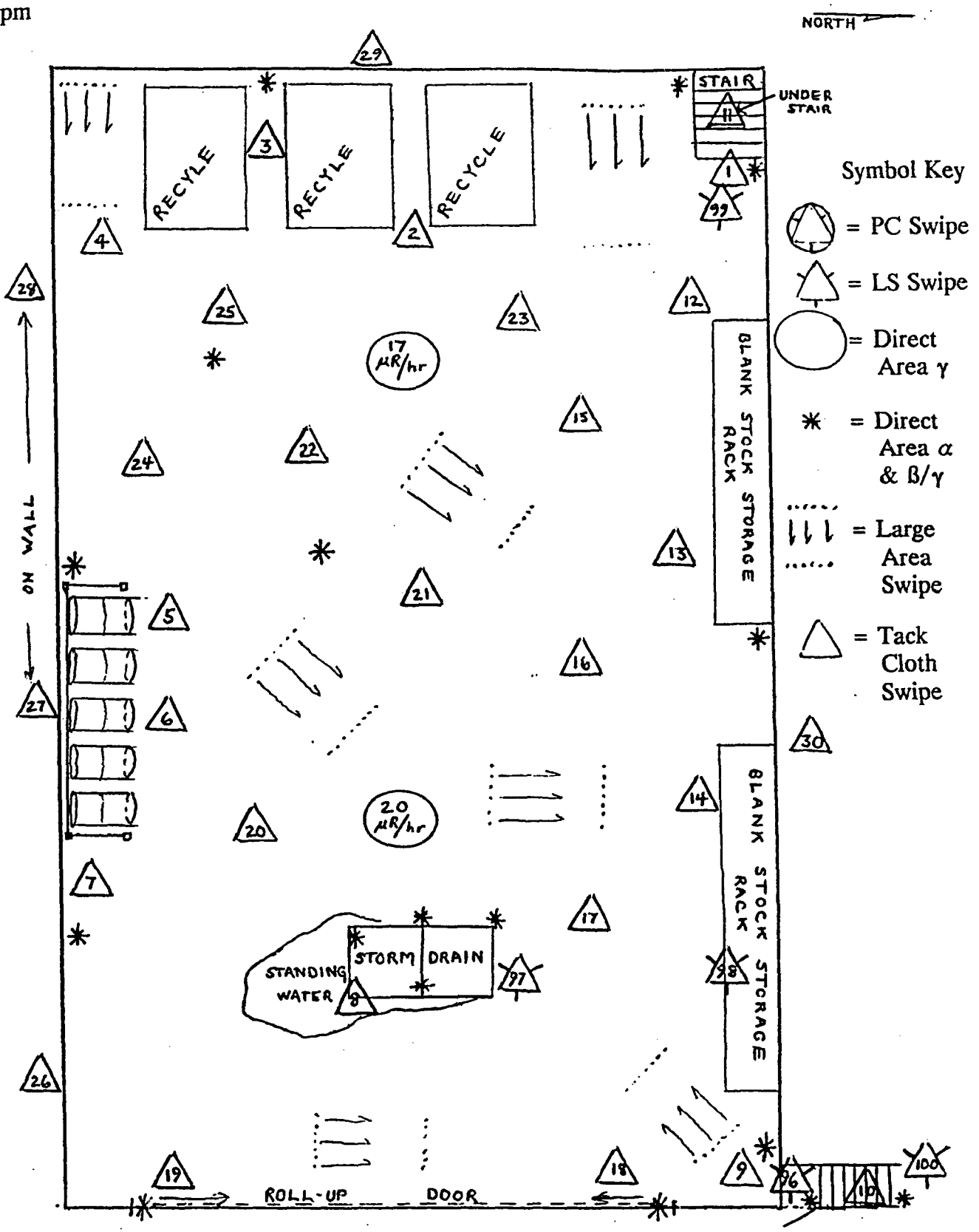
= PC Swipe = LS Swipe = Direct Area γ

= Direct Area α & ß/γ = Large Area Swipe



AREA 6 - Strontium Device Testing Area

Instrument Background Levels
γ = < 20 μR/hr
ß/γ = < 50 cpm
α = < 10 cpm



RSO, Inc.

Radiation Service Organization

June 11, 1993

Joe Moon
J. Stewart Bland Associates, Inc.
133 Defense Highway, Suite 208
Annapolis, MD 21401

Dear Mr. Moon,

Thank you for choosing RSO, Inc. to provide you with radioanalytical services. The results for the 110 samples you recently delivered to our laboratory are summarized below.

The 100 paper wipes were analyzed using a Beckman LS6000 Liquid Scintillation Counter (LSC). The counter was properly calibrated and standardized to identify the alpha emissions of Pu-238. The minimum detectable activity for this analysis was 50 disintegrations per minute (DPM). None of the 100 wipes exceeded 50 DPM.

The 10 adhesive backed wipes were analyzed using a Baird-Atomic Gas Flow Proportional Counter (GFPC). This analysis is not isotope specific, the measurement is for gross alpha activity only. The MDA for this instrument was 2.8 DPM. None of the 10 wipes exceeded 2.8 DPM.

If you have any questions about this report or our analysis protocol, please call me. Thank you again for choosing RSO, Inc.

Respectfully,

Myke Beard
Manager, Laboratory Services

P.O. Box 1526, Laurel, Maryland 20725-1526
Washington (301) 953-2482 Fax (301) 498-3017 Baltimore (410) 792-7444

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
631 PARK AVENUE
KING OF PRUSSIA, PENNSYLVANIA 19406

APR 15 1976

Teledyne Isotopes, Inc.
Attention: Peter J. Vogelberger, Jr.
President
110 West Timonium Road
Timonium, Maryland 21093

License Nos. SNM-849
19-01398-34 030-04533
Inspection No. 76-01

Gentlemen:

This refers to the inspection conducted by Mr. J. Kinneman of this office on April 7, 1976 of activities authorized by NRC License Nos. SNM-849 and 19-01398-34 and to the discussions of our findings held by Mr. Kinneman with Messrs. McGrew and Tilmes of your staff at the conclusion of the inspection.

The inspection of License No. SNM-849 was limited to an examination of your material transfer records concerning the disposition of material authorized by the license, and to an examination of the contamination surveys of your facility and equipment. The inspection of License No. 19-01398-34 was limited to a discussion of the activities authorized by the license and to a review of your future plans. Within this scope, the inspection consisted of selective examiantions of survey records, interviews with personnel, observations by the inspector, and independent measurements made by the inspector.

Within the scope of this inspection, no items of noncompliance were observed.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the Public Document Room.

No reply to this letter is required; however, should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

Paul R. Nelson

Paul R. Nelson, Chief
Fuel Facility and Materials Safety
Branch

bcc:
IE Mail & Files (For Appropriate Distribution)
PDR
Local PDR
NSIC
REG:I Reading Room
State of Maryland
J. Brown, USNRC, Materials and Fuel Cycle
Facility Licensing, Washington, D.C.

TELEDYNE ISOTOPES

110 WEST TIMONIUM ROAD
TIMONIUM, MARYLAND 21093
TELEPHONE: (301) 252-8220
TELEX: 87-780

DOCKETED USNRC APR 12 1976 REGULATORY MAIL SECTION DC

RECEIVED MAR 30 1976 U. S. Nuclear Regulatory Commission RMSS Mail Section

REGULATORY FILE CY

March 25, 1975
Refer to: TES-JWM-1251

U. S. Nuclear Regulatory Commission
Division of Material Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Cancellation of License No. SNM-849, Docket 70-908

Gentlemen:

The requirement for Teledyne Isotopes' Timonium, Maryland facility to retain a Special Nuclear Materials license has been critically evaluated. As a result of this evaluation, the decision has been made to terminate our SNM-849 license. Currently, three amendments to the license cover four items and these items will be discussed individually so that the rationale behind our conclusion can be presented.

1. Amendment 05, dated October 19, 1970, Items 6C, 7C and 8C covering 100 micrograms of elemental plutonium counter standards. Four counter standards are involved. The total activity is 6.5×10^{-8} Ci, considerably less than a licenseable quantity. The counter standards were never required to be on the license.

2. Amendment 05, dated October 19, 1970, Items 6E, 7E and 8E covering 100 grams of contained U-235, any enrichment, any form. The initial purpose was Research and Development as defined in 10 CFR 70.4 (j) and a later purpose was to demonstrate the capability of a thermal ionization source mass spectrometer which we manufacture for domestic and international sale. Currently, it is planned to do the calibration and demonstration of this device at the purchaser's facility because the RF noise in our own facility precludes that activity. We currently have no U-235 in house for this purppse. Regarding the R&D activity with U-235, none is currently underway and none is contemplated.

3. Amendment 10, dated June 6, 1974, Items 6F, 7F and 8F covering 100 micrograms of plutonium, any form. The purpose was to calibrate and demonstrate the mass spectrometer discussed in the previous paragraph. This activity cannot be accomplished because of the reason presented previously. We currently have no plutonium in house for this purpose.

3541

4. Amendment 12, dated November 1, 1974, Items 6G, 7G and 8G covering 300 grams total plutonium enriched in the isotope Pu-238 in seven sealed sources. This program is now concluded and we currently have no sealed source in house.

A comprehensive radiation survey has been made at the Teledyne Isotopes facility at 110 West Timonium Road, Timonium, Maryland. The survey consisted of a general portable instrument monitor supplemented by an extensive wipe test survey.

Instrumentation for the survey included:

Eberline E500B	Geiger Counter
Eberline PAC-1SA	Alpha Scintillation Meter
Eberline SAC-2	Scintillation Alpha Counter
NMC PCC-10A	Internal Proportional Counter

All areas that had been subjected to the use of radioactive materials were initially checked for contamination with the portable instruments, i.e., the E500B and PAC-1SA. All results of this survey were negative - no contamination was detected by the use of portable instruments.

The wipe test technique utilized for this survey consisted of smearing a dry filter paper over an area of approximately 100 cm^2 and counting the wipe in both the SAC-2 and the PCC-10A for alpha and beta/gamma activity, respectively. The SAC-2 operates with 35% efficiency and a background of $\sim$ 4 counts/minute. The PCC-10A operates with 50% efficiency and a background of $\sim$62 counts/minute. Efficiency and background readings were taken on both counters prior to counting the wipes and after the wipe counting had been concluded.

A total of 67 wipes were taken at various locations throughout the entire facility, concentrating on those areas where radioactive materials had been present. Results of this survey indicated minimal removable surface contamination. The maximum net results were less than 10 d/m/100 cm^2 for both alpha and beta/gamma activity from any one wipe. The details of this comprehensive survey are recorded in our permanent Health Physics Log.

The cancellation of our SNM-849 license is, of course, contingent upon approval of our survey results by the Division of Fuel Cycle and Material Safety and the Office of Inspection and Enforcement. Please let me know if further information is required.

Sincerely,

TELEDYNE ENERGY SYSTEMS

John W. McGrew

John W. McGrew,
Licensing & Accountability
Representative

4/12/76
John Kinneman Region I,
called - Inspected work of 4/[illegible] and
all material properly disposed of.
[illegible]

ek

cc: Chief, Materials Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Region 1
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

JAN 25 1995

License Nos. 19-01398-20 (Retired) Docket Nos. None
19-01398-32 (Retired) None
SNM-11 (Retired) 070-00014
SNM-53 (Retired) 070-00058
SNM-849 (Retired) 070-00908
SNM-907 (Retired) 070-00932
SNM-1192 (Retired) 070-00058
STB-187 (Retired) 040-03296

Ms. Joanne Brooks
Environmental Specialist
Maryland Aviation Administration
3rd Floor Terminal Building
P.O. Box 8760
BWI Airport, Maryland 21240

SUBJECT: NRC REGION I INSPECTION NO. 94-001

Dear Ms. Brooks:

As Stephen Holmes of my staff discussed with you by telephone on October 20, 1994, the Nuclear Regulatory Commission (NRC) has been reviewing records to ensure that facilities, where activities were authorized by Atomic Energy Commission (AEC) and NRC licenses that have been terminated, are suitable for release for unrestricted use in accordance with current NRC guidelines. As you may be aware, the NRC and its predecessor, the AEC, issue licenses that authorize the use of various radioactive materials.

A contractor for the NRC, Oak Ridge National Laboratory (ORNL), initially reviewed each terminated license file and scored it according to a system designed to identify facilities that require additional review by the NRC staff. In general, files that indicate that radioactive material may have been used at particular facilities, but which do not include adequate final survey records for those facilities, are identified for additional review. The review by ORNL identified License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192 and STB-187 as files describing sites that require additional review. These licenses were issued to Martin-Marietta, Isotopes, Inc., and Ebasco and authorized activities at the Martin-Marietta Middle River Facility and the Martin State Airport. The Region I staff reviewed these files and determined that additional action was necessary since the information in the files did not provide sufficient detail to conclude that Buildings C, D, KJ and KC meet current guidelines for release for unrestricted use.

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PDR ADOCK 04003296
C PDR

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RETURN ORIGINAL TO
REGION I

IE 07

On November 3, 1994, Mr. Holmes and Mr. Ray Manley of the Maryland Department of the Environment conducted an inspection at the Martin-Marietta Middle River Facility and Martin State Airport to determine whether radioactive contamination remains at those facilities as a result of activities previously authorized by these licensees. The findings of this inspection were discussed with a member of Mr. Jake West's staff, Glen Peregoy, at the conclusion of the inspection. The inspection report is enclosed with this letter.

As described in the enclosed report, the inspectors conducted a survey of each of the facilities and contacted and interviewed current and former employees of the licensees noted above. No radiation levels above background were identified at any of the sites. Only one building (C), in which only sealed sources were used, is presently being utilized. Another building (D) had been demolished and now only a concrete pad remains. The two remaining buildings (KJ and KC), on the Martin State Airport, have been abandoned and are scheduled for demolition pending remediation of asbestos and funding. Based on these facts and the findings described in the enclosed report, we plan no further action on these sites. They are suitable for unrestricted use.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed report will be placed in the Public Document Room. We will also provide copies to representatives of the State of Maryland.

No reply to this letter is required. Your cooperation with us is appreciated. If you have any questions, please contact Stephen Holmes at (610) 337-5390 or me at (610) 337-5252.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety
and Safeguards

License Nos.		Docket Nos.	
	19-01398-20 (Retired)		None
	19-01398-32 (Retired)		None
	SNM-11 (Retired)		070-00014
	SNM-53 (Retired)		070-00058
	SNM-849 (Retired)		070-00908
	SNM-907 (Retired)		070-00932
	SNM-1192 (Retired)		070-00058
	STB-187 (Retired)		040-03296

Enclosure: NRC Region I Inspection Report No. 94-001

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cc w/encl:
Jake West, Manager, Martin State Airport
R. Manley, State of Maryland

Distribution w/encl:
PUBLIC
Nuclear Safety Information Center (NSIC)
Region I Docket Room (w/concurrences)
P. Goldberg, NMSS
C. Gordon, RI

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DATE	01/23/95		01/25/95							

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 94-001

Docket Nos. None, None, 070-00014, 070-00058, 070-00908, 070-00932, 070-00058, 040-03296

License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, STB-00187

Licensee: Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Facility Name: Middle River Facility and Martin State Airport

Inspection at: 2323 Eastern Blvd
Baltimore, MD
and
701 Wilson Point Road
Baltimore, MD

Inspection Conducted: November 3, 1994

Inspector: Stephen W. Holmes, Radiation Specialist — 01/23/95 date

Approved by: John D. Kinneman, Chief
Site Decommissioning Section — 1/23/95 date

Inspection Summary: Closeout Verification Inspection No. 94-001.

Areas Inspected: Announced, inspection and survey of Buildings C and D at the Martin-Marietta Middle River facility and Buildings KJ and KC at the Martin State Airport.

Results: No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from the present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

9501310057

DETAILS

1.0 Persons Contacted

Joseph Alcarese, Esq.
Joanne Brooks, Environmental Specialist, Environmental Program Manager, Maryland Aviation Administration
Richard Brisson, former Acting Program Administrator, Maryland Dept. of the Environment, Radiological Health Program and former Martin-Marietta/Isotopes,Inc. employee
Thomas Flynn, Jr., Engineer, Raytheon (formally Ebasco Services, Inc.)
* Ray Manley, Inspector, Maryland Department of the Environment
Glen Peregoy, Engineer, Martin State Airport
* Jeffrey G. Smith, Manager Environmental Affairs, Martin Marietta
Jake West, Manager, Martin State Airport

* denotes those present at exit interview

2.0 Background

2.1 General

As part of a program to ensure that facilities where activities authorized by AEC and NRC licenses that have been terminated were suitable for release for unrestricted use as specified in current NRC criteria, the docket files for License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, and STB-187 were reviewed. Based on information in the files, the radiological status of four buildings could not be determined with certainty. These are Buildings C, D, on the Martin Marietta Corporation Middle River Facility and KJ (critical facility), and KC (radioisotope laboratory) on the Martin State Airport. Therefore, an onsite inspection was conducted. Prior to the on-site inspection, available records pertaining to the licensing, operation, and decommissioning of the activities in and around these buildings were reviewed by the inspector. Additionally, the inspector contacted two persons who had direct contact with these sites during actual operations or decommissioning: Mr. Thomas A. Flynn, Jr. the Project Manager of the 1965 "dismantling" of the Liquid Fluidized Bed Reactor (LFBR) at Building KC and Mr. Richard Brisson, a former employee of both Martin-Marietta, and Isotopes, Inc. Information obtained from these sources is documented in pertinent sections of this report.

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4.0 Survey Results

4.1 General

On November 3, 1994 surveys of each building/site were performed jointly by the NRC and State of Maryland inspectors. The inspectors surveyed each facility thoroughly and kept each other informed as to the results. The surveys were performed with the Micro R meters held at 0.5 meters above the surface with a forward movement of about 1.0 meters per second. In addition to Mr. Smith, who accompanied the inspectors to each site, Mr. Peregoy was present during the surveys of Buildings KC and KJ on the Martin State Airport property.

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The Building D site was being use to store trailers under contract with the Army. The site consisted of a large concrete pad, the leftover basement floor of the old building. The pad had numerous cracks, holes, and was very weathered after two decades of exposure to the elements.

The inspectors surveyed the concrete pad along parallel lines 5 meters apart, paying attention to drains, clean-outs, and holes in the pad. In addition to measurements taken at drains and clean-outs, surface contact readings were also taken at approximately 10 meter intervals. Numerous sealed/filled in drains/clean-outs/penetrations/holes in the pad were located. Although a few places were found where a hole in the pad had been filled with concrete, it could not be determined if these were any of the drains referred to in the closeout survey. Martin Marietta staff stated that the rubble from the demolition of the building was the responsibility of the contractor and was removed and believed to have been disposed of in a landfill. No detectable radiation levels above background (5μR/hr) were found. No development or other use of the site is planned by Martin Marietta.

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site was also completely abandoned, overgrown, exposed to the elements. The doors into the laboratory and, mechanical equipment room and office were ajar leaving the interior open to the outside. The inside was littered with "junk", leaves, bird and animal droppings, and dirt. A fair number of 100 lb. bags of "solidified" lime were present, as the building had been use for storage by the State of Maryland in the past. Rusted laboratory furniture and discarded fire extinguishers also littered the floor. The stainless steel ventilation duct-work and the laboratory hoods were still present less the duct-work section that had contained the HEPA filters. The inspectors surveyed the remains as well as possible given the state of the building. No radiation levels above background were detected. The planning representative of Maryland Aviation stated that the building, just like Building KC, had been scheduled for demolition after remediation of the asbestos, but the demolition was delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

5.0 Conclusions

No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

6.0 Exit Interview

The inspector met with the Martin-Marietta and Maryland Department of the Environment representatives listed in Section 1.0 of this report and discussed the scope and findings of this inspection. They acknowledged the inspection findings and the statements documented in this report. Messrs. Flynn and Brisson were contacted by telephone and also confirmed their statements in this report.

JAN 25 1995

License Nos.		Docket Nos.
	19-01398-20 (Retired)	None
	19-01398-32 (Retired)	None
	SNM-11 (Retired)	070-00014
	SNM-53 (Retired)	070-00058
	SNM-849 (Retired)	070-00908
	SNM-907 (Retired)	070-00932
	SNM-1192 (Retired)	070-00058
	STB-187 (Retired)	040-03296

Joseph Alcarese, Esq.
Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, Maryland 21220

SUBJECT: NRC REGION I INSPECTION NO. 94-001

Dear Mr. Alcarese:

As Stephen Holmes of my staff discussed with you by telephone on October 20, 1994, the Nuclear Regulatory Commission (NRC) has been reviewing records to ensure that facilities, where activities were authorized by Atomic Energy Commission (AEC) and NRC licenses that have been terminated, are suitable for release for unrestricted use in accordance with current NRC guidelines. As you may be aware, the NRC and its predecessor, the AEC, issue licenses that authorize the use of various radioactive materials.

A contractor for the NRC, Oak Ridge National Laboratory (ORNL), initially reviewed each terminated license file and scored it according to a system designed to identify facilities that require additional review by the NRC staff. In general, files that indicate that radioactive material may have been used at particular facilities, but which do not include adequate final survey records for those facilities, are identified for our additional review. The review by ORNL identified License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192 and STB-187 as files describing sites that require additional review. These licenses were issued to Martin-Marietta, Isotopes, Inc. and Ebasco and authorized activities at the Martin-Marietta Middle River Facility and the Martin State Airport. The Region I staff reviewed these files and determined that additional action was necessary since the information in the files did not provide sufficient detail to conclude that Buildings C, D, KJ and KC meet current guidelines for release for unrestricted use.

On November 3, 1994, Mr. Holmes and Mr. Ray Manley of the Maryland Department of the Environment conducted an inspection at the Martin-Marietta Middle River Facility and Martin State Airport to determine whether radioactive contamination remains at the facility as a result of activities previously authorized by these licensees to Martin-Marietta, Isotopes, Inc., and Ebasco.

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The inspection report is enclosed with this letter. The findings of this inspection were discussed with your representative, Mr. Jeffrey Smith, at the conclusion of the inspection.

As described in the enclosed report, the inspectors conducted a survey of each of the facilities and contacted and interviewed current and former employees of the licensees note above. No radiation levels above background were identified at any of the sites. Only one building (C), in which only sealed sources were used, is presently being utilized. Another building (D) had been demolished and now only a concrete pad remains. The two remaining buildings (KJ and KC), on the Martin State Airport, have been abandoned and scheduled for demolition pending remediation of asbestos and funding. Based on these facts and the findings annotated in the enclosed report, we plan no further actions on these sites. They are suitable for unrestricted use.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed report will be placed in the Public Document Room. We will also provide copies to representatives of the State of Maryland.

No reply to this letter is required. Your cooperation with us is appreciated. If you have any questions, please contact Stephen Holmes at (610) 337-5390 or me at (610) 337-5252.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety
and Safeguards

License Nos.		Docket Nos.	
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	19-01398-32 (Retired)		None
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	SNM-53 (Retired)		070-00058
	SNM-849 (Retired)		070-00908
	SNM-907 (Retired)		070-00932
	SNM-1192 (Retired)		070-00058
	STB-187 (Retired)		040-03296

Enclosure: NRC Region I Combined Inspection Report No. 94-001

cc w/encl:
Ray Manley, State of Maryland

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cc w/encl: (cont'd)
Richard Brisson
12 Linwood Court
Baltimore, Maryland 20104

Thomas A. Flynn, Jr.
Raytheon Engineering Consultants
2 World Trade Center
New York, New York 10048

Distribution w/encl:
PUBLIC
Nuclear Safety Information Center (NSIC)
Region I Docket Room (w/concurrences)
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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 94-001

Docket Nos. None, None, 070-00014, 070-00058, 070-00908, 070-00932, 070-00058, 040-03296

License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, STB-00187

Licensee: Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Facility Name: Middle River Facility and Martin State Airport

Inspection at: 2323 Eastern Blvd
Baltimore, MD
and
701 Wilson Point Road
Baltimore, MD

Inspection Conducted: November 3, 1994

Inspector: Stephen W. Holmes, Radiation Specialist — 01/23/95 date

Approved by: John D. Kinneman, Chief
Site Decommissioning Section — 1/23/95 date

Inspection Summary: Closeout Verification Inspection No. 94-001.

Areas Inspected: Announced, inspection and survey of Buildings C and D at the Martin-Marietta Middle River facility and Buildings KJ and KC at the Martin State Airport.

Results: No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from the present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

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DETAILS

1.0 Persons Contacted

Joseph Alcarese, Esq.
Joanne Brooks, Environmental Specialist, Environmental Program Manager, Maryland Aviation Administration
Richard Brisson, former Acting Program Administrator, Maryland Dept. of the Environment, Radiological Health Program and former Martin-Marietta/Isotopes,Inc. employee
Thomas Flynn, Jr., Engineer, Raytheon (formally Ebasco Services, Inc.)
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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 40-3296/82-01
40-2308/82-01

Docket No. 40-3296
40-2308

License No. STB-187
C-3991

Licensee: Martin-Marietta Corporation

Baltimore, Maryland

Facility Name: Martin-Marietta Corporation (The Martin Company)
Middle River Facilities
Middle River, Maryland

Inquiry Conducted: March 5 - June 15, 1982

Inspector: Jenny M. Johansen
Jenny M. Johansen, Radiation Specialist — 8/2/82 date

Approved by: John D. Kinneman
John D. Kinneman, Chief, Materials
Program Section No. 1 — 8/2/82 date

Inquiry Summary:

This inquiry consisted of telephone discussions and review of records provided by Martin-Marietta Corporation and NMSS to determine whether the facility at Middle River, Maryland formerly used for development and production of thorium-magnesium alloys meets current criteria for unrestricted use.

Results: The Middle River (Chesapeake Park) facility meets current criteria for release for unrestricted use.

DETAILS

1. Persons Contacted

A. Paul Guinn, MLB, NMSS, USNRC
B. Paul Majewski, Safety Coordinator
Martin-Marietta Laboratories
1450 S. Rolling Road
Baltimore, Maryland 21227 (301-247-0700)
C. Joseph P. Alcarese, Division Counsel
Martin-Marietta Aerospace, Baltimore Division
103 Chesapeake Park Plaza
Baltimore, Maryland 21220 (301-338-5000)
D. Robert E. Corcoran, Chief
Division of Radiation Control
201 West Preston Street
Baltimore, Maryland 21201 (301-383-2744)

2. Background

Martin-Marietta Corporation, Baltimore Division, was authorized by License Nos. C-3991 and STB-187 during the late 1950's and early 1960's for the development and production of magnesium-thorium alloys and for possession and use of small quantities of uranium and thorium metal in connection with work under government contracts. License No. STB-187 expired on April 30, 1964. The authorized place of use was at Martin-Marietta's Middle River, Maryland facilities which are also called Chesapeake Park.

3. Telephone Discussions with Individuals

Individual A in paragraph 1 was formerly employed as the Health Physics Supervisor at Martin-Marietta and monitored the activities conducted under License Nos. C-3991 and STB-187. He stated that all work authorized by these licenses occurred in the basement of Building D at Chesapeake Park, Middle River, Maryland. Individual D also stated that a former Martin-Marietta employee had told him that Building D had been torn down and the site covered with grass after the building and the site were decontaminated.

Individual C searched Martin-Marietta records and found a close-out survey covering Building D and correspondence discussing the release of this facility for unrestricted use. He provided the correspondence and survey report in a letter dated June 1, 1982 (see Enclosure A) and confirmed that Building D had been torn down and the area where it stood is now covered with grass.

4. Review of Records

A letter from Martin-Marietta to the AEC dated September 21, 1970 (See Enclosure A) states that AEC License No. SNM-1192 was issued to Martin--Marietta Corporation to allow decontamination of their laboratory facilities and that a report of the decontamination was enclosed. The "Comprehensive Radiation Survey Report for the Release of Decontaminated Premises for Unrestricted Use," enclosed, provided the following points of comparison to the licenses and Individual A's statement:

a. The decontamination effort involved Building D at Chesapeake Park. Individual A stated that all work under License Nos. C-3991 and STB-187 occurred in this building.

b. Special nuclear material processes took place in Building D nuclear laboratories. The decontamination program consisted primarily of removal of U-235 and U-238 residual oxide forms. License No. C-3991 authorized use of uranium metal under government contracts while License No. STB-187 authorized the use of thorium.

Review of the close-out survey indicates that an extensive effort was made to remove all contamination according to AEC criteria and to protect the workers performing the decontamination. Contamination was removed from surfaces by use of high vacuum systems. Fixed contamination found on equipment such as hoods, ducts, glove boxes was allowed to remain fixed and the equipment was removed, properly packaged and shipped to Moorehead Kentucky for burial. Swipe tests were made and various kinds of radiation detectors were used during the decontamination. The report states that removable activities and radiation levels met AEC criteria for release for unrestricted use; however, no site diagram, showing where the swipes and measurements were taken, nor actual results of the measurements are provided.

The report states the average fixed alpha emitter contamination was less than 2000 dpm/100 cm^2, with no beta-gamma contamination, except for a small area of fixed Sr-90 contamination reading 0.5 mrad/hr. Except for the Sr-90 contamination, these results are within present NRC criteria of 5000 dpm/100cm^2 (average U-nat, U-235, U-238 and associated decay products) surface contamination. A fixed contamination level of 0.5 mrad/hr from Sr-90 does not meet the present NRC criteria; however, it is within the 2 mrem/hr limit for an unrestricted area in 10 CFR 20.105(b), and, since it was only a small spot, presented no hazard to personnel.

All water samples taken were stated to be less than or equal to 9.0×10^{-7} microcuries per ml compared to 10^{-5} microcuries per ml allowed for U-235 and U-238 in 10 CFR 20, Appendix B, Table II, Column 2. All soil samples were less than 10 pCi per gram U-238 or U-235 except for one sample having 24 pCi per gram of U-238. These results are consistent with the recent Uranium Fuel Licensing Branch position on disposal of uranium.

Residual activity in drains consisted of a total of 29 microcuries of U-235, which the licensee proposed to seal in place with cement.

5. Conclusion

Materials authorized by License Nos. C-3991 and STB-187 were used in Building D at Martin-Marietta's Middle River facilities which are also called Chesapeake Park. The Building D which was decontaminated and released for unrestricted use when AEC License SNM-1192 was terminated is the same facility where work authorized by License Nos. C-3991 and STB-187 was conducted. If any material remained from operations under these licenses it would have been detected and removed during that effort. No determination could be made if the drains containing residual U-235 activity were sealed with cement, however, since the building is now demolished and the site covered with grass this activity is unlikely to present a hazard.

Region I concludes the site meets current NRC criteria for release for unrestricted use and that no site survey is necessary.

Enclosure A Region I Report
40-3296/82-01 - 40-2308/82-01

MARTIN MARIETTA AEROSPACE

BALTIMORE DIVISION
103 CHESAPEAKE PARK PLAZA
BALTIMORE, MARYLAND 21220
TELEPHONE (301) 338-5000

June 1, 1982

Ms. Jenny Johansen
USNRC
Region 1
631 Park Avenue
King of Prussia, Pa. 19406

Dear Ms. Johansen:

In accordance with your request, I am enclosing, from the records of the Martin Marietta Corporation, a copy of the "Comprehensive Radioactive Survey Report For The Release of Decontaminated Premises For Unrestricted Use", prepared in accordance with U.S.A.E.C. Material License No. SNM-1192 issued to the Martin Marietta Corporation for the decontamination of nuclear laboratories at Baltimore, Maryland.

I am also enclosing a copy of correspondence showing that the Survey Report was furnished to the AEC Division of Materials Licensing at Washington, D.C. and the AEC Compliance Division at Newark, New Jersey. Also, a copy of a letter to the AEC Division of Materials Licensing advising that the decontamination program was near complete and requesting an inspection of the facility.

We are pleased to be able to assist you in this matter.

Very truly yours,

MARTIN MARIETTA CORPORATION

Joseph P. Alcarese
Division Counsel
Martin Marietta Aerospace
Baltimore Division

JPA:jd
enclosures

15 July 1970

Mr. Donald A. Nussbaumer, Chief
Fuel Fabrication and Transportation Branch
Division of Materials Licensing
United States Atomic Energy Commission
Washington, D.C. 20545

Dear Mr. Nussbaumer:

Please be advised that the decontamination program at the Martin Marietta Corporation Baltimore facilities is nearing completion and it is anticipated the program shall be completed tentatively on August 5, 1970.

We request that an inspection of the subject facility be conducted on August 6, 1970, by a representative of your office in conjunction with the writer and a health physicist from the Eberline Instrument Corporation. If the above date is not compatible with your assignee's schedule and if there are questions regarding the above request and/or program, please advise the writer.

I wish to express my corporation's thanks and appreciation for the excellent service provided by representatives of your office toward bringing this program to a successful completion.

Sincerely yours,

MARTIN MARIETTA CORPORATION

Elmer M. Chenault
Health Physicist

cc: G. W. Heineman
R. G. Macaulay
J. Stewart
F. F. Huner
E. Petrochko
E. Geiger
R. T. Woolsey

21 September 1970

Director of Division Compliance
United States Atomic Energy Commission
970 Broad Street
Newark, New Jersey 07107

Attention: Mr. W. Lorenz

Gentlemen:

Enclosed is a comprehensive radiation survey report describing the successful decontamination of our laboratory facilities. The report is one of the requirements of the license (A.E.C. Material License No. SNM-1192) issued to the Martin Marietta Corporation, Baltimore Division, to allow decontamination of said facilities.

Sincerely,

Elmer M. Chenault
Sr. Health Physicist

Encl.

cc: G. W. Heineman
R. G. Macaulay
J. Stewart

22 September 1970

Director, Division of Materials Licensing
United States Atomic Energy Commission
Washington, D. C.

Attention: Mr. R. T. Woolsey

Gentlemen:

Enclosed is a comprehensive radiation survey report describing the successful decontamination of our laboratory facilities. The report is one of the requirements of the license (A.E.C. Material License No. SNM-1192) issued to the Martin Marietta Corporation, Baltimore Division, to allow decontamination of said facilities.

Sincerely,

Elmer M. Chenault
Sr. Health Physicist

Encl.

cc: G. W. Heineman
R. G. Macaulay
J. Stewart

COMPREHENSIVE RADIATION SURVEY REPORT FOR THE RELEASE OF DECONTAMINATED PREMISES FOR UNRESTRICTED USE

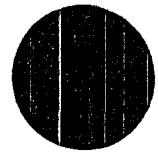
CHESAPEAKE PARK, INC., BALTIMORE, MARYLAND
MARTIN MARIETTA CORPORATION
BALTIMORE, MARYLAND

Prepared by

E. M. Chenault
Sr. Health Physicist
Martin Marietta Corporation

and

Stanley J. Waligora, Jr.
Consultant Health Physicist
Eberline Instrument Corporation
Santa Fe, New Mexico



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4. Bioassay Samples

a. Positive Nose Swipes

b. Urine Analysis

I. INTRODUCTION

Purpose: This radiation survey report is prepared as one of the conditions provided for in U.S.A.E.C. Material License No. SNM-1192 issued to the Martin Marietta Corporation for the decontamination of nuclear laboratories at Baltimore, Maryland.

Since the subject nuclear laboratories are no longer used for radioisotopes operations and/or special nuclear materials processes and have been decontaminated in accordance with U.S.A.E.C. guidelines, it is requested the above named facilities be released for unrestricted use.

On June 3, 1970, the decontamination program at the Martin Marietta Corporation, Baltimore Division, commenced and it was completed on September 2, 1970. The radioactive materials involved in the decontamination program consisted primarily of U^{235} and U^{238} in a residual oxide form.

The work was performed by a crew consisting of 8 trained operators from the Martin Marietta Corporation, two health physicists from Eberline Instrument Corporation, and one health physicist from Martin Marietta Corporation. The removal of the radioactive material from equipment and facilities was achieved primarily through the use of high vacuum systems, with the operators wearing U.S. Bureau of Mines air supplied respirators. Full protective clothing and footwear were provided the workers.

Air samples were collected throughout the general area during the decontamination program and were counted for gross alpha emitters. The results of all air samples collected were below the MPC, with the exception of 4 samples. One sample was collected in the Radioisotopes Laboratory while chipping SR^{90} from a concrete wall. The result was reported as 2.4×10^{-10} uCi/CC. The second sample was collected in the Spheroidizing Room while removing ventilation ducts. The results of the air samples are given in Appendix C-1.

It should be noted that air supply respirators were worn by the operators during the time the air dust concentrations were measured. Urine specimens were submitted by personnel assigned to the program prior to working in the contaminated areas, in order to provide a base line study. Nasal swipes of all men working in the contaminated areas were performed twice daily. The results of all nasal swipes were low to negligible and did show proper use of respiratory protective equipment.

Water samples were collected of all liquid effluent, analyzed prior to release, and records of all sample analysis and personnel dosimetry reports are maintained in the office of the Martin Marietta Corporation's health physicist.

II. LOCATION AND IDENTIFICATION OF FACILITIES

The subject nuclear laboratories that were decontaminated are located at Chesapeake Park and are owned by Martin Marietta Corporation at Baltimore, Maryland. The decontaminated laboratories encompass an area of approximately 40,000 FT^2, located in the basement area of building "D". The total area was subdivided into small separate rooms where various types of nuclear activity were performed. Most of the small rooms were of the laboratory-type, and equipment included ventilation hoods, glove boxes, filtration medias, laboratory benches and laboratory glassware. False ceilings were also a part of some laboratories, and each ceiling was surveyed and removed, where necessary.

For the most part, the radioactivity was confined to glove boxes, ventilation hoods, ducts and filtration medias contained in each laboratory. The radioactive materials removed were in the form of residual uranium oxides, with the exception of a minor amount of SR^{90} found on a wall.

Some of the laboratories contained sinks, floor drains and sumps used to control liquid effluent containing radioactive materials. The floor drains, traps and sumps were carefully monitored to determine the contamination level, if any, and the termination location of each drain line and sump line.

III. HEALTH PHYSICS TECHNICAL APPROACH

The removal of residual contamination was accomplished through the direction and guidance of three health physicists, two from Eberline Instrument Corporation and one from Martin Marietta Corporation. The work crew consisted of eight qualified workers trained in the radiological health aspect of nuclear decontamination.

The contamination, for the most part, was not found to be tightly bonded or sealed to the surfaces of the facilities and therefore most of it was removed by the use of high vacuum systems with absolute filters. One wall and several floor areas showed evidence of bonded alpha activity and, therefore, it became necessary to use pneumatic tools to remove the contamination and reduce radiation levels to acceptable levels. Contamination that was found to be fixed on equipment, such as ventilation hoods, ducts and glove boxes, was allowed to remain fixed, and the equipment was properly packaged, identified and shipped by truck carrier to burial grounds in Moorehead, Kentucky. The transportation and burial of all contaminated equipment was provided by the Nuclear Engineering Company, Moorehead, Kentucky.

IV. SCOPE OF SURVEY AND GENERAL PROCEDURES FOLLOWED

Radiation detection equipment used during the effort included several gas proportional alpha counters, one floor alpha monitor, RM-15 (soft gamma measurement), one beta plus gamma counter, TLD badges and film badge dosimetry.

Swipe samples by the use of whatman filter paper were collected from all surface areas where it was thought to be necessary. The filter paper samples were then counted for any gross alpha contamination. All loose radioactive material was removed from the facilities. Equipment that was heavily contaminated, such as glove boxes and ventilation hoods, were properly packaged and shipped by carrier truck for burial.

There were no areas detected whereby radioactive materials had been sealed by painting or by other means, and there was no attempt to seal any areas containing fixed radioactive materials.

The general procedure followed to accomplish the decontamination effort is entitled "The Health and Safety Procedure for the Decontamination of Building "D", Martin Marietta Corporation, Baltimore, Maryland." The procedure is presently on file in the office of the U.S.A.E.C. Division of Materials Licensing. The procedure provided the basic guidelines for performing the decontamination in a safe manner. "The Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use" was closely adhered to by the Martin Marietta Corporation decontamination work crew.

V. FINDINGS OF THE DECONTAMINATION SURVEY

The floors, walls and ceilings of all laboratories where nuclear activity was conducted were monitored and recleaned. Some areas did not show evidence of contamination. Those areas where contamination was found were vacuumed and sprayed with a jet-x cleaning device to remove any material that could not be vacuumed. The use of water was controlled and kept to a minimum to prevent water contamination and pollution.

During the initial phase of the decontamination inspection survey, six items or areas were found which required correction (letter to E. M. Chenault from S. J. Waligora, Jr., dated September 3, 1970) and all, with the exception of the floor drains, were corrected.

All floor drains were monitored and decontaminated as much as possible. Water samples were taken from the five drains indicating residual activity and all results showed low concentrations. (See Appendix C-2) The residual activity remaining in the six drains was estimated through the use of a 2" x 2" NaI(TR) crystal in conjunction with a single channel analyzer. With the detection system calibrated for ^{235}U gamma rays, the following estimates were established:

Drain No.	^{235}U(uCi)
39	1.0
46	1.0
52	15.0
55	6.0
56	6.0
Total	29.0

Water samples taken from these drains showed very low concentrations. As a further check, water was flushed continuously through these five drains while a two liter water sample was taken from the sanitary sewer sump servicing that portion of the building. Samples were submitted for analysis and showed 0.003 pCi/ml (MPC 30.0 pCi/ml).

All drains have been left open for inspection. With approval from the U.S. Atomic Energy Commission, we propose to seal the five drains with cement, thereby permanently inactivating the total of 29 uCi of ^{235}U. This measure would appear to be a feasible alternative to tearing out the concrete floor in order to remove the drains and associated pipe.

As a result of the final survey, all other areas were reduced to within limits prescribed by the U.S. Atomic Energy Commission. All walls, ceilings, and floors had been washed thoroughly or removed. The average alpha emitter contamination (^{235}U and/or ^{238}U only) is much less than 500 dpm/100 cm^2. Areas with remaining fixed alpha emitter contamination average less than 2,000 dpm/100 cm^2. Beta-gamma contamination is essentially nonexistent; ^{90}Sr-Y contamination which had been present in the Radioisotopes Laboratory has been completely removed with the exception of one minute area with fixed contamination measuring 0.5 mRad/hr.

This area of Building "D" will soon be renovated by Chesapeake Park and any remaining fixed contamination will be further enclosed with replastering, retiling of floors, and repainting. Following the renovation, any fixed residual contamination should be so well fixed that there should be no evidence of even trace quantities during the remaining life of the structure.

VI. PACKAGING, TRANSPORTATION AND DISPOSAL OF CONTAMINATED EQUIPMENT

All contaminated equipment, such as glove boxes, ventilation hoods and duct work, were properly packaged and identified in accordance with the Department of Transportation rules and regulations and sent by truck carrier to Moorehead, Kentucky, for burial. A total of nineteen (19) truckloads of equipment were sent to the burial grounds, with each truckload encompassing approximately 1,920 cubic feet.

APPENDIX B - SUMMARY OF DECONTAMINATION OPERATIONS

The following is a chronological task summary of decontamination operations from June 1 through September 3, 1970, and represents approximately 2400 man hours of labor.

1. Organization of people, equipment, supplies, and facilities; establishment of procedures and policies.
2. Removal of exhaust ducts from furnace room.
3. Samples taken from areas with potential for tritium and for cobalt 60 contamination.
4. Machinery and equipment removed from furnace room.
5. Areas expected to be clean were monitored and any anomalies entered to the work plan.
6. Arrangements were made for special disposal of nonradioactive but hazardous wastes (acids, alkalis, solvents, nitrates, peroxides, etc.)
7. Removed parafin shielding from neutron generator area.
8. Removed equipment from laundry area.
9. Surveyed dehydrator rooms and segregated areas and equipment.
10. Cleaned nine rooms which required general decontamination, but which posed no problems due to presence of contaminated equipment, exhaust ducts, absolute filters, etc.
11. Laundry area cleaned including removal of construction blocks and floor tiles.
12. Cleaned powder room - highly contaminated.
13. Discovered "contamination" in heat plant boiler room which analyses showed to be naturally occurring thorium.
14. Fire (primarily smoke) as the result of torches used during duct removal on outside of building by a local contractor. This duct work was past the absolute filter bands and there was no attendant radiation hazard

15. General cleaning accomplished in five additional rooms.

16. Vault decontaminated and bird cages removed.

17. Chipped concrete walls contaminated with ^{90}Sr-Y in Radioisotopes Laboratory.

18. Ductwork removal and clean-up in two additional rooms.

19. Removed glove boxes and other contaminated equipment from Spheroidizing Room; proceeded with remainder of clean-up.

20. Removed installed casework in Inorganic Chemistry Laboratory.

21. Decontaminated restroom floors in supposedly clean area.

22. Cleaned contamination which resulted from clean-up of Spheroidization Room.

23. Inspected Oil Farm Building (remote to Building "D") and removed contaminated equipment that had been stored. Survey showed no further decontamination was necessary.

24. Proceeded with clean-up of Inorganic Chemistry Laboratory.

25. Removed ducts and proceeded with clean-up of Powder Metal Room.

26. Removed duct and proceeding with clean-up of three rooms.

27. Removed duct work and equipment in Ceramics Laboratory and Spheroidization Laboratory.

28. Steamed Pellet Room in preparation to clean-up in order to reduce airborne (resuspended) contamination. Proceeded with clean-up.

29. Powder Room was also steamed prior to clean-up.

30. Removed absolute filters associated with Pellet Room.

31. All drains monitored and cleaned. Five remain contaminated.

32. Removed vertical rolling mill (several tons) from Powder Room. Residual contamination forced removal of two walls, ceilings, and floor tiles.

33. Ceiling and floor tiles removed in Spheroidization Room.

34. Removed absolute filters associated with Vault Room.

35. Final blowers, filters and ducts removed at termination and ventilation exhaust equipment.

36. Removed absolute filters and remainder of equipment associated with the Radioisotopes Laboratory.

37. Proceeded throughout entire facility with final monitoring and removed any contaminated items including floor tile, miscellaneous fixtures. Washed down all remaining ceilings, walls, and floors several times. A detailed swipe survey was performed.

38. Sumps and chip tanks associated with Dehydrator, Laundry Room, and Cleaning Room were decontaminated.

39. Asphalt floor covering in Cleaning Room removed.

40. Final waste shipment (19th truckload) departed. Two additional barrels filled with remaining miscellany for future shipment.

APPENDIX C - SAMPLE ANALYSIS RESULTS

1. Environmental Air Samples

Location	Date	Concentration (uCi/ec)
Radioisotopes Laboratory	7/9/70	$92.3 \pm 0.6 \times 10^{-12}$
Radioisotopes Laboratory	7/9/70	$240.0 \pm 1.0 \times 10^{-12}$
Spheroidizing Room	7/14/70	$68 \pm 2 \times 10^{-12}$
" "	7/15/70	$413 \pm 10 \times 10^{-12}$
Dehydrator Room (during fire)	6/26/70	3.3×10^{-12}
Furnace Room	6/17/70	1.17×10^{-13}
" "	6/17/70	8.5×10^{-13}
" "	6/18/70	2.7×10^{-13}
" "	6/19/70	1.1×10^{-13}
" "	6/22/70	5.36×10^{-13}
" "	6/23/70	3.3×10^{-13}
" "	6/23/70	2.6×10^{-12}
" "	6/23/70	5.3×10^{-12}
" "	6/24/70	2.7×10^{-13}
" "	6/24/70	3.5×10^{-12}
Break Room	6/24/70	2.1×10^{-12}
Furnace Room	6/25/70	5.5×10^{-13}
" "	6/25/70	3.5×10^{-12}
" "	6/26/70	3.5×10^{-12}
" "	6/26/70	2.7×10^{-13}
" "	6/26/70	3.3×10^{-12}
" "	6/26/70	3.5×10^{-12}
" "	6/26/70	2.7×10^{-13}
" "	6/29/70	3.5×10^{-12}
" "	6/29/70	2.6×10^{-12}

Environmental Air Samples (Continued)

Location	Date	Concentration (uCi/ec)
Furnace Room	6/30/70	1.75×10^{-12}
" "	6/30/70	3.6×10^{-13}
" "	7/1/70	1.4×10^{-12}
" "	7/1/70	5.5×10^{-13}
" "	7/6/70	3.5×10^{-12}
" "	7/6/70	1.75×10^{-12}
" "	7/6/70	6.6×10^{-13}
" "	7/7/70	3.3×10^{-13}
" "	7/8/70	1.6×10^{-13}
" "	7/9/70	2.7×10^{-13}
Spheroidizing Room	7/10/70	1.1×10^{-13}
Flame Room #12	7/10/70	2.6×10^{-12}
Inorganic Chemistry Lab	7/13/70	2.5×10^{-12}
" " "	7/13/70	6.2×10^{-12}
Spheroidizing Room	7/13/70	4.0×10^{-12}
Room #11	7/14/70	3.0×10^{-12}
* Spheroidizing Room	7/14/70	6.8×10^{-10}
Room #11	7/15/70	1.6×10^{-12}
* Spheroidizing Room	7/15/70	4.13×10^{-10}
Room #11	7/16/70	7.0×10^{-13}
Spheroidizing Room	7/16/70	6.6×10^{-11}
Spheroidizing Room	7/17/70	7.9×10^{-11}
Furnace Room	7/20/70	5.2×10^{-13}
Inorganic Chemistry Lab	7/21/70	4.4×10^{-12}
Inorganic Chemistry Lab	7/21/70	4.6×10^{-12}
* Spheroidizing Room	7/21/70	1.7×10^{-10}

Environmental Air Samples (Continued)

Location	Date	Concentration (u Ci/ec)
Furnace Room (Shipping Area)	7/22/70	3.9×10^{-13}
Inorganic Chemistry Lab	7/22/70	8.6×10^{-13}
" " "	7/22/70	1.7×10^{-12}
Room #32	7/23/70	1.75×10^{-11}
Room #32	7/23/70	2.6×10^{-12}
Room #57	7/23/70	7.0×10^{-12}
Spheroidizing Room	7/24/70	3.1×10^{-12}
Room #41 (Vault)	7/24/70	1.4×10^{-12}
Room #21 (Powder Metal)	7/24/70	6.3×10^{-12}
Spheroidizing Room	7/27/70	1.47×10^{-11}
" "	7/27/70	2.2×10^{-12}
Room #41 (Vault)	7/27/70	6.0×10^{-12}
Spheroidizing Room	7/28/70	9.9×10^{-11}
Room #41 (Vault)	7/28/70	1.4×10^{-12}
Room #21 (Powder Metal)	7/29/70	1.97×10^{-11}
" " " "	7/29/70	1.18×10^{-11}
Spheroidizing Room	7/29/70	2.1×10^{-12}
Ceramics Lab	7/30/70	7.0×10^{-12}
" "	7/30/70	2.9×10^{-12}
Spheroidizing Room	7/30/70	1.0×10^{-12}
Ceramics Lab	7/31/70	4.2×10^{-12}
Dehydrator Room	7/31/70	7.0×10^{-12}
Spheroidizing Room	7/31/70	4.4×10^{-12}
Furnace Room (Shipping Area)	8/3/70	3.5×10^{-11}
Corrosion Test Lab	8/3/70	1.6×10^{-12}
Spheroidizing Lab	8/4/70	2.2×10^{-11}
Pellet Room	8/4/70	7.0×10^{-12}

Environmental Air Samples (Continued)

Location	Date	Concentration (uCi/ec)
Furnace Room (Shipping Area)	8/4/70	2.4×10^{-12}
Pellet Room	8/5/70	5.3×10^{-12}
" "	8/5/70	9.3×10^{-12}
Furnace Room (Room #11)	8/5/70	1.6×10^{-12}
Pellet Room	8/6/70	9.5×10^{-13}
Furnace Room (Shipping Area)	8/7/70	7.7×10^{-12}
" " " "	8/7/70	8.8×10^{-12}
Furnace Room (Room #11)	8/7/70	3.3×10^{-13}
" " " "	8/10/70	7.0×10^{-12}
Shower Room	8/10/70	1.9×10^{-11}
Furnace Room (Shipping Area)	8/10/70	3.0×10^{-12}
" " " "	8/11/70	2.2×10^{-12}
" " " "	8/12/70	1.1×10^{-12}
" " " "	8/13/70	1.1×10^{-12}
" " " "	8/13/70	1.9×10^{-12}
" " " "	8/14/70	1.1×10^{-12}
" " " "	8/15/70	1.6×10^{-12}
" " " "	8/16/70	1.1×10^{-12}
" " " "	8/17/70	4.5×10^{-12}
" " " "	8/19/70	7.6×10^{-13}
" " " "	8/19/70	2.5×10^{-12}
Dehydrator Room	8/21/70	4.9×10^{-13}
Block House (Mech.Equip.)	8/22/70	1.9×10^{-12}
Dehydrator Room	8/23/70	3.8×10^{-13}
" "	8/24/70	3.2×10^{-13}
Radioisotopes Lab	8/24/70	2.2×10^{-12}

2. Environmental Water Samples

Location	Date	Concentration(pCi/l)
^{60}Co Shielding Pool	6/4/70	> 5
Dehydrator Sump	6/17/70	15.6±2.0
Dehydrator Effluent	6/17/70	2.8±1.0
E. Tunnel Welding Shop (#58)	8/17/70	(236±10 (113± 8
Pellet Room Sump	8/17/70	(318±13 (376±13
Plating Room Chip Tank	8/17/70	(852±21 (916±20
Dyn.Corr.Lab Chip Tank	8/17/70	(112±8 (123±7
Summary Sump	9/1/70	
Summary Sump	9/1/70	

3. Environmental Swipe and Soil Analysis

a. Tritium Swipes (All in Neutron Generator Room)

Location	Date	uCi/100cm^2
Wall Mount	6/4/70	5.5×10^{-5}
Target Box	6/4/70	1.9×10^{-5}
Neutron Generator	6/4/70	1.4×10^{-5}
Lab Room 3	6/4/70	1.6×10^{-4}

b. Soil Samples From South Area Outside Bldg. D

Location	Date	pCi/gm ^{238}U	^{235}U
#1		0.38±0.07	0.13±0.04
#2		0.48±0.08	0.39±0.07
#3		0.56±0.07	0.27±0.05
#4		0.40±0.06	0.48±0.07
#5		24.5±0.12	9.14±0.87
#6		0.68±0.12	0.61±0.11

b. Soil Samples From South Area Outside Bldg. D (Continued)

Location	Date	pCi/gm ^{238}U	pCi/gm ^{235}U
#7		0.64±0.10	0.33±0.07
#8		1.13±0.14	5.27±0.41

c. Firebrick from Boiler Room (Not associated with contaminated area)

Fire Box Residue	6/25/70
Fire Box Bricks	6/25/70
Boiler Fuel	6/25/70

4. Bioassay Sampling

a. Positive Nose Swipes

Name	Date	Total dpm Both Nostrils
Sandoval	6/12/70 (AM)	200
Hysaw	6/15/70 (PM)	200
Keyser	6/16/70 (PM)	200
Sandoval	6/16/70 (PM)	200
Perry	6/17/70 (AM)	100
Craig	6/17/70 (PM)	100
Libby	6/17/70 (PM)	100
Perry	6/17/70 (PM)	100
Petrochko	6/17/70 (PM)	100
Hallowel	6/18/70 (PM)	100
Hysaw	6/18/70 (PM)	100
Keyser	6/19/70 (PM)	200
Sandoval	6/19/70 (PM)	100
Perry	6/19/70 (PM)	200
Harwood	6/19/70 (PM)	100
Hollowell	6/22/70 (AM)	100

a. Positive Nose Swipes (Continued)

Name	Date	Total dpm Both Nostrils
Cridlebaugh	6/22/70 (AM)	100
Harwood	6/22/70 (AM)	100
Sandoval	6/22/70 (PM)	100
Hysaw	6/23/70 (PM)	100
Cridlebaugh	6/29/70 (PM)	300
Hollowell	7/7/70 (AM)	100
Cridlebaugh	7/7/70 (AM)	100
Craig	7/7/70 (PM)	100
Libby	7/7/70 (PM)	100
Sandoval	7/10/70 (AM)	100
Sandoval	7/10/70 (PM)	100
Harwood	7/10/70 (PM)	100
Keyser	7/13/70 (AM)	100
Craig	7/13/70 (AM)	100
Craig	7/13/70 (PM)	100
Sandoval	7/13/70 (PM)	200
Harwood	7/13/70 (PM)	100
Libby	7/14/70 (AM)	100
Sandoval	7/14/70 (AM)	100
Petrochko	7/14/70 (AM)	100
Mericle	7/14/70 (AM)	100
Craig	7/28/70 (AM)	200
Libby	7/28/70 (AM)	200
Harwood	7/28/70 (AM)	100
White	7/28/70 (AM)	200
Hollowell	7/28/70 (PM)	100

a. Positive Nose Swipes (Continued)

Name	Date	Total dpm Both Nostrils
Keyser	7/29/70 (AM)	100
Craig	7/29/70 (AM)	200
Hysaw	7/29/70 (AM)	100
Keyser	8/11/70 (AM)	100
Keyser	8/15/70 (AM)	200

b. Urine Sample Results (24-hour sample)

	Name	Date	dpm/Sample ^{235}U
	R. Sandoval	6/20/70	0.00±0.05 dpm
	R. Cridlebaugh	7/4/70	0.00± 0.03 dpm
	H. Keyser	7/4/70	0.00±0.03 dpm
	W. Hollowell	7/4/70	0.00±0.03 dpm
	J. Craig	7/4/70	0.06±0.03 dpm
	J. Hysaw	7/4/70	0.00±0.03 dpm
	G. Libby	7/4/70	0.00±0.03 dpm
	R. Sandoval	7/4/70	0.00±0.03 dpm
	H. Perry	7/4/70	0.00±0.03 dpm
	W. Harwood	7/4/70	0.00±0.03 dpm
	R. Petrochko	7/4/70	0.00±0.03 dpm
	D. Mericle	7/4/70	0.00±0.03 dpm
* (Eberline)	D. Mericle	7/28/70	2.9±0.7 dpm
* (Eberline)	F. White	7/28/70	10±2 dpm
	W. Harwood	7/30/70	0.00±0.05 dpm

Results of Occupational Radiation Exposure Report

Film Badge No.	Participant's Name	Radiation Exposure Period June 8-Sept. 2, 1970	(MREM) Beta Gamma Neutron
00055	H. W. Keyser		.00
00056	W. Hollowell		.00
00057	J. Craig		.00
00058	J. Hysaw		.00
00059	G. Libby		.00
00061	B. Sandoval		.00
00062	H. Perry		.00
00063	R. Cridlebaugh		.00
00064	W. Harwood		.00
854014	E. M. Chenault		.00

TELEDYNE ISOTOPES
110 WEST TIMONIUM ROAD
TIMONIUM, MARYLAND 21093
TELEPHONE (301) 252-1300
TELEX 87-870

September 19, 1975
Refer to: TES-JVM-1224

SEP 22 1975

U. S. Nuclear Regulatory Commission
Division of Materials Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer
Chief
Source and Special Nuclear Materials Branch

Subject: Amendment to Renew License No. SNM-849, Docket No. 70-908

References:
(1) Title 10 Code of Federal Regulations
Parts 70.21, 70.22, 70.34 and 70.41(a).
(2) Letter dated September 26, 1974, P. J. Vogelberger, Jr., to D. A. Nussbaumer, Subject: Pu-238 Sealed Sources.
(3) Letter dated April 30, 1974, P. J. Vogelberger, Jr., to D. A. Nussbaumer, Subject: Mass Spectrometer Demonstration.
(4) Letter dated April 5, 1974, P. J. Vogelberger, Jr., to D. A. Nussbaumer, Subject: Mass Spectrometer Demonstration.

Gentlemen:

Teledyne Isotopes, Inc., requests that License No. SNM-849 be amended to:

(a) Extend its expiration date to that specified in Section B below.

(b) Permit the possession and use of material described in Section D below for the purposes and under the conditions described therein at the company's location at 110 West Timonium Road, Timonium, Maryland 21093.

A. Applicant

Teledyne Isotopes, Inc., a Division of Teledyne, Inc., is incorporated in the state of California with its headquarters office at 1901 Avenue of the Stars, Los Angeles, California 90067. The principal officers, who are citizens of the United States, are as follows:

Jack H. Hamilton	President 3401 Shiloh Road Garland, Texas 75041

1894

George A. Roberts	Vice-President 1901 Avenue of the Stars Los Angeles, California 90067
Peter J. Vogelberger, Jr.	Vice-President 110 West Timonium Road Timonium, Maryland 21093
Donald F. Schutz	Vice-President 50 Van Buren Avenue Westwood, New Jersey 07675
Henry E. Singleton	Chairman of the Board 1901 Avenue of the Stars Los Angeles, California 90067

Teledyne Isotopes, Inc., is not owned, controlled or dominated by an alien, a foreign corporation or a foreign government.

Teledyne Isotopes, Inc., has the responsibility for the operation of facilities at Timonium, Maryland for the performance of programs utilizing special nuclear materials.

B. Term of License

To continue nuclear programs utilizing special nuclear materials, Teledyne Isotopes, Inc., requests an extension of SNM License No. 849 subject to the provisions outlined herein as well as those terms and conditions set forth in 10 CFR Part 70. We request that the license remain in effect until October 31, 1980.

C. Use of Special Nuclear Material

The scope of utilization of special nuclear materials at Teledyne Isotopes' Timonium, Maryland facilities will involve the assembly of small sealed sources into thermoelectric generators, limited R & D activities, the use of SNM isotopic standards as a means of demonstrating the analytical capability of mass spectrometers (a Teledyne Isotopes product line) and alpha and neutron instrument check.

D. License Limits

1.	Pu	Plutonium dioxide enriched to ~ 80% Pu-238 in sealed sources. Details are contained in Ref. (2).	300 grams maximum
2.	U-235	Any enrichment, any chemical form for R & D activities and mass spectrometer demonstration. Details are included in Refs. (3) and (4).	100 grams maximum

3.	Pu	Any isotope, any chemical form, to demonstrate mass spectrometer. Details are included in Refs. (3) and (4).	100 micrograms maximum
4.	Four (4) metallic plutonium alpha counting standards. Details of use are included in F.17.a.		< 100 micrograms

E. Technical Qualifications

In November 1956, the Martin Company was granted its first Special Nuclear Material License by the Atomic Energy Commission. The prime requirement at that time was for enriched uranium for the fabrication of fuel to be used in design and criticality studies for the medium power portable reactor concept. Since that time, the Martin Company developed its technical efficiencies and production capabilities as a supplier of the nuclear fuel components under license for the PRO Critical Facility-CNEN and Pathfinder reactors. As a contractor of the New York Operations Office of the Atomic Energy Commission, portable medium power reactors were delivered to the AEC for generation of electrical power at remote installations in Sundance, Wyoming (PM-1) and McMurdo Sound, Antarctica (PM-3A). During this development in the atomic energy field, the Martin Company also built and operated a critical assembly facility for use in obtaining nuclear physics data in connection with various nuclear core designs. Slab type, as well as liquid fluidized bed experiments, were conducted in this facility under specific class 104 Facilities Licenses issued in accordance with Title 10 Code of Federal Regulations Part 50. The Martin Company was also the proponent and primary supplier of devices utilizing special nuclear material as well as byproduct material for Systems for Nuclear Auxiliary Power (SNAP).

The fulfillment of the programs discussed above has necessitated the assembly of a competent and highly skilled technical staff. Included are engineering, physics, metallurgy, design, and production talents. On August 5, 1968, Isotopes, Inc., acquired the former Martin Marietta Corporation Nuclear Division. This transaction involved acquisition of Martin's nuclear technical staff. This staff remains with Teledyne Isotopes at the Timonium facility where they provide a broadly diversified technical capability.

F. Internal Procedural Control to Insure Compliance with License Conditions

1. General

Teledyne Isotopes has established a system of internal checks and balances to provide reasonable assurance of complete compliance with licensing requirements and applicable laws, rules and regulations. This system provides for internal review and inspection of all safety aspects involved in the handling of special nuclear material. The following general statements of the responsibilities of the functional groups associated with safety aspects in the utilization of special nuclear material are presented below.

Manager, Materials Engineering and Test (R & D)

(1) Supervises all R & D activities involving special nuclear materials to assure that individual users comply with all rules and regulations during utilization of the material.

(2) Serves as the Teledyne Isotopes contact with regulatory agencies in all matters pertaining to radioactive materials.

(3) Determines the need for and obtains all necessary governmental approvals required in the utilization of radioactive materials.

(4) Develops the criteria for and administers the accountability program for radioactive materials.

(5) Conducts periodic operational reviews to appraise user's compliance with latest regulations.

(6) Interprets and disseminates applicable regulatory information to activities concerned.

Supervisor, Health Physics

(1) Develops and administers the health physics program to minimize the hazard to personnel and reduce company liability during the utilization of radioactive materials.

(2) Monitors user performance to assure safety as well as compliance with rules and regulations.

(3) Reviews and approves each planned material usage.

Supervisor, Security

(1) Shall be responsible to establish security control areas and maintain surveillance of employee activities to assure compliance with Security requirements.

Criticality Engineer

(1) Shall be responsible for establishing safety criteria, as required, for operational procedures and monitoring operations to assure compliance with such criteria.

2. Technical, Personnel Qualifications

Manager, SNM R & D

Education:	B.S. in Chemistry, Chemical Engineering, or B.S. Physics or Engineering with graduate work in either chemistry or nuclear engineering.
Experience:	Minimum of 5 years experience in chemical system design, experimental system operation or related scientific type work.

Supervisor, Health Physics

Education:	B.S. in Physics, Chemistry, Math, Physical Sciences or equivalent.
Experience:	Four (4) years experience in Health Physics administration and control procedure with particular emphasis being placed on personnel possessing a broad spectrum of Health Physics experience as well as a knowledge of nuclear instrumentation or general electronics.

Criticality Engineer

Education:	B.S. in Physics, Engineering Physics or B.S. in Engineering, Chemistry with graduate work in physics or nuclear engineering.
Experience:	Minimum of 3 years experience in reactor physics design, nuclear experimental work and/or other related scientific type work.

G. Radiological Safety Controls and General Facility Requirements

Since Teledyne Isotopes forecasts no need for the handling and processing of large quantities of Uranium-235 and/or plutonium, criticality control will not be the limiting factor. The major emphasis will be placed upon radiological control to assure adequate personnel safeguards and compliance with applicable rules and regulations.

Uranium and plutonium compounds, in forms which can readily become airborne, will be handled only in contained atmospheres, or adequately ventilated enclosures in the case of uranium.

H. Special Nuclear Material Storage

All SNM accountable under this license will be stored in a Secure Fuel Storage Room or in a locked cabinet when not in use or awaiting shipment in an approved shipping container. Access to stored material will be controlled by Health Physics personnel and Security.

I. Radiological Safety Program

1. Introduction

The fundamental prerequisite for the operation of any nuclear facility is assurance that it will present no undue hazard to the health and safety of facility personnel or to the general public.

The basic radiological safety objectives for the achievement of this requirement are (1) to preclude the uncontrolled release of radioactivity to the normally occupied areas within the facility and/or to the outside environment, and (2) to limit the radiation exposure of facility personnel to the lowest practicable level and in compliance with established radiation protection standards.

The standards used in the conduct of the Teledyne Isotopes radiological safety program are in conformance with the recommendations and guides contained in the following publications: Title 10, Code of Federal Regulations; Federal Radiation Council; National Committee on Radiological Protection; National Bureau of Standards; and State Radiation Protection Codes.

2. Responsibility for the Radiological Safety Program

Responsibility for radiological safety, as for any other health and safety matter, rests with management and is discharged through management's representative.

Technical direction of the radiological safety program has been delegated to the Supervisor, Health Physics Section. This responsibility includes the development and maintenance of a complete and integrated program for radiation protection. The methods by which radiation safety is achieved involve the analysis of postulated hazards resulting from both routine and accidental occurrences within the facility and evaluation of the effectiveness of the control and surveillance mechanisms instituted to cope with any unique radiation problem which might arise.

3. Scope of the Radiological Safety Program

Teledyne Isotopes' Health Physics Section provides direct support in all programs concerned with radiation and radioactive materials. The major elements of this radiological safety program are:

(a) Nuclear facilities design consultation and approval.

(b) Program plan review.

(c) Radiological indoctrination and training.

(d) Personnel exposure surveillance and documentation including bioassay.

(e) Facilities, operations and environmental monitoring.

(f) Radioactive material hazard control.

(g) Radioactive waste disposal surveillance.

(h) Emergency planning and capability.

(i) Liaison with regulatory agencies.

4. Health Physics Experience

The individuals comprising the Health Physics Section have had wide experience in organizing and conducting Radiological Safety programs supporting the following nuclear activities:

(a) Research, power and production reactors and nuclear accelerators.

(b) Radiochemical processing plants, hot cell operations, and high level gamma and x-radiation facilities.

(c) Large scale environmental monitoring and waste disposal programs, radioactive material transportation problems, personnel monitoring and instrumentation development, evaluation and calibration.

5. Radiological Safety Organization

The Health Physics Section provides radiation protection services on a level-of-effort basis. The Supervisor, Health Physics Section, reports to the Manager, Materials Engineering and Test. In addition, he reports on a "dotted line" to the Vice-President of Teledyne Isotopes and also serves as the Radiation Protection Officer.

6. Radiation Surveys

Survey and control procedures are utilized to evaluate radiological hazards and establish effective control measures to limit personnel exposure. These surveys are conducted to determine radiation levels, the presence or absence of surface contamination and/or airborne radioactivity in work or occupancy areas. The surveys are usually performed by technicians under the supervision of a health physicist.

As a result of these surveys, suitable control measures are imposed to insure adequate personnel protection. The frequency and extent of the surveys are governed by the work performed or by existing conditions. Documentation of all surveys are recorded in operational logs.

7. External Dose Rate Measurements

The measurement of external dose rates is conducted using portable monitoring instruments. Selection of a particular instrument is based upon the type, energy and intensity of the radiation to be monitored. Portable monitoring instruments in use are calibrated at least once every three months and after each repair.

8. Surface Contamination Measurement

Each area where radioactive materials are utilized is surveyed for the presence of fixed and loose contamination. The frequency of these surveys is governed by the nature and type of operations performed. An accelerated survey schedule is employed during the initial phases of any new process or change in process to determine any unusual radiological hazard. Thereafter when work is in progress, a general daily survey is conducted in the work areas at locations which are most likely to indicate changes in contamination levels. If this general survey indicates an increase in contamination level, a detailed survey is initiated to determine the cause and institute measures to reduce or possibly eliminate the source of contamination.

Loose contamination is evaluated employing the wipe technique which consists of wiping an absorbent paper over an area of approximately 100 cm^2 and counting the wipe in a shielded detector-scaler assembly.

Alpha survey instruments are utilized to monitor floors and equipment for fixed alpha contamination.

Instrumentation used to evaluate contamination and radiation is listed in Table 1.

The contamination criteria currently in use is as follows:

Unrestricted Area	Removable	Max. Fixed	Avg. Fixed
All alpha contamination	100 dpm/100 cm^2	2500 dpm/100 cm^2	500 dpm/100 cm^2

9. Surface Contamination Control

Surface contamination is controlled in the fabrication area by employing one or a combination of the following techniques:

(a) Performing regular surveys to determine contamination levels.

(b) Providing ventilation at the sources of dispersable contaminants.

(c) Establishing isolated areas when dispersable contaminants are generated.

(d) Utilizing absorbent paper, polyethylene and coatings on equipment and exchanging these during the course of the work.

(e) Employing step off pads at entrances to isolated areas.

(f) Requiring the use of anti-contamination clothing.

The spread of dispersable contaminants to unrestricted areas is minimized by:

(a) Establishing buffer zones between the areas and providing frequent contamination surveys.

(b) Monitoring personnel at the point of egress from an isolated area.

(c) Monitoring equipment and utilizing an equipment check tag system.

(d) Providing receptacles for contaminated wastes and used anti-contamination clothing.

(e) Controlling the wearing of anti-contamination clothing outside of a restricted area.

10. Personnel Contamination Control

Anti-contamination clothing requirements are specified by Health Physics prior to starting any operation where potential contaminants may be encountered. These requirements are based upon operational experience and/or survey results.

Anti-contamination clothing will be laundered when required by an approved outside firm providing such service or disposed of as radioactive waste.

11. Description of Decontamination Techniques

Floor contamination is normally removed by scrubbing with mops and detergent solutions. Persistent contamination is removed by employing a mechanical scrubber and steel wool pads. The scrub solution is removed with a wet type vacuum cleaner and finally damp mopped. Waste solution is discharged to the sanitary sewer after sampling and evaluation has shown that the concentration is within the limits prescribed by 10 CFR 20.303.

Equipment contamination is removed by scrubbing with detergents and water or wiping with damp cloths. Large metal machinery and hand tools are decontaminated by wiping with solvent to minimize corrosion. Contaminated scrubbing equipment, mops and wipes are discarded as solid radioactive waste.

12. Airborne Radioactivity Measurement

Breathing zone air samples are collected on an accelerated schedule during the initial phases of any new process or change in process. The sample results are used to evaluate the particulate airborne radioactivity concentrations associated with the process and provide a basis for instituting special requirements to reduce the airborne contamination levels in accordance with the guides set forth in 10 CFR 20. After the initial breathing zone sample evaluations, general area samples are collected adjacent to any potential contamination producing operation.

Exhaust stack air samples are routinely collected and analyzed from the ventilation system exhaust whenever work is being conducted which could involve contamination dispersion of the environs. The samples are collected downstream from each exhaust system fan prior to exhausting to the environs. Air samples are collected using open face of in-line filter holders containing filter paper.

Air sample filters are counted and analyzed employing detector-scaler assemblies. The procedure can adequately determine concentrations prescribed by 10 CFR 20.103 and .106.

13. Personnel Exposure Surveillance

Personnel exposure surveillance is conducted to measure the amount of external and internal radiation exposure received by individuals whose work involves exposure to ionizing radiation.

14. Personnel Monitoring Methods

All personnel permanently assigned to work in areas where exposure to ionizing radiation is likely are required to wear film badges. Additional monitoring devices are issued as dictated by the type of work performed.

Thermoluminescent dosimeters (TLD badges) are used in all cases when personnel monitoring is required, whereas, neutron film is used only when personnel are exposed to neutron radiation. Film packets are processed and evaluated quarterly or after any suspect or unusual exposure as indicated by supplementary monitoring devices. Visitors are monitored in accordance with 10 CFR 20.202.

In those instances where handling of loose dispersable types of radioactive materials by specific personnel becomes necessary, those individuals are required to submit bioassay samples for analysis if there exists the possibility of a suspected body intake of radioactive material.

15. Records

Results of all personnel exposures are posted in the individual's exposure file where a cumulative exposure record is maintained.

16. Instrumentation and Related Equipment

A description of the radiation survey and related equipment utilized in the conduct of the radiological safety program is presented in Table 1.

17. Method, Frequency and Standards Used in Calibrating Instruments

a. Portable Radiation Detection Instruments

All portable survey meters in use are calibrated at least once every three months or after each servicing. A 1 mg Ra-226 source is used to calibrate beta-gamma instruments.

Neutron survey instruments are calibrated out of house. Calibration is generally performed out of doors to reduce scattering from building walls, etc. The instrument is adjusted to read the calculated neutron dose rate after adjusting the bias against gamma radiation.

Alpha survey meters are calibrated against reference sources of uranium and the metallic plutonium alpha counting standards listed in D.3 and adjusted to read the known value in counts per minute based upon the manufacturer's recommendations concerning counter efficiency.

b. Detector/Scaler Counting Assemblies

Background and statistical accuracy checks are made on all counting room instrumentation prior to use. Calibrated alpha and beta-gamma reference sources are placed in each detector and counted for a preset time. If the instrument readings vary greater than the calculated statistical error, it is recalibrated and the counter efficiency is then determined by comparing the counter count rate with that of the standard source.

c. Instrument Maintenance and Records

Minor instrument repairs and calibrations are performed by Health Physics personnel. Major repairs are performed by the facility instrument technician.

Health Physics maintains permanent records of all instrument calibrations and repair records are maintained by the instrument technician. Each instrument is tagged indicating the calibration date.

18. Radioactive Waste Disposal

All radioactive waste will be disposed in accordance with 10 CFR 20.301. A record for each container of waste, indicating the type of waste, approximate quantity, radiation and contamination level is maintained in the Health Physics office.

Please let me know if further information is required.

Sincerely,

TELEDYNE ISOTOPES, INC.

John W. McGrew
Licensing and Accountability Representative

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TABLE 1

TYPICAL RADIATION DETECTION INSTRUMENTS AND RELATED EQUIPMENT

Type of Instrument Make and Model Number	No. Avail.	Radiation Detected	Range	Window Thickness (mg/cm^2)	Use: Monitoring, Surveying and Measuring
Eberline E-500B G.M.	3	Beta-Gamma	0-2000 mr/hr	30 mg/cm^2	Surveying
Eberline PAC-1SA Scintillation	3	Alpha	0-1,000,000 cpm	Less than 1/4 mil mylar	Surveying, measuring
Eberline PAC-3g Gas Proportional	1	Alpha	0-1,000,000 cpm	Less than 1/4 mil mylar	Surveying
Texas-Nuclear Spherical Neutron Dosimeter Model 9145	1	Fast neutron	0-2000 mrem/hr	-	Surveying
NMC Mod. PC-10A Gas Proportional Scaling Assys.	2	Alpha Beta-gamma	1 to 10^6 dpm	Less than 1/4 mil mylar	Measuring
Eberline PNR-4 Portable Neutron Ratemeter	1	Fast neutron	0 to 5 rem/hr	-	Surveying
Eberline AIM-3 Constant Air Monitors	2	Alpha	10^{-10} uc/ml	1.0 mg/cm^2	Air particulate monitoring

TABLE 1 (CONT.)

TYPICAL RADIATION DETECTION INSTRUMENTS AND RELATED EQUIPMENT

Type of Instrument Make and Model Number	No. Avail.	Radiation Detected	Range	Window Thickness (mg/cm^2)	Use: Monitoring, Surveying and Measuring
Gast Air Sampling Vacuum Pumps and Associated 2" Filter Holders		Air sample filters counted for alpha and beta-gamma activity			Collection of air samples from work area atmosphere.
Radiation Monitoring Badges (Service supplied by U.S. Testing Co., Richland, Wash. and Teledyne Isotopes, Westwood, N. J.)		Upper limit of response: Gamma - 10,000 rem Beta - 10,000 rem Neutron - 10 rem			Film badges are worn in accordance with applicable sections of 10CFR20 and 10.03.10 (Md.) as part of the Personnel Monitoring Program.
Bioassay (Services supplied by Teledyne Isotopes, Westwood, N. J.)		Alpha, beta, gamma			This service is used to evaluate accidental uptake of radioactive materials in facility personnel.

ML080170088

ORNL SITES - SUMMARY

License No.:	STB-00187	ORNL Score:	17
Docket No.:	040-03296		
Licensee:	The Martin Company Martin-Marietta	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	no		
SDMP Site:	no		
Related License(s):	19-01398-20; 19-01398-32, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01150, SNM-01192; [C-04283: NOT ON LIST]		
NRC Reviewer:	David F. Limroth, Stephan W. Holmes		
Review Abstract:	License No. STB-00187 authorized the possession and use of large amounts of thorium alloy in Building D at Middle River, Maryland from 1961 to 1964. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.		
Recommendations:	None.		

Summary: License No. STB-00187, which superseded C-04283 on January 1, 1961, authorized possession of up to 100,000 pounds of thorium-magnesium alloy (4 percent thorium) for fabrication of missile components. The license was terminated on March 20, 1964 at the request of the licensee. Region I Inspection Report No. 40-3296/82-01 documents that all work under License No. STB-00187 was conducted in Building D at the Middle River facility.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey,

January 23, 1995

A1287

leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 01/23/95

Approved by: _____ **Date** 1/23/95

January 23, 1995

ML070170097

ORNL SITES - SUMMARY

License No.:	SNM-00011	ORNL Score:	1,811
Docket No.:	070-00014		
Licensee:	The Martin Company	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s):	19-01398-20, 19-01398-32, SNM-000053, SNM-00849, SNM-00907, SNM-01150, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		

Review Abstract: License No. SNM-00011 authorized research and development work with U-235 in Building D at Middle River, Maryland. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.

Recommendations: None.

Summary: License No. SNM-00011 authorized the possession and use of 2 kilograms of U-235 in enriched uranium for fuel element research and development to be used in the licensee's Nuclear Materials Laboratory in Building D, Plant I. The licensee's letter dated September 19, 1957 requested that certain special operations in the fabrication of fuel bundles be permitted in the pilot manufacturing facility and in other buildings at Plant I. The licensee specified that only fully clad uranium fuel tubes or plates would be used in these other buildings. The license expired on May 31, 1961 and was not renewed. On April 7, 1961, the licensee ceritifed that all material possessed under the license had been disposed of prior to expiration of the license.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small

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area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 01/23/95

Approved by: _____ **Date** 1/23/95

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 94-001

Docket Nos. None, None, 070-00014, 070-00058, 070-00908, 070-00932, 070-00058, 040-03296

License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, STB-00187

Licensee: Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Facility Name: Middle River Facility and Martin State Airport

Inspection at: 2323 Eastern Blvd
Baltimore, MD
and
701 Wilson Point Road
Baltimore, MD

Inspection Conducted: November 3, 1994

Inspector: Stephen W. Holmes, Radiation Specialist — 01/23/95 date

Approved by: John D. Kinneman, Chief
Site Decommissioning Section — 1/23/95 date

Inspection Summary: Closeout Verification Inspection No. 94-001.

Areas Inspected: Announced, inspection and survey of Buildings C and D at the Martin-Marietta Middle River facility and Buildings KJ and KC at the Martin State Airport.

Results: No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from the present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

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DETAILS

1.0 Persons Contacted

Joseph Alcarese, Esq.
Joanne Brooks, Environmental Specialist, Environmental Program Manager, Maryland Aviation Administration
Richard Brisson, former Acting Program Administrator, Maryland Dept. of the Environment, Radiological Health Program and former Martin-Marietta/Isotopes,Inc. employee
Thomas Flynn, Jr., Engineer, Raytheon (formally Ebasco Services, Inc.)
* Ray Manley, Inspector, Maryland Department of the Environment
Glen Peregoy, Engineer, Martin State Airport
* Jeffrey G. Smith, Manager Environmental Affairs, Martin Marietta
Jake West, Manager, Martin State Airport

* denotes those present at exit interview

2.0 Background

2.1 General

As part of a program to ensure that facilities where activities authorized by AEC and NRC licenses that have been terminated were suitable for release for unrestricted use as specified in current NRC criteria, the docket files for License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, and STB-187 were reviewed. Based on information in the files, the radiological status of four buildings could not be determined with certainty. These are Buildings C, D, on the Martin Marietta Corporation Middle River Facility and KJ (critical facility), and KC (radioisotope laboratory) on the Martin State Airport. Therefore, an onsite inspection was conducted. Prior to the on-site inspection, available records pertaining to the licensing, operation, and decommissioning of the activities in and around these buildings were reviewed by the inspector. Additionally, the inspector contacted two persons who had direct contact with these sites during actual operations or decommissioning: Mr. Thomas A. Flynn, Jr. the Project Manager of the 1965 "dismantling" of the Liquid Fluidized Bed Reactor (LFBR) at Building KC and Mr. Richard Brisson, a former employee of both Martin-Marietta, and Isotopes, Inc. Information obtained from these sources is documented in pertinent sections of this report.

2.2 Building D

Building D was located at the Martin-Marietta's Middle River, Maryland facility which is also called Chesapeake Park. Under License Nos. 19-01398-32, SNM-11, SNM-53, SNM-1192 and STB-187 a wide range of byproduct, source and special nuclear material were used in connection with various research and development activities in addition to work under government contracts. The facility was decontaminated in late 1970 under License No. SNM-1192, the license terminated, and the building subsequently demolished, leaving only the concrete basement floor/pad. An NRC inquiry regarding the site in June 1982 concluded that the site met the then current criteria for unrestricted use (Report Nos. 040-

03296/82-01 and 040-02308/82-011). However, there was no indication that a verification of the licensee's commitment to seal five contaminated drains with concrete was made.

2.3 Building C

Building C, also located at the Middle River site, was to have been used under License No. SNM-849 for operations involving encapsulated Pu-238 in conjunction with SNAP reactors and testing of fuel capsules and radioisotope generators containing Pu-238. This was reported to have occurred in the Environmental Test and Large Vacuum Chamber Laboratories. The building, which was being used as a warehouse at the time of this inspection, is a very large hanger type structure with a corresponding large basement. No records were available regarding the location of the laboratories within the building nor were any records of a termination or confirmatory survey of the facility available. Mr. Brisson stated that, to the best of his knowledge, only environmental and physical testing of the fueled SNAP and other radioisotope generators was performed in Building C and that no unsealed radioisotopes were used there. Additionally, he stated that the laboratories were located in the basement at the south west corner of the building and occupied an area no larger than 100' x 150' or 5 support pillars by 6 support pillars.

2.4 Building KJ

License No. 19-01398-20 was issued to Martin-Marietta for processing of Am-241 and Cm-242 in Building KJ which was designated the Radioisotope Laboratory and is located on the Martin State Airport property referred to as Strawberry Point, on a dirt access road off Strawberry Point Road, 330' S.W. of Building KC. This type of work had been previously performed in Building "D". The license was transferred to Isotopes, Inc. without a change in license number or location of work. In late 1969, Isotopes, Inc. requested termination of the license, simply stating that all radioactive material possessed under the license had been disposed of in accordance with 10 CFR 20 by transfer to a company authorized to receive the licensed material. The AEC terminated the license without comment. No record of a termination or confirmatory survey is in the docket file. Mr. Brisson stated that production processing did not occur in Building KJ and that only small source (μCi amounts of Am-241, no Cm-242) developmental operations to verify the chemistry were performed in the building. He and one other member of the Isotopes, Inc. staff performed the final cleanup and survey of the facility, including the removal and disposal of the HEPA filters. According to his memory, the survey demonstrating that the facility was ready for unconditional release was sent to the AEC contracting office on Hudson St., N.Y., N.Y.

2.5 Building KC

Building KC, the Critical Test Facility, was located 330' North East of Building KJ. The Martin-Marietta LFBR was situated in one of the building's three "test cells". Under License No. SNM-53 completed MH-1A fuel assemblies were stored in the test cells. License No. SNM-907 was issued to Ebasco Services, Inc. in 1965 for dismantling and removing the LFBR. The license included a provision to provide records of a post removal survey to the AEC's New York Operations Office and to Martin Marietta. Although a pre-dismantling survey was performed, no records of the required post removal survey could be found in the docket file. However, it was noted in the file that the LFBR never achieved criticality. Mr. Flynn stated that meticulous care was taken during the dismantling to prevent the spread of any contamination. Further, he stated that an AEC Inspector/Health Physicist from the New York Field Office/Laboratory was on site, oversaw the final survey, and signed the final report that asserted the dismantling of the LFBR had not added to or increased the contamination from the levels measured before the operation. Mr. Brisson confirmed that Ebasco's work produced no contamination throughout the rest of the building. Mr. Brisson also stated that his group decontaminated the underground LFBR water dump/holding tank by sandblasting the insides and disposing of the residue at a licensed burial site.

3.0 Instruments Used in Survey

During the survey three instruments were used, an Eberline PRM-6 with a 1" scintillator probe and a Ludlum Micro R meter Model 19 were used by the state inspector while a Ludlum Micro R meter Model 12 was used by the NRC inspector. The meters were calibrated, functional, and would detect gamma emitters of low energy and with good sensitivity. Based on the isotopes in question, these instrument were appropriate for this survey.

4.0 Survey Results

4.1 General

On November 3, 1994 surveys of each building/site were performed jointly by the NRC and State of Maryland inspectors. The inspectors surveyed each facility thoroughly and kept each other informed as to the results. The surveys were performed with the Micro R meters held at 0.5 meters above the surface with a forward movement of about 1.0 meters per second. In addition to Mr. Smith, who accompanied the inspectors to each site, Mr. Peregoy was present during the surveys of Buildings KC and KJ on the Martin State Airport property.

4.2 Building D

The Building D site was being use to store trailers under contract with the Army. The site consisted of a large concrete pad, the leftover basement floor of the old building. The pad had numerous cracks, holes, and was very weathered after two decades of exposure to the elements.

The inspectors surveyed the concrete pad along parallel lines 5 meters apart, paying attention to drains, clean-outs, and holes in the pad. In addition to measurements taken at drains and clean-outs, surface contact readings were also taken at approximately 10 meter intervals. Numerous sealed/filled in drains/clean-outs/penetrations/holes in the pad were located. Although a few places were found where a hole in the pad had been filled with concrete, it could not be determined if these were any of the drains referred to in the closeout survey. Martin Marietta staff stated that the rubble from the demolition of the building was the responsibility of the contractor and was removed and believed to have been disposed of in a landfill. No detectable radiation levels above background (5μR/hr) were found. No development or other use of the site is planned by Martin Marietta.

4.3 Building C

The Building C area where the old Environmental Test and Large Vacuum Chamber Laboratories were located is now warehouse space and a large empty room. With the exception of the support columns, no original walls, floors, ceiling, or ducts are left. The inspectors surveyed the area along parallel lines at 5 meter intervals with surface contact measurements every 5 meters and at drains and original concrete support columns. No radiation levels above background (5μR/hr) were detected.

4.4 Building KC

Building KC is at the end of a dirt access road off Strawberry Point road just east of the eastern most taxi way. The property was purchased in toto by the State of Maryland in 1975 and although the building was used in the past for storage, it has been abandoned and left open to the elements for the past ten to fifteen years. The site was completely abandoned, overgrown, exposed to the elements (of the three "test cells" only the one where the LFBR had been housed still had it's outer doors). The inspectors performed a walk-through survey of all three cells, the entrance way and connecting halls. Surface contact measurements were performed randomly throughout the building. The office/control room area was not entered due to the cluttered condition of and the layer of asbestos ceiling tiles covering the floor. No radiation levels above background were detected. Although an attempt was made to locate the underground dump/hold-up tank described by Mr. Brisson, the inspectors were unable to locate the tank or any indication that it had been removed. Based on discussion with Martin-Marietta and Martin State Airport personnel, it is believed that the tank was abandoned in place after the decontamination described in Section 2.5. The planning representative of Maryland Aviation stated that the building had been scheduled for demolition after remediation of the asbestos, but the plans were delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

4.5 Building KJ

Building KJ is 300' S.W. of building KC along the dirt access road. The

site was also completely abandoned, overgrown, exposed to the elements. The doors into the laboratory and, mechanical equipment room and office were ajar leaving the interior open to the outside. The inside was littered with "junk", leaves, bird and animal droppings, and dirt. A fair number of 100 lb. bags of "solidified" lime were present, as the building had been use for storage by the State of Maryland in the past. Rusted laboratory furniture and discarded fire extinguishers also littered the floor. The stainless steel ventilation duct-work and the laboratory hoods were still present less the duct-work section that had contained the HEPA filters. The inspectors surveyed the remains as well as possible given the state of the building. No radiation levels above background were detected. The planning representative of Maryland Aviation stated that the building, just like Building KC, had been scheduled for demolition after remediation of the asbestos, but the demolition was delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

5.0 Conclusions

No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

6.0 Exit Interview

The inspector met with the Martin-Marietta and Maryland Department of the Environment representatives listed in Section 1.0 of this report and discussed the scope and findings of this inspection. They acknowledged the inspection findings and the statements documented in this report. Messrs. Flynn and Brisson were contacted by telephone and also confirmed their statements in this report.

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License Nos. 19-01398-20 (Retired) — Docket Nos. None
19-01398-32 (Retired) — None
SNM-11 (Retired) — 070-00014
SNM-53 (Retired) — 070-00058
SNM-849 (Retired) — 070-00908
SNM-907 (Retired) — 070-00932
SNM-1192 (Retired) — 070-00058
STB-187 (Retired) — 040-03296

Ms. Joanne Brooks
Environmental Specialist
Maryland Aviation Administration
3rd Floor Terminal Building
P.O. Box 8760
BWI Airport, Maryland 21240

SUBJECT: NRC REGION I INSPECTION NO. 94-001

Dear Ms. Brooks:

As Stephen Holmes of my staff discussed with you by telephone on October 20, 1994, the Nuclear Regulatory Commission (NRC) has been reviewing records to ensure that facilities, where activities were authorized by Atomic Energy Commission (AEC) and NRC licenses that have been terminated, are suitable for release for unrestricted use in accordance with current NRC guidelines. As you may be aware, the NRC and its predecessor, the AEC, issue licenses that authorize the use of various radioactive materials.

A contractor for the NRC, Oak Ridge National Laboratory (ORNL), initially reviewed each terminated license file and scored it according to a system designed to identify facilities that require additional review by the NRC staff. In general, files that indicate that radioactive material may have been used at particular facilities, but which do not include adequate final survey records for those facilities, are identified for additional review. The review by ORNL identified License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192 and STB-187 as files describing sites that require additional review. These licenses were issued to Martin-Marietta, Isotopes, Inc., and Ebasco and authorized activities at the Martin-Marietta Middle River Facility and the Martin State Airport. The Region I staff reviewed these files and determined that additional action was necessary since the information in the files did not provide sufficient detail to conclude that Buildings C, D, KJ and KC meet current guidelines for release for unrestricted use.

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On November 3, 1994, Mr. Holmes and Mr. Ray Manley of the Maryland Department of the Environment conducted an inspection at the Martin-Marietta Middle River Facility and Martin State Airport to determine whether radioactive contamination remains at those facilities as a result of activities previously authorized by these licensees. The findings of this inspection were discussed with a member of Mr. Jake West's staff, Glen Peregoy, at the conclusion of the inspection. The inspection report is enclosed with this letter.

As described in the enclosed report, the inspectors conducted a survey of each of the facilities and contacted and interviewed current and former employees of the licensees noted above. No radiation levels above background were identified at any of the sites. Only one building (C), in which only sealed sources were used, is presently being utilized. Another building (D) had been demolished and now only a concrete pad remains. The two remaining buildings (KJ and KC), on the Martin State Airport, have been abandoned and are scheduled for demolition pending remediation of asbestos and funding. Based on these facts and the findings described in the enclosed report, we plan no further action on these sites. They are suitable for unrestricted use.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed report will be placed in the Public Document Room. We will also provide copies to representatives of the State of Maryland.

No reply to this letter is required. Your cooperation with us is appreciated. If you have any questions, please contact Stephen Holmes at (610) 337-5390 or me at (610) 337-5252.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety
and Safeguards

License Nos.		Docket Nos.	
	19-01398-20 (Retired)		None
	19-01398-32 (Retired)		None
	SNM-11 (Retired)		070-00014
	SNM-53 (Retired)		070-00058
	SNM-849 (Retired)		070-00908
	SNM-907 (Retired)		070-00932
	SNM-1192 (Retired)		070-00058
	STB-187 (Retired)		040-03296

Enclosure: NRC Region I Inspection Report No. 94-001

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cc w/encl:
Jake West, Manager, Martin State Airport
R. Manley, State of Maryland

Distribution w/encl:
PUBLIC
Nuclear Safety Information Center (NSIC)
Region I Docket Room (w/concurrences)
P. Goldberg, NMSS
C. Gordon, RI

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 94-001

Docket Nos. None, None, 070-00014, 070-00058, 070-00908, 070-00932, 070-00058, 040-03296

License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, STB-00187

Licensee: Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Facility Name: Middle River Facility and Martin State Airport

Inspection at: 2323 Eastern Blvd
Baltimore, MD
and
701 Wilson Point Road
Baltimore, MD

Inspection Conducted: November 3, 1994

Inspector: Stephen W. Holmes, Radiation Specialist — 01/23/95 date

Approved by: John D. Kinneman, Chief
Site Decommissioning Section — 1/23/95 date

Inspection Summary: Closeout Verification Inspection No. 94-001.

Areas Inspected: Announced, inspection and survey of Buildings C and D at the Martin-Marietta Middle River facility and Buildings KJ and KC at the Martin State Airport.

Results: No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from the present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

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DETAILS

1.0 Persons Contacted

Joseph Alcarese, Esq.
Joanne Brooks, Environmental Specialist, Environmental Program Manager, Maryland Aviation Administration
Richard Brisson, former Acting Program Administrator, Maryland Dept. of the Environment, Radiological Health Program and former Martin-Marietta/Isotopes,Inc. employee
Thomas Flynn, Jr., Engineer, Raytheon (formally Ebasco Services, Inc.)
* Ray Manley, Inspector, Maryland Department of the Environment
Glen Peregoy, Engineer, Martin State Airport
* Jeffrey G. Smith, Manager Environmental Affairs, Martin Marietta
Jake West, Manager, Martin State Airport

* denotes those present at exit interview

2.0 Background

2.1 General

As part of a program to ensure that facilities where activities authorized by AEC and NRC licenses that have been terminated were suitable for release for unrestricted use as specified in current NRC criteria, the docket files for License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, and STB-187 were reviewed. Based on information in the files, the radiological status of four buildings could not be determined with certainty. These are Buildings C, D, on the Martin Marietta Corporation Middle River Facility and KJ (critical facility), and KC (radioisotope laboratory) on the Martin State Airport. Therefore, an onsite inspection was conducted. Prior to the on-site inspection, available records pertaining to the licensing, operation, and decommissioning of the activities in and around these buildings were reviewed by the inspector. Additionally, the inspector contacted two persons who had direct contact with these sites during actual operations or decommissioning: Mr. Thomas A. Flynn, Jr. the Project Manager of the 1965 "dismantling" of the Liquid Fluidized Bed Reactor (LFBR) at Building KC and Mr. Richard Brisson, a former employee of both Martin-Marietta, and Isotopes, Inc. Information obtained from these sources is documented in pertinent sections of this report.

2.2 Building D

Building D was located at the Martin-Marietta's Middle River, Maryland facility which is also called Chesapeake Park. Under License Nos. 19-01398-32, SNM-11, SNM-53, SNM-1192 and STB-187 a wide range of byproduct, source and special nuclear material were used in connection with various research and development activities in addition to work under government contracts. The facility was decontaminated in late 1970 under License No. SNM-1192, the license terminated, and the building subsequently demolished, leaving only the concrete basement floor/pad. An NRC inquiry regarding the site in June 1982 concluded that the site met the then current criteria for unrestricted use (Report Nos. 040-

03296/82-01 and 040-02308/82-011). However, there was no indication that a verification of the licensee's commitment to seal five contaminated drains with concrete was made.

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2.4 Building KJ

License No. 19-01398-20 was issued to Martin-Marietta for processing of Am-241 and Cm-242 in Building KJ which was designated the Radioisotope Laboratory and is located on the Martin State Airport property referred to as Strawberry Point, on a dirt access road off Strawberry Point Road, 330' S.W. of Building KC. This type of work had been previously performed in Building "D". The license was transferred to Isotopes, Inc. without a change in license number or location of work. In late 1969, Isotopes, Inc. requested termination of the license, simply stating that all radioactive material possessed under the license had been disposed of in accordance with 10 CFR 20 by transfer to a company authorized to receive the licensed material. The AEC terminated the license without comment. No record of a termination or confirmatory survey is in the docket file. Mr. Brisson stated that production processing did not occur in Building KJ and that only small source (μCi amounts of Am-241, no Cm-242) developmental operations to verify the chemistry were performed in the building. He and one other member of the Isotopes, Inc. staff performed the final cleanup and survey of the facility, including the removal and disposal of the HEPA filters. According to his memory, the survey demonstrating that the facility was ready for unconditional release was sent to the AEC contracting office on Hudson St., N.Y., N.Y.

2.5 Building KC

Building KC, the Critical Test Facility, was located 330' North East of Building KJ. The Martin-Marietta LFBR was situated in one of the building's three "test cells". Under License No. SNM-53 completed MH-1A fuel assemblies were stored in the test cells. License No. SNM-907 was issued to Ebasco Services, Inc. in 1965 for dismantling and removing the LFBR. The license included a provision to provide records of a post removal survey to the AEC's New York Operations Office and to Martin Marietta. Although a pre-dismantling survey was performed, no records of the required post removal survey could be found in the docket file. However, it was noted in the file that the LFBR never achieved criticality. Mr. Flynn stated that meticulous care was taken during the dismantling to prevent the spread of any contamination. Further, he stated that an AEC Inspector/Health Physicist from the New York Field Office/Laboratory was on site, oversaw the final survey, and signed the final report that asserted the dismantling of the LFBR had not added to or increased the contamination from the levels measured before the operation. Mr. Brisson confirmed that Ebasco's work produced no contamination throughout the rest of the building. Mr. Brisson also stated that his group decontaminated the underground LFBR water dump/holding tank by sandblasting the insides and disposing of the residue at a licensed burial site.

3.0 Instruments Used in Survey

During the survey three instruments were used, an Eberline PRM-6 with a 1" scintillator probe and a Ludlum Micro R meter Model 19 were used by the state inspector while a Ludlum Micro R meter Model 12 was used by the NRC inspector. The meters were calibrated, functional, and would detect gamma emitters of low energy and with good sensitivity. Based on the isotopes in question, these instrument were appropriate for this survey.

4.0 Survey Results

4.1 General

On November 3, 1994 surveys of each building/site were performed jointly by the NRC and State of Maryland inspectors. The inspectors surveyed each facility thoroughly and kept each other informed as to the results. The surveys were performed with the Micro R meters held at 0.5 meters above the surface with a forward movement of about 1.0 meters per second. In addition to Mr. Smith, who accompanied the inspectors to each site, Mr. Peregoy was present during the surveys of Buildings KC and KJ on the Martin State Airport property.

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The inspectors surveyed the concrete pad along parallel lines 5 meters apart, paying attention to drains, clean-outs, and holes in the pad. In addition to measurements taken at drains and clean-outs, surface contact readings were also taken at approximately 10 meter intervals. Numerous sealed/filled in drains/clean-outs/penetrations/holes in the pad were located. Although a few places were found where a hole in the pad had been filled with concrete, it could not be determined if these were any of the drains referred to in the closeout survey. Martin Marietta staff stated that the rubble from the demolition of the building was the responsibility of the contractor and was removed and believed to have been disposed of in a landfill. No detectable radiation levels above background (5μR/hr) were found. No development or other use of the site is planned by Martin Marietta.

4.3 Building C

The Building C area where the old Environmental Test and Large Vacuum Chamber Laboratories were located is now warehouse space and a large empty room. With the exception of the support columns, no original walls, floors, ceiling, or ducts are left. The inspectors surveyed the area along parallel lines at 5 meter intervals with surface contact measurements every 5 meters and at drains and original concrete support columns. No radiation levels above background (5μR/hr) were detected.

4.4 Building KC

Building KC is at the end of a dirt access road off Strawberry Point road just east of the eastern most taxi way. The property was purchased in toto by the State of Maryland in 1975 and although the building was used in the past for storage, it has been abandoned and left open to the elements for the past ten to fifteen years. The site was completely abandoned, overgrown, exposed to the elements (of the three "test cells" only the one where the LFBR had been housed still had it's outer doors). The inspectors performed a walk-through survey of all three cells, the entrance way and connecting halls. Surface contact measurements were performed randomly throughout the building. The office/control room area was not entered due to the cluttered condition of and the layer of asbestos ceiling tiles covering the floor. No radiation levels above background were detected. Although an attempt was made to locate the underground dump/hold-up tank described by Mr. Brisson, the inspectors were unable to locate the tank or any indication that it had been removed. Based on discussion with Martin-Marietta and Martin State Airport personnel, it is believed that the tank was abandoned in place after the decontamination described in Section 2.5. The planning representative of Maryland Aviation stated that the building had been scheduled for demolition after remediation of the asbestos, but the plans were delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

4.5 Building KJ

Building KJ is 300' S.W. of building KC along the dirt access road. The

site was also completely abandoned, overgrown, exposed to the elements. The doors into the laboratory and, mechanical equipment room and office were ajar leaving the interior open to the outside. The inside was littered with "junk", leaves, bird and animal droppings, and dirt. A fair number of 100 lb. bags of "solidified" lime were present, as the building had been use for storage by the State of Maryland in the past. Rusted laboratory furniture and discarded fire extinguishers also littered the floor. The stainless steel ventilation duct-work and the laboratory hoods were still present less the duct-work section that had contained the HEPA filters. The inspectors surveyed the remains as well as possible given the state of the building. No radiation levels above background were detected. The planning representative of Maryland Aviation stated that the building, just like Building KC, had been scheduled for demolition after remediation of the asbestos, but the demolition was delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

5.0 Conclusions

No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

6.0 Exit Interview

The inspector met with the Martin-Marietta and Maryland Department of the Environment representatives listed in Section 1.0 of this report and discussed the scope and findings of this inspection. They acknowledged the inspection findings and the statements documented in this report. Messrs. Flynn and Brisson were contacted by telephone and also confirmed their statements in this report.

JAN 25 1995

License Nos.		Docket Nos.
	19-01398-20 (Retired)	None
	19-01398-32 (Retired)	None
	SNM-11 (Retired)	070-00014
	SNM-53 (Retired)	070-00058
	SNM-849 (Retired)	070-00908
	SNM-907 (Retired)	070-00932
	SNM-1192 (Retired)	070-00058
	STB-187 (Retired)	040-03296

Joseph Alcarese, Esq.
Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, Maryland 21220

SUBJECT: NRC REGION I INSPECTION NO. 94-001

Dear Mr. Alcarese:

As Stephen Holmes of my staff discussed with you by telephone on October 20, 1994, the Nuclear Regulatory Commission (NRC) has been reviewing records to ensure that facilities, where activities were authorized by Atomic Energy Commission (AEC) and NRC licenses that have been terminated, are suitable for release for unrestricted use in accordance with current NRC guidelines. As you may be aware, the NRC and its predecessor, the AEC, issue licenses that authorize the use of various radioactive materials.

A contractor for the NRC, Oak Ridge National Laboratory (ORNL), initially reviewed each terminated license file and scored it according to a system designed to identify facilities that require additional review by the NRC staff. In general, files that indicate that radioactive material may have been used at particular facilities, but which do not include adequate final survey records for those facilities, are identified for our additional review. The review by ORNL identified License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192 and STB-187 as files describing sites that require additional review. These licenses were issued to Martin-Marietta, Isotopes, Inc. and Ebasco and authorized activities at the Martin-Marietta Middle River Facility and the Martin State Airport. The Region I staff reviewed these files and determined that additional action was necessary since the information in the files did not provide sufficient detail to conclude that Buildings C, D, KJ and KC meet current guidelines for release for unrestricted use.

On November 3, 1994, Mr. Holmes and Mr. Ray Manley of the Maryland Department of the Environment conducted an inspection at the Martin-Marietta Middle River Facility and Martin State Airport to determine whether radioactive contamination remains at the facility as a result of activities previously authorized by these licensees to Martin-Marietta, Isotopes, Inc., and Ebasco.

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The inspection report is enclosed with this letter. The findings of this inspection were discussed with your representative, Mr. Jeffrey Smith, at the conclusion of the inspection.

As described in the enclosed report, the inspectors conducted a survey of each of the facilities and contacted and interviewed current and former employees of the licensees note above. No radiation levels above background were identified at any of the sites. Only one building (C), in which only sealed sources were used, is presently being utilized. Another building (D) had been demolished and now only a concrete pad remains. The two remaining buildings (KJ and KC), on the Martin State Airport, have been abandoned and scheduled for demolition pending remediation of asbestos and funding. Based on these facts and the findings annotated in the enclosed report, we plan no further actions on these sites. They are suitable for unrestricted use.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed report will be placed in the Public Document Room. We will also provide copies to representatives of the State of Maryland.

No reply to this letter is required. Your cooperation with us is appreciated. If you have any questions, please contact Stephen Holmes at (610) 337-5390 or me at (610) 337-5252.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety
and Safeguards

License Nos.		Docket Nos.	
	19-01398-20 (Retired)		None
	19-01398-32 (Retired)		None
	SNM-11 (Retired)		070-00014
	SNM-53 (Retired)		070-00058
	SNM-849 (Retired)		070-00908
	SNM-907 (Retired)		070-00932
	SNM-1192 (Retired)		070-00058
	STB-187 (Retired)		040-03296

Enclosure: NRC Region I Combined Inspection Report No. 94-001

cc w/encl:
Ray Manley, State of Maryland

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cc w/encl: (cont'd)
Richard Brisson
12 Linwood Court
Baltimore, Maryland 20104

Thomas A. Flynn, Jr.
Raytheon Engineering Consultants
2 World Trade Center
New York, New York 10048

Distribution w/encl:
PUBLIC
Nuclear Safety Information Center (NSIC)
Region I Docket Room (w/concurrences)
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DATE	01/23/95		01/24/95							

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 94-001

Docket Nos. None, None, 070-00014, 070-00058, 070-00908, 070-00932, 070-00058, 040-03296

License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, STB-00187

Licensee: Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Facility Name: Middle River Facility and Martin State Airport

Inspection at: 2323 Eastern Blvd
Baltimore, MD
and
701 Wilson Point Road
Baltimore, MD

Inspection Conducted: November 3, 1994

Inspector: Stephen W. Holmes, Radiation Specialist — 01/23/95 date

Approved by: John D. Kinneman, Chief
Site Decommissioning Section — 1/23/95 date

Inspection Summary: Closeout Verification Inspection No. 94-001.

Areas Inspected: Announced, inspection and survey of Buildings C and D at the Martin-Marietta Middle River facility and Buildings KJ and KC at the Martin State Airport.

Results: No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from the present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

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DETAILS

1.0 Persons Contacted

Joseph Alcarese, Esq.
Joanne Brooks, Environmental Specialist, Environmental Program Manager, Maryland Aviation Administration
Richard Brisson, former Acting Program Administrator, Maryland Dept. of the Environment, Radiological Health Program and former Martin-Marietta/Isotopes,Inc. employee
Thomas Flynn, Jr., Engineer, Raytheon (formally Ebasco Services, Inc.)
* Ray Manley, Inspector, Maryland Department of the Environment
Glen Peregoy, Engineer, Martin State Airport
* Jeffrey G. Smith, Manager Environmental Affairs, Martin Marietta
Jake West, Manager, Martin State Airport

* denotes those present at exit interview

2.0 Background

2.1 General

As part of a program to ensure that facilities where activities authorized by AEC and NRC licenses that have been terminated were suitable for release for unrestricted use as specified in current NRC criteria, the docket files for License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, and STB-187 were reviewed. Based on information in the files, the radiological status of four buildings could not be determined with certainty. These are Buildings C, D, on the Martin Marietta Corporation Middle River Facility and KJ (critical facility), and KC (radioisotope laboratory) on the Martin State Airport. Therefore, an onsite inspection was conducted. Prior to the on-site inspection, available records pertaining to the licensing, operation, and decommissioning of the activities in and around these buildings were reviewed by the inspector. Additionally, the inspector contacted two persons who had direct contact with these sites during actual operations or decommissioning: Mr. Thomas A. Flynn, Jr. the Project Manager of the 1965 "dismantling" of the Liquid Fluidized Bed Reactor (LFBR) at Building KC and Mr. Richard Brisson, a former employee of both Martin-Marietta, and Isotopes, Inc. Information obtained from these sources is documented in pertinent sections of this report.

2.2 Building D

Building D was located at the Martin-Marietta's Middle River, Maryland facility which is also called Chesapeake Park. Under License Nos. 19-01398-32, SNM-11, SNM-53, SNM-1192 and STB-187 a wide range of byproduct, source and special nuclear material were used in connection with various research and development activities in addition to work under government contracts. The facility was decontaminated in late 1970 under License No. SNM-1192, the license terminated, and the building subsequently demolished, leaving only the concrete basement floor/pad. An NRC inquiry regarding the site in June 1982 concluded that the site met the then current criteria for unrestricted use (Report Nos. 040-

03296/82-01 and 040-02308/82-011). However, there was no indication that a verification of the licensee's commitment to seal five contaminated drains with concrete was made.

2.3 Building C

Building C, also located at the Middle River site, was to have been used under License No. SNM-849 for operations involving encapsulated Pu-238 in conjunction with SNAP reactors and testing of fuel capsules and radioisotope generators containing Pu-238. This was reported to have occurred in the Environmental Test and Large Vacuum Chamber Laboratories. The building, which was being used as a warehouse at the time of this inspection, is a very large hanger type structure with a corresponding large basement. No records were available regarding the location of the laboratories within the building nor were any records of a termination or confirmatory survey of the facility available. Mr. Brisson stated that, to the best of his knowledge, only environmental and physical testing of the fueled SNAP and other radioisotope generators was performed in Building C and that no unsealed radioisotopes were used there. Additionally, he stated that the laboratories were located in the basement at the south west corner of the building and occupied an area no larger than 100' x 150' or 5 support pillars by 6 support pillars.

2.4 Building KJ

License No. 19-01398-20 was issued to Martin-Marietta for processing of Am-241 and Cm-242 in Building KJ which was designated the Radioisotope Laboratory and is located on the Martin State Airport property referred to as Strawberry Point, on a dirt access road off Strawberry Point Road, 330' S.W. of Building KC. This type of work had been previously performed in Building "D". The license was transferred to Isotopes, Inc. without a change in license number or location of work. In late 1969, Isotopes, Inc. requested termination of the license, simply stating that all radioactive material possessed under the license had been disposed of in accordance with 10 CFR 20 by transfer to a company authorized to receive the licensed material. The AEC terminated the license without comment. No record of a termination or confirmatory survey is in the docket file. Mr. Brisson stated that production processing did not occur in Building KJ and that only small source (μCi amounts of Am-241, no Cm-242) developmental operations to verify the chemistry were performed in the building. He and one other member of the Isotopes, Inc. staff performed the final cleanup and survey of the facility, including the removal and disposal of the HEPA filters. According to his memory, the survey demonstrating that the facility was ready for unconditional release was sent to the AEC contracting office on Hudson St., N.Y., N.Y.

2.5 Building KC

Building KC, the Critical Test Facility, was located 330' North East of Building KJ. The Martin-Marietta LFBR was situated in one of the building's three "test cells". Under License No. SNM-53 completed MH-1A fuel assemblies were stored in the test cells. License No. SNM-907 was issued to Ebasco Services, Inc. in 1965 for dismantling and removing the LFBR. The license included a provision to provide records of a post removal survey to the AEC's New York Operations Office and to Martin Marietta. Although a pre-dismantling survey was performed, no records of the required post removal survey could be found in the docket file. However, it was noted in the file that the LFBR never achieved criticality. Mr. Flynn stated that meticulous care was taken during the dismantling to prevent the spread of any contamination. Further, he stated that an AEC Inspector/Health Physicist from the New York Field Office/Laboratory was on site, oversaw the final survey, and signed the final report that asserted the dismantling of the LFBR had not added to or increased the contamination from the levels measured before the operation. Mr. Brisson confirmed that Ebasco's work produced no contamination throughout the rest of the building. Mr. Brisson also stated that his group decontaminated the underground LFBR water dump/holding tank by sandblasting the insides and disposing of the residue at a licensed burial site.

3.0 Instruments Used in Survey

During the survey three instruments were used, an Eberline PRM-6 with a 1" scintillator probe and a Ludlum Micro R meter Model 19 were used by the state inspector while a Ludlum Micro R meter Model 12 was used by the NRC inspector. The meters were calibrated, functional, and would detect gamma emitters of low energy and with good sensitivity. Based on the isotopes in question, these instrument were appropriate for this survey.

4.0 Survey Results

4.1 General

On November 3, 1994 surveys of each building/site were performed jointly by the NRC and State of Maryland inspectors. The inspectors surveyed each facility thoroughly and kept each other informed as to the results. The surveys were performed with the Micro R meters held at 0.5 meters above the surface with a forward movement of about 1.0 meters per second. In addition to Mr. Smith, who accompanied the inspectors to each site, Mr. Peregoy was present during the surveys of Buildings KC and KJ on the Martin State Airport property.

4.2 Building D

The Building D site was being use to store trailers under contract with the Army. The site consisted of a large concrete pad, the leftover basement floor of the old building. The pad had numerous cracks, holes, and was very weathered after two decades of exposure to the elements.

The inspectors surveyed the concrete pad along parallel lines 5 meters apart, paying attention to drains, clean-outs, and holes in the pad. In addition to measurements taken at drains and clean-outs, surface contact readings were also taken at approximately 10 meter intervals. Numerous sealed/filled in drains/clean-outs/penetrations/holes in the pad were located. Although a few places were found where a hole in the pad had been filled with concrete, it could not be determined if these were any of the drains referred to in the closeout survey. Martin Marietta staff stated that the rubble from the demolition of the building was the responsibility of the contractor and was removed and believed to have been disposed of in a landfill. No detectable radiation levels above background (5μR/hr) were found. No development or other use of the site is planned by Martin Marietta.

4.3 Building C

The Building C area where the old Environmental Test and Large Vacuum Chamber Laboratories were located is now warehouse space and a large empty room. With the exception of the support columns, no original walls, floors, ceiling, or ducts are left. The inspectors surveyed the area along parallel lines at 5 meter intervals with surface contact measurements every 5 meters and at drains and original concrete support columns. No radiation levels above background (5μR/hr) were detected.

4.4 Building KC

Building KC is at the end of a dirt access road off Strawberry Point road just east of the eastern most taxi way. The property was purchased in toto by the State of Maryland in 1975 and although the building was used in the past for storage, it has been abandoned and left open to the elements for the past ten to fifteen years. The site was completely abandoned, overgrown, exposed to the elements (of the three "test cells" only the one where the LFBR had been housed still had it's outer doors). The inspectors performed a walk-through survey of all three cells, the entrance way and connecting halls. Surface contact measurements were performed randomly throughout the building. The office/control room area was not entered due to the cluttered condition of and the layer of asbestos ceiling tiles covering the floor. No radiation levels above background were detected. Although an attempt was made to locate the underground dump/hold-up tank described by Mr. Brisson, the inspectors were unable to locate the tank or any indication that it had been removed. Based on discussion with Martin-Marietta and Martin State Airport personnel, it is believed that the tank was abandoned in place after the decontamination described in Section 2.5. The planning representative of Maryland Aviation stated that the building had been scheduled for demolition after remediation of the asbestos, but the plans were delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

4.5 Building KJ

Building KJ is 300' S.W. of building KC along the dirt access road. The

site was also completely abandoned, overgrown, exposed to the elements. The doors into the laboratory and, mechanical equipment room and office were ajar leaving the interior open to the outside. The inside was littered with "junk", leaves, bird and animal droppings, and dirt. A fair number of 100 lb. bags of "solidified" lime were present, as the building had been use for storage by the State of Maryland in the past. Rusted laboratory furniture and discarded fire extinguishers also littered the floor. The stainless steel ventilation duct-work and the laboratory hoods were still present less the duct-work section that had contained the HEPA filters. The inspectors surveyed the remains as well as possible given the state of the building. No radiation levels above background were detected. The planning representative of Maryland Aviation stated that the building, just like Building KC, had been scheduled for demolition after remediation of the asbestos, but the demolition was delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

5.0 Conclusions

No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

6.0 Exit Interview

The inspector met with the Martin-Marietta and Maryland Department of the Environment representatives listed in Section 1.0 of this report and discussed the scope and findings of this inspection. They acknowledged the inspection findings and the statements documented in this report. Messrs. Flynn and Brisson were contacted by telephone and also confirmed their statements in this report.

ORNL SITES - SUMMARY

License No.:	19-01398-32	ORNL Score:	1,061
Docket No.:	none		
Licensee:	Martin-Marietta Isotopes, Inc.	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s)	19-01398-20, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01150, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		
Review Abstract:	License No. 19-01389-32 authorized research and development work with unsealed byproduct material in Building D at Middle River, Maryland. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.		
Recommendations:	None.		

Summary: License No. 19-01398-32 was issued on December 9, 1964 authorizing research and development work with a variety of unsealed byproduct materials in Building D at the Martin Company's Middle River, Maryland facility. On September 4, 1968, License No. 19-01398-32 was transferred to Isotopes, Incorporated. The license was terminated on March 20, 1969; however, no record of a termination or confirmatory survey, transfer of material, etc., could be located. It appears that Building D was returned to Martin-Marietta at that time.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to

be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 1/23/95

Approved by: _____ **Date** 1/23/95

EXPERT SYSTEM LICENSE EVALUATION
EVALUATION REPORT FOR LICENSE 19-01398-32

Licensee: MARTIN-MARIETTA CORPORATION (ISOTOPES INC.IN 1968)
Site of operation: MIDDLE RIVER PLANT, MIDDLE RIVER,MD

The final ranking for SITE CONTAMINATION is: 1061

--Type and form of materials licensed--

Material--	--Form--
ANY BYPRODUCT/1-83	Loose material
AM-241	Loose material
CS-137	Loose material
EU-152	Loose material
EU-154	Loose material
PM-147	Loose material
SR-90	Loose material

--For evaluation purposes, amounts of the following materials were obtained-

Material--	--Form--	--Amount--	--Unit--
ANY BYPRODUCT/1-83	LOOSE	20.03	CI
AM-241	LOOSE	.025	CI
CS-137	LOOSE	1.	CI
EU-152	LOOSE	.003	CI
EU-154	LOOSE	.003	CI
PM-147	LOOSE	65.00	CI
SR-90	LOOSE	100.00	CI

Rank of the license based on the loose materials licensed: 282

DESCRIPTION OF SITE AT WHICH 19-01398-32 WAS USED

MIDDLE RIVER PLANT AT MIDDLE RIVER, MD.
WERE ALSO AUTHORIZED TO TRANSPORT THE 25 MILLICURIES OF BYPRODUCT MATERIAL TO THE UNIVERSITY OF MARYLAND.

1. License was for loose materials,or materials handled loose
2. Use of 'any byproduct material' on this license was for a purpose for which it is not possible to determine the actual materials possessed.
3. There was at least one loose material on this license for which the amount remaining was reduced according to the length of the half-life
4. There was one identifiable site with this license.
5. Some likelihood that activity could have generated significant contamination. Rank=rank*1.0

Reviewer's comments concerning potential CONTAMINATION

LICENSEE WORKED WITH RADIOTOXIC MATERIALS. THE USE OF GLOVE TYPE DRY BOXES WAS REFERED TO IN THIS FILE. THERE IS NO INSPECTION OF ANY TYPE TO INDICATE THE QUALITY OF THE HEALTH PHYSICS PROGRAM FOR THE WORK AREAS.

6. There was NO verifiable decontamination of the site at closeout. Rank=rank*1.2
7. There was insufficient information in the file to determine the likelihood of release to atmosphere or environment. Rank not changed.
8. Information insufficient to judge frequency of turnover for operation Rank not changed
9. There was limited use of glove boxes, hoods, or protective clothing
10. Possible inappropriate disposal or abandonment of contaminated material from glove boxes,hoods,clothing. Rank=rank*1.1
11. There was limited use of contaminated waste material in the operation. Rank=rank*1.2.
12. Possible inappropriate disposal or abandonment of contaminated waste material. Rank=rank*1.1
13. No documentation of materials disposition,or very inadequate Rank=rank*1.2
14. There was no information in file indicating burial or dumping by licensee. Rank not changed
15. There was NO closeout survey for this license. Rank=rank*1.8
16. There was NOT an NRC FINAL INSPECTION of the facility. Rank not changed.

CATEGORY FOR POTENTIAL SITE CONTAMINATION:
HIGHEST PRIORITY-Category 1A

| The final ranking for SITE CONTAMINATION is: 1061 |

Description of THE LICENSEE ACTIVITY AUTHORIZED by this license

STUDY CONVERSION OF KINETIC ENERGY TO ELECTRICAL ENERGY
TEST AND DEVELOP METHODS OF PURIFICATION
DEVELOP METHODS TO SEPARATE Cm-242 FROM Am-241
DEVELOPMENT OF CHEMICAL PROCESSES

Description of THE USE OF BYPRODUCT MATERIAL under this license

USE WAS ON THE APPLICATION FOR 19-01398-14 AND REFERENCED FOR THIS LICENSE.

Reviewer's comments concerning license 19-01398-32

License 19-01398-32 was issued in December,64, to supercede license 19-01398-14 at the Middle River, Md. facility of Martin-Marietta. Yttrium-90 which exists in equilibrium with Sr-90 was not entered as a material and neither was Cm-242 as it has a short halflife and is not available on the expert system. The license was terminated in March,69, by amendment 03 which referenced a licensee letter of 2-3-69. This letter stated a form 314 was attached for disposition of materials, but this form was not found in this file. Since no closeout survey was conducted, the possibility of contamination at the site has not been rule out.

EXPERT SYSTEM EVALUATION WAS BASED ON THE
INVENTORY RECORD IN JOB 0321, BOX 09

Docket

Licensee: MARTIN-MARIETTA CORPORATION (ISOTOPES INC.IN 1968)
Address: MIDDLE RIVER PLANT AT MIDDLE RIVER, MD Zip: 21220
State of operation: MD
Disposition information present: NO DISPOSITION INFORMATION GIVEN
This license was listed as terminated on 03/20/69
Remarks:FILE ALSO CONTAINS MATERIAL ON THE PRECEEDING LICENSE 19-01398-14
JOB NUMBER: 0321 BOX NUMBER: 09

EXPERT SYSTEM LICENSE EVALUATION
EVALUATION REPORT FOR LICENSE 19-01398-32

Licensee: MARTIN-MARIETTA CORPORATION (ISOTOPES INC.IN 1968)
Site of operation: MIDDLE RIVER PLANT, MIDDLE RIVER,MD

The final ranking for SITE CONTAMINATION is: 1061

--Type and form of materials licensed--

Material--	--Form--
ANY BYPRODUCT/1-83	Loose material
AM-241	Loose material
CS-137	Loose material
EU-152	Loose material
EU-154	Loose material
PM-147	Loose material
SR-90	Loose material

--For evaluation purposes, amounts of the following materials were obtained-

Material--	--Form--	--Amount--	--Unit--
ANY BYPRODUCT/1-83	LOOSE	20.03	CI
AM-241	LOOSE	.025	CI
CS-137	LOOSE	1.	CI
EU-152	LOOSE	.003	CI
EU-154	LOOSE	.003	CI
PM-147	LOOSE	65.00	CI
SR-90	LOOSE	100.00	CI

Rank of the license based on the loose materials licensed: 282

DESCRIPTION OF SITE AT WHICH 19-01398-32 WAS USED

MIDDLE RIVER PLANT AT MIDDLE RIVER, MD.
WERE ALSO AUTHORIZED TO TRANSPORT THE 25 MILLICURIES OF BYPRODUCT MATERIAL TO THE UNIVERSITY OF MARYLAND.

1. License was for loose materials,or materials handled loose
2. Use of 'any byproduct material' on this license was for a purpose for which it is not possible to determine the actual materials possessed.
3. There was at least one loose material on this license for which the amount remaining was reduced according to the length of the half-life
4. There was one identifiable site with this license.
5. Some likelihood that activity could have generated significant contamination. Rank=rank*1.0

Reviewer's comments concerning potential CONTAMINATION

LICENSEE WORKED WITH RADIOTOXIC MATERIALS. THE USE OF GLOVE TYPE DRY BOXES WAS REFERED TO IN THIS FILE. THERE IS NO INSPECTION OF ANY TYPE TO INDICATE THE QUALITY OF THE HEALTH PHYSICS PROGRAM FOR THE WORK AREAS.

6. There was NO verifiable decontamination of the site at closeout. Rank=rank*1.2
7. There was insufficient information in the file to determine the likelihood of release to atmosphere or environment. Rank not changed.
8. Information insufficient to judge frequency of turnover for operation Rank not changed
9. There was limited use of glove boxes, hoods, or protective clothing
10. Possible inappropriate disposal or abandonment of contaminated material from glove boxes,hoods,clothing. Rank=rank*1.1
11. There was limited use of contaminated waste material in the operation. Rank=rank*1.2.
12. Possible inappropriate disposal or abandonment of contaminated waste material. Rank=rank*1.1
13. No documentation of materials disposition,or very inadequate Rank=rank*1.2
14. There was no information in file indicating burial or dumping by licensee. Rank not changed
15. There was NO closeout survey for this license. Rank=rank*1.8
16. There was NOT an NRC FINAL INSPECTION of the facility. Rank not changed.

CATEGORY FOR POTENTIAL SITE CONTAMINATION:
HIGHEST PRIORITY-Category 1A

The final ranking for SITE CONTAMINATION is: 1061

Description of THE LICENSEE ACTIVITY AUTHORIZED by this license

STUDY CONVERSION OF KINETIC ENERGY TO ELECTRICAL ENERGY
TEST AND DEVELOP METHODS OF PURIFICATION
DEVELOP METHODS TO SEPARATE Cm-242 FROM Am-241
DEVELOPMENT OF CHEMICAL PROCESSES

Description of THE USE OF BYPRODUCT MATERIAL under this license

USE WAS ON THE APPLICATION FOR 19-01398-14 AND REFERENCED FOR THIS LICENSE.

Reviewer's comments concerning license 19-01398-32

License 19-01398-32 was issued in December,64, to supercede license 19-01398-14 at the Middle River, Md. facility of Martin-Marietta. Yttrium-90 which exists in equilibrium with Sr-90 was not entered as a material and neither was Cm-242 as it has a short halflife and is not available on the expert system. The license was terminated in March,69, by amendment 03 which referenced a licensee letter of 2-3-69. This letter stated a form 314 was attached for disposition of materials, but this form was not found in this file. Since no closeout survey was conducted, the possibility of contamination at the site has not been rule out.

EXPERT SYSTEM EVALUATION WAS BASED ON THE
INVENTORY RECORD IN JOB 0321, BOX 09

Docket

Licensee: MARTIN-MARIETTA CORPORATION (ISOTOPES INC.IN 1968)
Address: MIDDLE RIVER PLANT AT MIDDLE RIVER, MD Zip: 21220
State of operation: MD
Disposition information present: NO DISPOSITION INFORMATION GIVEN
This license was listed as terminated on 03/20/69
Remarks:FILE ALSO CONTAINS MATERIAL ON THE PRECEEDING LICENSE 19-01398-14
JOB NUMBER: 0321 BOX NUMBER: 09

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 40-3296/82-01
40-2308/82-01

Docket No. 40-3296
40-2308

License No. STB-187
C-3991

Licensee: Martin-Marietta Corporation

Baltimore, Maryland

Facility Name: Martin-Marietta Corporation (The Martin Company)
Middle River Facilities
Middle River, Maryland

Inquiry Conducted: March 5 - June 15, 1982

Inspector: Jenny M. Johansen
Jenny M. Johansen, Radiation Specialist — 8/2/82 date

Approved by: John D. Kinneman
John D. Kinneman, Chief, Materials Program Section No. 1 — 8/2/82 date

Inquiry Summary:

This inquiry consisted of telephone discussions and review of records provided by Martin-Marietta Corporation and NMSS to determine whether the facility at Middle River, Maryland formerly used for development and production of thorium-magnesium alloys meets current criteria for unrestricted use.

Results: The Middle River (Chesapeake Park) facility meets current criteria for release for unrestricted use.

DETAILS

1. Persons Contacted

   A. Paul Guinn, MLB, NMSS, USNRC
   B. Paul Majewski, Safety Coordinator
      Martin-Marietta Laboratories
      1450 S. Rolling Road
      Baltimore, Maryland 21227 (301-247-0700)
   C. Joseph P. Alcarese, Division Counsel
      Martin-Marietta Aerospace, Baltimore Division
      103 Chesapeake Park Plaza
      Baltimore, Maryland 21220 (301-338-5000)
   D. Robert E. Corcoran, Chief
      Division of Radiation Control
      201 West Preston Street
      Baltimore, Maryland 21201 (301-383-2744)

2. Background

   Martin-Marietta Corporation, Baltimore Division, was authorized by License Nos. C-3991 and STB-187 during the late 1950's and early 1960's for the development and production of magnesium-thorium alloys and for possession and use of small quantities of uranium and thorium metal in connection with work under government contracts. License No. STB-187 expired on April 30, 1964. The authorized place of use was at Martin--Marietta's Middle River, Maryland facilities which are also called Chesapeake Park.

3. Telephone Discussions with Individuals

   Individual A in paragraph 1 was formerly employed as the Health Physics Supervisor at Martin-Marietta and monitored the activities conducted under License Nos. C-3991 and STB-187. He stated that all work authorized by these licenses occurred in the basement of Building D at Chesapeake Park, Middle River, Maryland. Individual D also stated that a former Martin-Marietta employee had told him that Building D had been torn down and the site covered with grass after the building and the site were decontaminated.

   Individual C searched Martin-Marietta records and found a close-out survey covering Building D and correspondence discussing the release of this facility for unrestricted use. He provided the correspondence and survey report in a letter dated June 1, 1982 (see Enclosure A) and confirmed that Building D had been torn down and the area where it stood is now covered with grass.

4. Review of Records

A letter from Martin-Marietta to the AEC dated September 21, 1970 (See Enclosure A) states that AEC License No. SNM-1192 was issued to Martin--Marietta Corporation to allow decontamination of their laboratory facilities and that a report of the decontamination was enclosed. The "Comprehensive Radiation Survey Report for the Release of Decontaminated Premises for Unrestricted Use," enclosed, provided the following points of comparison to the licenses and Individual A's statement:

a. The decontamination effort involved Building D at Chesapeake Park. Individual A stated that all work under License Nos. C-3991 and STB-187 occurred in this building.

b. Special nuclear material processes took place in Building D nuclear laboratories. The decontamination program consisted primarily of removal of U-235 and U-238 residual oxide forms. License No. C-3991 authorized use of uranium metal under government contracts while License No. STB-187 authorized the use of thorium.

Review of the close-out survey indicates that an extensive effort was made to remove all contamination according to AEC criteria and to protect the workers performing the decontamination. Contamination was removed from surfaces by use of high vacuum systems. Fixed contamination found on equipment such as hoods, ducts, glove boxes was allowed to remain fixed and the equipment was removed, properly packaged and shipped to Moorehead Kentucky for burial. Swipe tests were made and various kinds of radiation detectors were used during the decontamination. The report states that removable activities and radiation levels met AEC criteria for release for unrestricted use; however, no site diagram, showing where the swipes and measurements were taken, nor actual results of the measurements are provided.

The report states the average fixed alpha emitter contamination was less than 2000 dpm/100 cm^2, with no beta-gamma contamination, except for a small area of fixed Sr-90 contamination reading 0.5 mrad/hr. Except for the Sr-90 contamination, these results are within present NRC criteria of 5000 dpm/100cm^2 (average U-nat, U-235, U-238 and associated decay products) surface contamination. A fixed contamination level of 0.5 mrad/hr from Sr-90 does not meet the present NRC criteria; however, it is within the 2 mrem/hr limit for an unrestricted area in 10 CFR 20.105(b), and, since it was only a small spot, presented no hazard to personnel.

All water samples taken were stated to be less than or equal to 9.0 x 10^{-7} microcuries per ml compared to 10^{-5} microcuries per ml allowed for U-235 and U-238 in 10 CFR 20, Appendix B, Table II, Column 2. All soil samples were less than 10 pCi per gram U-238 or U-235 except for one sample having 24 pCi per gram of U-238. These results are consistent with the recent Uranium Fuel Licensing Branch position on disposal of uranium.

Residual activity in drains consisted of a total of 29 microcuries of U-235, which the licensee proposed to seal in place with cement.

5. Conclusion

Materials authorized by License Nos. C-3991 and STB-187 were used in Building D at Martin-Marietta's Middle River facilities which are also called Chesapeake Park. The Building D which was decontaminated and released for unrestricted use when AEC License SNM-1192 was terminated is the same facility where work authorized by License Nos. C-3991 and STB-187 was conducted. If any material remained from operations under these licenses it would have been detected and removed during that effort. No determination could be made if the drains containing residual U-235 activity were sealed with cement, however, since the building is now demolished and the site covered with grass this activity is unlikely to present a hazard.

Region I concludes the site meets current NRC criteria for release for unrestricted use and that no site survey is necessary.

Enclosure A Region I Repo
40-3296/82-01 - 40-2308/82-01

MARTIN MARIETTA AEROSPACE

BALTIMORE DIVISION
103 CHESAPEAKE PARK PLAZA
BALTIMORE, MARYLAND 21220
TELEPHONE (301) 338-5000

June 1, 1982

Ms. Jenny Johansen
USNRC
Region 1
631 Park Avenue
King of Prussia, Pa. 19406

Dear Ms. Johansen:

In accordance with your request, I am enclosing, from the records of the Martin Marietta Corporation, a copy of the "Comprehensive Radioactive Survey Report For The Release of Decontaminated Premises For Unrestricted Use", prepared in accordance with U.S.A.E.C. Material License No. SNM-1192 issued to the Martin Marietta Corporation for the decontamination of nuclear laboratories at Baltimore, Maryland.

I am also enclosing a copy of correspondence showing that the Survey Report was furnished to the AEC Division of Materials Licensing at Washington, D.C. and the AEC Compliance Division at Newark, New Jersey. Also, a copy of a letter to the AEC Division of Materials Licensing advising that the decontamination program was near complete and requesting an inspection of the facility.

We are pleased to be able to assist you in this matter.

Very truly yours,

MARTIN MARIETTA CORPORATION

Joseph P. Alcarese
Division Counsel
Martin Marietta Aerospace
Baltimore Division

JPA:jd
enclosures

15 July 1970

Mr. Donald A. Nussbaumer, Chief
Fuel Fabrication and Transportation Branch
Division of Materials Licensing
United States Atomic Energy Commission
Washington, D.C. 20545

Dear Mr. Nussbaumer:

Please be advised that the decontamination program at the Martin Marietta Corporation Baltimore facilities is nearing completion and it is anticipated the program shall be completed tentatively on August 5, 1970.

We request that an inspection of the subject facility be conducted on August 6, 1970, by a representative of your office in conjunction with the writer and a health physicist from the Eberline Instrument Corporation. If the above date is not compatible with your assignee's schedule and if there are questions regarding the above request and/or program, please advise the writer.

I wish to express my corporation's thanks and appreciation for the excellent service provided by representatives of your office toward bringing this program to a successful completion.

Sincerely yours,

MARTIN MARIETTA CORPORATION

Elmer M. Chenault
Health Physicist

cc: G. W. Heineman
R. G. Macaulay
J. Stewart
F. F. Huner
E. Petrochko
E. Geiger
R. T. Woolsey

21 September 1970

Director of Division Compliance
United States Atomic Energy Commission
970 Broad Street
Newark, New Jersey 07107

Attention: Mr. W. Lorenz

Gentlemen:

Enclosed is a comprehensive radiation survey report describing the successful decontamination of our laboratory facilities. The report is one of the requirements of the license (A.E.C. Material License No. SNM-1192) issued to the Martin Marietta Corporation, Baltimore Division, to allow decontamination of said facilities.

Sincerely,

Elmer M. Chenault
Sr. Health Physicist

Encl.

cc: G. W. Heineman
R. G. Macaulay
J. Stewart

22 September 1970

Director, Division of Materials Licensing
United States Atomic Energy Commission
Washington, D. C.

Attention: Mr. R. T. Woolsey

Gentlemen:

Enclosed is a comprehensive radiation survey report describing the successful decontamination of our laboratory facilities. The report is one of the requirements of the license (A.E.C. Material License No. SNM-1192) issued to the Martin Marietta Corporation, Baltimore Division, to allow decontamination of said facilities.

Sincerely,

Elmer M. Chenault
Sr. Health Physicist

Encl.

cc: G. W. Heineman
R. G. Macaulay
J. Stewart

COMPREHENSIVE RADIATION SURVEY REPORT FOR THE RELEASE OF DECONTAMINATED PREMISES FOR UNRESTRICTED USE

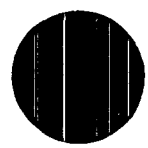
CHESAPEAKE PARK, INC., BALTIMORE, MARYLAND
MARTIN MARIETTA CORPORATION
BALTIMORE, MARYLAND

Prepared by

E. M. Chenault
Sr. Health Physicist
Martin Marietta Corporation

and

Stanley J. Waligora, Jr.
Consultant Health Physicist
Eberline Instrument Corporation
Santa Fe, New Mexico



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1. Environmental Air Samples

2. Environmental Water Samples

3. Environmental Swipe and Soil Samples

4. Bioassay Samples

a. Positive Nose Swipes

b. Urine Analysis

I. INTRODUCTION

Purpose: This radiation survey report is prepared as one of the conditions provided for in U.S.A.E.C. Material License No. SNM-1192 issued to the Martin Marietta Corporation for the decontamination of nuclear laboratories at Baltimore, Maryland.

Since the subject nuclear laboratories are no longer used for radioisotopes operations and/or special nuclear materials processes and have been decontaminated in accordance with U.S.A.E.C. guidelines, it is requested the above named facilities be released for unrestricted use.

On June 3, 1970, the decontamination program at the Martin Marietta Corporation, Baltimore Division, commenced and it was completed on September 2, 1970. The radioactive materials involved in the decontamination program consisted primarily of U^{235} and U^{238} in a residual oxide form.

The work was performed by a crew consisting of 8 trained operators from the Martin Marietta Corporation, two health physicists from Eberline Instrument Corporation, and one health physicist from Martin Marietta Corporation. The removal of the radioactive material from equipment and facilities was achieved primarily through the use of high vacuum systems, with the operators wearing U.S. Bureau of Mines air supplied respirators. Full protective clothing and footwear were provided the workers.

Air samples were collected throughout the general area during the decontamination program and were counted for gross alpha emitters. The results of all air samples collected were below the MPC, with the exception of 4 samples. One sample was collected in the Radioisotopes Laboratory while chipping SR^{90} from a concrete wall. The result was reported as 2.4×10^{-10} uCi/CC. The second sample was collected in the Spheroidizing Room while removing ventilation ducts. The results of the air samples are given in Appendix C-1.

It should be noted that air supply respirators were worn by the operators during the time the air dust concentrations were measured. Urine specimens were submitted by personnel assigned to the program prior to working in the contaminated areas, in order to provide a base line study. Nasal swipes of all men working in the contaminated areas were performed twice daily. The results of all nasal swipes were low to negligible and did show proper use of respiratory protective equipment.

Water samples were collected of all liquid effluent, analyzed prior to release, and records of all sample analysis and personnel dosimetry reports are maintained in the office of the Martin Marietta Corporation's health physicist.

II. LOCATION AND IDENTIFICATION OF FACILITIES

The subject nuclear laboratories that were decontaminated are located at Chesapeake Park and are owned by Martin Marietta Corporation at Baltimore, Maryland. The decontaminated laboratories encompass an area of approximately 40,000 FT^2, located in the basement area of building "D". The total area was subdivided into small separate rooms where various types of nuclear activity were performed. Most of the small rooms were of the laboratory-type, and equipment included ventilation hoods, glove boxes, filtration medias, laboratory benches and laboratory glassware. False ceilings were also a part of some laboratories, and each ceiling was surveyed and removed, where necessary.

For the most part, the radioactivity was confined to glove boxes, ventilation hoods, ducts and filtration medias contained in each laboratory. The radioactive materials removed were in the form of residual uranium oxides, with the exception of a minor amount of SR^{90} found on a wall.

Some of the laboratories contained sinks, floor drains and sumps used to control liquid effluent containing radioactive materials. The floor drains, traps and sumps were carefully monitored to determine the contamination level, if any, and the termination location of each drain line and sump line.

III. HEALTH PHYSICS TECHNICAL APPROACH

The removal of residual contamination was accomplished through the direction and guidance of three health physicists, two from Eberline Instrument Corporation and one from Martin Marietta Corporation. The work crew consisted of eight qualified workers trained in the radiological health aspect of nuclear decontamination.

The contamination, for the most part, was not found to be tightly bonded or sealed to the surfaces of the facilities and therefore most of it was removed by the use of high vacuum systems with absolute filters. One wall and several floor areas showed evidence of bonded alpha activity and, therefore, it became necessary to use pneumatic tools to remove the contamination and reduce radiation levels to acceptable levels. Contamination that was found to be fixed on equipment, such as ventilation hoods, ducts and glove boxes, was allowed to remain fixed, and the equipment was properly packaged, identified and shipped by truck carrier to burial grounds in Moorehead, Kentucky. The transportation and burial of all contaminated equipment was provided by the Nuclear Engineering Company, Moorehead, Kentucky.

IV. SCOPE OF SURVEY AND GENERAL PROCEDURES FOLLOWED

Radiation detection equipment used during the effort included several gas proportional alpha counters, one floor alpha monitor, RM-15 (soft gamma measurement), one beta plus gamma counter, TLD badges and film badge dosimetry.

Swipe samples by the use of whatman filter paper were collected from all surface areas where it was thought to be necessary. The filter paper samples were then counted for any gross alpha contamination. All loose radioactive material was removed from the facilities. Equipment that was heavily contaminated, such as glove boxes and ventilation hoods, were properly packaged and shipped by carrier truck for burial.

There were no areas detected whereby radioactive materials had been sealed by painting or by other means, and there was no attempt to seal any areas containing fixed radioactive materials.

The general procedure followed to accomplish the decontamination effort is entitled "The Health and Safety Procedure for the Decontamination of Building "D", Martin Marietta Corporation, Baltimore, Maryland." The procedure is presently on file in the office of the U.S.A.E.C. Division of Materials Licensing. The procedure provided the basic guidelines for performing the decontamination in a safe manner. "The Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use" was closely adhered to by the Martin Marietta Corporation decontamination work crew.

V. FINDINGS OF THE DECONTAMINATION SURVEY

The floors, walls and ceilings of all laboratories where nuclear activity was conducted were monitored and recleaned. Some areas did not show evidence of contamination. Those areas where contamination was found were vacuumed and sprayed with a jet-x cleaning device to remove any material that could not be vacuumed. The use of water was controlled and kept to a minimum to prevent water contamination and pollution.

During the initial phase of the decontamination inspection survey, six items or areas were found which required correction (letter to E. M. Chenault from S. J. Waligora, Jr., dated September 3, 1970) and all, with the exception of the floor drains, were corrected.

All floor drains were monitored and decontaminated as much as possible. Water samples were taken from the five drains indicating residual activity and all results showed low concentrations. (See Appendix C-2) The residual activity remaining in the six drains was estimated through the use of a 2" x 2" NaI(TR) crystal in conjunction with a single channel analyzer. With the detection system calibrated for ^{235}U gamma rays, the following estimates were established:

Drain No.	^{235}U(uCi)
39	1.0
46	1.0
52	15.0
55	6.0
56	6.0
Total	29.0

Water samples taken from these drains showed very low concentrations. As a further check, water was flushed continuously through these five drains while a two liter water sample was taken from the sanitary sewer sump servicing that portion of the building. Samples were submitted for analysis and showed 0.003 pCi/ml (MPC 30.0 pCi/ml).

All drains have been left open for inspection. With approval from the U.S. Atomic Energy Commission, we propose to seal the five drains with cement, thereby permanently inactivating the total of 29 uCi of ^{235}U. This measure would appear to be a feasible alternative to tearing out the concrete floor in order to remove the drains and associated pipe.

As a result of the final survey, all other areas were reduced to within limits prescribed by the U.S. Atomic Energy Commission. All walls, ceilings, and floors had been washed thoroughly or removed. The average alpha emitter contamination (^{235}U and/or ^{238}U only) is much less than 500 dpm/100 cm^2. Areas with remaining fixed alpha emitter contamination average less than 2,000 dpm/100 cm^2. Beta-gamma contamination is essentially nonexistent; ^{90}Sr-Y contamination which had been present in the Radioisotopes Laboratory has been completely removed with the exception of one minute area with fixed contamination measuring 0.5 mRad/hr.

This area of Building "D" will soon be renovated by Chesapeake Park and any remaining fixed contamination will be further enclosed with replastering, retiling of floors, and repainting. Following the renovation, any fixed residual contamination should be so well fixed that there should be no evidence of even trace quantities during the remaining life of the structure.

VI. PACKAGING, TRANSPORTATION AND DISPOSAL OF CONTAMINATED EQUIPMENT

All contaminated equipment, such as glove boxes, ventilation hoods and duct work, were properly packaged and identified in accordance with the Department of Transportation rules and regulations and sent by truck carrier to Moorehead, Kentucky, for burial. A total of nineteen (19) truckloads of equipment were sent to the burial grounds, with each truckload encompassing approximately 1,920 cubic feet.

APPENDIX B - SUMMARY OF DECONTAMINATION OPERATIONS

The following is a chronological task summary of decontamination operations from June 1 through September 3, 1970, and represents approximately 2400 man hours of labor.

1. Organization of people, equipment, supplies, and facilities; establishment of procedures and policies.
2. Removal of exhaust ducts from furnace room.
3. Samples taken from areas with potential for tritium and for cobalt 60 contamination.
4. Machinery and equipment removed from furnace room.
5. Areas expected to be clean were monitored and any anomalies entered to the work plan.
6. Arrangements were made for special disposal of nonradioactive but hazardous wastes (acids, alkalis, solvents, nitrates, peroxides, etc.)
7. Removed parafin shielding from neutron generator area.
8. Removed equipment from laundry area.
9. Surveyed dehydrator rooms and segregated areas and equipment.
10. Cleaned nine rooms which required general decontamination, but which posed no problems due to presence of contaminated equipment, exhaust ducts, absolute filters, etc.
11. Laundry area cleaned including removal of construction blocks and floor tiles.
12. Cleaned powder room - highly contaminated.
13. Discovered "contamination" in heat plant boiler room which analyses showed to be naturally occurring thorium.
14. Fire (primarily smoke) as the result of torches used during duct removal on outside of building by a local contractor. This duct work was past the absolute filter bands and there was no attendant radiation hazard.

15. General cleaning accomplished in five additional rooms.

16. Vault decontaminated and bird cages removed.

17. Chipped concrete walls contaminated with ^{90}Sr-Y in Radioisotopes Laboratory.

18. Ductwork removal and clean-up in two additional rooms.

19. Removed glove boxes and other contaminated equipment from Spheroidizing Room; proceeded with remainder of clean-up.

20. Removed installed casework in Inorganic Chemistry Laboratory.

21. Decontaminated restroom floors in supposedly clean area.

22. Cleaned contamination which resulted from clean-up of Spheroidization Room.

23. Inspected Oil Farm Building (remote to Building "D") and removed contaminated equipment that had been stored. Survey showed no further decontamination was necessary.

24. Proceeded with clean-up of Inorganic Chemistry Laboratory.

25. Removed ducts and proceeded with clean-up of Powder Metal Room.

26. Removed duct and proceeding with clean-up of three rooms.

27. Removed duct work and equipment in Ceramics Laboratory and Spheroidization Laboratory.

28. Steamed Pellet Room in preparation to clean-up in order to reduce airborne (resuspended) contamination. Proceeded with clean-up.

29. Powder Room was also steamed prior to clean-up.

30. Removed absolute filters associated with Pellet Room.

31. All drains monitored and cleaned. Five remain contaminated.

32. Removed vertical rolling mill (several tons) from Powder Room. Residual contamination forced removal of two walls, ceilings, and floor tiles.

33. Ceiling and floor tiles removed in Spheroidization Room.

34. Removed absolute filters associated with Vault Room.

35. Final blowers, filters and ducts removed at termination and ventilation exhaust equipment.

36. Removed absolute filters and remainder of equipment associated with the Radioisotopes Laboratory.

37. Proceeded throughout entire facility with final monitoring and removed any contaminated items including floor tile, miscellaneous fixtures. Washed down all remaining ceilings, walls, and floors several times. A detailed swipe survey was performed.

38. Sumps and chip tanks associated with Dehydrator, Laundry Room, and Cleaning Room were decontaminated.

39. Asphalt floor covering in Cleaning Room removed.

40. Final waste shipment (19th truckload) departed. Two additional barrels filled with remaining miscellany for future shipment.

APPENDIX C - SAMPLE ANALYSIS RESULTS

1. Environmental Air Samples

Location	Date	Concentration (uCi/ec)
Radioisotopes Laboratory	7/9/70	$92.3 \pm 0.6 \times 10^{-12}$
Radioisotopes Laboratory	7/9/70	$240.0 \pm 1.0 \times 10^{-12}$
Spheroidizing Room	7/14/70	$68 \pm 2 \times 10^{-12}$
" "	7/15/70	$413 \pm 10 \times 10^{-12}$
Dehydrator Room (during fire)	6/26/70	3.3×10^{-12}
Furnace Room	6/17/70	1.17×10^{-13}
" "	6/17/70	8.5×10^{-13}
" "	6/18/70	2.7×10^{-13}
" "	6/19/70	1.1×10^{-13}
" "	6/22/70	5.36×10^{-13}
" "	6/23/70	3.3×10^{-13}
" "	6/23/70	2.6×10^{-12}
" "	6/23/70	5.3×10^{-12}
" "	6/24/70	2.7×10^{-13}
" "	6/24/70	3.5×10^{-12}
Break Room	6/24/70	2.1×10^{-12}
Furnace Room	6/25/70	5.5×10^{-13}
" "	6/25/70	3.5×10^{-12}
" "	6/26/70	3.5×10^{-12}
" "	6/26/70	2.7×10^{-13}
" "	6/26/70	3.3×10^{-12}
" "	6/26/70	3.5×10^{-12}
" "	6/26/70	2.7×10^{-13}
" "	6/29/70	3.5×10^{-12}
" "	6/29/70	2.6×10^{-12}

Environmental Air Samples (Continued)

Location	Date	Concentration (uCi/ec)
Furnace Room	6/30/70	1.75×10^{-12}
" "	6/30/70	3.6×10^{-13}
" "	7/1/70	1.4×10^{-12}
" "	7/1/70	5.5×10^{-13}
" "	7/6/70	3.5×10^{-12}
" "	7/6/70	1.75×10^{-12}
" "	7/6/70	6.6×10^{-13}
" "	7/7/70	3.3×10^{-13}
" "	7/8/70	1.6×10^{-13}
" "	7/9/70	2.7×10^{-13}
Spheroidizing Room	7/10/70	1.1×10^{-13}
Flame Room #12	7/10/70	2.6×10^{-12}
Inorganic Chemistry Lab	7/13/70	2.5×10^{-12}
" " "	7/13/70	6.2×10^{-12}
Spheroidizing Room	7/13/70	4.0×10^{-12}
Room #11	7/14/70	3.0×10^{-12}
* Spheroidizing Room	7/14/70	6.8×10^{-10}
Room #11	7/15/70	1.6×10^{-12}
* Spheroidizing Room	7/15/70	4.13×10^{-10}
Room #11	7/16/70	7.0×10^{-13}
Spheroidizing Room	7/16/70	6.6×10^{-11}
Spheroidizing Room	7/17/70	7.9×10^{-11}
Furnace Room	7/20/70	5.2×10^{-13}
Inorganic Chemistry Lab	7/21/70	4.4×10^{-12}
Inorganic Chemistry Lab	7/21/70	4.6×10^{-12}
* Spheroidizing Room	7/21/70	1.7×10^{-10}

Environmental Air Samples (Continued)

Location	Date	Concentration (u Ci/ec)
Furnace Room (Shipping Area)	7/22/70	3.9×10^{-13}
Inorganic Chemistry Lab	7/22/70	8.6×10^{-13}
" " "	7/22/70	1.7×10^{-12}
Room #32	7/23/70	1.75×10^{-11}
Room #32	7/23/70	2.6×10^{-12}
Room #57	7/23/70	7.0×10^{-12}
Spheroidizing Room	7/24/70	3.1×10^{-12}
Room #41 (Vault)	7/24/70	1.4×10^{-12}
Room #21 (Powder Metal)	7/24/70	6.3×10^{-12}
Spheroidizing Room	7/27/70	1.47×10^{-11}
" "	7/27/70	2.2×10^{-12}
Room #41 (Vault)	7/27/70	6.0×10^{-12}
Spheroidizing Room	7/28/70	9.9×10^{-11}
Room #41 (Vault)	7/28/70	1.4×10^{-12}
Room #21 (Powder Metal)	7/29/70	1.97×10^{-11}
" " " "	7/29/70	1.18×10^{-11}
Spheroidizing Room	7/29/70	2.1×10^{-12}
Ceramics Lab	7/30/70	7.0×10^{-12}
" "	7/30/70	2.9×10^{-12}
Spheroidizing Room	7/30/70	1.0×10^{-12}
Ceramics Lab	7/31/70	4.2×10^{-12}
Dehydrator Room	7/31/70	7.0×10^{-12}
Spheroidizing Room	7/31/70	4.4×10^{-12}
Furnace Room (Shipping Area)	8/3/70	3.5×10^{-11}
Corrosion Test Lab	8/3/70	1.6×10^{-12}
Spheroidizing Lab	8/4/70	2.2×10^{-11}
Pellet Room	8/4/70	7.0×10^{-12}

Environmental Air Samples (Continued)

Location	Date	Concentration (uCi/ec)
Furnace Room (Shipping Area)	8/4/70	2.4×10^{-12}
Pellet Room	8/5/70	5.3×10^{-12}
" "	8/5/70	9.3×10^{-12}
Furnace Room (Room #11)	8/5/70	1.6×10^{-12}
Pellet Room	8/6/70	9.5×10^{-13}
Furnace Room (Shipping Area)	8/7/70	7.7×10^{-12}
" " " "	8/7/70	8.8×10^{-12}
Furnace Room (Room #11)	8/7/70	3.3×10^{-13}
" " " "	8/10/70	7.0×10^{-12}
Shower Room	8/10/70	1.9×10^{-11}
Furnace Room (Shipping Area)	8/10/70	3.0×10^{-12}
" " " "	8/11/70	2.2×10^{-12}
" " " "	8/12/70	1.1×10^{-12}
" " " "	8/13/70	1.1×10^{-12}
" " " "	8/13/70	1.9×10^{-12}
" " " "	8/14/70	1.1×10^{-12}
" " " "	8/15/70	1.6×10^{-12}
" " " "	8/16/70	1.1×10^{-12}
" " " "	8/17/70	4.5×10^{-12}
" " " "	8/19/70	7.6×10^{-13}
" " " "	8/19/70	2.5×10^{-12}
Dehydrator Room	8/21/70	4.9×10^{-13}
Block House (Mech.Equip.)	8/22/70	1.9×10^{-12}
Dehydrator Room	8/23/70	3.8×10^{-13}
" "	8/24/70	3.2×10^{-13}
Radioisotopes Lab	8/24/70	2.2×10^{-12}

2. Environmental Water Samples

Location	Date	Concentration(pCi/l)
^{60}Co Shielding Pool	6/4/70	> 5
Dehydrator Sump	6/17/70	15.6±2.0
Dehydrator Effluent	6/17/70	2.8±1.0
E. Tunnel Welding Shop (#58)	8/17/70	(236±10 (113± 8
Pellet Room Sump	8/17/70	(318±13 (376±13
Plating Room Chip Tank	8/17/70	(852±21 (916±20
Dyn.Corr.Lab Chip Tank	8/17/70	(112±8 (123±7
Summary Sump	9/1/70	
Summary Sump	9/1/70	

3. Environmental Swipe and Soil Analysis

a. Tritium Swipes (All in Neutron Generator Room)

Location	Date	uCi/100cm^2
Wall Mount	6/4/70	5.5×10^{-5}
Target Box	6/4/70	1.9×10^{-5}
Neutron Generator	6/4/70	1.4×10^{-5}
Lab Room 3	6/4/70	1.6×10^{-4}

b. Soil Samples From South Area Outside Bldg. D

Location	Date	pCi/gm ^{238}U	^{235}U
#1		0.38±0.07	0.13±0.04
#2		0.48±0.08	0.39±0.07
#3		0.56±0.07	0.27±0.05
#4		0.40±0.06	0.48±0.07
#5		24.5±0.12	9.14±0.87
#6		0.68±0.12	0.61±0.11

b. Soil Samples From South Area Outside Bldg. D (Continued)

Location	Date	pCi/gm ^{238}U	pCi/gm ^{235}U
#7		0.64±0.10	0.33±0.07
#8		1.13±0.14	5.27±0.41

c. Firebrick from Boiler Room (Not associated with contaminated area)

Fire Box Residue	6/25/70
Fire Box Bricks	6/25/70
Boiler Fuel	6/25/70

4. Bioassay Sampling

a. Positive Nose Swipes

Name	Date	Total dpm Both Nostrils
Sandoval	6/12/70 (AM)	200
Hysaw	6/15/70 (PM)	200
Keyser	6/16/70 (PM)	200
Sandoval	6/16/70 (PM)	200
Perry	6/17/70 (AM)	100
Craig	6/17/70 (PM)	100
Libby	6/17/70 (PM)	100
Perry	6/17/70 (PM)	100
Petrophko	6/17/70 (PM)	100
Hallowel	6/18/70 (PM)	100
Hysaw	6/18/70 (PM)	100
Keyser	6/19/70 (PM)	200
Sandoval	6/19/70 (PM)	100
Perry	6/19/70 (PM)	200
Harwood	6/19/70 (PM)	100
Hollowell	6/22/70 (AM)	100

a. Positive Nose Swipes (Continued)

Name	Date	Total dpm Both Nostrils
Cridlebaugh	6/22/70 (AM)	100
Harwood	6/22/70 (AM)	100
Sandoval	6/22/70 (PM)	100
Hysaw	6/23/70 (PM)	100
Cridlebaugh	6/29/70 (PM)	300
Hollowell	7/7/70 (AM)	100
Cridlebaugh	7/7/70 (AM)	100
Craig	7/7/70 (PM)	100
Libby	7/7/70 (PM)	100
Sandoval	7/10/70 (AM)	100
Sandoval	7/10/70 (PM)	100
Harwood	7/10/70 (PM)	100
Keyser	7/13/70 (AM)	100
Craig	7/13/70 (AM)	100
Craig	7/13/70 (PM)	100
Sandoval	7/13/70 (PM)	200
Harwood	7/13/70 (PM)	100
Libby	7/14/70 (AM)	100
Sandoval	7/14/70 (AM)	100
Petrochko	7/14/70 (AM)	100
Mericle	7/14/70 (AM)	100
Craig	7/28/70 (AM)	200
Libby	7/28/70 (AM)	200
Harwood	7/28/70 (AM)	100
White	7/28/70 (AM)	200
Hollowell	7/28/70 (PM)	100

a. Positive Nose Swipes (Continued)

Name	Date	Total dpm Both Nostrils
Keyser	7/29/70 (AM)	100
Craig	7/29/70 (AM)	200
Hysaw	7/29/70 (AM)	100
Keyser	8/11/70 (AM)	100
Keyser	8/15/70 (AM)	200

b. Urine Sample Results (24-hour sample)

	Name	Date	dpm/Sample ^{235}U
	R. Sandoval	6/20/70	0.00±0.05 dpm
	R. Cridlebaugh	7/4/70	0.00± 0.03 dpm
	H. Keyser	7/4/70	0.00±0.03 dpm
	W. Hollowell	7/4/70	0.00±0.03 dpm
	J. Craig	7/4/70	0.06±0.03 dpm
	J. Hysaw	7/4/70	0.00±0.03 dpm
	G. Libby	7/4/70	0.00±0.03 dpm
	R. Sandoval	7/4/70	0.00±0.03 dpm
	H. Perry	7/4/70	0.00±0.03 dpm
	W. Harwood	7/4/70	0.00±0.03 dpm
	R. Petrochko	7/4/70	0.00±0.03 dpm
	D. Mericle	7/4/70	0.00±0.03 dpm
* (Eberline)	D. Mericle	7/28/70	2.9±0.7 dpm
* (Eberline)	F. White	7/28/70	10±2 dpm
	W. Harwood	7/30/70	0.00±0.05 dpm

Results of Occupational Radiation Exposure Report

Film Badge No.	Participant's Name	Radiation Exposure Period June 8-Sept. 2, 1970 (MREM) Beta Gamma Neutron
00055	H. W. Keyser	.00
00056	W. Hollowell	.00
00057	J. Craig	.00
00058	J. Hysaw	.00
00059	G. Libby	.00
00061	B. Sandoval	.00
00062	H. Perry	.00
00063	R. Cridlebaugh	.00
00064	W. Harwood	.00
854014	E. M. Chenault	.00

Question No. 7 - Describe Purpose for Which Byproduct Material Will Be Used.

E. Includes:

1. Fission products present as impurity in Sr^{90}-Yt^{90} when received.

2. Fission products up to 100 millicuries used to develop methods for separation of Cu-242 from Am-241 and fission products.

3. Irradiated semi-conductors and semi-conductor components. To investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.

24501

9. Experience with Rad ion (Actual use of radioiso. es or equivalent experience)

	Isotope	Maximum Amount	Where Experience Was Gained	Duration of Experience	Type
A.	C^{14}	Curie Quant.	Brookhaven Nat'l. Lab.	1 yr.	Research
B.	I^{131}		" "	3 yrs.	Research & process dev.
C.	Ce; R.E. Xe, Po	Several Curies	" "	4 yrs. 4 yrs. 2 yrs.	Analysis of solutions from LMFR

EXPERIENCE WITH RADIATION:

Work was done on a small research project to determine maximum concentration of titanium formed in fission. A procedure was developed for decontamination of titanium from other fission products and the investigation was successfully concluded. Several curies of mixed fission products were involved.

A. A one year research program on isotopic exchange between Co_2 of the atmosphere and C^{14} from $BuCO_3$ was also successfully undertaken using tracer quantities.

B. A great deal of work was done with iodine 131 during the development of a device for "milking" I^{131} from Te^{131} for cancer research. This program later changed to Te^{132}. A device was developed and a patent applied for. This device enables a user of short lived I^{132} to have this material constantly available by milking a chromotographic column on which is embedded Te^{132}.

C. With the advent of the LMFR research program at Brookhaven, extensive analytical work was done on corrosion samples from the radiation loop, analyzing for such elements as radioactive iodine, tellurium, cerium, cesium, ruthenium, strontium, rare earths and Xenon. A procedure was developed for the separation of Xenon from metal samples and analysis of it s quantity. This work later was extended to samples from reactor irradiated bismuth which contained much polonium. Separation procedures were developed for removing polonium from all samples and also for removing bismuth from samples in which bismuth interferred. Uranium was also separated and analyzed for. Total activity per sample was almost 1 curie.

In addition to the above experience Mr. Samos has conducted the work in the Radioisotope Laboratory of The Martin Company under the direction of Mr. H. O. Banks since January 1959.

SUPPLEMENTAL SHEET NO. 2

24901

Question No. 10 - Radiation Detection Instruments

Type of Instrument	No. Avail.	Radiation Detected	Sensitivity Range	Window Thickness	Use
GM Survey, Nuclear Chicago Md 2612	6	Beta, gamma	0-60,000 c/m 0-20 mr/hr	35 mg/cm^2	Monitoring Surveying
Gas Flow Proportional Counter NMC Md PC-1A	2	Alpha, Beta-gamma	0.5-1,000,000 d/m; 100-1,000,000 d/m	gas chamber	Measuring
Gas Proportional Alpha Counter Eberline Instr. PAC-36	2	Alpha	0-100,000 c/m	0.85 mg/cm^2	Monitoring Surveying
Alpha Scintillation NRD Md-CS-5 + Md S5-A Basic Scintillation Unit	1	Alpha	-	-	Measuring
Alpha, Beta, Gamma Air Particulate Monitor NMC Model AM 33	1	Alpha Beta Gamma	10^{-12} uc/cc Alpha or Beta Gamma	gas prop. detector	Monitoring measuring

Question No. 11 - Method, Frequency, and Standards Used In Calibrating Instruments Listed Above (Question 10)

Calibration of Health Physics survey instruments is performed in the Calibration Facility located in the Waste Storage Room outside the Nuclear Manufacturing and Engineering Laboratories at Plant No. 1. Each instrument is calibrated once a month. Repaired instruments are calibrated when they are returned to Health Physics.

The sources are located in one corner of the Waste Room behind a four foot high, eight-inch thick, cement block wall. A one curie Co-60 source contained in a lead-steel shielded container is used for calibrating "Cutie-Pie" and similar type instruments.

The source is calibrated so that at given distances the dose rate in mr/hr is known. The instrument can be remotely placed at a given distance from the source and calibrated to read the field of radiation at that distance. Where possible, each instrument is calibrated on each scale or range setting.

Smaller Sources include an eight millicurie Co-60 source and a one millicurie Ra-226 source. These are also stored behind the shielding wall and used to calibrate low range (up to 20 mr/hr) instruments.

Neutron survey instruments are calibrated by using a five curie Po-Be neutron source of known flux (determined by foil activation) and setting the instrument to read the correct level.

Counting room instruments are calibrated by using standard calibrated sources of uranium alpha and beta-gamma. The first step is construction of a "plateau" to determine correct operating voltages. The counter efficiency is then determined by comparing the counter countrate with that of the standard source.

The NMC Model AM 33 Alpha-Beta-Gamma Air Particulate Monitor is calibrated by placing a source of known disintegration rate in view of the detector. The source used is the isotope in process at that time. The monitor is calibrated according to the disintegration rate and air flow necessary to match the calibration source.

The Eberline PAC-3G Gas Proportional Alpha Counter is calibrated by placing alpha sources of known disintegration rate in front of the probe face. Check sources and counting plateaus are provided for high voltage adjustments which are necessary with altitude changes.

24901

Question No. 12 - Film Badges, Dosimeters, and Bio-Assay Procedures Used.

A. General:

All personnel working with radioactive materials permanently or temporarily, are required to wear a film badge and two pocket chambers sensitive to beta-gamma radiation.

Personnel working in areas where fast and/or thermal neutron radiation is prevalent are required to wear a film badge sensitive to beta, gamma and fast neutrons and pocket chambers sensitive to thermal neutrons.

Film badges are changed either weekly, biweekly, or each 13 weeks depending upon the radiation levels in the work areas. Pocket chambers are changed and read daily. Self-reading dosimeters are also available and used under the discretion of Health Physics.

A film badge service is contracted on a yearly basis to supply and process film and badges for the program. The present supplier is Health Physics Services, Baltimore, Maryland

B. Dosimetry Information:

Special film badge changes are made by Health Physics when any of the following conditions exist:

(1) Both pocket chambers off scale.

(2) Exposure in excess of 100 mr/wk is recorded from daily pocket chamber readings.

(3) Inexplicable exposure in excess of 50 mr per day is recorded.

Permanent records are maintained of all film badge and pocket chamber results.

The upper limit of dosimetry response is as follows:

FILM BADGES	UPPER LIMIT (rem)
Gamma	1000
Beta	500
Neutrons	100
POCKET CHAMBERS	
Gamma	200 mr
Neutrons	200 mrem

(Question No. 12 - Cont'd.)

C. Bioassay

All facility personnel are required to submit bioassay samples at periodic intervals. In the case of unusual incidents, including exposure to airborne concentrations of radioactive materials exceeding the maximum permissible concentrations for personnel without respiratory protection, or other suspected ingestion of radioactive material, special samples are collected from all personnel involved.

All urinalysis results are filed as permanent records in the Health Physics office and are available to responsible persons upon request.

24301

Question No. 14 - Radiation Protection Program

A. Health Physics Responsibilities:

1. Plans and administers the radiation protection program to provide adequate protection to Company and to personnel from ionizing radiation.

2. The inspection and monitoring, with the aid of various detection instruments, of personnel, machinery, furniture, ventilating equipment, gamma and neutron irradiation test facilities, radioisotopic laboratories, etc., to detect and prevent spread of radioactivity, measure levels of radiation or concentrations of radioactive materials present.

3. The review and approval of all working areas and facilities.

4. The evaluation of radiation hazard control methods for adequacy and compliance with recommendations of the National Committee on Radiation Hazards and pertinent government regulations.

5. The promotion of the Health Physics program through the proper indoctrination and training of personnel engaged in handling or working with materials or equipment that emit ionizing radiation.

6. Determines radiation monitoring equipment requirements in all areas.

7. The internal control and enforcement of licensing regulations pertaining to receiving, possession, use, transfer and disposal of nuclear source, special nuclear, or by-product materials.

8. The investigation of accidents and personnel radiation exposures to determine the cause and recommend corrective action to be taken to eliminate future occurrences.

9. The continual monitoring of personnel engaged in handling or working with radioactive materials and x-ray equipment for compliance with recommended procedures and regulations of good housekeeping and work habits.

10. The issuance of appropriate personnel monitoring devices (film badges, pocket chambers, etc.), scheduling of pre-exposure and follow-up physical examination, and the establishment and maintenance of detailed employee records of cumulative doses of radiation exposure, biological assays, laboratory reports, etc., to form the basis of permanent Company records and to conform to Atomic Energy Commission regulations.

11. The conducting of laboratory tests of environmental sample analyses and biological assays to determine the quantity of radioactivity discharged to the environs and the quantity received by the individual through inhalation, ingestion, wounds, etc.

24901

Question 14 - Cont'd.

12. Collaborates with representatives of the various divisions and departments concerned on reactor site surveys, design of facilities, power reactors and associated control systems for hazard evaluation and control to assure protection of personnel and facilities.

13. Maintains liaison with representatives of the Atomic Energy Commission, National Committee on Radiation Hazards, Federal, State and Local government health and welfare agencies, and various divisions and departments, to resolve areas of common health physics interest.

14. Prepares and revises as necessary Health Physics bulletins outlining procedures to be followed to assure compliance with all pertinent National Committee or radiation hazards recommendations and government regulations.

15. The calibration of all Health Physics monitoring instruments where radiation sources must be used to perform the calibration.

B. Leak Testing

Leak tests are performed on all sealed sources when they are received and at least once every three months thereafter. The source, or source shield, depending upon the strength of the source, is wiped with a filter paper disc. The disc is then counted in the proper radiation counter to detect and measure any leakage of alpha or beta-gamma contamination.

Radium sources are leak tested by wrapping the source in cotton for approximately three days, removing the cotton and counting it with a beta-gamma detector.

Leak tests are performed by Health Physics techniciane who have had three years of on-the-job Health Physics training with The Martin Company.

Maintenance, service and repairs to all sources are performed by the source supplier.

C. See also supplementary report MND 2109.

24901

Question No. 15 - Waste Disposal

Solid waste is currently stored in 55 gallon steel drums awaiting disposal through an AEC approved, licensed waste disposal service. A record is maintained by Health Physics concerning the contents, radiation and number of each drum.

Liquid waste is monitored to assure that the levels of radioactivity are below the tolerances established in Title 10, Part 20 Code of Federal Regulations for disposal into sanitary sewers. All liquid waste with activity above those levels is evaporated and concentrated for eventual solid waste disposal through AEC approved and licensed waste disposal services.

24901

Question No. 13 - Facilities and Equipment

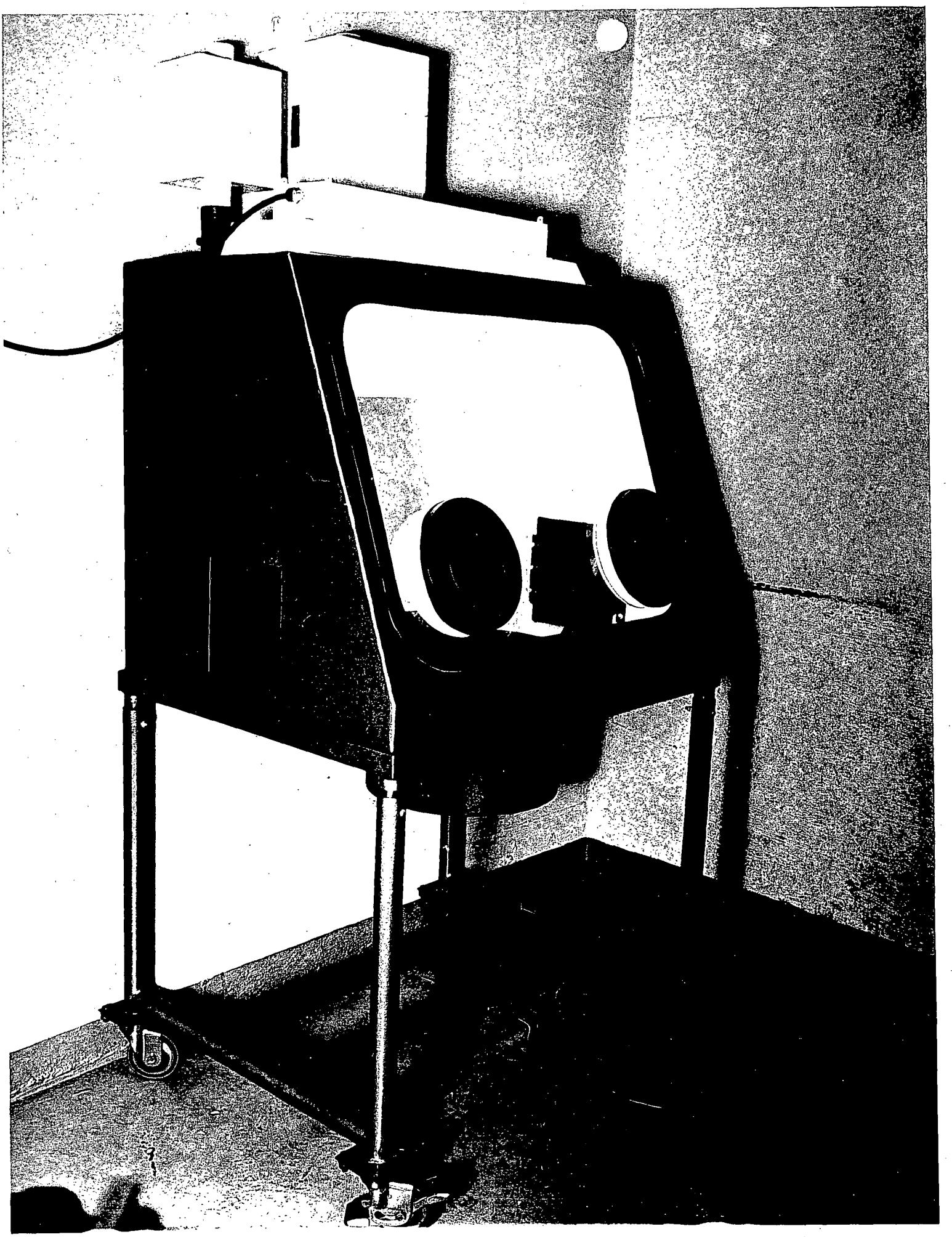
The Radioisotopes Laboratory consists of 3 sections - a small office area, a general lab for doing cold chemistry and tracer level chemistry, and a large room 22 ft. square which is being set up as a warm chemistry lab.

The general lab has a main lab bench, several tables, counting equipment and a hood. The air flow through the hood, with the door half way down is 100 l.f.m. An absolute type filter is in the line to absorb all particulate matter. The interior of the hood is of stainless steel, top, sides and bottom. Work involving use of trace quantities of isotopes is done in the hood. The floor of the hood is covered with "kimpak", an absorbent paper, and this is covered with polyethylene sheeting to facilitate decontamination, if a spill should occur. Liquid radioactive waste is kept in a 5 gallon polyethylene bottle. Metal pails with polyethylene bag liners are used for solid waste. A bench monitor is used to survey glassware, hands and clothing for β contamination. Portable gas flow proportional counters will be used for γ monitoring.

The large area, a room approximately 22' X 22' is currently being prepared for alpha chemistry work. The room has 2 foot thick concrete walls. A fiber glass polyester resin floor has been laid over the existing concrete floor to facilitate decontamination should a spill occur. A 6" thick steel door, on rollers, is located in the outside wall of the room to enable large pieces of equipment to be brought into the room. This room has been used for gamma radiography and the heavy steel door served as a radiation shield. The doorway will be altered so that two regular doors can be installed. The steel door will then be left normally open unless the radiation level will be such as to make closing necessary.

Americium, curium and plutonium chemistry will be done in glove type dry boxes. Each box is 27" deep, 26" long and 30" high with sloping safety glass fronts incorporating 8" fiberglass gloves. The box will be made of plastic sandwich honeycomb with coved corners, 1/8" thick stainless steel floor, and safety plate glass mounted in interlock rubber retainer. Filters are two replaceable Pf 105 inlet and one combination pre-filter Cambridge absolute type filter rated for 50 cfm, at 1" H_2O. A fluorescent light fixture and four liquid line fittings are also provided. All plastic materials are fire and chemical resistant. The box has 7" X 8" access ports at each end of the box which open inward and lock shut against neoprene gaskets to seal the chamber.

24301



U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICE SE
Supplementary Sheet

License Number 19-01398-3

Amendment No. 03

pes, Incorporated
ar Systems Division
Box 4937
rn Boulevard at Martin
ulevard, N. E.
e River, Maryland 21220

cordance with letter dated February 3, 1969, License Number
398-32 is hereby terminated, effective on the date below.

For the U. S. Atomic Energy Commission
Original Signed by
Robert E. Erickson
by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

MAR 2 0 1969

:74A

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICI 3E
Supplementary Sheet

License Number 19-01398-32

Amendment No. 02

es, Incorporated
r Systems Division
Box 4937
n Boulevard at Martin
levard, N. E.
River, Maryland 21220

ordance with letter dated August 6, 1968, License Number
98-32 is amended as follows:

1. and 2. are amended to read:

topes, Incorporated
lear Systems Division

O. Box 4937
tern Boulevard at Martin
Boulevard, N. E.
dle River, Maryland 21220

For the U. S. Atomic Energy Commission

SEP 4 1968

by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

74A

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICE. E
Supplementary Sheet

License Number 19-01398-32

Amendment No. 01

-Marietta Corporation
r Division
ore, Maryland 21203

ordance with letter dated November 30, 1966, signed by C. W. Keller,
e Number 19-01398-32 is amended as follows:

piration date in Item 4 is changed to December 31, 1968.

DEC 7 1966

For the U. S. Atomic Energy Commission
Original Signed By
Robert E. Brinkman
by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LIC. SE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name: Martin-Marietta Corporation, Nuclear Division	3. License number: 19-1398-32 (166)
2. Address: Baltimore 3, Maryland	4. Expiration date: December 31, 1966
	5. Reference No.: 19-1398-14

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Strontium 90-Yttrium 90	A. Any	A. 100 curies
B. Cesium 137	B. Any	B. 1 curie
C. Americium 241 (see page 2)	C. Any	C. 25 millicuries

9. Authorized use

A. To be used to develop methods of purification and to test corrosion of fuel form compounds
B. and F. To be used to investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.
C., D. and E. To be used to develop methods for separation of Curium 242 from Americium 241 and fission products. (see page two)

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above:

11. Byproduct material may only be used at Martin-Marietta Corporation, Middle River Plant, Middle River, Maryland.

12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation".

13. Byproduct material shall be used by, or under the supervision of, George Samos, James C Neace, or John H. Gray.

14. A. Each sealed source acquired from another person and containing byproduct material with a half-life greater than thirty days and in any form other than gas, shall be tested for contamination and/or leakage prior to use. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.
(see page two)

MATERIAL LICENSE

Supplementary Sheet

Continued From Page 1

License Number 19-1398-32
(166)

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
D. Curium 242	D. Any	D. 20 millicuries
E. Any byproduct material between Atom Nos. 3 & 83, inclusive	E. Irradiated semiconductors, semiconductor components and/or mixed fission products	E. 20 curies
F. Promethium 147	F. Any	F. 65 curies
G. Europium 152	G. Any	G. 3 millicuries
H. Europium 154	H. Any	H. 3 millicuries
I. Any byproduct material having Atomic Nos. between 3 & 83, inclusive	I. Any	I. 25 millicuries

9. Authorized Use (Continued)

G. and H. To be used in development of chemical processes for purification of rare earths.
I. Transportation of material between facilities of the licensee at Middle River, Maryland and the University of Maryland for the measurement of tracer amounts of radioisotopes in irradiated material.

Condition 14 continued:

B. Each sealed source fabricated by the licensee shall be tested for contamination and/or leakage immediately after fabrication. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall repair and/or decontaminate and retest the source. Sealed sources fabricated for distribution and containing byproduct material (with the exception of solid metallic Iridium 192, byproduct material with a half-life not exceeding thirty days, and byproduct material in the form of gas) shall, in addition to an initial test upon fabrication, be stored for a period of seven days and retested prior to being distributed.

C. Each sealed source containing byproduct material with a half-life greater than thirty days and in any form other than gas, shall be tested for leakage and/or contamination at intervals not to exceed six months, except that sources designed as an alpha emitting source shall be tested at intervals not exceeding three months

(... next page)

Item 14 continued:

The test shall be capable of detecting the presence of 0.005 microcurie of removable contamination on the test sample. The test sample shall be taken from the sealed source or from the appropriate accessible surfaces of the device in which the sealed source is permanently or semipermanently mounted or stored. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

If the test required in A or C above reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within five days of the test with the Director Division of Materials Licensing, U. S Atomic Energy Commission, Washington, D. C., 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such report shall be sent to the Director, Region I, Division of Compliance, USAEC, 376 Hudson Street, New York, New York, 10014.

Except as provided otherwise by this license, the licensee shall possess and use byproduct material described in Items 6, 7 and 8 of this license in accordance with statements, representations, and procedures contained in the application for license, amendments thereto if any, submitted by the licensee's predecessor, the Martin Company; application from the Martin Marietta Corporation dated September 28, 1962; letter from the Martin Company dated October 10, 1961; letter from Martin Marietta Corporation dated October 17, 1961; letter from Richard H. Boutelle dated May 3, 1962; letter from C W Keller dated November 25 1964.

DEC 9 1964

For the U. S. Atomic Energy Commission
Original Signed by
Robert E. Brinkman
Isotopes Branch
by Division of Materials Licensing
Washington 25, D. C.

74A

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 19-1398-14 (J64)

Amendment Number 11

Martin-Marietta Corporation
Nuclear Division
Baltimore 3, Maryland

Attention: George Semos
James C. Reece
John H. Gray

In accordance with letter dated March 26, 1963, and signed by Richard H. Boutelle, Condition 13 of License No. 19-1398-14 is amended to read as follows:

13. Byproduct material shall be used by, or under the supervision of, George Semos, James C. Reece, or John H. Gray.

For the U. S. Atomic Energy Commission

by Original Signed by Robert E. Brinkman
Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

B

U. S. ATOMIC ENERGY COMMISSION

MATERIAL LICENSE

Supplementary Sheet

~~From Page xxx~~

License Number 19-1393-14 (J64)

Amendment No. 10

~~xxxx

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION

BYPRODUCT MATERIAL LICENSE

NO. 19-1398-14 AMENDMENT NO. 8
(J62)

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name: Martin - Marietta Corporation Isotopic Power Development	3. License number: 19-1398-14 is amended in its entirety to read as follows:
2. Address: Department of Nuclear Division Baltimore 3, Maryland	4. Expiration date: October 31, 1962
	5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may posses at any one time
A. Strontium 90-Yttrium 90	A. Any	A. 100 curies
B. Cesium 137	B. Any	B. 1 curie
(See Page 2)		

9. Authorized use

A. To be used to develop methods of purification and to test corrosion of fuel form compounds.

B. and F. To be used to investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.

(See Page 2)

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

11. Byproduct material may only be used at Martin-Marietta Corporation, Middle River Plant, Middle River, Maryland.

12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards For Protection Against Radiation".

13. Byproduct material shall be used by, or under the direct personal supervision of, George Sanso, Edward Fowler or Arnold Abries.

14. A. Each sealed source acquired from another person and containing byproduct material with a half-life greater than thirty days and in any form other than gas, shall be tested for contamination and/or leakage prior to use. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested.

(See Page 2)

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
C. Americium 241	C. Any	C. 25 millicuries
D. Curium 242	D. Any	D. 20 millicuries
E. Any byproduct material between Atomic Nos. 3 and 83, inclusive	E. Irradiated semiconductors, semiconductor components and/or mixed fission products	E. 20 curies
F. Promethium 147	F. Any	F. 65 curies
G. Europium 152	G. Any	G. 3 millicuries
H. Europium 154	H. Any	H. 3 millicuries

9. Authorized use

C., D. and E. To be used to develop methods for separation of Curium 242 from Americium 241 and fission products.

G. and H. To be used in development of chemical processes for purification of rare earths.

CONDITIONS

14. B. Each sealed source fabricated by the licensee shall be tested for contamination and/or leakage immediately after fabrication. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall repair and/or decontaminate and retest the source. Sealed sources fabricated for distribution and containing byproduct material (with the exception of solid metallic Iridium 192, byproduct material with a half-life not exceeding thirty days, and byproduct material in the form of gas) shall, in addition to an initial test upon fabrication, be stored for a period of seven days and retested prior to being distributed.

C. Each sealed source containing byproduct material with a half-life greater than thirty days and in any form other than gas, shall be tested for leakage and/or contamination at intervals not to exceed six months, except that sources designed as an alpha emitting source shall be tested at intervals not exceeding three months.

(See Page 3)

d From Page 2

CONDITIONS

Each sealed source containing byproduct material with a half-life greater than thirty days and in any form other than gas, shall be tested for leakage and/or contamination at intervals not to exceed six months, except that sources designed as an alpha emitting source shall be tested at intervals not exceeding three months.

The test shall be capable of detecting the presence of 0.005 microcurie of removable contamination on the test sample. The test sample shall be taken from the sealed source or from appropriate accessible surfaces of the device in which the sealed source is permanently or semipermanently mounted or stored. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

If the test required in A or C above reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within five days of the test with the Director, Division of Licensing and Regulation, U. S. Atomic Energy Commission, Washington 25, D. C., describing the equipment involved, the test results and the corrective action taken. A copy of such report shall be sent to the manager of the nearest AEC operations office listed in Appendix D of Title 10, Code of Federal Regulations, Part 20.

ept as provided otherwise by this license, the licensee shall possess and use roduct material described in Items 4, 7 and 8 of this license in accordance h statements, representations and procedures contained in the application for ense, and amendments thereto if any, submitted by the licensee's predecessor, Martin Company, letter from the Martin Company dated October 10, 1961 and ter from Martin-Marietta Corporation dated October 17, 1961.

For the U. S. Atomic Energy Commission

by Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

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U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

Page 1 of 1 Pages

License Number [illegible]
(J82)

[illegible] 7

[illegible]
[illegible] development
[illegible] of Nuclear Division
[illegible]

[illegible] George [illegible]
[illegible]
[illegible]

[illegible] application dated December [illegible], [illegible], License No. 19-[illegible]-[illegible] is [illegible]

[illegible] material [illegible]	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
[illegible]	[illegible]	[illegible] 3 millicuries
[illegible]	[illegible]	[illegible] 3 millicuries

[illegible] use

[illegible] be used in development of chemical processes for purification of rare earths.

For the U. S. Atomic Energy Commission

Original Signed By
James R. Mason

by [illegible]
Division of Licensing and Regulation
Washington 25, D. C.

FORM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION

BYPRODUCT MATERIAL LICENSE NO. 19-1393-14, AMENDMENT (362) NO. 6

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name: The Martin Company Isotopic Power Development	3. License number: In accordance with application dated September 27, 196 19-1393-14 is amended in its entirety to read as follows:
2. Address: Department of Nuclear Division Baltimore 3, Maryland	4. Expiration date: October 31, 1962
	5. Reference No.

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may posses at any one time
A. Strontium 90 - Yttrium 90	A. Any	A. 155 curies
B. Cesium 137 (See Page 2)	B. Any (See Page 2)	B. 1 curie (See Page 2)

9. Authorized use

A. To be used to develop methods of purification and to test corrosion of fuel form compounds.

(See Page 2)

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

11. Byproduct material may only be used at Martin Plant, Middle River, Maryland.

12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation."

13. Byproduct material shall be used by, or under the direct supervision of, George Semos, Edward Fowler or Arnold Airing.

14. A Each sealed source, acquired from another person, containing byproduct material with a half-life greater than thirty (30) days and in any form other than gas, shall be tested for leakage and/or contamination. The test shall be performed on the sealed source surface, or on the accessible surfaces of the device in which such a source is permanently or semi-permanently mounted. The test shall be performed upon receipt from another person, unless the licensee receives certification from the person making the transfer that the sealed source had been tested within thirty (30) days prior to transfer and found free of any removable radioactive material. (See Page 2)

CONTINUED:

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
C. Americium 241	C. Any	C. 25 millicuries
D. Curium 242	D. Any	D. 20 millicuries
E. Any byproduct material between Atomic Nos. 3 and 83, inclusive	E. Irradiated semiconductors, semiconductor components and/or mixed fission products	E. 20 curies
F. Promethium 147	F. Any	F. 63 curies

9. Authorized use

B and F. To be used to investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.

C, D and E. To be used to develop methods for separation of Curium 242 from Americium 241 and fission products.

CONDITIONS

14. continued

B Each sealed source containing byproduct material which is fabricated by the licensee shall be tested for leakage and/or contamination immediately after fabrication. If the test reveals any removable radioactive material, the licensee shall repair and/or decontaminate and retest the source prior to placing it in use.

C Following completion of the test prescribed in A or B, each sealed source containing byproduct material with a half-life greater than thirty (30) days and in any form other than gas, except sources designed as alpha emitting sources, shall be tested for leakage and/or contamination at intervals not to exceed six (6) months. Each sealed source which is designed as an alpha emitting source shall be tested at intervals not to exceed three (3) months.

(See Page 3)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

Supplementary Sheet

License Number 19-1393-14 (302)

AMENDMENT NO. 6

D:

CONDITIONS

ntinued

The test performed pursuant to A, B, or C shall be sufficiently sensitive to detect 0.05 microcurie of removable beta and/or gamma emitting radioactive material and 0.005 microcurie of removable alpha emitting radioactive material. Records of leak test results shall be maintained by the licensee.

If the test performed pursuant to A or C reveals removable radioactive material, the licensee shall take immediate action to prevent spread of contamination and shall notify the Isotopes Branch, Division of Licensing and Regulation, U. S. Atomic Energy Commission, Washington 25, D. C. within thirty (30) days after completion of the test.

cept as provided otherwise by this license, the licensee shall possess and byproduct material described in Items 6, 7 and 8 of this license in ordance with statements, representations, and procedures contained in his lications dated February 5, 1959, March 11, 1960 and September 27, 1960.

suant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, pter 1, Part 70, "Special Nuclear Material Regulations," you are further ensed to receive, possess and use special nuclear material resulting from the ay of Americium 241 and Curium 242. This license shall be deemed to contain conditions specified in Section 70.32 (a) of said regulations.

For the U. S. Atomic Energy Commission

James R. Kuser,
by Chief, Isotopes Branch

Division of Licensing and Regulation
Washington 25, D. C.

OCT - 1960

4A

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 19-1398-14 (J60)

AMENDMENT NO. 2

in Company
Power Development
ent of Nuclear Division
e 3, Maryland

e: Hampden O. Banks, Jr.

dance with application dated February 5, 1959, License No. 19-1398-14 is
mended to add:

oduct material ment and mass er)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
ntium-90	B. Any	B. 100 curies

orized use

etermine methods of purifying Strontium-90 and to investigate the icability of Strontium-90 for use in the development of battery ers, transmission oil heaters, and other military low level ications.

CONDITIONS

licensee shall possess and use byproduct material described in Items 6, 7 8 of this license in accordance with statements, representations, and pro- ures contained in his application dated February 5, 1959, except that where h statements, representations and procedures conflict with provisions of this ense, the license provisions shall take precedence.

For the U. S. Atomic Energy Commission

February 18, 1959

by Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

4A

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICE .E
Supplementary Sheet

License Number 19-1398-14 (J60)

AMENDMENT NO. 2

In Company
Power Development
ent of Nuclear Division
e 3, Maryland

n: Hampden C. Banks, Jr.

dance with application dated February 5, 1959, License No. 19-1398-14 is
ended to add:

oduct material ment and mass er)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
ntium-90	B. Any	B. 100 curies

prized use

etermine methods of purifying Strontium-90 and to investigate the
sibility of Strontium-90 for use in the development of battery
ers, transmission oil heaters, and other military low level
ications.

CONDITIONS

licensee shall possess and use byproduct material described in Items 6, 7
8 of this license in accordance with statements, representations, and pro-
ures contained in his application dated February 5, 1959, except that where
statements, representations and procedures conflict with provisions of this
nse, the license provisions shall take precedence.

For the U. S. Atomic Energy Commission

February 18, 1959

Chief, Isotopes Branch

by

Division of Licensing and Regulation
Washington 25, D. C.

4A

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICE[illegible]

Supplementary Sheet

License Number 19-1398-1h
(J60)

AMENDMENT NO. 1

[illegible]artin Company
[illegible]opic Power Development
[illegible]rtment of Nuclear Division
[illegible]more 3, Maryland

[illegible]tion: Hampden D. Banks, Jr.

[illegible]ccordance with letter dated November 10, 1958, License No. 19-1398-1h is amended [illegible]nge Item 9A to read as follows:

[illegible]thorized use

, Corrosion, stability, and similar laboratory studies to determine the integrity of cermets (containing Strontium 90) as a source of heat and power.

For the U. S. Atomic Energy Commission
[illegible] Signed By
[illegible]. Mason

November 20, 1958

by Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

'4A

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICE. E
Supplementary Sheet

License Number 19-1398-14
(J60)

AMENDMENT NO. 1

Martin Company
opic Power Development
artment of Nuclear Division
imore 3, Maryland

ntion: Hampden O. Banks, Jr.

ccordance with letter dated November 10, 1958, License No. 19-1398-14 is amended
hange Item 9A to read as follows:

---

uthorized use

, Corrosion, stability, and similar laboratory studies to determine the integrity of cermets (containing Strontium 90) as a source of heat and power.

For the U. S. Atomic Energy Commission

Signed by
James R. Mason

November 20, 1958

by Chief, Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICE E

ant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, f Byproduct Material, and in reliance on statements and representations heretofore made by the icense is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and im- luct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Com- r or hereafter in effect and to any conditions specified below.

Licensee	
The Martin Company Isotopic Power Development Department of Nuclear Division Baltimore 3, Maryland	3. License number 19-1398-1L (J60) 4. Expiration date October 31, 1960 5. Reference No.

ct material and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may posses at any one time
ntium 90	A. Any	A. 100 millicuries

ed use

sion, stability, and similar laboratory studies to determine the integrity of nts (containing Strontium 90) as a source of heat and power.

CONDITIONS

otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

luct material may only be used at Martin Plant, Middle River, Maryland.

icensee shall comply with the provisions of Title 10, Part 20, Code of Federal ations, Chapter 1, "Standards for Protection Against Radiation".

luct materials shall be used by, or under the direct supervision of, Hampden C. , Jr.

For the U. S. Atomic Energy Commission

October 31, 1958

by Original Signed By [illegible] Chief, Isotopes Branch

Division of Licensing and Regulation
Washington 25, D. C.

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENS
Supplementary Sheet

License Number 19-01398-3

Amendment No. 03

pes, Incorporated
ar Systems Division
Box 4937
rn Boulevard at Martin
ulevard, N. E.
e River, Maryland 21220

cordance with letter dated February 3, 1969, License Number
398-32 is hereby terminated, effective on the date below.

For the U. S. Atomic Energy Com[redacted]on
Original Signed by
Robert E. Brinkman
by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

MAR 2 0 1969

R E B

RJC cook

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U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 19-01398-32

Amendment No. 02

is, Incorporated
: Systems Division
)ox 4937
1 Boulevard at Martin
levard, N. E.
River, Maryland 21220

)rdance with letter dated August 6, 1968, License Number
)8-32 is amended as follows:

l. and 2. are amended to read:

:opes, Incorporated
lear Systems Division

). Box 4937
:ern Boulevard at Martin
)oulevard, N. E.
lle River, Maryland 21220

For the U. S. Atomic Energy Commission

:P 4 1968

by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

74A

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE
Supplementary Sheet

License Number 19-01398-32

Amendment No. 01

-Marietta Corporation
r Division
ore, Maryland 21203

ordance with letter dated November 30, 1966, signed by C. W. Keller,
e Number 19-01398-32 is amended as follows:

piration date in Item 4 is changed to December 31, 1968.

DEC 7 1966

For the U. S. Atomic Energy Commission
Original Signed By
Robert E. Brinkman
by Isotopes Branch
Division of Materials Licensing
Washington, D. C. 20545

RM AEC-374
(12-57)

U. S. ATOMIC ENERGY COMMISSION
BYPRODUCT MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 30, Licensing of Byproduct Material, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess, transfer and import byproduct material listed below; and to use such byproduct material for the purpose(s) and at the place(s) designated below. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name	Martin-Marietta Corporation Nuclear Division
2. Address	Baltimore 3, Maryland

3. License number	19-1398-32 (L66)
4. Expiration date	December 31, 1966
5. Reference No.	19-1398-14

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity which licensee may possess at any one time
A. Strontium 90-Yttrium 90	A. Any	A. 100 curies
B. Cesium 137	B. Any	B. 1 curie
C. Americium 241 (see page 2)	C. Any	C. 25 millicuries

9. Authorized use

A. To be used to develop methods of purification and to test corrosion of fuel form compound
B. and F. To be used to investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.
D., D. and E. To be used to develop methods for separation of Curium 242 from Americium 241 and fission products. (see page two)

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above:

11. Byproduct material may only be used at Martin-Marietta Corporation, Middle River Plant, Middle River, Maryland.

12. The licensee shall comply with the provisions of Title 10, Part 20, Code of Federal Regulations, Chapter 1, "Standards for Protection Against Radiation".

13. Byproduct material shall be used by, or under the supervision of, George Samos, James C Neace, or John H. Gray.

14. A. Each sealed source acquired from another person and containing byproduct material with a half-life greater than thirty days and in any form other than gas, shall be tested for contamination and/or leakage prior to use. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source shall not be put into use until tested. (see page two)

Continued From Page 1

License Number 19-1398-32
(L66)

6. Byproduct material (element and mass number)	7. Chemical and/or physical form	8. Maximum amount of radioactivity whic licensee may possess at any one time
D. Curium 242	D. Any	D. 20 millicuries
E. Any byproduct material between Atom Nos. 3 & 83, inclusive	E. Irradiated semiconductors, semiconductor components and/or mixed fission products	E. 20 curies
F. Promethium 147	F. Any	F. 65 curies
G. Europium 152	G. Any	G. 3 millicuries
H. Europium 154	H. Any	H. 3 millicuries
I. Any byproduct material having Atomic Nos. between 3 & 83, inclusive	I. Any	I. 25 millicuries

9. Authorized Use (Continued)

G. and H. To be used in development of chemical processes for purification of rare earths.
I. Transportation of material between facilities of the licensee at Middle River, Maryland and the University of Maryland for the measurement of tracer amounts of radioisotopes in irradiated material.

Condition 14 continued:

B. Each sealed source fabricated by the licensee shall be tested for contamination and/or leakage immediately after fabrication. If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall repair and/or decontaminate and retest the source. Sealed sources fabricated for distribution and containing byproduct material (with the exception of solid metallic Iridium 192, byproduct material with a half-life not exceeding thirty days, and byproduct material in the form of gas) shall, in addition to an initial test upon fabrication, be stored for a period of seven days and retested prior to being distributed.

C. Each sealed source containing byproduct material with a half-life greater than thirty days and in any form other than gas, shall be tested for leakage and/or contamination at intervals not to exceed six months, except that sources designed as an alpha emitting source shall be tested at intervals not exceeding three months

(see page three)

U. S. ATOMIC ENERGY COMMISSION
YPRODUCT MATERIAL LICENS.
Supplementary Sheet

License Number 19-1398-32
(L66)

1 14 continued:

The test shall be capable of detecting the presence of 0.005 microcurie of removabl contamination on the test sample. The test sample shall be taken from the sealed source or from the appropriate accessible surfaces of the device in which the seale source is permanently or semipermanently mounted or stored. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

If the test required in A or C above reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired or to be disposed of in accordance with Commission regulations. A report shall be filed within five days of the test with the Director Division of Materials Licensing, U. S Atomic Energy Commission, Washington, D. C., 20545, describing the equipment involved, the test results, and the corrective action taken. A copy of such repott shall be sent to the Director, Region I, Division of Compliance, USAEC, 376 Hudson Street, New York, New York, 10014.

ept as provided otherwise by this license, the licensee shall possess and use roduct material described in Items 6, 7 and 8 of this license in accordance with tements, representations, and procedures contained in the application for license, amendments thereto if any, submitted by the licensee's predecessor, the Martin pany; application from the Martin Marietta Corporation dated September 28, 1962; ter from the Martin Company dated October 10, 1961; letter from Martin Marietta poration dated October 17, 1961; letter from Richard H. Boutelle dated May 3, 1962; letter from C. W. Keller dated November 25, 1964.

For the U. S. Atomic Energy Commission

Original Signed by
Robert E. Brinkman

by Isotopes Branch
Division of Materials Licensing
Washington 25, D. C.

DEC 9 1964

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REB

ISOTOPES
NUCLEAR SYSTEMS DIVISION

036

February 3, 1969

Refer to: [illegible]
PJK-1210-024

Isotopes Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Attention: Mr. Robert E. Brinkman

Subject: Byproduct Material License
Nos. 19-01398-01 and 19-01398-32

Reference: AEC Correspondence DML:IB:RJD dated 1/7/69

Gentlemen:

We have recently completed a review concerning our need for the subject licenses. As a result of this review, we are requesting the following actions:

(1) Termination of BPML No. 19-01398-32
AEC Form 314 attached.

(2) Renewal and amendment of BPML No. 19-01398-01
AEC Form 313 and Supplemental Data to support our request attached. The supplemental data was prepared to conform with the request contained in referenced correspondence.

This new information is being furnished to support our amended request. Except for those specific references contained herein, it is intended that this information supersede all previous submittals made in connection with BPML No. 19-01398-01.

Sincerely,

Peter J. Knapp
Licensing & Accountability
Representative

PJK/PJK:ns

Enclosures: AEC 314 (3 copies)
AEC 313 (3 copies)
Item 11 (3 copies)
Item 12 (3 copies)
Item 13 (3 copies)
Item 14 (3 copies)

JAN 7 1969

DML:IB:RJD
(06763)
(07139)

Isotopes, Incorporated
Nuclear Systems Division
P. O. Box 4937
Eastern Blvd. at Martin Blvd. N. E.
Middle River, Maryland 21220

Attention: Mr. Peter J. Knapp
Licensing and Accountability
Representative

Gentlemen:

This will confirm your telephone conversation of January 3, 1969, with Mr. Robert J. Dube.

In support of your application for renewal of License Nos. 19-01398-32 and 19-01398-01, please complete items 10 through 15 of Form AEC-313. You should include an updated comprehensive description of the administrative and operational aspects of your radiation safety program. Information previously submitted describing your facilities and equipment may be incorporated in your application by specific reference including date of the letter or application containing the information.

Sincerely,

Original Signed by
Robert E. Brinkman

Robert E. Brinkman
Isotopes Branch
Division of Materials Licensing

bcc: St. Br. Dist.
CO, Region I
DML

OFFICE ▶	DML:IB					
SURNAME ▶	RJDube:eaj					
DATE ▶	1/6/69					

Form AEC-318 (Rev. 9-53) AECM 0240 U.S. GOVERNMENT PRINTING OFFICE : 1968 O—296-617

Form AEC-313 (8-64) 10 CFR 30

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application or an application for renewal of a license. Information contained in previous applications filed with the Commission with respect to Items 8 through 15 may be incorporated by reference provided references are clear and specific. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U.S. Atomic Energy Commission, Washington, D.C., 20545, Attention: Isotopes Branch, Division of Materials Licensing. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30, and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital person, etc. Include ZIP Code.)*

Isotopes, a Teledyne Company
Nuclear Systems Division
P. O. Box 4937
Eastern Blvd. at Martin Blvd. N.E.
Middle River, Maryland 21220

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1(a). Include ZIP Code.)*

Same

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Nuclear Systems Division

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

19-01398-32

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

John H. Gray

5. RADIATION PROTECTION OFFICER. *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Richard Brisson

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*	
A. Strontium 90-Yttrium 90	A. Any	A. 100 curies
B. Cesium 137	B. Any	B. 1 curie
C. Americium 241	C. Any	C. 25 millicuries
D. Curium 242	D. Any	D. 20 millicuries
E. Any byproduct material between Atomic Nos. 3&83 inclusive	E. Irradiated semiconductors semiconductor components and/or mixed fission products	E. 20 curies
F. Promethium 147	F. Any	F. 65 curies
G. Europium 152	G. Any	G. 3 millicuries
H. Europium 154	H. Any	H. 3 millicuries
I. Any byproduct mat'l having Atomic Nos. between 3& 83 Inclusive	I. Any	I. 25 millicuries

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

A. To be used to develop methods of purification and to test corrosion of fuel form compounds

B. and F. To be used to investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electric energy.

C., D. & E. To be used to develop methods for separation of Curium 242 from Americium 241 and fission products.

G. and H. To be used in development of chemical processes for purification of rare earths.

I. Transportation of material between facilities of the licensee at Middle River, Maryland and the University of Maryland for the measurement of tracer amounts of radioisotopes in irradiated material.

06763

(Continued on reverse side)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB *(Circle answer)*	FORMAL COURSE *(Circle answer)*
a. Principles and practices of radiation protection	See last previous application		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		See last previous application		

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS *(Include make and model number of each)*	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE *(mr/hr)*	WINDOW THICKNESS *(mg/cm²)*	USE *(Monitoring, surveying, measuring)*
See last previous application					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

See last previous application

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

See last previous application

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS IN DUPLICATE

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No

See last previous application

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

See last previous application

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.

See last previous application

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date November 21, 1968

Isotopes, A Teledyne Company
Applicant named in item 1

By: P. J. Knapp
Licensing and Accountability Represent.
Title of certifying official

RECEIVED
NOV 25 1968
U.S. ATOMIC ENERGY COMMISSION
Regulatory Mail Section

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948, 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

☆ U.S. GOVERNMENT PRINTING OFFICE : 1964 O—745-382

ISOTOPES
NUCLEAR SYSTEMS DIVISION
EASTERN BLVD AT MARTIN BLVD N. E.
P. O. BOX 4937
MIDDLE RIVER, MARYLAND 21220
(301) 682-5800 TWX (710) 239-9037

A TELEDYNE COMPANY

21 November 1968

Refer to: 00641-11-21-68
PJK:1210-10

Isotopes Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Attention: Mr. Richard E. Cunningham

Subject: Renewal Request, License Number 19-01398-32

Gentlemen:

Isotopes, a Teledyne Company, hereby requests renewal of Byproduct Material License Number 19-01398-32. A completed form AEC-313 is enclosed.

Sincerely yours,

Peter J. Knapp
Licensing and Accountability
Representative

/jt

Enclosure AEC 313 (2 copies)

FOR DIV. OF

06763

SEP 4 1968

DML:IB:REB

Isotopes, Incorporated
Nuclear Systems Division
P. O. Box 4937
Eastern Boulevard at Martin
Boulevard, N. E.
Middle River, Maryland 21220

Attention: Mr. L. P. Crewsns
Assistant Secretary

Gentlemen:

Pursuant to your letter dated August 6, 1968, the byproduct material licenses listed in the enclosed attachment are revised by the enclosed amendments to reflect the change of name from Martin Marietta Corporation to Isotopes, Incoporated.

Sincerely,

Original Signed by
Robert E. Brinkman

Robert E. Brinkman
Isotopes Branch
Division of Materials Licensing

cc: Martin Marietta
Attention: Mr. William H. Alper
Director - Management Operations
Nuclear Division

Enclosures:
1. List of Byproduct Material Licenses
2. License Amendments

bcc: St. Br. Dist.
CO, Region I
DML

DML:IB

REBrinkman:caj
9/3/68

LIST OF PRODUCT MATERIAL LICENSES TRANSFERRED

LICENSE NO.
19-01398-1
19-01398-3
19-01398-9
19-01398-19
19-01398-20
19-01398-21
19-01398-23
19-01398-25
19-01398-31
19-01398-32
19-01398-33
19-01398-34
19-01398-36

614 Reb

ISOTOPES
NUCLEAR SYSTEMS DIVISION
P.O. BOX 4937
EASTERN BLVD. at MARTIN BLVD., N.E.
MIDDLE RIVER, MARYLAND 21220
(301) 682-5800 TWX (710) 230-9937

A TELEDYNE COMPANY

August 6, 1968

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C.

Attention: Mr. John McBride, Director

Subject: Transfer of Byproduct License Responsibility

Reference: (a) Title 10 Code of Federal Regulations, Part 30.34b

Gentlemen:

Effective August 4, 1968, Isotopes, Inc., A Teledyne Company, 50 Van Buren Place, Westwood, New Jersey 07675 assumed responsibility for the Nuclear Division of the Martin Marietta Corporation located in Middle River, Maryland. In compliance with reference (a), Isotopes, Inc. hereby requests the consent of the USAEC for the transfer to Isotopes, Inc. of the Martin Marietta Corporation Byproduct Licenses listed on the attachment to this letter.

Until further notice, Isotopes, Inc. will continue to operate in the same facilities in Middle River, Maryland as the Nuclear Systems Division of Isotopes, Inc.

Isotopes, Inc. affirms that in accepting the transfer of these licenses we adopt the statements, representations, and procedures contained in the applications and correspondence filed by the Martin Marietta Corporation and identified in the licenses and any amendments thereof listed in the attachment to this letter.

Very truly yours,

ISOTOPES, INC.

L. F. Cremona

L. F. Cremona
Assistant Secretary

LFC:ls

Attachment

04724

T02

Control for 19-1398-32

MARTIN MARIETTA CORPORATION

NUCLEAR DIVISION
Baltimore, Maryland
21203

Refer to: 00389-08-02-68

August 2, 1968

U. S. Atomic Energy Commission
Division of Material Licensing
Washington, D. C.

Attention: Mr. John McBride, Director

Subject: Transfer of Byproduct License Responsibility

Reference: (a) Title 10 Code of Federal Regulations Part 30.34b

Gentlemen:

Isotopes, Inc., A Teledyne Company, has acquired the Martin Marietta Corporation Nuclear Division effective August 4, 1968. We are aware that Isotopes, Inc. is in the process of filing an application for the transfer of Byproducts Licenses as enumerated on the attached enclosure, which request will be submitted during the week of August 5, 1968.

The Martin Marietta Corporation consents to the transfer of the above mentioned licenses and joins Isotopes, Inc. in its request for said transfer.

Very truly yours,

MARTIN MARIETTA CORPORATION

William H. Alper
Director - Management Operations
Nuclear Division

WHA:ls

Enclosure

TRANSFER OF BYPRODUCT LICENSES

LICENSE NO.	ISOTOPES
19-01398-1	Po-210, Co-60, H-3
19-01398-3	Co-60
19-01398-9	Co-60, Sr-90, Cs-137, Po-210 Atomic No. 1-64
19-01398-19	Iridium-192, Co-60
19-01398-20	Curium 244, Po-210 Atomic No. 3-83
19-01398-21	Sr-90 Heat Sources
19-01398-23	H-3
19-01398-25	Cs-137
19-01398-31	Sr-90
19-01398-32	Atomic No. 3-83
19-01398-33	Promethium-147
19-01398-34	Sr-90
19-01398-36	H-3

04724

Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved
Budget Bureau No. 38-R027.4

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

The Martin Company
Nuclear Division
Baltimore 3, Md.

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

Middle River Plant
Middle River, Maryland

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Auxilliary Power Systems Department
(Formerly Isotopic Power Development Department

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Amendment to 19-1398-14

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

George Samos
Edward Fowler
Arnold Abross

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Richard H. Boutelle

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

Eu 152-154

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

Any chemical form 3 mc maximum

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

To be used as a tracer in the laboratory development of chemical processes for purification of rare earths.

DUPLICATED
FOR DIV. OF COMPLIANCE

31417

(Continued on reverse side)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	Previously submitted.		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		Previously submitted.		

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS *(Include make and model number of each)*	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE *(mr/hr)*	WINDOW THICKNESS *(mg/cm²)*	USE *(Monitoring, surveying, measuring)*
Previously submitted					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

Previously submitted.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

Previously submitted

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No Previously submitted

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

Previously submitted

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. Previously submitted

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

RECEIVED DEC 29 1960 U.S.A.E.C. Isotopes Branch Div. of L & R

The Martin Company, Nuclear Division
Applicant named in item 1

Date December 22, 1960

By: J. V. Loppert
Licensing Officer
Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948, 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

GPO - 87 407 3

MARTIN COMPANY

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

November 25, 1964

Refer to: ACC-349
Internal Mail 845

U. S. Atomic Energy Commission
Division of Material Licensing
Washington, D. C. 20545

Attention: Mr. Lyall Johnson, Director

Subject: Renewal of Martin Marietta Byproduct Material License No. 19-1398-14

Gentlemen:

In our September 28, 1964 letter, a copy of which is attached, we requested renewal of Martin Marietta byproduct material license No. 19-1398-14. Since a check of AEC records indicates that the letter has not been received by AEC, we have evidently misplaced it here.

Accordingly, we are resubmitting our request for renewal of byproduct license No. 19-1398-14. Procedures which were approved on November 1, 1961 as Amendment No. 8 to byproduct license No. 19-1398-14 and as detailed in subsequently approved amendments number 9, 10 and 11 shall apply.

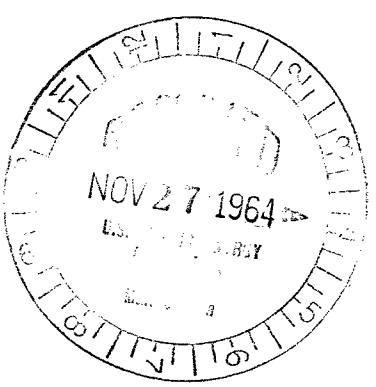
Thank you for your effort in this matter.

Very truly yours,

C W Keller

C. W. Keller, Nuclear
Accountability &
Licensing Representative

CWK/plm



64096

Refer to: ACC-335
Mail No. 845
28 September 1964

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attn: Mr. Lyall Johnson

Subj: Renewal of Martin Marietta Byproduct Material License No. 19-1398-14

Gentlemen:

We request that Martin Marietta byproduct material license no. 19-1398-14 be renewed.

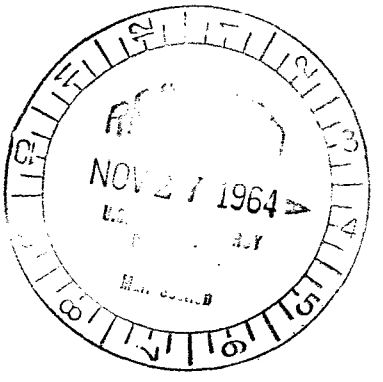
Procedures which were approved on November 1, 1961 as amendment number 8 to byproduct license no. 19-1398-14 and as detailed in subsequently approved amendment numbers 9, 10, and 11 shall apply.

Thank you for your consideration in this matter.

Very truly yours,

C. W. Keller
Nuclear Accountability
and Licensing Representative

CWK:jn



November 25, 1964

Refer to: ACC-349
Internal Mail 845

U. S. Atomic Energy Commission
Division of Material Licensing
Washington, D. C. 20545

Attention: Mr. Lyall Johnson, Director

Subject: Renewal of Martin Marietta Byproduct
Material License No. 19-1398-14

Gentlemen:

In our September 28, 1964 letter, a copy of which is attached, we requested renewal of Martin Marietta byproduct material license No. 19-1398-14. Since a check of AEC records indicates that the letter has not been received by AEC, we have evidently misplaced it here.

Accordingly, we are resubmitting our request for renewal of byproduct license No. 19-1398-14. Procedures which were approved on November 1, 1961 as Amendment No. 8 to byproduct license No. 19-1398-14 and as detailed in subsequently approved amendments number 9, 10 and 11 shall apply.

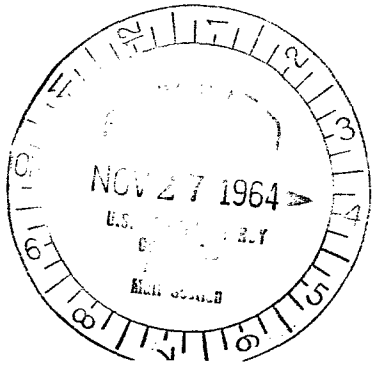
Thank you for your effort in this matter.

Very truly yours,

C. W. Keller

C. W. Keller, Nuclear
Accountability &
Licensing Representative

CWK/pls



[illegible]

[illegible]

[illegible]

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington, D. C. 20545

Attn: Mr. [illegible]

Subj: Renewal of Materials [illegible]
License No. [illegible]

[illegible]

We request that [illegible]
[illegible] be [illegible]

Procedures [illegible]
[illegible] amendment number 8 [illegible]
detailed in subsequently [illegible]
shall apply.

Thank you for your [illegible]

[illegible]

[illegible]
[illegible]
[illegible]
[illegible]

[illegible]

NOV 27 [illegible]

64096

MARTIN COMPANY

Baltimore,
Maryland
21203

November 30, 1 966

Refer to: ACC-522
CWK:845

U. S. Atomic Energy Commission
Division of Material Licensing
Washington, D. C.

Attention: Mr. Robert E. Brinkman, Isotopes Branch

Subject: Renewal of Byproduct Material License No. 19-1398-32

Gentlemen:

The Martin Marietta Corporation hereby requests that Byproduct Material License be renewed. The following previously submitted applications and letters shall apply.

(a) Application from the Martin Marietta Corporation dated September 28, 1962.

(b) Letter from the Martin Marietta Corporation dated October 10, 1961.

(c) Letter from Martin Marietta Corporation dated October 17, 1961.

(d) Letter from Richard H. Boutelle dated May 3, 1962.

(e) Letter from C. W. Keller dated November 25, 1964.

Thank you for your effort in renewing this license.

Very truly yours,

Martin Company
MARTIN-MARIETTA CORPORATION
Baltimore, Maryland

C W Keller

C. W. Keller
Nuclear Accountability &
Licensing Representative

CWK:mal

A DIVISION OF MARTIN MARIETTA

90685

November 30, 1 966

Refer to: ACC-522
CWK:845

U. S. Atomic Energy Commission
Division of Material Licensing
Washington, D. C.

Attention: Mr. Robert E. Brinkman, Isotopes Branch

Subject: Renewal of Byproduct Material License No. 19-1398-32

Gentlemen:

The Martin Marietta Corporation hereby requests that Byproduct Material License be renewed. The following previously submitted applications and letters shall apply.

(a) Application from the Martin Marietta Corporation dated September 28, 1962.

(b) Letter from the Martin Marietta Corporation dated October 10, 1961.

(c) Letter from Martin Marietta Corporation dated October 17, 1961.

(d) Letter from Richard H. Boutelle dated May 3, 1962.

(e) Letter from C. W. Keller dated November 25, 1964.

Thank you for your effort in renewing this license.

Very truly yours,

Martin Company
MARTIN-MARIETTA CORPORATION
Baltimore, Maryland

C W Keller

C. W. Keller
Nuclear Accountability &
Licensing Representative

CWK:mal

90685

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

IN REPLY REFER TO:

DML:KEL
70-58
40-577

APR 30 1964

Martin Company
Nuclear Division
Baltimore, Maryland 21203

Attention: Mr. William H. Alper
Manager, Contracts Department

Gentlemen:

Thank you for your letter dated April 14, 1964, advising us that you have appointed Mr. Charles W. Keller as Nuclear Accountability and Licensing Representative for the Nuclear Division, Martin Company. This information has been made a part of our records on your Source, Special Nuclear and Byproduct Material Licenses.

Sincerely yours,

(Signed) L. Johnson

Lyall Johnson
Acting Director
Division of Materials Licensing

Copies provided for
Byproduct Licenses: 19-1398-1,-3,-9,-14,-15,-17
19-1398-19,-20,-21,-22,-23,-24,-25
19-1398-26,-27,-28,-29,-30,-31
19-6870-1
19-1243-3

MARTIN COMPANY

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

Mail No. 805
April 14, 1964

United States Atomic Energy Commission
Division of Licensing & Regulation
Washington, D. C. 20545

Attn: Mr. Lyall Johnson, Acting Director for
Materials Licensing

Dear Mr. Johnson:

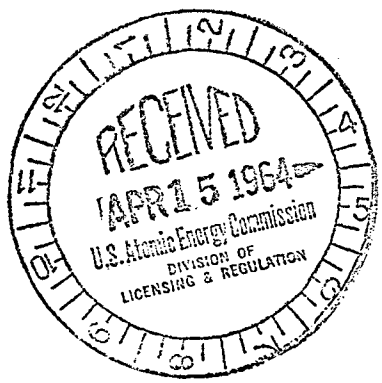
Martin Company has centralized all Radioactive Materials Management within the Contracts Department. This includes coordination of all licensing activities within the Nuclear Division. The By-product Material Licensing which was previously handled by Mr. Richard J. Brisson, Supervisor of Health Physics, will now be the responsibility of Nuclear Accountability and Licensing Representative, Mr. Charles W. Keller. Mr. Brisson will continue to be responsible for radiological safety at the Martin Company. All correspondence should be addressed as follows:

Mr. Charles W. Keller
Nuclear Acct. & Lic. Representative
Mail No. 807
Martin Company
Baltimore, Md. 21203

Phone: 687-3800, Ext. 513
(Area Code 301)

Very truly yours,

William H. Alper
Manager, Contracts
Department



THE AEROSPACE
DIVISION OF
MARTIN
MARIETTA

1000

MARTIN COMPANY

Baltimore 3,
Maryland

Mail No. 729

March 26, 1963

United States Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Gentlemen:

Re: Byproduct Material License
No. 19-1398-14

It is requested that Byproduct Material License No. 19-1398-14 be amended to include James C. Neace and John H. Gray as users. Three (3) copies of answers to Questions 8 and 9, Form AEC-313 are enclosed.

Edward Fowler and Arnold Abriss can be dropped from the list as they are no longer employed by Martin Company.

Yours very truly,

Richard H. Boutelle

Richard H. Boutelle, Chief
Health Physics Section

RHB:ebc

Enclosures

RECEIVED
MAR 28 1963
U.S.A.E.C.
Isotopes Branch
Div. of L & R

DUPLICATED
FOR DIV. OF COMPLIANCE

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4

USER: John H. Gray

A. Principles and practices of radiation protection.

B. Radioactivity measurement standardization and monitoring techniques and instruments.

C. Mathematics and calculations basic to the use and measurement of radioactivity.

D. Biological effects of radiation.

Type of Training	Where Trained	Duration of Training	On the Job	Formal Course
(See A above)	Carnegie Institute of Technology "Principles of Radiochemistry" "Radiochemical Technology" "Advanced Nuclear Theory"	6/58 - 4/62	4 years	1½ yrs.
(See B above)	Carnegie Institute of Technology "same as above"	6/58 - 4/62	4 years	1½ yrs
(See C above)	Haverford College - Pennsylvania "Radiochemistry"	9/56 - 6/57		1 yr
	Carnegie Instute of Technology "same as above"	6/58 - 4/62	4 years	1½ yrs.
(See D above)	NONE			

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FOR DIV. OF CONTRACTS

John H. Gray

9. Experience with Radi[illegible]on (Actual use of radioisotope[illegible]r equivalent experience)

Isotope	Maximum Amount	Where Experience Was Gained	Duration of Experience	Type
n general contact with all isotopes between Atomic No. 3 and Atomic No.79	The general range for all products was 1.0 - 20 milli-curies	Carnegie Institute of Technology	6/58 - 4/62	Became familiar with safety standards involved with a high energy (440 mev) proton cyclotron. All isotopes were produced by proton bombardment on the appropriate target foils.
pecific uclides con-isted of: Be^{7} F^{18} $Na^{22,24}$ $P^{32,33}$ S^{38} Al^{27} $Mn^{52,54,56}$ $Fe^{52,59}$ Co^{59} $Ag^{107,109}$ Au^{197} I^{131} Sr^{88} $Kr^{74,76,77,79}$				The various isotopes were produced, monitored, transported, purified, separated, shielded with the necessary calculations and monitoring equipment.
All spallation and fission products from Aluminum Cobalt Silver Gold Targets				

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4

USER: James C. Neace

A. Principles and practices of radiation protection.

B. Radioactivity measurement standardization and monitoring techniques and instruments.

C. Mathematics and calculations basic to the use and measurement of radioactivity.

D. Biological effects of radiation.

Type of Training	Where Trained	Duration of Training	On the Job	Formal Course
(See A above)	GE-ANP, Evendale, Ohio	4 years	X	
	Martin Nuclear, Middle River, Md	6 years	X	
	University of Maryland, Graduate School, College Park, Md.	5 months		X
(See B above)	GE-ANP, Evendale, Ohio	4 years	X	
	Martin Nuclear, Middle River, Md.	6 years	X	
	University of Maryland, Graduate School, College Park, Md.	5 months		X
(See C above)	Same as above			
(See D above)	Same as above			

James C. Neace

9. Experience with Radiation (Actual use of radioisotopes or equivalent experience)

Isotope	Maximum Amount	Where Experience Was Gained	Duration of Experience	Type
U^{235}	500 g (as oxide)	GE-ANP	4 years	Performed salvage operation
		Martin Company Nuclear Division	4 years	" " "
Am^{241}	5 mc	Martin Company Nuclear Division	1 year	Conducted purification studies
Cm^{242}	5 mc	" "	1 year	Conducted purification studies
Mixed Fission Products	5 mc	Martin Company Nuclear Division	1½ years	Conducted separations and radiochemical analysis.
Sr^{90}	2 mc	Martin Company Nuclear Division	1½ years	Conducts research and development on fuel forms.
Pm^{147}	2 mc			
Ce^{144}	2 mc			
Ru^{106}	2 mc			
$Zr\text{-}Nb^{95}$	2 mc			
Cs^{137}	2 mc			

DUPLICATED
FOR DIV. OF COMPLIANCE

Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027.4.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

Martin Marietta Corporation
Nuclear Division
Baltimore 3, Maryland

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

Middle River Plant
Middle River, Maryland

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Nuclear Components Department
(Formerly Auxilliary Power Systems Dept.)

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Renew Byproduct Material License
19-1398-14

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

George Samos

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Richard H. Boutelle

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*	
A. Sr^{90}-Y^{90}	A. Any form	100 curies maximum
B. Cesium 137	B. Any	1 curie
C. Americium 241	C. Any	25 millicuries
D. Curium 242	D. Any	20 millicuries
E. Any byproduct material between Atomic Nos. 3 and 83 inclusive	E. Irradiated semiconductors, semiconductor components, and/or mixed fission products	20 curies
F. Promethium 147	F. Any	65 curies
G. Europium 152	G. Any	3 millicuries
H. Europium 154	H. Any	3 millicuries

(See supplemental Sheet No. 1)

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

A. To be used to develop methods of purification and to test corrosion of fuel form compounds.

B. and F. To be used to investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.

C, D. and E. To be used to develop methods for separation of Curium 242 from Americium 241 and fission products.

G. and H. To be used in development of chemical processes for purification of rare earths.

I. Transportation of material between facilities of licensee at Middle River, Md. & University of Maryland for the measurement of tracer amounts of radioisotopes in irradiated material.

40627

RECEIVED

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	PREVIOUSLY SUBMITTED IN APPLICATION IN CONNECTION WITH LICENSE NO. 19-1398-14		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		PREVIOUSLY SUBMITTED IN APPLICATION IN CONNECTION WITH LICENSE NO. 19-1398-14		

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm^2)	USE (Monitoring, surveying, measuring)
PREVIOUSLY SUBMITTED IN APPLICATION IN CONNECTION WITH LICENSE NO. 19-1398-14					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

PREVIOUSLY SUBMITTED

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

PREVIOUSLY SUBMITTED

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No PREVIOUSLY SUBMITTED

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. PREVIOUSLY SUBMITTED

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. See application dated 3/11/60 in connection with License No. 19-1398-14

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Martin Marietta Corporation
Applicant named in item 1

Date September 28, 1962

By: Richard H. Boutelle
Richard H. Boutelle, Chief
Health Physics Section
Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U.S. GOVERNMENT PRINTING OFFICE : 1961 O—615963

SUPPLEMENTAL SHEET NO. 1

Part 6 (a)	Part 6 (b)	
I. Any byproduct material between Atomic Nos. 3 and 83, inclusive.	I. Any Form	25 millicuries

40627

MARTIN COMPANY

Baltimore 3,
Maryland

REFER TO:
RHB:729

September 28, 1962

United States Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Gentlemen:

Enclosed are three (3) copies of AEC Form 313 in which we request the renewal of Byproduct Material License No. 19-1398-14. While the program is at the moment the same as it has previously been, certain changes in the facility are contemplated and we expect to apply for additional amendments in the near future.

Should you have any questions regarding this application, please call me at 687-3800 extension 9517.

Yours very truly,

Richard H. Boutelle

Richard H. Boutelle, Chief
Health Physics Section

RHB:ebc

Enclosure

40627

THE AEROSPACE
DIVISION OF
MARTIN
MARIETTA

19-1398-14
Am #9

MARTIN MARIETTA CORPORATION

AEROSPACE CHEMICALS CONSTRUCTION MATERIALS

NUCLEAR DIVISION
Baltimore 3, Maryland

May 3, 1962

REFER TO:
RHB:729

United States Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that Byproduct Material License No. 19-1398-14 be amended to permit the possession of twenty-five millicuries (25 mc) of Byproduct Material, Atomic Number 3 - 83 inclusive, in any form, to measure tracer amounts of various radioisotopes in irradiated materials.

It is also requested that this license be amended to permit the transportation of up to twenty-five millicuries (25 mc) of material, Atomic Number 3 - 83 inclusive, under the following conditions:

1. Material will be transported between University Park, Maryland and the Martin Plant at Middle River, in either direction.
2. The packaging and shielding of the licensed materials in transit will be done in accordance with the specifications contained in I. C. C. Regulation, Paragraph 73.393, any exemptions allowed therein notwithstanding.
3. Labeling of materials in transit will be in accordance with specifications contained in I. C. C. Regulations, Paragraph 73.394, exemptions notwithstanding and in conformance with 10 CFR 20.205.
4. The licensed material will be transported in a Martin Company vehicle which will be marked in accordance with I. C. C. Regulations, Paragraph 77.823, in all cases, exemptions notwithstanding.
5. The licensed user will accompany the shipment.
6. Each transfer will be scheduled and will be supervised by the Health Physics Section.

Should any additional information be required, please contact me at 687-3800, extension 9517.

Yours very truly,

Richard H. Boutelle

Richard H. Boutelle, Chief
Health Physics Section

RHB:ebc

DUPLICATED
FOR DIV. OF COMPLIANCE

43174

19-398-14 Amend. #8

MB-0821 OCT 17 1961

Refer to:

U. S. Atomic Energy Commission
Germantown, Maryland

Attention: Mr. R. L. Lowenstein

Subj: Martin Company Byproduct Licenses

Gentlemen:

Reference is made to The Martin Company's letter of October 10, 1961 requesting your consent to the transfer of the licenses described above from The Martin Company to Martin-Marietta Corporation.

You are advised that the consolidation described in the above referenced letter has been accomplished and your assent to the previously requested transfer is now requested in the name of Martin-Marietta Corporation.

Very truly yours,

W. L. Lucas
Secretary and Treasurer

JTE/ab

38102

DUPLICATED
FOR DIV. OF COMPLIANCE

Refer to: MB- 0 7 9 8 OCT 1 0 1961

U. S. Atomic Energy Commission
Germantown, Maryland

Attention: Mr. R. L. Lowenstein

Subj: Martin Company Byproduct Licenses

Gentlemen:

The Martin Company is in the late stages of concluding arrangements for consolidation with the American-Marietta Company to form a new corporation to be known as Martin-Marietta Corporation. The new corporation will be incorporated under the laws of the State of Maryland and its address will be Box 988, Baltimore 3, Maryland. We are attaching hereto a list of licenses with the location and brief description of each, with the request that you grant authority for transfer of these licenses to the Martin-Marietta Corporation.

The stock of the new company will be listed on the New York Stock Exchange and the predominant ownership and control will be by American citizens.

It is expected that the consolidation will be effective on October 10, shortly after which time you will receive the request from the new corporation to receive the licenses. The existing operations will continue unchanged in the name of the new corporation. The health and safety requirements, the nature of the operations, and the general management of the programs for which the licenses were issued will be in no way effected by the consolidation. I am enclosing herewith, three copies of the Proxy Statement which has been issued to all stockholders which, in effect, confirms this fact. I refer you to pages 20 through 22 for information as to the officers and directors and advise you that they are all citizens of the United States. I also refer you to page 13 and succeeding pages for the proforma combined summary

38102

DUPLICATED
FOR DIV. OF COMPLIANCE

balance sheet giving effect of the consolidation and other financial information.

We shall appreciate your prompt consideration of this request for permission to transfer the licenses.

Very truly yours,

W. L. Lucas
Secretary

JTE/ab
Encl.

DUPLICATED
FOR DIV. OF COMPLIANCE

October 6, 1961

THE MARTIN COMPANY

BYPRODUCT MATERIAL

License No.	Location	Description	
9-7729-1	The Martin Company Sand Lake Road Orlando, Florida	Sealed Source - Stronium 90 Gas Chromatograph Gauge	
5-3010-3	The Martin Company Denver Division Littleton Plant Denver, Colorado	Cobalt 60 Strontium 90 Thulium 170	Calibration sources for Test Laboratory
5-3010-4	The Martin Company Denver Division Littleton Plant Denver, Colorado	Cesium 137	Sealed source for gauge
5-3010-5	The Martin Company Denver Division Waterton Plant	Tritium	Source for ionizing air - animal study in Space Medicine Lab.
5-3010-6	The Martin Company Denver Division Waterton Plant	Cesium 137	Sealed source for calibration
19-1243-2	RIAS, Inc. Department of Physics 7212 Bellona Avenue Baltimore, Maryland	Any Atomic Numbers between 3 - 83 Irradiated Metal Wire 100 milicuries each - 1 curie total Basic Research Lab	
19-1243-3	RIAS, Inc. Biochemistry Dept. 7212 Bellona Avenue Baltimore, Maryland	Carbon 14 Iron 59 Arsenic 76 Sulphur 35 Phosphorous 32 Research	100 millicuries 20 " 10 " 100 " 250 "
19-1398-1	The Martin Company Nuclear Division Baltimore 3, Maryland Critical Experiment Facility	Sealed Sources for Calibration	

38102
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FOR [illegible] OF CONFIDENCE

License No.	Location	Description
19-1398-3	Middle River Plant	Sealed Cobalt Sources
19-1398-9	Middle River Plant	Sealed Sources for Instrument Calibration
19-1398-12	Middle River Plant	Sealed Sources Krypton 85 (Light Source)
19-1398-14	Middle River Plant	Research & Development
19-1398-15	Middle River Plant	Radioisotopic Heat Sources
19-1398-17	Middle River Plant	Sealed Strontium Sources Calibration
19-1398-18	Middle River Plant	Sealed Source for Density Gauge
19-1398-19	Middle River Plant PM-1 Reactor Site Sundance, Wyoming	Sealed Sources for Radiography
19-1398-20	Middle River Plant	For preparation of sealed source for irradiation
19-1398-21	Middle River Plant	Thermoelectric Converters
19-1398-22	Quehanna Nuclear Facility Quehanna, Pennsylvania	Decontamination
19-1398-23	Middle River Plant	Sealed H^3 Standard Light Source
19-1398-24	Quehanna Nuclear Facility	Assembly of Thermoelectric Converters
19-1398-25	Middle River Plant (Baltimore Division)	Sealed Source Density Gauge
19-1398-26	PM-1 Power Plant Sundance, Wyoming	Sealed Sources for Calibration

DUPLICATE FOR COMPLIANCE 38102

THE MARTIN COMPANY

Baltimore 3, Maryland

December 27, 1960

REFER TO:
RFB:W-729

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

Submitted herewith are three (3) copies of an Application for Amendment of Byproduct Material License No. 19-1398-14, to include the possession and use of europium 152-154.

If there are any further questions, please call me or Mr. Richard H. Boutelle, MUrdock 7-3800.

Yours very truly,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer

RHB:ebc

Enclosures

RECEIVED
DEC 29 1960
U.S.A.E.C.
Isotopes Branch
Div. of L & R

31417

THE MARTIN COMPANY

Baltimore 3, Maryland

September 28, 1960
Mail No. W-756
Nuclear Division

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attnetion: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

Application is hereby made for amendment to Byproduct Material License 19-1398-14 to extend the expiration date and to add the name of Arnold Abriss as user. Three copies of Form AEC-313 and supplemental sheets are enclosed in support of this application.

Should you require any further information contact me or Mr. Richard H. Boutelle, X9517-8.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer

Encl:



29462

Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.3.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

The Martin Company
Nuclear Division
Baltimore 3, Maryland

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

Radioisotope Lab
"D" Building
Middle River, Maryland

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Radioisotope Unit
Nuclear Components Department

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

To Amend 19-1398-14 (RENEWAL)

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

George Samos - Edward Fowler
Arnold Abriss (request application be amended to include this new user at this time)

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Richard H. Boutelle
(Resume previously submitted)

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

A. Sr^{90} - Y^{90}	Any - 100 curies maximum
B. Cs^{137}	Any - 1 curie maximum
C. Am^{241}	Any - 25 millicuries maximum
D. Cm^{242}	Any - 20 millicuries maximum
E. At Nos. 3-83	Any - Mixed - 20 curies maximum
F. Pm^{147} & Daughter	Any - 65 curies maximum

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

A. To develop methods of purification and to test corrosion of fuel form compounds such as strontium titanite.

B. & F. To investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.

C. & D. To develop methods for separation of Cm^{242} from Am^{241} and fission products.

(CONTINUED ON SUPPLEMENTAL SHEET NO. 1)

DUPLICATED

19-1398-14 Amend 6

29152

FOR DIV. OF INSP.

(Continued on reverse side)

Form AEC-313 (5-58) Page Two

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	See Supplemental Sheet No. 2		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	for new user being added on Arnold Abriss		Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
See Supplemental Sheet No. 3				

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm^2)	USE (Monitoring, surveying, measuring)
NO CHANGE					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

NO CHANGE

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

NO CHANGE

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes No NO CHANGE

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.

NO CHANGE

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. See Supplemental Sheet No. 4

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

RECEIVED SEP 29 1960 U.S.A.E.C. Isotopes Branch Div. of L & R

The Martin Company
Applicant named in item 1

Date September 27, 1960 By: J. V. Loppert

Licensing Officer
Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948, 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1959 O—491408

Question No. 7 - Describe Purposes for which Byproduct Material Will Be Used.

E. Includes:

1. Fission products present as impurity is Sr^{90} - Y^{90} when received.

2. Fission products up to 100 millicuries used to develop methods for separation of Cm-242 from Am-241 and fission products.

3. Irradiated semi-conductors and semi-conductor components. To investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.

DUPLICATED
FOR DIV. OF INSR

Arnold Abriss

SUPPLEMENTAL SHEET NO. 2

A. Principles and practices of radiation protection

B. Radioactivity measurements, standardization and monitoring techniques and instruments

C. Mathematics and calculations basic to the use and measurement of radioactivity

D. Biological effects of radiation

Type of Training	Where Received	Length of Training	On the Job	Formal School
(See A above)				
Mostly Experience Brookhaven National Lab Safety Manual	Brookhaven National Lab	5½ yrs.	X	
(See B above)				
Beta-Gamma counting techniques using GM, proportional, and scintillation counters and analyzers, monitor-equipment, Nuclear Physics	Brookhaven National Lab.	6 months		X
(See B above)				
Experience - calculation of efficiencies, geometries, plateaus, standarizations of various isotopes and instruments	Brookhaven National Lab	5½ yrs.	X	
(See D above)				
National Bureau of Standards Handbooks	Brookhaven National Lab.	5½ yrs.	X	

29462

Isotope	Curies used	Where experiment carried out	Length of experiment	Type
Sr^{90} Y^{90}	2 curies per experiment	Brookhaven Nat'l. Lab.	5½ yrs.	Sr^{90} in liquid solution and conversion to solids, ion exchange, separation analysis, beta absorbtion, leaching from solids
Cs^{137} Cs^{134} =	2 curies	Brookhaven Nat'l. Lab.	5½ yrs.	Cs^{137} or Cs^{134} in liquid, solid and gaseous states, ion exchange, seperation analysis, gamma spectra conversion to solid for ultimate disposal, leaching from solids
Ce^{144}	50 mc	Brookhaven Nat'l. Lab.	5½ yrs.	Beta, gamma, counting, gamma spectra, ion exchange, leaching from solids
Ru^{106}	25 mc	Brookhaven Nat'l. Lab.	5½ yrs.	Beta, gamma counting, gamma spectra, ion exchange, preparation of nitrosyl nitrate, leaching from solids
Zr^{95}	25 mc	Brookhaven Nat'l. Lab.	5½ yrs.	Beta, gamma counting, gamma spectra, ion exchange, leaching from solids
Fe^{59}	10 mc	Brookhaven Nat'l. Lab.	5½ yrs.	Beta, gamma counting, ion exchan leadhing from solids
Rare Earth	25 mc	Brookhaven Nat'l. Lab.	5½ yrs.	Beta, gamma counting, Pr, Y ion exhhange
M. F. P.	50 mc	Brookhaven Nat'l. Lab.	5½ yrs.	Beta, gamma counting, ion exchange, leaching from solids

The applicant was supervisor of the laboratory in which these experiments were conducted.

29462

Question No. 15 - Waste Disposal

Solid waste is currently stored in 55 gallon steel drums awaiting disposal through an AEC approved, licensed waste disposal service. A record is maintained by Health Physics concerning the contents, radiation and number of each drum.

Liquid waste is monitored to assure that the levels of radioactivity are below the tolerances established in Title 10, Part 20 Code of Federal Regulations for disposal into sanitary sewers. All liquid waste with activity above these levels is evaporated and concentrated for eventual solid waste disposal through AEC approved and licensed waste disposal services.

Am #5 19-1398-14

THE MARTIN COMPANY

Baltimore 3, Maryland

Refer to:
JVL:W756

June 28, 1960

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that Byproduct Material License No. 19-1398-14 be amended to permit the storage of 350 curies of Am^{241} (oxide, dry) in the shipping containers as received from Oak Ridge National Laboratories. The storage would be in a dry box as previously described in application dated March 11, 1960. The dry box atmosphere will be monitored and any material removed from the dry box will be checked prior to removal. The material stored in this manner would eventually be transferred to the Americium Processing Facility as described in the application submitted for license 19-1398-20.

Should you require any further information please contact the writer or Mr. Richard H. Boutelle, MUrdock 7-3800.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer

JVL:mnh

RECEIVED
JUL 1 - 1960
U.S.A.E.C.
Isotopes Branch
Div. of L & R

DUPLICATED
FOR DIV. OF INSP.

27336

THE MARTIN COMPANY

Baltimore 3, Maryland

May 10, 1960
Mail No. W-756
Nuclear Division

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that Byproduct Material License 19-1398-14 be amended as follows:

Item 4 - Change users from H. O. Banks and George Samos to George Samos and Edward E. Fowler

We are enclosing herewith completed Sections 8 and 9 covering Mr. Fowler's training and experience with radiation.

Should you require any further information contact me or Mr. Richard H. Boutelle, X9517-8.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer

Encl:

RECEIVED
MAY 16 1960
U.S.A.E.C.
Isotopes Branch
Div. of L & R

DUPLICATED
FOR DIV. OF INSP.

19-1398-14

May 10, 1960
Mail No. W-756
Nuclear Division

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

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Should you require any further information contact me or Mr. Richard H. Boutelle, X9517-8.

Very truly yours,

THE MARTIN COMPANY

J. W. Loppert
Licensing Officer

Encl:

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4.

A. Principles and practices of radiation protection.

B. Radioactivity measurement standardization and monitoring techniques and instruments.

C. Mathematics and calculations basic to the use and measurement of radioactivity.

D. Biological effects of radiation.

Type of Training	Where Trained	Duration of Training	On the Job	Formal Course
(See A above) Working under the supervision of Health Physics	Westinghouse Electric Co., Bettis Site, Pittsburgh, Penna.	2 months	X	
(See B above) Working under the supervision of Health Physics	Westinghouse Electric Co., Bettis Site, Pittsburgh, Penna.	2 weeks	X	
(See C above) Working under the supervision of Health Physics	Westinghouse Electric Co., Bettis Site, Pittsburgh, Penna.	2 weeks	X	
(See D above) Under the supervision of Health Physics	Westinghouse Electric Co., Bettis Site, Pittsburgh, Penna.	2 weeks	X	

9. Experience with radiation (Actual use of radioisotopes or equivalent experience)

Isotope	Maximum Amount	Where Experience Was Gained	Duration of Experience	Type
Cs^{137}	1000 kilo-curie	Westinghouse Electric Co., Bettis Site, Pittsburgh, Penna.	4½ yrs.	*
I^{131}	"	"	"	*
U^{238}	"	"	"	*
U^{233}	10 curie	"	"	*
Np^{239}				
Ba^{139}	1000 curie	"	"	*
Br^{84}	" "	"	"	*
Ce^{144}	" "	"	"	*
Co^{60}	" "	"	"	*
Fe^{59}	" "	"	"	*
Sr^{89}	" "	"	"	*
Sr^{90}	" "	"	"	*
Zr^{95}	" "	"	"	*

*Participated in the chemical separation from mixed fission products performed on the above mentioned isotopes. This work consisted of obtaining samples, preparing them and performing chemical and radiation analyses. Another phase of the work was to assist with the storage and disposal of radioactive waste.

am 3 13-1398-14

THE MARTIN COMPANY

Baltimore 3, Maryland

March 16, 1960
Mail No. W-756
Nuclear Division

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that Byproduct Material License No. 19-1398-14 be amended as shown in the attached Application For Byproduct Material License. In summary the changes requested are:

1. Add George Samos as user.

2. Add the following isotopes to the Strontium 90 previous listed in Part 6: Cesium 137, Americium 241, Curium 242, Promethium 147 and isotopes of Atomic Nos. 3-83 inclusive.

3. Revise authorized use to include programs currently contemplated.

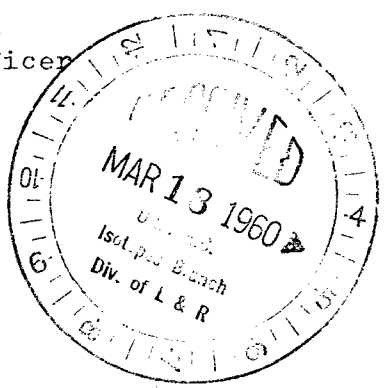
Should any further information be required please contact me at MUrdock 7-3800, X9668 or Mr. Richard H. Boutelle, X9517.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer

cc: R. Boutelle



DUPLICATE
FOR DIV. OF INSP.

24901

19-1398-14

Form AEC-313 (5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.3.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

The Martin Company
Nuclear Division
Baltimore 3, Maryland

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

Radioisotope Lab
"D" Building
Middle River, Maryland

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Radioisotope Unit
Nuclear Components Department

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

To Amend 19-1398-14

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

George Samos

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Richard H. Boutelle
(Resume previously submitted)

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*
A. Sr^{90}-Yt^{90}	Any - 100 curies maximum.
B. Cs^{137}	Any - 1 curie maximum
C. Am^{241}	Any - 25 millicuries maximum
D. Cu^{242}	Any - 20 millicuries maximum
E. At Nos. 3-83	Any - Mixed - 20 curies maximum
F. Pm^{147} & Daughter	Any - 65 curies maximum

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

A. To develop methods of purification and to test corrosion of fuel form compounds such as strontium titanate.

B. & F. To investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.

C. & D. To develop methods for separation of Cu^{242} from Am^{241} and fission products.

(CONTINUED ON SUPPLEMENTAL SHEET NO. 1)

UNCLASSIFIED

Form AEC–313 (5-58) Page Two

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	Brookhaven National Lab.	8 yrs.	(Yes) No	Yes (No)
b. Radioactivity measurement standardization and monitoring techniques and instruments	Brookhaven National Lab	8 yrs.	(Yes) No	Yes (No)
c. Mathematics and calculations basic to the use and measurement of radioactivity	Brookhaven National Lab Polytechnic Inst. of Brkl'n.	8 yrs. 6 mos.	(Yes) No	Yes (No)
d. Biological effects of radiation	Brookhaven National Lab. Health Physics Indoct.	Periodic	(Yes) No	Yes (No)

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
SEE SUPPLEMENTAL SHEET NO. 2				

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm^2)	USE (Monitoring, surveying, measuring)
Ion Chamber, Victoreen Model 592	4	Gamma	0-1,000 mr/hr	Encased	Monitoring Measuring
Ion Chamber, Victoreen Model 740	3	Beta-gamma	0-10,000 mr/hr	0.9 mg/cm^2	Measuring Monitoring
Ion Chamber, NRD Model CS-40	2	Beta-gamma	0-29,000 mr/hr	75 mg/cm^2	Monitoring Measuring
(See SUPPLEMENTAL SHEET NO. 3)					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

(See SUPPLEMENTAL SHEET NO. 4)

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*

(See SUPPLEMENTAL SHEET No. 5)

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

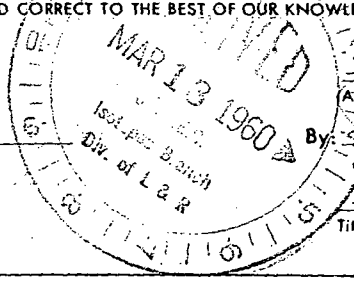
13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes No (See SUPPLEMENTAL SHEET NO. 8)

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source.
(See SUPPLEMENTAL SHEET No. 6)

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved.
(SEE SUPPLEMENTAL SHEET NO. 7)

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.



The Martin Company
(Applicant named in item 1)

Date March 11, 1960 By: J. V. Loppert
Licensing Officer
Title of certifying official

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

Question No. 7 - Describe Purpose for Which Byproduct Material Will Be Used.

E. Includes:

1. Fission products present as impurity in Sr^{90}-Yt^{90} when received.

2. Fission products up to 100 millicuries used to develop methods for separation of Cu-242 from Am-241 and fission products.

3. Irradiated semi-conductors and semi-conductor components. To investigate novel principles for conversion of kinetic energy of corpuscular nuclear radiation to electrical energy.

SUPPLEMENTAL SHEET NO. 1

DUPLICATED
FOR DIV. OF INSP

9. Experience with Radiat A (Actual use of radioisotop or equivalent experience)

	Isotope	Maximum Amount	Where Experience Was Gained	Duration of Experience	Type
A.	C^{14}	Curie Quant.	Brookhaven Nat'l. Lab.	1 yr.	Research
B.	I^{131}		" "	3 yrs.	Research & process dev.
C.	Ce; R.E. Xe, Po	Several Curies	" "	4 yrs. 4 yrs. 2 yrs.	Analysis of solutions from LMFR

EXPERIENCE WITH RADIATION:

Work was done on a small research project to determine maximum concentration of titanium formed in fission. A procedure was developed for decontamination of titanium from other fission products and the investigation was successfully concluded. Several curies of mixed fission products were involved.

A. A one year research program on isotopic exchange between Co_2 of the atmosphere and C^{14} from $BuCO_3$ was also successfully undertaken using tracer quantities.

B. A great deal of work was done with iodine 131 during the development of a device for "milking" I^{131} from Te^{131} for cancer research. This program later changed to Te^{132}. A device was developed and a patent applied for. This device enables a user of short lived I^{132} to have this material constantly available by milking a chromotographic column on which is embedded Te^{132}.

C. With the advent of the LMFR research program at Brookhaven, extensive analytical work was done on corrosion samples from the radiation loop, analyzing for such elements as radioactive iodine, tellurium, cerium, cesium, ruthenium, strontium, rare earths and Xenon. A procedure was developed for the separation of Xenon from metal samples and analysis of its quantity. This work later was extended to samples from reactor irradiated bismuth which contained much polonium. Separation procedures were developed for removing polonium from all samples and also for removing bismuth from samples in which bismuth interferred. Uranium was also separated and analyzed for. Total activity per sample was almost 1 curie.

In addition to the above experience Mr. Samos has conducted the work in the Radioisotope Laboratory of The Martin Company under the direction of Mr. H. O. Banks since January 1959.

SUPPLEMENTAL SHEET NO. 2

Question No. 10 - Radiation Detection Instruments

Type of Instrument	No. Avail.	Radiation Detected	Sensitivity Range	Window Thickness	Use
GM Survey, Nuclear Chicago Md 2612	6	Beta, gamma	0-60,000 c/m 0-20 mr/hr	35 mg/cm^2	Monitoring Surveying
Gas Flow Proportional Counter NMC Md PC-1A	2	Alpha, Beta-gamma	0.5-1,000,000 d/m; 100-1,000,000 d/m	gas chamber	Measuring
Gas Proportional Alpha Counter Eberline Instr. PAC-36	2	Alpha	0-100,000 c/m	0.85 mg/cm^2	Monitoring Surveying
Alpha Scintillation NRD Md-CS-5 + Md S5-A Basic Scintillation Unit	1	Alpha	-	-	Measuring
Alpha, Beta, Gamma Air Particulate Monitor NMC Model AM 33	1	Alpha Beta Gamma	10^{-12} uc/cc Alpha or Beta Gamma	gas prop. detector	Monitoring measuring

Question No. 11 - Method, Frequency, and Standards Used In Calibrating Instruments Listed Above (Question 10)

Calibration of Health Physics survey instruments is performed in the Calibration Facility located in the Waste Storage Room outside the Nuclear Manufacturing and Engineering Laboratories at Plant No. 1. Each instrument is calibrated once a month. Repaired instruments are calibrated when they are returned to Health Physics.

The sources are located in one corner of the Waste Room behind a four foot high, eight-inch thick, cement block wall. A one curie Co-60 source contained in a lead-steel shielded container is used for calibrating "Cutie-Pie" and similar type instruments.

The source is calibrated so that at given distances the dose rate in mr/hr is known. The instrument can be remotely placed at a given distance from the source and calibrated to read the field of radiation at that distance. Where possible, each instrument is calibrated on each scale or range setting.

Smaller Sources include an eight millicurie Co-60 source and a one millicurie Ra-226 source. These are also stored behind the shielding wall and used to calibrate low range (up to 20 mr/hr) instruments.

Neutron survey instruments are calibrated by using a five curie Po-Be neutron source of known flux (determined by foil activation) and setting the instrument to read the correct level.

Counting room instruments are calibrated by using standard calibrated sources of uranium alpha and beta-gamma. The first step is construction of a "plateau" to determine correct operating voltages. The counter efficiency is then determined by comparing the counter countrate with that of the standard source.

The NMC Model AM 33 Alpha-Beta-Gamma Air Particulate Monitor is calibrated by placing a source of known disintegration rate in view of the detector. The source used is the isotope in process at that time. The monitor is calibrated according to the disintegration rate and air flow necessary to match the calibration source.

The Eberline PAC-3G Gas Proportional Alpha Counter is calibrated by placing alpha sources of known disintegration rate in front of the probe face. Check sources and counting plateaus are provided for high voltage adjustments which are necessary with altitude changes.

24901

Question No. 12 - Film Badges, Dosimeters, and Bio-Assay Procedures Used.

A. General:

All personnel working with radioactive materials permanently or temporarily, are required to wear a film badge and two pocket chambers sensitive to beta-gamma radiation.

Personnel working in areas where fast and/or thermal neutron radiation is prevalent are required to wear a film badge sensitive to beta, gamma and fast neutrons and pocket chambers sensitive to thermal neutrons.

Film badges are changed either weekly, biweekly, or each 13 weeks depending upon the radiation levels in the work areas. Pocket chambers are changed and read daily. Self-reading dosimeters are also available and used under the discretion of Health Physics.

A film badge service is contracted on a yearly basis to supply and process film and badges for the program. The present supplier is Health Physics Services, Baltimore, Maryland

B. Dosimetry Information:

Special film badge changes are made by Health Physics when any of the following conditions exist:

(1) Both pocket chambers off scale.

(2) Exposure in excess of 100 mr/wk is recorded from daily pocket chamber readings.

(3) Inexplicable exposure in excess of 50 mr per day is recorded.

Permanent records are maintained of all film badge and pocket chamber results.

The upper limit of dosimetry response is as follows:

FILM BADGES	UPPER LIMIT (rem)
Gamma	1000
Beta	500
Neutrons	100
POCKET CHAMBERS	
Gamma	200 mr
Neutrons	200 mrem

24901

(Question No. 12 - Cont'd.)

C. Bioassay

All facility personnel are required to submit bioassay samples at periodic intervals. In the case of unusual incidents, including exposure to airborne concentrations of radioactive materials exceeding the maximum permissible concentrations for personnel without respiratory protection, or other suspected ingestion of radioactive material, special samples are collected from all personnel involved.

All urinalysis results are filed as permanent records in the Health Physics office and are available to responsible persons upon request.

24801

Question No. 14 - Radiation Protection Program

A. Health Physics Responsibilities:

1. Plans and administers the radiation protection program to provide adequate protection to Company and to personnel from ionizing radiation.

2. The inspection and monitoring, with the aid of various detection instruments, of personnel, machinery, furniture, ventilating equipment, gamma and neutron irradiation test facilities, radioisotopic laboratories, etc., to detect and prevent spread of radioactivity, measure levels of radiation or concentrations of radioactive materials present.

3. The review and approval of all working areas and facilities.

4. The evaluation of radiation hazard control methods for adequacy and compliance with recommendations of the National Committee on Radiation Hazards and pertinent government regulations.

5. The promotion of the Health Physics program through the proper indoctrination and training of personnel engaged in handling or working with materials or equipment that emit ionizing radiation.

6. Determines radiation monitoring equipment requirements in all areas.

7. The internal control and enforcement of licensing regulations pertaining to receiving, possession, use, transfer and disposal of nuclear source, special nuclear, or by-product materials.

8. The investigation of accidents and personnel radiation exposures to determine the cause and recommend corrective action to be taken to eliminate future occurrences.

9. The continual monitoring of personnel engaged in handling or working with radioactive materials and x-ray equipment for compliance with recommended procedures and regulations of good housekeeping and work habits.

10. The issuance of appropriate personnel monitoring devices (film badges, pocket chambers, etc.), scheduling of pre-exposure and follow-up physical examination, and the establishment and maintenance of detailed employee records of cumulative doses of radiation exposure, biological assays, laboratory reports, etc., to form the basis of permanent Company records and to conform to Atomic Energy Commission regulations.

11. The conducting of laboratory tests of environmental sample analyses and biological assays to determine the quantity of radioactivity discharged to the environs and the quantity received by the individual through inhalation, ingestion, wounds, etc.

Question 14 - Cont'd.

12. Collaborates with representatives of the various divisions and departments concerned on reactor site surveys, design of facilities, power reactors and associated control systems for hazard evaluation and control to assure protection of personnel and facilities.

13. Maintains liaison with representatives of the Atomic Energy Commission, National Committee on Radiation Hazards, Federal, State and Local government health and welfare agencies, and various divisions and departments, to resolve areas of common health physics interest.

14. Prepares and revises as necessary Health Physics bulletins outlining procedures to be followed to assure compliance with all pertinent National Committee or radiation hazards recommendations and government regulations.

15. The calibration of all Health Physics monitoring instruments where radiation sources must be used to perform the calibration.

B. Leak Testing

Leak tests are performed on all sealed sources when they are received and at least once every three months thereafter. The source, or source shield, depending upon the strength of the source, is wiped with a filter paper disc. The disc is then counted in the proper radiation counter to detect and measure any leakage of alpha or beta-gamma contamination.

Radium sources are leak tested by wrapping the source in cotton for approximately three days, removing the cotton and counting it with a beta-gamma detector.

Leak tests are performed by Health Physics technicians who have had three years of on-the-job Health Physics training with The Martin Company.

Maintenance, service and repairs to all sources are performed by the source supplier.

C. See also supplementary report MND 2109.

24301

Question No. 15 - Waste Disposal

Solid waste is currently stored in 55 gallon steel drums awaiting disposal through an AEC approved, licensed waste disposal service. A record is maintained by Health Physics concerning the contents, radiation and number of each drum.

Liquid waste is monitored to assure that the levels of radioactivity are below the tolerances established in Title 10, Part 20 Code of Federal Regulations for disposal into sanitary sewers. All liquid waste with activity above those levels is evaporated and concentrated for eventual solid waste disposal through AEC approved and licensed waste disposal services.

24901

Question No. 13 - Facilities and Equipment

The Radioisotopes Laboratory consists of 3 sections - a small office area, a general lab for doing cold chemistry and tracer level chemistry, and a large room 22 ft. square which is being set up as a warm chemistry lab.

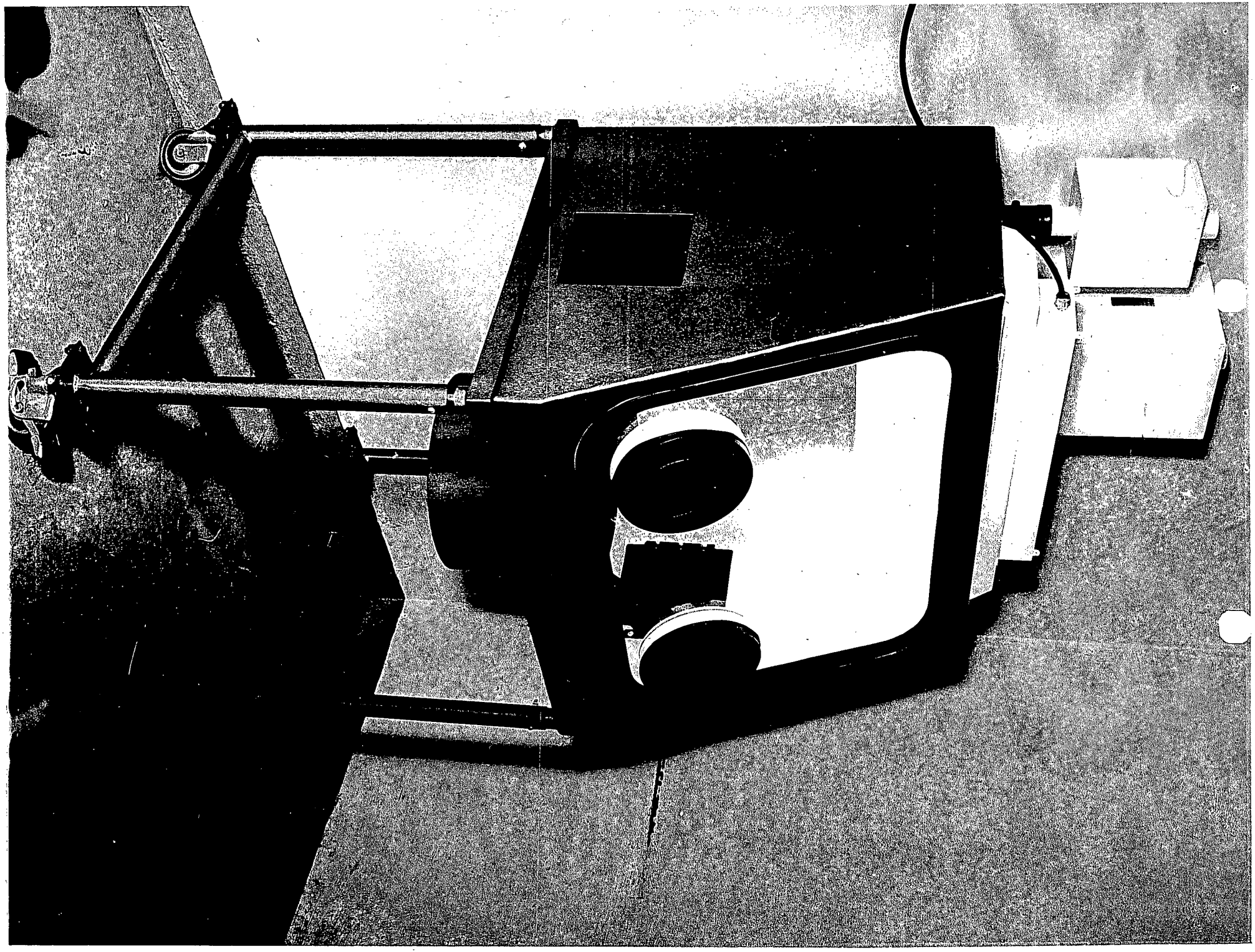
The general lab has a main lab bench, several tables, counting equipment and a hood. The air flow through the hood, with the door half way down is 100 l.f.m. An absolute type filter is in the line to absorb all particulate matter. The interior of the hood is of stainless steel, top, sides and bottom. Work involving use of trace quantities of isotopes is done in the hood. The floor of the hood is covered with "kimpak", an absorbent paper, and this is covered with polyethylene sheeting to facilitate decontamination, if a spill should occur. Liquid radioactive waste is kept in a 5 gallon polyethylene bottle. Metal pails with polyethylene bag liners are used for solid waste. A bench monitor is used to survey glassware, hands and clothing for $\beta\gamma$ contamination. Portable gas flow proportional counters will be used for α monitoring.

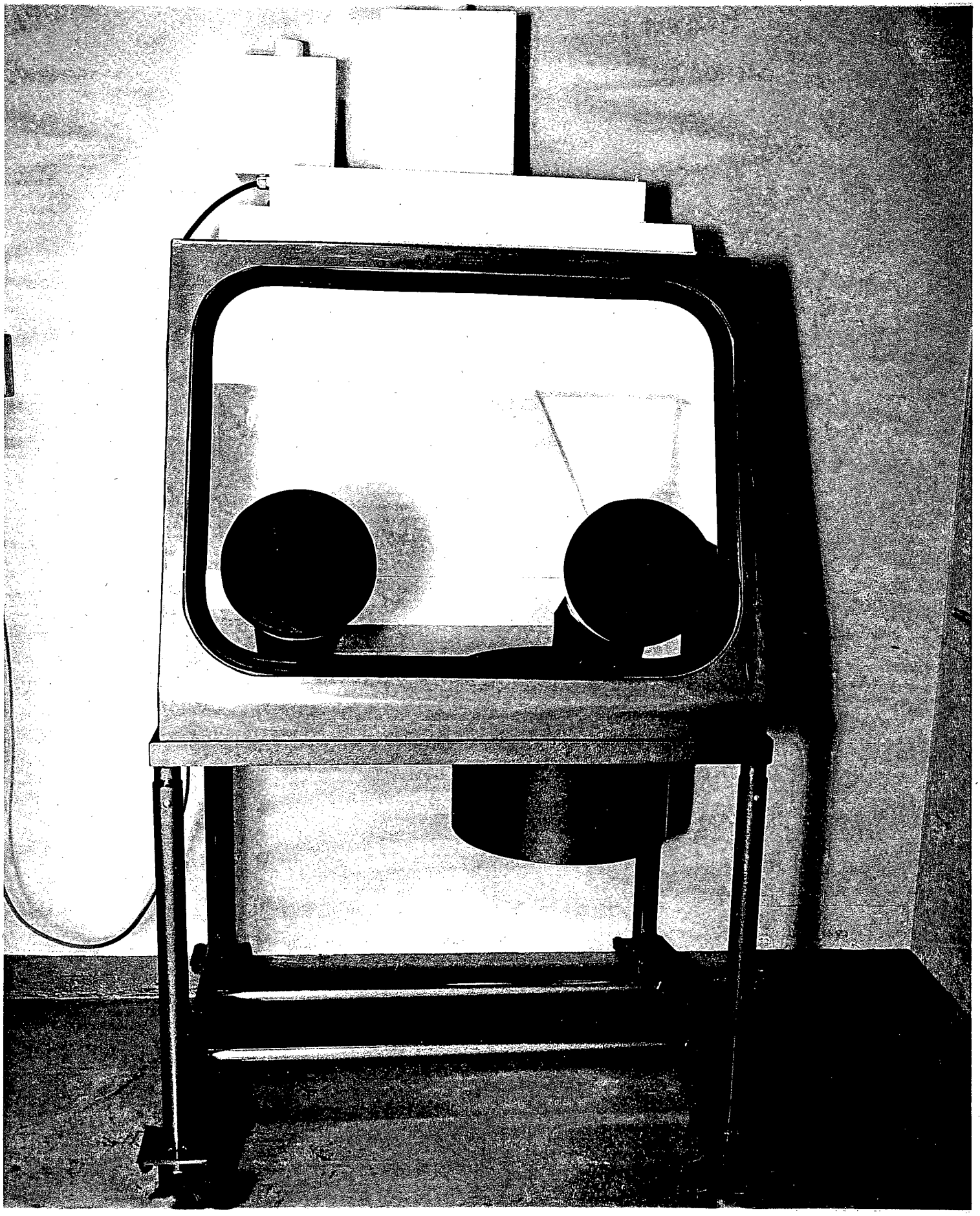
The large area, a room approximately 22' X 22' is currently being prepared for alpha chemistry work. The room has 2 foot thick concrete walls. A fiber glass polyester resin floor has been laid over the existing concrete floor to facilitate decontamination should a spill occur. A 6" thick steel door, on rollers, is located in the outside wall of the room to enable large pieces of equipment to be brought into the room. This room has been used for gamma radiography and the heavy steel door served as a radiation shield. The doorway will be altered so that two regular doors can be installed. The steel door will then be left normally open unless the radiation level will be such as to make closing necessary.

Americium, curium and plutonium chemistry will be done in glove type dry boxes. Each box is 27" deep, 26" long and 30" high with sloping safety glass fronts incorporating 8" fiberglass gloves. The box will be made of plastic sandwich honeycomb with coved corners, 1/8" thick stainless steel floor, and safety plate glass mounted in interlock rubber retainer. Filters are two replaceable Pf 105 inlet and one combination pre-filter Cambridge absolute type filter rated for 50 cfm, at 1" $H_{2}O$. A fluorescent light fixture and four liquid line fittings are also provided. All plastic materials are fire and chemical resistant. The box has 7" X 8" access ports at each end of the box which open inward and lock shut against neoprene gaskets to seal the chamber.

24901

FOR DIV. OF INSP





DUPLICATED

Amend. 19-1398-10

Form AEC-313 (5-58)	ATOMIC ENERGY COMMISSION **APPLICATION FOR BYPRODUCT MATERIAL LICENSE**	Form approved. Budget Bureau No. 38-R027.3.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

CANCELLED FOR DIV. OF NMSP

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

The Martin Company
Baltimore 3, Maryland

Attn: Mr. R. G. Macaulay
Licensing Officer

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

Martin Plant
Middle River, Maryland

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Isotopic Power Development Dept.
of Nuclear Division

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Eight Byproduct Material Licenses are currently in effect.

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

Hampden O. Banks, Jr.
Assistant Project Engineer

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Paul R. Guinn - See Resume Submitted With Martin Application Dated Dec. 13, 1957-
Re: License No. 19-1398-9
Amendment No. 2

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

Strontium-90

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

A maximum of 100 curies of strontium-90 to be procured in the oxide or nitrate form.

Note: It is anticipated that 10 curies will be procured immediately upon the issuance of the Byproduct Material License, the balance from time to time during the progress of the work identified below.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

1. For experimental work under Contract AT(30-1)-2281 between Martin and the AEC, to determine methods of purifying strontium-90.

2. To investigate the applicability of strontium-90 for use in the development of battery heaters, transmission oil heaters, and other military low-level applications.

RECEIVED FEB 9. 1959 Isotopes Div. of Lic. & Reg.

16208

(Continued on reverse side)

Form AEC-313 (5-58) Page Two

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	See resume submitted with License Application dated September 30, 1958. Re: License No. 19-1398-11		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments			Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
		See aforementioned License Application dated September 30, 1958.		

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS *(Include make and model number of each)*	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE *(mr/hr)*	WINDOW THICKNESS *(mg/cm²)*	USE *(Monitoring, surveying, measuring)*
See list submitted with License Application dated September 22, 1958.					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.
See statement submitted with License Application dated September 22, 1958.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*
See statement submitted with License Application dated September 22, 1958.

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. *(Circle answer)* Yes, No See statement submitted with Application dtd. Sept. 30, '58

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. See statement submitted with License Application dtd. Sept. 22, 1958

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. See Application dtd. Sept. 22, 1958

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

THE MARTIN COMPANY
Applicant named in item 1

Date February 5, 1959

By: Ross G. Macaulay

Title of certifying official
Licensing Officer

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

GPO 939373

Amend. 2
19-1398-121

THE MARTIN COMPANY

Baltimore 3, Maryland

February 5, 1959

1082

Mr. William O. Miller
Senior Licensing Reviewer
U. S. Atomic Energy Commission
Isotopes Branch
Division of Licensing & Regulation
Washington 25, D. C.

Dear Mr. Miller:

It is requested that a Byproduct Material License authorizing The Martin Company to transfer, receive, acquire, own and possess 100 curies of strontium-90 be issued in accordance with the provisions of Part 30 of Title 10 of the Code of Federal Regulations.

In support of this request, I am enclosing herewith three duly completed copies of AEC Form-313. I might point out that, except for the quantity of strontium-90 required and the purposes for which it will be used, the enclosed Application is identical to our Application dated September 30, 1958, which resulted in the issuance of Byproduct Material License No. 19-1398-14. Consequently, it may be convenient for you to issue an amendment to the existing license rather than to issue a new license.

Please give me a call (MUrdock 7-3800, extension 595, collect) if you desire clarification or any additional information relative to the enclosed Application.

Very truly yours,

THE MARTIN COMPANY

Ross G. Macaulay
Licensing Officer
Nuclear Division

RECEIVED
FEB 9 1959
U.S.A.E.C.
Isotopes Branch
Div. of L & R

RGM:hp
Enclosures

16208

Amendment 1
19-1398-14

THE MARTIN COMPANY

Baltimore 3, Maryland

November 10, 1958

3226

DUPLICATE
FOR DIV. C...

Mr. Raymond Herbin
Isotopic Branch
Division of Licensing Regulation
U. S. Atomic Energy Commission
1717 H Street, N. W.
Washington 25, D. C.

Dear Mr. Herbin:

I wish to acknowledge receipt of Byproduct Materials License No. 19-1398-14 covering 100 millicuries of Strontium-90 and thank you for your cooperation and assistance in expediting its issuance.

Reviewing the license, I note that Item 9 defines the authorized use as follows: Corrosion, stability, and similar laboratory studies to determine the integrity of cements (containing Strontium-90) as a source of heat and power. I believe that the reference to "cements" in the foregoing definition should be to "cermets." I assume that this is simply a typographical error and that it will be unnecessary to issue a correcting amendment, but please let me know if such is not the case.

Very truly yours,

THE MARTIN COMPANY

Ross G. Macaulay
Licensing Officer
Nuclear Division

RGM:hp

November 3, 1958

RAYMOND L. HERVIN, ISOTOPES BRANCH
DIVISION OF LICENSING AND REGULATION
U.S. ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

ROUTINE

THE MARTIN COMPANY
ATTN: ROSS G. MACAULAY, LICENSING OFFICER
NUCLEAR DIVISION
BALTIMORE 3, MARYLAND

LICENSE NO 19-1398-14 ISSUED OCTOBER 31, 1958 COVERING THE USE OF 100

MILLICURIES OF STRONTIUM 90 END REF L&R:IB:RLH

in:bq
5725

OFFICE ▶	L&R:IB					
NAME ▶	Hervin:bq					
DATE ▶						

AEC 18 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16-62761-3

THE MARTIN COMPANY

Baltimore 3, Maryland

October 31, 1958

DUPLICATED
FOR DIV. OF INSP.

4987

Mr. Raymond Herbin
Isotopic Branch
Division of Licensing Regulation
U. S. Atomic Energy Commission
1717 H Street, N. W.
Washington 25, D. C.

Dear Mr. Herbin:

With further reference to our application for Byproduct Material License dated September 30, 1958, I am enclosing herewith a self-explanatory letter from Mr. H. O. Banks, covering the technical questions which you raised the other day. I shall appreciate it if you will call me collect at MUrdock 7-3800, extension 595 or 596, when the necessary processing on the license has been completed.

Very truly yours,

THE MARTIN COMPANY

Ross G. Macaulay
Licensing Officer
Nuclear Division

RGM:hp
Enclosure

ENCLOSURE

LABORATORY CONTAINMENT PROCEDURE FOR STRONTIUM-90

All chemical processing, furnace cermeting, sintering, cladding and corrosion testing of the Strontium-90 contained material will be conducted in a Kewaunee Model 3604 type fume hood. This hood is equipped with an absolute filter and will be maintained at a slight negative pressure. The front portal will be modified by installing a pressure gasketed lucite panel. Hand access into the hood will be accomplished by means of obstetrical type rubber gloves securely attached to the lucite panel. Transfer of material will be made through a double airlock type of exit; an eleven (11) such transfers will be supervised by the Health Physics Department. Air sampling will be maintained throughout the study both in the hood room and at the filtered air exit to the outside. In addition, face masks, surgical gloves, smocks and shoe covers will be used as needed. Entrance into and exiting from the hood room by authorized personnel will be monitored by a Health Physicist. Adequate containment of all waste materials both liquid and solid will be maintained. An estimated 1 to 2 mc of Strontium-90 will be contained in each finished cermet. No unclad cermets will be removed from the hood.

THE MARTIN COMPANY

Baltimore 3, Maryland

DUPLICATED
FOR DIV. OF INSP.

October 30, 1958

4987

Mr. Raymond Herbin
Isotopic Branch
Division of Licensing Regulation
U.S. Atomic Energy Commission
1717 H Street, N.W.
Washington 25, D. C.

Dear Mr. Herbin:

Per our telephone conversation of October 30th, I am attaching the information on the Fume Hood equipment together with the amounts of Strontium-90 per cermet to be used by Martin-Nuclear on our Strontium Heat Source Program.

I trust that this data is adequate and will appreciate any effort on your part to expedite the licensing procedure necessary for my procurement of 100 mc of Strontium-90. If any further information is required, please do not hesitate to contact me.

Very truly yours,

THE MARTIN COMPANY

H. O. Banks

H. O. Banks, Jr.
Assistant Project Engineer
Isotopic Power Department
Nuclear Division

HOB:jp
Encl:

19-1398-14

Form AEC-313 (2-57)

...OMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.3.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail two copies to: U. S. Atomic Energy Commission, P. O. Box E, Oak Ridge, Tenn. Attention: Isotopes Extension, Division of Civilian Application. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

The Martin Company
Baltimore 3, Maryland

Attn: Mr. R. G. Macaulay
Licensing Officer

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

Martin Plant
Middle River, Maryland

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Isotopic Power Development Dept.
of Nuclear Division

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Seven Byproduct Material Licenses
are currently in effect.

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

Hampden C. Banks, Jr.
Assistant Project Engineer

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Paul R. Guinn - See Resume Submitted With Martin Application Dated Dec. 13, 1957 - Re: License No. 19-1398-9, Amendment No.2

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

Strontium-90

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

100 millicuries of Sr. 90 to be received in the oxide form.

DUPLICATED
FOR DIV. OF INSP.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

Phase I - The above byproduct material will be used in the performance of corrosion and stability studies of Sr. containing cermets, such studies being designed to determine the integrity of the cermet as a source of heat and power. Trace amounts of radio Sr. will be mixed with stable Sr.

Phase II - A similar cermet containing trace amounts of radio Sr. will be placed in a double container. Corrosion tests will then be performed to determine the integrity of this system.

13369

(Continued on reverse side)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 *(Use supplemental sheets if necessary)*

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	Brookhaven National Laboratory Missouri School of Mines	1950-56 1948-50	(Yes) No	(Yes) No
b. Radioactivity measurement standardization and monitoring techniques and instruments	Brookhaven National Laboratory Orins-Gamma Radiography Course Missouri School of Mines	1950-56 2 weeks 1947-50	(Yes) No	(Yes) (Yes) No
c. Mathematics and calculations basic to the use and measurement of radioactivity	Brookhaven National Laboratory	1950-56	(Yes) No	(Yes) No
d. Biological effects of radiation	Brookhaven National Laboratory	1950-56	(Yes) No	(Yes) No

9. EXPERIENCE WITH RADIATION. *(Actual use of radioisotopes or equivalent experience.)*

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
I-82	10c to 30c	Brookhaven National Lab.	1950-56	Experimental production of radioisotopes for sale.
Mixed	100 mc.	The Martin Company	1956-58	Tool wear study.

10. RADIATION DETECTION INSTRUMENTS. *(Use supplemental sheets if necessary.)*

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
See list submitted with Martin Application for Byproduct Material License dated September 22, 1958.					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE. See statement submitted with Martin Application for Byproduct Material License dated Sept. 22, 1958.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. *(For film badges, specify method of calibrating and processing, or name of supplier.)*
See statement submitted with Martin Application for Byproduct Material License dated Sept. 22, 1958.

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes (No) See attached statement identified as "Item 13."

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. See statement submitted with Martin Application for Byproduct Material License dated Sept. 22, 1958.

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. See Martin Application referenced above.

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Date September 30, 1958

THE MARTIN COMPANY
Applicant named in item 1

By: Ross G. Macaulay
Ross G. Macaulay
Licensing Officer
Title of certifying official

USAEC Isotopes Branch Div. of L & R OCT 2 1958 RECEIVED

WARNING.—18 U. S. C., Section 1001, Act of June 25, 1948, 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE : 1957 O-F—424006

19-1398-14

Submitted with Martin letter of September 30, 1958 to Mr. James W. Hitch

---

13. Facilities and Equipment

All of the operations described in Item 7 will be conducted in a Kauwanee type hood equipped with absolute filters and an airflow system. The work will be performed within The Martin Company's Radioisotope Laboratory, a description of which was furnished with Martin Byproduct Material License Application dated November 6, 1956, Re: License No. 19-1398-2.

19-1398-14

THE MARTIN COMPANY

Baltimore 3, Maryland

September 30, 1958

Mr. James W. Hitch
U. S. Atomic Energy Commission
Isotopes Branch
Division of Licensing and Regulation
Washington 25, D. C.

Dear Mr. Hitch:

It is requested that a Byproduct Material License authorizing The Martin Company to transfer, receive, acquire, own and possess 100 millicuries of strontium-90, be issued in accordance with the provisions of Part 30 of Title 10 of the Code of Federal Regulations. In support of this request, we have completed and I am enclosing herewith three copies of AEC Form-313.

All of the work described in Item 7 of the Application will be performed pursuant to a contract currently being negotiated with the Atomic Energy Commission. Since we are anxious to commence this work at an early date, I shall appreciate it if you will give me a call (MUrdock 7-3800, Ext. 595 or 596) in the event that you desire any further information relative to the enclosed Application. I might add that Dr. Paul Abersold of the AEC is familiar with the technical aspects of the work.

Very truly yours,

THE MARTIN COMPANY

Ross G. Macaulay
Licensing Officer
Nuclear Division

RGM:hp
Enclosures

13369

DOCKET NO. 70-58

Formal

THE MARTIN COMPANY

Baltimore 3, Maryland

December 12, 1957

Director
U. S. Atomic Energy Commission
Division of Civilian Application
Washington 25, D. C.

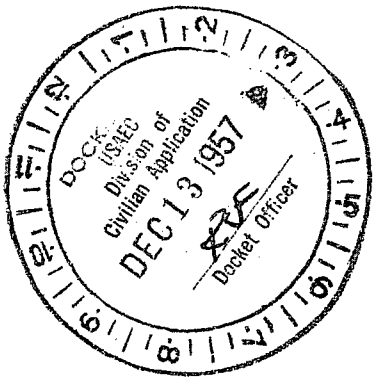
Attention Mr. Lyall Johnson
Chief, Licensing Branch

Dear Mr. Johnson:

Enclosed are three (3) signed and notarized copies of an application for a general license to receive, possess, use and transfer special nuclear material pursuant to Part 70, Title 10, Code of Federal Regulations. Appendix A to the application, a revision of MND-1063 filed April 22, 1957, is under preparation and will be submitted as soon as possible. Appendix F, MND-1069, is business confidential and therefore is supplied in two copies under separate cover.

The Martin Company holds License No. SNM-11, as amended June 12, 1957, authorizing the use of a maximum of two kilograms of U235 in special nuclear materials for fuel element research and development to be performed principally in the Nuclear Division Engineering Materials Laboratory. The enclosed application requests authorization for use of a maximum of five hundred kilograms of contained U235 in all facilities at Middle River including the Critical Experiment Facility. In this connection, reference is made to License No. SNM-53 as amended May 3, 1957 which permits the storage of fifty kilograms of UO_2 containing uranium enriched in the isotope U235.

Request is made also at this time for an allocation for calendar year 1958 of one hundred and fifty kilograms of U235 contained in special nuclear materials enriched up to over 90% in the isotope U235. This general allocation is requested as it is not possible to anticipate all of the various forms and enrichments which will be required for commercial work.



Very truly yours,

THE MARTIN COMPANY

C. A. Wendel
Licensing Officer
Nuclear Division

CAW/bw

DOCKET NO. 70-58

Suppl. file cy

THE MARTIN COMPANY

APPLICATION FOR GENERAL LICENSE TO RECEIVE, POSSESS, USE AND TRANSFER SPECIAL NUCLEAR MATERIAL (PART 70, CFR 10)

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Work Areas in Critical Experiment Facility. . . . . .

APPLICATION FOR GENERAL LICENSE TO RECEIVE, POSSESS, USE AND TRANSFER SPECIAL NUCLEAR MATERIAL (PART 70, CFR 10)

I. The Martin Company is engaged in design, research, development and construction of nuclear reactors and nuclear components at its Middle River Plant near Baltimore, Maryland. For the purpose of development and fabrication of reactor fuel elements, a Nuclear Materials Laboratory and a Pilot Manufacturing Plant have been constructed in the basement of "D" Building at Plant I. A critical experiment facility for zero power testing of proto-type reactor cores is in the final stage of completion. This facility is located near the Martin airport some two thousand feet southeast of Plant I.

Research and development work on fuel elements is conducted under Special Nuclear Material License No. 11, as amended, in accordance with procedures described in the Company's applications of May 22, 1957 and September 19, 1957. The most recent revision of this license permits special operations involving fully clad fuel elements to be performed in the pilot manufacturing plant and in other buildings at Plant I in addition to the laboratory areas.

Initial operation of the Pilot Manufacturing Plant involves fabrication of stainless steel tubular elements containing highly enriched UO_2, for a proto-type MPR core to be tested to zero power for the Atomic Energy Commission under Contract AT (30-3)-277. Government-owned fuel has been handled through Accountability Station MND, which was authorized by the Schenectady Operations Office after approval of the Martin Nuclear Division's procedures regarding criticality control, accountability, health and safety, and security.

In addition to MPR type tubular elements, The Martin Company plans to fabricate other fuel element types in the Pilot Manufacturing Plant. Certain special operations will be performed in other buildings at Plant I. Some of the work to be undertaken will be on a commercial basis and therefore must be done under a Special Nuclear Material License issued by the Commission. In this connection, note is made that the Commission issued SNM License 53 to The Martin Company on November 26, 1956 permitting receipt and possession of fifty (50) kilograms of UO_2 enriched to over 90% in the isotope U235.

Several types of fuel elements including rods, tubes and plates will be manufactured. These elements will utilize uranium metal or uranium dioxide in a fuel marrow clad with such materials as stainless steel, aluminum alloys and zirconium alloys.

In view of these varied contemplated activities, The Martin Company pursuant to Part 70, CFR 10 hereby applies for a general license to receive, possess and use up to five hundred kilograms of contained U235 in special nuclear materials at its Middle River facilities, including uses in the Critical Experiment Facility other than activities licensed under Part 50, CFR 10. Application is made for a license extending for three years from date of issuance. The experience gained by the Nuclear Division during the past three years in safe handling of nuclear materials is reflected in the general procedures outlined in this application in sections which follow.

II. Information required pursuant to Section 70.22, Title 10, Chapter 1, CFR:

(1) Applicant is The Martin Company, Baltimore 3, Maryland incorporated in the State of Maryland and having its principal plant and place of business at Middle River, Maryland.

Principal officers are:

G. M. Bunker, President, The Martin Company, Baltimore 3, Maryland - USA

W. B. Bergen, Executive Vice President, The Martin Company, Baltimore 3, Maryland - USA

W. L. Lucas, Secretary and Treasurer, The Martin Company, Baltimore 3, Maryland - USA

The Martin Company is not owned, controlled, or dominated by an alien, a foreign corporation, or foreign government. The applicant is the real party in interest and is not making this application as an agent for any undisclosed principal.

(2) Activities:

Attached for reference are plans of the nuclear facilities at the Martin Middle River plant showing work areas and quantities of special nuclear material (in terms of contained isotope U235) permitted in each work area:

Plate 1 - Plan of Engineering Materials Laboratory
Plate 2 - Plan of Pilot Manufacturing Plant
Plate 3 - Plan of Critical Experiment Facility located near Martin airport.

General procedures in connection with activities contemplated are:

(a) Receiving -

SNM will be received at Gate 5 of Plant I by the Accountability Representative. After monitoring by Health Physics Services for radiation hazards, shipments will be conveyed to Vault Annex Room, (Work Area IB) or Vault, (Work Area IA) for unpacking and weighing of special nuclear material.

(b) Storage -

The storage vault is a fully enclosed room, 22'8" by 13'9" by 11'0" high. It is designed to hold up to 600 kilograms of enriched uranium in powders, foils, elements or ingots stored in birdcage devices approximately 12" x 12" to 17" x 17" in cross-section. Walls, ceiling, and floor are constructed of a minimum of 9 inches of reinforced concrete. Sole entrance to the vault is through a $1\frac{1}{2}$" steel door equipped with a three-way combination lock. There are no water or service piping or drains within the vault.

Materials will be stored in separate containers containing quantities which are less than the theoretical critical masses calculated for optimum conditions with respect to geometry of container, moderators, and reflector according to the calculating procedures outlined in the Martin Criticality Precautions Manual, MND-1063 (Appendix A) and its reference "A Guide to the Calculation of Criticality Limits for Enriched Uranium" by Dr. Chernick. Each container will be at least 12" x 12" in cross-section with a length about 12" longer than the material to be held. Containers and birdcages will vary in design according to the form of the material. For example:

Uranium dioxide powders will be stored in metal bottles of approximately 150 cubic centimeters capacity. No more than 600 grams of uranium dioxide enriched to over 90% in the isotope U235 or more than 550 grams of contained isotope U235 will be stored in each metal bottle. One and only one bottle will be suspended inside a cubical "birdcage" type structure of welded metal construction having dimensions of 16 5/8" x 16 5/8" x 21 3/8".

Uranium metal foil will be stored in birdcages 12" x 12" x 34" with bundles of foil each containing no more than 1000 grams of U235 held roughly in the center by inserts.

Fuel elements, tubular or plate, will be held in cradles in storage devices or similar dimensions (12" x 12" x 30-40"). Each cradle will hold a prescribed number of tubes or plates, the total U235 content of which will be within the allowable limits established for the particular form of material involved.

Solid scrap will be stored in metal boxes 9 1/2" x 11 3/4" x 26", each held in a birdcage 12" by 12" x 40" long.

Insofar as it is practical, all birdcages will be placed in rows along the walls of the vault to permit easy access. The lowest rows will be placed on platforms about 17 inches above the floor to prevent accidental contact with water. Even if flooding occurred above the height of 22" required to reach any special nuclear material, no hazard would exist since (1) all materials will be in latched birdcages in amounts less than the theoretical critical limits and (2) powders will be in water-tight metallic containers within the birdcages.

All material will be stored during non-work hours either in the vault or in locked repository safes in the manufacturing area.

When special nuclear material must be taken from the nuclear facilities to other areas within the Martin plant, it will always be in the custody of a "Q" cleared accountability designee.

(c) Forms of material -

Forms with corresponding allowable limits in contained U235 have been established as shown on the following two pages.

(d) Work Areas and Criticality Control -

Reference is made to Plates 1, 2 and 3 and to the Martin Criticality Precautions Manual, MND-1063, filed with the AEC, April 22, 1957. A revised copy of this manual is attached as Appendix A. The manufacturing area and the critical experiment area have been divided into Work Areas for purposes of control of criticality. The laboratory except for a few designated work areas is considered to be one integral work area. Limits (in terms of U235) are shown on the plates for the various

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
Ia	all enrichments	UO_2 powder, density when loose approx. 5 gr/cc	800 grams
Ib	all enrichments	UO_2 powder, pressed and sintered shapes density approx. 10 gr/cc	800 grams
Ic	0.72% to 20.0%	UO_2 and ThO_2, powder and sintered shapes	* grams
IIa	highly enriched	UO_2 and stainless steel mixture, density approx. 8.4 gr/cc	1600 grams
IIb	highly enriched	Sintered cermet of UO_2 and stainless steel density approx. 8.4 gr/cc	1850 grams
III	all enrichments	Uranium in aqueous solution	2 grams/liter (1)
IV	highly enriched	Stainless steel clad tubes, with Form IIb as fuel marrow	2000 grams
V	over 20.0%	Stainless steel clad plates with uranium metal as fuel marrow	1600 grams
VIa	over 20.0%	Uranium metal in thin forms; ribbon, foil wire, etc.	500 grams
VIb	over 20.0%	Uranium metal in fine cuttings, dust., etc.	500 grams
VIIa	all enrichments	UO_2 and powdered Al mixture, approx. density 2.5 gr/cc	800 grams
VIIb	all enrichments	Pressed or sintered UO_2 and Al mixture in (VIIa) approx. density 5.0 gr/cc	800 grams

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
VIIIa	all enrichments	Aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
VIIIb	all enrichments	Iron-aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
IX	over 20.0%	Uranium metal in buttons, derbies, etc.	10000 grams (2)
X	over 20.0%	Uranium metal in ingots, bars, machined shapes, smallest dimension 70.25 inches	3000 grams
XI	0.72% to 20.0%	Stainless steel clads filled with solid pellets of Form Ib or Ic	2000 grams
XII	over 20.0%	Zirconium, titanium, molybdenum and other "special" alloy-clad plates with uranium metal fuel marrow	grams (3)
XIII	over 20.0%	Uranium-thorium molybdenum alloys	grams (3)

(1) Except when total amount in any one container in all forms is less than 400 grams of U235

(2) Subject to review with regard to minimum dimensions and reflecters

(3) To be determined

forms of SNM (pages 5 and 6) which can be present in each work area at any one time. In the event that several forms are present at one time in a work area, the lowest allowable limit for U235 applies to all materials present.

All transfers between work areas are made by the courier acting as a designee of the Accountability Representative. Enforcement of criticality procedures within work areas is a responsibility of each facility supervisor. Material, under close weighing control, is transported to an "Off-Spot" in work boxes in "carrier" devices. Amounts present in each work area are shown on prominent signs posted by the Accountability Representative.

(e) Manufacturing -

Fabrication of fuel elements will be performed in the pilot shop located in "D" Building.

A few special operations such as brazing of fully clad tubes to end castings will be done in other buildings at Plant I.

Processes, either developed or being developed include:

(1) Fabrication of stainless steel clad plates enclosing uranium metal foil (Form I)

(2) Stainless steel clad tubes enclosing fuel marrow of enriched uranium dioxide-stainless steel cermet (Form IV)

(3) Aluminum and aluminum alloy clad tubes enclosing pressed uranium dioxide-aluminum blended compacts as fuel marrow (Form VIII)

(4) Stainless steel clads filled with solid compacts of uranium dioxide or uranium dioxide and thoria (Form XI)

General descriptions of these processes are outlined in Appendix B with corresponding manufacturing flow charts shown in Appendix C.

(f) Accountability -

The Martin Nuclear Division accountability procedures for strict control of valuable special nuclear materials

apply to both government-furnished SNM and to licensed SNM. Each lot received is assigned a ledger number. All material withdrawn is kept separate from other lots throughout processing. Scrap is kept segregated by contract or project. Thus there is no risk of intermingling materials or several contracts or of different enrichments.

(g) Security -

All facilities are controlled areas with only authorized personnel permitted access. An escort-control pass system is applied to authorized visitors.

Materials are given security protection in accord with the categories outlined in the AEC manual.

(h) Transport to Critical Experiment Facility -

Finished fuel tubes, plates or rods are moved to the facility in "birdcage" transporting devices in a guard-escorted motor vehicle. No more than 800 grams of U235 contained in sealed elements are allowed per "birdcage" device. These birdcage devices are 12" by 12" by 34" and retain in a center position wooden cradles 9 1/2" by 11 3/4" by 23 3/4" which hold the fuel tubes or plates.

(i) Receipt and Storage at Critical Experiment Facility -

After verification by the Accountability Designee of the Facility of the number of tubes or plates delivered the birdcages will be placed in the storage vault. The vault is of similar construction to the vault in the pilot manufacturing plant and has a floor area of 175 square feet. It is accessible only through a 1 1/2" steel door equipped with a three-way combination lock.

(j) Assembly at Critical Experiment Facility -

Tubes or plates are assembled into experimental bundles in Work Area 102, adjacent to the Storage Vault and Test Cells.

Following assembly, the fuel elements (bundles or boxes) will be placed in wooden cradles which are held in the birdcage storage devices. The dimensions of the cradle holding a bundle of thirty-seven (37) MPR tubes are 9 1/2" by 11 3/4" by 23 3/4".

The birdcage devices are then transferred to the storage vault for retention until withdrawal for experimental work authorized by a Class 104 c license.

(k) Shipping procedures -

Shipments of special nuclear material to the Commission or to other licensees will be made as follows:

(1) If the shipment contains no more than 100 grams of U235, the material will be securely packed in a container with resilient material between this container and the outside package. In addition, the parcel will be checked for possible radiation hazards and marked in accordance with ICC regulations.

No more than one package containing up to 100 grams of contained U235 will be transported or delivered to a carrier in any one shipment.

(2) If the shipment contains over 100 grams of U235, the material, depending on its form, will be packed in a container in either one of the Martin "birdcage" devices described in part 2(b) or an equivalent device to be furnished by the shipper. The quantity of U235 in any shipping device will be within the allowable limits for various forms shown on pages 7 and 8 of the manual, MND-1063.

(3) A general license is requested for a period of three years.

(4) Special Nuclear Material will be used in the forms shown in section 2(c). The general categories are:

Uranium dioxide powder; low-enrichment to over 90% enriched in isotope U235
Uranium metal foil, ribbon and wire; low-enrichment to over 90% enriched in isotope U235
Uranium metal ingots, slugs, billets, bars, derbies; all enrichments.

It is not possible to estimate amounts of each type required. However, a total requirement at one time of up to 500 kilograms of contained U235 in SNM is foreseen.

(5) The contemplated requirements for Special Nuclear Material for the last quarter of 1957 and the first quarter of 1958 are shown on the next page.

(6) The Martin Nuclear Division has been engaged in handling special nuclear materials for over two years in research and development of fuel elements. The new laboratory and pilot manufacturing plant have been in operation since June, 1957.

Several new concepts of fuel elements have been developed including the highly-enriched stainless steel clad, UO_2 cermet marrow tubular type. The first core loading of 1700 of these tubes will be completed in November. The technical staff of the Nuclear Division includes some 200 engineers. The manufacturing plant supervisor has had fifteen years of precision shop experience. Health Physics personnel include two senior health physicists each with over 5 years of training at AEC and industrial installations. The Accountability Representative is a public accountant with 10 years experience including 9 months in the handling of nuclear materials.

(7) Equipment and facilities used to protect health and safety -

Storage facilities are described in (2b) and (2i). The manufacturing and laboratory areas are under negative pressure with respect to adjacent working areas of "D" Building. Air flow is from non-contaminated areas to slightly-contaminated areas to more-contaminated areas, with the highest ventilation rates in those rooms or areas where the greatest air-borne contamination is possible.

Exhaust air that may contain appreciable radioactive particulate matter (that is from the hoods or dry boxes) is passed through absolute filters before being released to the atmosphere.

Hoods are used for handling uranium dioxide powders. These hoods, exhausting ducts and glove boxes are equipped with absolute filters. Machining of uranium metal will be done using an oil bath.

A partial list of available instruments and equipment appears as Appendix D.

MATERIAL	ENRICHMENT	QUANTITY ON HAND	4TH QUARTER 1957		1ST QUARTER 1958	
			Receipts	Returns	Receipts	Returns
UO_2 Powder	20%	5 kg	-	3	-	2
UO_2 Powder	over 90%	50 kg	20	25	10	25
Uranium foil	over 90%	0.5 kg	-	-	-	-
Uranium foil	over 90%	-	31	-	-	-
Uranium metal ingot	31%	-			40	40
Uranium metal ingot	over 90%	-			100	100

(8) Health and Safety measures -

Personnel working with radioactive materials (including SNM) or in radiation areas are routinely monitored for external radiation exposure by means of film badges and pocket chambers. Contamination is controlled by surveying likely objects or areas with appropriate detecting instruments or by making filter paper smears (which must be counted with an appropriate detector), recording results, and informing proper supervision. All operating personnel must be constantly alert to contamination possibilities involved in their operations and must continually strive to keep contamination to a minimum. Health Physics takes air samples in areas where airborne contamination is possible (frequency of sampling depends on operation). A tolerance of no more than 5×10^{-11} microcuries per milliliter air is established. If this tolerance is approached all personnel in the area affected are required to wear respirators. Uranium urinalyses and blood tests will be made every three months to check on internal deposition on people assigned to work in these areas.

From receipt of material to shipping or storage, Health Physics will be concerned with contamination and radiation levels from the SNM. External radiation measurements will be made on the received package and recorded. The Accountability Representative will open these packages. Health Physics shall assist in examination for breakage or other damage and subsequent contamination control in case of damage. During weighings of received SNM, Health Physics will make necessary smear checks. Samples to be sent for outside laboratory analysis will be packaged to conform with all pertinent ICC regulations.

Contamination control effectiveness will be checked by Health Physics throughout the operations in the laboratory and in the pilot manufacturing plant.

Protective clothing will be used to reduce personnel contamination.

Disposal of radioactive wastes: There will be no radioactive gaseous effluent from the Martin facilities. The incineration of radioactive combustible materials will be controlled by monitoring the exhaust stack of the incinerator.

Liquid wastes will be stored in polyethelene lined 55 gallon drums until ready for concentration. Batches containing no more than 400 grams of U235 will be reduced nearly to dry salt and these residues will be sent to AEC installations for recovery.

Solid wastes such as incinerator ashes will be mixed with a prepared cement mix before disposal by land or sea burials in accordance with Part 20, CFR 10.

The large volumes of slightly contaminated liquid wastes from the Decontamination Laundry will be held in collecting sumps until filtered, sampled, and counted for radioactivity before discharge to the sanitary sewer. Tap water dilution will be used, if necessary, to reduce the concentration to the levels required by 10 CFR Part 20.

(9) Emergency procedures -

An outline of the procedures to be followed in case of incidents involving nuclear materials is contained in the Criticality Precautions Manual, MND-1063, pages 5 and 5a.

(10) Financial Qualifications -

The Martin Company has done business under its present charter in the State of Maryland for a period of over twenty-five years. (b)(4) (b)(4) (b)(4) The Nuclear Division, headed by a General Manager, is part of the company organization and draws its budgetary support therefrom. Ex 4

The Martin Company will assume financial responsibility for all special nuclear materials received and will pay to the Commission the presented use charge based on the value of the material until the material is returned to the latter.

A copy of the 1956 Annual Report of the Company is attached as Appendix E.

III. Pursuant to Section 70.32, The Martin Company stipulates that:

(1) Title to all special nuclear material shall at all times be in the United States.

(2) No right to the special nuclear material shall be conferred by the license except as defined by the license.

(3) Neither the license nor any right under the license shall be assigned or otherwise transferred in violation of the provisions of the act.

(4) All special nuclear material shall be subject to the right of recapture or control reserved by section 108 and to all other provisions of the act.

(5) No special nuclear material may be used in any utilization or production facility except in accordance with the provisions of the act.

(6) The licensee shall not use the special nuclear material to construct an atomic weapon or any component of an atomic weapon.

(7) The licensee will hold the United States and the Commission harmless from any damages resulting from the use or possession of special nuclear material by the licensee.

(8) The license shall be subject to, and the licensee shall observe, all applicable rules, regulations, and orders of the Commission.

I certify that the statements made in this application and its attachments are true, complete and correct to the best of my knowledge and belief, and are made in good faith.

THE MARTIN COMPANY

BY: Tibor F. Nagey

Tibor F. Nagey
General Manager
Nuclear Division
Baltimore 3, Maryland

Subscribed and sworn to before me this 6th day of December, 1957.

Henrietta Marie Peters

Notary Public

My commission expires May 4, 1959.

APPENDIX B

DESCRIPTION OF PROCESSES EITHER DEVELOPED OR BEING DEVELOPED

(1) Stainless steel clad plates enclosing enriched uranium metal foil, Form V.

The process is diagrammed in the flow sheet for Form V, Appendix B. Material is received from processor in clean flat strips of foil, (Form VI) cut to size and enclosed in polyethylene bags. It is stored in birdcage boxes, 12" x 12" x 34" in lots not exceeding 1000 grams of U235 per container. Batches not exceeding 500 grams of contained U235 are withdrawn from storage vault, (Work Area 1a) and transferred by courier to Work Area 10 for assembly between stainless steel plates. Assembly is seam welded, evacuated at a low temperature and a final end seam weld made in Work Area 10. After radiography in Work Area 7, batches of plates will be autoclaved in Work Area 22 to determine porosity reliability.

Destructive and non-destructive testing will be performed on selected plates in Work Area 11.

(2) Stainless steel clad tubes enclosing fuel marrow of enriched uranium dioxide-stainless steel cermet (Form IV).

A description of the ~~process~~ destroyed & superseded by new Appendix "F" 1 pg. process is contained in the confidential manual, MND-1069 which is furnished as a supporting document to this application, (Appendix F). A flow sheet for the process is also included in Appendix C.

(3) Aluminum and aluminum alloy clad tubes enclosing pressed UO_2 -Al blended compacts (Form VIII).

Enriched uranium dioxide is blended with three parts by volume of powdered aluminum in Work Area 2. This blend is compacted to pressed bushings in Work Area 5. The bushings are assembled on a tube of aluminum or aluminum alloy and a second tube is passed over the bushings to complete the assembly. The assembly is swaged and drawn in Work Area 4 and then annealed to complete the metallurgical bonding in Work Area 5. Cleaning of the finished tubes is accomplished in Work Area 9. After radiography in Work Area 7, the assembly is sheared to size (Work Area 4) and the ends seam-welded in Work Area 10. Radiography, non-destructive testing, and porosity testing are done in Work Areas 7, 11 and 20 respectively to complete the tube manufacturing process. Brazing and welding of sealed tubes into bundles will be done in other facilities at Plant I under security and health safety safeguards required.

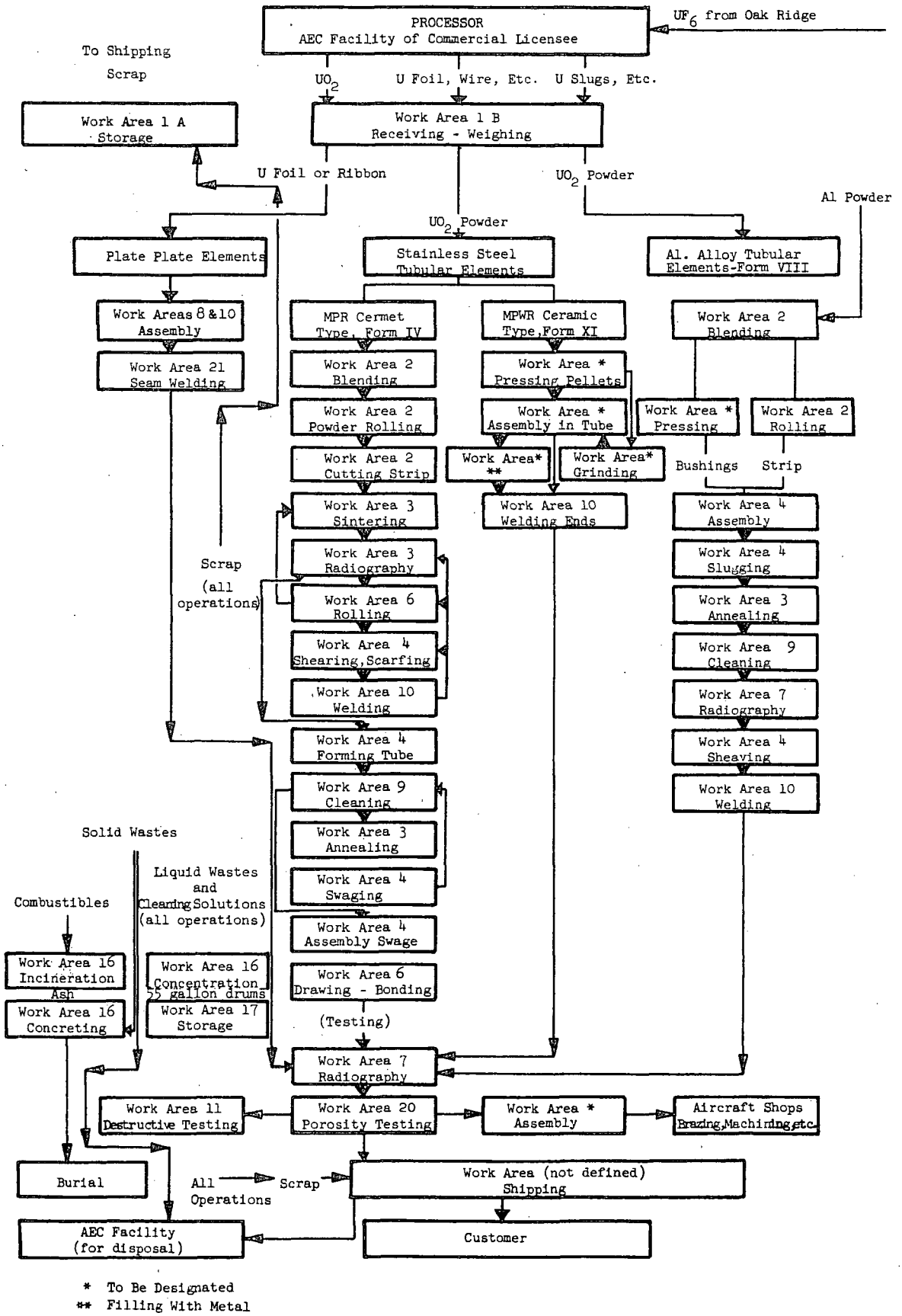
(4) Stainless steel cladsfilled with pressed compacts of uranium dioxide or uranium dioxide and thoria (Form XI).

Uranium dioxide powder of low enrichment in the isotope U235 is pressed into pellets. These pellets are assembled in stainless steel tubes and the interstices filled with a liquid metal to provide for efficient heat transfer between the fuel and the outside tube.

(An alternate method using ground pellets fitting to close tolerances in the tube may be used.)

The ends of the tubes are welded in Work Area 10 and the completed tubes are radiographed, porosity tested and cleaned.

MANUFACTURING FLOW CHARTS



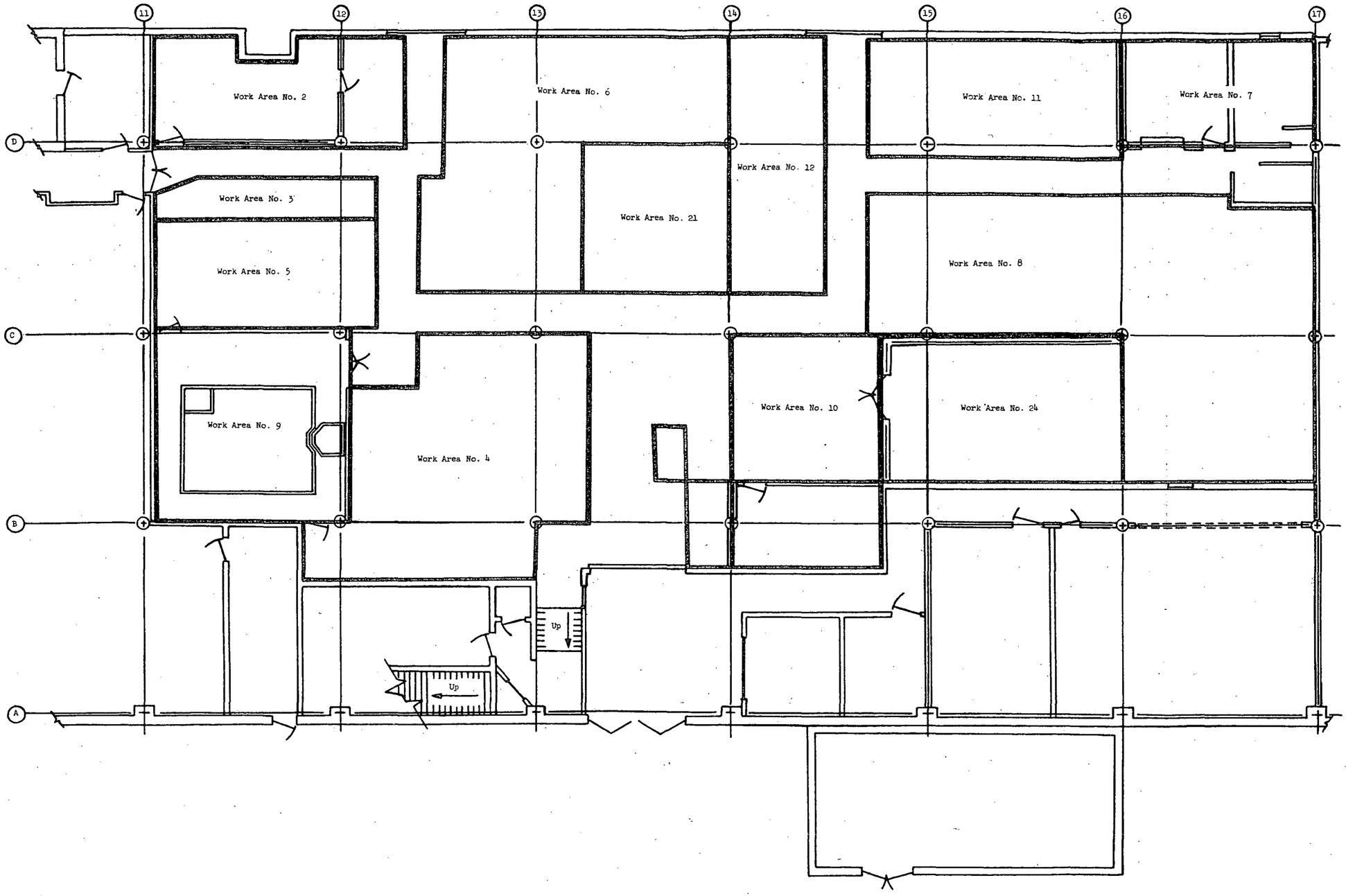
APPENDIX D

List of Health Physics Instruments

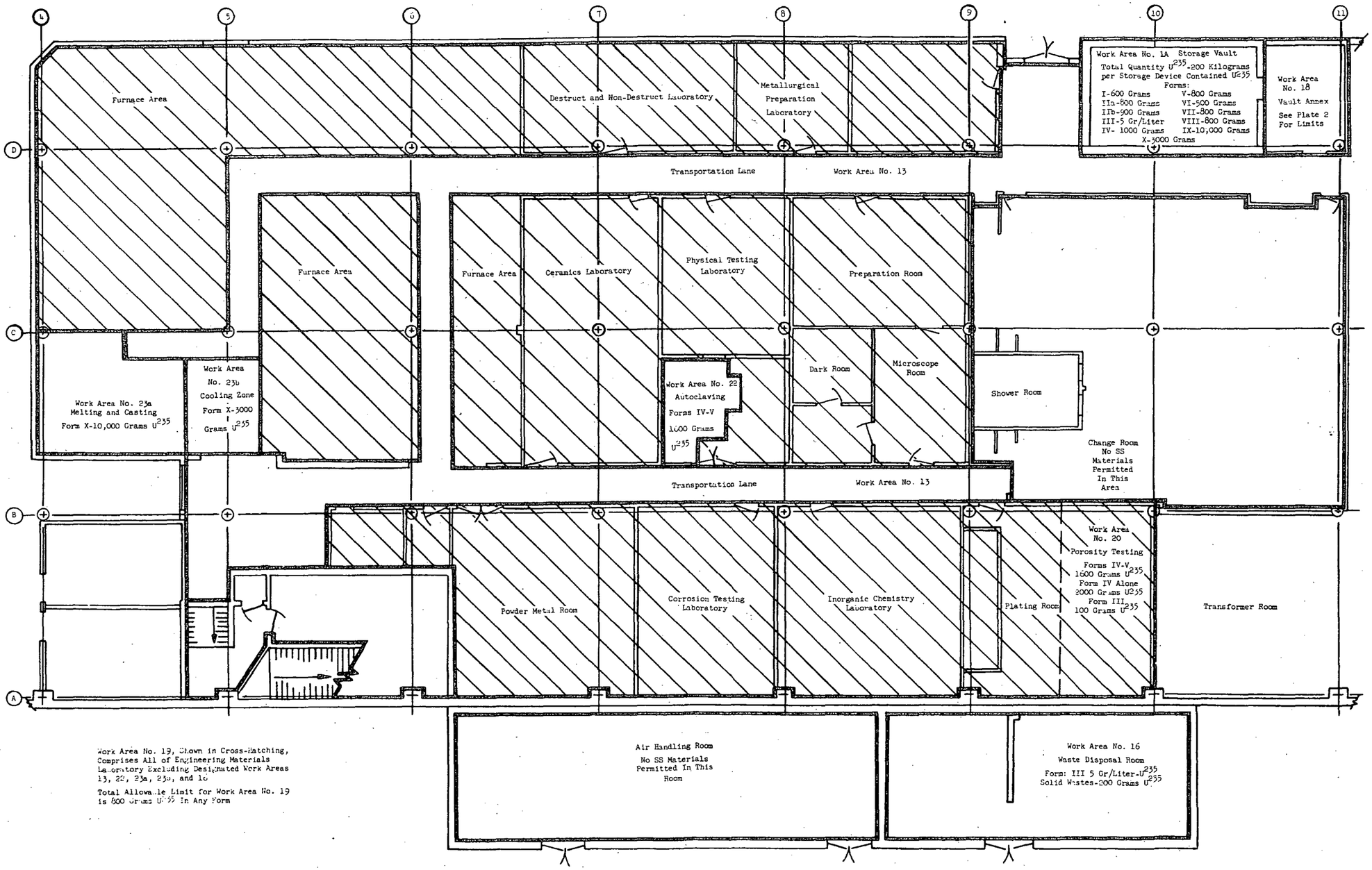
No.	Type of Instrument	Manufacturer	Model No.
4	Alpha Survey Meters	Nuclear-Chicago	2112
1	" " -Samson	NED Instrument Co.	D-6
2	Alpha Probes	Nuclear-Chicago	AP-4
1	G.M. Survey Meter	Berkley	2750
4	" " Meters	Victoreen	592
5	" " Meters	Nuclear-Chicago	2612
3	"Cutie Pie" Survey Meters	Nuclear-Chicago	2586
2	" " " "	Tracerlab	SU-1H
2	" " " "	NRD Instrument Co.	CS-40
4	Count Rate Meters	Tracerlab	SU-3C
1	" " "	Nuclear-Chicago	1619
2	" " "	" "	1615-B
1	" " "	" "	1613-A
1	" " "	Nuclear Instrument and Chemical Corporation	MR-10
1	" " "	Nuclear Measurements Corp.	LCRM-2M
1	Pee Wee	Nuclear-Chicago	2111
1	Fast Neutron Counter	NRD Instrument Co.	E-1A
1	" " " Probe	" " "	F-1
1	Poppy Probe	General Electric	
1	Scaler	Nuclear-Chicago	1310
2	Scalers	" "	161-A
1	Scaler	Radiation Instrument Lab.	1201-T
1	Scaling Unit	Nuclear-Chicago	183
1	Ultra Scaler	Nuclear-Chicago	192
1	Scaler-Decade	Radiation Counter Lab. Mark 13	10-D
1	Proportional Counter	Nuclear Measurements Corp.	PC-1
1	" " Converter	" "	PC-16

List of Health Physics Instruments Cont'd

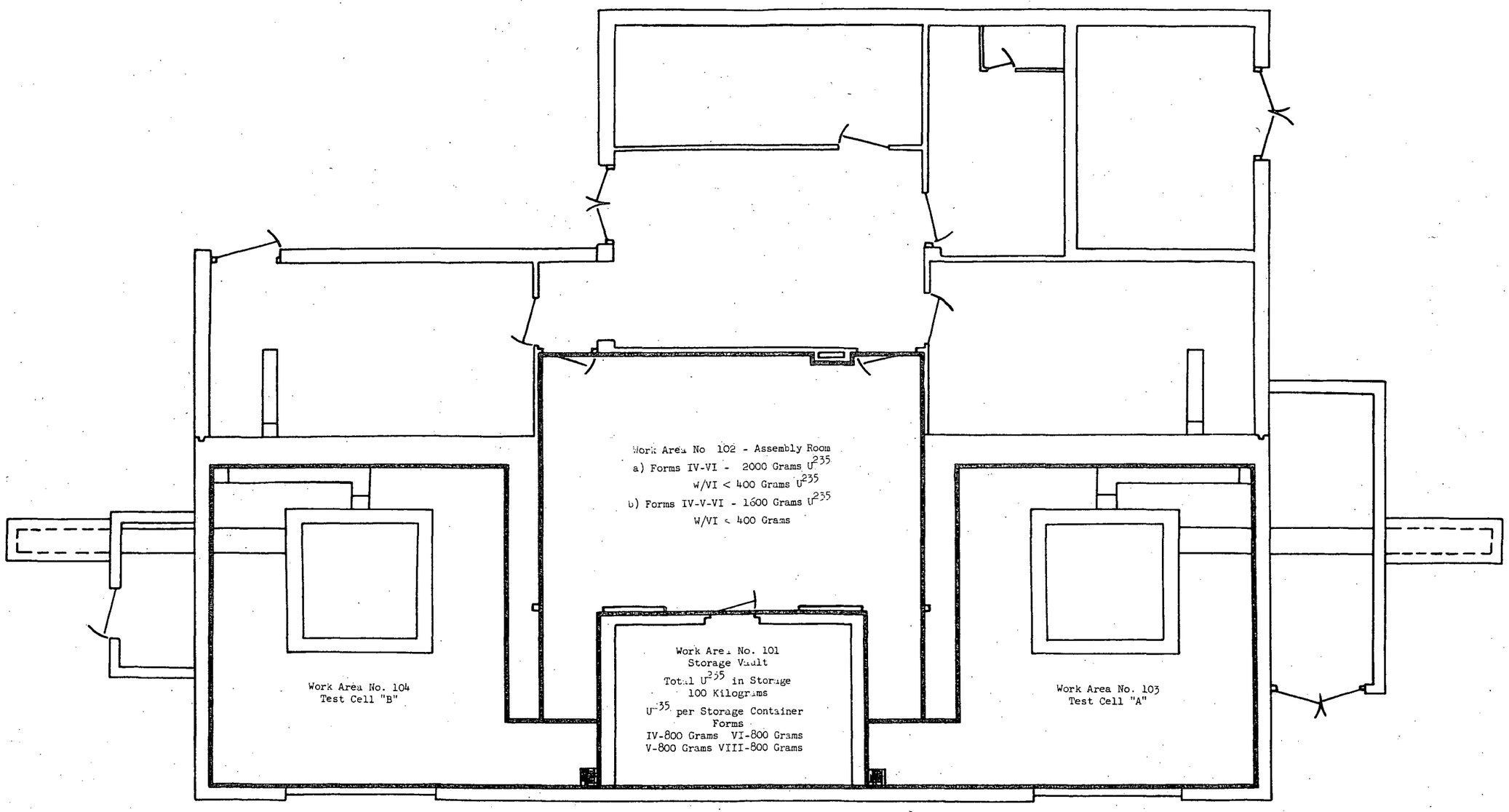
No.	Type of Instrument	Manufacturer	Model No.
1	Scintillation Probe	Radiation Counter Labs	Used with Decade Scaler Model #10-D
1	Alpha Scintillation Detector	Tracerlab	P-12
2	Air Samplers	Millipore	
2	Air Monitors	"	S44AK-978
1	" "	Staplex	TF-1A
1	Fluorimeter	Jarrell-Ash Company	JA-2600
2	Jordan RAMS Systems	Jordan Electronics, Inc.	
1	Decade Scaler used with P10 A Proportional Counter	Tracerlab	
1	Gamma Survey Meter K-350B	Tracerlab	
1	Neutron Probe N-C Model DN3 for NC-2112 Unit	Nuclear-Chicago	
2	BF_3 Probes	Radiation-Counter Laboratories	
1	Mobile Continuous Air Monitor NMC Model AM-2A	Nuclear Measurements Corp.	



Martin Nuclear Division Criticality Work
Pilot Manufacturing Plant



Martin Nuclear Division Engineering Materials Laboratory
Criticality Work Areas Plate 1



Martin Critical Experiment Facility Criticality Work Area Plate 3

Document No.	License No.	Original Date	To/from	Building/Facility Name
A-1	C-3572 Amendment No. 2	?	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-2	C-3508 Amendment No. 4	?	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-3	?	10-1-1957		Radioisotope Lab and Associated Facility, The Martin Co, Baltimore MD
A-4	SNM 53	12-12-1957	To: The Martin Company From: US Atomic Energy Commission – Application for Nuclear Materials	Building D, Plant 1
A-5	19-1398 various amendments	10-22-1957	To: The Martin Co. From: US Atomic Energy Commission	Compliance Inspection Report
A-6	Not legible	12-31-1957	The Martin Company	Not legible
A-7	?	1-13-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-8	C-3572 C-3147 C-3508	10-22-1957	To: The Martin Co. From: US Atomic Energy Commission	To: The Martin Co. From: US Atomic Energy Commission
A-9	?	1-13-1958	To: US Atomic Energy Commission From: The Martin Co	Building D
A-10	C-3572 C-3147 C-3508	1-15-158	Not legible	?
A-11	Criticality Precautions Manual	1-16-1958	To: Atomic Energy Com. From: The Martin Co	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
A-12	?	1-17-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-13	?	1-20-1958	Interoffice Memo: US Government	Baltimore, MD
A-14	?	1-20-1958	To: Atomic Energy Com. From: The Martin Co	Baltimore, MD
A-15		12-18-1957	To: Atomic Energy Com. From: The Martin Co	Baltimore, MD
A-16	19-1398-1	2-7-1958	Interoffice Memo: US Government	Baltimore, MD
A-17	C-3147; C-3508 C-3572	2-7-1958	Interoffice Memo: US Government	Baltimore, MD
A-18		2-12-1958	Interoffice Memo: US Government	Baltimore, MD
A-19	C-3508; C-3572	2-12-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-20	C-3991		To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-21	C-3991	2-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-22	C-3991	2-24-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-23	C-3508, C3572	2-26-1958	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-24	SNM-53	2-27-1958	Interoffice Memo: US Government	Baltimore, MD
A-25	19-1398-2	2-28-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
A-26	SNM-53	2-28-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-27	SNM-11	2-28-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-28	C-3508		To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-29	D-3572; C-3147; C-3508	4-11-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-30	?	9-12-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-31	C-4263	9-5-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-32	?	12-1-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-33		10-1-1958	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-34	?	1-7-1959	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-35	?	1-19-1959	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-36	?	2-20-1959	Office Memo, US government	Baltimore, MD
A-37	C-4283	3-11-1959	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
A-38	?	3-16-1959	Office Memo, US government	Baltimore, MD
A-39	19-1398-10A60	8-25-1959	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-40	C-4283	9-3-1959	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-41	C-4283	9-7-1959	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-42	19-1398-19	9-14-1959	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-43	19-1398-10	1-29-1960	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-44	SNM-53	2-9-1960	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-45	?	2-18-1960	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-46	SNM-53	3-3-1960	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-47	SNM-53	3-11-1960	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-48	SNM-53	3-18-1960	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-49	SNM-53	3-23-1960	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-50	?	3-25-1960	Office memo US Government	Baltimore, MD
A-51	SNM-53	3-30-1960	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
A-52	SNM-53	3-30-1960	Office memo US Government	Baltimore, MD
A-53	SNM-53	4-5-1960	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-54	19-1398-19	4-18-1960	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-55	?	4-16-1960	Office Memo US Government	Baltimore, MD
A-56	SNM-53	4-20-1960	Office memo US Government	Baltimore, MD
A-57	C-4283	4-28-1960	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-58	19-1398-19	5-3-1960	To: US Atomic Energy Commission To: The Martin Co.	Baltimore, MD
A-59	C-4283	5-5-1960	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-60	?	6-?-1960	Office Memo US Government	Baltimore, MD
A-61	SNM-53	6-17-1960	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-62	SNM-53	6-21-1960	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-63	SNM-53	6-22-1960	To: US Atomic Energy Commission From: The Martin Co	Baltimore, MD
A-64	SNM-53	6-?-1960	Interoffice Memo US Government	Baltimore, MD
A-65	SNM-53	6-28-1960	Interoffice Memo US Government	Baltimore, MD
A-66	SNM-53	7-22-1960	Interoffice Memo US Government	Baltimore, MD
A-67	SNM-53	7-22-1960	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-68	C-4283	8-25-1960	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
A-69	?	10-11-1960	To: The Martin Company Stock Holders From: The Martin Company	Baltimore, MD
A-70	C-4283	Not legible	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-71	?	10-25-1960	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-72	SNM-53	12-1-1960	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-73	?	12-5-1960	Interoffice Memo US Government	Baltimore, MD
A-74	?	1-12-1961	Interoffice Memo US Government	Baltimore, MD
A-75	?	1-?-1961	Interoffice Memo US Government	Baltimore, MD
A-76	?	1-30-1961	Interoffice Memo US Government	Baltimore, MD
A-77	?	2-1-1961	Interoffice Memo US Government	Baltimore, MD
A-78	?	2-17-1961	Interoffice Memo US Government	Baltimore, MD
A-79	SNM-53	2-20-1961	Interoffice Memo US Government	Baltimore, MD
A-80	SNM-53	2-21-1961	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-81	C-4283	3-9-1961	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-82	C-4283	3-3-1961	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-83	C-4283	4-13-1961	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-84	STB-187	4-20-1961	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
A-85	STB-187	4-20-1961	To: The Martin Co. From: US Atomic Energy Commission	Baltimore, MD
A-86	19-1398-19	7-21-1961	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-87	SNM-53	8-4-1961	Interoffice Memo US Government	Baltimore, MD
A-88	19-1398-19	9-1-1961	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
A-89	various	10-6-1961	The Martin Company By Product Material List	Baltimore, MD
A-90	SUB-313; STB-187; SMB-112	10-11-1961	To: US Atomic Energy Commission From: The Martin Co.	Notice of name change to Martin Marietta Corp.
A-91	STB-187	10-17-1961	To: US Atomic Energy Commission From: Martin Marietta Corp.	Baltimore, MD
A-92	SNM-53 SUB-313; STB-187; SMB-112	11-16-1961	To: Martin Marietta Corp. From: US Atomic Energy Commission	Baltimore, MD
A-93	19-1398-19	1-24-1962	To: US Atomic Energy Commission From: Martin Marietta Corp.	Baltimore, MD
A-94	SNM-53 MND-2603	3-23-1962	Interoffice Memo US Government	Baltimore, MD
A-95	SNM-53	3-27-1962	Interoffice Memo US Government	Baltimore, MD
A-96	SNM-53	4-2-1962	Interoffice Memo US Government	Baltimore, MD
A-97	SNM-53	5-8-1962	Interoffice Memo US Government	Baltimore, MD
A-98	SNM-53	4-21-1962	Interoffice Memo US Government	Baltimore, MD
A-99	SNM-53	4-2-1962	Interoffice Memo US Government	Baltimore, MD
A-100	SNM-53	6-11-1962	Interoffice Memo US Government	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
A-101	SNM-53	6-14-1962	Interoffice Memo US Government	Baltimore, MD
A-102	SNM-53	9-4-1962	Interoffice Memo US Government	Baltimore, MD
A-103	SNM-53	9-11-1962	Interoffice Memo US Government	Baltimore, MD
A-104	SNM-53	10-10-1962	Interoffice Memo US Government	Baltimore, MD
A-105	SNM-53	11-23-1962	Interoffice Memo US Government	Baltimore, MD
A-106	19-1389-19	1-29-1963	To: Martin Marietta Corp. From: US Atomic Energy Commission	Baltimore, MD
A-107	Document is illegible			
A-108	SNM-53	4-16-1963	To: Martin Marietta Corp. From: US Atomic Energy Commission	Baltimore, MD
A-109	SNM-53	4-19-1963	Interoffice Memo US Government	Baltimore, MD
A-110	SNM-53	4-24-1963	Interoffice Memo US Government	Baltimore, MD
A-111	SNM-53	4-26-1963	Interoffice Memo US Government	Baltimore, MD
A-112	SNM-53	4-30-1963	Interoffice Memo US Government	Baltimore, MD
A-113	SNM-53	6-17-1963	Interoffice Memo US Government	Baltimore, MD
A-114	SNM-53	7-1-1963	Interoffice Memo US Government	Baltimore, MD
A-115	SNM-53	7-2-1963	Interoffice Memo US Government	Baltimore, MD
A-116	SNM-53	7-19-1963	Interoffice Memo US Government	Baltimore, MD
A-117	SNM-53	7-30-1963	Interoffice Memo US Government	Baltimore, MD
A-118	SNM-53	7-30-1963	To: US Atomic Energy Commission From: Martin Marietta Corp.	Baltimore, MD
A-119	SNM-53	7-30-1963	Interoffice Memo US Government	Baltimore, MD
A-291	SNM-0053	3-10-1995	Nuclear Regulatory Commission	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
B-2	MND-2078; MND-2109	8-26-1959	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
B-3	SNM-53	4-18-1960	To: US Atomic Energy Commission From: The Martin Co.	Baltimore, MD
B-4	?	10-3-1961	Interoffice Memo US Government	Baltimore, MD
B-5	SNM-53	4-22-1962	To: US Atomic Energy Commission From: Martin Marietta Corp.	Baltimore, MD
B-6	SNM-53	7-21-1962	To: US Atomic Energy Commission From: Martin Marietta Corp	Baltimore, MD
B-7	SNM-53	6-7-1962	Interoffice Memo US Government	Baltimore, MD
B-8	SNM-53	6-7-1962	Interoffice Memo US Government	Baltimore, MD
B-9	SNM-53	9-20-1962	Interoffice Memo US Government	Baltimore, MD
B-10	SNM-53	9-24-1962	To: The Martin Co From: US Atomic Energy Commission	Baltimore, MD
B-11	SNM-53	5-17-1963	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD
B-12	?	7-30-1963	Interoffice Memo US Government	Baltimore, MD
B-13	SNM-53	10-8-1963	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD
B-14	19-1398-19	1-23-1984	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD
B-15	SNM-53	2-28-1964	Interoffice Memo US Government	Baltimore, MD
B-16	SNM-53	3-9-1964	Interoffice Memo US Government	Baltimore, MD
B-17	SNM-53	3-12-1964	To: The Martin Co From: US Atomic Energy Commission	Baltimore, MD
B-18	SNM-53	3-20-1964	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD

Document No.	License No.	Original Date	To/from	Building/Facility Name
B-19	SNM-53	4-1-1964	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD
B-20	SNM-53	4-7-1964	Interoffice Memo US Government	Baltimore, MD
B-21	SNM-53	4-24-1964	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD
B-22	SNM-53	4-24-1964	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD
B-23	SNM-53	6-2-1964	Interoffice Memo US Government	Baltimore, MD
B-30	SNM-53	8-26-1964	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD
B-31	SNM-53	9-11-1964	To: US Atomic Energy Commission From: The Martin Company	Baltimore, MD
B-32	SNM-53	9-24-1964	Interoffice Memo US Government	Baltimore, MD
FOIA/PA-2008-0006			Appendix B	
FOIA/2008-0006			Appendix A	
IE 07			Docket Region 1	
NRC Region 1	various	1-25-1995	To: Martin Marietta NRC	
Teledyne	SNM-849	3-25-1975	To: NRC From: Teledyne	

Record / Docket Number	
A/44 – 70-58	2/1/60 – license amendment request SNM-53. Martin to AEC adds Plutonium Beryllium source for Critical Facility (KC) experiments. Indicates details on the Critical facility can be found in Martin Nuclear Division documents MND-1110, 1111, 1112, and 1157, and revised Criticality Manual MND-1063.
A/45 – 70-58	No date (1960)– Attachment 1 to above license amendment. Documents fabrication of uranium-aluminum alloy fuel elements (not clear whether in Building KC). Described fuel core assembly process– aluminum-uranium cores, hot-rolled in work area 17, punched from billets in work area 35, and assembled into plates in work area 41. Also documents testing consisting of radiography in work area 23, non-destructive testing in work area 25, and blister-annealing in work area 37.
A/46 – 70-58	3/4/60 - Telegram communication Martin Co. to AEC – requested the AEC's approval of above license amendment be expedited ahead of complete amendment.
A/47 – 70-58	3/11/60 - Telegram communication Martin Co. to AEC – requested the AEC's approval of above license amendment be expedited due to contract Martin had to supply fuel elements by May 4, 1960.
A/48 – 70-58	3/18/60 – Martin Company to AEC, clarification regarding sections of Martin Criticality Manual MND-1063 which had been revised. Indicates storage of PM-1 and ANPP fuel elements, and ERDL foil containers. (Building KC)
A/49 – 70-58	3/23/60 – Martin Co. to AEC – Indicates intent to replace original letter dated 2/9/60, due to misunderstandings which have held up approval. Clarification provided as to plan to fabricate uranium-aluminum alloy fuel elements, and attaches a new Nuclear Division report (MND-2330) covering health safety aspects of this work. Indicates there was a storage room in Building KC, 22 ft. x 13 ft. x 11 ft high, and walls of reinforced concrete 9 inches thick. The birdcages (storage containers for source materials) were placed on racks along the walls at least 17 inches above the floor to avoid flooding. Storage racks for fuel elements were located in the center of the room.
A/50 – 70-58	3/25/60 – AEC to Martin Co. recommending approval of the 3/23/60 amendment. Discusses SNM process flow and procedures (mass limits and concentration controls) to avoid criticality. (KC)
A/51 – 70-58	3/30/60 – Re: Amendment to SMN 53 (from 3/23/60): Internal AEC from Chief of licensing branch to hazards evaluation branch requesting review of applicants procedures to avoid accidental criticality. (KC)
A/52 – 70-58	3/30/60 – AEC Analysis and Findings responding to above request for review. Approval of amendment was recommended based on adequate safety procedures and experience of applicant. (KC)
A/53 – 70-58	4/5/60 - Form AEC-401 Amended SNM license, SNM-53 for U-235 as uranium oxide, and plutonium Pu-239 as Pu-Be source. (KC)
A/54 – 70-58	4/18/60 – (unspecified building) Martin Company to AEC, request for amendment to Byproduct Material License 19-1398-19. Changing maximum radioactivity of

	Cobalt-60 source to 10 curies.
A/55 – 70-58	4/18/60 – no license #/bldg. named. Internal MND safety calculation for storage boxes holding U-235 under flooded conditions.
A/56 – 70-58	04/20/60 – Re: Amendment to SMN 53 (request dated 4/18/60): Internal AEC from Chief of licensing branch to hazards evaluation branch requesting review of safety of Martin Company storage of fuel plate assemblies in cardboard and wood.
A/57 – 70-58	4/28/60 - no license #/bldg. named. Martin Company to AEC requesting amendment to source material license C-4283 to increase amount of Thorium-Magnesium Alloy from 75,000 to 100,000 pounds.
A/58 – 70-58	5/3/60 – no license #/bldg. named. Request from Martin Company to AEC Division of Licensing for Amendment to Byproduct Material License 19-1398-19. Request was to use a Technical Operations, Inc. model 412 projector with an Iridium-192 (50 curie) source.
A/59 – 70-58	5/5/60 – AEC licensing branch to Martin Company. Approval of 4/28/60 amendment to license C-4283 to increase amount of Thorium-Magnesium Alloy from 75,000 to 100,000 pounds.
A/60 – 70-58	6/10/60 – (SNM-53) Recommends approval of 4/18/60 Martin Company request to approve shipping procedures for aluminum clad fuel elements in wood/cardboard containers. Mentions shipment to University of California or University of Washington.
A/61 – 70-58	6/17/60 – MND request for amendment to SMN-53 further revising 4/5/60 amendment for Pu-Be source, to add Plutonium-alpha source to be used for instrument calibration purposes. Includes by attachment MND plutonium handling procedure.
A/62 – 70-58	6/21/60 – Writeup of the shipping procedure under SMN-53 for shipment of uranium-aluminum fuel elements via railcar to Universities of California and Washington.
A/63 – 70-58	6/22/60 – From Martin Company, Chairman Nuclear Control, regarding 1959 installation of radiation monitoring system at Middle River plant. (Building D).
A/64 – 70-58	6/28/60 – (SNM-53) Memorandum from AEC hazards evaluation branch to licensing branch regarding shipment of fuel elements via railcar to Universities of California and Washington. Indicates the AEC reviewed plan for shipping and recommended additional procedures be implemented to ensure radioactive fuels elements are not commingled with other radioactive materials.
A/65 – 70-58	6/28/60 – Internal communication from AEC hazards evaluation branch to licensing branch indicating the additional information requested by AEC 6/10/60 for SNM-53 amendment.
A/66 – 70-58	7/22/60 – AEC recommends approval of 6/17/60 amendment request to use plutonium alpha source as calibration standard. Also approves the request for shipping uranium-aluminum fuel elements to Universities of California and Washington.
A/67 – 70-58	7/26/60 – Form AEC-401, for amendment to SNM-53, adding the plutonium alpha source as calibration standard. The SMN-license now includes up to 500 kg. of U-235, 150 grams of Pu-239 as a Pu-Be neutron source, and 0.7 mg. Pu-239 as a Pu-alpha source. Location – Middle River Plant, Middle River, MD.
A/68 – 70-58	8/25/60 – no license #/bldg. named. Martin Co. to AEC requesting extension of

	license C-4283 (source material license) from 9/30/60 to 12/31/60.
A/69 – 70-58	10/11/61 (docket date) – Notice of Special Meeting of Stockholders: regarding the consolidation of American-Marietta Company with The Martin Company. Includes a prospectus of each company; describes the Martin Nuclear activities.
A/70 – 70-58	9/9/60 – AEC to Martin Company, issuance of license C-4283 (source material license) for the possession of 100,000 pounds of thorium magnesium alloy containing not more than 4-percent thorium. Subsequent document indicates this material was for fabricating the outer skins of Titan I missiles.
A/71 – 70-58	4/19/61 – Source material license C-4283 - AEC Radiation Safety Branch radiation safety check (inspection report). Indicates 150,000 pounds or thorium magnesium alloy stored at any given time. Indicates limited volumes 3,000 (no units) liquid waste disposed in or transferred to sewer, marked as "adequate" on inspection form.
A/72 – 70-58	12/1/60 – Martin Company to AEC, request for further amendment to SNM-53, in reference to storage of 500 kg of U-235 in licensed vault. Requests addition of storage facilities for feed material and finished products. Includes storage in an area of 8 former munitions bunkers known as the "revetment" area. Each bunker measured 15 x 13 x 11 ft. high. Plans for storage of 75 kg. U-235 in each of 3 of the bunkers. No maps or photos included.
A/73 – 70-58	12/5/60 – Re: Amendment to SMN 53 (request dated 4/18/60): Internal AEC from Chief of licensing branch to hazards evaluation branch requesting review of procedures in place to avoid accidental criticality in storage areas referenced in 12/1/60 request.
A/74/75 – 70-58	1/12/61 – AEC facilities and materials handling branch to MND nuclear facilities safety. Requests detailed information on the types of materials and conditions they would be stored in within the 3 former ammunition bunkers. Requests that alarmed detection sensors should be installed in each of the bunkers, and requests additional information on the manner of storage in the outdoor fenced area near Building D.
A/76 – 70-58	1/30/61 – AEC internal communication nuclear materials branch to criticality evaluation branch requesting evaluation of procedures to avoid criticality in storage areas/bunkers.
A/77 – 70-58	2/1/61 – AEC internal communication clarifying the additional information that should be requested regarding the storage areas in Martin Co. request dated 12/1/60.
A/78 – 70-58	2/17/61 - AEC internal communication criticality branch to nuclear materials branch. Indicates review of accidental criticality prevention was completed and the storage areas are safe under even flooded conditions due to the mass limitations.
A/79 – 70-58	2/20/61 – AEC Analysis and Findings – recommends approval of 1/17/61 MND request to amend SNM-53 by increasing the U-235 quantity in the melt and ingot process during fabrication of uranium-aluminum fuel plates.
A/80 – 70-58	2/20/61 – Form AEC-401 for SMN-53, increases U-235 quantity to 500 kgs. (for Middle River Plant, MD)
A/81 – 70-58	3/9/61 – re: license C-4283, Martin Company request to AEC to increase the limit of thorium-magnesium alloy (4% thorium) from 100,000 lbs. to 150,000 lbs. and requesting an extension of the license from 9/30/61 to 9/30/62.

A/82 – 70-58	3/31/61 – AEC to Martin Co. acknowledgement of receipt of 3/9/61 request to amend license C-4283. Requests additional information including detailed descriptions of the activities to be performed, and the quantities and disposal methods of radioactive waste.
A/83 – 70-58	4/12/61 – Martin Company to AEC re: 3/31/61 AEC request for additional information in connection with above license amendment. Lists activities to be performed including machining, cleaning of alloy plates using trichloroethylene and chromic acid pickle, and finishing with dichromate treatment and zinc chromate primer (as outer skins for Titan I missiles). Describes wastes generated including chips, clippings, dust, etc. accumulated at 3,000 lbs. maximum quantity. Solid wastes removed at 6 to 10 month intervals and sold to a licensed scrap dealer. Liquid wastes were analyzed periodically and were found safe to dispose in the sanitary sewer.
A/84 – 70-58	4/20/61 – from AEC to Martin Company re: new license identification system, source material license STB-187 replaced C-4283.
A/85 – 70-58	4/20/61 – AEC to Martin Co. approval of storage of 100,000 lbs. thorium-magnesium alloy under license STB-187.
A/86 – 70-58	7/21/61 – Martin Co. to AEC – letter requests amendment to by-product material license 19-1398-19 (sealed sources for radiography) to permit the use of by-product material for radiography (Iridium-192 and Cobalt-60) at PM-1 reactor being assembled near Sundance, Wyoming. Requests by-product material be shipped from Middle River to point of commercial delivery nearest the reactor site and transported by the user to the reactor site.
A/87 – 70-58	8/4/61 – AEC memorandum criticality branch to source & special nuclear materials branch. Martin Co. submitted application 7/31/61 to amend SNM-53 to add highly enriched uranium oxide powder in spherical form, maximum 4,000 grams. This memorandum indicates the safety controls are adequate to prevent accidental criticality.
A/88 – 70-58	9/1/61 – Martin Co. to AEC request to amend byproduct material license 10-1938-19 to include use of a projector containing 50 curies of Iridium-192.
A/89 – 70-58	10/6/61 – Inventory of all Martin Company licenses for byproduct material, by location. The following licenses are listed for the Middle River Plant location: 19-1398-1 – sealed sources for calibration at the Critical Experiment Facility (Bldg. KC); also, includes photos of bunkers to be used as referenced in above SNM-53 amendment request (A-72 to A-76). 19-1398-3 – sealed cobalt sources 19-1398-9 – sealed sources for instrument calibration 19-1398-12 – sealed sources Krypton-85 (light source) 19-1398-14 – research & development 19-1398-15 – radioisotopic heat sources 19-1398-17 – sealed strontium sources for calibration 19-1398-18 – sealed sources for density gauge 19-1398-19 – sealed sources for radiography 19-1398-20 – for preparation of sealed source for irradiation 19-1398-21 – thermoelectric converters 19-1398-23 – sealed H3 standard light source 19-1398-25 – sealed source density gauge

	Also references a fenced outdoor storage area (on concrete slab) for nuclear materials scrap on the south side of Building D, including storage of up to 100 kg of U-235 and other scrap in drums.
A/90 – 70-58	10/10/61 – Martin Co. to AEC, letter indicating Martin Co. will become Martin-Marietta, but the management and operations governed under licenses STB-187, SMB-112, and SUB-313 would remain unaffected.
A/91 – 70-58	10/17/61 - Martin Co. to AEC, letter indicating the consolidation to Martin-Marietta had occurred and requesting transfer of licenses to the name of the new corporation.
A/92 – 70-58	11/16/61 – letter from AEC to Martin Company indicating the license SMN-53 had been transferred to the new corporation name of Martin-Marietta. (revised license attached).
A/93 – 70-58	1/24/62 – Martin-Marietta to AEC – request to amend expiration date only for by-product material license 19-1398-19.
A/94 – 70-58	3/23/62 – AEC memorandum documenting department of licensing & regulation meeting with Martin Nuclear Division to discuss amendment to SNM-53. Martin-Marietta requested to increase the production capacity for spheroidizing Uranium oxide powder. The amendment would include an increase in the amount of wastewater due to increasing the size of the washing apparatus to two washing towers. Recommends limits on U2-O2 in air and water filters.
A/95 – 70-58	3/27/62 – (no bldg. name.) AEC internal communication nuclear materials branch to criticality evaluation branch requesting evaluation of procedures to avoid criticality with amendment to SNM-53 requested by MND on 3/22/62.
A/96 – 70-58	4/2/62 – AEC approval of MND amendment to SNM-53 to increase the production and washing capacity for the uranium-dioxide powder.
A/97 – 70-58	5/8/62 – (no bldg. name.) AEC internal communication nuclear materials branch to criticality evaluation branch requesting evaluation of procedures to avoid criticality in amendment requested by Martin-Marietta on 5/3/62.
A/98 – 70-58	5/17/62 – same as above.
A/99 – 70-58	5/24/62 – (no bldg. name.) AEC internal communication nuclear materials branch to process evaluation branch requesting review of containers proposed in connection with the drop-hammer test.
A/100 – 70-58	6/11/62 – AEC Memorandum re: amendment to SNM-53 (requested 5/8/62) for shipment of uranium-dioxide stainless steel clad fuel plates to the National Nuclear Energy Department in Rome, Italy.
A/101 – 70-58	6/14/62 - AEC Memorandum re: Martin-Marietta request to increase mass limits of uranium-dioxide powder under license SNM-53 from 800 grams to 3.5 kilograms.
A/102 – 70-58	9/4/62 – transmittal letter nuclear materials branch to process evaluation branch indicating materials attached were being provided to aid evaluating shipping procedures.
A/103 – 70-58	9/11/62 – AEC letter acknowledging AEC completed review of shipping procedures or shipment to Rome, Italy, and approved pending reassurance that the Italian government would ensure subsequent transport is done safely.
A104 – 70-58	10/10/62 – (Bldg. KQ?) Letter from Enforcement Branch AEC to Martin-Marietta. Dr. McHerney of the Metallographic Laboratory had an elevated film badge reading of 100 rem over 13 weeks; however it was concluded that the badges had

	been stored too close to uranium sources.
A/105 – 70-58	11/23/62 – AEC internal memorandum documents MND request to ship and receive two central core fuel bundles of PM-3a elements to Andrews Air Force base.
A/106 – 70-58	1/29/63 – Martin Company request to AEC to renew two byproduct material licenses (19-1398-19 and 19-1398-27). Attachment from Martin Company describes chamber leak-testing. Nuclear Components Department named on license. Includes Thulium-170 and Strontium-Yttrium 90 on license, in addition to Iridium and Cobalt.
A/107 – 70-58	4/16/63 – AEC Division of Compliance, transmittal of Type "B" incident, explosion of spheroidizing room. Spheroidizing operation equipment was lost for more than one week. Failure of MND to determine whether a release of UO2 occurred through the stack
A/108 – 70-58	4/19/63 – AEC Memorandum, division of licensing and regulation to compliance division describes explosion of spheroidizing room. (No Bldg. is named). States one employee was contaminated and the area was decontaminated.
A/109 – 70-58	
A/110 – 70-58	4/24/63 – AEC compliance division to division of licensing and regulation regarding a Type "B" incident, explosion, tagged SNM-53. States a memorandum was transmitted on April 19, 1963 regarding an investigation report dated April 16th, 1963, which included the urinalyses and film badge results for a licensee employee. Smear survey results of the filter system at the licensee's facility are also included.
A/111 – 70-58	4/26/63 – AEC enforcement branch to Files regarding license SNM-53 describing that no items of noncompliance were found during the investigation and no enforcement action is appropriate.
A/112 – 70-58	4/30/1963 – Criticality Evaluation Branch (DLR) to Source and Special Nuclear Materials Branch (DLR) regarding an application dated March 29, 1963 for procedure to be followed in using a "work box" both for fuel storage and general storage at a processing location. They conclude that the procedures described are adequate to prevent a condition of accidental criticality for fuel material, but are reminded that any fuel differing in enrichment or chemical and physical form must be covered for a request for a license amendment.
A/113 – 70-58	6/17/63 -- Criticality Evaluation Branch (DLR) to Source and Special Nuclear Materials Branch (DLR) states the review and acceptance of the use of 50 in-process storage tanks
A/114 – 70-58	7/1/63 – Criticality Evaluation Branch to Files regarding a meeting held on June 25, 1963 to discuss a subject license amendment application regarding the stability and structural integrity of a shipping container for pathfinder fuel elements.
A/115 – 70-58	7/2/63 – Follow up memorandum of A/114 stating the criticality evaluation branch reviewed the application requesting the use of shipping containers for the shipment of Pathfinder fuel elements. The use of railway express for the shipments was stated by the applicant, but the CEB can not conclude that the use of railway express will prevent comingling with other materials. The CEB approves the proposed procedures subject to the use of railway express.
A/116 – 70-58	7/19/63 – Another follow up memorandum of A/115 stating the subject application has been reviewed and concluded there is insufficient information to

	determine adequacy of procedures to prevent a condition of accidental criticality. This memorandum describes nine areas where additional information is required to continue analysis
A/117 – 70-58	7/30/63 – AEC to fuel processing branch regarding the needed review of the structural integrity of the aforementioned shipping container for pathfinder fuel
A/118 – 70-58	7/30/63 – AEC letter regarding the shipment of Pathfinder fuel elements from Baltimore to Sioux Falls, South Dakota. The use of vehicle or courier escort was determined not feasible, so REA Express was contacted and enclosed is the reply letter describing the ability to handle the said shipment.
A/119 – 70-58	8/6/63 – AEC memorandum requesting the review of the letter dated July 30, 1963 (above) from the standpoint of adequate control to prevent comingiling of SNM shipments. Also states the Martin container and shipping procedures may be used by Pathfinder to return any rejected elements.
A/120 – 70-58	8/9/63 – AEC memorandum stating the review of the aforementioned letter dated July 30, 1963 determining the letter from REA express is not adequate evidence of compliance with certain provisions. AEC requests a written certificate from REA express describing that the shipment will meet procedure to ensure the requirements of shipment are followed
A/121 – 70-58	8/13/63 – AEC internal memo describing the requests stated above regarding the shipment of Pathfinder fuel
A/122 – 70-58	12/11/63 – AEC memorandum describing the review of the application dated July 19, 1963, also includes specific revisions suggested to the application
A/123 – 70-58	1/28/64 – AEC to Martin company nuclear division describing the application dated March 28, 1963 for renewal of license SNM-53. The results of the discussion require the re-submission of the application, including covering the 20 points of additional information enclosed in this document.
A/124 – 70-58	2/14/1964 – Martin company to AEC regarding the proposed amendment 20 to SNM-53 including the proposed use shipping containers and methods for the shipment of excess uranium bearing material for reprocessing. Approval from AEC is requested for this amendment
A/125 – 70-58	2/21/64 – Martin company to AEC requesting that license 19-1398-27 be combined with 19-1398-19 thereby eliminating 19-1398-27 since they are both similar. Additional information needed for the application is also included
A/126 – 70-58	2/25/64 – Martin company to AEC requesting the establishment of an allocation for enriched uranium to assure proper authorizations are in effect for withdrawal in April
A/127 – 70-58	2/25/64 – summary of telephone conversation between Martin company and C. Keller regarding the status of the application dated 2/14/64 to ship air filters containing uranium
A/128 – 70-58	3/2/64 – AEC to Martin corporation describing Source Material License number STB-187 is due to expire on April 30, 1964
A/129 – 70-58	3/3/64 – AEC requesting the review of the martin application dated 2/14/64(filters containing uranium) with reference to the structural integrity and shoring of the shipping containers.
A/130 – 70-58	3/20/64 – Martin company to AEC acknowledging the expiration of license STB-187 and executing the termination of said license due to no longer needing the application at the Middle River facilities

A/131 – 70-58	3/24/64 – AEC internal, regarding the letter from 3/20/64 (shipment of air filters) requesting review from the standpoint of criticality control.
A/132 – 70-58	4/6/64 – AEC internal responding to the above request for review of shipment of air filters. AEC has no further objections, but informs Martin some calculations were erroneous and in need of reviewing
A/133 – 70-58	4/8/64 – AEC internal regarding Martin Company requesting amendment of SNM-53, requesting review of the application from the standpoint of criticality control
A/134 – 70-58	4/14/64 – Martin company to AEC, Martin centralized all Radioactive Materials Management within the Contracts Department.
A/135 – 70-58	4/15/64 – AEC internal regarding the Martin Company application dated 4/1/64. AEC reviewed the application for SNM-53 to authorize the fabrication of a nuclear core. Inlcuded are comments regarding said application
A/136 – 70-58	4/29/64 – AEC internal, regarding further information in reply to letter dated 4/20/64, review of the application from the standpoint of criticality control is requested
A/137 – 70-58	4/30/64 – AEC to Martin company acknowledging Martin's letter dated 4/14/64 regarding the appointment of C. Keller as Nuclear Accountability and Licensing Representative for Martin Company.
A/138 – 70-58	5/15/64 – AEC internal, regarding Martin company application dated 5/11/64. Review concludes the procedures described in application for amendment of SNM-53 to authorize the shipment of uranium solutions are adequate.
A/139 – 70-58	6/9/64 – AEC internal, regarding Martin company requesting authorization for Class III shipment of 15 drums of uranium solution, 21 drums of solid and powder uranium scrap and six metal containers for large ductwork filters. AEC has no objections, subject to approval by C. Beck regarding the structural integrity of the container
A/140 – 70-58	6/12/64 – AEC internal, Martin company application dated 6/9/64 reviewed, requesting authorization for shipment of ten containers in two rows of five each of uranium scrap. AEC has no objections, but subject to C. Beck review (like above)
A/141 – 70-58	6/29/64 – Martin company revision request for shipment of scrap to Erwin, Tennessee
A/142 – 70-58	6/22/64 – AEC internal, describing a visit to NFS in Tennessee and the shipment of filters received from Martin corporation. Comments describe a question concerning the ability of the shoring to withstand a one hour fire test as well as the filters containing more uranium than previously approved, a further discussion is requested.
A/143 – 70-58	6/22/64 – AEC internal hand written note regarding the shipment of filters containing U-235 from Martin to Tennessee.
A/144 – 70-58	7/7/64 – Martin company to AEC regarding proposed amendment 22 to SNM-53. Policy change in AEC to establish all health and safety aspects of special nuclear material processing results in Martin Corporation requesting approval for several processing steps previously approved by the New York Operations office of the AEC.
A/145 – 70-58	7/8/64 – AEC internal, regarding letter 8/7/64 from Martin Company requesting amendment of SNM-53 to include particle coating, extrusion, and hydrostatic pressing of enriched uranium be reviewed from the standpoint of criticality control

A/146 – 70-58	7/20/64 – Martin company to AEC, Martin requesting by product material license 19-1398-20 be amended to permit the measuring of basic spectrum derived from radioactive decay of several radioisotopes, includes description of the procedures to be used
A/147 – 70-58	7/22/64 – AEC internal, regarding Martin company application dated 7/9/64 and includes a list of discussion points pertaining to nuclear safety
A/148 – 70-58	7/28/64 – AEC internal, regarding Martin company application 7/7/64, supplemented 7/20/64. Describes that AEC reviewed the application and can not agree with the statement that uranium particle coating be termed as a "dry" operation, AEC includes recommendations to either limit the maximum uranium-235 within coating or provide a detailed nuclear safety analysis demonstrating the safety of the proposed operations
A/149 – 70-58	8/12/64 – AEC to Martin company, same content as A/148, see above
A/150 – 70-58	8/17/64 – AEC internal, regarding Martin company application dated 8/4/1964. Describes the review of the amendment of SNM-53 to authorize the fabrication of a nuclear core employing U (5%) O2 pellets.
A/151 – 70-58	8/19/64 – AEC internal, regarding Martin company application 8/14/64. AEC reviewed the application for authorization to ship U(5%) O2 pellets and, subject to approval by C. Beck, have no objections
A/152 – 70-58	8/26/64 – AEC internal, regarding Martin company additional information dated 8/19/64. AEC reviewed the information and concludes that cleaning operations are safe from uranium build up and have no objection to the described storage or the handling procedures for scrap
A/153 – 70-58	8/27/64 – AEC to Martin company, describing SNM-53 being amended to authorize shipment of uranium oxide pellets from Erwin, Tennessee to Baltimore, Maryland in accordance with procedures described in letters dated 8/14/64 and 8/26/64
A/154 – 70-58	8/28/64 – AEC to Martin company, regarding SNM-53 amendment described above. Describes a typographical error in the 8/6/64 submittal
A/155 – 70-58	No date, AEC to Martin company asking for three copies of Martins latest annual financial report
A/156 – 70-58	9/9/64 – Martin company to AEC, complying to the above request and enclosing three copies of the annual financial report
A/157 – 70-58	9/24/64 – AEC internal, regarding Martin company application dated 9/11/64, stating AEC reviewed the request to increase in certain station limits and the inclusion of several new process steps and have no objections
A/158 – 70-58	9/29/64 – AEC to Martin company, regarding the further amendment of SNM-53 in accordance with the procedures described in the letters dated 8/4/64, 8/19/64, and 9/11/64
A/159 – 70-58	10/5/64 – AEC to Martin company, stating SNM-53 is amended to authorize uranium particle coating, tube extrusion and hydrostatic pressing of tubular fuel components in accordance with procedures described in letter dated 7/7/64 and telegram dated 7/20/64 subject to the maximum quantity of enriched uranium not exceed 350 grams
A/160 -- 70-58	10/28/64—Western union telegram for the request of approval for shipment of UO2 from Middle River, MD to Battelle Memorial Institute in Columbus, OH.
A/161 – 70-58	10/30/64 – AEC internal, regarding Martin company TWX of 10/28/64. AEC states

	they have reviewed the application requesting authorization for shipping one kg enriched with UO2, approve the shipping container drop tests but cannot approve the “uncontrolled” shipment plan.
A/162 – 70-58	11/2/64 – AEC internal, regarding chronologies of actions on timely renewal applications. Describes the actions taken for 14 licenses that expired and are being continued on a timely renewal basis
A/163 – 70-58	11/16/64 – AEC to Martin company, describes the telephone conversation on 11/2/64 stating the withdrawn request dated 10/28/64 to ship 1 kg of UO2 and that no further action would be taken
A/164 –70-58	12/4/64 – AEC to Martin company, regarding SNM-53 being further amended to authorize the storage of MH-1A fuel tubes in accordance with procedures described in the licensee’s application dated 11/23/64
A/165 – 70-58	12/4/64 – AEC internal, regarding Martin company application dated 11/23/64, stating they have no objection to the request for the authorization for the temporary storage of fuel tubes containing UO2 pellets.
A/166 – 70-58	12/4/64 – Kramer-Consolidated Freight Lines, Inc to Martin company, Kramer stating that they have a program for the proper handling of radioactive material and do not intermix radioactive shipments
A/167 – 70-58	12/11/64 – AEC internal, regarding Martin company nuclear material license SNM-53. Includes the report of a nuclear safety inspection conducted at the Baltimore facilities on 11/12/64
A/168 – 70-58	12/18/64 – AEC to Martin company, stating the 3/28/63 license SNM-53 is renewed and will expire on 6/30/65
A/169 – 70-58	12/31/64 – AEC internal, regarding Martin company PU-238 criticality limits. Describes a telephone conversation between Martin and AEC, Martin asked about criticality requirements concerning PU-238 that AEC had in place, AEC did not have any established as of yet
A/170 – 70-58	1/8/65 – Telegram from Martin to AEC, stating Martin will be unable to meet target date for new submission of SNM-53 that AEC requested, application is in the last stages of editing
A/171 – 70-58	1/21/65 – AEC internal, regarding the compliance inspection report for Martin company for the inspection conducted 11/12/64. Describes that AEC does not plan to correspond with Martin regarding the inspection as no items of noncompliance were found
A/172 – 70-58	1/28/65 – Martin company to AEC, regarding the revised application for Martin license SNM-53, Martin submits the revised Martin Marietta corporation application for SNM-53
A/173 – 70-58	2/24/65 – Martin company to AEC, regarding the shipment of special nuclear material Argonne National Laboratory, requesting AEC approval for further use of a container
A/174 – 70-58	2/24/65 – AEC byproduct material license for Martin Marietta Corp, license 19-1398-33
A/175 – 70-58	3/11/65 – AEC internal, regarding Martin company application dated 3/3/65, AEC reviewed the request for authorization for the storage of MH-1A fuel elements and have no objection to the request
A/176 – 70-58	3/12/65 – AEC to Martin company, describing SNM-53 is further amended to authorize storage of unirradiated MH-1A fuel elements, storage on elements after

	use in criticality experiments is still under consideration
A/177 – 70-58	3/29/65 – Mason Dixon Lines, inc to Martin company stating Mason Dixon will not transport shipments of radioactive materials in the same trailer with other shipments of radioactive materials
A/178 – 70-58	4/12/65 – Martin company to AEC regarding the shipment of SNM to Battelle Memorial Institute in Columbus, OH. Martin requesting approval for shipment of U-235 to BMI in OH
A/179 – 70-58	4/12/65 – Martin company to AEC regarding the shipment of SNM to Nuclear Fuel Services in Erwin, Tennessee. Martin requesting AEC approval for use of the container previously used in a drop test to ship excess fuel from the Pathfinder program to NFS in Tennessee
A/180 – 70-58	4/14/65 – AEC to Martin company, describes AEC response to Martin letter from 2/24/65 requesting amendment of SNM-53 to authorize shipment of uranium oxide powder
A/181 – 70-58	4/15/65 – Martin company to AEC regarding the storage of fuel elements and how Martin needed approval from AEC by 5/5/65
A/182 – 70-58	4/20/65 – Martin company to AEC, Martin encloses six copies of the Martin Marietta corporation annual report for 1964
A/183 – 70-58	4/26/65 – AEC to Martin explaining the request to store MH-1A fuel elements after use in critical experiments will be transferred to a different branch (Division of Reactor Licensing)
A/184 – 70-58	4/29/65 – AEC to Martin Company stating SNM-53 further amended to authorize the shipment of U-235 from Baltimore,MD to Erwin, TN
A/185 – 70-58	4/29/65 – AEC internal, regarding Martin company application dated 4/12/65. AEC reviewed the applications for shipments of U-235 and have no objections
A/186 – 70-58	5/28/65 – AEC to Martin company, AEC further amends SNM-53 to authorize storage of MH-1A fuel elements after use in critical experiments
A/187 – 70-58	6/3/65 – Martin company to AEC, regarding the shipment of excess SNM from Martin Company to Uranium Reprocessing Facility. Martin requests AEC approval for this shipment
A/188 – 70-58	6/16/65 – AEC internal, regarding Martin company consolidated renewal application dated 1/28/65. AEC reviewed the application for renewal of SNM-53 and requests more information to continue their review
A/189 – 70-58	6/30/65 – AEC to Martin company, amending SNM-53 to list expiration date as 8/30/65 and the request for renewal for SNM-53 for the 3 year period is under consideration
A/190 – 70-58	7/13/65 – AEC to Martin company, regarding the renewal of SNM-53, AEC requests more information for their review
A/191 – 70-58	7/15/65 – Martin telegram to AEC, describing the content of the phone conversation involving containers and filters
A/192 – 70-58	7/16/65 – Martin telegram to AEC, describing specifics on solution containers and U-235 content in filters
A/193 – 70-58	7/16/65 – AEC to Martin company, describing the amendment of Condition 13 of License 19-1398-33 regarding personnel who will be supervising byproduct material
A/194 – 70-58	7/19/65 – AEC internal, regarding Martin company application dated June 3, 1965. AEC reviewed the application for authorization for the exclusive use shipment of

	scrap material, they conclude that the shipment is safe
A/195 – 70-58	7/20/65 – AEC to Martin company, authorizes the shipment of U-235 from Baltimore, MD to Erwin, TN
A/196 – 70-58	8/10/65 – AEC to Martin company, notice that SNM-53 is set to expire on 9/30/65
A/197 – 70-58	9/2/65 – Martin company to AEC, regarding the AEC letter from D. Nussbaumer dated 7/13/65, Martin submits revised pages for the renewal of SNM-53
A/198 – 70-58	9/20/65 – AEC internal, regarding Martin company application dated 9/2/65. AEC has no objections to the information presented but expresses concerns towards evaporator concentration of liquid radioactive waste
A/199 – 70-58	9/30/65 – AEC to Martin company, AEC amends SNM-53 expiration date to 12/30/65
A/200 – 70-58	9/30/65 – Martin company to AEC, regarding renewal of SNM-53, included are references containing additional information requested by AEC
A/201 – 70-58	10/7/65 – Martin company to AEC, Martin requests that Byproduct Material License 19-1398-33 be amended to include personnel as an authorized user for the transport and demonstration of a Martin product
A/202 – 70-58	10/18/65 – AEC internal, regarding Martin company application dated 9/30/65. Included are various responses to items pertaining to the application
A/203 – 70-58	11/18/65 – AEC to Martin, includes amendment to License 19-1398-33 with respect to Item 8A and Condition 15
A/204 – 70-58	12/1/65 – Martin company to AEC, Martin submits revised pages to further clarify the SNM-53 renewal application due 12/31/65
A/205 – 70-58	12/1/65 – Martin company to AEC, Martin submits proposed section VI Part B of SNM-53 for the purpose of obtaining license coverage for the shipment of MH-1A fuel elements between the Martin facilities at Middle River, MD and Fort Belvoir, VA
A/206 – 70-58	12/3/65 – Martin company to AEC, Martin submits revised pages for renewal of SNM-53 pertaining to the discussion in Bethesda on 12/1/65
A/207 – 70-58	12/15/65 – AEC internal, AEC reviewed the application for the shipment of MH-1A fuel elements and denies the request due to C. Beck indicating the tie-downs are inadequate to assure certain spacing in the event of an accident
A/208 – 70-58	12/16/65 – AEC internal, regarding applications dated 12/1/65 and 12/3/65. AEC reviewed the supplemental applications and due to the revisions has no further objections and recommends approval
A/209 – 70-58	12/22/65 – AEC internal. AEC reviews renewal application for renewal of SNM-53 and concludes to recommend renewal for SNM-53
A/210 – 70-58	1/7/66 – AEC to Martin company, regarding SNM-53 being renewed, includes SNM-53 as renewed
A/211 – 70-58	1/21/66 – Martin company to AEC, Martin requests AEC to replace a referenced submission with Section VI, Part B, of SNM-53 which detailed the revised methods for shipment of MH-1A fuel elements
A/212 – 70-58	2/3/66 – AEC internal, AEC reviewed application stated above and has no objections
A/213 – 70-58	2/4/66 – AEC to Martin, includes an amendment to SNM-53 pertaining to dates of renewal
A/214 – 70-58	7/6/66 – AEC to Martin, AEC informs Martin they are allocated uranium in the U-235 isotope, also includes arrangements for procurement of said material

A/215 – 70-58	8/15/66 – Martin to AEC, Martin requests the allocation of SNM for government fiscal year 1967 from AEC
A/216 – 70-58	8/24/66 – AEC Special Nuclear Material Draft form pertaining to the above allocation request by Martin
A/217 – 70-58	8/24/66 – AEC to Martin, AEC approves allocation of U-235 to Martin as previously described
A/218 – 70-58	9/26/66 – Martin company to AEC, Martin requests an amendment to SNM-53 to authorize the fabrication of a uranium oxide-metal hydride component
A/219 – 70-58	10/3/66 – Martin company to AEC, Martin includes a revised page III-D-1 which they believe will clarify the minor questions discussed during a meeting on 9/30/66
A/220 – 70-58	10/3/66 – AEC internal, describes the telephone call between C.Keller of Martin and K. Lauterbach on 9/30/66 to discuss application of 9/26/66
A/221 – 70-58	10/13/66 – AEC internal, describes telephone call on 10/11/66 regarding the criticality of 238 PU
A/222 – 70-58	10/14/66 – AEC internal, regarding application dated 9/26/66, AEC recommends further review of allowable numbers for storage containers used for storage of the hyrdided disks in question
A/223 – 70-58	10/14/66 – Martin to AEC, Martin submits revised copies of page IV-A-5 and figures I-B2, IV-A5, and V-E2 which define a new location for the nuclear storage area pertaining to SNM-53
A/224 – 70-58	10/24/66 – AEC internal, AEC reviews request stated above and as no objections
A/225 – 70-58	10/24/66 – Martin to AEC, Martin attaches page III-D-2A which defines limits of certain pellets in storage vaults at Middle River, MD, also pertains to SNM-53
A/226 – 70-58	10/28/66 – AEC internal, AEC disagrees with Martin information regarding the allowable number of units as read from Fig 22 and gives a recommendation for changes.
A/227 – 70-58	11/9/66 – AEC to Martin, AEC amends SNM-53 dated 9/26/66 but does not agree with 10/24/66 application described above but again recommends a revision
A/228 – 70-58	11/18/66 – Martin company to AEC, Martin submits three copies of the proposed amendment to Byproduct Material License 19-01398-20 to AEC for review
A/229 – 70-58	12/8/66 – AEC to Martin, AEC informs Martin they have completed their annual review of practices and procedures for the control of SS materials and conclude Martin does meet AEC requirements
A/230 – 70-58	12/14/66 – AEC to Martin, AEC acknowledges receipt of consolidation application for SNM-53 to deliver special nuclear material to a carrier for transport
A/231 – 70-58	12/14/66 – Martin to AEC, Martin recognizes AEC comments concerning the nuclear storage area and replies that they believe they are in compliance with subparagraph 70.24(a) of title 10 Code of Federal Regulations, Part 70
A/232 – 70-58	12/21/66 – AEC internal, regarding Martin company letter dated 12/14/66, thanking AEC for comments in the referenced letter concerning the new location of the storage area
A/233 – 70-58	12/27/66 – AEC internal, regarding Martin application dated 11/11/66, AEC reviewed the application and have no objection
A/234 – 70-58	1/11/67 – AEC to Martin, AEC enclosing amendment 71-1 to SNM-53 authorizing the delivery of SNM to a carrier for transport in the package designated as the Martin All Purpose container

A/235 – 70-58	1/31/67 – Martin to AEC, continued discussion of the nuclear storage area, includes references of letters back and forth from AEC to Martin
A/236 – 70-58	2/8/67 – AEC internal, Martin company letter dated 1/31/67 referring to new location of their nuclear storage area is enclosed
A/237 – 70-58	2/9/67 – AEC to Martin, AEC encloses a copy of a Notice of Rule Making published in the Federal Register on 2/3/67, concerning amendments to 10 CFR Part 70 specifying certain requirements for the safeguarding of SNM
A/238 – 70-58	2/14/67 – AEC to Martin, AEC amends SNM-53 dated 1/31/67 and 10/14/66 with dates for use
A/239 – 70-58	4/12/67 – Martin to AEC, regarding Title 10 Code of Federal Regulations Part 70, Martin requests approval of its procedures for the safeguarding of SNM
A/240 – 70-58	1/15/68 – Survey of SS material safeguards control at Martin Marietta Corporation, Middle River, MD.
A/241 –70-58	5/14/68 – Martin to AEC, regarding emergency plans, AEC asks Martin to participate in the re-evaluation of guidelines for the scope of plans and procedures required to cope with emergency situations
A/242 – 70-58	4/14/69 – AEC to Isotopes Incorporated, AEC approves request to amend SNM-53 to authorize a maximum quantity of 5000 grams of SNM
A/243 – 70-58	8/2/68 – Martin to AEC, regarding the transfer of SNM and source licenses. Explains that Isotopes, Inc, has acquired the Martin Marietta Corporation Nuclear Division effective 8/4/68
A/244 – 70-58	8/6/68 – Isotopes Inc to AEC, regarding a request for transfer of source and SNM license responsibility. Isotopes Inc states they will operate in the same facilities at Middle River, MD as the Nuclear Systems Division of Isotopes Inc.
A/245 – 70-58	8/19/68 – AEC internal, Notification of intended action regarding the transfer described above
A/246 – 70-58	9/3/68 – AEC to Isotopes inc, AEC informs Isotopes that the transfer is in accordance with the Atomic Energy Act of 1954
A/247 – 70-58	9/3/68 – AEC to Martin, further confirmation of the Isotopes Inc transfer described above
A/248 – 70-58	Date unreadable (1968) – AEC to Isotopes Inc, further notice of transfer of license to Isotopes Inc
A/249 – 70-58	12/9/68 – AEC to Isotopes, regarding notification of intended action for licensing, explains licensing action is necessary and will coordinate
A/250 – 70-58	9/12/68 – AEC to Isotopes, AEC reviews certain licensing activities with respect to nuclear materials safeguards with Isotopes due to the recent transfer
A/251 – 70-58	1968 – AEC to Isotopes, notice that SNM-53 expires on 12/31/68
A/252 – 70-58	11/13/68 – Isotopes to AEC, Isotopes expressing appreciation to AEC for the guidance provided during a meeting on 11/6/68, Isotopes confirms that they intend to submit the Fundamental Material Controls and Nuclear Materials Safeguards required in connection to SNM-53
A/253 – 70-58	12/68 – AEC to Isotopes, AEC encloses amendments to part 71, title 10, code of federal regulations
A/254 – 70-58	2/5/69 – Isotopes to AEC, Isotopes encloses the first portion of the Fundamental Material Controls and Nuclear Safeguards Procedures
A/255 – 70-58	2/24/69 – AEC to Isotopes, AEC responds to Isotopes application for renewal of AEC SNM-53 and requests Isotopes to submit a new application

A/256 – 70-58	4/9/69 – AEC internal, regarding Isotopes application dated 4/4/69 involving the fabrication of UO2 into test fuel pins, AEC recommends approval
A/257 – 70-58	4/10/69 – AEC to Isotopes, notification of intended action for application dated 4/4/69, no action needed
A/258 – 70-58	4/14/69 – AEC internal, enclosed is a copy of a letter from P. Knapp of Isotopes to D. Harmon dated 4/4/69 requesting a modification to SNM-53
A/259 – 70-58	4/14/69 – AEC internal, Notification of intended action for Isotopes application dated 4/8/69, licensing action is necessary
A/260 – 70-58	4/21/69 – Isotopes memo regarding safeguards inspection no. SO-I-5, describes resulting conclusions
A/261 – 70-58	4/21/69 – AEC to Isotopes, also discussing safeguards inspection described above
A/262 – 70-58	6/11/69 – Martin to AEC, regarding the request for release for public use of a facility formerly used for nuclear activities by Martin Marietta Corp
A/263 – 70-58	6/17/69 – Isotopes to AEC, regarding the abandonment of a facility formerly used for nuclear activities. States that Isotopes Nuclear Systems Division recently completed decontamination of the Martin Marietta Corp Radiochemistry Laboratory (KJ)
A/264 – 70-58	6/20/69 – AEC to Isotopes, AEC thanks Isotopes for their letter of June 5, 1969 in response to our April 22, 1969 letter, corrective actions will be reviewed during the next safeguards inspection
A/265 – 70-58	6/21/69: Hand written document pertaining to Martin company containers and certain drop test results
A/266 – 70-58	7/7/69 – AEC to Isotopes, AEC informs Isotopes that the application submitted for the renewal of SNM-53 was still insufficient and requested a resubmittal
A/267 – 70-58	7/7/69 – AEC to Martin, regarding the release for public use of a facility (KJ building) formerly used for nuclear activities by Martin Marietta Corporation and Isotopes Inc
A/268 – 70-58	7/8/69 – AEC to Isotopes with a notification of intended action regarding application dated 6/30/69, no action by that division is required
A/269 – 70-58	7/14/69 – Isotopes acknowledging P. Knapp they received the letter of 6/17/69 stating building KJ is no longer needed for radioisotope operations under AEC byproduct material license 19-01398-33, survey reports indicate that there is no need to maintain building KJ as a restricted area nor to require a license of subsequent possessors of the building
A/270 – 70-58	7/15/69 – AEC to Isotopes with a notification of intended action regarding application dated 7/7/69, no activity needed by that division
A/271 – 70-58	7/25/69 – AEC to Isotopes, AEC confirms the receipt of further information requested for the renewal of SNM-53 and will now review
A/272 – 70-58	8/15/69 – Isotopes to AEC, regarding Isotopes' Nuclear Systems Division moving to new facilities, Isotopes states they will vacate Middle River facilities by 9/30/69
A/273 – 70-58	8/15/69 – Isotopes to AEC, Isotopes requests amendment to SNM-53 to extend the expiration date, allow them to possess material at their new location in Timonium, MD, and possession of SNM
A/274 – 70-58	9/4/69 – AEC to Isotopes with a notification of intended action regarding application dated 8/15/69, no action required by that division
A/275 – 70-58	9/23/69 – AEC to Isotopes, AEC encloses the SNM license SNM-1150 to be used at the facility in Timonium, MD

A/276 – 70-58	1/29/70 – AEC to Martin, describes a phone call from Martin personnel telling AEC they have decided to apply for a license to receive the contaminated Baltimore facility back from Isotopes Inc and for authority to decontaminate the premises
A/277 – 70-58	2/3/70 – AEC to Martin, describing a phone conversation on 1/29/70 about licensing requirements
A/278 – 70-58	2/20/70 – AEC internal, discussing replies to letters back and forth between Martin and AEC, discusses how no further replies are necessary
A/279 – 70-58	4/24/70 – Martin to AEC, Martin encloses the completed application and work procedure for a license to permit the decontamination of the nuclear laboratories in building "D" if Martin Marietta corporation facilities, Middle River, MD
A/280 – 70-58	5/22/70 – AEC to Martin, AEC encloses Material License SNM-1192 and a copy of their guidelines for decontamination of facilities and equipment
A/281 –70-58	7/8/81 – Department of Health and Mental Hygiene to US Nuclear Regulatory Commission, in reference to a letter of 8/7/80 regarding formerly used sites in connection with source material licenses for and/ or operations at these sites
A/282 – 70-58	7/29/81 – US NRC internal, describes Maryland's response to 7/7/81 inquiry concerning Martin Marietta's formerly licensed site, with responses concerning Tennessee, New York and Kansas sites
A/283 – 70-58	9/9/81 – Department of Health and Mental Hygiene to US NRC, Describes a reply to the letter from 7/15/81 regarding formerly licensed sites in MD. DoHMH obtained additional information that building "D" was demolished and now is a plot of grass, the site was decontaminated to acceptable levels at the time the building was demolished to meet the requirements of the NRC
A/284 – 70-58	6/1/82 – Martin to USNRC, Martin encloses a copy of the "Comprehensive Radioactive Survey Report for the Release of the Decontaminated Premises for Unrestricted Use" prepared in accordance with USAEC material license SNM-1192 issued to Martin for the decontamination of nuclear laboratories at Baltimore, MD.
A/285 – 70-58	8/2/82 – USNRC Region I Inquiry for Martin Marietta Corporation Middle River Facilities in Middle River, MD.
A/286 – 70-58	8/19/82 – USNRC internal, describes that between March 5 and June 15 of 1982 Region I conducted an inquiry of the Martin facility, determines the facility meets current criteria for unrestricted use
A/287 – 70-58	1/23/95 – ORNL Sites Summary. Explains that License STB-00187 authorized the possession and use of large amounts of thorium alloy in Building D at Middle River, MD from 1961 to 1964. The report indicates that some contamination remained in drains and on surfaces, the building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on 11/3/94 indicate that the site is suitable for unrestricted use.
A/288 – 70-58	1/23/95 – ORNL Sites Summary. Explains license SNM-00011 authorized research and development work with U-235 in Building D at Middle River. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces, the building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on 11/3/94 indicate that the site is suitable for unrestricted use.

A/289 – 70-58	1/23/95 – USNRC Region I inspection summary of Middle River Facility and Martin State Airport , inspection conducted 11/3/94, results conclude that no radiation levels above background were detected and no indication of contamination was found in any of the buildings and these facilities are suitable for unrestricted use.

The propulsion Systems Department is at work on several classified government projects, including its contribution to a study contract for the National Aeronautics and Space Agency in the RIFT (Reactor in Flight Test) program, under which plans are being formulated for the flight testing of the first nuclear rocket engine.

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 94-001

Docket Nos. None, None, 070-00014, 070-00058, 070-00908, 070-00932, 070-00058, 040-03296

License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, STB-00187

Licensee: Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Facility Name: Middle River Facility and Martin State Airport

Inspection at: 2323 Eastern Blvd
Baltimore, MD
and
701 Wilson Point Road
Baltimore, MD

Inspection Conducted: November 3, 1994

Inspector: Stephen W. Holmes, Radiation Specialist — 01/23/95 date

Approved by: John D. Kinneman, Chief
Site Decommissioning Section — 1/23/95 date

Inspection Summary: Closeout Verification Inspection No. 94-001.

Areas Inspected: Announced, inspection and survey of Buildings C and D at the Martin-Marietta Middle River facility and Buildings KJ and KC at the Martin State Airport.

Results: No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from the present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

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DETAILS

1.0 Persons Contacted

Joseph Alcarese, Esq.
Joanne Brooks, Environmental Specialist, Environmental Program Manager, Maryland Aviation Administration
Richard Brisson, former Acting Program Administrator, Maryland Dept. of the Environment, Radiological Health Program and former Martin-Marietta/Isotopes,Inc. employee
Thomas Flynn, Jr., Engineer, Raytheon (formally Ebasco Services, Inc.)
* Ray Manley, Inspector, Maryland Department of the Environment
Glen Peregoy, Engineer, Martin State Airport
* Jeffrey G. Smith, Manager Environmental Affairs, Martin Marietta
Jake West, Manager, Martin State Airport

* denotes those present at exit interview

2.0 Background

2.1 General

As part of a program to ensure that facilities where activities authorized by AEC and NRC licenses that have been terminated were suitable for release for unrestricted use as specified in current NRC criteria, the docket files for License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, and STB-187 were reviewed. Based on information in the files, the radiological status of four buildings could not be determined with certainty. These are Buildings C, D, on the Martin Marietta Corporation Middle River Facility and KJ (critical facility), and KC (radioisotope laboratory) on the Martin State Airport. Therefore, an onsite inspection was conducted. Prior to the on-site inspection, available records pertaining to the licensing, operation, and decommissioning of the activities in and around these buildings were reviewed by the inspector. Additionally, the inspector contacted two persons who had direct contact with these sites during actual operations or decommissioning: Mr. Thomas A. Flynn, Jr. the Project Manager of the 1965 "dismantling" of the Liquid Fluidized Bed Reactor (LFBR) at Building KC and Mr. Richard Brisson, a former employee of both Martin-Marietta, and Isotopes, Inc. Information obtained from these sources is documented in pertinent sections of this report.

2.2 Building D

Building D was located at the Martin-Marietta's Middle River, Maryland facility which is also called Chesapeake Park. Under License Nos. 19-01398-32, SNM-11, SNM-53, SNM-1192 and STB-187 a wide range of byproduct, source and special nuclear material were used in connection with various research and development activities in addition to work under government contracts. The facility was decontaminated in late 1970 under License No. SNM-1192, the license terminated, and the building subsequently demolished, leaving only the concrete basement floor/pad. An NRC inquiry regarding the site in June 1982 concluded that the site met the then current criteria for unrestricted use (Report Nos. 040-

03296/82-01 and 040-02308/82-011). However, there was no indication that a verification of the licensee's commitment to seal five contaminated drains with concrete was made.

2.3 Building C

Building C, also located at the Middle River site, was to have been used under License No. SNM-849 for operations involving encapsulated Pu-238 in conjunction with SNAP reactors and testing of fuel capsules and radioisotope generators containing Pu-238. This was reported to have occurred in the Environmental Test and Large Vacuum Chamber Laboratories. The building, which was being used as a warehouse at the time of this inspection, is a very large hanger type structure with a corresponding large basement. No records were available regarding the location of the laboratories within the building nor were any records of a termination or confirmatory survey of the facility available. Mr. Brisson stated that, to the best of his knowledge, only environmental and physical testing of the fueled SNAP and other radioisotope generators was performed in Building C and that no unsealed radioisotopes were used there. Additionally, he stated that the laboratories were located in the basement at the south west corner of the building and occupied an area no larger than 100' x 150' or 5 support pillars by 6 support pillars.

2.4 Building KJ

License No. 19-01398-20 was issued to Martin-Marietta for processing of Am-241 and Cm-242 in Building KJ which was designated the Radioisotope Laboratory and is located on the Martin State Airport property referred to as Strawberry Point, on a dirt access road off Strawberry Point Road, 330' S.W. of Building KC. This type of work had been previously performed in Building "D". The license was transferred to Isotopes, Inc. without a change in license number or location of work. In late 1969, Isotopes, Inc. requested termination of the license, simply stating that all radioactive material possessed under the license had been disposed of in accordance with 10 CFR 20 by transfer to a company authorized to receive the licensed material. The AEC terminated the license without comment. No record of a termination or confirmatory survey is in the docket file. Mr. Brisson stated that production processing did not occur in Building KJ and that only small source (μCi amounts of Am-241, no Cm-242) developmental operations to verify the chemistry were performed in the building. He and one other member of the Isotopes, Inc. staff performed the final cleanup and survey of the facility, including the removal and disposal of the HEPA filters. According to his memory, the survey demonstrating that the facility was ready for unconditional release was sent to the AEC contracting office on Hudson St., N.Y., N.Y.

2.5 Building KC

Building KC, the Critical Test Facility, was located 330' North East of Building KJ. The Martin-Marietta LFBR was situated in one of the building's three "test cells". Under License No. SNM-53 completed MH-1A fuel assemblies were stored in the test cells. License No. SNM-907 was issued to Ebasco Services, Inc. in 1965 for dismantling and removing the LFBR. The license included a provision to provide records of a post removal survey to the AEC's New York Operations Office and to Martin Marietta. Although a pre-dismantling survey was performed, no records of the required post removal survey could be found in the docket file. However, it was noted in the file that the LFBR never achieved criticality. Mr. Flynn stated that meticulous care was taken during the dismantling to prevent the spread of any contamination. Further, he stated that an AEC Inspector/Health Physicist from the New York Field Office/Laboratory was on site, oversaw the final survey, and signed the final report that asserted the dismantling of the LFBR had not added to or increased the contamination from the levels measured before the operation. Mr. Brisson confirmed that Ebasco's work produced no contamination throughout the rest of the building. Mr. Brisson also stated that his group decontaminated the underground LFBR water dump/holding tank by sandblasting the insides and disposing of the residue at a licensed burial site.

3.0 Instruments Used in Survey

During the survey three instruments were used, an Eberline PRM-6 with a 1" scintillator probe and a Ludlum Micro R meter Model 19 were used by the state inspector while a Ludlum Micro R meter Model 12 was used by the NRC inspector. The meters were calibrated, functional, and would detect gamma emitters of low energy and with good sensitivity. Based on the isotopes in question, these instrument were appropriate for this survey.

4.0 Survey Results

4.1 General

On November 3, 1994 surveys of each building/site were performed jointly by the NRC and State of Maryland inspectors. The inspectors surveyed each facility thoroughly and kept each other informed as to the results. The surveys were performed with the Micro R meters held at 0.5 meters above the surface with a forward movement of about 1.0 meters per second. In addition to Mr. Smith, who accompanied the inspectors to each site, Mr. Peregoy was present during the surveys of Buildings KC and KJ on the Martin State Airport property.

4.2 Building D

The Building D site was being use to store trailers under contract with the Army. The site consisted of a large concrete pad, the leftover basement floor of the old building. The pad had numerous cracks, holes, and was very weathered after two decades of exposure to the elements.

The inspectors surveyed the concrete pad along parallel lines 5 meters apart, paying attention to drains, clean-outs, and holes in the pad. In addition to measurements taken at drains and clean-outs, surface contact readings were also taken at approximately 10 meter intervals. Numerous sealed/filled in drains/clean-outs/penetrations/holes in the pad were located. Although a few places were found where a hole in the pad had been filled with concrete, it could not be determined if these were any of the drains referred to in the closeout survey. Martin Marietta staff stated that the rubble from the demolition of the building was the responsibility of the contractor and was removed and believed to have been disposed of in a landfill. No detectable radiation levels above background (5μR/hr) were found. No development or other use of the site is planned by Martin Marietta.

4.3 Building C

The Building C area where the old Environmental Test and Large Vacuum Chamber Laboratories were located is now warehouse space and a large empty room. With the exception of the support columns, no original walls, floors, ceiling, or ducts are left. The inspectors surveyed the area along parallel lines at 5 meter intervals with surface contact measurements every 5 meters and at drains and original concrete support columns. No radiation levels above background (5μR/hr) were detected.

4.4 Building KC

Building KC is at the end of a dirt access road off Strawberry Point road just east of the eastern most taxi way. The property was purchased in toto by the State of Maryland in 1975 and although the building was used in the past for storage, it has been abandoned and left open to the elements for the past ten to fifteen years. The site was completely abandoned, overgrown, exposed to the elements (of the three "test cells" only the one where the LFBR had been housed still had it's outer doors). The inspectors performed a walk-through survey of all three cells, the entrance way and connecting halls. Surface contact measurements were performed randomly throughout the building. The office/control room area was not entered due to the cluttered condition of and the layer of asbestos ceiling tiles covering the floor. No radiation levels above background were detected. Although an attempt was made to locate the underground dump/hold-up tank described by Mr. Brisson, the inspectors were unable to locate the tank or any indication that it had been removed. Based on discussion with Martin-Marietta and Martin State Airport personnel, it is believed that the tank was abandoned in place after the decontamination described in Section 2.5. The planning representative of Maryland Aviation stated that the building had been scheduled for demolition after remediation of the asbestos, but the plans were delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

4.5 Building KJ

Building KJ is 300' S.W. of building KC along the dirt access road. The

site was also completely abandoned, overgrown, exposed to the elements. The doors into the laboratory and, mechanical equipment room and office were ajar leaving the interior open to the outside. The inside was littered with "junk", leaves, bird and animal droppings, and dirt. A fair number of 100 lb. bags of "solidified" lime were present, as the building had been use for storage by the State of Maryland in the past. Rusted laboratory furniture and discarded fire extinguishers also littered the floor. The stainless steel ventilation duct-work and the laboratory hoods were still present less the duct-work section that had contained the HEPA filters. The inspectors surveyed the remains as well as possible given the state of the building. No radiation levels above background were detected. The planning representative of Maryland Aviation stated that the building, just like Building KC, had been scheduled for demolition after remediation of the asbestos, but the demolition was delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

5.0 Conclusions

No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

6.0 Exit Interview

The inspector met with the Martin-Marietta and Maryland Department of the Environment representatives listed in Section 1.0 of this report and discussed the scope and findings of this inspection. They acknowledged the inspection findings and the statements documented in this report. Messrs. Flynn and Brisson were contacted by telephone and also confirmed their statements in this report.

Inspection Summary: Closeout Verification Inspection No. 94-001.

Areas Inspected: Announced, inspection and survey of Buildings C and D at the Martin-Marietta Middle River facility and Buildings KJ and KC at the Martin State Airport.

Resul ts: No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from the present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 94-001

Docket Nos. None, None, 070-00014, 070-00058, 070-00908, 070-00932, 070-00058, 040-03296

License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, STB-00187

Licensee: Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Facility Name: Middle River Facility and Martin State Airport

Inspection at: 2323 Eastern Blvd
Baltimore, MD
and
701 Wilson Point Road
Baltimore, MD

Inspection Conducted: November 3, 1994

Inspector: Stephen W. Holmes, Radiation Specialist — 01/23/95 date

Approved by: John D. Kinneman, Chief
Site Decommissioning Section — 1/23/95 date

DETAILS

1.0 Persons Contacted

Joseph Alcarese, Esq.
Joanne Brooks, Environmental Specialist, Environmental Program Manager
Maryland Aviation Administration
Richard Brisson, former Acting Program Administrator, Maryland Dept. o
the Environment, Radiological Health Program and former
Martin-Marietta/Isotopes,lnc. employee
Thomas Flynn, Jr., Engineer, Raytheon (formally Ebasco Services, Inc.)
Ray Manley, Inspector, Maryland Department of the Environment
Glen Peregoy, Engineer, Martin State Airport
Jeffrey G. Smith, Manager Environmental Affairs, Martin Marietta
Jake West, Manager, Martin State Airport

* denotes those present at exit interview

2.0 Background

2.1 General

As part of a program to ensure that facilities where activities authorized by AEC and NRC licenses that have been terminated were suitable for release for unrestricted use as specified in current NRC criteria, the docket files **for License Nos. 19-01398-20, 19- 01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, and STB-187 were reviewed.** Based on information in the files, the radiological status of four buildings could not be determined with certainty. These are Buildings C, D, on the Martin Marietta Corporation Middle River Facility and KJ (critical facility), and KC (radioisotope laboratory) on the Martin State Airport. Therefore, an onsite inspection was conducted. Prior to the on- site inspection, **available records pertaining to** the licensing, operation, and decommissioning of the activities in and around these buildings were reviewed by the inspector. Additionally, the inspector contacted two persons who had direct contact with these sites during actual operations or decommissioning: Mr. Thomas A. Flynn, Jr. the Project Manager of the 1965 "dismantling" of the Liquid Fluidized Bed Reactor (LFBR) at Building KC and Mr. Richard Brisson, a former employee of both Martin-Marietta, and Isotopes, Inc. Information obtained from these sources is documented in pertinent sections of this report.

Building D

byproduct, source and with various research

Building D was located at the Martin-Marietta's Middle River, Maryland facility which is also called Chesapeake Park. Under License Nos. 19-01398-32, SNM-11, SNM-53, SNM-1192 and STB-187 a wide range of special nuclear material were used in connection and development activities in addition to work under government contracts. The facility was decontaminated in late 1970 under License No. SNM-1192. the license terminated. :_-~d the building subsequently demolished, leaving only the concrete basement floor/pad. An NRC inquiry regarding the site in June

1982 concluded that the site met the then current criteria for unrestricted use (Report Nos. 040

03296/82-01 and 040-02308/82-011). However, there was no indication that a verification of the licensee's commitment to seal five contaminated drains with concrete was made.

Building C

Building C, also located at the Middle River site, was to have been used under License No. SNM-849 for operations involving encapsulated Pu-2138 in conjunction with SNAP reactors and testing of fuel capsules and radioisotope generators containing Pu-238. This was reported to have occurred in the Environmental Test and Large Vacuum Chamber Laboratories The building, which was being used as a warehouse at the time of this inspection, is a very large hanger type structure with a corresponding large basement. No records were available regarding the location of the laboratories within the building nor were any records of a termination or confirmatory survey of the facility available. Mr. Brisson stated that, to the best of his knowledge, only environmental and physical testing of the fueled SNAP and other radioisotope generators was performed in Building C and that no unsealed radioisotopes were used there. Additionally, he stated that the laboratories were located in the basement at the south west corner of the building and occupied an area no larger than 100' x 150' or 5 support pillars by 6 support pillars.

2.4 Building KJ

License **No. 19-01398-20 was** issued to Martin-Marietta for processing of Am-241 and Cm-242 in Building KJ which was designated the Radioisotope Laboratory and is located on the Martin State Airport property referred to as Strawberry Point, on a dirt access road off Strawberry Point Road, 330' S.W. of Building KC. This type of work had been previously performed in Building "D". The license was transferred to Isotopes, Inc. without a change in license number or location of work. In late 1969, Isotopes, Inc. requested termination of the license, simply stating that all radioactive material possessed under the license had been disposed of in accordance with 10 CFR 20 by transfer to a company authorized to receive the licensed material. The AEC terminated the license without comment. No record of a termination or confirmatory survey is in the docket file. Mr. Brisson stated that production processing did not occur in Building KJ and that only small source (uCi amounts of Am-241, no Cm242) developmental operations to verify the chemistry were performed in the building. He and one other member of the Isotopes, Inc. staff performed the final cleanup and survey of the facility, including the removal and disposal of the HEPA filters. According to his memory, the survey demonstrating that the facility was ready for unconditional release was sent to the AEC contracting office on Hudson St., N.Y.

N. Y.

2.5 Building KC

Building KC, the Critical Test Facility, was located 330' North East of Building KJ. The Martin-Marietta LFBR was situated in one of the building's three "test cells". Under License No. SNM- 53 completed MH-1A fuel assemblies were stored in the test cells. License No. SNM-907 was issued to Ebasco Services, Inc. in 1965 for dismantling and removing the LFBR. The license included a provision to provide records of a post removal survey to the AEC's New York Operations Office and to Martin Marietta. Although a pre-dismantling survey was performed, no records of the required post removal survey could be found in the docket file. However, it was noted in the file that the LFBR never achieved criticality. Mr. Flynn stated that meticulous care was taken during the dismantling to prevent the spread of any contamination. Further, he stated that an AEC Inspector/Health Physicist from the New York Field Office/Laboratory was on site, oversaw the final survey, and signed the final report that asserted the dismantling of the LFBR had not added to or increased the contamination from the levels measured before the operation. Mr. Brisson confirmed that Ebasco's work produced no contamination throughout the rest of the building. Mr. Brisson also stated that his group decontaminated the underground LFBR water dump/holding tank by sandblasting the insides and disposing of the residue at a licensed burial site.

3.0 Instruments Used in Survey

During the survey three instruments were used, an Eberline PRM-6 with a 1" scintillator probe and a Ludlum Micro R meter Model 19 were used by the state inspector while a Ludlum Micro R meter Model 12 was used by the NRC inspector. The meters were calibrated, functional, and would detect gamma emitters of low energy and with good sensitivity. Based on the isotopes in question, these instrument were appropriate for this survey.

4.0

4.1 General

Survey
Results

On November 3, 1994 surveys of each building/site were performed jointly by the NRC and State of Maryland inspectors. The inspectors surveyed each facility thoroughly and kept each other informed as to the results. The surveys were performed with the Micro R meters held at 0.5 meters above the surface with a forward movement of about 1.0 meters per second. In addition to Mr. Smith, who accompanied the inspectors to each site. Mr. Peregoy was present during the surveys of Buildings KC and KJ on the Martin State Airport property.

4.2 Building D

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basement floor of the old building. The pad had numerous cracks, holes, and was very weathered after two decades of exposure to the elements.

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4.3 Building C

The Building C area where the old Environmental Test and Large Vacuum Chamber Laboratories were located is now warehouse space and a large empty room. With the exception of the support columns, no original walls, floors, ceiling, or ducts are left. The inspectors surveyed the area along parallel lines at 5 meter intervals with surface contact measurements every 5 meters and at drains and original concrete support columns. No radiation levels above background (5uR/hr) were detected.

4.4 Building KC

Building KC is at the end of a dirt access road off Strawberry Point road just east of the eastern most taxi way. The property was purchased in toto by the State of Maryland in 1975 and although the building was used in the past for storage, it has been abandoned and left open to the elements for the past ten to fifteen years. The site was completely abandoned, overgrown, exposed to the elements (of the three "test cells" only the one where the LFBR had been housed still had it's outer doors). The inspectors performed a walk-through survey of all three cells, the entrance way and connecting halls. Surface contact measurements were performed randomly throughout the building. The office/control room area was not entered due to the cluttered condition of and the layer of asbestos ceiling tiles covering the floor. No radiation levels above background were detected. Although an attempt was made to locate the underground dump/hold-up tank described by Mr. Brisson, the inspectors were unable to locate the tank or any indication that it had been removed. Based on discussion with Martin-Marietta and Martin State Airport personnel, it is believed that the tank was abandoned in place after the decontamination described in Section 2.5. The planning representative of Maryland Aviation stated that the building had been scheduled for demolition after remediation of the asbestos, but the plans were delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

4.5 Building KJ

Building KJ is 300' S.W. of building KC along the dirt access road. The

site was also completely abandoned, overgrown, exposed to the elements. The doors into the laboratory and, mechanical equipment room and office were ajar leaving the interior open to the outside. The inside was littered with "junk", leaves, bird and animal droppings, and dirt. A fair number of 100 lb. bags of "solidified" lime were present, as the building had been use for storage by the State of Maryland in the past. Rusted laboratory furniture and discarded fire extinguishers also littered the floor. The stainless steel ventilation duct-work and the laboratory hoods were still present less the duct- work section that had contained the HEPA filters. The inspectors surveyed the remains as well as possible given the state of the building. No radiation levels above background were detected. The planning representative of Maryland Aviation stated that the building, just like Building KC, had been scheduled for demolition after remediation of the asbestos, but the demolition was delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

5.0 Conclusions

No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

6.0 Exit Interview

The inspector met with the Martin-Marietta and Maryland Department of the Environment representatives listed in Section 1.0 of this report and discussed the scope and findings of this inspection. They acknowledged the inspection findings and the statements documented in this report. Messrs. Flynn and Brisson were contacted by telephone and also confirmed their statements in this report.

License Nos.19-01398-20
(Retired)
19-01398-32
(Retired)
SNM-11 (Retired)
SNM-53 (Retired)
SNM-849 (Retired)
SNM-907 (Retired)
SNM-1192 (Retired)
STB-187 (Retired)

Ms. Joanne Brooks
Environmental Specialist
Maryland Aviation
Administration
3rd Floor Terminal Building
P.O. Box 8760
BWI Airport, Maryland 21240

SUBJECT: NRC REGION I INSPECTION NO. 94-
001

Dear Ms. Brooks:

Docket Nos. None None 070- 00014 070- 00058 070- 00908 070- 00932 070- 00058
040- 03296

As Stephen Holmes of my staff discussed **with you by telephone on October** 20, 1994, the Nuclear Regulatory Commission (NRC) has been reviewing records to ensure that facilities, where activities were authorized by Atomic Energy Commission (AEC) and NRC licenses that have been terminated, are suitable for release for unrestricted use in accordance with current NRC guidelines. As you may be aware, the NRC and its predecessor, the AEC, issue licenses that authorize the use of various radioactive materials.

A contractor for the NRC, Oak Ridge National Laboratory (ORNL), initially reviewed each terminated license file and scored it according to a system designed to identify facilities that require additional review by the NRC staff. In general, files that indicate that radioactive material may have been used at particular facilities, but which do not include adequate final survey records for those facilities, are identified for additional review. The review by ORNL identified License Nos. 19-01398-20, 19-01398-32, SNM- 11, SNM-53, SNM-849, SNM-907, SNM-1192 and STB-187 as files describing sites that require additional review. These licenses were issued to Martin-Marietta, Isotopes, Inc., and Ebasco and authorized activities at the Martin-Marietta Middle River Facility and the Martin State Airport. The Region I staff reviewed these files and determined that additional action was necessary since the information in the files did not provide sufficient detail to conclude that Buildings C, D, KJ and KC meet current guidelines for release for unrestricted use.

40-2308

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:
40-664

SOURCE MATERIAL LICENSE

License No. C-3572
Amendment No. 2
Dated:

The Martin Company
Baltimore 3, Maryland

Attention: Mr. C. A. Wendel
Licensing Officer
Nuclear Division

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to two hundred (200) pounds of magnesium-thorium alloys, one gram of uranium metal and two grams of thorium metal for use, during the term of this license, in connection with your work under government contracts.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire June 1, 1958.

FOR THE ATOMIC ENERGY COMMISSION

Lyall Johnson
Chief, Licensing Branch
Division of Civilian Application

A11

40-2000

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:
40-765
CAL:RFB

SOURCE MATERIAL LICENSE

License No. C-3508
Amendment No. 4
Dated:

The Martin Company
Baltimore 3, Maryland

Attention: Mr. C. A. Wendel
Licensing Officer
Nuclear Division

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to thirty-five hundred (3500) pounds of magnesium-thorium alloys during the term of this license for use in connection with the Navy Vanguard Program.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire June 1, 1958.

FOR THE ATOMIC ENERGY COMMISSION

Lyall Johnson
Chief, Licensing Branch
Division of Civilian Application

C-3508

A/2

Inventory of Health Physics Instruments

Appendix A

Field Instruments

October 1, 1957
R. F. Hassell

Type of Instrument	Manufacturer	Model No.	Serial No.
Alpha Survey Meter	Nuclear-Chicago	2112	129
" " "	" "	"	144
" " "	" "	"	98
" " "	" "	"	39
" " -Samson	NRD Instrument Co.	D-6	470
Alpha Probe	Nuclear-Chicago	AP-4	130
" "	" "	"	36
G.M. Survey Meter	Berkley	2750	471
" " " "	Victoreen	592	776
" " " "	"	"	523
" " " "	"	"	494
" " " "	"	"	403
" " " "	Nuclear-Chicago	2612	130
" " " "	" "	"	202
" " " "	" "	"	248
" " " "	" "	"	571
" " " "	" "	"	584
Cutie Pie	Nuclear-Chicago	2586	42
" "	" "	"	43
" "	" "	"	93
" "	Tracerlab	SU-1H	1256
" "	"	"	1614
" "	NRD Instrument Co.	CS-40	171
" "	" " "	"	2475
Count Rate Meter	Tracerlab	SU-3C	1276
" " "	"	"	1277
" " "	"	"	1373
" " "	"	"	1374
" " "	Nuclear-Chicago	1619	76
" " "	" "	1615-B	614
" " "	" "	"	712
" " "	" "	1613-A	1312
" " "	Nuclear Instrument and Chemical Corp.	MR-10	39
Pee Wee	Nuclear-Chicago	2111	987
Fast Neutron Counter	NRD Instrument Co.	E-1A	4
" " Counter Probe	" " "	F-1	534
Poppy Probe	General Electric		
" "	" "		

A/3

(3)

Inventory of Health Physics Instruments

Appendix A

October 1, 1957
R. F. Hassell

Lab Counting Instruments

Type of Instrument	Manufacturer	Model No.	Serial No.
Scaler	Nuclear-Chicago	1310	
"	" "	161-A	1182
"	" "	"	1183
Scaling Unit	" "	183	298
Ultra Scaler	Nuclear-Chicago	192	50
Scaler	Radiation Instrument Lab Developing	1201-T	1386
Scaler-Decade	Radiation Counter Lab	Mark 13 10-D	102
Proportional Counter	Nuclear Measurements Corp.	PC-1	173
" " Converter	" " "	PC-16	2
Scintillation Probe	Radiation Counter Labs	Used with Decade Scaler Model #10D	102
Alpha Scintillation Detector	Tracerlab	P-12	433
Recorder	Easterline-Angus	AW	109730
Timer	Nuclear-Chicago	T-101	
"	" "	"	
Lead Pig	Radiation Counter Lab. Inc.		
" "	Nuclear-Chicago		
" "	" "		

(3)

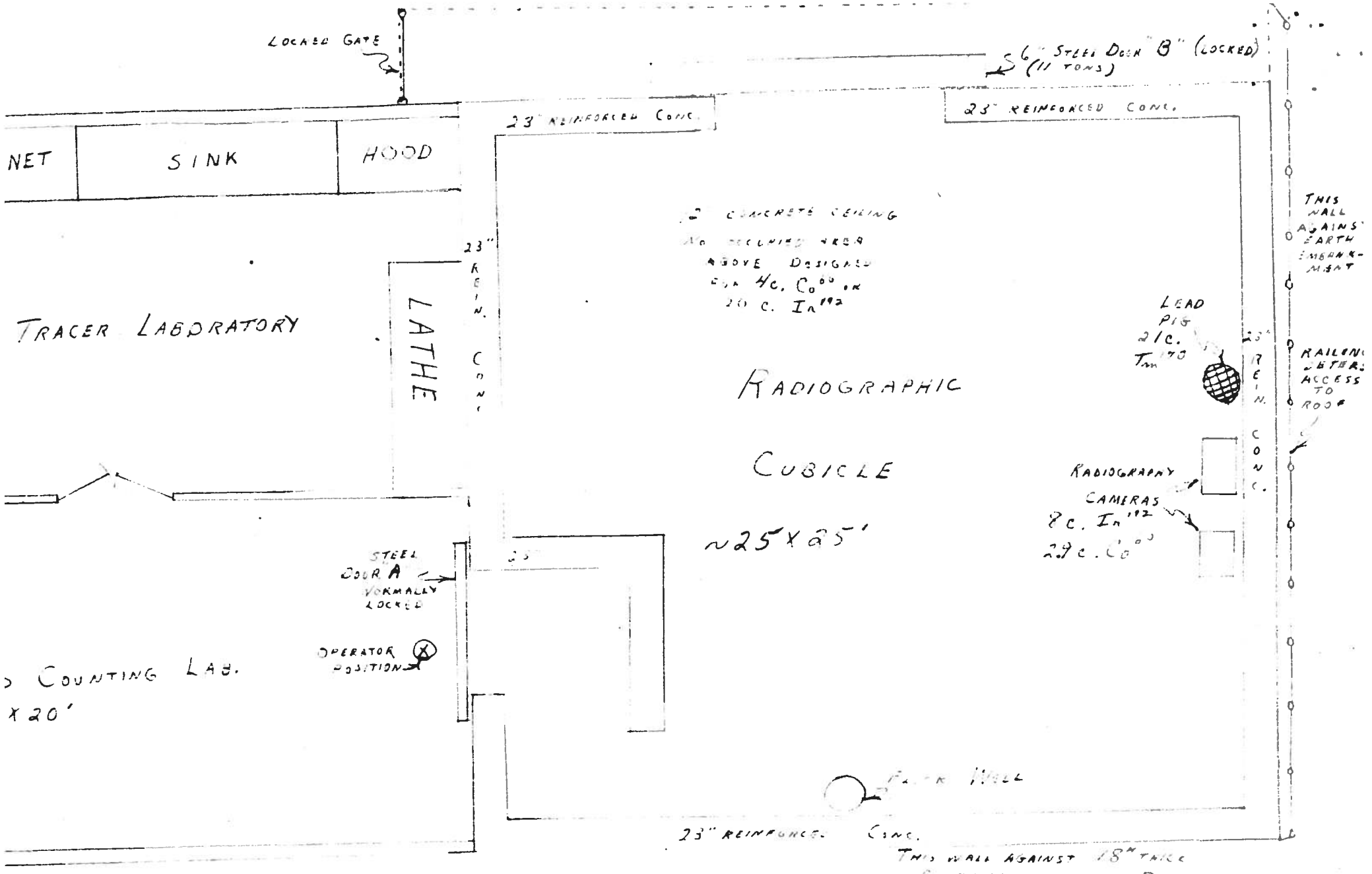
Inventory of Health Physics Instruments

APPENDIX A

October 1, 1957
R. F. Hassell

Sampling and Detection Equipment

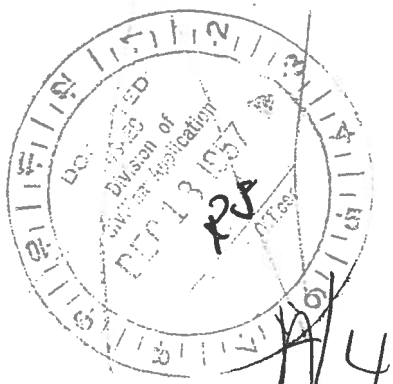
Type of Instrument	Manufacturer	Model No.	Serial No.
Air Sampler	Millipore		
" "	"		R47227
" Monitor	"		R47191
" "	"	S44AK-978	
" "	"	"	
	Staplex	TF-1A	2052
Decade Resistor Box	Leeds-Northrup Co.	Cat. #4754	1211881
Hydrogen Sulphide Detector	Mine Safety Appliances Co.		
Aromatic Hydrocarbon Det.	" " " "		
Nitrogen Dioxide "	" " " "		
Fisher Powerhouse	Fisher Scientific Company		
Fluorimeter	Jarrell-Ash Company	JA-2600	126654
Galvanometer, Pointer Type A	G-M Laboratories, Inc.		
Galvanometer, Mirrow type K	G-M Laboratories, Inc.		
Melting Point Apparatus	Fisher-Johns Corp.		
Pulse Amplifier	Detectolab	D-43	
Ph Meter	Beckman	G	B-104
Powerstat Variable Transformer	Superior Electric Co.	116	
Simpson Meter	Simpson Electric Company	260	
Spectrophoto Meter with	Beckman	2400	130642
Battery Power Supply	"	14500	134861
Timer	Standard Electric Time Co.		33922
Timer, Dual	Nuclear-Chicago	T-1	1052
Velometer, Alnor	Illinois Testing Lab, Inc.		



RADIOISOTOPE LAB AND ASSOCIATED FACILITIES
THE MARTIN CO. BALTIMORE, MD.
EXHIBIT 1.

DOCKET NO. 70-58
EXTRA
EXTRA

THE MARTIN COMPANY
APPLICATION FOR GENERAL LICENSE TO RECEIVE,
POSSESS, USE AND TRANSFER SPECIAL NUCLEAR
MATERIAL (PART 70, CFR 10)



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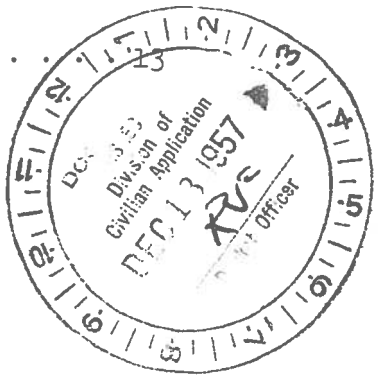

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Plate 3 . . . . . .

Work Areas in Critical Experiment Facility. . . . . .



APPLICATION FOR GENERAL LICENSE TO RECEIVE, POSSESS, USE AND TRANSFER SPECIAL NUCLEAR MATERIAL (PART 70, CFR 10)

I. The Martin Company is engaged in design, research, development and construction of nuclear reactors and nuclear components at its Middle River Plant near Baltimore, Maryland. For the purpose of development and fabrication of reactor fuel elements, a Nuclear Materials Laboratory and a Pilot Manufacturing Plant have been constructed in the basement of "D" Building at Plant I. A critical experiment facility for zero power testing of proto-type reactor cores is in the final stage of completion. This facility is located near the Martin airport some two thousand feet southeast of Plant I.

Research and development work on fuel elements is conducted under Special Nuclear Material License No. 11, as amended, in accordance with procedures described in the Company's applications of May 22, 1957 and September 19, 1957. The most recent revision of this license permits special operations involving fully clad fuel elements to be performed in the pilot manufacturing plant and in other buildings at Plant I in addition to the laboratory areas.

Initial operation of the Pilot Manufacturing Plant involves fabrication of stainless steel tubular elements containing highly enriched UO_2, for a proto-type MPR core to be tested to zero power for the Atomic Energy Commission under Contract AT (30-3)-277. Government-owned fuel has been handled through Accountability Station MND, which was authorized by the Schenectady Operations Office after approval of the Martin Nuclear Division's procedures regarding criticality control, accountability, health and safety, and security.

In addition to MPR type tubular elements, The Martin Company plans to fabricate other fuel element types in the Pilot Manufacturing Plant. Certain special operations will be performed in other buildings at Plant I. Some of the work to be undertaken will be on a commercial basis and therefore must be done under a Special Nuclear Material License issued by the Commission. In this connection, note is made that the Commission issued SNM License 53 to The Martin Company on November 26, 1956 permitting receipt and possession of fifty (50) kilograms of UO_2 enriched to over 90% in the isotope U235.

Several types of fuel elements including rods, tubes and plates will be manufactured. These elements will utilize uranium metal or uranium dioxide in a fuel marrow clad with such materials as stainless steel, aluminum alloys and zirconium alloys.

DOCKETED USAEC Division of Civilian Application DEC 13 1957 RVF Docket Officer

In view of these varied contemplated activities, The Martin Company pursuant to Part 70, CFR 10 hereby applies for a general license to receive, possess and use up to five hundred kilograms of contained U235 in special nuclear materials at its Middle River facilities, including uses in the Critical Experiment Facility other than activities licensed under Part 50, CFR 10. Application is made for a license extending for three years from date of issuance. The experience gained by the Nuclear Division during the past three years in safe handling of nuclear materials is reflected in the general procedures outlined in this application in sections which follow.

II. Information required pursuant to Section 70.22, Title 10, Chapter 1, CFR:

(1) Applicant is The Martin Company, Baltimore 3, Maryland incorporated in the State of Maryland and having its principal plant and place of business at Middle River, Maryland.

Principal officers are:

G. M. Bunker, President, The Martin Company, Baltimore 3, Maryland - USA

W. B. Bergen, Executive Vice President, The Martin Company, Baltimore 3, Maryland - USA

W. L. Lucas, Secretary and Treasurer, The Martin Company, Baltimore 3, Maryland - USA

The Martin Company is not owned, controlled, or dominated by an alien, a foreign corporation, or foreign government. The applicant is the real party in interest and is not making this application as an agent for any undisclosed principal.

(2) Activities:

Attached for reference are plans of the nuclear facilities at the Martin Middle River plant showing work areas and quantities of special nuclear material (in terms of contained isotope U235) permitted in each work area:

Plate 1 - Plan of Engineering Materials Laboratory
Plate 2 - Plan of Pilot Manufacturing Plant
Plate 3 - Plan of Critical Experiment Facility located near Martin airport.

General procedures in connection with activities contemplated are:

(a) Receiving -

SNM will be received at Gate 5 of Plant I by the Accountability Representative. After monitoring by Health Physics Services for radiation hazards, shipments will be conveyed to Vault Annex Room, (Work Area IB) or Vault, (Work Area IA) for unpacking and weighing of special nuclear material.

(b) Storage -

The storage vault is a fully enclosed room, 22'8" by 13'9" by 11'0" high. It is designed to hold up to 600 kilograms of enriched uranium in powders, foils, elements or ingots stored in birdcage devices approximately 12" x 12" to 17" x 17" in cross-section. Walls, ceiling, and floor are constructed of a minimum of 9 inches of reinforced concrete. Sole entrance to the vault is through a $1\frac{1}{2}$" steel door equipped with a three-way combination lock. There are no water or service piping or drains within the vault.

Materials will be stored in separate containers containing quantities which are less than the theoretical critical masses calculated for optimum conditions with respect to geometry of container, moderators, and reflector according to the calculating procedures outlined in the Martin Criticality Precautions Manual, MND-1063 (Appendix A) and its reference "A Guide to the Calculation of Criticality Limits for Enriched Uranium" by Dr. Chernick. Each container will be at least 12" x 12" in cross-section with a length about 12" longer than the material to be held. Containers and birdcages will vary in design according to the form of the material. For example:

Uranium dioxide powders will be stored in metal bottles of approximately 150 cubic centimeters capacity. No more than 600 grams of uranium dioxide enriched to over 90% in the isotope U235 or more than 550 grams of contained isotope U235 will be stored in each metal bottle. One and only one bottle will be suspended inside a cubical "birdcage" type structure of welded metal construction having dimensions of 16 5/8" x 16 5/8" x 21 3/8".

Uranium metal foil will be stored in birdcages 12" x 12" x 34" with bundles of foil each containing no more than 1000 grams of U235 held roughly in the center by inserts.

Fuel elements, tubular or plate, will be held in cradles in storage devices or similar dimensions (12" x 12" x 30-40"). Each cradle will hold a prescribed number of tubes or plates, the total U235 content of which will be within the allowable limits established for the particular form of material involved.

Solid scrap will be stored in metal boxes 9 1/2" x 11 3/4" x 26", each held in a birdcage 12" by 12" x 40" long.

Insofar as it is practical, all birdcages will be placed in rows along the walls of the vault to permit easy access. The lowest rows will be placed on platforms about 17 inches above the floor to prevent accidental contact with water. Even if flooding occurred above the height of 22" required to reach any special nuclear material, no hazard would exist since (1) all materials will be in latched birdcages in amounts less than the theoretical critical limits and (2) powders will be in water-tight metallic containers within the birdcages.

All material will be stored during non-work hours either in the vault or in locked repository safes in the manufacturing area.

When special nuclear material must be taken from the nuclear facilities to other areas within the Martin plant, it will always be in the custody of a "Q" cleared accountability designee.

(c) Forms of material -

Forms with corresponding allowable limits in contained U235 have been established as shown on the following two pages.

(d) Work Areas and Criticality Control -

Reference is made to Plates 1, 2 and 3 and to the Martin Criticality Precautions Manual, MND-1063, filed with the AEC, April 22, 1957. A revised copy of this manual is attached as Appendix A. The manufacturing area and the critical experiment area have been divided into Work Areas for purposes of control of criticality. The laboratory except for a few designated work areas is considered to be one integral work area. Limits (in terms of U235) are shown on the plates for the various

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
Ia	all enrichments	UO_2 powder, density when loose approx. 5 gr/cc	800 grams
Ib	all enrichments	UO_2 powder, pressed and sintered shapes density approx. 10 gr/cc	800 grams
Ic	0.72% to 20.0%	UO_2 and ThO_2, powder and sintered shapes	* grams
IIa	highly enriched	UO_2 and stainless steel mixture, density approx. 8.4 gr/cc	1600 grams
IIb	highly enriched	Sintered cermet of UO_2 and stainless steel density approx. 8.4 gr/cc	1850 grams
III	all enrichments	Uranium in aqueous solution	2 grams/liter (1)
IV	highly enriched	Stainless steel clad tubes, with Form IIb as fuel marrow	2000 grams
V	over 20.0%	Stainless steel clad plates with uranium metal as fuel marrow	1600 grams
VIa	over 20.0%	Uranium metal in thin forms; ribbon, foil wire, etc.	500 grams
VIb	over 20.0%	Uranium metal in fine cuttings, dust., etc.	500 grams
VIIa	all enrichments	UO_2 and powdered Al mixture, approx. density 2.5 gr/cc	800 grams
VIIb	all enrichments	Pressed or sintered UO_2 and Al mixture in (VIIa) approx. density 5.0 gr/cc	800 grams

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
VIIIa	all enrichments	Aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
VIIIb	all enrichments	Iron-aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
IX	over 20.0%	Uranium metal in buttons, derbies, etc.	10000 grams (2)
X	over 20.0%	Uranium metal in ingots, bars, machined shapes, smallest dimension 70.25 inches	3000 grams
XI	0.72% to 20.0%	Stainless steel clads filled with solid pellets of Form Ib or Ic	2000 grams
XII	over 20.0%	Zirconium, titanium, molybdenum and other "special" alloy-clad plates with uranium metal fuel marrow	grams (3)
XIII	over 20.0%	Uranium-thorium molybdenum alloys	grams (3)

(1) Except when total amount in any one container in all forms is less than 400 grams of U235

(2) Subject to review with regard to minimum dimensions and reflecters

(3) To be determined

forms of SNM (pages 5 and 6) which can be present in each work area at any one time. In the event that several forms are present at one time in a work area, the lowest allowable limit for U235 applies to all materials present.

All transfers between work areas are made by the courier acting as a designee of the Accountability Representative. Enforcement of criticality procedures within work areas is a responsibility of each facility supervisor. Material, under close weighing control, is transported to an "Off-Spot" in work boxes in "carrier" devices. Amounts present in each work area are shown on prominent signs posted by the Accountability Representative.

(e) Manufacturing -

Fabrication of fuel elements will be performed in the pilot shop located in "D" Building.

A few special operations such as brazing of fully clad tubes to end castings will be done in other buildings at Plant I.

Processes, either developed or being developed include:

(1) Fabrication of stainless steel clad plates enclosing uranium metal foil (Form .)

(2) Stainless steel clad tubes enclosing fuel marrow of enriched uranium dioxide-stainless steel cermet (Form IV)

(3) Aluminum and aluminum alloy clad tubes enclosing pressed uranium dioxide-aluminum blended compacts as fuel marrow (Form VIII)

(4) Stainless steel clads filled with solid compacts of uranium dioxide or uranium dioxide and thoria (Form XI)

General descriptions of these processes are outlined in Appendix B with corresponding manufacturing flow charts shown in Appendix C.

(f) Accountability -

The Martin Nuclear Division accountability procedures for strict control of valuable special nuclear materials

apply to both government-furnished SNM and to licensed SNM. Each lot received is assigned a ledger number. All material withdrawn is kept separate from other lots throughout processing. Scrap is kept segregated by contract or project. Thus there is no risk of intermingling materials or several contracts or of different enrichments.

(g) Security -

All facilities are controlled areas with only authorized personnel permitted access. An escort-control pass system is applied to authorized visitors.

Materials are given security protection in accord with the categories outlined in the AEC manual.

(h) Transport to Critical Experiment Facility -

Finished fuel tubes, plates or rods are moved to the facility in "birdcage" transporting devices in a guard-escorted motor vehicle. No more than 800 grams of U235 contained in sealed elements are allowed per "birdcage" device. These birdcage devices are 12" by 12" by 34" and retain in a center position wooden cradles 9 1/2" by 11 3/4" by 23 3/4" which hold the fuel tubes or plates.

(i) Receipt and Storage at Critical Experiment Facility -

After verification by the Accountability Designee of the Facility of the number of tubes or plates delivered the birdcages will be placed in the storage vault. The vault is of similar construction to the vault in the pilot manufacturing plant and has a floor area of 175 square feet. It is accessible only through a 1 1/2" steel door equipped with a three-way combination lock.

(j) Assembly at Critical Experiment Facility -

Tubes or plates are assembled into experimental bundles in Work Area 102, adjacent to the Storage Vault and Test Cells.

Following assembly, the fuel elements (bundles or boxes) will be placed in wooden cradles which are held in the birdcage storage devices. The dimensions of the cradle holding a bundle of thirty-seven (37) MPR tubes are 9 1/2" by 11 3/4" by 23 3/4".

The birdcage devices are then transferred to the storage vault for retention until withdrawal for experimental work authorized by a Class 104 c license.

(k) Shipping procedures -

Shipments of special nuclear material to the Commission or to other licensees will be made as follows:

(1) If the shipment contains no more than 100 grams of U235, the material will be securely packed in a container with resilient material between this container and the outside package. In addition, the parcel will be checked for possible radiation hazards and marked in accordance with ICC regulations.

No more than one package containing up to 100 grams of contained U235 will be transported or delivered to a carrier in any one shipment.

(2) If the shipment contains over 100 grams of U235, the material, depending on its form, will be packed in a container in either one of the Martin "birdcage" devices described in part 2(b) or an equivalent device to be furnished by the shipper. The quantity of U235 in any shipping device will be within the allowable limits for various forms shown on pages 7 and 8 of the manual, MND-1063.

(3) A general license is requested for a period of three years.

(4) Special Nuclear Material will be used in the forms shown in section 2(c). The general categories are:

Uranium dioxide powder; low-enrichment to over 90% enriched in isotope U235
Uranium metal foil, ribbon and wire; low-enrichment to over 90% enriched in isotope U235
Uranium metal ingots, slugs, billets, bars, derbies; all enrichments.

It is not possible to estimate amounts of each type required. However, a total requirement at one time of up to 500 kilograms of contained U235 in SNM is foreseen.

(5) The contemplated requirements for Special Nuclear Material for the last quarter of 1957 and the first quarter of 1958 are shown on the next page.

(6) The Martin Nuclear Division has been engaged in handling special nuclear materials for over two years in research and development of fuel elements. The new laboratory and pilot manufacturing plant have been in operation since June, 1957.

Several new concepts of fuel elements have been developed including the highly-enriched stainless steel clad, UO_2 cermet marrow tubular type. The first core loading of 1700 of these tubes will be completed in November. The technical staff of the Nuclear Division includes some 200 engineers. The manufacturing plant supervisor has had fifteen years of precision shop experience. Health Physics personnel include two senior health physicists each with over 5 years of training at AEC and industrial installations. The Accountability Representative is a public accountant with 10 years experience including 9 months in the handling of nuclear materials.

(7) Equipment and facilities used to protect health and safety -

Storage facilities are described in (2b) and (2i). The manufacturing and laboratory areas are under negative pressure with respect to adjacent working areas of "D" Building. Air flow is from non-contaminated areas to slightly-contaminated areas to more-contaminated areas, with the highest ventilation rates in those rooms or areas where the greatest air-borne contamination is possible.

Exhaust air that may contain appreciable radioactive particulate matter (that is from the hoods or dry boxes) is passed through absolute filters before being released to the atmosphere.

Hoods are used for handling uranium dioxide powders. These hoods, exhausting ducts and glove boxes are equipped with absolute filters. Machining of uranium metal will be done using an oil bath.

A partial list of available instruments and equipment appears as Appendix D.

MATERIAL	ENRICHMENT	QUANTITY ON HAND	4TH QUARTER 1957		1ST QUARTER 1958	
			Receipts	Returns	Receipts	Returns
UO_2 Powder	20%	5 kg	-	3	-	2
UO_2 Powder	over 90%	50 kg	20	25	10	25
Uranium foil	over 90%	0.5 kg	-	-	-	-
Uranium foil	over 90%	-	31	-	-	-
Uranium metal ingot	31%	-			40	40
Uranium metal ingot	over 90%	-			100	100

(8) Health and Safety measures -

Personnel working with radioactive materials (including SNM) or in radiation areas are routinely monitored for external radiation exposure by means of film badges and pocket chambers. Contamination is controlled by surveying likely objects or areas with appropriate detecting instruments or by making filter paper smears (which must be counted with an appropriate detector), recording results, and informing proper supervision. All operating personnel must be constantly alert to contamination possibilities involved in their operations and must continually strive to keep contamination to a minimum. Health Physics takes air samples in areas where airborne contamination is possible (frequency of sampling depends on operation). A tolerance of no more than 5×10^{-11} microcuries per milliliter air is established. If this tolerance is approached all personnel in the area affected are required to wear respirators. Uranium urinalyses and blood tests will be made every three months to check on internal deposition on people assigned to work in these areas.

From receipt of material to shipping or storage, Health Physics will be concerned with contamination and radiation levels from the SNM. External radiation measurements will be made on the received package and recorded. The Accountability Representative will open these packages. Health Physics shall assist in examination for breakage or other damage and subsequent contamination control in case of damage. During weighings of received SNM, Health Physics will make necessary smear checks. Samples to be sent for outside laboratory analysis will be packaged to conform with all pertinent ICC regulations.

Contamination control effectiveness will be checked by Health Physics throughout the operations in the laboratory and in the pilot manufacturing plant.

Protective clothing will be used to reduce personnel contamination.

Disposal of radioactive wastes: There will be no radioactive gaseous effluent from the Martin facilities. The incineration of radioactive combustible materials will be controlled by monitoring the exhaust stack of the incinerator.

Liquid wastes will be stored in polyethelene lined 55 gallon drums until ready for concentration. Batches containing no more than 400 grams of U235 will be reduced nearly to dry salt and these residues will be sent to AEC installations for recovery.

Solid wastes such as incinerator ashes will be mixed with a prepared cement mix before disposal by land or sea burials in accordance with Part 20, CFR 10.

The large volumes of slightly contaminated liquid wastes from the Decontamination Laundry will be held in collecting sumps until filtered, sampled, and counted for radioactivity before discharge to the sanitary sewer. Tap water dilution will be used, if necessary, to reduce the concentration to the levels required by 10 CFR Part 20.

(9) Emergency procedures -

An outline of the procedures to be followed in case of incidents involving nuclear materials is contained in the Criticality Precautions Manual, MND-1063, pages 5 and 5a.

(10) Financial Qualifications -

The Martin Company has done business under its present charter in the State of Maryland for a period of over twenty-five years. Total current assets on December 31, 1956 were $96,000,000 and sales for the year totalled about $360,000,000. The Nuclear Division, headed by a General Manager, is part of the company organization and draws its budgetary support therefrom.

The Martin Company will assume financial responsibility for all special nuclear materials received and will pay to the Commission the presented use charge based on the value of the material until the material is returned to the latter.

A copy of the 1956 Annual Report of the Company is attached as Appendix E.

III. Pursuant to Section 70.32, The Martin Company stipulates that:

(1) Title to all special nuclear material shall at all times be in the United States.

(2) No right to the special nuclear material shall be conferred by the license except as defined by the license.

(3) Neither the license nor any right under the license shall be assigned or otherwise transferred in violation of the provisions of the act.

(4) All special nuclear material shall be subject to the right of recapture or control reserved by section 108 and to all other provisions of the act.

(5) No special nuclear material may be used in any utilization or production facility except in accordance with the provisions of the act.

(6) The licensee shall not use the special nuclear material to construct an atomic weapon or any component of an atomic weapon.

(7) The licensee will hold the United States and the Commission harmless from any damages resulting from the use or possession of special nuclear material by the licensee.

(8) The license shall be subject to, and the licensee shall observe, all applicable rules, regulations, and orders of the Commission.

I certify that the statements made in this application and its attachments are true, complete and correct to the best of my knowledge and belief, and are made in good faith.

THE MARTIN COMPANY

BY: Tibor F. Nagey

Tibor F. Nagey
General Manager
Nuclear Division
Baltimore 3, Maryland

Subscribed and sworn to before me this 6th day of April, 1957.

Henrietta Marie Peters
Notary Public

My commission expires May 4, 1959.

APPENDIX B

DESCRIPTION OF PROCESSES EITHER DEVELOPED OR BEING DEVELOPED

(1) Stainless steel clad plates enclosing enriched uranium metal foil, Form V.

The process is diagrammed in the flow sheet for Form V, Appendix B. Material is received from processor in clean flat strips of foil, (Form VI) cut to size and enclosed in polyethylene bags. It is stored in birdcage boxes, 12" x 12" x 34" in lots not exceeding 1000 grams of U235 per container. Batches not exceeding 500 grams of contained U235 are withdrawn from storage vault, (Work Area 1a) and transferred by courier to Work Area 10 for assembly between stainless steel plates. Assembly is seam welded, evacuated at a low temperature and a final end seam weld made in Work Area 10. After radiography in Work Area 7, batches of plates will be autoclaved in Work Area 22 to determine porosity reliability.

Destructive and non-destructive testing will be performed on selected plates in Work Area 11.

(2) Stainless steel clad tubes enclosing fuel marrow of enriched uranium dioxide-stainless steel cermet (Form IV).

A description of the process is contained in the confidential manual, MND-1069 which is furnished as a supporting document to this application, (Appendix F). A flow sheet for the process is also included in Appendix C.

(3) Aluminum and aluminum alloy clad tubes enclosing pressed UO_2 -Al blended compacts (Form VIII).

Enriched uranium dioxide is blended with three parts by volume of powdered aluminum in Work Area 2. This blend is compacted to pressed bushings in Work Area 5. The bushings are assembled on a tube of aluminum or aluminum alloy and a second tube is passed over the bushings to complete the assembly. The assembly is swaged and drawn in Work Area 4 and then annealed to complete the metallurgical bonding in Work Area 5. Cleaning of the finished tubes is accomplished in Work Area 9. After radiography in Work Area 7, the assembly is sheared to size (Work Area 4) and the ends seam-welded in Work Area 10. Radiography, non-destructive testing, and porosity testing are done in Work Areas 7, 11 and 20 respectively to complete the tube manufacturing process. Brazing and welding of sealed tubes into bundles will be done in other facilities at Plant I under security and health safety safeguards required.

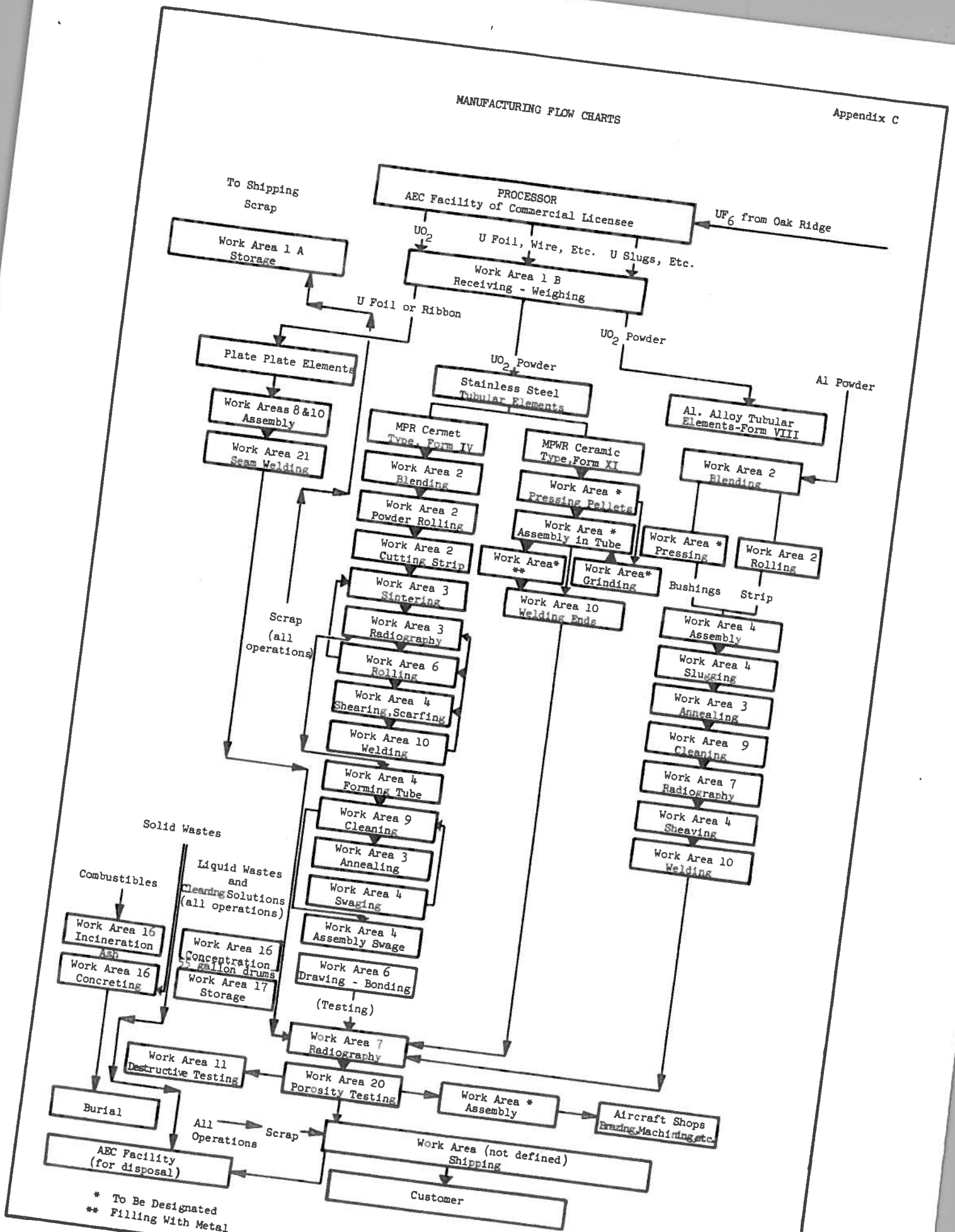
(4) Stainless steel cladsfilled with pressed compacts of uranium dioxide or uranium dioxide and thoria (Form XI).

Uranium dioxide powder of low enrichment in the isotope U235 is pressed into pellets. These pellets are assembled in stainless steel tubes and the interstices filled with a liquid metal to provide for efficient heat transfer between the fuel and the outside tube.

(An alternate method using ground pellets fitting to close tolerances in the tube may be used.)

The ends of the tubes are welded in Work Area 10 and the completed tubes are radiographed, porosity tested and cleaned.

MANUFACTURING FLOW CHARTS



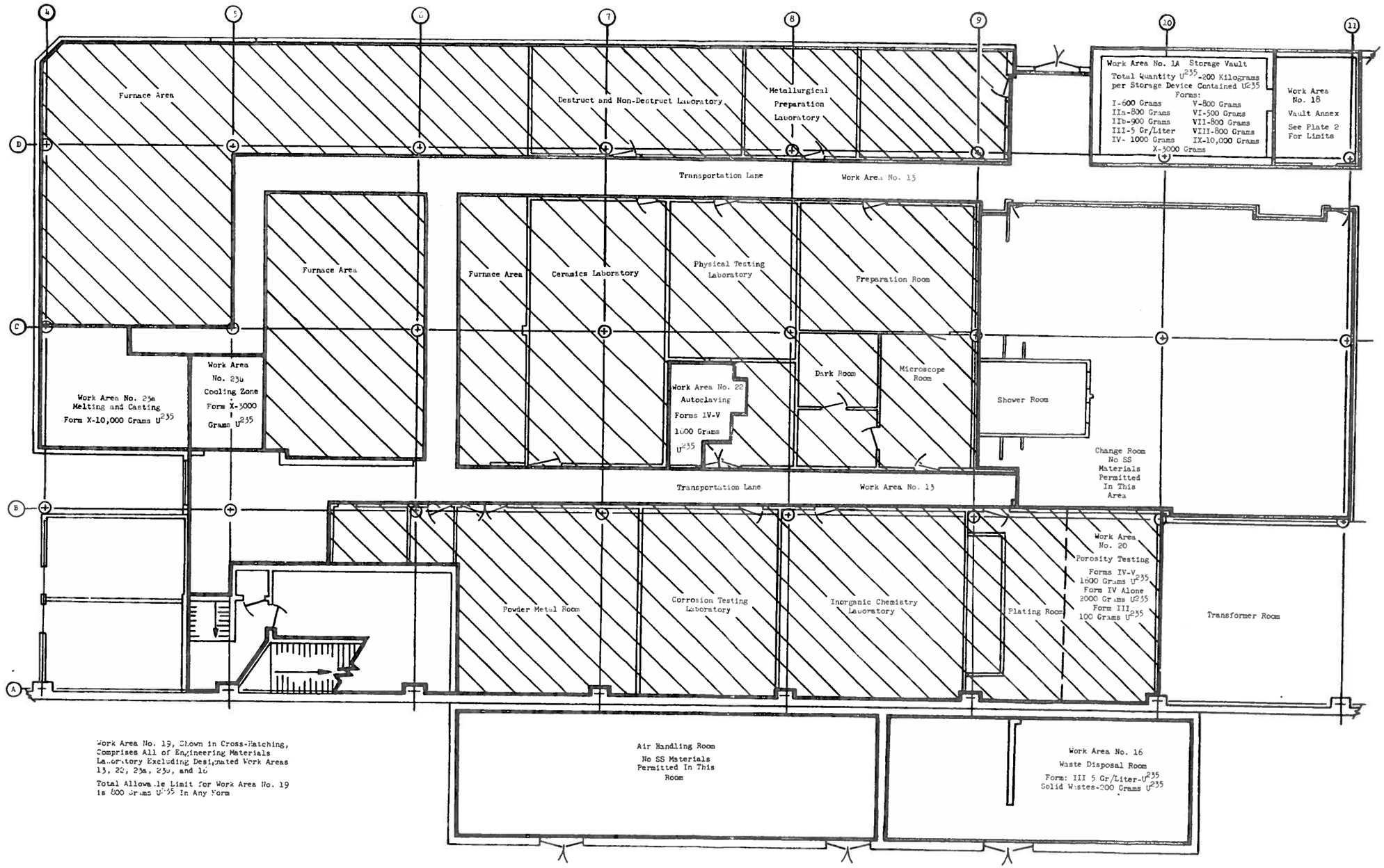
APPENDIX D

List of Health Physics Instruments

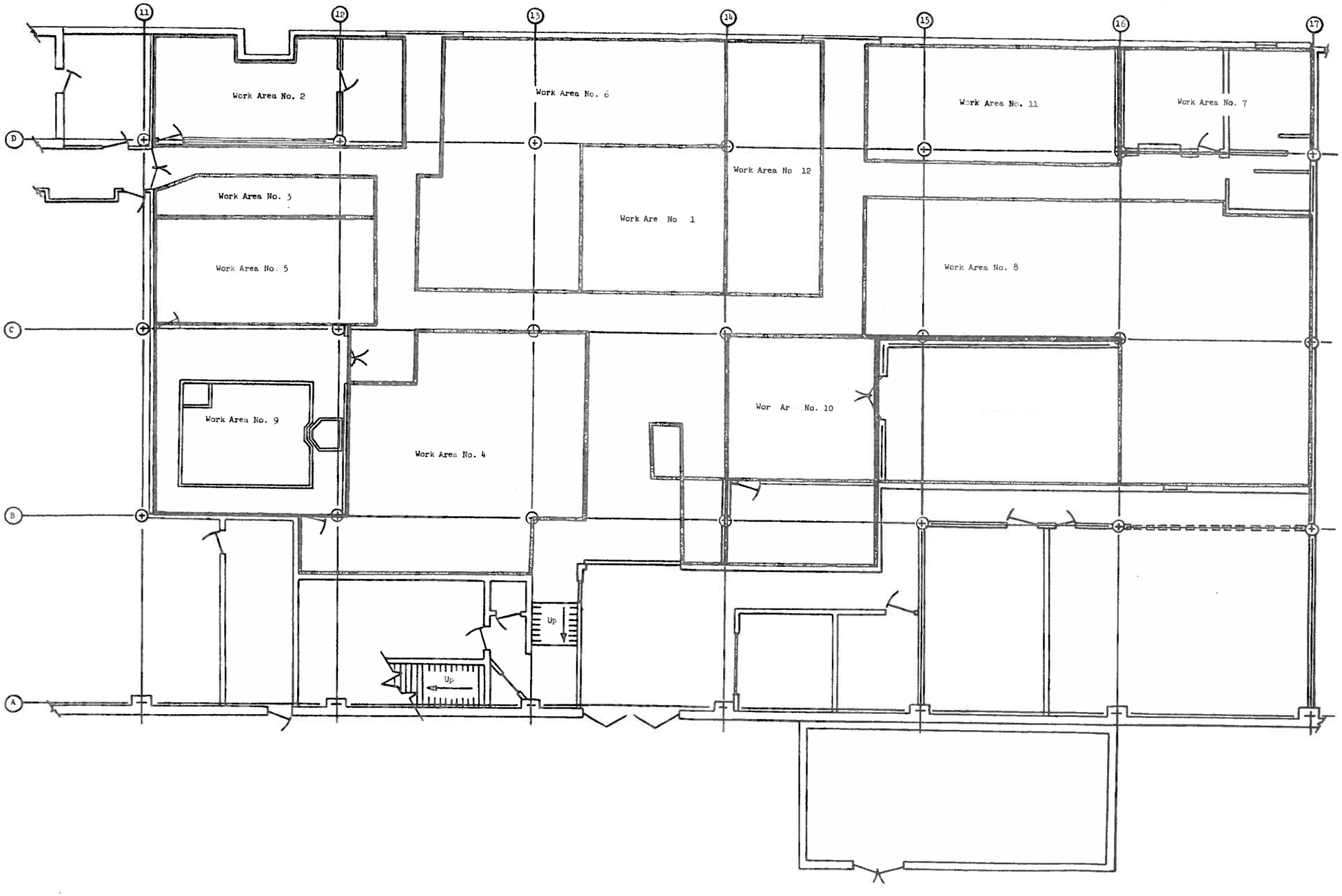
No.	Type of Instrument	Manufacturer	Model No.
4	Alpha Survey Meters	Nuclear-Chicago	2112
1	" " -Samson	NED Instrument Co.	D-6
2	Alpha Probes	Nuclear-Chicago	AP-4
1	G.M. Survey Meter	Berkley	2750
4	" " Meters	Victoreen	592
5	" " Meters	Nuclear-Chicago	2612
3	"Cutie Pie" Survey Meters	Nuclear-Chicago	2586
2	" " " "	Tracerlab	SU-1H
2	" " " "	NRD Instrument Co.	CS-40
4	Count Rate Meters	Tracerlab	SU-3C
1	" " "	Nuclear-Chicago	1619
2	" " "	" "	1615-B
1	" " "	" "	1613-A
1	" " "	Nuclear Instrument and Chemical Corporation	MR-10
1	" " "	Nuclear Measurements Corp.	LCRM-2M
1	Pee Wee	Nuclear-Chicago	2111
1	Fast Neutron Counter	NRD Instrument Co.	E-1A
1	" " " Probe	" " "	F-1
1	Poppy Probe	General Electric	
1	Scaler	Nuclear-Chicago	1310
2	Scalers	" "	161-A
1	Scaler	Radiation Instrument Lab.	1201-T
1	Scaling Unit	Nuclear-Chicago	183
1	Ultra Scaler	Nuclear-Chicago	192
1	Scaler-Decade	Radiation Counter Lab. Mark 13	10-D
1	Proportional Counter	Nuclear Measurements Corp.	PC-1
1	" " Converter	" "	PC-16

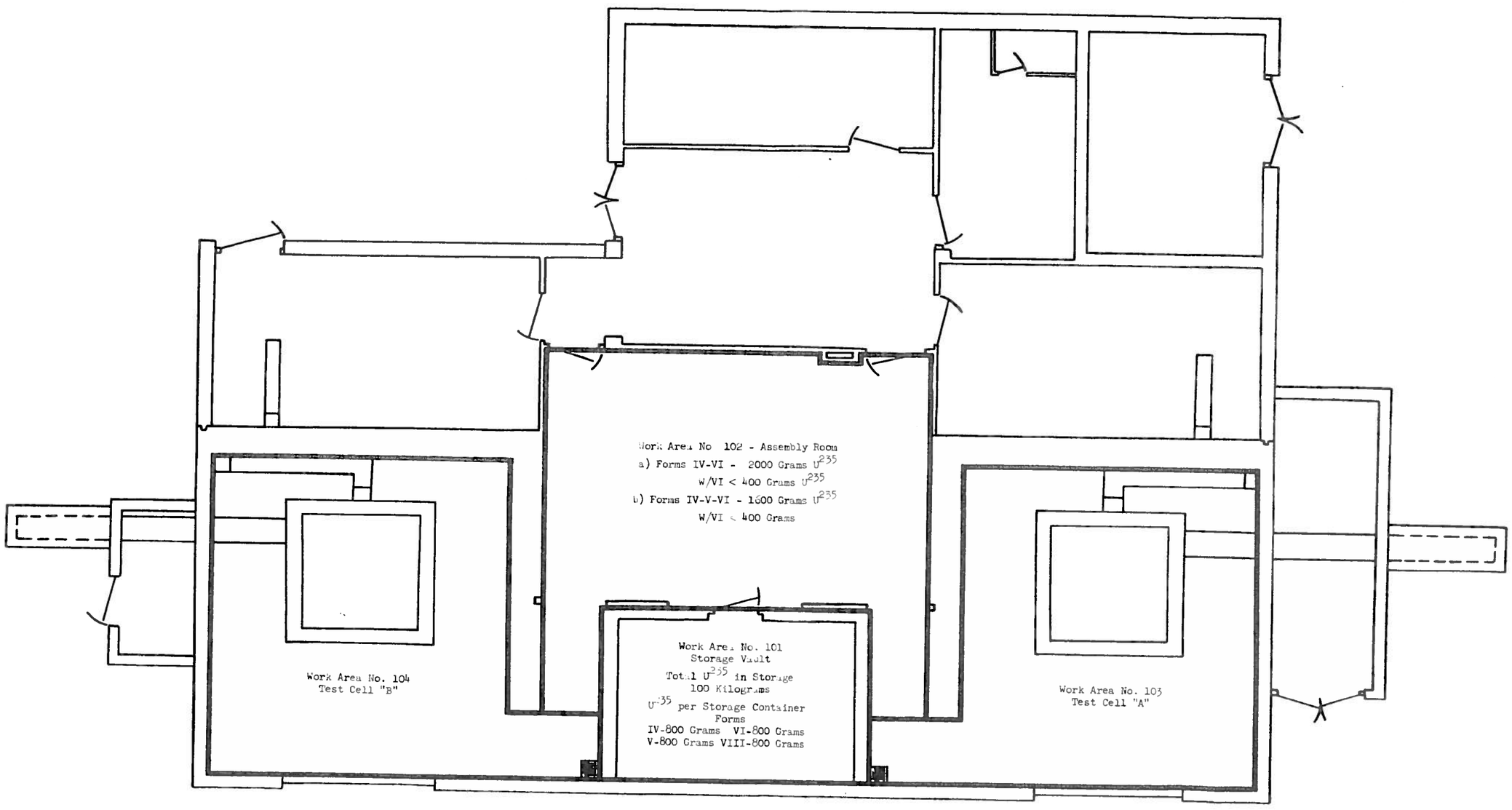
List of Health Physics Instruments Cont'd

No.	Type of Instrument	Manufacturer	Model No.
1	Scintillation Probe	Radiation Counter Labs	Used with Decade Scaler Model #10-D
1	Alpha Scintillation Detector	Tracerlab	P-12
2	Air Samplers	Millipore	
2	Air Monitors	"	S44AK-978
1	" "	Staplex	TF-1A
1	Fluorimeter	Jarrell-Ash Company	JA-2600
2	Jordan RAMS Systems	Jordan Electronics, Inc.	
1	Decade Scaler used with P10 A Proportional Counter	Tracerlab	
1	Gamma Survey Meter K-350B	Tracerlab	
1	Neutron Probe N-C Model DN3 for NC-2112 Unit	Nuclear-Chicago	
2	BF_3 Probes	Radiation-Counter Laboratories	
1	Mobile Continuous Air Monitor NMC Model AM-2A	Nuclear Measurements Corp.	



Martin Nuclear Division Engineering Materials Laboratory
Criticality Work Areas Plate 1


11
12
13
14
15
16
17
D
C
B
A
Work Area No. 2
Work Area No. 6
Work Area No. 11
Work Area No. 7
Work Area No. 3
Work Area No 12
Work Are No 1
Work Area No. 5
Work Area No. 8
Work Area No. 9
Work Area No. 4
Wor Ar No. 10
Up
Up



Martin Critical Experiment Facility Criticality Work Area Plate 3

Form AEC-417
(8-57)

UNITED STATES ATOMIC ENERGY COMMISSION

COMPLIANCE INSPECTION REPORT

1. Name and address of licensee or permit holder
The Martin Company
Baltimore 3, Maryland
Reactor Test Unit, Nuclear Division
Manufacturing, Engineering and Research Depts.
Engineering Division, Nuclear Support
Engineering Division, ANP Project
Engineering Division, Reactor Test Unit
Health Physics Department

2. Date of inspection
October 22, 1957

3. Type of inspection
Initial

4. 10 CFR part(s) applicable
20 - 30

5. License (or permit) number(s) and expiration date(s)

Number	Date	Exp. date	Number	Date	Exp. date
19-1398-1 w/amend. #1,2 (Dr. J.A. Hunter, Mr. H.B. Rosenthal)		11/30/58	19-1398-6 w/amend. #1 (G.J. Rausa, A.E. Lennert)		4/30/59
19-1398-2 w/amend. #1 (Mr. H.O. Banks)		12/31/57	19-1398-7 w/amend. #1 (Dr. J.F. Phelps, Mr. A.E. Evans)		4/30/59
19-1398-3 w/amend. #1 (Mr. A.K. Kniebler)		3/31/62	19-1398-8 w/amend. #1 (J.F. Stebbins, D.G. Harvey)		4/30/59
19-1398-5 (G.J. Rausa, A.E. Lennert)		4/30/59	19-1398-9 w/amend. #1 (A. Stefanes)		6/30/59

6. Scope of license(s) and permit
19-1398-1 w/amend. #1,2
Licensee authorized 40 curies of Polonium 210 as 2 Po-Be neutron sealed sources of 20 curies each to be used by reactor test unit for work in the Martin Critical Facility.
19-1398-2 w/amend. #1
Licensee authorized 30 curies of Iridium 192 as sealed source Model No. A-424, Technical Operations, Inc. to be used in Technical Operations Inc. Model 412 projector for industrial radiography. 5 curies of Cobalt 60 as sealed source Model No. A-424 Technical Operations (Cont

7. Special conditions and limitations of license(s) or permit
19-1398-1
12. Licensed material shall be used as sealed source for purpose stated and sources shall not be altered, opened or combined.
13. Leak testing of the sources licensed above shall be carried out at intervals of ninety days and records of the leak test results to be furnished to the Atomic Energy Commission upon request.

(Cont'd)

8. Inspection findings
The Baltimore location of the Martin Company is composed of Martin Nuclear Division and Martin, Baltimore. The Nuclear Materials Controls Committee at Martin Company is concerned with all problems involved in the handling of byproduct, source and special nuclear materials. All applications for these materials must be approved by the Controls Committee. Radiation safety instructions and procedures are satisfactory for the work being done with byproduct materials. Facilities for use and handling of the materials on hand, and instrumentation for detection of radiation are adequate. Isotope procurement and survey procedures are sufficient. Leak testing of Sr^{90} sources as required by condition 14 of license -2 and condition 13 of license -9 has not been carried out (Item 15). (Cont'd)

9. Items of noncompliance
20.203 "Caution signs, lables, and signals" -(f)(1) "Containers": labeling of waste containers in waste storage area.
30.3 "License requirements" - Licensee possesses a 1 mc Ra^{170} source not presently covered by a specific license. (Cont'd)

10. Give date of last previous inspection: None

11. Is "Company Confidential" information contained in this report? Yes
(Specify page(s) and paragraph(s)) Entire Report

DISTRIBUTION:
4 cys. - Division of Inspection, Washington
2 cys. - Inspection Division, NYCO

Paul B. Klevin (Inspector)

Approved by: Robert W. Kirkman, Director
New York
(Operations office)

December 30, 1957

IT & E FORM

Inc. to be used in Technical Operations Inc. Model 400 projector for industrial
p , 6 millicuries of Strontium 90 sealed source Model S-1 Tracer Lab,
Inc. for beta thickness gage experiments and radiography of thin sections. For
experimental purposes only. 37 curies of Thulium 170 sealed source (aluminum
capsule type B shielded type A capsule) Technical Operations, Inc. to be used
in Martin Company's gamma type projector #1 Iridium 192 sealed source (aluminum
capsule type B shielded type A capsule) Technical Operations, Inc. to be used in their photographic
A-69-70, and A-Gamma. 10 millicuries of Iridium 192 in any form for the experimental
laboratory of Bendix, twelve hundred millicuries of any byproduct material
between Atomic Nos. 3 and 83 inclusive as irradiated tool tips used to conduct
a tool wear study.

19-1098-3 w/amend. #2

Licensee authorized to use 800 curies of Cobalt 60 as sealed source (Brookhaven,
cylindrical) to be used in a shield (Glenn L. Martin drawing MSR-7-0117)
for gamma irradiation research, 1,500 curies of Cobalt 60 as sealed source
(Brookhaven, by 3rd Mod.) and 78 sources of 55 curies each total 4,290 curies of
Cobalt 60 as sealed sources (Ace.) to be used in water shielded facility (Glenn
L. Martin drawings RV-D/Mod) for gamma irradiation research.

19-1098-5

700 milligrams of Promethium 147 as plated copper disc and sealed for roll modification.

19-1098-6 w/amend. #1

25 - 1 curie sources of Cobalt 60, Oak Ridge National Laboratory sealed sources to be
used in ground handling experiments to simulate aircraft reactor system. 25-200
millicuries sources of Cesium 137 as Oak Ridge National Laboratory sealed sources to
be used as gamma source in configuration to obtain a collimated plane source for
instrumentation studies. 7 curies of Beloulum 210 Mound Laboratory or ANL sealed
Be-Be neutron source for the neutron development and foil activation. 1 milli-
curie of Barium 133, 1 millicurie of Nickel 63, 1 millicurie of Potassium 42, 1
millicurie of Silver 85, 10 millicuries of Sodium 22 to be used for the calibration
of instruments.

19-1098-7 w/amend. #1

40 millicuries of Cobalt 60 as NRC sealed source Model No. AMC-3, 1 millicurie of
Cobalt 60 as Tracerlab sealed source Model B-5 for instrument calibration and
testing.

19-1098-8 w/amend. #1

1 millicurie of byproduct material between Atomic No. 3 and 83 inclusive,
t as irradiated structural materials for laboratory testing to determine physical
properties of irradiated materials.

19-1098-9 w/amend. #1

15 millicuries of Cobalt 60 as sealed source, double shielded encapsulated, 100
e of Promethium 147 as sealed source, Standard Model Radium for instrument
calibration and radiation sources for research and development program. 7 curies
of Beryllium-Beryllium 210 as Jordan Electronics, Inc. Sealed Source Model
BE-210, 2 curies of 300 millicuries each - total 600 millicuries of Promethium 90
as Jordan Electronics, Inc. sealed sources Model BE-750 for instrument calibration.

19-1098-2

11. Licensed material shall be used as sealed sources for purposes stated and neutron shall
not be altered, opened or subdivided.

14. Leak tests of the Strontium 90 sources listed above shall be carried out at intervals
of six months and records of the leak test results shall be furnished the Atomic Energy
Commission upon request.

15. Written safety instructions shall be adopted and protection control
procedures shall be furnished to all individuals responsible for handling licensed mat-
erial. The applicant shall indicate the assignment of responsibility for radiological pro-

License No. 19-1396-1

12. This license supersedes authorization numbers 21309 and 21716 issued February 9, 1956 and February 6, 1956.

14. Sealed sources licensed above shall not be opened.

15. Written administrative instructions covering appropriate radiological protection [illegible] of operational procedures and [illegible] responsibility for radiological protection, control and security of the byproduct material shall be supplied individuals using or having responsibility for use of such material.

License No. 19-1396-2

11. Byproduct material to be used only at Martin Company, Engineering Division ANP Project, Baltimore 3, Maryland.

License No. 19-1396-3

This license supersedes license No. 19-1396-2, issued March 29, 1957 to the Glenn L. Martin Company, Baltimore, Maryland.

14. Byproduct material must be encapsulated prior to conveyance by licensee.

15. Sealed sources licensed above shall not be opened.

16. Leak testing of sealed sources containing byproduct material shall be carried out at intervals of 90 days and records of the leak test results shall be furnished the Atomic Energy Commission upon request.

License No. 19-1396-4

17. Leak testing of sealed sources containing beta and/or gamma emitting byproduct material (except those containing iridium 192, tantalum 182, gold 198, and natural cobalt 60 in metallic form) shall be carried out at intervals of not more than six months and records of leak test results shall be furnished the Atomic Energy Commission upon request.

License No. 19-1396-5

13. Sealed sources licensed above shall not be opened.

License No. 19-1396-6

11. Byproduct material to be used by or under the supervision of J.P. Stebbins, D.C. Harvey, [illegible]

License No. 19-1396-7

11. Byproduct material to be used by or under the supervision of Anthony Vivenzo.

12. Sealed sources licensed above shall not be opened.

13. Leak testing of sealed sources containing beta and/or gamma-emitting byproduct material except those containing iridium 192, tantalum 182, gold 198, and plated natural cobalt 60 in metallic form shall be carried out at intervals of six months and records of the leak test results shall be furnished the Atomic Energy Commission upon request.

License No. 19-1396-8

[illegible] Byproduct material licenses issued to the Martin Company, Baltimore, [illegible] facilities at the Martin Company are adequate. The answers to the radiography exhibit [illegible] provided with an appropriate visible or audible alarm [illegible] required by 10 CFR 20.203 (c)(2) - (Item 12). All [illegible] were properly labeled with the [illegible] of several [illegible] to material stored in the [illegible] room (Item 9). Adequate records of [illegible] inventory, [illegible] and [illegible] were maintained. It was noted that the Martin Company has on hand some [illegible] which is not covered by an existing license.

License No. 19-1396-9

Violation [illegible] condition 14 of license 19-1396-8 and condition 13 of license 19-1396-8 requiring leak testing of [illegible] sealed sources.

PART 30 INSPECTION

The Martin Company
Baltimore), Maryland

Date of Inspection: October 22, 1957

Persons Accompanying Inspector:

Dr. W. F. Reindollar, Director, Division of Industrial Hygiene and Air Pollution, Maryland State Department of Health
Mr. Howard Cooney, Division of Industrial Health and Air Pollution, Maryland State Health Department

Persons Contacted:

Mr. C. A. Wendel, In charge of Licensing
Mr. A. J. Stevens, Health Physicist
Mr. Lester Stevens, Accountability Representative
Mr. J. M. Thaler, Nuclear Engineer
Mr. H. D. Wildsmith, Insurance Representative
Mr. H. M. Rosenthal, Supervisor of Reactor Test Unit
Mr. J. T. Hays, Security Officer
Mr. Paul Quinn, Radiation Safety Officer
Mr. Arthur Sheiler, In charge of the Canon facility
Mr. H. O. Banks, Radiological Health, Senior Manufacturing Engineer
Mr. A. E. Lonnert, Senior Nuclear Test Engineer
Mr. J. D. Stubbins, Research Engineer
Miss Harrison, Health Physics Section
Mr. C. H. Krug, Business Manager of Purchasing Department
Mr. A. M. Evans, Nuclear Physicist, Critical Facility

Persons contacted during initial interview at Martin Company when details of the basic organization of the Martin Company were discussed.

Persons contacted by phone only.

12. Organization and Administration

The Baltimore location of The Martin Company (formerly the Glenn L. Martin Co.) is composed of the Nuclear Division and Martin Baltimore. Other than their Baltimore facilities, The Martin Company has additional facilities located in Florida and Colorado.

Mr. Richard Henderson, Office of the General Manager, acts as Chairman of the Nuclear Materials Controls Committee. Other members of the committee are as follows:

Mr. L. B. Stevens, Accountability Representative, Nuclear Division
Mr. C. A. Wendel, Licensing, Nuclear Division
Mr. Paul Quinn, Health Physics Representative, U.S.O., Martin Baltimore
Mr. J. T. Hays, Security Officer, Martin Baltimore
Dr. [illegible] Manufacturing Representative, Nuclear Division
Mr. William Maxwell, Engineering Laboratory, Nuclear Division
Mr. James [illegible], Accountability Engineer, Nuclear Division
Mr. Jesse Darnell, Quality Control, Martin Baltimore

The Nuclear Materials Control Committee is concerned with all problems involved in the handling of by-product, source and special nuclear materials. All applications for these materials must be approved by the Controls Committee.

Mr. Paul Quinn, the Radiological Safety Officer, received experience and training for approximately [illegible] years at Oak Ridge, Tennessee, where he worked under Dr. James Hart as [illegible] Health Physicist on nuclear work. He has an ed[illegible] lectures at

Physics from Ohio State in 1953. He was a research physicist from 1954 - 1957 at Wright Paterson, Ohio where he worked on Van De Graaff accelerators.

Dr. Jack A. Hunter received training and experience in radiation safety for approximately five years at Ohio State University, for one year at NEPA, and for four years at G-E ANP. In Oak Ridge, he worked with approximately 20 curies of Po^{210} for approximately one year.

Mr. H. B. Rosenthal received training and experience in radiation safety at G-E ANPD, he worked with 10 curies of Po^{210}, 1 curie of Co^{60} and 1 curie of Ra^{226}.

19-1398-2 - Mr. Hampton O. Banks, Radio-Chemist, Senior Manufacturing Engineer, received radiation experience and training at Brookhaven National Laboratory for approximately 6 years and at the Missouri School of Mines for approximately 2 years. At Brookhaven, he worked with multi-curie amounts of mixed fission products and kilogram amounts of uranium. Under the supervision of Mr. Banks, one assistant who was trained by Mr. Banks uses radioactive material.

19-1398-3 - Mr. A. W. Kneibler of the gamma facility received experience and training with radioactive materials at the University of Miami from February 53 to June 54 and at the Martin Company from March 1957 to the present time. At the University of Miami he worked with 10 millicurie amounts of cobalt 60 and at the Martin Company he works with approximately 6000 curies of cobalt 60. There are no other persons working with radioactive materials under license -3.

19-1398-4, 6 - Mr. A. H. Lannert, Senior Nuclear Test Engineer was trained at the University of Washington for approximately 2 years and at the Olin-Mathieson Chemical Company for approximately 2 years in the proper handling of radiation and radioactive materials. He worked with approximately 50 millicuries of Sr^{90} - Y^{90} and 1 curie of cobalt 60 at the Olin-Mathieson Company.

Mr. G. J. Rauna, Nuclear Staff Engineer was trained at the University of Rochester for approximately 4 years, at the Brookhaven National Laboratory for approximately 3 months, and at the Oak Ridge National Laboratory for approximately 1 year in all phases involved in the use and handling of radiation and radioactive material. At the University of Rochester he worked with approximately 2 curies of Radium-Beryllium and at the University of Rochester and Oak Ridge National Laboratory he worked with Polonium and Beryllium sources of 6 and 30 curies magnitude. At the Brookhaven National Laboratory he worked with a 1000 curie cobalt 60 source. At the University of Rochester he worked with various amounts of other isotopes up to as much as 6 curies in one year.

No work is presently being done under these licenses.

19-1398-7 - Dr. Phelps, one of the individual users, is no longer with the Martin Company. The qualifications of Mr. A. E. Evans, the other individual user, are listed under license -1.

19-1398-8 - Mr. J. B. Stebbins was trained at Savannah River for approximately 3 years and at Argonne National Laboratory for approximately 8 months in all phases of radiation and the handling of radioactive material. At Savannah River, he worked with quantities up to 5 millicuries of the full fission product spectrum.

Mr. D. G. Harvey received experience and training in the safe handling of radiation and radioactive materials at Massachusetts Institute of Technology for approximately 1 year and at WADC for approximately 3 years.

19-1398-9 - Mr. A. J. Stefanec, Health Physicist, received a B. A. from Western Reserve. He worked as a Health Physicist for the Warshaw Chemical Company from 1948 to 1953. He was employed by National Lead of Ohio as a

[illegible] cadmium lined paraffin block, the door to this cell was interlocked, and the area around the source was enclosed by a rope with a yellow and magenta radiation symbol. The source cells [illegible] must use. At the time of inspection, the source was in storage. When in use, this source is used by the reactor test unit for work in the various cells [illegible].

12-1.9-d - Materials under license -2 and -3 with the exception of 9.5 millicuries of Co[illegible] sources under -2 are used in the radioisotope laboratory and associated facilities which comprise a one story building (see Exhibit 1). A combined counting laboratory approximately 15' by 20' is supplied with a number of Chicago Nuclear-Pie and a number of Chicago G.M. survey meters. Adjacent to the office is a dark room and a tracer laboratory. Both of these are accessible through the office-counting laboratory. The tracer laboratory is equipped with a lathe where irradiated cells under license -2 are used in machining operations. Appropriate portions of the lathe are covered by a hood which provides 2" of lead shielding in the forward direction (directly toward the operator) and 1" of lead on both sides of the lathe. The tracer laboratory also contains a large chemical hood and both the chemical hood and the lathe hood are [illegible] through rotolator filters and separately exhausted to the roof by the ventilating system. In addition, the tracer laboratory is equipped with a double stainless steel sink, sample bench space, and a number of Chicago count rate meters with an end window G.M. detector.

[illegible] the radioisotope laboratory and accessible through the office-counting room is a [illegible] radioactive material. This building is surrounded on all sides by a [illegible] of concrete, with the exception of a portion of one wall where a 5" thick steel door has been provided. The rear wall of this building is underground. [illegible] the radioactive material building is surrounded on two sides by a high fence several feet from the building. This fence restricts [illegible] entering on the roof or approaching too close to the building. A third side of the material joins an adjacent building, and the fourth side shares a common wall with the office-counting laboratory, [illegible] tracer laboratory, [illegible] floor wall, approximately 6' deep and provided with a 2" steel cover, located in the [illegible] radiography exhibit, is used for storage of irradiated structural materials under license -2. The [illegible] also contains [illegible] shielded with lead bricks bearing an [illegible] source, and a lead pig containing a Pi[illegible] source. The public is not equipped with a visible or audible alarm system. Several low level irradiated tool tips were on hand and stored in the tracer laboratory. No [illegible] was on hand at the time of this inspection.

Ir192 [illegible] source, and the Co60 source are used for radiography inside the radiography cubicle. The Ir192 source, used for exterior radiography purposes, is stored [illegible] under license 19-1393-9). Irradiated tool tips are used in tool wear studies. Irradiated structural steel and [illegible] used in [illegible] the physical properties of structural steel and will be used in [illegible].

A few spot checks were made with the [illegible] are stored in air. In the office-counting laboratory, a reading [illegible] of 2 mr/hr at waist height was obtained with an [illegible] source. [illegible] from the fence, a dose rate of [illegible] mr/hr was obtained with the same [illegible]. Banke stated that the dose rate in the [illegible] is well under 6 mr/hr and that all [illegible] from any [illegible] wear film badges. Anyone outside the fence could be [illegible] with no person having reason to remain in this area for any [illegible] length of time.

Frequency of [illegible] not be used [illegible] all in the next week. The [illegible] are used [illegible] making radiographs using the [illegible] as great as [illegible] tool [illegible].

delivered to the material under test in comparatively short periods of time. Mr. Kneibler stated that the source is never removed from the pig, but that the material to be irradiated is placed inside of the pig. Mr. Kneibler also stated that the cover to the pig is kept locked at all times when material is not being removed from or placed into the pig. The lead pig itself is surrounded by the room walls and a metal pipe fence several feet high which prevents the operator from approaching too close to the pig. A radiation reading of 6 mr/hr was obtained at the metal pipe fence and at a distance of approximately 5' from the floor. A reading of 10 mr/hr in the same position was obtained at a height of approximately 7'. Both of these readings were made with the source inside the pig and the cover to the pig in the closed position. It was noted that 3 film badges were placed in various locations around the pig in an attempt to determine accumulated radiation dosages in the vicinity of the pig.

On the floor above and directly over this irradiation facility a film badge is normally placed at floor level and left for a period of one week (7 days, 24 hours per day). Film badge records for 1957 showed that the highest weekly dose to this badge was approximately 800 mr with the weekly dose averaging about 250 to 300 mr. Occupancy in this area would be transient.

The other irradiation facility in the gamma facility room consists of a swimming pool type irradiation set-up. The pool itself is approximately 6 x 6 x 12' deep and is normally filled with water to within 1' of the top of the pool. Sources used for irradiation purposes are stored and used at the bottom of this pool and are not removed from the pool at any time. The sources in the pool facility are arranged in such a fashion that they have approximately 12' of water between them and any accessible area. The facility itself, being underground, is surrounded on all sides by dirt. Individual sources in the facility are located on the floor of the pool and are arranged in such a fashion that one large source of approximately 1075 curies is in the center of this floor. Surrounding this source in a circle are 78 radioactive pencils each consisting of 9 slugs of cobalt 60. Each slug contains a little less than 5 curies of cobalt 60 which results in each pencil having an activity of approximately 43.5 curies. The pool facility is provided with an underwater storage rack where all or part of the pencils may be kept if it is desired to use fewer than 78 pencils for a certain experiment. Using all 78 pencils and the large center source, it is possible to provide underwater radiation fields of from 500,000 to 800,000 roentgens per hour. The pool is provided with several safety features.

1. A float is attached in such a fashion that if the water level drops by 6" or more, additional water will be pumped into replace that which is lost,

2. a device which senses water depth arranged in such a fashion that if the water drops 6" or more below normal level an audible alarm system is activated,

3. a radiation sensing device consisting of an ion chamber arranged in such a fashion that if the radiation level immediately above the pool exceeds 75 mr/hr an audible alarm system is activated. It was noted that a set of written radiation safety instructions have been provided for use with the irradiation facilities. In addition, the access door to the facility is kept locked at all times in the absence of Mr. Kneibler. Above the door to the facility an electric "Keep Out" sign is posted. Posted on the entrance door is a list of emergency instructions. Mr. Kneibler stated that the hazard sensing devices on the pool facility are checked monthly to be certain that they are operating properly.

It was learned that samples of water are removed from the pool every few days to make certain that the sources have not corroded or released

19-1398-4, 5, 6 - None of the facilities under license -4, 5, 6 were examined in that no material under these licenses has yet been procured. Mr. Bennert stated by phone that the laboratory facilities for handling the licensed material have not as yet been built due to a lack of funds, and that in all probability the facilities will not be constructed for a number of months.

19-1398-7 - A 23 millicurie and a 9 millicurie Co^{60} source used for instrument calibration and test by Mr. Evans are stored in the Critical Facilities test area. Neither source was in use at the time of inspection and both were stored in properly posted and labeled lead containers.

19-1398-8 - Facilities discussed under -2.

Mr. Stebbins stated that he has essentially no material on hand and that he does not anticipate doing any work in the near future under license -9. Material under this license would be used for checking the physical properties of irradiated material.

19-1398-9 - Materials under license -9 are stored in the waste room at the Martin Company. This facility consists of 2 adjacent rooms. In one room several barrels containing radioactive/waste material are stored in a corner. This corner is separated from the rest of the room by means of a large metal cabinet, an open steel frame, and a rope stretched between the cabinet and steel frame. In this corner a 7 millicurie cobalt 60 calibration source in a small big is stored behind 12" of concrete. In the metal cabinet several Sr^{90} sources totaling approximately 100 millicuries, which are used for calibration purposes, are stored. Also in the metal cabinet, a 1 millicurie thulium source not presently covered by any license issued to the Martin Company is stored. Other areas in this room are used for the storage of contaminated radioactive or other waste materials.

A reading of ½ mr/hr was obtained at the rope separating the corner from the rest of the room. At the surface of a bag of radioactive scrap material, a reading of 8 mr/hr was obtained. This bag of scrap along with several other bags of waste material was contained in the open frame shelves. Adjacent to this room, another room containing drums of radioactive material and 2 bottles of liquid radioactive wastes are stored. This room contains a device for the concentration of radioactive wastes.

Mr. Stefanec stated that the waste rooms are always locked in the absence of a responsible individual. It was further noted that outside of the waste storage facility, a number of barrels containing radioactive materials were stored on the ground. Mr. Stefanec said that these barrels contained either source material or special nuclear material waste.

Individuals working in this area are supplied with film badge service.

14. Instrumentation

Instrumentation on hand at the time of the inspection was supplied in a separate communication to Mr. Paul Elevin by Mr. Tony Stefanec. A list of this instrumentation is attached as Appendix A of this report.

15. Radiological Safety Precautions and Procedures

Instructions

In addition to radiation instructions as previously noted in the report, the Martin Company provides a printed volume of radiation safety instructions to all employees who work with radioactive material. This set of instructions includes a 5 page discussion of radiation and radiation protection written in simplified language and understandable to the layman. In addition to this preliminary explanation, the radiation manual contains a series of 20 health physics bulletins governing radiation safety in

...ent and rubber gloves are worn during most i... operations using radioactive
tool ... r ... ed
th ... these operations are performed. Mr. Banks
said t... radiation all workers operating radioactive tool tips, the
Fraser ... laboratory where the machining is done is thoroughly covered by the
Health Physics group.

Mr. Hutchins stated that he does not make routine surveys of the irradiation
facility, but that he does ... survey when he feels that the need arises.
An annual ... survey is made of the pool type irradiation facility
in the ... common ... to an alarm is arranged over the pool
in such a ... radiation level above the pool exceeds 75 mr/hr,
an audible ... system is activated.

Appropriate ... radiation surveys are conducted at the critical facility, and
records are maintained of these results.

Leak Testing

Leak testing of ... sources as required by license -2 and license -9 has
been carried ... out in an appropriate manner.

... under ... are removed from the pool facilities every few days and these
... leak ... checked for contamination. To date there has been no contamination.

Leak testing of polonium as required by license -1 has been carried out.

Locking of Areas

According to the individuals ... contacted, all areas where radioactive materials
are ... are locked and are kept locked whenever the responsible user of the
particular ... material in question is not present. Mr. Banks stated that door
... (Exhibit 1) to the ... radiographic facility is either locked or an individual
... this door during all ... radiographic exposures. Door #3 is normally
locked ... at all times ... except when equipment is being moved into or out of
... cubicle.

Procurement Procedures and Control

... applications for radioactive materials including special nuclear and
... source material ... must be processed through Mr. Hendel, who is in charge of licensing.
Radioactive materials ... are received by the responsible user in the original un-
opened shipping ... containers. A copy of ... the receiving procedure, for
both byproduct and ... source material, is included in the licensee's file.

17. Items

-1, 7 ... Listings of the sources obtained under these licenses is discussed
under Item ... 12, Facilities and Uses of ... Product Material (Items 4 and 7).

-2 - All ... material used ... with the exception of 25 millicuries of
Tm^{170}, which is stored in ... room, are stored in the radioisotope
laboratory ... except radiographic ... exposures. An 8 curie Ir^{192} source in a
Model A12 Tec... Operations Industrial Radiography camera, a 2.0 millicurie
Co^{60} source in ... Model ... tions Model 402 radiography camera, and a 25
curie Tm^{170} source ... in a lead pig are stored in the radiographic vehicle or
... radioisotope laboratory. Other materials ... under this license are kept in
a ... vault ... room fl... wall ... th a 2 ... steel cover.

-3 - All ... material ... under license -3, namely 9055 ... curies of Co^{60} are stored in
the gamma ... irradiation facility previously discussed. These are never removed
from their ... facilities.

-4, 5, 6 - ... materials are pro... only on hand under licenses

It was noted that the Martin Company has on hand a source of approximately 1 millicurie of Tm^{170}, stored in the waste room, which is not covered under any existing license.

18. Waste Disposal

There is no waste disposal of byproduct material under licenses -1, 2, 3, 4, 5, 6, 7, 8, 9.

19. Posting

-1, 7 - The access doors to the criticality area and test facility were properly posted and radiation sign and symbol. Containers housing the individual sources noted under facilities were properly labeled.

-2 - Mr. Banks stated that whenever radioactive material is being used in the hood, appropriate radiation signs and symbols are posted in the area.

It was noted that all industrial radiography cameras in the radiography cubicle were labeled with appropriate radiation caution sign and symbol. The radiography cubicle was not provided with an appropriate visible or audible alarm system as required by 20.203(c)(2). Mr. Banks stated that door "A" (Exhibit 1) to the radiography cubicle is either locked or a man posted at this door during all radiographic exposures. Door "B" is normally locked during radiographic exposures.

-3 - The gamma irradiation facility was posted with an electric sign above the entrance door instructing personnel to "keep out" of the area. It was further noted that the irradiation pig and the irradiation pool were posted with appropriate radiation caution sign and symbol. Written/Safety instructions required by Condition 15 of license -3 were posted in a conspicuous place.

Posting is not applicable under license -4, 5, 6, as no material is presently on hand under these licenses.

-8 - Material under license -8 is stored in the radioisotope laboratory and covered under posting as discussed in license -2.

-9 - Radioactive materials under license -9 are stored in the waste room. The Sr^{90} sources under license -9 and -2 and the unlicensed Tm^{170} source were labeled with appropriate radiation sign and symbol. Some of the waste containers in the area were properly labeled; however, numerous bags and other containers of radioactive waste material were not labeled appropriately. Labeling of all waste containers in this area would constitute satisfactory posting of the area.

20. Personnel Monitoring

Film badges are supplied weekly to all employees of the Martin Company who work with radioactive materials or in areas associated with this work. Personnel monitoring dosimeters are also available for use by all employees who have need for these devices. Film badge results were examined for the year 1957 and it was noted that no overexposures were received by personnel working with radioactive material.

On 3/9/57, a Mr. Clark received an exposure of 3700 mr. This exposure was due entirely to x-rays, as Mr. Clark was doing no work with radioactive material.

21. Records

Satisfactory records of isotope purchase, inventory, film badge results, and survey results where surveys have been conducted (see Item 15) are maintained. No results of leak tests of the Sr^{90} [illegible]

Marvin M. Mann, Assistant Director
Division of Inspection, Washington

Robert [illegible] Kirkman, Director
Inspection Division, [illegible]

DEC 31 1957

[illegible] - 10 CFR 30

[illegible] : [illegible] :PBK

Transmitted herewith is the following inspection report involving "non-compliance":

The [illegible] Company
Baltimore 3, Maryland

License No. 19-13[illegible]-1 through 9 except -4 which is superseded by -6

w/amend #1, 2 to -1
w/amend #1 to -2
w/amend #1 to -3
w/amend #1 to -6
w/amend #1 to -7
w/amend #1 to -[illegible]
w/amend #1 to -9

The following items of non-compliance were brought to the attention of Mr. Paul Guinn, who stated that these items will be corrected:

20.[illegible] "Caution signs, labels and signals" -(f)(1) "Containers": labeling of waste containers in waste storage area.

3[illegible].3 "License requirements": Licensee possesses a 1 millicurie Tm^{170} source not presently covered by a specific license.

Violation of Condition 14 of license 19-13[illegible]-2 and Condition 13 of license 19-13[illegible]-9 requiring leak testing of Tr^{90} sealed sources.

We feel that a slight hazard exists from the licensees failure to leak test Tr^{90} sources as required by licenses -2 and -9. We feel that essentially no hazard exists from the licensees failure to label [illegible] containers and acquire a license for the one millicurie Tm^{170} source.

It should be noted that this licensee 19-13[illegible]-2 has not been cited for failure to provide a visible or audible alarm system as required by [illegible]. In view of the physical set-up of the

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DEC 31 1957

adioisotope laboratory and associated facilities; and the fact that Mr. [illegible] stated that door "[illegible]" to the radiography cubicle is either locked [illegible] a man [illegible] at this door during all radiographic exposures, we do [illegible] feel that this type of device is necessary. Door "[illegible]" to the cubicle [illegible] locked during all radiographic exposures (See item 13, [illegible]).

[illegible] letter [illegible] to the [illegible] Company - Attention: [illegible] Paul Guinn, [illegible] Safety [illegible] - requiring correction of [illegible] items of non-compliance.

[illegible]:
[illegible] (1)

DOCKET NO. 70-58
File Cy

THE MARTIN COMPANY

Baltimore 3, Maryland

January 13, 1958

Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention Mr. Lyall Johnson
Chief, Licensing Branch

Dear Mr. Johnson:

Reference is made to our letter of December 12, 1957 transmitting three copies of an application for a general license to handle special nuclear material pursuant to Part 70, Title 10, Code of Federal Regulations.

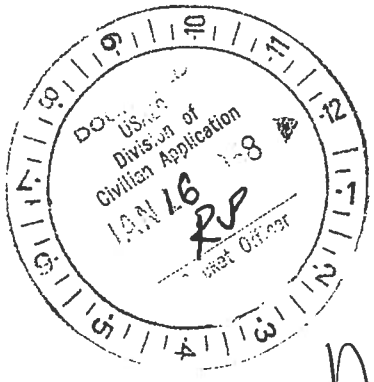
In Appendix B of the referenced application, the following statement appears under item (2):

> "A description of the process is contained in the confidential manual, MND-1069 which is furnished as a supporting document to this application, (Appendix F)."

Enclosed are three copies of an unclassified Appendix F providing an unclassified description of the process for item (2). We now desire to withdraw the two copies of MND-1069 which were originally transmitted as Appendix F and we shall appreciate their immediate return.

See Reports File

There are also enclosed three copies of the revised Martin Criticality Precautions Manual, MND-1063, as Appendix A to the application. As noted in our letter of December 12, 1957 this revised manual was under preparation at the time of filing of the application.



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USAEC
Division of
Civilian Application
JAN 16 1958
RS
Docket Officer

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THE MARTIN COMPANY

Baltimore 3, Maryland

January 13, 1958

I certify that the statements made in this letter and the referenced enclosures are true, complete and correct to the best of my knowledge and belief, and are made in good faith.

THE MARTIN COMPANY

BY: _____

Tibor F. Nagey
General Manager
Nuclear Division
Baltimore 3, Maryland

STATE OF MARYLAND)
COUNTY OF BALTIMORE) ss.

Subscribed and sworn to before me this _____ day of _____, 1958.

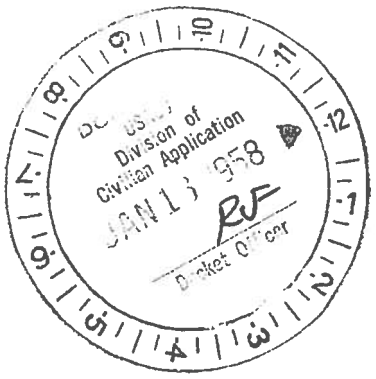
_____

Notary Public

My commission expires _____.

Enclosures: (1) Three copies of Appendix A - MND-1063, (Revised)
(2) Three copies of Appendix F - "Description of Process"

DOCKET NO. 70-58
Files



Form AEC-417
(8-57)

UNITED STATES ATOMIC ENERGY COMMISSION

COMPLIANCE INSPECTION REPORT

1. Name and address of licensee or permit holder

The Martin Company
Baltimore 3, Maryland

2. Date of inspection

October 22, 1957

3. Type of inspection

Initial

4. 10 CFR part(s) applicable

20-40

5. License (or permit) number(s) and expiration date(s)

Number	Date	Exp. date	Number	Date	Exp. date
C-3572 w/amend #1,2	(Mr. E.R.McDonald Mr. C.A.Wendel)	6/1/58			
C-3147 and Rev. #1, w/amend #2	(Mr. T.F.Nagey)	6/1/58			
C-3508 and Rev. #1,2,3 w/amend #3,4	(Mr. C.A.Wendel)	6/1/58			

6. Scope of license(s) and permit

C-3572 - Authorized use of two hundred (200) pounds of Magnesium-thorium alloys, one gram of uranium metal and two grams of thorium metal for use, during the term of this license, in connection with work under government contracts.
C-3147 - Licensee authorized to receive possession of and title to one hundred and fifty (150) kilograms of refined source material during the term of this license for use in development studies and fabrication of experimental fuel elements. This license extends to the Nuclear Engineering Laboratories, and pilot manufacturing plant located at Middle River, Maryland.(CONT

7. Special conditions and limitations of license(s) or permit

C-3508 C-3147 C-3572
Licensee is required to maintain records of inventories, receipts and transfers of refined sour material. Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

8. Inspection findings

The Martin Nuclear Division engages in research and development and production activities at their facilities in Baltimore, Maryland. The facilities for use and handling of source material and radiation detection instrumentation are adequate. The Nuclear Materials Control Committee discussed, in Part 30 inspection report dated December 30, 1957, reviews, approves operating procedures, and s vested with managerial authority on health-safety and accountability to ensu that responsibilities of operating departments are carried out effectively. Procurement procedures, accountability, health and radiation safety, and source security were found to be adequate. Personnel monitoring, air and direct radiation surveys, and waste disposal records are satisfactory. All of the areas performing work under the above licensees were properly (CONT'D)

9. Items of noncompliance

20.203 "Caution signs, labels and signals" -(f)(2) failure of licensee to label with proper sign and symbol 6.6 lbs. container of uranium oxide. License C-3147.

10. Give date of last previous inspection: None

11. Is "Company Confidential" information contained in this report? No
(Specify page(s) and paragraph(s))

DISTRIBUTION:

2 cys. - Division of Inspection, Washington
2 cys. - Inspection Division, NYOO

Paul B. Klevin
(Inspector)

Approved by: Robert W. Kirkman, Director
New York
(Operations office)

January 15, 1958
(Date report prepared)

If additional space is required for any numbered item above, the continuation may be extended to the reverse of this form using foot to head format, leaving sufficient margin at p or binding, identifying each item by number and noting "Continued" on the face of form under appropriate item.

RECOMMENDATIONS SHOULD BE SET FORTH IN A SEPARATE VERING MEMORANDUM

U. S. GOVERNMENT PRINTING OFFICE 0—732614-1

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ITEM 6 CONT'D

Licensed to receive possession of and title to, and to transfer to authorized licensees, seven (7) pounds of refined source material for use in research and development.

C-3503 - Licensee authorized to receive possession of and title to thirty-five hundred (3500) pounds of magnesium-thorium alloys during the term of this license for use in connection with the Navy Vanguard Program.

ITEM 8 CONT'D

posted in accordance with 10 CFR 20. However, under license C-3147, a fibre pak container containing 6.6# of UO_2 was labeled with radiation caution sign and symbol (Paragraph 18).

PART 40 INSPECTION

The Martin Company
Baltimore 3, Maryland

Date of Inspection: October 22, 1957

Persons Contacted:

C-3508 C-3147 C-3572

Mr. C. A. Wendel, Licensing Officer, Nuclear Division
Mr. L. D. Bradley, Assistant Contract Manager, Vanguard
Mr. Joe Kalb, Superintendent, Material Control
Mr. Robert Spangler, Superintendent, Production Activity
Mr. Maxwell, Chief, Engineering Laboratory
Mr. Bierds, Jr., Assistant Chief, Engineering Laboratory

12. Organization and Administration

C-3508 C-3147 C-3572

Same as described in Part 30 inspection report dated December 30, 1957.

13. Facilities and Uses of Source Material

C-3508

The Thorium Magnesium obtained under this license is for a secret project for the Department of Defense. The material in use is kept guarded in an exclusion area within Plant #2, in which authorized personnel perform assembly work and a small amount of scrap chipping. The material is marked with the words, "Magnesium and Thorium." The weight of this material (2' x 3' x 1/8") is less than that requiring posting and labeling according to the requirements in Part 20. The operations are performed in the Sheet Metal Department of Plant #1, and involve the following:

1. Forming of shapes.
2. Dimpling and drilling holes.

No film badges are worn by personnel working on this project.

C-3147

Under this license 65% of Uranium oxide plus aluminum powder is used to manufacture bushings .238 id x .248 od x 3/4 inch long. The powder metallurgy operations involved are:

1. Pouring powder into a die and pressing.
2. Sintering pressed powder.
3. Stringing bushings into a 24 inch length.
4. Grading the bushings.
5. Pouring into aluminum jackets and hot pressing.

The bushings are fabricated under contract for Phillips Petroleum Company. The operations are done inside a locked and posted metallurgy laboratory which contains hoods, hydraulic presses, two Stanet powder rolling mills, a large rolling mill, Fenn swaging unit, vacuum furnaces, induction furnaces, and other allied equipment. The floor of the room is covered with asphalt tile and the work benches are covered with stainless steel.

C-3572

Work under this license has been completed. Facilities used are the same described as for license C-3147.

14. Radiological Safety Precautions and Procedures

C-3508 C-3147 C-3572

Same as Part 30 write-up, December 30, 1957.

C-3147 C-3572

Film badges are worn by personnel working under these licenses. See Part 30 report dated December 30, 1957.

C-3508

Personnel do not wear film badges.

15. Instrumentation

C-3508 C-3147 C-3572

Instrumentation is listed as Appendix "A" to Part 30 report of December 30, 1957.

16. Procurement Procedures and Control

C-3508 C-3147 C-3572

See Paragraph 16 of Part 30 report dated December 30, 1957.

17. Waste Disposal

C-3147

According to Mr. Guinn, Health Physicist, a waste disposal area is presently under going construction. The waste disposal area includes a recovery and incineration area. To date, according to Mr. Guinn, there has been no incineration, inasmuch as no filter system was available to contain any ashes. Wastes awaiting incineration are presently being stored in posted, sealed 55 gallon drums until the wastes can be disposed of. A waste recovery building is undergoing construction. When the recovery system is completed all radioactive waste waters will be pumped into a sump and then pumped through a filter system into holding tanks for storage. If the stored waste samples are found to contain less than 220 dpm per liter, they are released to the sewer system. The average flow from the Martin Plant is 4 million gallons of water per day.

Mr. Guinn stated that his Health Physics Office monitors the flow of water into the sewer system and submits monthly reports to the Maryland State Department of Health Sanitation Engineering Department.

C-3508

No disposal has been made to date of the Thorium Magnesium scrap. The scrap materials, according to Mr. Spangler, are stored in a 55 gallon container.

Mr. Guinn stated that until the recovery facilities are completed, the wastes will be contained in 55 gallon drums immediately adjacent to the recovery area. These were inspected and noted to be properly labeled, with radiation warning sign and symbol. The area was posted with radiation sign and symbol.

18. Posting

C-3147

A fiberpak container shipped to the licensee by Mallinckrodt Chemical Works, St. Louis, Missouri, contained 6.6 lbs. of UO_2 sources and was not labeled with the proper radiation sign and symbol. The large cabinets in which the source material was contained were properly labeled.

C-3508

The magnesium thorium sheets were not marked with radiation sign. This material, received from Dow Chemical Company had written on each of the containers the words "Magnesium Thorium Alloy". Neither the individual sheets or the area required posting at the time of this inspection.

19. Records

C-3508 C-3147 C-3572

Records of inventory, procurement purchase, disposal, film badge results and results of surveys are maintained.

20. Surveys

C-3508 C-3147

Mr. Guinn stated that both direct radiation and air surveys have been taken at the facilities used by both licensees. A letter stating the results of these surveys is included in the licensee's file. The survey results were all negative.

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70-58

File C

January 12, 1958

Manager
U. S. Atomic Energy Commission
Schenectady Operations Office
P. O. Box 1069
Schenectady, New York

Attention: Mr. V. V. Hendrix
Director
Reactor Eng. & Technical Services Division

Gentlemen:

On October 25, 1957, I sent you a letter requesting an opinion on raising the allowable storage capacity of our vault to six hundred kilograms of U235.

Attached is a sheet containing a sketch of our vault storage area and calculations regarding the maximum quantities of U235 which can be stored in the various storage devices to be used. For consistency with a figure submitted to the Licensing Branch, we are revising our maximum limit to 500 kilograms of contained U235.

I trust that the data presented will enable you to respond to our inquiry.

Very truly yours,

THE MARTIN COMPANY

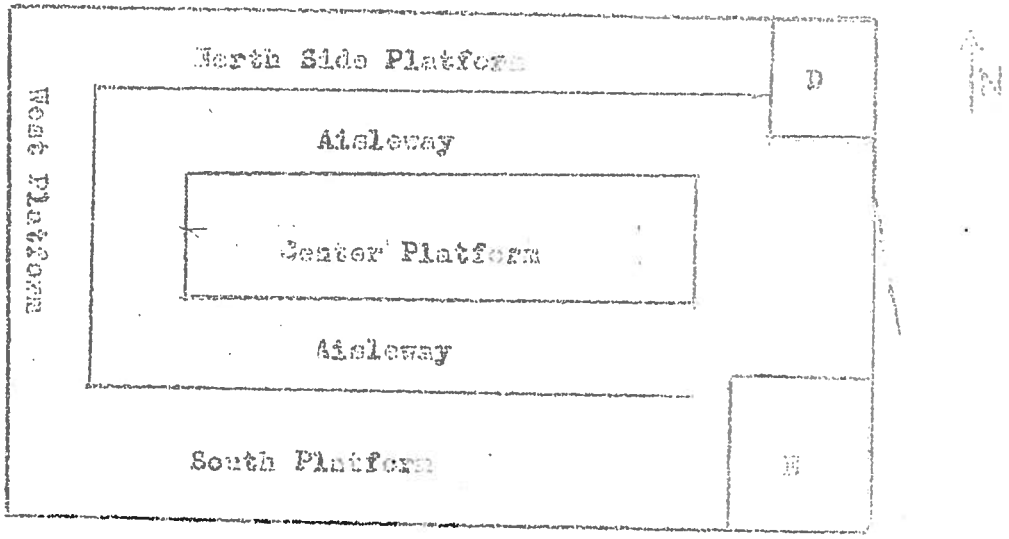
C. A. Wendel
Licensing Officer
Nuclear Division

CAW/bw

A19

CALCULATIONS OF STORAGE SPACE IN

MARTIN "D" BUILDING STORAGE VAULT, WORK AREA 1 (a)



Volume of Storage Devices

Symbol	Unit	Approx. Dimensions		Volume
A	Powder Birdcage	16 5/8"x16 5/8"x21 3/8"	3.4	3.4 cu. ft.
B	Work Box Carriers	12" x 12" x 42"	3.5	3.5 cu. ft.
C	Fuel Storage Box	12" x 12" x 3'8"	2.8	2.8 cu. ft.
D	Supplies Birdcage	3'9" x 3'7" x 3'8"	10.49	10.49 cu. ft.
E	Ingot Box	12" x 12" x 12"	0.5	1 cu. ft.

Available Storage Volume

Area	Approx. Dimensions	Volume	No. Of Devices	Maximum Quantity U235
Vault	13'9" x 22'8" x 11'	3428 cu. ft.		
Aisleways	30" x 47'4" x 11'	1269 cu. ft.		
Center Storage	3'6" x 13'6" x 9.5'	470 cu. ft.	C= 117	117 kg
Wall Storage (West)	25" x 30' x 9.5'	570 cu. ft.	A= 110	110 kg
D & E	25' x 9'7" x 9.5'	219 cu. ft.	D= 4	20 kg
Wall Storage (South)	42" x 18' x 9.5'	600 cu. ft.	B= 162	162 kg
Under Platform		123 cu. ft.	E= 100	200 kg
			Total	609 kg

JAN 1 [illegible]

Marvin [illegible], Assistant Director
Division of Inspection, Washington

Robert [illegible], Director
Inspection Division, [illegible]

[illegible] - [illegible] 40

[illegible]

Transmitted herewith is the following inspection report involving "technical non-compliance":

The Martin Company
Baltimore 3, Maryland

Licence Nos. C-3508
C-3147
C-3572

No items of non-compliance were found for C-3508 and C-3572.

For licence C-3147, the licensee was found in non-compliance with the following item, which he agreed to correct.

20.203(f)(2) "Caution signs, labels and signals": failure of licensee to label with proper sign and symbol 6.6 lbs. container of uranium oxide.

We feel that essentially no hazard exists with the licensee's failure to label containers.

We recommend that a letter be sent to the licensee requiring him to label containers.

Enclosure:
Insp. rpts. (2)

A/10

DOCKET NO. 50-22

Suppl. only

THE MARTIN COMPANY

Baltimore 3, Maryland

January 17, 1958

Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention Mr. Lyall Johnson
Chief, Licensing Branch

Dear Mr. Johnson:

Pursuant to Mr. Delaney's request, there are enclosed additional copies of each of three documents relating to The Martin Company's application for a general license, reference Mr. Nagey's letter of January 13, 1958.

The enclosures are:

(1) Criticality Precautions Manual, MND-1063
(2) Mr. Nagey's letter of January 13, 1958, attaching
(3) Appendix F (unclassified)

It is now understood that instead of returning the two classified copies of MND-1069 to The Martin Company as we requested, you will destroy these and so advise us in a letter.

Very truly yours,

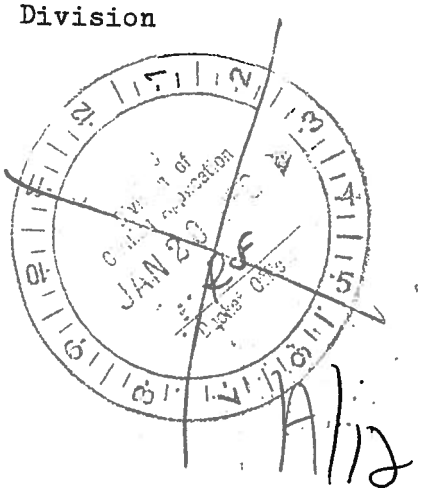
THE MARTIN COMPANY

C S Wendel

C. A. Wendel
Licensing Officer
Nuclear Division

CAW/bw

(1 addl cy. of each).



A112

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : Wilbur A. Strauser, Deputy Director
Division of Classification

DATE: January 20, 1958

FROM : Lyall Johnson, Chief, Licensing Branch
Division of Licensing and Regulation

SUBJECT: THE MARTIN COMPANY SNM APPLICATION
SUPPLEMENT - DOCKET NO. 70-58

Attached are copies of documents we propose to place in the AEC Public Document Room in accordance with established procedures. Also enclosed is a list, in duplicate, of these documents. One copy should be retained for your file.

Please review these documents, and if no Restricted Data are contained therein, indicate this determination in the space provided below.

In the event one or more documents are deemed to contain Restricted Data, detach the document or documents and return them separately to us, indicating the specific references which include Restricted Data.

The appropriate item or items on the attached list should be stricken in the event the corresponding documents are deemed to contain Restricted Data.

Attachments: Docket No. 70-58 - The Martin Company
Martin Co. ltr. 1/13/58, Appendix "F"- "Description of Process for Stainless Steel...", and Report MND-1063 - "Criticality Precautions Manual".

* * * * * * * * * * * *

The documents listed in the attachment have been reviewed and it has been determined that none contains Restricted Data.

L C Callmyer
Division of Classification

23 Jan 58
Date

Sent to Dave Hondo for Pub. Doc. Room

1/13

Docket No. 72-26

File Cy.

THE MARTIN COMPANY

Baltimore 3, Maryland

January 20, 1958

Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention Mr. Lyall Johnson
Chief, Licensing Branch

Dear Mr. Johnson:

Three copies of the revised copy of the Criticality Precautions Manual, MND-1063 were transmitted to you on January 13, 1958 under cover of a letter signed by Mr. Nagey.

In the meantime it has come to our attention that three deletions in the manual should be made. These are as follows:

Page 9 - line 17 - delete last word

Page 12 - line 18 - delete next to last word

Page 12 - line 31 - delete eighth word

Kindly make these deletions not only in the four copies of the revised manual in your possession but in the copy of the original manual transmitted under cover of Mr. Nagey's letter of April 22, 1957.

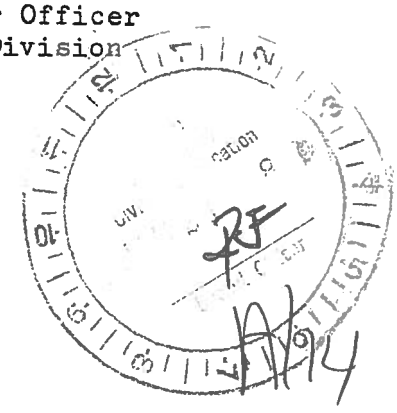
Very truly yours,

THE MARTIN COMPANY

C A Wendel

C. A. Wendel
Licensing Officer
Nuclear Division

CAW/bw



Form AEC-355
(4-55)

ATOMIC ENERGY COMMISSION

CERTIFICATE OF DESTRUCTION Supplemental File 70-5

Description (Title, subject matter or identification number)	Date of Document	Classification	Number of Pages	Number of Copies
Office Memorandum from Division of Classification Subject: The Martin Company SNM Application Supplementary Docket No. 70-58 Originator: Murray L. Nash, Chief Classification Branch Copy No. 1 of 6 copies, Series A	12-18-57	Secret	1	6

I certify that the documents listed above were destroyed in accordance with current security regulations.

R. J. Frederick
(Signature and organizational title of person destroying document)
R. J. Frederick, Docket Officer

Date of destruction JAN 28 1958

C. P. McCallum
(Signature and organizational title of person witnessing destruction)
C. P. McCallum, Jr., Licensing Assistant

U. S. GOVERNMENT PRINTING OFFICE 16—69866-2

A|15

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : H.L. Price, Director,
Division of Licensing and Regulation

DATE: FEB 7 1958

FROM : Marvin M. Mann, Assistant Director for Compliance
Division of Inspection

SUBJECT: THE MARTIN COMPANY, LICENSE NOS. 19-1398-1 through 9 except -4 which is superseded by -6
(10 CFR 30)

SYMBOL: INS:CCP

Attached is a copy of the inspection report, prepared by the New York Operations Office Inspection Division, concerning activities of the subject licensee.

Information gathered during inspection shows that the licensee was in non-compliance with the following:

License Condition No. 14 of License No. 19-1398-2 and Condidition No. 13 of License No. 19-1398-9. "Leak-testing of sealed sources".
Strontium 90 sealed sources are not tested as required.
(Paragraphs 8 and 15, page 6 of report)

10 CFR 20.203(f)(1) Caution signs, labels and signals.
Radioactive waste containers are not labeled as specified in this section. (Paragraphs 8 and 19-9, Part 30 Inspection of report, page 7).

10 CFR 30.3 License requirements.
Company possess 1 mc Thulium source without a license. (Paragraphs 8 and 13, page 5 of report).

Your attention is invited to the memorandum of transmittal prepared by the office that conducted the inspection. It is suggested that a letter be addressed to the licensee to inform him of the above non-compliance items and request that appropriate action be taken to correct or overcome these deficiencies. When corrective action has been completed on this matter, please furnish the office that conducted the inspection with copies of pertinent correspondence and these items will be checked during the next regularly scheduled inspection.

A/16

FEB 7 1958

A summary of this case will be included in the February report to the Office of the General Manager.

A copy of this memorandum and the enclosures has been furnished the Office of the General Counsel.

Enclosure:
1. Cpy rpt dtd 12/30/57
2. Trans memo R.W. Kirkman, NYOO to MMMann 12/31/57

IDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

: H. L. Price, Director
Division of Licensing and Regulation

DATE: FEB 7 1958

OM : Marvin M. Mann, Assistant Director, Compliance
Division of Inspection

BJECT: THE MARTIN COMPANY, LICENSE NOS. C-3147, C-3508 and C-3572, 10 CFR 40

mbol: INS:CCP

Attached is a copy of the inspection report, prepared by the New York Operations Office Inspection Division, concerning activities of the subject licensee.

Information gathered during inspection shows that the licensee was in non-compliance with the following:

10 CFR 20.203(f)(2) Caution signs, labels, and signals
(License No. C-3147)
Container containing 6.6 lbs. of UO_2 sources was not labeled as specified in this section.
(Par. 18 of report.)

It is suggested that a letter be addressed to the licensee to inform him of the above non-compliance items and request that appropriate action be taken to correct or overcome these deficiencies. When corrective action has been completed on this matter, please furnish the office that conducted the inspection with copies of pertinent correspondence and these items will be checked during the next regularly scheduled inspection.

A summary of this case will be included in the February report to the Office of the General Manager.

A copy of this memorandum and the enclosure has been furnished the Office of the General Counsel.

Enclosure
Cpy Rpt Dtd 1-15-58

AL M

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : Lyall Johnson, Chief
Licensing Branch

DATE: February 12, 1958

FROM : Clifford K. Beck, Chief
Hazards Evaluation Branch

SUBJECT: MARTIN COMPANY REQUEST FOR SNM LICENSE, DOCKET No. 70-58

We have reviewed the information presented by the Martin Company in their application for an SNM license dated December 12, 1957 and conclude that the procedures proposed by the applicant for the avoidance of critical hazards in the operations are satisfactory.

A118

DOCKET NO. 40-2308

THE MARTIN COMPANY

Baltimore 3, Maryland

February 12, 1958

Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention Mr. Joseph Delaney

Gentlemen:

Reference is made to Source Material Licenses No. C-3508, Amendment No. 4 dated May 9, 1957 and C-3572, Amendment No. 2 dated May 7, 1957.

Request is hereby made for the consolidation of these two licenses into a single one under which The Martin Company will be authorized to receive possession of and title to 10,000 pounds of magnesium-thorium alloys for developmental and production purposes at its Middle River, Maryland facilities.

In addition to projects of the Martin Baltimore Division, it is contemplated that some fabrication work will be performed for the Denver Division of the Martin Company under transfers from Denver's Source Material License No. C-3670, Revision 3 dated February 19, 1957. Later similar services may be done for Martin Orlando Division if that unit obtains thorium alloys under AEC license.

The Martin Company has now centralized control of thorium-magnesium materials used at its Middle River facilities. These materials are now retained in inventory in a special enclosed area and are distributed under strict accountability procedures to various operating projects. Monitoring of activities under direction of the Martin Health Physics Supervisor, Mr. Paul Guinn, is performed to ensure that requirements of Part 20 CFR 10 are followed.

Very truly yours,

THE MARTIN COMPANY

C. A. Wendel
Licensing Officer
Nuclear Division

CAW/bw



A119

In Reply Refer To
L&R:ND
Docket No: 40-2308

FEB 24 1958

The Martin Company
Baltimore 3, Maryland

Attention: Mr. C. A. Wendel

Gentlemen:

Enclosed is Source Material License No. C-3991.

This license replaces both your licenses No. C-3508, Amendment No. 4, dated May 9, 1957, and license C-3572, Amendment No. 2, dated May 7, 1957. These licenses should be returned with a request that they be revoked.

Very truly yours,

J. C. Delaney
Chief, Materials Section
Licensing Branch
Division of Licensing & Regulation

Enclosure:
License No. C-3991

A/20

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:
40-2308
LRL:ND

SOURCE MATERIAL LICENSE

The Martin Company
Baltimore 3, Maryland

License No. C-3991

Attention: Mr. C. A. Wendel

Dated: FEB [illegible] 1958

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to ten thousand (10,000) pounds of thorium-magnesium alloys, one gram of uranium metal and two grams of thorium metal for use, during the term of this license, in connection with your work under government contracts.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire February 28, 1959.

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Materials Section
Licensing Branch
Division of Licensing and Regulation

Doc officer

A/21

In Reply Refer To:
L&R:ND
Docket No: 40-2308

FEB 2 4 1958

The Martin Company
Baltimore 3, Maryland

Attention: Mr. C. A. Wendel

Gentlemen:

Enclosed is Source Material License No. C-3991.

This license replaces both your licenses No. C-3508, Amendment No. 4, dated May 9, 1957, and license C-3572, Amendment No. 2, dated May 7, 1957. These licenses should be returned with a request that they be revoked.

Very truly yours,

J. C. Delaney
Chief, Materials Section
Licensing Branch
Division of Licensing & Regulation

Enclosure:
License No. C-3991

Distribution:
Document Room
Docket Officer
S/Health
M. M. Mann

A122

OFFICE ▶	L&R	L&R				
SURNAME ▶	NDoulos/jeb	JCDelaney				
DATE ▶	2/24	2/24				

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

DOCKET NO. 40-2308

THE MARTIN COMPANY

Baltimore 3, Maryland

February 26, 1958

Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention Mr. J. C. Delaney
Chief, Materials Section
Licensing Branch

Gentlemen:

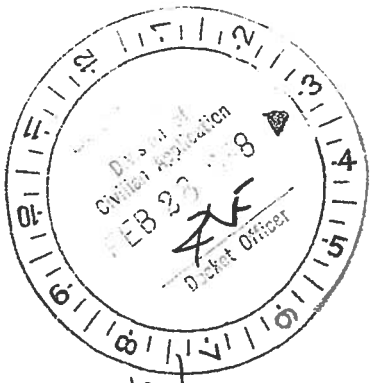
Pursuant to the request in your letter of February 24, 1958 (L&R:ND Docket No. 40-2308), enclosed are the originals of Martin License No. C-3508, Amendment No. 4, dated May 9, 1957 and License No. C-3572, Amendment No. 2, dated May 7, 1957.

Very truly yours,

THE MARTIN COMPANY

C. A. Wendel
Licensing Officer
Nuclear Division

CAW/bw



A123

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : Files
(THRU) J. G. Delaney, Chief, Materials Section

DATE: February 27, 1958

FROM : C. P. McCallum

SUBJECT: THE MARTIN COMPANY APPLICATION FOR SPECIAL NUCLEAR MATERIAL LICENSE - DOCKET NO. 70-58

ANALYSIS AND FINDINGS

An analysis of the application for a special nuclear material license executed December 6, 1957, submitted by The Martin Company has resulted in the following observations, conclusions and findings. The application has been considered as a request for amendment to The Martin Company's License SNM-53.

The applicant requests that it be licensed to receive five hundred kilograms of U-235 contained in uranium of any enrichment of the U-235 isotope for use in the development and fabrication of reactor fuel elements.

The proposed use of the special nuclear material is for the conduct of research and development activities of the type specified in Section 31 of the Act.

Based upon our review of the information furnished by the applicant, it is hereby determined that the applicant is qualified by reason of training and experience to use the special nuclear material for the purpose requested and that the applicant's procedures, facilities and equipment are adequate to protect health and minimize danger to life or property. The applicant's procedures to avoid accidental criticality have been found to be adequate.

The application contains adequate financial and corporate data.

The application has been notarized.

No allocation of special nuclear material is required.

It is therefore determined that the application meets the requirements of the Act and the regulations of the Commission and that a license may be issued authorizing the activities proposed by the applicant.

APPROVED:

Lyall Johnson
Chief, Licensing Branch

A/24

9468

THE MARTIN COMPANY

Baltimore 3, Maryland

February 28, 1958

Refer to:
AJS:W-711

Mr. W. O. Miller
Isotopes Branch
Division of Licensing and Regulations
1717 H Street
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Mr. Miller:

You have brought to our attention that during the last AEC isotopes inspection, there were three items of deficiencies. These were (1) a Strontium 90 source authorized under license no. 19-1398-2 was being used by Health Physics, (2) a 1000 mc Thulium source purchased in March of 1955 and authorized by license no. 19-1398-2 was being kept by Health Physics in their storage well to decay, and (3) bags of radioactive waste stored in our waste room unmarked.

We have corrected these deficiencies in the following manner:

Item I. The Strontium 90 source has been removed from license no. 19-1398-2 and placed on Health Physics license No. 19-1398-9. This change was made 20 December 1957.

Item II. The Thulium source was returned to the Radioisotopes Lab where all sources authorized by license no. 19-1398-2 are kept. Since this source is of no use to us, we are planning to return it to the vendor.

Item III. All containers of radioactive wastes are being properly marked before storage.

Very truly yours,

THE MARTIN COMPANY

A. J. Stefanec
Health Physicist
Mail No. W-711

A/25

AJS:jmr

In reply refer to:
L&R:CPM

FEB 2 8 1958

The Martin Company
Baltimore 3, Maryland

Attention: Mr. C. A. Wendel
Licensing Officer
Nuclear Division

Gentlemen:

Enclosed is Special Nuclear Material License SNM-53, as amended.

The deletions in your Criticality Precautions Manual, MND-1063 have been made on all copies in our possession as requested in your letter of January 20, 1958.

Very truly yours,

Lyall Johnson
Chief, Licensing Branch
Division of Licensing and Regulation

Enclosure:
License SNM-53, as amended

DISTRIBUTION:
Formal Docket file, w/encl.
Suppl. Docket file, w/encl.
Document Room file, w/encl.
H. M. Roth, OROO, w/encl.
M. M. Mann, INS, w/encl.
D. F. Musser, NMM, w/encl.
J. C. Ryan, FIN, w/encl. (2)
H. Steele, L&R, w/encl.
S. R. Gustavson, L&R, w/encl.

OFFICE ▶	L&R	L&R	FIN	L&R	L+R
SURNAME ▶	McCallum/mad	J. Dougherty	M. K. Kellogg	L. Johnson	
DATE ▶	2-27-58	2/26	2/27/58		

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING

A/26

Form AEC-401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Name: The Martin Company

2. Address: Baltimore 3, Maryland

3. License No.: SNM-53, as amended

4. Expiration Date: February 28, 1961

5. Docket No.: 70-58

6. Special Nuclear Material

Uranium enriched in the U-235 isotope

7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license

Five hundred (500) kilograms of U-235 contained in uranium enriched in the U-235 isotope as UO_2 and metal.

8. Authorized use: For the development and fabrication of reactor fuel elements in accordance with the procedures described in the licensee's application dated October 11, 1956, as amended October 24, 1956, and as amended by amendments executed December 6, 1957 and January 15, 1958.

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part

None

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

Place of use: licensee's Middle River Plant, Maryland.

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance

Lyall Johnson
Chief, Licensing Branch

U. S. GOVERNMENT PRINTING OFFICE 1956—O-380858

FORM AEC-437
(11-57)

U. S. ATOMIC ENERGY COMMISSION

NUCLEAR MATERIAL DRAFT

TO (Supplying Operations Office):	DELIVER TO OR ORDER OF (SS Material Representative and Address):	IDENTIFICATION NO.
Oak Ridge Operations Office USAEC Attn: Dr. H. M. Roth	The Martin Company Baltimore 3, Maryland Attn: C. A. Wendel	from 4000 program to: 7000 -- SNM-11 -- 16(4)
		ON OR ABOUT (Date of Delivery): Prior to June 30, 1958

THE FOLLOWING NUCLEAR MATERIAL:

ORDERED		DESCRIPTION AND NOTES	SHIPPED	
Kg.	Wt. %		Kg.	Wt. %
0.231	20%	725 grams of uranium as UO_2 and 485 grams of UO_2. The uranium in both cases about 20% U-235.		

Ordering Operations Office

DRO

Lyall Johnson, Chief, Licensing Branch
Division of Licensing & Regulation

Headquarters Division Director

CERTIFIED
I HEREBY CERTIFY THAT THE ABOVE QUANTITY WILL NOT EXCEED MATERIAL APPROVED FOR THIS DIVISION FOR FISCAL YEAR 1958.

D. F. Musser, Dir., Div. of Nuclear Materials Management

Director, Division of Nuclear Materials Management

FEB 28 1958

U. S. GOVERNMENT PRINTING OFFICE 16-73712-1

HEADQUARTERS PROGRAM DIVISION COPY

Sid.

although what OR is doing sounds O & think we should put this on the usual basis - I suggest we send MCW some forms to use for this [illegible].

[illegible]

CHARGE OUT FILE CARD

Form WA-33
(2-19)

16—57710-1

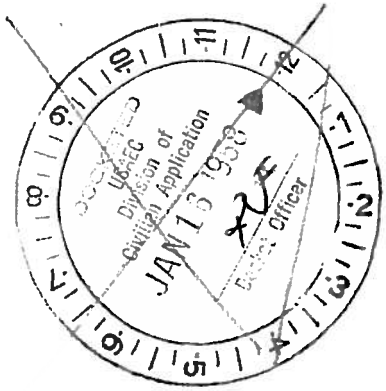
CHARGED TO	DATE	CHARGED TO	DATE	CHARGED TO	DATE	CHARGED TO	DATE	CHARGED TO	DATE

MND 1063

70-58

EXTRA

Criticality Precautions Manual



DOCKETED
USAEC
Division of
Civilian Application
JAN 16 1958
Docket Officer

A/11

MARTIN

DOCKET NO. 70-54

CRITICALITY PRECAUTIONS MANUAL

Authorized by:

Tibor F. Nagey
General Manager
MARTIN NUCLEAR DIVISION

MND-1063

FOREWORD

This manual on Criticality Precautions has been prepared by the Martin Nuclear Division in compliance with United States Atomic Energy Commission regulations. It outlines the Criticality procedures that will be observed by the Martin Company in handling special nuclear materials.

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APPENDIX A

	Procedure for Calculating Maximum Allowable Fissionable Material Masses	A-1

2.001.0 INTRODUCTION

2.001.1 Special nuclear materials in certain configurations and masses are capable of initiating a nuclear reaction. Such a reaction could result in a nuclear incident involving the release of radioactive fission products and other radioactivity with possible damage to personnel and surrounding property.

2.001.2 United States Atomic Energy Commission, (AEC), regulations, based on the Atomic Act of 1954, require industrial firms engaged in the handling of nuclear materials to establish procedures to protect the health and safety of the public. The procedures outlined here are designed to comply with all applicable AEC requirements in this connection.

2.002.0 APPROACH TO PROBLEM

2.002.1 A Nuclear Materials Controls Committee shall review and approve standards and procedures for the handling of all nuclear materials in the Martin Nuclear Division. The Committee is composed of representatives of the following:

General Manager's Office; (Chairman) Martin Nuclear
Engineering Department; Martin Nuclear
Finance Department; Martin Nuclear
Manufacturing Department; Industrial Relations, Martin Baltimore
Health Physics Services; Martin Nuclear
Quality Control Department; Quality Division, Martin Baltimore
Security Department; Industrial Relations, Martin Baltimore

2.002.2 Approved general standards and procedures are set forth with respect to criticality precautions in Sections 2.003 through 2.005 of this manual. Specific procedures for various facilities are included in Sections beginning with 2.006.

2.002.3 Copies of the Criticality Precautions Manual, after approval by the AEC, shall be distributed to corporate officers, all senior managerial personnel of the Martin Nuclear Division, and selected operating personnel. These manuals will be used for reference whenever necessary.

2.002.4 Additions to and revision of standards and procedures shall be the responsibility of the Nuclear Materials Controls Committee. These changes shall be forwarded to the AEC for review.

2.003.0 ENFORCEMENT

2.003.1 Enforcement of criticality procedures with respect to movement of special nuclear materials between work areas shall be the responsibility of the Accountability Representative. Responsibility for handling of these materials in accordance with approved procedures within work areas shall rest with the facility supervisors.

2.003.2 The Accountability Representative may delegate responsibility to his area supervisors. Upon delegation of responsibility, the Accountability Representative must assure himself that the area supervisors are fully informed regarding the procedures as set forth.

2.003.3 Infractions of criticality procedures shall be reported by the Accountability Representative, the Criticality Engineer, or the Facility Supervisors. The Nuclear Controls Management Committee shall make appropriate recommendations, after learning the circumstances, as to any action required to prevent recurrences of such incidents.

2.004.0 MEANS OF CONTROL

2.004.1 The basic criteria shall be in terms of grams of special nuclear material per square foot of Work Area or in terms of grams of special nuclear material per unit volume. Separate work areas are established with specific allowable limits for amounts of special nuclear material to be present at any one time.

2.004.2 Critical Work Areas - A work area is an area where there can be no nuclear interaction of material from one zone to another, (i.e., the perimeter of the zone may be shielded or the distance between material inventories within criticality zones is so great as to preclude the possibility of forming a critical mass).

Effective physical control is maintained with regard to the transfer of special source material into or out of the zone.

The Accountability Representative, or his designee who is aware of the criticality precautions, shall monitor material flow and storage between work areas.

A sign or suitable visible record shall be present indicating the allowable limit of nuclear material, present inventory of nuclear material, and the name of the supervisor charged with responsibility for the zone.

2.004.3 Allowable Limits for Special Nuclear Materials - The allowable limit for nuclear materials for each work area will be established on the basis of nuclear calculation as set forth in Ref. 1.

Each work area shall have its perimeter indicated by a two-inch band of paint unless otherwise designated. Off-spots for carriers of special nuclear material will be similarly designated in each critical work area.

The Criticality Engineer shall calculate the allowable limits for special nuclear materials for the various forms and configurations in which it will be used.

2.005.0 EMERGENCY PROCEDURES

2.005.1 Prominent signs at each facility shall outline rules for the employee action in the event of an emergency incident. In case of an accident the Emergency Director of the Facility, Accountability Representative, Security Officer, Criticality Engineer, and Health Physicist shall be notified immediately.

2.005.2 Person in charge - A qualified individual (with an alternate) shall be designated as Emergency Director for each facility to assume immediate responsibility in any emergency which may develop. The Emergency Director shall immediately consult with the Health Physics Representative, the Security Officer, the Criticality Engineer, and the Accountability Representative and assign responsibilities for implementing emergency procedures.

2.005.3 Control and monitoring of personnel - The area will be evacuated immediately and all personnel monitored for radioactive contamination. All personnel re-entering the area will be equipped to cope with the emergency situation. Dependent on the nature of the emergency, further medical checks as deemed necessary by the Health Physicist or Medical Director will be accomplished.

2.005.4 Movement of fuel - All special nuclear material in any work area affected by an emergency will, dependent on accessibility, be removed to a fireproof repository or returned to the storage vault. Should it be necessary to remove special nuclear material from more than one work area, insofar as possible the quantities will be kept segregated in carriers or birdcages to prevent criticality conditions. In any event, no more than a quantity equivalent to the combined allowable limits of any two work areas will be placed in proximity to each other without being in a carrier or birdcage. An emergency team assigned by the Plant Protection Department, the Emergency Director, or Plant Superintendent acting under the direction of the Criticality Engineer, will remove all materials.

2.005.5 Theft or losses - If theft or loss of radioactive material[1] is suspected, the Emergency Director of the facility involved shall immediately notify the Health Physics Supervisor (or in his absence, the Licensing Officer) and the Nuclear Division Security Officer. Upon their determination

that an actual theft, or an unaccountable loss of such quantity that a substantial hazard exists which might seriously affect persons in unrestricted areas, the General Manager of the Nuclear Division and the Corporate Director of Information Services of the Martin Company will be immediately advised of all pertinent details by the Health Physics Supervisor.

If it is suspected that the theft or loss involves radioactive material furnished under governmental contract, the Health Physics Supervisor (or in his absence, the Licensing Officer) will report the incident immediately by telephone and telegraph to the Manager, (or the Nuclear Materials Management Officer) of the Schenectady Operations Office, AEC; telephone Schenectady EXpress 3-6611. Both communications will contain pertinent facts including type of loss and manner of suspected theft.

If the incident should involve licensed radioactive nuclear material, the Licensing Officer (or in his absence, the Health Physics Supervisor) will report this immediately by telephone to the Manager of the New York Operations Office, AEC, New York City; telephone PLaza 7-3600 and also send a confirming telegram to the same office, address 70 Columbus Avenue, New York 23, New York.

2.005.6 Accidents - In case of an accident involving radioactive materials, the stipulated emergency procedures for the facility shall be followed. An immediate report by telephone shall be made and a confirming telegram shall be sent as outlined for theft or losses. The Manager of the Schenectady Operations Office shall be informed when licensed material is involved.

The Health Physics Supervisor, with the assistance of others concerned, will make a written report to the Director of the Division of Civilian Application, AEC, Washington 25, D. C. within thirty days of the occurence of an accident involving licensed radioactive materials pursuant to Part 20, Title 10 CFR as amended 10 May, 1957.

A similar report prepared by the Health Physics Supervisor will be made to the Schenectady Operations Office of any accident involving radioactive materials obtained under governmental contract.

2.005.7 Information to public - All information for public dissemination will be cleared through Martin Information Services monitored by AEC approval.

2.005.8 Critical Experiment Facility - The detailed emergency procedures covering the critical experiment facility are outlined in Operational Procedures Manual, Martin Critical Experiment Facility, MND-1111. Procedures for reporting are the same as those for the other nuclear facilities of The Martin Company.

1 - Includes source material, special nuclear material and by-product material (radioisotopes).

2.006.0 DESCRIPTION OF FACILITIES AND PROCESSES FOR PILOT MANUFACTURING PLANT

2.006.1 Description of Facilities - Physical layout of the manufacturing plant is shown on the floor plan. For reference, the adjoining nuclear engineering laboratory is now shown. The manufacturing area is partitioned from the remainder of the building by masonry walls extending from floor to ceiling. The floor is reinforced concrete. Sole entry is through a set of double doors which are either locked or under guard at all times.

The storage vault is a fully-enclosed room, 22 feet 8 inches long by 13 feet 9 inches wide and 11 feet high. Walls will be a minimum of nine inches thick and made of reinforced concrete. Ceiling and floor will be of the same construction.

Sole entrance to the vault will be through a $1\frac{1}{2}$-inch solid steel door equipped with an approved combination lock.

There will be no water conduits or other service piping and no drains within the vault.

2.006.2 Storage Containers - The birdcage for storing and transporting uranium dioxide powder and powder blends of uranium dioxide with non-fissionable materials will be a skeletal box-like device enclosing a cavity for holding the containers for the uranium dioxide powder and blends. The birdcages will be of welded metal construction and so dimensioned that there will be a minimum distance of six inches from the cavity walls to the outer boundaries of the birdcage. They will be provided with means to hold the container firmly in the cavity and for locking the lid of the birdcage. Dimensions of the Martin UO_2 powder birdcage are 16 5/8 inches by 16 5/8 inches by 21 3/8 inches high.

The containers for the special nuclear material powders will be smooth, spherical-bottomed, stainless steel cylinders provided with firm attachable stainless steel covers capable of affecting an airtight seal.

The birdcages for holding fuel element tubes and special nuclear material other than powders are 12 inches by 12 inches by 30 inches high. These will be of the same general type of construction as that for the retention of powders except that the internal container will be a wooden cradle designed to hold fuel element tubes, fuel element plates, bundles of

tubes, or boxes of fuel element plates. The type of cradle for the MPR tubular elements will be 9 1/2 inches by 11 3/4 inches by 23 3/4 inches and will provide for the storage of 50 separate tubes.

The dimensions for the type of birdcage used to hold annealing boats, sintering boats, and scrap containers are 12 inches by 12 inches by 39 3/4 inches. The dimensions of the cradle centered within the birdcage which holds the various boats and scrap container are 9 1/2 inches by 11 3/4 inches by 26 inches.

The transport vehicle will be a four-wheeled cart modified by the addition of a metal framework superstructure to hold securely the birdcage carriers while being moved.

2.006.3 Allowable Limits for Work Areas - The Criticality Engineer has determined the theoretical limits for the amounts of special nuclear materials in the various material forms relating to the fabrication of stainless steel clad enriched uranium dioxide tubular fuel elements. Reference, Appendix A.

These limits are based on the theoretical limits for the various forms using the optimum mixture of water and fuel-bearing aggregates. For this reason, the results are used as allowable limits and no additional factor is applied for "double batching" except in Form III. Limits for other forms have been determined using either similar calculations or provision for accidental "double batching" in the presence of a moderator. These limits are shown on pages 10 and 11.

2.006.4 Procedures for Specific Work Areas - All manufacturing operations will be performed in accordance with the detailed instructions set forth in the Manufacturing Manual. The allowable limits in 2.006.3 apply to the forms indicated for specific work areas. Additional limits for combinations of forms present at the same time are shown.

WORK AREA I (VAULT AND VAULT ANNEX ROOM)

Vault Room (1 A)

Floor Area ---------- 312 square feet

Forms: I, IIa, IIb, IV, V, VI, VII, VIII, IX, X, XI

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
I	highly enriched	UO_2 powder, density when loose approx. 5 gr/cc	800 grams
IIa	highly enriched	UO_2 and stainless steel mixture, density approx. 8.4 gr/cc	1600 grams
IIb	highly enriched	Sintered cermet of UO_2 and stainless steel density approx. 8.4 gr/cc	1850 grams
III	all enrichments	Uranium in aqueous solution	2 grams/liter [1]
IV	highly enriched	Stainless steel clad tubes, with Form IIb as fuel marrow	2000 grams
V	highly enriched	Stainless steel clad plates with uranium metal as fuel marrow	1600 grams
VIa	over 20.0%	Uranium metal in thin forms; ribbon, foil wire, etc.	500 grams
VIb	over 20.0%	Uranium metal in fine cuttings, dust., etc.	500 grams
VIIa	all enrichments	UO_2 and powdered Al mixture, approx. density 2.5 gr/cc	800 grams
VIIb	all enrichments	Pressed or sintered UO_2 and Al mixture in (VIIa) approx. density 5.0 gr/cc	800 grams

1 Except when amount in any one container in all forms does not exceed 400-grams of U-235

FORM	ENRICHMENT OF URANIUM IN ISOTOPE U235	TYPE OF MATERIAL	ALLOWABLE LIMIT IN ANY WORK AREA (grams of contained U235)
VIIIa	all enrichments	Aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
VIIIb	over 20.0%	Iron-aluminum alloy clad tubes with Form VIIb as fuel marrow	800 grams
IX	over 20.0%	Uranium metal in buttons, derbies, etc.	10,000 grams [2]
X	over 20.0%	Uranium metal in ingots, bars, machined shapes, smallest dimension > 0.25 inches	2000 grams
XI	0.72% to 20.0%	Stainless steel clads filled with solid pellets of Form Ib or Ic	2000 grams

2 Subject to review regarding minimum dimensions and reflectors

Allowable Capacities of:

Total in storage devices	500 kilograms U-235
Form I, per storage device	600 grams U-235
Form IIa, per storage device	800 grams U-235
Form IIb, per storage device	900 grams U-235
Form IV, per storage device	1000 grams U-235
Form V, per storage device	800 grams U-235
Form VIa, per storage device	1000 grams U-235
Form VIb, per storage device	500 grams U-235
Form VII, per storage device	800 grams U-235
Form VIII, per storage device	800 grams U-235
Form IX, per storage device	10,000 grams U-235
Form X, per storage device	3000 grams U-235
Form XI, per storage device	2000 grams U-235

Receipt and Storage of Special Nuclear Material (SNM): It is planned that the special nuclear material will be transferred from the processor in lots each comprising one birdcage shipping device containing five polyethylene bottles, each holding two pounds of dry enriched uranium oxide. The birdcage is roughly cubical with dimensions of 3 feet 9 inches by 3 feet 7 inches by 3 feet 8 inches and provides 12 inches of air space around each container.

Upon receipt of a shipment from Railway Express, it will be taken to the vault annex room, to be received by the Accountability Representative and a member of the Health Physics Group. Containers will be removed one at a time from the birdcage in the annex room and placed in the glove box in the annex room. The UO_2 powder will be transferred to a Martin container which will convey the following information: Container number, tare weight, net weight, and lot number. The material will be repacked and stored in wide-mouthed metal bottles of approximately 150 cubic centimeters capacity. No more than 600 grams of uranium oxide, enriched, will be stored in each metal bottle. One and only one bottle will be suspended inside each cubical birdcage-type structure, and no portion of the bottle can be closer than six inches to the outside of the structure. These birdcages may then be stacked in any manner and the uranium oxide in any metal bottle will be separated from any other SNM by at least 12 inches. The birdcages will be placed along the

22-foot 8-inch walls of the vault in a single line. One layer will store approximately 18 kilograms of UO_2. As more storage space is required a second or third layer will be added.

Vault Annex Room (1 B)

Floor Area ---------- 120 square feet

Forms: I, II, VI, VII, IX, X, per vault limits

IV, V, VIII, XI, XII, XIII, in transit per vault limits

Combined allowable capacity of U-235 in Forms I, IIa, IIb and VII------ 800 grams (This limit may be increased to 4000 grams when necessary to handle special lots, provided precautions are taken regarding containment and presence of moderators and reflectors). Special procedures will be followed as directed in writing by the Chairman of the Committee.

Issuing Special Nuclear Material: On receipt of an approved requisition form, the courier shall fill the order only after making the checks outlined in the Accountability Manual.

Only after establishing the propriety of the requisition, a designee of the Accountability Representative shall remove from the vault a Martin storage birdcage holding a Martin container of UO_2 powder to the annex room. In the annex room, a designee of the Accountability Representative shall transfer the container of UO_2 powder from the storage birdcage to a carrier designed specifically for the work area to which the UO_2 powder is being consigned. When the UO_2 powder must be transferred from the storage container in its entirety, or in part to another work area container, the two containers shall be placed in the glove box and the transfer of UO_2 powder made therein. The storage container will be placed back in the storage birdcage and returned to the vault. The work area container will be placed in the carrier made specifically for the work station to which this particular order is being consigned and signed out by the courier for delivery to the consigned work area.

WORK AREA 2 (POWDER ROOM)

Floor Area ---------- 480 square feet

Forms: I, IIa, VII

Combined Allowable Capacities in:

Forms Ia and IIa with Form I not to exceed 500 grams of this amount ---------- 1075 grams U-235

Forms I and VIIa, Form I < 550 grams ----- 800 grams U-235

Work Description:

Weighing of UO_2, BN, and metal powders

Sieving of UO_2, and metal powders

Calcining of UO_2 powder

Blending of UO_2, BN, and metal powder mix

Powder rolling of UO_2, BN, and metal powder mix

WORK AREA 3 (PARTIAL SINTER AREA)

Floor Area ----------156 square feet

Forms: IIa, IIb, IV

Combined Allowable Capacity of Material: 1600 grams U-235

Work Description: Partial sintering of UO_2, BN, metal powder compact

WORK AREA 4 (SHEAR, BRAKE, SWAGING, AND ASSEMBLY AREA)

Floor Area ---------- 650 square feet

Forms: IIa, IIb, IV, VIIb, VIII, XI

Combined Allowable Capacity in:

Forms IIa, IIb, and IV ---------- 1600 grams U-235
Forms VIIb and VIII---------- 800 grams U-235

Work Description: Shearing of core to rough blank size
Shearing of core to finish blank size
Forming of core blank into tubes
Swaging of core tube
Assembly of core, inner and outer cladding on to mandrel
cutoff of fuel elements to length

WORK AREA 5 (PRESS AND SINTER AREA)

Floor Area ---------- 400 square feet

Forms: IIa, IIb, IV, VIIa, VIIb

Combined Allowable Capacity in:

Forms IIa, IIb and IV ---------- 1600 grams U-235

Forms VIIa and VIIb ---------- 800 grams U-235

Work Description: Pressing dead ends onto core blanks
Full sintering of core blanks

WORK AREA 6 (ROLLING AND DRAWING AREA

Floor Area ---------- 1000 square feet

Forms: IIa, IIb, IV, VIIb, VIII

Combined Allowable Capacity in:

Forms IIa, IIb and IV ---------- 1600 grams U-235

Forms VIIb and VIII ---------- 800 grams U-235

Work Description:

Cold rolling of core blanks
Annealing of core blanks
Drawing of tubular fuel element assemblies
Annealing and bonding of tubular fuel element assemblies
Removal of mandrels from tubular fuel element assemblies

WORK AREA 7 (RADIOGRAPHY ROOM)

Floor Area ---------- 418 square feet

Forms: IIb, IV, V, VIII, XI

Combined Allowable Capacity in:

Forms IIb, IV, V, and XI ---------- 1600 grams U-235

Forms IIb, IV and VIII ---------- 800 grams U-235

Work Description:

Radiographic inspection of core blanks
Layout of core blanks
Radiographic inspection of fuel elements
Layout of fuel elements
Identity marking of core blanks and fuel elements

WORK AREA 8 (MACHINE SHOP AREA)

Floor Area ---------- 1430 square feet

Forms: IIb, IV, V, VI

Combined Allowable Capacities in:

Forms IIb and IV alone ---------- 1850 grams U-235

Forms IIb, IV and V (in absence of Form VI) ---------- 1600 grams U-235

Forms V and VI alone with maximum in Form VI of 350 grams ---------- 1000 grams U-235

Forms X and VI with maximum in Form VI of 350 grams ---------- 3000 grams U-235

Work Description:

Edge milling of core blanks
Cutting cladding free of draw mandrel
Finish-machining fuel elements to length
Resistance welding of dead ends to cermet strip
Seam welding of plates

WORK AREA 9 (CHEMICAL CLEANING AND PLATING ROOM)

Floor Area ---------- 637 square feet

Forms: IIb, III, IV, VI, X

Combined Allowable Capacities in:

Solid materials in Forms IIb and IV alone ------ 600 grams U-235

Solid materials in Forms IIb, IV and VI with maximum in Form VI of 400 grams ---------- 500 grams U-235

Form III, per liter ---------- 2 grams U-235

Work Description:

Chemical cleaning and surface preparation of tubular cores and cladding
Chemical polishing of fuel elements

WORK AREA 10 (WELDING AREA)

Floor Area ---------- 518 square feet

Forms: IIb, IV, V, VI

Combined Allowable Capacities in:

Forms IIb and IV alone ---------- 1850 grams U-235

Forms IIb, IV and V (in absence of Form VI) ---- 1600 grams U-235

Forms V and VI with maximum in Form VI of 350 grams ---------- 1000 grams U-235

Forms VI and X with maximum in Form VI of 350 grams ---------- 3000 grams U-235

Work Description:

Seal welding of fuel element ends
Seam welding of plates

WORK AREA 11 (INSPECTION AREA)

Floor Area ---------- 428 square feet

Forms: IIb, IV, V, VIII, VI

Combined Allowable Capacity in:

Forms IIb, IV and V ---------- 1600 grams U-235

Forms IIb, IV, V, VIII ---------- 800 grams U-235
Forms IIb, IV, V and VI, Form VI, 350 grams - 1000 grams U235

Work Description:

In-process inspection
Layout
Final inspection

WORK AREA 12 (RESEARCH AND DEVELOPMENT AREA)

Floor Area ---------- 673 square feet

Forms: IIa, IIb, IV, V, VII, VIII, XI

Combined Allowable Capacity in:

Forms IIa, IIb, IV, V ---------- 1600 grams U-235

Forms IIa, IIb, IV, V, VIIa, VIIb, VIII, XI -- 800 grams U-235

Work Description:

Research and development

WORK AREA 13 (TRANSPORT LANES)

Floor Area ---------- 1070 square feet

Forms: all forms

The capacity of a birdcage or carrier of material as specified under Work Area 1

Work Description:

On receipt of a carrier containing special nuclear material (UO_2) the courier shall transport the carrier to its consigned work area via the established transportation lane ONLY, NEVER ACROSS WORK AREAS. At the consigned work area, the courier shall first check the amount of special nuclear material in the consigned work area and then shall place the carrier in the OFF SPOT location within the consigned work area. At the OFF SPOT will be a bulletin board and a signal.

The courier shall post the signal as soon as he deposits the carrier in the OFF SPOT. The bulletin board shall carry information pertaining to the work area such as:

Allowable weight of U-235 or of material ------ XXXX grams
Allowable number of units ---------- XXXX pieces
Weight of U-235 or material currently in work area ---------- XXXX grams
Number of units in work area ---------- XXXX pieces
Weight of U-235 in solution ---------- XXXX grams
Concentration of U-235 in solution ---------- XXXX grams per liter

The courier shall first check to see that the amount of special nuclear material he is delivering does not exceed the allowable amount for the consigned work area in either weight of U-235 or of material or number of pieces. The courier shall then mark on the bulletin board the weight of U-235 or number of pieces that he has delivered to the consigned work area. The Plant Superintendent or his designated representative shall sign a receipt acknowledging delivery of the material to the work area. This receipt shall be returned immediately to the courier for recording the information in the log book.

NOTE: Only the courier is authorized to change the information on the bulletin board as to the amount of U-235 within a work area. Except in emergency, only the courier is authorized to deliver or remove special nuclear material to or from a work area. In any event this must be in accordance with established transportation controls.

Work Description:

Transporting of SNM between vault and work area and between work areas

WORK AREA 14 (SCRAP STORAGE AREA)

Floor Area ---------- 194 square feet

Forms: all forms

Allowable capacities of materials in individual repositories
same as Work Area 1

Work Description:

Storage of U-235 containing solid and liquid scrap

WORK AREA 15 (TRANSPORT TO CRITICAL FACILITY)

Forms: IV, V, VI, VIII, XI

Allowable capacity of U-235 in any form per birdcage transporting device ---------- 800 grams

Work Description:

Movement of finished fuel elements from Main Plant to Critical Experiment Facility by guard-escorted motor vehicle.

WORK AREA 16 (WASTE DISPOSAL AREA)

Forms: Disposable solid waste, III

Allowable Capacities in:

Form III and solid wastes in any one container ------- 400 grams U-235

Per liter ---------- 2 grams U-235 *

In solid wastes ---------- 200 grams U-235

Work Description:

Concentration of accountable liquid wastes
Incineration of contaminated accountable and non-accountable wastes

* Provided uranium is uniformly dispersed and no sludge formation or settling out can possibly occur

WORK AREA 17 (WASTE STORAGE AREA)

Forms: III, Solid wastes

Allowable Capacities in:

Same as Work Area 16

Work Description:

Storage of carboys or drums containing concentrated liquid wastes

WORK AREA 18 (WEIGHING STATION)

Forms: all forms except III

Capacities: As specified in 2.006.3 of this chapter, when handled alone and with the exception of material in birdcage devices

Work Description:

Weighing and measuring of materials for accountability purposes

WORK AREA 19 (ENGINEERING MATERIALS LABORATORY)

Forms: all forms

Allowable capacities in all forms combined with maximum in Form VI of 350 grams ---------- 800 grams U-235

Work Description:

Chemical analysis of samples and engineering tests
Development of fuel elements and experimental fabrication

WORK AREA 20 (POROSITY TEST AREA)

Floor Area ---------- 250 square feet

Forms: III, IV, V

Combined Allowable Capacities in:

Form IV and V ----------1600 grams U-235

Form III ---------- 100 grams U-235

WORK AREA 21 (FURNACE AREA)

Floor Area ---------- 500 square feet

Forms: IIa, IIb, IV, VIII

Combined Allowable Capacity in:

Forms IIa, IIb, and IV ----------1600 grams U-235

Work Description:

Diffusion bounding, sintering, pre-cleaning, annealing

WORK AREA 22 (AUTOCLAVE AREA)

Floor Area ---------- 160 square feet

Forms: IV, V, (totally immersed in H_2O)

Combined Allowable Capacity in Forms IV and V --------1600 grams U-235

Work Description:

Autoclaving of sealed fuel elements at 300 degrees Fahrenheit

WORK AREA 23 (VACUUM FURNACE AREA)

Floor Area ---------- 300 square feet

Forms: IX, X

Capacities: Allowable capacity in Form IX and X --------- 10,000 grams U-235

Work Description:

Melting, pouring and casting of uranium metal in vacuum

WORK AREA 23a (COOLING AREA)

Floor Area ---------- 150 square feet

Forms: X

Allowable capacity in Form X ---------- 10,000 grams U-235

Work Description:

Cooling and preliminary deslagging of cast ingots

WORK AREA 24 (SAWING AREA)

Floor Area ---------- 100 square feet

Forms: VI, IX, X

Combined Allowable Capacities in:

Forms VI, IX, and X with maximum in Form VI
of 350 grams ---------- 10,000 grams U-235

2.007.0 DESCRIPTION OF PROCEDURES FOR CRITICAL EXPERIMENT FACILITY

MND Report 1110, Part III, describes the Critical Experiment Facility. A detailed plan of the facility is shown in this report.

For purposes of accountability, the entire Critical Experiment Facility is a Materials Balance Area as described in MND-1111, Chapter IX, and in the Nuclear Materials Control Manual, MND-1069.

For purposes of criticality control, there will be two critical work areas in the facility:

WORK AREA 101 - The storage vault

WORK AREA 102 - The work area adjacent to the vault

The test cells, Work Areas 103 and 104 respectively, are not considered criticality control areas. Experimental test work involving critical quantities of special nuclear materials will be conducted under specific Class 104 Facilities Licenses issued pursuant to Part 50, Title 10, CFR using procedures described in Reports MND-1110, 1111, 1112 and others to follow.

Except for transit of special nuclear material to Work Areas 101, 102, 103, and 104, no special nuclear material will be handled in any other room or area of the facility.

WORK AREA 101 (VAULT ROOM)

Floor Area ---------- 176 square feet

Forms: IV, V, VI

Allowable Capacities of:

U-235 total in storage devices ---------- 100 kilograms

U-235 in any form per storage device ------- 800 grams

RECEIPT AND STORAGE OF SPECIAL NUCLEAR MATERIAL

As described, fuel tubes or plates will be moved to the Critical Experiment Facility in birdcage transportation and storage devices. These birdcage devices are 12 inches by 12 inches by 30 inches and retain in a center position wooden cradles 9 1/2 inches by 11 3/4 inches by 23 3/4 inches which hold the fuel tubes or plates. After

verification by the Accountability Designee of the Facility of the number of tubes or plates delivered (as described in MND-1069) the birdcages will be placed in the storage vault and arranged in rows along the back wall.

WORK AREA 102 (WORK ROOM ADJACENT TO VAULT)

Floor Area ---------- 460 square feet

Forms: IV, V, VI

Allowable capacity of U-235:

Forms IV and VI with maximum of 400 grams of U-235 in Form VI ---------- 2000 grams

Forms IV, V and VI with a maximum of 400 grams in Form VI ---------- 1600 grams

Work Description:

Assembly of Form IV tubes into bundles of 37 tubes each

Assembly of Form V plates into boxes of 18 plates each

Following assembly, the fuel elements (bundles or boxes) will be placed in wooden cradles which are held in the birdcage storage devices. The dimensions of the cradle holding a bundle of 37 MPR tubes are 9 1/2 inches by 11 3/4 inches by 23 3/4 inches.

The birdcage devices are then transferred to the storage vault for retention until withdrawal for authorized experimental work.

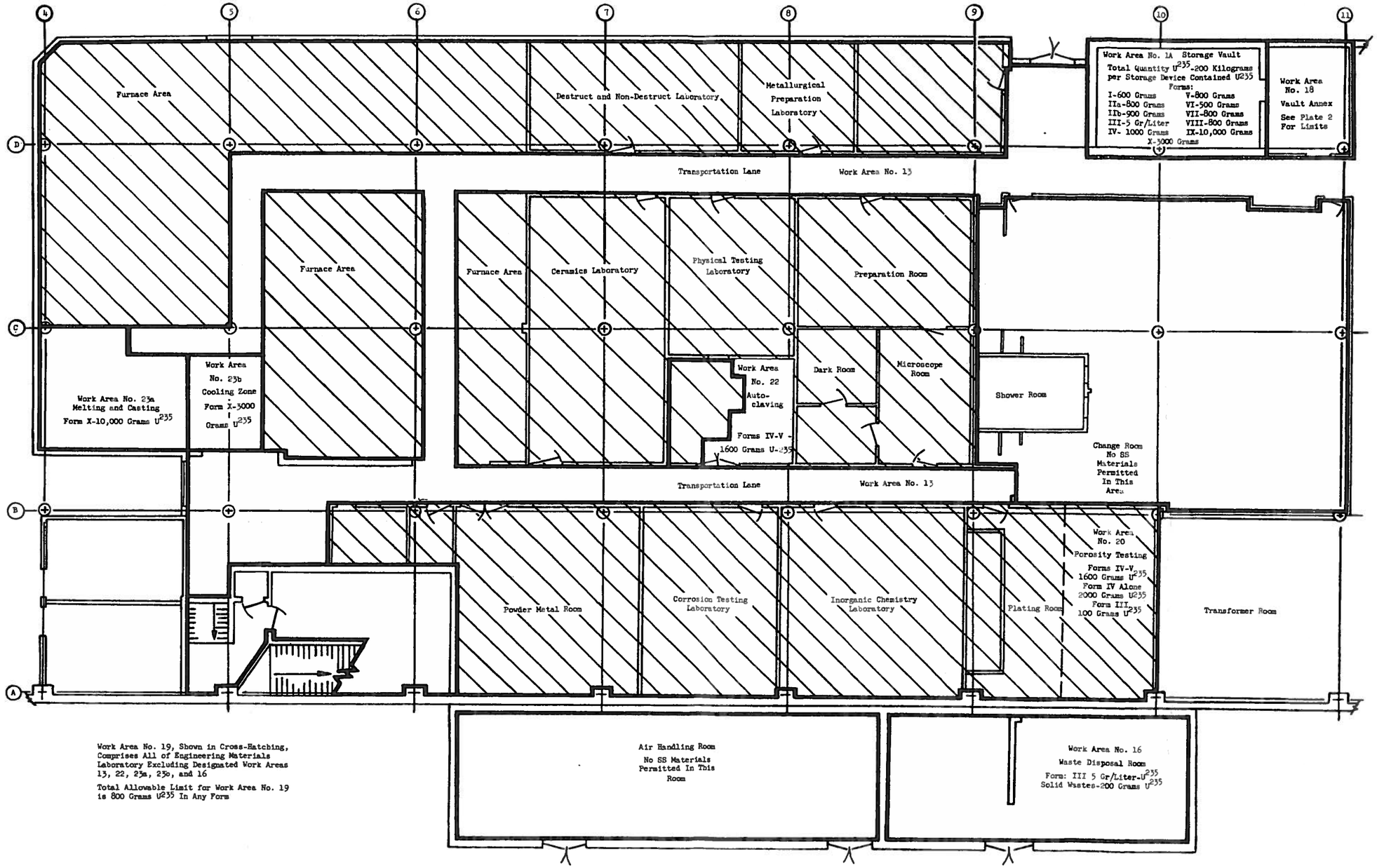
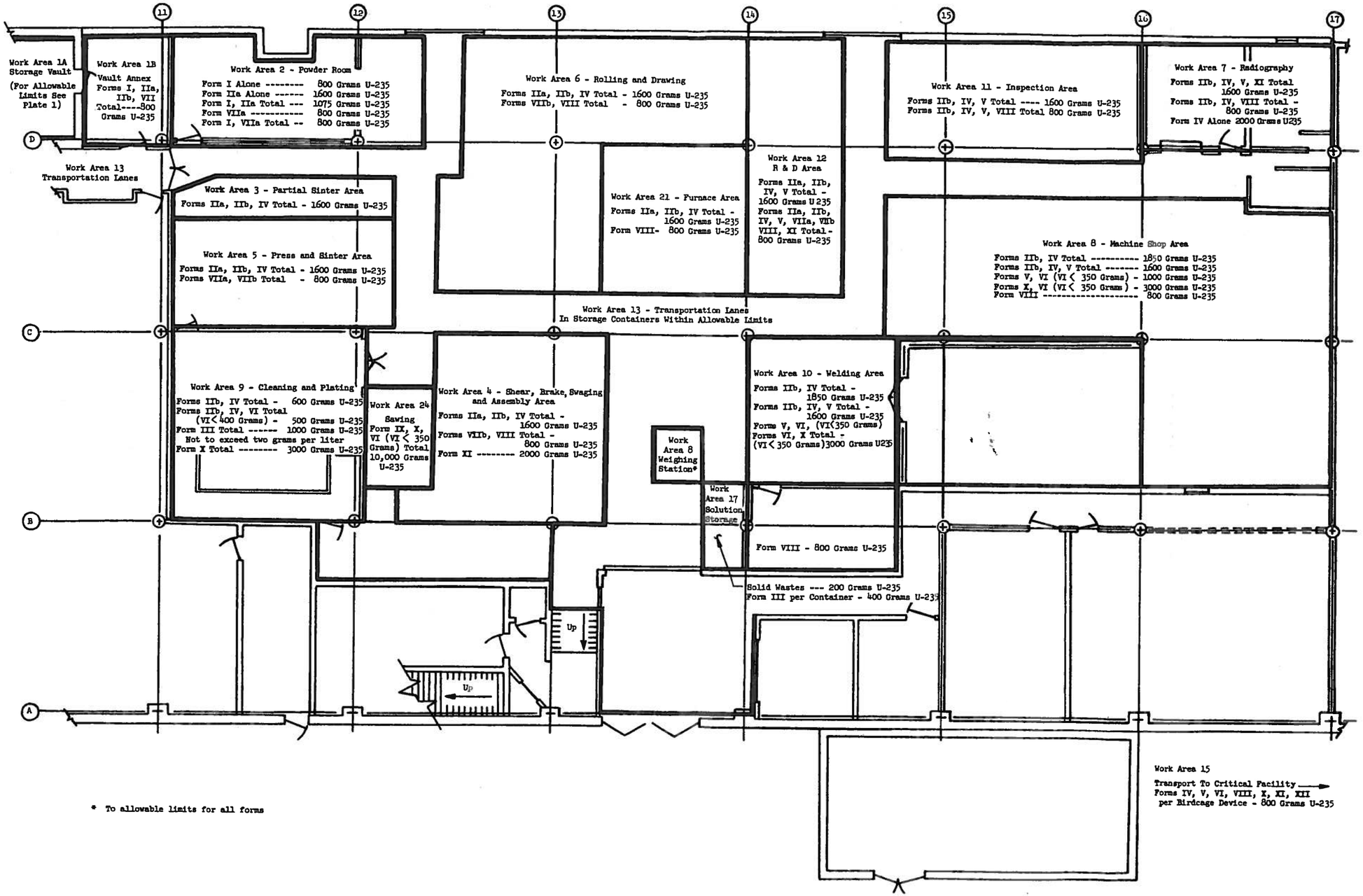


Plate 1 - Martin Nuclear Division Engineering Materials Laboratory
Criticality Work Areas



* To allowable limits for all forms

Plate 2 - Martin Nuclear Division Manufacturing Pilot Plant
Criticality Work Areas

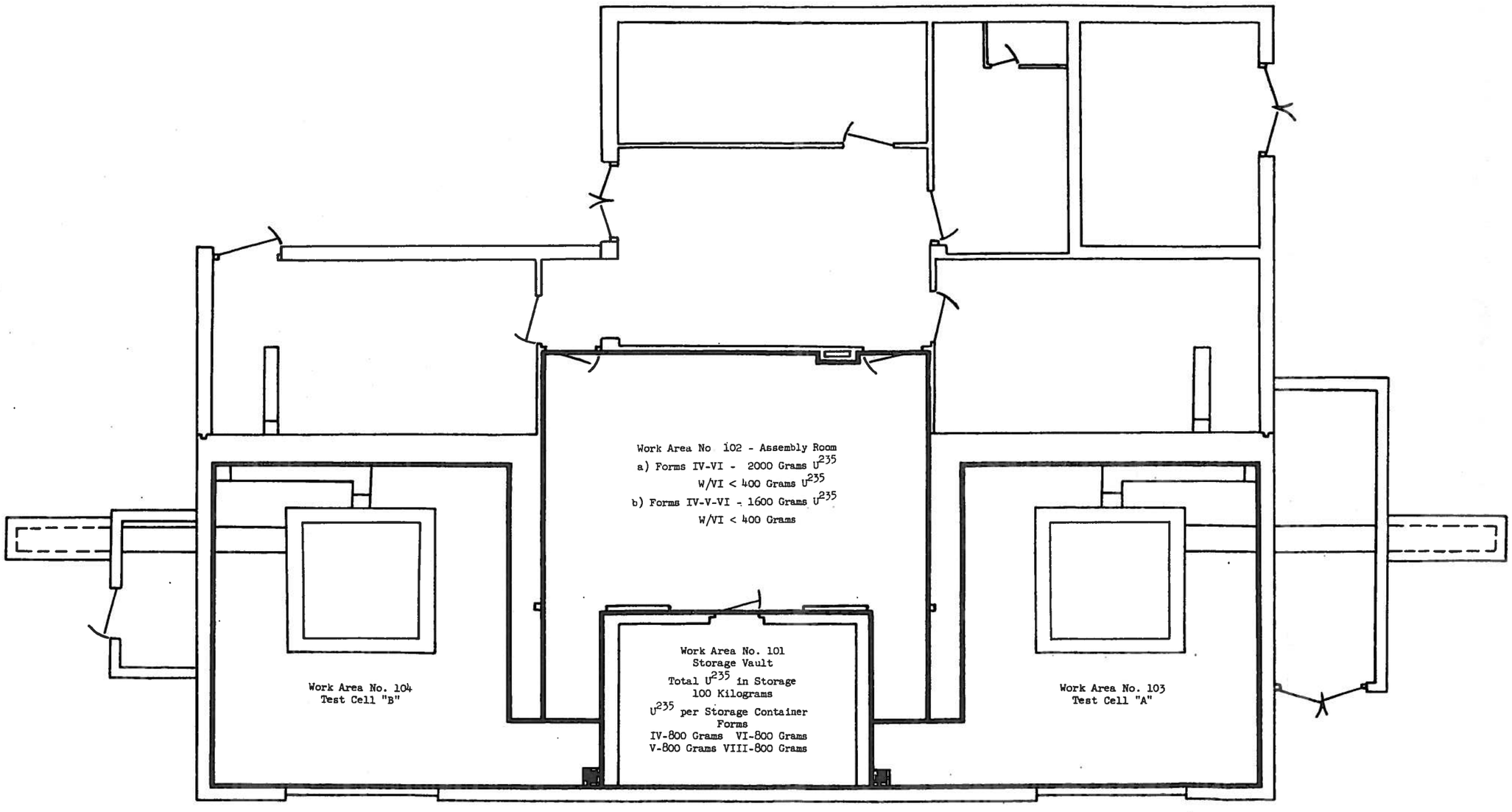


Plate 3 - Martin Critical Experiment Facility Criticality Work Areas

REFERENCE

1. Chernick, Dr.; "A Guide to the Calculation of Criticality Limits for Enriched Uranium", January 1957

APPENDIX A

PROCEDURE FOR CALCULATING MAXIMUM ALLOWABLE FISSIONABLE MATERIAL MASSES

Basic Formulas

1. $k_\infty = 1 + M^2B^2$
2. $B^2 = (\frac{\pi}{\bar{R}})^2$
3. $\bar{R} = R + 7$
4. ρ = fuel density grams per cubic centimeter
5. y = volume per cent of fuel
6. Mass = $4/3\ \pi R^3\ y\ \rho$

Basic Systems

1. UO_2
2. UO_2 in stainless steel with boron (25 per cent UO_2, 1/4 per cent BN, remainder stainless steel Type 18-8)
3. U in water

List of Constants

			Atomic Weight
$\sigma_a\ (U_{235})$	= 670b		235
σ_a (O)	= 0.0002b	σ_s = 4.2b	16
σ_a (B)	= 750b	σ_s = 4b	10.82
σ_a (H)	= 0.33b	σ_s = 20b	1
σ_a (Fe)	= 2.4b	σ_s = 11b	55.85
σ_a (Cr)	= 2.9b	σ_s = 3b	52.01
σ_a (Ni)	= 4.5b	σ_s = 17.5b	58.69

Step 1 $\quad k_\infty = \eta f \qquad \eta = 2.08$ for U_{235}

System 1

$$f = \frac{\Sigma\ U_{235}}{\Sigma\ U_{235} + \Sigma\ H_2O}$$

$$= \rho\ y\ x\ \frac{0.93\ x\ \frac{235}{267}\ x\ 670}{235}$$

$$= \frac{}{\rho y \times \frac{0.93 \times \frac{235}{267} \times 670}{235} + (1-y) \times \frac{2 \times 0.33}{18}}$$

$$= \frac{1}{1 + (\frac{1-y}{\rho y}) \times 0.0156}$$

System 2

$$f = \frac{\Sigma U_{235}}{\Sigma U_{235} + \Sigma B + \Sigma H_2O \Sigma ss}$$

$$f = \frac{\rho y \times \frac{0.25 \times 0.93 \times \frac{235}{267} \times 670}{235}}{\rho y \left[\frac{0.25 \times 0.93 \times \frac{235}{267} \times 670}{235} + \frac{0.0025 \times 750}{24.8} + \frac{0.75 \times 0.74 \times 2.4}{55.8} + \frac{0.18 \times 0.75 \times 2.9}{52} + \frac{0.08 \times 0.75 \times 4.5}{58.7} \right] + (1-y) \frac{2 \times 0.33}{18}}$$

$$f = \frac{0.584 \rho y}{\rho y \left[0.584 + 0.0755 + 0.0238 + 0.0075 + 0.0046\right] + (1-y) \ 0.0367}$$

$$f = \frac{0.584 \rho y}{0.6954 \rho y + (1-y) \ 0.0367}$$

$$f = \frac{1}{1.19 + (\frac{1-y}{\rho y}) \ 0.0628}$$

System 3

$$f = \frac{\rho y \ \frac{670}{235}}{\rho \frac{670}{235} + (1) \frac{2 \times 0.33}{18}}$$

$$f = \frac{1}{1 + (\frac{1}{\rho}) \frac{0.66}{18} \times \frac{235}{670}}$$

$$f = \frac{1}{1 + \left(\frac{1}{\rho}\right) 0.0129}$$

Values of k_∞

System 1

$$k_\infty = \frac{2.08}{1 + \left(\frac{1-y}{\rho y}\right) 0.0156}$$

System 2

$$k_\infty = \frac{2.08}{1.19 + \left(\frac{1-y}{\rho y}\right) 0.0628}$$

$$k_\infty = \frac{1.75}{1 + \left(\frac{1-y}{\rho y}\right) 0.0528}$$

System 3

$$k_\infty = \frac{2.08}{1 + \left(\frac{1}{\rho}\right) 0.0129}$$

Step 2 $k_\infty = 1 + M^2 B^2$

assume $M^2 = T + L^2 = 35$ square centimeters

$$\frac{k_\infty - 1}{35} = \frac{\pi^2}{(R + 7)^2}$$

Step 3

1. Assume value of ρ and y;
2. Find k_∞ from proper formula (Equation 2);
3. Find R from formula (Equation 3);
4. Find mass allowable from formula (Equation 1);
5. Plot curves of mass (Step 4) versus y (Step 1) holding ρ constant (Step 1);
6. Plot curves of minimum mass from Step 5 versus ρ (Step 1).

In Reply Refer To:
L:R:MD
Docket No. 40-2308

The Martin Company
Baltimore 3, Maryland

Attention: Mr. C. A. Wendel
Licensing Officer
Nuclear Division

Gentlemen:

We are in receipt of your licenses numbered C-3508, Amendment No. 4 and C-3572, Amendment No. 2 which you returned to us for revocation.

You are hereby advised that licenses number C-3508 and C-3572 are revoked.

Very truly yours,

J. C. Delaney
Chief, Materials Section
Licensing Branch
Division of Licensing & Regulation

A128

Formal Docket File
Docket No. 40-2308

664
765
2308

APR 1 1 1958

The Martin Co.
Baltimore 3, Maryland

Attention: Mr. Paul Guinn

Gentlemen:

This refers to the inspection conducted on October 22, 1957 of your activities authorized under Source Material License Nos. C-3572 with Amend. #1 and 2; C-3147 with Amend. #1; and C-3508 with Amend. #1,2,3,and 4; and Byproduct Material License Nos. 19-1398-1,2,3,5,6,7,8,and 9.

It appears that certain of your activities were not conducted in full compliance with the conditions of your Byproduct Material and Source Material Licenses and the requirements of the AEC's regulations in Parts 20 and 30, Title 10, Code of Federal Regulations in that:

1. The carton containing the 6.6 pounds of UO_2 was not labeled with the proper radiation signs as required by Section 20.203(f).

2. The 1 mc Thulium 170 source was not covered by a specific license as required in Section 30.3 of 10 CFR 30.

3. Leak tests of the Strontium 90 sealed sources were not carried out as required by Condition 14 of License No. 19-1398-2.

It is noted that these deficiencies were called to your attention and you agreed to take the necessary corrective action and verified in your letter of February 28, 1958 the action which would be taken. Particular attention will be given these items during the next inspection of your activities.

There were no other items of noncompliance reported to us as a result of this visit. We appreciate the cooperation given to the AEC representative.

Very truly yours,

James H. Mason, Chief
Isotopes Branch
Division of Licensing and Regulation

A/29

NO. 40-3296

THE MARTIN COMPANY

Baltimore 3, Maryland

September 12, 1958

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. J. C. Delaney
Chief, Materials Section
Licensing Branch

Gentlemen:

As you may know, the Denver Division of The Martin Company is engaged in the development and fabrication of the Titan missile, pursuant to a prime contract with the Air Force. The Baltimore Division of the Company will support this effort by producing certain of the missile components, an undertaking which will require the procurement of substantial quantities of thorium-magnesium alloy.

Specifically, it is anticipated that approximately 50,000 pounds of HK-31A alloy will be required during the next twelve months. I shall, therefore, appreciate it if you will issue a source material license for this quantity of thorium-magnesium alloy in accordance with the provisions of Section 40.21 of Title 10 of the Code of Federal Regulations. I shall, of course, be glad to furnish any additional information which may be required relative to this Application.

In connection with the same program, it will be necessary for us to procure additional quantities of the alloy during the remainder of 1959 and during 1960 and 1961. Applications for these additional quantities will be submitted on a timely basis.

Very truly yours,

THE MARTIN COMPANY

Ross G. Macaulay
Licensing Officer
Nuclear Division

RGM:hp

DOCKETED
SEP 12 1958
Division of Licensing & Regulations
Docket Officer

A-130

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:
40-3296
DLeND

SOURCE MATERIAL LICENSE

License No. C-4263

Dated: SEP 15 1959

The Martin Company
Baltimore 3
Maryland

Attention: Mr. Ross G. Macaulay
Licensing Officer
Nuclear Division

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to, at the above stated location, fifty thousand (50,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire September 30, 1959.

FOR THE ATOMIC ENERGY COMMISSION

Encl:
10 CFR 20

J. C. Delaney
Chief, Materials Section
Licensing Branch
Division of Licensing and Regulation

A/31

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

IN REPLY REFER TO:
40-3296
DLM:MD

SOURCE MATERIAL LICENSE

License No. C-4263

Dated:

The Martin Company
Baltimore 3
Maryland

Attention: Mr. Rose O. Macaulay
Licensing Officer
Nuclear Division

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to , at the above stated location, fifty thousand (50,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire September 30, 1959.

FOR THE ATOMIC ENERGY COMMISSION

Encl:
10 CFR 20

CC: Docket Officer
Document Room
S/H
M.M. Mann, Insp.

J. C. Delaney
Chief, Materials Section
Licensing Branch
Division of Licensing and Regulation

THE MARTIN COMPANY

Baltimore 3, Maryland

December 1, 1958

DOCKET NO. 40-3296

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. J. C. Delaney
Chief, Materials Section
Licensing Branch

DEC 1 [illegible]
Maa

Gentlemen:

You will recall that some time ago we discussed by telephone some of the problems relating to the handling of thorium-magnesium (containing 4% or less thorium) that have been encountered in the Baltimore Division of this Company. I explained at that time that this Division has made extensive use of this alloy in the past in connection with the fabrication of such Martin products as the Vanguard and Matador and that we anticipate using substantially increased amounts in connection with the Titan Missile. I also pointed out that because of this increased usage, and because of the minimal hazards presented, we believe it necessary to adopt a set of procedures which would be applicable to this particular alloy as distinguished from other types of source material.

Our Management Engineering Department has now prepared, and I am enclosing herewith, three copies of a document entitled "Proposed Procedure for Handling of Magnesium-Thorium." The document has been reviewed and approved by our Health Physics Department. Although this procedure is self-explanatory, I would like to call your attention to certain of the accountability aspects. While the procedure calls for very strict accountability with regard to scrap materials, we have not made provision for detailed accounting with respect to thorium-magnesium material which is fabricated into components. The weighing of such material would be wholly impracticable, in our particular circumstances, for the reason that the fabricated components are incorporated into complex assemblies containing various non-source materials before being shipped to Denver for final installation in the missile. It should be recognized, however, that all of the 4% thorium-magnesium procured by this Company is utilized in the performance of contracts with the Government. Consequently, the difference between the quantities purchased and the scrap realized represents, at any time, the amount that has been or will be delivered to the Government in the form of fabricated end items.

A/32

THE MARTIN COMPANY
Baltimore 3, Maryland

I shall appreciate it if you will review the enclosure and confirm to me that the proposed procedure set forth therein satisfies existing AEC requirements relative to the handling and accountability of 4% thorium-magnesium. While this procedure would be applicable only to the Baltimore Division, we would expect, subject to AEC concurrence, to institute substantially similar procedures in our other Divisions. We shall be glad to meet with you in your office if you desire any further information or if you have any questions regarding the proposed procedures.

Very truly yours,

THE MARTIN COMPANY

Ross G. Macaulay
Licensing Officer
Nuclear Division

RGM:hp
Enclosures

MARTIN
BALTIMORE

PROPOSED 11-17-58
NO. 44.43
REVISION
ISSUED
PAGE 1 OF

☐ OPERATING INSTRUCTION
☒ STANDARD PROCEDURE

SUBJECT: Proposed Procedure For Handling Of Magnesium-Thorium

FUNCTIONS AFFECTED:
Material & Procurement
Manufacturing
Quality
Health Physics - Safety
Property Accountability

40-3296

REMARKS:

This procedure establishes the method of handling and processing alloys of Magnesium-Thorium containing 4% or less Thorium. Since this material is a licensed Source Material controlled by The United States Atomic Energy Commission, it is important that all raw material, work in process, offal, scrap, rejected parts, and surplus material be handled separately from other materials in accordance with the provisions of this procedure.

The Memorandum Procedure issued by this department on January 6, 1958 subject "Thorium Alloy - Accountability" is superseded by this Standard Procedure.

Additional copies of this Standard Procedure may be obtained by calling 9295 or 9327.

R. E. Weber
Management Engineering

DEC 1

AP-3 (9-58)

I Materiel & Procurement

A Purchasing

Specify in the purchase of all Magnesium-Thorium materials that material must be so designated and that all shipping papers must be marked with the net weight of the material.

B Stores

All Magnesium-Thorium material in Stores must be properly designated and may not be mixed with other types of materials.

NOTE: This means separate racks but does not necessarily mean separate rooms or cages.

C Material Control

1 Keep detailed perpetual inventory records on all orders, receipts, and issues, returns and excess materials.

2 Initiate Termination Inventory Schedules on obsolete, canceled, and terminated raw sheet stock.

II Manufacturing

A Production Planning

Provide special colored and stenciled Shop Order folders marked Magnesium-Thorium to identify that the detail parts are to be made from Magnesium-Thorium alloy.

B Production Project

1 Deliver Magnesium-Thorium materials with the color coded Magnesium-Thorium folder to DETAIL MANUFACTURING. Return all excess material larger than 8"x10" to RAW STORES.

2 Initiate Termination Inventory Schedules on obsolete, canceled, and terminated parts in process and completed assemblies.

3 Process cancellations on details and assemblies that are canceled by Engineering design changes.

4 Have all parts moved as an integral package - do not permit losses of material due to rejections, split folders, or other reasons.

C Manufacturing Engineering & Research

1 Flag all primary data sheets where there are detail parts to be made from Magnesium-Thorium.

2 Mark each page of the Process Planning Sheets in bold letters "MAGNESIUM-THORIUM".

3 Before each operation that will require removing material such as cuttings, chips or other residue, a step will be added to the process plan stating "clean machine and floor thoroughly before performing the next operation".

II-C (Cont'd)

4 After each operation that requires removing material such as cutting, chips, or residual remnant material, a step will be added to the process plan stating "clean machine and floor thoroughly and put all cuttings, chips, residual material in designated Magnesium-Thorium container".

5 A step will be included in the process plan requiring that all completed parts be identified with a Magnesium-Thorium identification spot.

D Factory

1 Handle Magnesium-Thorium in accordance with instructions in process plan, Safety Bulletins, and instructions of the Health Physics Representative.

2 Account for all material and parts as finished parts, rejected parts, scrap, or ofall.

E Conservation

1 Provide containers for Magnesium-Thorium material, cuttings, trimmings, clippings, and floor sweepings.

2 Store Magnesium-Thorium material until sufficient quantity is available for shipment to a designated scrap dealer.

3 Package the Magnesium-Thorium in containers to insure against loss.

4 Weigh all scrap and notify MATERIAL CONTROL of the weight of scrap sold.

NOTE: All rejected parts, scrap, ofall, or surplus materials will be kept separate from other materials and will be disposed of only to a licensed scrap dealer or in accordance with normal Government excess and surplus disposition procedure.

III Quality

A Inspect incoming material to assure that the proper quantity is received and material is identified as Magnesium-Thorium.

B Any portion of Magnesium-Thorium required for test purposes must not be disposed of in regular scrap material but must be returned to Magnesium-Thorium containers.

C Notify CONSERVATION whenever scrap is generated indicating the contract number involved.

IV Health Physics - Safety

A Monitor the handling of Magnesium-Thorium as required to assure prescribed safety measures are followed and that no health hazards exist. In particular, monitor all operations involving welding, grinding, polishing, etc., to insure that no harmful fumes or dusts are present in work areas.

B Monitor scrap metal containers to prevent accidental mixing of Magnesium-Thorium with other materials.

V Property Accountability

Process terminations and cancellations for Magnesium-Thorium as required.

FORMS USED

Termination Inventory Schedule A	-	Form 060830
Termination Inventory Schedule B	-	Form 060831
Termination Inventory Schedule C	-	Form 060832

THE MARTIN COMPANY
BALTIMORE 3, MARYLAND

DOCKET NO. 70-14 & 70-58

Mail No. M-722
Nuclear Division

filed



Director
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention: Mr. Joseph Delaney

Gentlemen:

Pursuant to Title 10 Code of Federal Regulations, Part 70 - SPECIAL NUCLEAR MATERIAL - amended November 11, 1958, we are submitting our plans for the installation of the radiation monitoring system and a description of our procedures for evacuating personnel in the event of any emergency.

I understand from the conversation between you and Joe Lockpert that we can expect your comments, probably in about a month, regarding the plans and procedures enclosed. Since it was requested that a tentative date for installing the system be submitted at this time, our estimate of time is based upon the receipt of your reply. Because the equipment to be employed is a Martin capital investment, amounting to a significant quantity, procurement action will be initiated as soon as we hear from your office. Allowing a maximum of 90 days for delivery plus an additional 30 days for installation and testing, it can be assumed that approximately four (4) months will elapse from the time of ordering equipment and materials to the time of accepted usage.

The enclosed floor plan shows the entire wiring scheme and the location of the currently planned stations. The receptacles, noted in red, are plug-in types which can accommodate one monitoring unit each.

For example, in the Waste Disposal Area work is performed only a few days per month. Any permanent station would therefore remain idle for the most part. Whenever work is to be performed in this area, a portable unit will be employed. By this means it will reduce our total inventory of monitoring units and allow flexibility in operations. Six permanent stations are currently planned with an additional two portable units to be used to monitor work in the areas where work is sporadic.

A/33

Enclosed is a listing of the units to be employed in the Manufacturing and Research Areas, and the Critical Facility Vault. We have not enclosed a plan for the Critical Facility. At the present time our test reactors are equipped, as required, with monitoring devices. The only additional coverage will be to install a unit in the Critical Facility Vault and include it in the circuit system now employed.

A copy of emergency procedures is also enclosed for your review and comment.

Very truly yours,

THE MARTIN COMPANY

/S/ F. G. Myers

F. G. Myers
Operations Manager

FGM:JVL pfb

DOCKET NO. 70-14 & 70-58 (7) File

EMERGENCY PROCEDURES

I High radiation fields

Created as a result of a criticality incident or removal of an intense radiation source from a shielded to unshielded position.

A. Detected by observing the audible and visual alarms of the radiation monitoring equipment.

B. Personnel involved will:

1. Immediately leave the area taking advantage of all possible shielding and using nearest exit.

2. Notify Health Physics.

3. Keep other personnel from entering the area.

D. Health Physics will:

1. Establish the magnitude of the hazard by making appropriate instrument surveys.

2. Keep personnel at a safe distance from the source.

3. Check area for radioactive contamination.

4. Assist operating personnel in taking corrective action.

II High level spill

Created as a result of the breaking of a container of highly radioactive liquids or fine solids or as a result of an explosion, failure of ventilation system, etc.

A. The spill is detected by being observed by one or more operating personnel or by the audible-visual alarms of the radiation monitors.

B. Personnel involved in the spill will:

1. Leave the area and warn other personnel of the spill. If floor contamination is suspected, remove shoes to avoid spreading of contamination.

2. Call Health Physics.

3. Permit no one to enter the spill area until cleared by Health Physics.

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C. Health Physics will:

1. Monitor the area to determine levels of contamination and to evaluate the potential hazards.

2. Establish the protective clothing that is needed and whether respirators should be worn.

3. Aid personnel in decontamination.

4. Determine the levels of radiation exposures and initiate urinalysis requests if internal exposures are suspected.

III Low level spills

Created by the dropping or breaking of a container of lowlevel radioactive liquids or solids or due to failures in ventilation system, fires, etc.

A. Detected by observation of operating personnel. May or may not be alarms from radiation monitoring equipment.

B. Personnel involved will:

1. Take immediate corrective action such as covering the spill with paper.

2. Leave the area taking precautions to minimize the spread of contamination.

3. Notify Health Physics.

4. Prevent other personnel from entering the area until cleared by Health Physics.

C. Health Physics will:

1. Establish the magnitude of the hazard.

2. Establish controls to prevent the spreading of contamination.

3. Assist in decontamination of personnel and equipment.

4. Determine the levels of radiation exposures and initiate urinalysis requests if internal exposures are suspected.

IV Air contamination

Created by fires, explosions, spills, failure in the ventilation system, etc.

A. Detected by the constant air monitors which give an audible and visual alarm. May or may not be alarms [illegible]

monitoring equipment in the area.

B. Personnel involved will:

1. Leave the area immediately and shut doors behind them.

2. Notify Health Physics.

3. Keep other personnel out of the area until cleared by Health Physics.

4. Decontaminate the entire area.

C. Health Physics will:

1. Evaluate the hazard and make recommendations concerning respiratory protection.

2. Aid operating personnel in finding the source of air contamination.

3. Establish controls to prevent the spread of contamination.

4. Aid in decontamination of personnel and equipment.

5. Determine levels of radiation exposures and initiate urinalysis requests if internal exposures are suspected.

V Fires involving radioactive materials

Fires of this type are divided into two categories:

A. Those that occur in areas containing low level sources and materials and,

B. Those that occur in areas containing high level sources and materials.

The procedures to be followed are as follows:

(A) Low level sources and materials:

These areas are all posted with a radiation sign reading, "CAUTION RADIOACTIVE MATERIALS";

1. Personnel involved will:

a. Notify fire department.

b. Attempt to extinguish fire by using approved fire fighting methods.

c. Avoid breathing of fumes or dusts created by the fire. Scott Air PAC respirators should be worn if air contamination is suspected.

d. Keep all personnel not needed to fight fire away from the scene.

e. Decontaminate area after fire is out.

2. Health Physics will:

a. Determine as quickly as possible the air contamination levels.

b. Check all personnel and equipment for contamination before they are permitted to leave the area.

c. Assist personnel in decontamination of area.

d. Determine levels of personnel exposures and initiate urinalysis requests if internal exposures are suspected.

(E) High level sources or materials:

These areas are all posted with a radiation sign reading, "CAUTION - RADIATION HAZARD".

1. Personnel involved will:

a. Notify Health Physics.

b. Notify fire department.

c. Attempt to extinguish blaze if there is good reason to believe that external radiation levels or air contamination levels are not excessive. Otherwise leave area immediately.

d. Keep all personnel away from scene except those needed to combat fire.

e. Decontaminate area after fire is out.

2. Health Physics will:

a. Determine radiation levels as quickly as possible. Stay with fire fighting crew until fire is out.

b. Determine contamination levels of entire area and of all fire fighting equipment.

c. Assist personnel in decontamination of area and equipment.

d. Determine levels of personnel exposures. If internal exposures are suspected, initiate urinalysis requests.

VI Emergencies during off shift hours

The outlined procedures will expedite emergency situations during off-shift hours by permitting firemen and others to safely enter certain areas without unnecessary and perhaps costly delays. The areas are identified as follows:

Radioactive Material Areas

These areas are identified by a 8" x 10½" magenta and yellow sign at each entrance reading RADIOACTIVE MATERIALS. The only conceivable way during off-shift hours of receiving an over-exposure to radiation in these areas is by breathing or swallowing dusts, fumes, or liquids, during such emergencies as a fire, an explosion, or failure in the ventilation system. Thus, the only protection needed by emergency personnel would be a Scott Air Pack, or similar type, respirator. Emergency personnel may enter these areas without waiting for the approval of the responsible supervisor. Emergency directors in each area will be notified by the Dispatcher after notifying emergency crews.

All personnel, before leaving these areas or removing any equipment following an emergency, must contact a Health Physics representative who will make any necessary contamination checks. These Radioactive Materials Areas are listed on the attached sheet.

Radiation Areas

These areas are identified by a 8" x 10½" yellow and magenta sign at each entrance reading RADIATION AREA. <u>These areas must not be entered by emergency personnel unless authorized by the responsible supervisor or a Health Physicist.</u> These areas are identified on the attached sheet.

All other areas not marked by one of the two signs above, will be free of radiation hazards and normal emergency procedures will apply.

EMERGENCY PROCEDURES IN AREAS CONTAINING RADIOACTIVE MATERIALS AND SOURCES

Radioactive Material Areas

1. Identified by a 8" x 10½" magenta and yellow radiation sign at each entrance reading "RADIOACTIVE MATERIALS".

2. May be entered in emergencies if Scott Air Pac or similar type respirators are worn. Respirators must be worn until the responsible supervisor or Health Physicist determines they are not needed.

3. Dispatcher must notify responsible supervisor after sending emergency crews to the scene.

4. Personnel must notify Health Physics before removing equipment or leaving the area.

5. Location:

   (1) The Nuclear Engineering Materials Laboratory and Pilot Plant Manufacturing Area, except for the Vault. Located in "D" building basement.

   (2) The Waste Room. This is an annex outside the south side of "D" building basement.

   (3) The Filter Room. This is an annex outside the south side of "D" building basement.

Radiation Areas

1. Identified by 8" x 10½" magenta and yellow radiation sign at each entrance reading "RADIATION AREA".

2. Must not be entered except on approval of the responsible supervisor or a Health Physicist.

3. Dispatcher must notify responsible supervisor immediately of any emergencies in these areas.

4. Personnel must notify Health Physics before removing equipment or leaving the area.

5. The door to all radiation areas are locked during "off shift" hours.

5. Location:

(1) The Vault. Located in the Pilot Plant Manufacturing Area.

(2) The test cell in the Radioisotopes Laboratory. Located in the SW corner of the "D" building basement annex.

(3) KC building or "C" test facility.

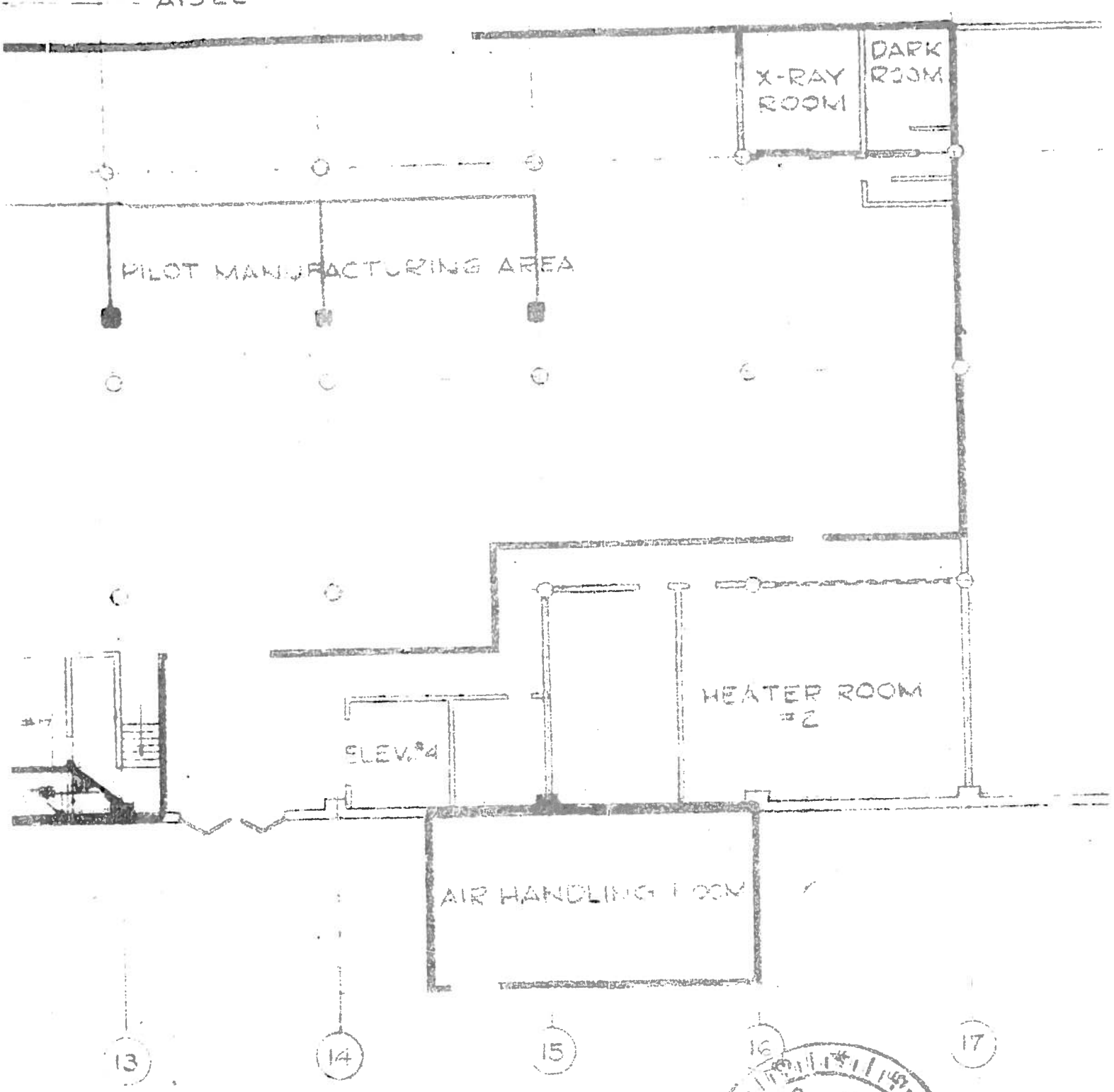
(4) The Gamma Pool. Located at column E-2, "D" building basement. The Gamma Pool has a special warning instrument outside the entrance door. A sign over the instrument explains how this area may be entered in the event of an intermittent alarm. If the Gamma Pool alarm sounds continuously, no entrance should be permitted without authorization from the responsible supervisor or a Health Physics representative.

DESCRIPTION OF MONITORING SYSTEM FOR

NUCLEAR FACILITIES (D BLDG.)

Nomenclature	Description
Basic Control Unit Victoreen Model 712	Provides power for up to 20 detector stations
Auxiliary chassis Victoreen model 713	Provides extra space for 6-10 detectors in addition to the 5 in the basic control unit
Scaling elements (detectors) Victoreen Model 716A	Gamma detectors Range 0.1 to 100 mr/hr built in calibration source. Logarithmic output, monitors 3 adjacent decades of radiation intensity on a single scale. Complete with audio-visual alarm
Sensing element (detector) Victoreen Model 716A	Gamma detector Range 1 to 10,000 mr/hr built in calibration source. Logarithmic output, monitors 3 adjacent decades of radiation intensity on a single scale. Complete with audio-visual alarm.
Plug in stations Victoreen Model 715B	Contains indicating and alarm meter, indicator light, remote calibration button. Should contain buzzer alarm.

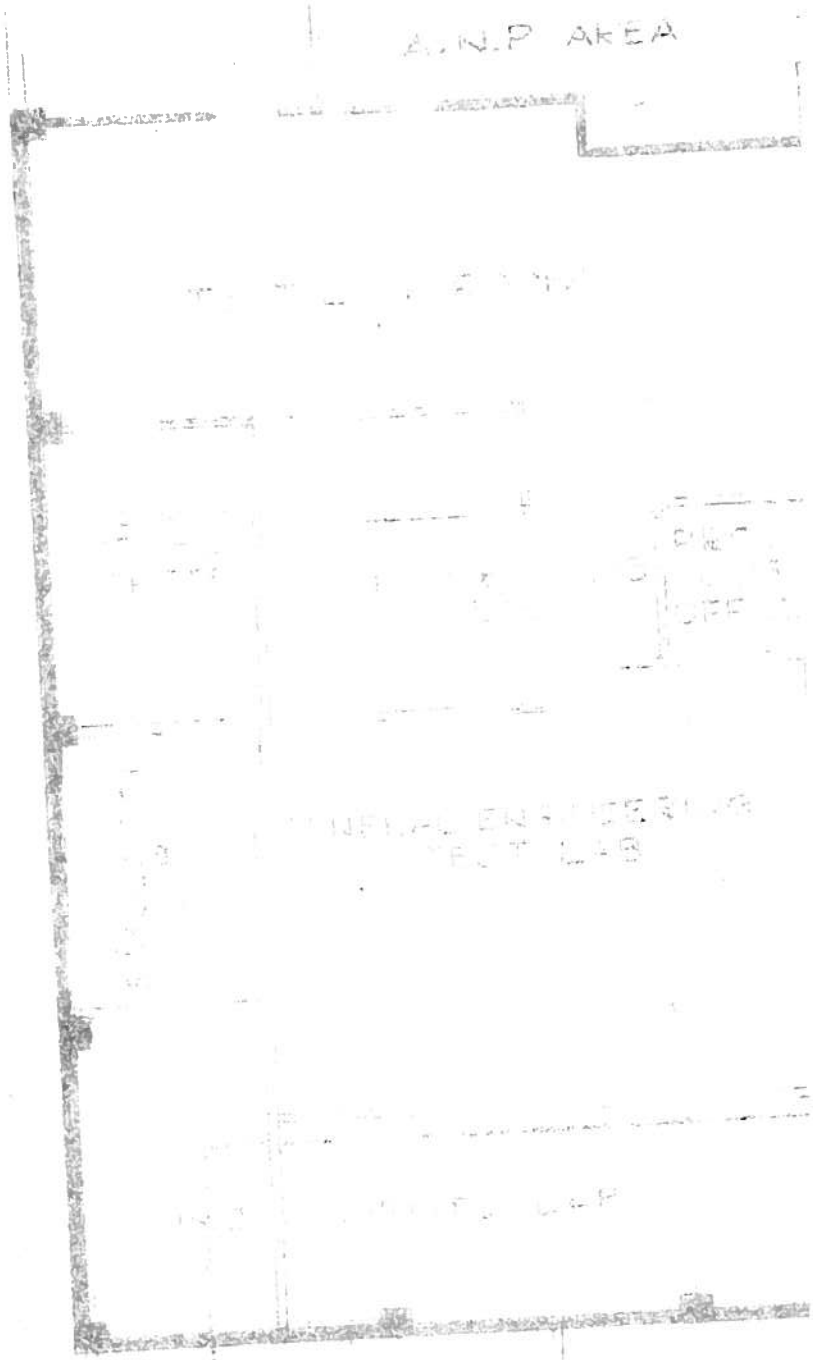
DOCKET NO. 10-58

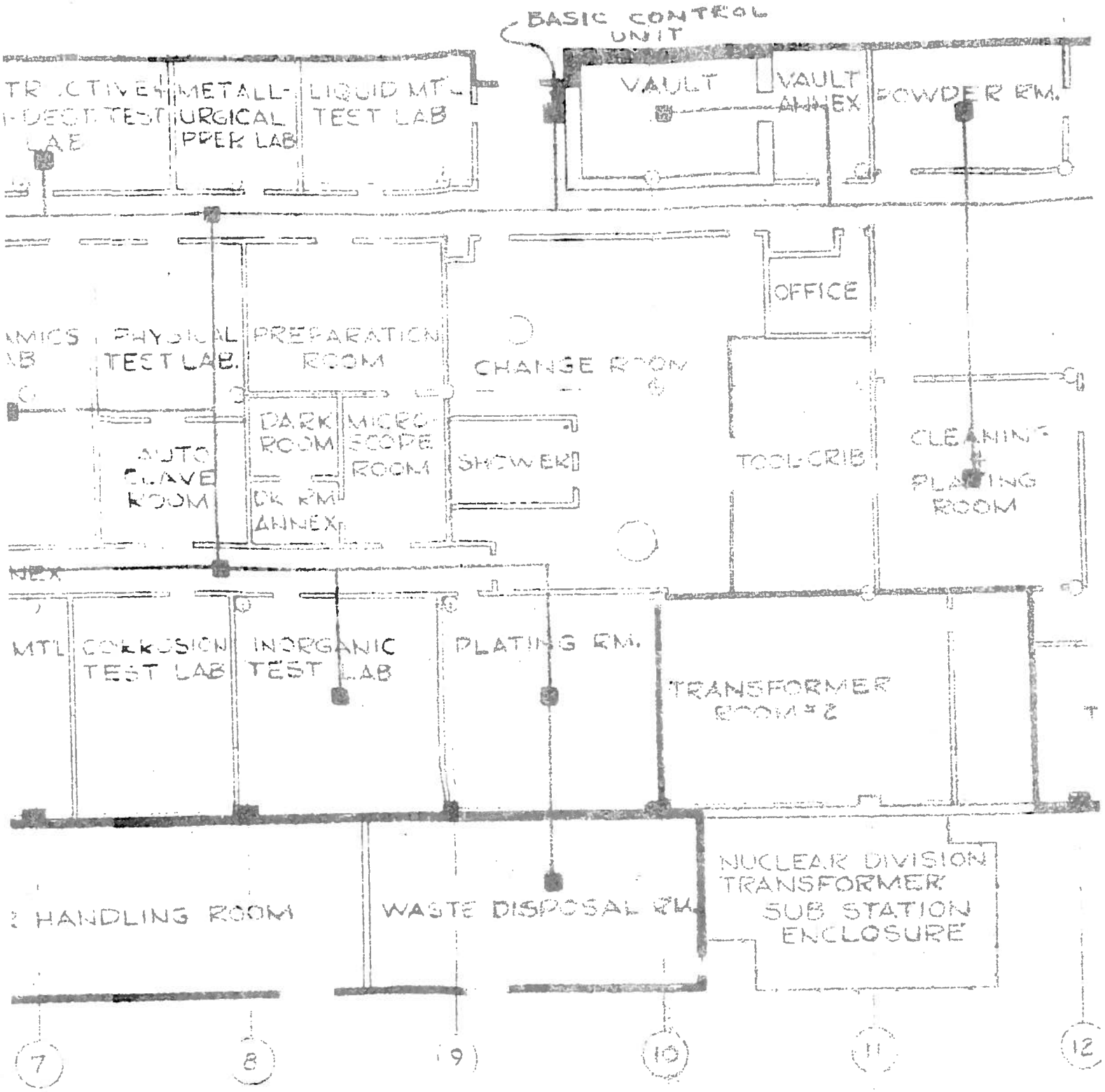


LEGEND

- PERMANENT
- RECEPTACLES FOR ADDITIONS

DOCKETED USAEC Division of Licensing & Regulation DEC 16 1958 Docket Officer


A.N.P AREA



LAYOUT & DETECTOR LOCATION FOR DIATION MONITOR SYSTEM

NUCLEAR AREAS

40-3296
LRL:RD

JAN 7 1959

The Martin Company
Baltimore 3, Maryland

Attention: Mr. Rose G. Macauley
Licensing Officer, Nuclear Division

Gentlemen:

This is in reply to your letter of December 1, 1958 regarding the procedures you have established in the handling and processing of alloys of magnesium-thorium containing 4% or less thorium.

Your proposed procedures as you have outlined them appear to be satisfactory from a radiation safety standpoint under existing AEC requirements for the handling of 4% thorium-magnesium alloy.

Very truly yours,

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

A/34

40-3296
LRL:ND

JAN 7 1959

The Martin Company
Baltimore 3, Maryland

Attention: Mr. Ross G. Macauley
Licensing Officer, Nuclear Division

Gentlemen:

This is in reply to your letter of December 1, 1958 regarding the procedures you have established in the handling and processing of alloys of magnesium-thorium containing 4% or less thorium.

Your proposed procedures as you have outlined them appear to be satisfactory from a radiation safety standpoint under existing AEC requirements for the handling of 4% thorium-magnesium alloy.

Very truly yours,

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

OFFICE ▶	LRL	LRL	INS	OGC		
SURNAME ▶	NDoulos/cw	JCDelaney	CCP	TBC		
DATE ▶	12-31-58	~~12-31-58~~ 1/7/59	1-5-59	1/7/59		

AEC 318 (Rev. 9-53) GOVERNMENT PRINTING OFFICE 16—62701-3

THE MARTIN COMPANY

Baltimore 3, Maryland

January 16, 1959

DOCKET NO. 40-3296

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. J. C. Delaney
Chief, Materials Section
Licensing Branch

Gentlemen:

I wish to acknowledge and thank you for your letter of January 7, 1959 relative to our procedures for handling and processing alloys of thorium-magnesium containing 4% or less thorium. While your letter very adequately covers the radiation safety aspect, we still have some concern with respect to the AEC's requirements for the maintenance of records.

As you know, the source material licenses covering these alloys require the licensee to maintain records of inventories and all receipts and transfers of refined source material. Insofar as I am aware, the AEC has not defined, with any greater particularity, the character of the records which are required for such material. In pursuance of the general requirement, our procedures do, of course, provide for the maintenance of strict records of the quantities of alloy procured and of the quantities disposed of as waste. At the same time we have, as explained in my letter to you dated December 1, 1958, found that it would be an extremely difficult and impractical task for us to maintain records of the quantities actually transferred in the form of fabricated items. However, we believe, and trust that you will agree, that such transfer records should not be regarded as essential, in our particular circumstances, because of the fact that all items fabricated by this Company which contain thorium-magnesium alloys are ultimately delivered to agencies of the Government.

In order that the matter may be clarified, I shall appreciate it if you will review the procedures previously submitted and let me know whether they satisfactorily meet the records requirements presently imposed by the applicable source material licenses. Please let me know if any additional information is desired.

DOCKETED
JAN 19 1959
Division of Licensing & Regulations
Docket Officer

Very truly yours,

THE MARTIN COMPANY

A135

RGM:hp

Ross G. Macaulay - Licensing Officer
Nuclear Division

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

DATE: Feb. 20, 1959

TO : Lyall Johnson, Chief, Licensing Branch
Division of Licensing and Regulation

FROM : Lester R. Rogers, Chief, Radiation Safety Branch
Division of Licensing and Regulation L.R. Rogers

SUBJECT: THE MARTIN COMPANY - DOCKET NO. 40-3296

The subject company has requested in their letter of January 16 that we review their accountability procedures for 4% thorium-magnesium alloy to determine if they meet the requirements of the condition of their source material license regarding record-keeping.

The Standard Procedures #44.43 dated November 17, 1958 appear to meet the requirements of the condition of license No. C-4283 regarding the maintenance of records of inventories, receipts, and transfer of refined source material. They had previously been advised that these procedures were satisfactory from the radiation safety standpoint. (Letter January 7, 1959).

As long as the company has records of receipt, and scrap disposal of thorium alloy, and the remainder is fabricated into missile components, records of the amount of thorium in each part and the total number of parts manufactured should not be required by the AEC. We would suggest, however, that records of transfer to various agencies be kept. It would seem as if this would be done in the normal course of business. Since only 4% alloy in fabricated parts is involved, a record of the names of the agencies to whom such transfers are made will probably be sufficient.

A/36

40-3896
LRL:ND

MAR 1 1 1959

The Martin Company
Baltimore 3, Maryland

Attention: Mr. Ross G. Macaulay

Gentlemen:

This is in reply to your letter of January 16, 1959.

The procedures outlined in your letter of December 1, 1958, regarding source material record requirements, appear to meet the requirements of the conditions of your license No. C-4263. We would like to suggest, however, that records of transfer to various agencies be kept.

Distribution:
Document room
Formal & Suppl.
Br & Div rf's

Very truly yours,

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

A/57

OFFICE ▶	LRL	LRL	Ias:		OGC	INS
SURNAME ▶	NDoulos/cw	JCDelaney	CCP		TBC	
DATE ▶	3-9-59	3-10-59	3-10-59		3/10/59	

Form AEC-318 (Rev. 9-53)

40-3296
LGL:MD

MAR 1 1 1959

The Martin Company
Baltimore 3, Maryland

Attention: Mr. Ross G. Macauley

Gentlemen:

This is in reply to your letter of January 16, 1959.

The procedures outlined in your letter of December 1, 1958, regarding source material record requirements, appear to meet the requirements of the conditions of your license No. [redacted]. We would like to suggest, however, that records of transfer to various agencies be kept.

Very truly yours,

J. O. Delaney
Chief, Nuclear Materials [redacted]
Licensing Branch
Division of Licensing & Regulation

OPTIONAL FORM NO. 10

UNITED STATES GOVERNMENT

Memorandum

TO Lyall Johnson, Chief
Licensing Branch

DATE: March 16, 1960

FROM Charles D. Luke
Hazards Evaluation Branch

SUBJECT: MARTIN CO.

Re: February 9, 1960 application

The subject application included a revised manual. It is, of course, time consuming to review such a manual, when only a few changes from previously approved procedures are involved.

I talked with Mr. Fred Perella of Martin Co. here at Headquarters last week, and Mr. Lane and I spoke with Mr. Wm. Wachtel of Martin Co. by telephone today. Mr. Wachtel agreed to submit a list of specific changes from the previously approved procedures.

We will review these when received. No further action on Docket 70-58 is necessary at this time, and it is returned herewith.

Regi

A138

THE MARTIN COMPANY

Baltimore 3, Maryland

August 25, 1959

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

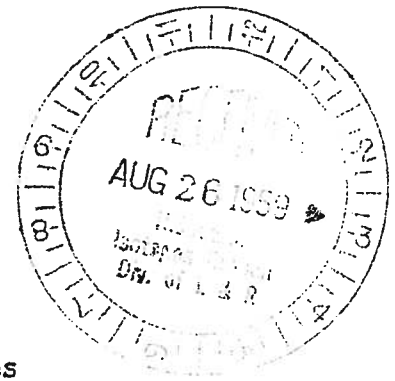
It is requested that an appropriate amendment be issued to Byproduct Material License No. 19-1398-10A60 which will permit The Martin Company to transfer, own, and possess up to a maximum of 15 grams of irradiated Hastelloy C, in accordance with the provisions of Part 30 of Title 10 of the Code of Federal Regulations. In support of this request, we have completed and I am enclosing herewith three copies of AEC Form-313.

Please give me a call at MUrdock 7-3800, extension 595, if you desire any further information with respect to the enclosed application for amendment.

Very truly yours,

THE MARTIN COMPANY

Ross G. Macaulay
Licensing Officer
Nuclear Division



RGM:hp
Enclosures

A/39

20859

THE MARTIN COMPANY

Baltimore 3, Maryland

September 3, 1959

DOCKET NO. 40-3296

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. J. C. Delaney
Chief, Materials Section
Licensing Branch

Gentlemen:

Pursuant to the provisions of Section 40.26 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40, The Martin Company hereby requests that Source Material License No. C-4283, dated September 15, 1958, be extended for a period of one year from September 30, 1959 to September 30, 1960.

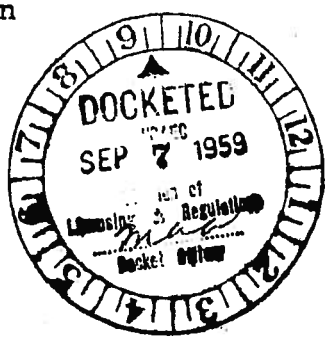
We anticipate that we shall have to procure an additional 25,000 pounds of HK31A alloy during the one year period ending September 30, 1960. Accordingly, it is requested that said license be further revised to increase the amount of Thorium-magnesium alloy (containing not more than 4% Thorium) from 50,000 pounds to 75,000 pounds.

Very truly yours,

THE MARTIN COMPANY

Ross G. Macaulay
Licensing Officer
Nuclear Division

RGM:hp



A/40

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:
40-3296
DLM:MD

SOURCE MATERIAL LICENSE

License No. C-4283

Dated: SEP 7 1959

The Martin Company
Baltimore 3
Maryland

Attention: Mr. Ross G. Macaulay

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to , at the above stated location, seventy-five thousand (75,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire September 30, 1960.

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

A/41

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:
40-3296

SOURCE MATERIAL LICENSE

License No. [illegible]

Dated: [illegible] 1959

The Martin Company
Baltimore 3
Maryland

Attention: Mr. [illegible]

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to, at the above stated location, seventy-five thousand (75,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire December 30, 1960.

CC: Docket Officer
Document Room
S/H
Insp. w/c letter 9/3/59

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

Dictator [illegible]

Approved [illegible]

L&R:IB:JMB (19-1398-19)

September 14, 1959

Mr. R. G. Macaulay
Licensing Officer
The Martin Company
Baltimore 3, Maryland

Dear Mr. Macaulay:

We are enclosing License No. 19-1398-19 in response to your application of August 25, 1959.

We have not amended License No. 19-1398-10 to include this material as requested by your letter of August 25, 1959, because of our current policy of licensing the radiography use of byproduct material separate from other uses of by-product material.

Very truly yours,

Robert E. Brinkman
Senior Licensing Reviewer
Isotopes Branch
Division of Licensing and Regulation

Enclosures:
1. LN 19-1398-19
2. 10-CFR-20 & 30
3. AEC-313 w/instructions

A|42

OFFICE ▶	L&R:IB	L&R:IB				
SURNAME ▶	Bell:mog	Brinkman				
DATE ▶	9/14/59	9/15/59				

Form AEC-318 (Rev. 9-53)

U.S. GOVERNMENT PRINTING OFFICE 16—62761-3

Amend 1
19-1398-19

THE MARTIN COMPANY

Baltimore 3, Maryland
January 29, 1960
Mail No. W-756
Nuclear Division

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that License No. 19-1398-10 heretofore issued to The Martin Company be amended to extend the expiration date and to reflect the changes noted in the enclosed form AEC-313.

Since License No. 19-1398-10 expires on January 31, 1960, it is requested that you extend the validity of the license for a period sufficient to allow your evaluation of the enclosed application. It is also requested that License No. 19-1398-19 be cancelled since the work involved in that license is covered in the enclosed application.

Enclosed, in triplicate, are AEC Forms 313 detailing the changes requested. Any additional information will be submitted upon request. You can contact me at MUrdock 7-3800 - Extension 8281 or 9668.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert (RHE)

J. V. Loppert
Licensing Officer

JVL/agc
Enclosures

RECEIVED
FEB 1 - 1960
U.S.A.E.C.
Isotopes Branch
Div. of L & R

A/43
23795

Form AEC-313 (5-58)

'OMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved. Budget Bureau No. 38-R027.3.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

The Martin Company
Nuclear Division
Baltimore 3, Maryland

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

Radioisotope Laboratory, "D" Bldg.
Middle River, Maryland
(Radiograph Room)

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Materials Service Unit,
Nuclear Components Department

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

19-1398-10

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

C. E. Hollens

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Richard H. Boutelle
(Resume previously submitted)

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*	(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*
A. Ir^{192}	Sealed sources, Technical Operations Inc., Model A424 - 62 curies max., 31 curies/source max.
B. Sr^{90}-Yt^{90}	Sealed sources, Tracerlab model RA-2 150 millicuries max. Tracerlab model S-1 - 150 millicuries/source max.
C. Co^{60}	Sealed sources, Technical Operations, Inc., Model A-424 10 curies max., 5 curies/source max.
D. Tm^{170}	Sealed Sources, Technical Operations, Inc., Type A capsules, 120 curies max., 60 curies/source max.
E. Any byproduct material between Atomic #3 and 83 inclusive.	Irradiated metal samples, 2000 millicuries max. total of byproduct material between Atomic Nos. 3 & 83 inclusive.

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

(A) Ir^{192} to be used in Technical Operations Model 412 projector for industrial radiography at the Martin Plant, Middle River; (B) Sr^{90}-Yt^{90} to be used for instrument calibration and for research and development programs in the radioisotope laboratory. (C) Co^{60} to be used in Technical Operations Model 402 projector for industrial radiography at the Martin Plant, Middle River; (D) Tm^{170} to be used for instrument calibration and for research and development programs in the radioisotope laboratory. (E) Atmoic Nos. 3 & 83 inclusive - experimental tool wear studies and sea water corrosion tests conducted in the radioisotope lab.

DUPLICATED 37
FOR DIV. OF INSP.

(Continued on reverse side)

Question No. 10 - Radiation Detection Instruments

Type of Instrument	No. Avail.	Radiation Detected	Sensitivity Range	Window Thickness	Use
GM Survey, Nuclear Chicago Md 2612	6	Beta, gamma	0-60,000 c/m 0-20 mr/hr	35 mg/cm^2	Monitoring Surveying
Gas Flow Proportional Counter NMC Md PC-1A	2	Alpha, Beta-gamma	0.5-1,000,000 d/m; 100-1,000,000 d/m	gas chamber	Measuring

DUPLICATED
FOR DIV OF INSP

23795

Question No. 11 - Method, Frequency, and Standards used in calibrating instruments listed above (Question 10)

Calibration of Health Physics survey instruments is performed in the Calibration Facility located in the Waste Storage Room outside the Nuclear Manufacturing and Engineering Laboratories at Plant No. 1. Each instrument is calibrated once a month. Repaired instruments are calibrated when they are returned to Health Physics.

The sources are located in one corner of the Waste Room behind a four foot high, eight-inch thick, cement block wall. A one curie Co-60 source contained in a lead-steel shielded container is used for calibrating "Cutie-Pie" and similar type instruments.

The source is calibrated so that at given distances the dose rate in mr/hr is known. The instrument can be remotely placed at a given distance from the source and calibrated to read the field of radiation at that distance. Where possible, each instrument is calibrated on each scale or range setting.

Smaller sources include an eight millicurie Co-60 source and a one millicurie Ra-226 source. These are also stored behind the shielding wall and used to calibrate low range (up to 20 mr/hr) instruments.

Neutron survey instruments are calibrated by using a five curie Po-Be neutron source of known flux (determined by foil activation) and setting the instrument to read the correct level.

Counting room instruments are calibrated by using standard calibrated sources of uranium alpha and beta-gamma. The first step is construction of a "plateau" to determine correct operating voltages. The counter efficiency is then determined by comparing the counter countrate with that of the standard source.

23705

Question No. 12 - Film Badges, Dosimeters, and Bio-Assay Procedures Used.

A. General:

All personnel working with radioactive materials permanently or temporarily, are required to wear a film badge and two pocket chambers sensitive to beta-gamma radiation.

Personnel working in areas where fast and/or thermal neutron radiation is prevalent are required to wear a film badge sensitive to beta, gamma and fast neutrons and pocket chambers sensitive to thermal neutrons.

Film badges are changed either weekly, biweekly, or each 13 weeks depending upon the radiation levels in the work areas. Pocket chambers are changed and read daily. Self-reading dosimeters are also available and used under the discretion of Health Physics.

A film badge service is contracted on a yearly basis to supply and process film and badges for the program. The present supplier is Health Physics Services, Baltimore, Maryland

B. Dosimetry Information:

Special film badge changes are made by Health Physics when any of the following conditions exist:

(1) Both pocket chambers off scale.

(2) Exposure in excess of 100 mr/wk is recorded from daily pocket chamber readings.

(3) Inexplicable exposure in excess of 50 mr per day is recorded.

Permanent records are maintained of all film badge and pocket chamber results.

The upper limit of dosimetry response is as follows:

FILM BADGES	UPPER LIMIT (rem)
Gamma	1000
Beta	500
Neutrons	100
POCKET CHAMBERS	
Gamma	200 mr
Neutrons	200 mrem

23735

(Question No. 12 - Cont'd.)

C. Bioassay

All facility personnel are required to submit bioassay samples at periodic intervals. In the case of unusual incidents, including exposure to airborne concentrations of radioactive materials exceeding the maximum permissible concentrations for personnel without respiratory protection, or other suspected ingestion of radioactive material, special samples are collected from all personnel involved.

All urinalysis results are filed as permanent records in the Health Physics office and are available to responsible persons upon request.

23795

Question No. 14 - Radiation Protection Program

A. Health Physics Responsibilities:

1. Plans and administers the radiation protection program to provide adequate protection to Company and to personnel from ionizing radiation.

2. The inspection and monitoring, with the aid of various detection instruments, of personnel, machinery, furniture, ventilating equipment, gamma and neutron irradiation test facilities, radioisotopic laboratories, etc., to detect and prevent spread of radioactivity, measure levels of radiation or concentrations of radioactive materials present.

3. The review and approval of all working areas and facilities.

4. The evaluation of radiation hazard control methods for adequacy and compliance with recommendations of the National Committee on Radiation Hazards and pertinent government regulations.

5. The promotion of the Health Physics program through the proper indoctrination and training of personnel engaged in handling or working with materials or equipment that emit ionizing radiation.

6. Determines radiation monitoring equipment requirements in all areas.

7. The internal control and enforcement of licensing regulations pertaining to receiving, possession, use, transfer and disposal of nuclear source, special nuclear, or by-product materials.

8. The investigation of accidents and personnel radiation exposures to determine the cause and recommend corrective action to be taken to eliminate future occurrences.

9. The continual monitoring of personnel engaged in handling or working with radioactive materials and x-ray equipment for compliance with recommended procedures and regulations of good housekeeping and work habits.

10. The issuance of appropriate personnel monitoring devices (film badges, pocket chambers, etc.), scheduling of pre-exposure and follow-up physical examination, and the establishment and maintenance of detailed employee records of cumulative doses of radiation exposure, biological assays, laboratory reports, etc., to form the basis of permanent Company records and to conform to Atomic Energy Commission regulations.

11. The conducting of laboratory tests of environmental sample analyses and biological assays to determine the quantity of radioactivity disdharged to the environs and the quantity received by the individual through inhalation, ingestion, wounds, etc.

22795

Question 14 - Cont'd.

12. Collaborates with representatives of the various divisions and departments concerned on reactor site surveys, design of facilities, power reactors and associated control systems for hazard evaluation and control to assure protection of personnel and facilities.

13. Maintains liaison with representatives of the Atomic Energy Commission, National Committee on Radiation Hazards, Federal, State and Local government health and welfare agencies, and various divisions and departments, to resolve areas of common health physics interest.

14. Prepares and revises as necessary Health Physics bulletins outlining procedures to be followed to assure compliance with all pertinent National Committee or radiation hazards recommendations and government regulations.

15. The calibration of all Health Physics monitoring instruments where radiation sources must be used to perform the calibration.

B. Leak Testing

Leak tests are performed on all sealed sources when they are received and at least once every three months thereafter. The source, or source shield depending upon the strength of the source, is wiped with a filter paper disc. The disc is then counted in the proper radiation counter to detect and measure any leakage of alpha or beta-gamma contamination.

Radium sources are leak tested by wrapping the source in cotton for approximately three days, removing the cotton and counting it with a beta-gamma detector.

Leak tests are performed by Health Physics technicians who have had three years of on-the-job Health Physics training with The Martin Company.

Maintenance, service and repairs to all sources are performed by the source supplier.

C. See also supplementaty report MND 2109.

23795

Question No. 15 - Waste Disposal

Solid waste is currently stored in 55 gallon steel drums awaiting disposal through an AEC approved, licensed waste disposal service. A record is maintained by Health Physics concerning the contents, radiation and number of each drum.

Liquid waste is monitored to assure that the levels of radioactivity are below the tolerances established in Title 10, Part 20 Code of Federal Regulations for disposal into sanitary sewers. All liquid waste with activity above those levels is evaporated and concentrated for eventual solid waste disposal through AEC approved and licensed waste disposal services.

23795

70-58
Filed

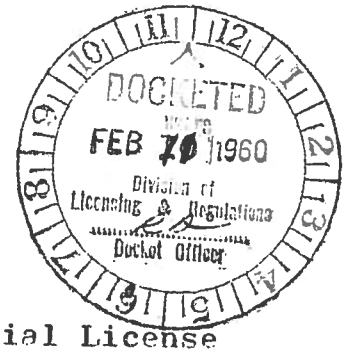
THE MARTIN COMPANY

Baltimore 3, Maryland

Nuclear Division
Mail Number W-722
February 9, 1960

Refer to: NMC-5

Director
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D. C.



Attention: Mr. Lvall Johnson
Chief, Licensing Branch

Gentlemen:

Reference is made to our Special Nuclear Material License SNM-53 as amended. We desire to further amend this license in order that we can (1) proceed to fabricate an additional element type not previously described and (2) receive and use a Plutonium-Beryllium neutron source in connection with our critical facility experiments.

Accordingly, we wish to add to Appendix B of our License application the process description and SN material flow chart, Attachment (1).

The Plutonium-Beryllium source will be used to supply neutrons for starting the ERDL critical assembly and it is anticipated that it will be kept by The Martin Company for an indefinite period of time for use in other critical experiments. For details on the Martin Critical Facility see reports MND-1110, 1111, 1112 and MND-E-1157.

The source consists of Beryllium intimately mixed with Plutonium and seal welded in an inner tantalum capsule. This inner capsule is in turn welded in an outer capsule of stainless steel whose dimensions are 1.55 inch diameter by 3.4 inch length. The source contains 160 grams of Plutonium isotope 239. Reference the Mound Laboratory catalog of Polonium and Plutonium sources, November 1, 1959, pages 24 through 26.

The source will be stored in the original shipping container and kept in a controlled area until it is installed in the source shield in the critical assembly tank. The source

A/44

will be raised to operating position for start-up of the assembly. Swipe tests will be performed no less frequently than once once every three months. The Martin Company has been using a Polonium-Beryllium Source as covered under License Number 19-1398-1.

Since there have been revisions in our facilities and handling of SNM materials we are enclosing the latest revised copy of our Criticality Manual, MND-1063, revised as of February 1, 1960. Please return our Criticality Manual that you now have in your possession.

I certify that the statements made in this letter and the referenced enclosures are true, complete and correct to the best of my knowledge and belief, and are made in good faith.

Very truly yours,

THE MARTIN COMPANY

J. V. Lonnert
Operations Manager
Nuclear Division

70-58
File Cy.

ALUMINUM CLAD [illegible]-ZIRCONIUM ALLOY FUEL PLATE UNIT ELEMENTS
(Part VI-c)

A predetermined quantity of uranium metal (enrichment range 5 to 20 weight percent) and [illegible] are melted in Work Area 33. A billet is then formed and hot rolled (Work Area 17) into a billet approximately 1/4 inch thick. Fuel cores are punched (Work Area 35) from the billet, and identified. The fuel cores are then reassembled into cladding (picture frames) and hot rolled to a reduction of about 90 percent. Aluminum cladding sheets are tack welded on each side of the pre-rolled core and the elements are reduced to final size causing bonding to occur between the aluminum cladding and the uranium-aluminum core. Radiography, non-destructive testing and blister-annealing are done in Work Areas 23, 25 and 27 respectively. The fuel plates are assembled into fuel elements in Work Area 41.

Attachment (1)

DOCKETED
USAEC
Division of
Licensing & Regulation
JUL 11 1960
Docket Officer



FEB 18 1960

W. A. Strauser, Deputy Director
Division of Classification

Lyall Johnson, Chief, Licensing Branch
Division of Licensing and Regulation

CLASSIFICATION REVIEW OF SNM APPLICATIONS
THE MARTIN CO. - DOCKET NO. 70-58
NUCLEAR MATERIALS AND EQUIPMENT CORP. - DOCKET NO. 70-364

Attached are the following documents which we propose to place in the AEC Public Document Room in accordance with established procedures:

Martin Company letter dated 2/9/60 with Attachment 1 (process description and SNM flow chart) and Criticality Precautions Manual MND-1063, revised 2/1/60.

Nuclear Materials and Equipment Corp. letter dated 2/8/60 with enclosed Feasibility Report for NUMEC Plutonium Facility dated 2/8/60 (NUMEC P-11)

Please review the above letters and reports, and if no Restricted Data are contained therein, indicate this determination in the space provided below. One copy of this memorandum may be retained for your file.

In the event the documents do contain Restricted Data, please return to us with your memorandum indicating the specific references which include Restricted Data.

If desired, you may retain the material furnished by NUMEC, but it is necessary that the documents from The Martin Company be returned for our files.

Enclosures:
Martin Co. ltr 2/9/60 w/Attachment 1 & Manual MND-1063, rev. 2/1/60
NUMEC ltr 2/8/60 w/Feasibility Report dtd 2/8/60 (NUMEC P-11)

* * * * * * * * * * * * * * * *

The letters and documents listed above have been reviewed and it has been determined that they do not contain any Restricted Data:

A/45

	Division of Classification					
OFFICE ▶	LRL	LRL		Date		
SURNAME ▶	Steele:hs	L Johnson				
DATE ▶	2/18/60	2/18/60				

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62701-3

C-133

INCOMING TELEGRAM

U S ATOMIC ENERGY COMM.
TWX UNIT

1960 MAR 3 PM 2 44

DOCKET NO. 70-58

File Cy.

ACA008 (242 PME MAR3 60) PB400 P

MAA009 DL PD WUX MA BALTIMORE MD 3 230PME

US ATOMIC ENERGY COMMISSION, ATTN J DULANEY

WASHDC

WE WOULD APPRECIATE EARLIEST POSSIBLE APPROVAL OF OUR SNM-53 LICENSE AMENDMENT FOR FUEL ELEMENT FABRICATION AND PLUTONIUM BERLYIUM SOURCE IF POSSIBLE PLEASE EXPIDITE SOURCE APPROVAL AHEAD OF COMPLETE AMENDMENT

MARTIN CO W WACHTL W722 3/3 1330E

SNM-53 W722 3/3 1330E

(31).

DOCKETED
USAEC
Division of
Licensing & Regulation
MAR 4 1960
Docket Officer

INCOMING TELEGRAM

A/46

TWX INCOMING

1960 MAR 11 PM

U.S. ATOMIC ENERGY
TWX UNIT

20-58

U.S. ATOMIC ENERGY COMMISSION ATTN... MR. L. JOHNSON

WASHINGTON 25, D.C.

WE URGENTLY REQUIRE APPROVAL TO OUR PROPOSED AMENDMENT DATED 2/5/60 TO MARTIN LICENSE SNM-5. THIS AMENDMENT EXTENDS OUR LICENSE TO COVER CERTAIN SHOP MODIFICATIONS AND ALSO THE FABRICATION OF URANIUM-ALUMINUM ALLOY TYPE FUEL ELEMENTS. WE CURRENTLY HAVE A CONTRACT TO SUPPLY FUEL ELEMENTS BY MAY 4/ 1960 AND ARE TWO WEEKS BEHIND SCHEDULE WAITING FOR APPROVAL OF THE AMENDMENT. ANY HELP IN EXPEDITING THIS APPROVAL WILL BE APPRECIATED.

W.W. WACHTL W-722 MARTIN CO 3/11 0945Z

CORRECTION... FIFTH LINE SHUD READ...

CURRETLY HAVE A CONTRACT TO SUPPLY FULL ELEMENTS BY MAY 4 1960 AND

END GA PLS

REC NEL 1119112

TWX INCOMING

A/47

70-58
File Cy

THE MARTIN COMPANY

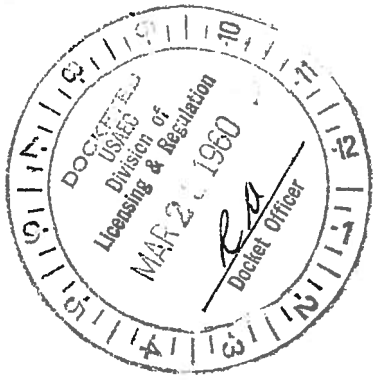
Baltimore 3, Maryland

Mail Number W-722
March 18, 1960

Refer to: NMC-107

No cy. to R. Doc. Rm.
Per Mr. Lane (RA)

DOCKETED USAEC Division of Licensing & Regulation MAR 2 1960 Docket Officer



Director
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D. C.

Attention: Mr. Lyall Johnson
Chief, Licensing Branch

Reference: (a) Amendment dated February 9, 1960 to License SNM-53
(b) Criticality Precautions Manual, revised February 1, 1960

Gentlemen:

In order to assist you in reviewing our Amendment, Reference (a), we are submitting the following information which outlines differences in the Criticality Precautions Manual in your possession and the revised manual, Reference (b).

2.002.0 Approach to Problem

The procedure for making additions to the manual is clarified. Work description and allowable limits for each fuel element process and associated work areas will be prepared as Appendicies to the basic manual.

2.003.0 Enforcement

Responsibility for enforcing criticality procedures now lies with the accountable person, i.e. Accountability Representative, Facility Supervisor or designee.

2.004.0 Means of Control

Paragraphs 2.004.2 and 2.004.3 are revised in the referenced manual.

A/48

2.005.0 Emergency Procedures

Health Physics emergency procedures have been removed from the referenced manual, however, Health Physics procedures outlined in the original manual are still applicable.

2.006.0 Procedures for Fuel Element Development and Manufacture

Description of Facilities - Current manufacturing and engineering shop arrangements and criticality areas are presented in Figures 1 and 2 in the referenced manual.

Allowable Limits for Work Areas - Additional material forms have been added to the Table of Allowable Limits for Work Areas as follows: Ib, IIc, IId, IIe, IIf, IVb, VIc, VIIIc and XIb. Forms IX and X are redefined.

Storage Containers - Three additional types of storage containers have been added as follows: ERDL Foil Containers; PM-1 Fuel Element Containers; Inserts for ANPP Fuel Element Storage Containers.

Procedures for Special Work Areas - Work area descriptions as applicable to specific projects have been deleted. Descriptions of general procedures are given as follows in the referenced manual:

	Paragraph
Receipt and Storage	2.006.4
Issuing of Special Nuclear Material	2.006.5
Transfer of Nuclear Materials	2.006.6
Transport Lanes	2.006.7
Shipping	2.006.8
Procedures for Specific Work Areas	2.006.9

2.007.0 Procedures for Critical Experiment Facilities

Work area 105, Counting Room, was added.

2.008.0 References

Additional references given in the referenced manual include:

TID-7016 - Nuclear Safety Guide
TID-7019 - Guide to Shipment of U-235 Enriched Uranium Materials

THE MARTIN COMPANY

Baltimore 3, Maryland

Refer to: NMC-107 3 March 18, 1960

2.009.0 Procedures for Calculating Maximum Allowable Fissionable Material Masses

Appendix A in the original manual is now labeled paragraph 2.009.0. There are no changes in this section.

If there are any further questions do not hesitate to contact us.

Very truly yours,

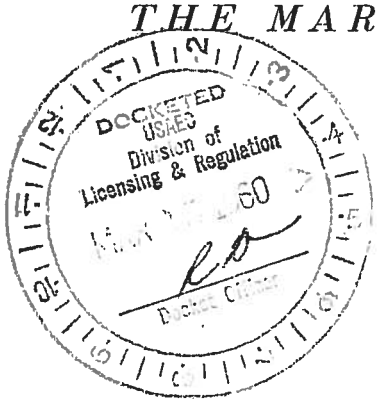
THE MARTIN COMPANY

W. W. Wachtl

William W. Wachtl
Chairman
Nuclear Materials Control
Committee

70-58
Filed.

THE MARTIN COMPANY



Baltimore 3, Maryland

Nuclear Division
Mail Number W-722
March 23, 1960

Refer to: NMC-109

cy this request sent Inspection 3/30/60

Director
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D. C.

Reference: Our letter NMC-5 dated February 9, 1960

Gentlemen:

In the referenced letter we applied for an additional amendment to our Special Nuclear Material License, SNM-53. Due to certain misunderstandings which have held up approval of this amendment we request that the referenced application be replaced by this letter.

We desire to amend License SNM-53 in order that we can (1) proceed to fabricate uranium-aluminum alloy fuel elements and (2) receive and use a Plutonium-Beryllium neutron source in connection with our critical facility experiments.

Since our License as it currently stands does not cover fabrication of uranium-aluminum alloy fuel elements, we are enclosing a report, MND-2330, which covers the Nuclear and Health Safety aspects of this fabrication.

The Plutonium-Beryllium source will be used to supply neutrons for starting the ERDL critical assembly and it is anticipated that it will be kept by The Martin Company for an indefinite period of time for use in other critical experiments. For details on the Martin Critical Facility see reports MND-1110, 1111, 1112 and MND-E-1157.

The source consists of Beryllium intimately mixed with Plutonium and seal welded in an inner tantalum capsule. This inner capsule is in turn welded in an outer capsule of stainless steel whose dimensions are 1.55 inch diameter by 3.4 inch length. The source contains 160 grams of Plutonium isotope 239. Reference the Mound Laboratory catalog of Polonium and Plutonium sources, November 1, 1959, pages 24 through 26.

A/49

THE MARTIN COMPANY

Baltimore 3, Maryland

The source will be stored in the original shipping container and kept in a controlled area until it is installed in the source shield in the critical assembly tank. The source will be raised to operating position for start-up of the assembly. Swipe tests will be performed no less frequently than once every three months. The Martin Company has been using a Polonium-Beryllium Source as covered under License Number 19-1398-1.

I certify that the statements made in this letter and the referenced enclosures are true, complete and correct to the best of my knowledge and belief, and are made in good faith.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer
Nuclear Division

DOCKET No. 70-58
File cy.
(Trans. w/Lt. 3-23-6

LICENSE REPORT
MNP 2330

NUCLEAR AND HEALTH SAFETY
CONTROLS FOR FABRICATION OF
URANIUM-ALUMINUM FUEL PLATES

March 23, 1960



DOCKETED
USAEC
Division of
Licensing & Regulation
1960
Docket Officer

INTRODUCTION

This report outlines nuclear material control requirements for the fabrication of uranium-aluminum alloy fuel elements as described below. Two cores consisting of 46 fuel elements 11 fuel plates each, are planned to be fabricated. The total feed requirement is approximately nine kilograms of 93 % enriched uranium metal. The process involves alloying uranium and aluminum, hot rolling the ingots to one-quarter inch slabs and punching fuel core slugs. These core slugs are then pressed into aluminum picture frames and hot rolled. Cladding of 1100 aluminum will then be applied, followed by further hot and cold rolling to achieve bonding. Each fuel plate will contain 13.2 ± 1.0 grams of U-235. The anticipated final scrap consists of uranium aluminum alloy and will include approximately 10% of the feed material.

The table below shows the form of uranium to be utilized in the process and the allowable limits. These limits are based upon the theoretical limits for the form calculated using the optimum mixture of water and fuel bearing aggregate and based on Appendix A of NMD-1053. These limits are conservative with respect to recommendations presented in TID-7016 (Nuclear Safety Guide) and TID-7029 (Guide to Shipment of U 235 Enriched Uranium Materials).

Form	Limits U-235
(1) Uranium metal in fine cuttings, dust, etc.	500 gms
(2) Uranium-Al alloys in this form	700 gms
(3) Uranium-Al alloy clad shapes in this form	500 gms
(4) Uranium in aqueous solutions	2 gms/liter

Total quantities will be kept under 350 grams

The actual quantities of U 235 used in the process below will fall under the above theoretical limits.

Reject plates will be chemically milled (etched) in 170 liters caustic solution. A maximum of 24 plates will be etched at one time (equivalent of 338 grams U-235). The plates will be under-etched leaving about 2 mils of aluminum cladding on the core. However, samples of the caustic solution will be taken after each batch to determine uranium content. Should all the plates in one batch dissolve in the caustic solution the maximum concentration would be less than two grams per liter.

Storage and shipping of scrap and finished fuel elements will be covered in a forthcoming amendment.

HEALTH PHYSICS AND INDUSTRIAL HYGIENE

A. Health Physics

The entire manufacturing operation will be conducted under the surveillance of the Health Physics Section of the Employment and Personnel Department.

Specific health physics requirements for each operation are contained in the Nuclear Materials Control Manual issued for the program. All processes will be surveyed by Health Physics Section to insure compliance with standards of 10 CFR 20 or better in all aspects.

B. Industrial Hygiene

Safety and industrial hygiene services at The Martin Company are handled by the Safety Section of the Security Division of The Martin Baltimore Division. This Section provides various safety and industrial hygiene consulting services, specified equipment and approved processes for all operations not involving radioactive material. The following precautions will be taken throughout the process in order to maintain safe working conditions for personnel involved in the manufacturing of fuel elements:

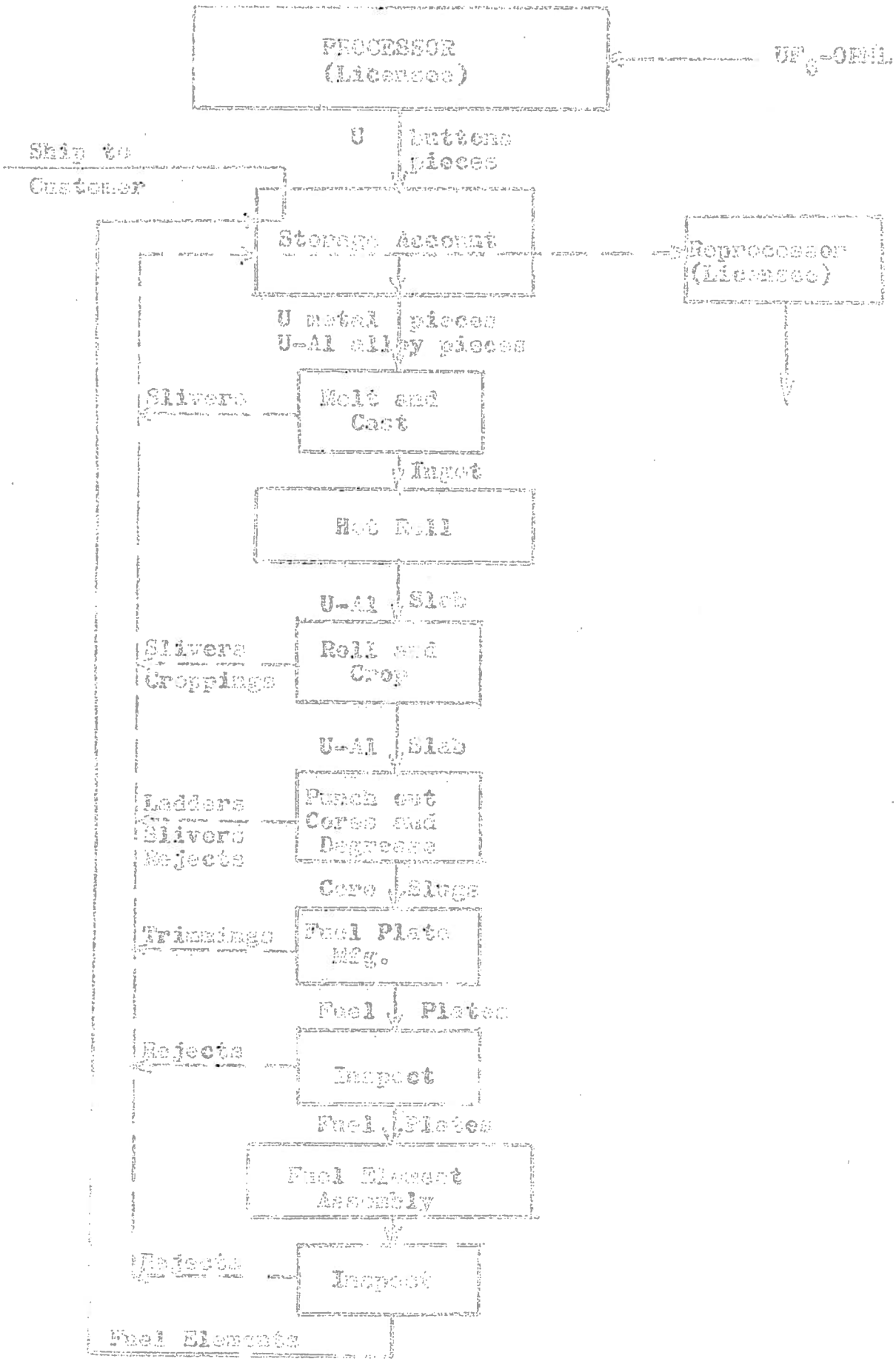
1. Ventilation will be provided for all operations involving hazardous vapors if necessary.

2. Personnel protective equipment, including acid resistant rubber gauntlets, aprons, acid type goggles and approved respirators, will be worn during all cleaning and degreasing operations. Similar equipment, with the addition of heat resistant gloves, will be worn during aluminum melting operations.

3. Processes and equipment will be evaluated prior to being put into operation to insure the incorporation of necessary safety and health precautions.

4. All operations will be surveyed routinely and any corrective action taken as needed.

S. MATERIAL & MANUFACTURING FLOW CHART



STORAGE BIRD CAGE

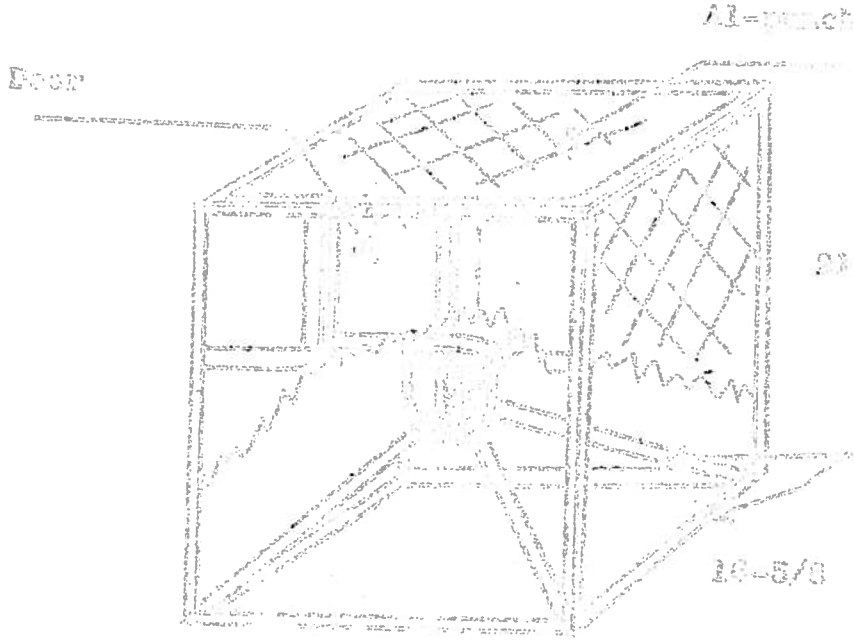


Figure 9

The birdcage for storing and transporting mealing parakeets is a skeletal box-like device, a cavity for holding the SS material. The birdcage is of welded aluminum construction. The birdcage is 16-5/8 inches by 16-5/8 inches by 21-3/8 inches high. The cavity is 4-1/4 inches in diameter by 6-3/4 inches deep and is situated so as to provide 4 inches from its outer diameter to the sides, front, rear and bottom of the birdcage and 10-1/2 inches to the top of the birdcage.

The containers for powder, border blends and broken kernels are constructed of 1/16 inch stainless steel and are smooth, spherical bottomed cylinders with flat screw type stainless steel covers capable of effecting an airtight seal. The smaller cylindrical container is 3-7/16 inches inside depth by 2 inches inside diameter with a 1 inch inside spherical radius bottom. The larger cylindrical container is 5-15/16 inches inside depth by 3-3/16 inches inside diameter with a 2.062 outside spherical radius bottom.

Containers for holding fuel tubes, fuel plates and other SS fuel materials are 12 inches by 12 inches or 12 inches by 15 inches and vary in length from 30 inches to 36 inches. These are of welded aluminum construction to facilitate handling. Handling eyelets of [illegible] are provided to hold the SS feed material, [illegible] and flat-head pullout.

Stock scrap is generated at [illegible] Company, Nuclear Materials [illegible] and [illegible] Mallinckrodt (as described [illegible]) [illegible] [illegible] [illegible]

STORAGE VAULT

As discussed in MID-1003, the storage vault is a fully enclosed room, 22 feet 6 inches long by 15 feet 9 inches wide and 11 feet high. Walls are nine inches thick and made of reinforced concrete. Ceiling and floor will be of the same construction. Sole entrance to the vault is through a 1/2 inch solid stainless steel door equipped with an approved combination lock. There are no water conduits or other service piping or drains within the vault.

The storage cartridges will be stored along three walls of the vault in a pile array. The lowest rows are placed on platforms about 12 inches above the floor to decrease the probability of flooding. Storage racks for fuel elements are located in the center of the vault. An aisle with a minimum width of 3 feet separates these racks from bird-cage array along the walls.

CORE SLAB SAMPLING PROCEDURE

SAMPLING PROCEDURE

Each slab will have 9 specimens, (numbered 1 to 9) punched in the areas shown on the attached, "Slab Sampling Plan".

Specimens 1, 2, 3, 4, 5 and 6 will be chemically analyzed individually for uranium content.

Specimens 7, 8 and 9 from the core area will be chemically analyzed together.

A permanent record of each slab as split based on above information will be maintained.

OPTIONAL FORM NO. 10

UNITED STATES GOVERNMENT

Memorandum

TO : Lyall Johnson, Chief
Licensing Branch

DATE: March 25, 1960

FROM : Clifford K. Beck, Chief
Hazards Evaluation Branch

SUBJECT: MARTIN CO.

We have reviewed the Martin application dated March 23, 1960, describing a process for the fabrication of uranium-aluminum fuel elements.

The proposed operations include receiving and storage of raw materials, melting and casting of the uranium-aluminum alloy, hot rolling, cropping and punching, final rolling and trimming of the fuel plates and assembly into fuel elements. Rejected fuel plates will be etched in caustic to remove most of the aluminum cladding, after which the material will be recycled to the melting operation. Shipping of the scrap and finished fuel elements will be covered in a subsequent amendment.

Martin proposes to insure safety from criticality by limiting the mass of U-235 in each individual work area and, in the case of solutions by limiting U-235 concentration to 2 g/liter. A maximum of 500 g U-235 will be charged to each casting operation. During subsequent processing steps the maximum U-235 handled in any operation (work area) will be limited to 700 or 800 g U-235 in the uranium-aluminum alloy. Uranium aqueous solutions will be limited to a maximum of 350 g U-235 in any batch and also the concentration will be limited to 2 g U-235/liter. During the etching process the U-235 in the caustic solution will be limited so that if all 24 plates being etched in one batch were to be completely dissolved in the caustic solution the maximum U-235 concentration would be less than 2 g/liter. Batches of dry scrap will contain a maximum of 500 g U-235.

Vault storage procedures have been previously approved in connection with the basic application. However, we have again reviewed vault dimensions and storage arrays and believe that there is no undue risk of criticality in the storage vaults.

We believe that the mass limits and concentration controls proposed by Martin are conservative. Consequently, we recommend approval of the application amendment.

A/50

C. K. Beck, Chief
Hazards Evaluation Branch

March 30, 1960

Lyall Johnson, Chief
Licensing Branch

THE MARTIN COMPANY REQUEST DATED MARCH 23, 1960 FOR AMENDMENT TO THEIR SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-53 - DOCKET NO. 70-58

SYMBOL: LRL:JJL

Please review the subject application for the adequacy of the applicant's procedures to avoid a condition of accidental criticality. The enclosed copy of the application may be retained for your files.

Enclosure:
Cy appli. dtd 3/23/60

DISTRIBUTION
Supp'l.
L&R - LRL Readings
J. J. Lane, LRL

A/51

OFFICE ▶	LRL	LRL	LRL			
SURNAME ▶	JJLane /rh	JDelaney	LJohnson			
DATE ▶	3/30/60	3/30/60	3/30/60			

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62701-3

OPTIONAL FORM NO. 10

UNITED STATES GOVERNMENT

Memorandum

TO : Files

DATE: March 30, 1960

FROM : J. J. Lane

SUBJECT: THE MARTIN COMPANY REQUEST DATED FEBRUARY 9, 1960 AS AUGMENTED MARCH 23, 1960 FOR AMENDMENT TO THEIR SPECIAL NUCLEAR MATERIAL LICENSE SNM-53 - DOCKET NO. 70-58

ANALYSIS AND FINDINGS

An analysis of the subject application for amendment to their special nuclear material license has resulted in the following observations, conclusions and findings.

The applicant requests that it be authorized to receive, possess and use one hundred sixty (160) grams of Pu-239 for the starting of their ERDL critical assembly and other critical experiments, and to fabricate uranium - aluminum fuel elements. The proposed use of the special nuclear material is for the conduct of research and development activities of the type specified in Section 31 of the Act.

Based on our review of the information furnished by the applicant, it is hereby determined that the applicant is qualified by reason of training and experience to use the special nuclear material for the purpose requested and that the applicant's proposed procedures, facilities and equipment are adequate to protect health and minimize danger to life and property. The applicant's procedures to avoid a condition of accidental criticality are adequate.

The application contains adequate corporate data.

It is, therefore, determined that the application meets the requirements of the Act and the regulations of the Commission and that the license may be amended to authorize the additional activities proposed, and that the required allocation may be granted.

APPROVED:

J. C. Delaney
Chief, Nuclear Materials Section

A/52

LRL:JJL
Docket No. 70-58

APR 5 1960

The martin Company
Baltimore 3
Maryland

Attention: Mr. J. V. Loppert
Licensing Officer
Nuclear Division

Gentlemen:

Enclosed is Special Nuclear Material License No. SNM-53, as amended.

For information regarding procurement prior to June 30, 1960, of the allocated material, you should communicate with the Dayton Area Office, U. S. Atomic Energy Commission, BOX 66, Miamisburg, Ohio, Attention: Mr. W. B. Creamer, Area Manager.

Very truly yours,

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing and Regulation

DISTRIBUTION
W. B. Creamer, DAO, w/encl. & (3 cys NMD)
L. D. MacKay, OROO, -FIN-, w/encl.
Div. of INS, w/encl.
D. F. Musser, NMM, w/encl. & (1 cy NMD)
H. Steele, LRL, w/encl.
S. R. Gustavson, LRL, w/encl. & (1 cy NMD)
S/Health, lic. only
J. C. Delaney, lic. only
Doc. Rm., w/encl.
Formal, w/encl.
Suppl., w/encl. & (1 cy NMD)

Enclosure:
SNM-53, as amended

L&R - LRL Readings, w/encl.
J. J. Lane, LRL, w/encl.

A/53

OFFICE ▶	LRL	FIN	NMM	LRL		
SURNAME ▶	JJLane /rh	[signature]	[signature]	JCDelaney		
DATE ▶	3/30/60	3/31/60	4/4/60	4/5/60		

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

Form AEC-401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Name **The Martin Company**

2. Address **Baltimore 3, Maryland**

3. License No. **SNM-53, as amended**

4. Expiration Date **April 30, 1963**

5. Docket No. **70-58**

6. Special Nuclear Material

Uranium enriched in the U-235 isotope, and plutonium.

7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license **500 kgs U-235 contained in uranium enriched in the U-235 isotope as UO_2 and metal, and 160 grams Pu-239 as a Pu-Be neutron source.**

8. Authorized use: **For the development and fabrication of reactor fuel elements in accordance with the procedures described in the licensee's application dated Oct. 11, 1956, as amended Oct. 24, 1956, and as amended by amendments executed Dec. 6, 1957; Jan. 15, 1958 and March 23, 1960.**

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part

0.16 kg Pu-239 encapsulated as a Pu-Be neutron source.

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

Place of Use: Licensee's Middle River Plant, Maryland

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance

3/30/60

4/5/60

U. S. GOVERNMENT PRINTING OFFICE 1956 O 385852 **J. C. Delaney**
Division of Licensing and Regulation

SNM 63

FORM AEC-437
(11-57)

U. S. ATOMIC ENERGY COMMISSION

NUCLEAR MATERIAL DRAFT

TO (Supplying Operations Office):	DELIVER TO OR ORDER OF (SS Material Representative and Address):	IDENTIFICATION NO.
U. S. Atomic Energy Commission Dayton Area Office P. O. Box 66 Miamisburg, Ohio Attention: Mr. W. B. Cremer	The Martin Company Baltimore 3, Maryland Attention: Mr. J. V. Loppert Licensing Officer Nuclear Division	7000/SNM-53/DCA-16(2) ON OR ABOUT (Date of Delivery): Prior to June 30, 1960

THE FOLLOWING NUCLEAR MATERIAL:

ORDERED		DESCRIPTION AND NOTES	SHIPPED	
Kg.	Wt. %		Kg.	Wt. %
0.16	-	Pu-239 encapsulated as a Pu-Be neutron source.		

DATED: 4/5/60

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing and Regulation

CERTIFIED: I HEREBY CERTIFY THAT THE ABOVE QUANTITY WILL NOT EXCEED MATERIAL APPROVED FOR THIS DIVISION FOR FISCAL YEAR 1960.

for D. E. Carney
D. E. George, Act. Dir., Div. of Nuclear Materials Management

Ordering Operations Office	Headquarters Division Director	Director, Division of Nuclear Materials Management
		APR 1960

U. S. GOVERNMENT PRINTING OFFICE 16-73712-1

THE MARTIN COMPANY

Baltimore 3, Maryland

April 18, 1960
Mail No. W-756
Nuclear Division

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that Byproduct Material License No. 19-1398-19 be amended as follows:

Item 8B - Change maximum amount of radioactivity to read: Two sources not to exceed 10 curies per source.

This change is requested to permit use of a 10 curie Cobalt-60 source in the Technical Operations, Inc. Model 402 projector. It is understood that the manufacturer of this projector has filed specifications with your office and that the use of the projector with a 10 curie source will conform to standards of Title 10 CFR Part 20.

Should you require any further information contact me or Mr. Richard H. Boutelle, X9517-8.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer

RECEIVED
APR 25 1960
U.S.A.E.C.
Isotopes Branch
Div. of L & R
A-54

DUPLICATE
FOR DIV. OF INSP.

19-1398-19

DOCKET NO. 20-58

INTER-DEPARTMENT COMMUNICATION

April 18, 1960

To: W. Wachtl

From: E. Scicchitano

Subject: AMF Storage Box Nuclear Calculations-Summary of Results

I. Multiplication Factor

A. 6.25" X 5.4" X 24" box containing 4-Li plate assemblies.

		K_{eff}
1)	Dry	.01
2)	Wet	.40
3)	Wet with ∞ water reflector	.64

B. 55 gal. drum

		K_{eff}
1)	Infinite array of homogeneous mixture	.40
2)	Infinite array of homogeneous with double loading (by mistake)	.72

Multiplication factor calculations were based on three group diffusion theory calculations. The distributions of the materials within the box and drum were assumed to be homogeneous.

II. Interaction Calculations*

	Ω(Steradians)
A. 3 X 2 array of 6.25" X 5.4" X 27" boxes in 55 gal. drums.	1.4

* Ref. I TID 7016-Guide to Shipment of U235 Enriched Uranium Material
Page 74 Appendix 4

Conclusions

As seen from results in I above, the shipping containers are safe under flooded conditions.

From results of interaction calculations (II above) and Appendix 5 in Ref. I, the shipping containers are still safe.

E. Scicchitano

A155

INTER-DEPARTMENT COMMUNICATION

April 12, 1960

To: W. Wachtl

From: E. Scicchitano

Subject: AMF Storage Box Nuclear Calculations-Summary of Results

I. Multiplication Facts.

A. 6.25" X 5.4" X 24" box containing 4-11 plate assemblies.

		K_{eff}
1)	Dry	.01*
2)	Wet	.40
3)	Wet with ∞ water reflector	.64

B. 55 gal. drum

		K_{eff}
1)	Infinite array of homogeneous mixture	.40
2)	Infinite array of homogeneous with double loading (by mistake)	.66

Multiplication factor calculations were based on three group diffusion theory calculations. The distributions of the materials within the box and drum were assumed to be homogeneous.

II. Interaction Calculations*

		R_0(Steradians)
A	3 X 2 array of 6.25" X 5.4" X 27" boxes in 55 gal. drums.	1.4

* Ref. 1 TID 7016-Guide to Shipment of U233 Enriched Uranium Material
Page 74 Appendix 4

Conclusions

As seen from results in I above, the shipping containers are safe under flooded conditions.

From results of interaction calculations (II above) and Appendix 5 in Ref. 1, the shipping containers are still safe.

E. Scicchitano

C. K. Beck, Chief
Hazards Evaluation Branch

April 20, 1960

C. T. Edwards, Acting Chief
Licensing Branch

THE MARTIN COMPANY REQUEST DATED APRIL 18, 1960 FOR AMENDMENT TO THEIR SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-53 - DOCKET 70-58

SYMBOL: LRL:JJL

Please review the subject request for the adequacy of the applicant's procedures to avoid a condition of accidental criticality.

It is noted that combustible material, in the form of cardboard and wood, will be used in packaging and bracing the fuel plate assemblies. May we also have your comments on this procedure.

The enclosed copy of the application may be retained for your files.

Enclosure:
Appli. dtd 4/18/60

DISTRIBUTION
Suppl.
L&R Reading
LRL Reading
J. J. Lane, LRL

A/56

OFFICE ▶	LRL	LRL	LRL			
SURNAME ▶	JJLane /rh	[illegible]	CTEdwards			
DATE ▶	4/20/60	4/20/60	4/[illegible]/60			

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

DOCKET NO. 10-3296

THE MARTIN COMPANY

Baltimore 3, Maryland

Mail No. W-756
April 28, 1960

U. S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. J. C. Delaney
Chief, Materials Section
Licensing Branch

Gentlemen:

Pursuant to the provisions of Section 40-26 of The Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40, The Martin Company requests that Source Material License No. C-4283 be revised to increase the amount of Thorium-Magnesium Alloy (containing not more than 4% Thorium) from 75,000 pounds to 100,000 pounds.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer
Nuclear Division

LGB:mdb



A/57

THE MARTIN COMPANY

Baltimore 3, Maryland

Mail No. W-756
May 3, 1960

U.S. Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attn: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that Byproduct Material License No. 19-1398-19 be amended as follows:

Item 8A - Change maximum amount of radioactivity to read: Two sources not to exceed 50 curies per source.

This change is requested to permit use of a 50 curie Iridium 192 source in the Technical Operations, Inc. Model 412 projector. It is understood that the manufacturer of this projector has filed specifications with your office and that the use of the projector with a 50 curie source will conform to standards of Title 10 CFR Part 20.

Should you require any further information contact me or Mr. Richard H. Boutelle, X-9517-8.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer
Nuclear Division

Amend 3
19-1398-19

RECEIVED
MAY - 5 1960
U.S.A.E.C.
Isotopes Branch
Div. of L & R

A158

DUPLICATED
FOR DIV. OF INSP

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

IN REPLY REFER TO:
40-3296
DL:ND

SOURCE MATERIAL LICENSE

License No. C-4283
Amendment # 1
Dated: MAY 5 1960

The Martin Company
Baltimore 3
Maryland

Attention: Mr. J. V. Lopert

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to, at the above stated location, one hundred thousand (100,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire September 30, 1960.

CC: Docket Officer
Document Room
S/H
Insp. w/c appl

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

Dictator HW
Approved JCD

A/59

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

IN REPLY REFER TO:
40-3296
LRL:ND

SOURCE MATERIAL LICENSE

License No. C-4283
Amendment # 1
Dated:

The Martin Company
Baltimore 3
Maryland

Attention: Mr. J. V. Lopert

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to, at the above stated location, one hundred thousand (100,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire September 30, 1960.

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

OPTIONAL FORM NO. 10

UNITED STATES GOVERNMENT

Memorandum

TO : Lyall E. Johnson, Chief
Licensing Branch

DATE:

FROM : Clifford K. Beck, Chief
Hazards Evaluation Branch CKB

SUBJECT: MARTIN COMPANY

We have reviewed the Martin Company application dated April 18, 1960, requesting approval of procedures for shipping fuel elements.

Martin proposes to ship four aluminum clad elements (156 g U-235 each, 624 g total) per container. Each fuel element will be enclosed in corrugated cardboard, and the four elements will be packed in a 6" x 7" x 28" wood box which is supported in the center of a 55 gallon steel drum by means of plywood supports. Any one shipment (to either the University of California or the University of Washington) will comprise a maximum of six containers (24 elements, 3.74 kg U-235).

We recommend approval of the shipping containers, on the basis of acceptable mass per unit and spacing between individual units, which would protect against accidental criticality in case the array is wetted or flooded.

The actual shipping procedures are not described in the application. We request further information on the mode of shipment, including applicant's arrangements to insure that his material will not be brought into proximity enroute with other shipments of special nuclear material.

Info on shipping given to Wachtl on 6/13/60 (office visit. Martin will submit the additional info. JJS

A/60

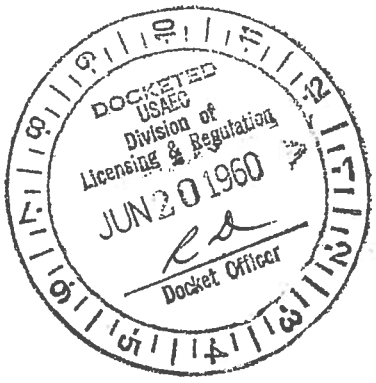
Docket No. 70-58
File 4

THE MARTIN COMPANY

Baltimore 3, Maryland

June 17, 1960
Mail Number M-722

Refer to: LSN-1



Director
Division of Licensing & Regulation
U.S. Atomic Energy Commission
Washington 25, D.C.

Attention: Mr. J. C. Delaney
Chief, Nuclear Materials
Licensing Branch

Gentlemen:

Reference is made to our Special Nuclear Material License SNM-53 as amended. Under a recent amendment dated 4/5/60 The Martin Company was authorized to receive and use 0.16 Kg Pu-239 encapulated as a Pu-Be neutron source. We request to further amend this license to receive and use a Plutonium-Alpha Source.

The requested Pu-Alpha Source will be used by our Health Physics Section for instrument calibration purpose. The use, restrictions and proposed health-safety precautions are attached to this request.

The Pu-Alpha Source is a Mound Laboratory Catalog Item No. IX-B (Mound Laboratory Catalog of Polonium and Plutonium Sources, November 1, 1959, pages 22, 23 and 24). The source will consist of no more than 0.7 milligrams (10^8 disintegrations per minute) deposited in the form of PuO_2 on stainless steel. The stainless steel plate is a circular disk, 1/8 inches thick by two (2) inches in diameter. The PuO_2 is deposited in a un-sealed well 0.02 inches deep by one (1) inch in diameter.

I certify that the statements made in this letter and enclosure are true, complete and correct to the best of my knowledge and belief and are made in good faith.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert,
Licensing Officer
Nuclear Division

A/61

WWW/JVL/plm
Enclosures

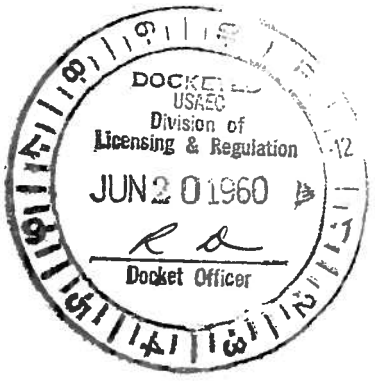
DOCKET NO. 70-58
File 9

Plutonium Handling - Unclad - Procedure

This unclad, Pu source will be used by members of the Health Physics Section to calibrate alpha counters. It will be handled with tongs and when not in use will be stored in a metal container and placed in a wooden source holder. When handling, care will be taken not to scratch the source surface.

Procedure:

1. Keep source in container when not in use.
2. Use tongs to handle source, never bare hands as it is unclad.
3. Do not scratch source surface.



DOCKET NO. 70-58

File Cy

June 21, 1960
Mail Number W-722

Refer to: LSN:2

Director, Division of Licensing & Regulations
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention: Mr. Lyle Johnson, Chief
Licensing Branch

Gentlemen:

Reference is made to our letter NMC-113 in which we requested that our special Nuclear Material License SNM-53 be amended. We enclose for your information a write-up of the shipping procedure to be followed in the delivery of fuel elements to the Universities of California and Washington.

I certify that the statements made in this letter and referenced enclosures are true, complete and correct to the best of my knowledge and belief and are made in good faith.

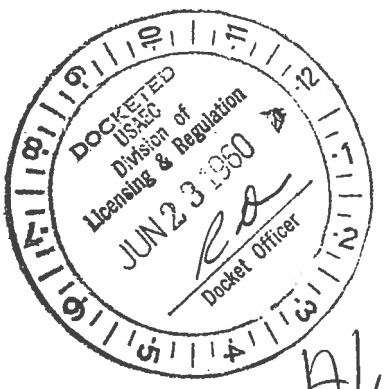
Very truly yours,

THE MARTIN COMPANY

J. V. Loppert,
Licensing Officer
Nuclear Division

PWB/JVL/plw

Enclosure



A/62

70-58

File C

SHIPPING PROCEDURE

1. The contents of each drum will be marked on the outside. The drums will also be marked "TOP SIDE UP" and "DO NOT ROLL". An eight (8) inch yellow-red poison label and packing list will be attached to each.

2. Prepare a Martin Company Shipping Request (Sample attached).

3. Prepare a Nuclear Division Outgoing Shipment Routing Form (Sample attached).

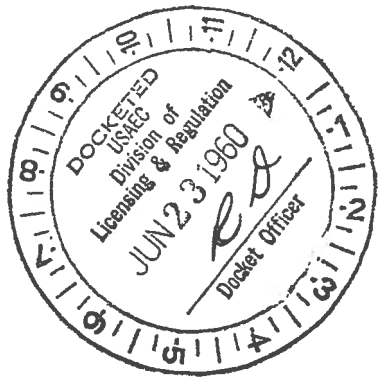
4. Prepare a DD-250 from the Shipping Request (Sample attached).

5. Prepare a Railway Express Bill of Lading with the following note typed in the center of the page:

   Note: The Railway Express Company agrees that they will not ship any other radioactive materials in the same car with this shipment. Reference letter from dated 5/ /60.

   Signed By,

   Railway Express Driver
   As Agent for Company



DOCKET NO. 70-58

NUCLEAR DIVISION
OUTGOING SHIPMENT ROUTING FORM

PLANT II SHIPPING - RETURN COMPLETED FORM WITH 1 COPY OF SHIPPING REQUEST, 2 COPIES OF COMPLETED SHIPPING PAPERS TO:

TO: NUCLEAR PRODUCTION PLANNING & CONTROL

DATE

NO.

FROM:

FILL IN THIS BLOCK FOR RADIO ACTIVE MATERIALS ONLY

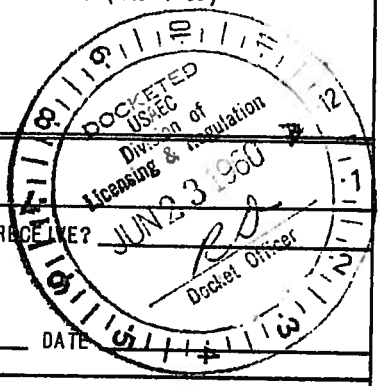
METHOD OF SHIPMENT _____

METHOD APPROVED BY _____ DATE _____

IN ACCORDANCE WITH SHIPPING AUTHORIZATION NUMBER _____ BY _____, CONTRACTS MANAGER, DATED _____, PLEASE ARRANGE TO SHIP THE FOLLOWING AFTER OBTAINING INDICATED CLEARANCES. (MARTIN CRITICALITY REGULATIONS AS OUTLINED IN CRITICALITY PRECAUTIONS MANUAL (MND-1063) HAVE BEEN COMPLIED WITH).

SIGNED _____

* CLEARANCE REQUIRED ONLY WHEN RADIOACTIVE MATERIALS INCLUDED IN SHIPMENT-



DESCRIPTION OF SHIPMENT	
ACCOUNTABILITY * (NUCLEAR MATERIAL)	A. ISOTOPE _____ D. CUSTOMER LICENSED TO RECEIVE? _____ B. AMOUNT _____ C. FORM _____ APPROVED _____ DATE _____
QUALITY CONTROL	SHIPPING REQUEST SIGNED? _____ RELEASED _____ DATE _____
HEALTH PHYSICS *	A. RADIATION READING ON SURFACE OF MATERIAL BEFORE PACKAGING _____ MR/HR. B. RADIATION READING ON SURFACE OF PACKAGE _____ MR/HR. C. SURFACE CONTAMINATION? _____ D. RADIATION READING AT ONE METER FROM CENTER OF PACKAGE _____ MR/HR. E. NUMBER OF RADIATION UNITS? _____ F. ICC LABEL AFFIXED TO SURFACE OF PACKAGE? _____ G. APPROVED _____ DATE _____
SECURITY *	(WHEN SHIPMENT CONTAINS 10 GRAMS OF NUCLEAR MATERIAL ENRICHED OVER 20%, THE SECURITY OFFICER SHALL NAME SECURITY CATEGORY, AND DESIGNATE SECURITY MEASURE REQUIRED, SUCH AS ARMED GUARD, ETC.) APPROVED _____ DATE _____
ACCOUNTABILITY (PROPERTY)	WHEN SHIPMENT INVOLVES (1) CUSTOMER-FURNISHED MATERIALS AND/OR EQUIPMENT OR (2) WASTE OR SCRAP NUCLEAR MATERIAL, THIS FORM MUST BE ROUTED TO AND APPROVED BY PROPERTY ACCOUNTABILITY. APPROVED _____ DATE _____
PRODUCTION PLANNING & CONTROL REPRESENTATIVE	DATE DELIVERED TO INSIDE TRANSPORTATION _____ SIGNED _____
PLANT II SHIPPING	"THIS IS TO CERTIFY THAT THE ABOVE NAMED ARTICLES ARE PROPERLY DESCRIBED, AND ARE PACKED AND MARKED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO REGULATIONS PRESCRIBED BY THE INTERSTATE COMMERCE COMMISSION". THE ABOVE STATEMENT TOGETHER WITH A COMPLETE DESCRIPTION OF THE RADIOACTIVE MATERIALS IN THIS SHIPMENT APPEARS ON ALL SHIPPING PAPERS. SIGNED _____ DATE _____

No. 20-58
Filed.



DOCKET NO. 70-5[illegible]

MT. VERNON BUSINESS FORMS, BALTIMORE 2, MD.

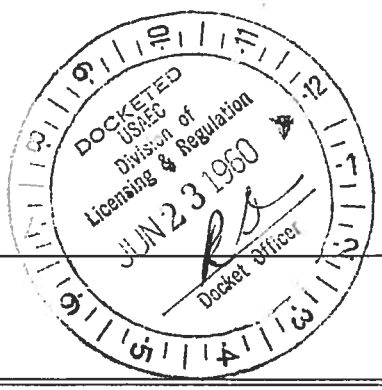
361506 (2-59)

SHIPPING REQUEST

MISCELLANEOUS ITEMS

ORIGINATING DEPARTMENT: FOLLOW DETAILED INSTRUCTIONS ON BACK OF SECOND SHEET.

1. SHIP TO:



SECURITY CLASSIFICATION
☐ UNCLASSIFIED ☐ CONFIDENTIAL ☐ SECRET RADIOACTIVE MATERIAL

3. CONTRACT & ITEM NO. AND/OR CUSTOMER PURCHASE ORDER NO.

4. ACCOUNT NO.

REQUESTED BY | DATE

2. MARK FOR:

MAIL NO. | PHONE

5. AUTHORIZED SIGNATURE | DATE

6. ITEM NO.	7. QUANTITY & UNIT	8. PART NUMBER	9. DESCRIPTION
	12 EA.	55 GAL. STEEL DRUMS CONTAINING: SERIAL #	FUEL ELEMENT ASS'YS. PART NO. 89-31-103 A — 3 ASS'YS EACH DRUM — TOTAL 24 ASS'YS.
	DRUM #1		
	DRUM #2		
	DRUM #3		
	DRUM #4		
	DRUM #5		
	DRUM #6		
	DRUM #7		
	DRUM #8		
	DRUM #9		
	DRUM #10		
	DRUM #11		
	DRUM #12		

RADIOACTIVE MATERIALS
CLASS D POISON
GROUP #
CONTENTS
MAX READING ON PACKAGE
READING AT ONE METER
NO. RADIATION UNITS
LABEL REQUIRED
HEALTH PHYSICS
DATE

REMARKS OR SPECIAL INSTRUCTIONS: SHIP VIA RAILWAY EXPRESS — ARMED GUARD SURVEILLANCE REQUIRED — RAILWAY EXPRESS AGREES THAT NO OTHER RADIOACTIVE MAT'L WILL BE SHIPPED IN THE SAME CAR WITH THIS SHIPMENT

SHIP: ☐ PREPAID ☐ COLLECT ☐ GOVERNMENT B/L ☒ PROOF OF PREVIOUS INSPECTION ACCOMPANIES THIS SHIPPING REQUEST INSURED VALUE $

11. INFLAMMABLE ☐ YES ☐ NO

12. EXPLOSIVE ☐ YES ☐ NO

13. MARTIN PURCHASE ORDER NO.

14. INSPECTION REQUIREMENTS ☐ VISUAL ☐ DESTINATION ☐ SOURCE ☐ PACKAGING

15. AUTHORITY FOR SHIPMENT:
☐ CUSTOMER LETTER NO.
☐ PER SPECIFICATION NO.
☐ PER CONTRACT

LOANED MATERIAL TO BE RETURNED
DATE:
LOAN FOLLOW-UP BY:

MATERIAL REQUIRED FOR TEST PURPOSES ☐ YES ☐ NO

THIS ITEM TO MAKE UP SHORTAGE ON ITEM NO.

THIS SECTION TO BE COMPLETED BY SHIPPING

NOTICE OF SHIPMENT NO. | NO. OF PACKAGES | BOX SIZE | WEIGHT

THIS SECTION TO BE COMPLETED BY TRAFFIC DEPT.

SHIP VIA: | ROUTED BY | PREWRAP INSPECTION | PACKAGING INSPECTION

Docket No. 70-58

NUCLEAR DIVISION
OUTGOING SHIPMENT ROUTING FORM

PLANT II SHIPPING - RETURN COMPLETED FORM WITH 1 COPY OF SHIPPING REQUEST, 2 COPIES OF COMPLETED SHIPPING PAPERS TO:

TO: NUCLEAR PRODUCTION PLANNING & CONTROL	DATE	NO.
FROM:	FILL IN THIS BLOCK FOR RADIO ACTIVE MATERIALS ONLY	METHOD OF SHIPMENT _____ METHOD APPROVED BY _____ DATE _____

IN ACCORDANCE WITH SHIPPING AUTHORIZATION NUMBER _____ BY _____, CONTRACTS MANAGER, DATED _____, PLEASE ARRANGE TO SHIP THE FOLLOWING AFTER OBTAINING INDICATED CLEARANCES. (MARTIN CRITICALITY REGULATIONS AS OUTLINED IN CRITICALITY PRECAUTIONS MANUAL (MND-1063) HAVE BEEN COMPLIED WITH).

SIGNED _____

* CLEARANCE REQUIRED ONLY WHEN RADIOACTIVE MATERIALS INCLUDED IN SHIPMENT-

DOCKETED USAEC Division of Licensing & Regulation JUN 23 1960 Docket Officer

DESCRIPTION OF SHIPMENT	
ACCOUNTABILITY * (NUCLEAR MATERIAL)	A. ISOTOPE _____ D. CUSTOMER LICENSED TO RECEIVE? _____ B. AMOUNT _____ C. FORM _____ APPROVED _____ DATE _____
QUALITY CONTROL	SHIPPING REQUEST SIGNED? _____ RELEASED _____ DATE _____
HEALTH PHYSICS *	A. RADIATION READING ON SURFACE OF MATERIAL BEFORE PACKAGING _____ MR/HR. B. RADIATION READING ON SURFACE OF PACKAGE _____ MR/HR. C. SURFACE CONTAMINATION? _____ D. RADIATION READING AT ONE METER FROM CENTER OF PACKAGE _____ MR/HR. E. NUMBER OF RADIATION UNITS? _____ F. ICC LABEL AFFIXED TO SURFACE OF PACKAGE? _____ G. APPROVED _____ DATE _____
SECURITY *	(WHEN SHIPMENT CONTAINS 10 GRAMS OF NUCLEAR MATERIAL ENRICHED OVER 20%, THE SECURITY OFFICER SHALL NAME SECURITY CATEGORY, AND DESIGNATE SECURITY MEASURE REQUIRED, SUCH AS ARMED GUARD, ETC.) APPROVED _____ DATE _____
ACCOUNTABILITY (PROPERTY)	WHEN SHIPMENT INVOLVES (1) CUSTOMER-FURNISHED MATERIALS AND/OR EQUIPMENT OR (2) WASTE OR SCRAP NUCLEAR MATERIAL, THIS FORM MUST BE ROUTED TO AND APPROVED BY PROPERTY ACCOUNTABILITY. APPROVED _____ DATE _____
PRODUCTION PLANNING & CONTROL REPRESENTATIVE	DATE DELIVERED TO INSIDE TRANSPORTATION _____ SIGNED _____
PLANT II SHIPPING	"THIS IS TO CERTIFY THAT THE ABOVE NAMED ARTICLES ARE PROPERLY DESCRIBED, AND ARE PACKED AND MARKED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO REGULATIONS PRESCRIBED BY THE INTERSTATE COMMERCE COMMISSION". THE ABOVE STATEMENT TOGETHER WITH A COMPLETE DESCRIPTION OF THE RADIOACTIVE MATERIALS IN THIS SHIPMENT APPEARS ON ALL SHIPPING PAPERS. SIGNED _____ DATE _____

RECEIVED
USAEC
Division of
Licensing & Regulation
JUN 23 1960
Docket Officer

Docket No. 70-58
File 9

THE MARTIN COMPANY

Baltimore 3, Maryland

June 22, 1960
Mail Number B-722

Refer to: LSN-3

Director
Division of Licensing & Regulations
U.S. Atomic Energy Commission
Washington 25, D. C.

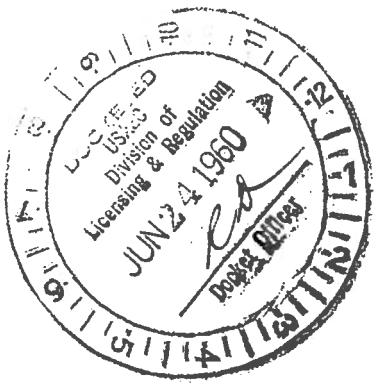
Attention: Lyall Johnson
Chief, Licensing Branch

Gentlemen:

Reference is made to our Special Nuclear Material License SNM-53 as amended. On January 26, 1959, you sent a letter to the Martin Company amending our License by adding the following item:

> "Item 10: Unless otherwise specified, the authorized place of use is the address stated in Item 2 above. Authorized place of use, the licensee's plant at Middle River, Maryland. As a further condition of this license, the licensee shall, within 120 days of the date of this letter, comply with the provisions of his application filed with the Commission December 16, 1958 regarding the plans for compliance with Section 70.21 10 CFR 70, and shall advise the Commission in writing when the installation of the radiation monitoring system is complete".

We complied with the request as called for in the above item in February, 1959, but inadvertently did not notify you of our compliance. We regret the delay and request that you accept our notification of compliance at this time.



Very truly yours,

THE MARTIN COMPANY

W. W. Wachtl,
Chairman
Nuclear Control

A163

OPTIONAL FORM NO. 10

UNITED STATES GOVERNMENT

Memorandum

TO : Lyall Johnson, Chief
Licensing Branch

DATE:

FROM : Clifford K. Beck, Chief
Hazards Evaluation Branch

SUBJECT: MARTIN COMPANY - DOCKET 70-58, PROJECT S-16

We have reviewed the Martin Company application dated June 21, 1960 describing shipping procedures for transporting fuel elements to the Universities of California and Washington.

We have commented on the Martin Company shipping container (my memo 6/10/60). Martin describes in the present application a procedure designed to prevent comingling enroute of the Martin shipment with other shipments of SNM. This proposed procedure is limited to a notation typed on the bill of lading which is to be acknowledged by signature of the Railway Express driver.

We do not believe that printing of the request (not to ship other radioactive materials in the same car) on the bill of lading and the driver signature will adequately protect against comingling unless the Railway Express Company will certify that such procedures are adequate for this purpose. Until we have such assurance we cannot recommend approval of this proposed plan.

A164

June 28, 1960

C. K. Beck, Chief
Hazards Evaluation Branch

Lyall Johnson, Chief
Licensing Branch

THE MARTIN COMPANY REQUEST DATED APRIL 18, 1960, FOR AMENDMENT TO THEIR SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-53 - DOCKET NO. 70-58.

SYMBOL: LRL:TGM

The subject request contains additional information relative to the applicant's application dated April 18, 1960. Please review in reference to your memorandum dated June 10, 1960, asking for additional information. The enclosed copy of the additional information may be retained for your files.

Enclosure:
Additional Info. dtd. 6/21/60

Distribution:
Suppl.
L&R Rdg.
LRL Rdg.
T. G. McCreless

JUN 29 1960

A/65

OFFICE ▶	LRL	L&R	L&R			
SURNAME ▶	McCreless:sjs	JMaloney	LJohnson			
DATE ▶	6/28/60	6/29/60	6/[illegible]/60			

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—92761-2

OPTIONAL FORM NO. 10

UNITED STATES GOVERNMENT

Memorandum

TO : Files

DATE: July 22, 1960

FROM : T. G. McCreless

SUBJECT: THE MARTIN COMPANY REQUESTS DATED JUNE 17, 1960, AND APRIL 18, 1960, AS AUGMENTED JUNE 21, 1960, FOR AMENDMENT TO THE SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-53 - DOCKET NO. 70-58

SYMBOL: LRL:TGM

ANALYSIS AND FINDINGS

Reference is made to the memorandum to the files dated March 30, 1960, regarding the observations, conclusions and findings resulting from the review of The Martin Company's request for amendment to their Special Nuclear Material License.

By letter dated June 17, 1960, the licensee requests authorization to receive, possess and use .7 milligrams of plutonium fabricated as an alpha source as a calibration standard.

By letter dated April 18, 1960, as augmented June 21, 1960, the licensee requests ~~that~~ authorization to ship uranium-aluminum type fuel elements to the Universities of California and Washington.

From a review of the request of June 17, 1960, it has been determined that the licensee has adequate training and procedures for safely handling the requested source.

Reference is made to the memoranda in the file from HEB dated June 10, and June 28, 1960. A review of the proposed shipping containers and procedures have been determined to adequately meet the requirements of the Act and the regulations of the Commission with the possible exception of the licensee's ability to assure that comingling of material in transit will not occur. It does appear, however, that the licensee proposes to take all practical measures to insure that comingling will not occur.

It is therefore recommended that the licensee's requests be granted and the license be amended to include the requested alpha source and that the cover letter for the amended license grant one time authority for the shipping of the uranium-aluminum fuel elements to the Universities of California and Washington.

APPROVED:

J. C. Delaney
Chief, Nuclear Materials Section

A/66

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LRL:TGM
Docket No. 70-58

JUL 21 1960

The Martin Company
Baltimore 3, Maryland

Attention: Mr. J. V. Loppert
Licensing Officer
Nuclear Division

Gentlemen:

Pursuant to 10 CFR 71, you are hereby authorized under your License SNM-53 to ship on a one-time-only basis, uranium-aluminum fuel elements to the Universities of California and Washington in accordance with the procedures submitted in your application dated April 18, 1960, as augmented June 21, 1960. This authorization expires when shipment is completed or on December 31, 1960, whichever is earlier.

Enclosed is Special Nuclear Material License No. SNM-53 as amended to authorize the receipt, possession and use of 0.7 milligrams of plutonium fabricated as an alpha source, as requested in your letter of June 17, 1960. For information regarding procurement prior to June 30, 1961, of the allocated alpha source, you should communicate with the Dayton Area Office, U. S. Atomic Energy Commission, P. O. Box 66, Miamisburg, Ohio, Attention: Mr. W. B. Creamer, Area Manager.

Very truly yours,

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing and Regulation

Enclosure:
SNM-53, as amended

7/67

OFFICE ▶	L&R	I&R	L&R FIN	L&R NMM		
SURNAME ▶	McCreless:sjs	JCDelaney	RHSlade			
DATE ▶	7/22/60	7/27/60	7/25/60	7/ /60		

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—02761-3

Form AEC-401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Name The Martin Company	3. License No. [illegible], as amended
2. Address Baltimore 3, Maryland	4. Expiration Date April 30, 1961
	5. Docket No. 70-[illegible]

6. Special Nuclear Material

Uranium enriched in the U-235 isotope, and plutonium

7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license 500 kgs U-235 contained in uranium enriched in the U-235 isotope as UO_2 and metal, 160 grams Pu-239 as an encapsulated Pu-Be neutron source, and .7 milligrams Pu-239 as a Pu-alpha source.

8. Authorized use: In accordance with the procedures described in the licensee's applications dated Oct. 11 and Oct. 2[illegible], 1956; applications executed Dec. 6, 1957, and Jan. 15, 1958; procedures filed Dec. 16, 1958; applications dated March 23 and June 17, 1960.

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part

0.7 milligrams of plutonium fabricated as Pu-Alpha source herein allocated.

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

Place of use: Licensee's Middle River Plant, Maryland

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance Jan. 7/22/60 JCD 7/26/60

J. C. Delaney
Division of Licensing and Regulation

☆ U. S. GOVERNMENT PRINTING OFFICE : 1958—O-471648

FORM AEC-437
(11-57)

U. S. ATOMIC ENERGY COMMISSION

NUCLEAR MATERIAL DRAFT

TO (Supplying Operations Office):	DELIVER TO OR ORDER OF (SS Material Representative and Address):	IDENTIFICATION NO.
U. S. Atomic Energy Commission Dayton Area Office P. O. Box 66 Miamisburg, Ohio ATTENTION: Mr. W. B. Creamer	The Martin Company Baltimore, Maryland	7000/SNM-53/45(3) ON OR ABOUT (Date of Delivery): Prior to December 31, 1960

THE FOLLOWING NUCLEAR MATERIAL:

ORDERED		DESCRIPTION AND NOTES	SHIPPED	
Kg.	Wt. %		Kg.	Wt. %
7X10-7		Pu-239 fabricated as a Pu-alpha source.		

DATE: [illegible]

JCD 7/22/60

J. C. Delaney
Chief, Nuclear Materials Section
~~Licensing Branch, Div. of Lic. & Reg.~~
Headquarters Division Director

CERTIFIED
I HEREBY CERTIFY THAT THE ABOVE QUANTITY WILL NOT EXCEED MATERIAL APPROVED FOR THIS DIVISION FOR FISCAL YEAR 1961

D. E. George, Act. Dir., Div. of Nuclear Materials Management

Ordering Operations Office

Director, Division of Nuclear Materials Management

JUL 25 1960

U. S. GOVERNMENT PRINTING OFFICE 16-73712-1

HEADQUARTERS PROGRAM DIVISION COPY

DOCKET NO. 40-329
Filed

THE MARTIN COMPANY

Baltimore 3, Maryland

August 25, 1960
Mail Number W-722

Refer to: LSS-2

U.S. Atomic Energy Commission
Division of Licensing and Regulations
Washington 25, D.C.

Attention: Mr. J. C. Delaney, Chief
Materials Section Licensing Branch

Subject: Source Material License C-4283

Gentlemen:

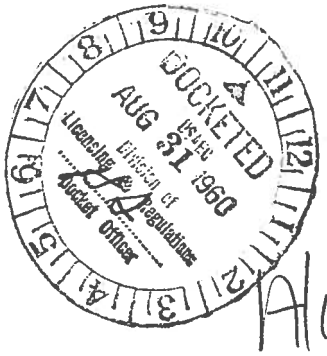
Pursuant to the provisions of Section 40-26 of The Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40, The Martin Company requests that the subject license be revised to extend the expiration date from September 30, 1960 to December 31, 1960.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert,
Licensing Officer
Nuclear Division

RLM/JVL/plm



40-397
40-577
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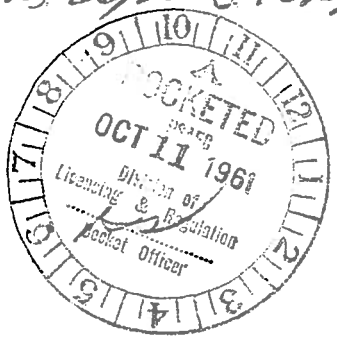
THE MARTIN COMPANY

DOCKETED
OCT 11 1961
Division of Licensing & Regulation
Docket Officer



Notice of Special Meeting of Stockholders

TO THE STOCKHOLDERS:

Notice is hereby given that a Special Meeting of the stockholders of The Martin Company will be held on October 9, 1961 at 11:00 o'clock a.m., Eastern Daylight Saving Time, at the offices of the Company, Middle River, Baltimore County, Maryland, for the following purposes:

(1) To consider and take action upon the proposed Articles and Plan of Consolidation (the Plan) of The Martin Company with American-Marietta Company, an Illinois corporation, declared advisable by the Board of Directors, pursuant to which a new corporation to be designated Martin-Marietta Corporation will be formed under the laws of the State of Maryland. The new corporation when so formed will issue shares of its stock to stockholders of The Martin Company and American-Marietta Company in accordance with the Plan, and will succeed to all of the assets of The Martin Company and American-Marietta Company and assume all of their respective liabilities.

(2) To transact such other business as may properly come before the meeting.

Only stockholders of record at the close of business on August 30, 1961, the record date fixed by the Board of Directors, will be entitled to vote at the Special Meeting.

By Order of the Board of Directors

W. L. LUCAS, *Secretary*

Middle River, Maryland

August 30, 1960

Approval by the holders of a majority of the total number of shares outstanding on August 30, 1961 is required to approve the proposed consolidation. Whether or not you plan to attend the Special Meeting of the stockholders, you are requested to sign and return at once the accompanying Proxy. If you do attend the meeting, you may vote there in person should you so desire.

A/69

PROXY STATEMENT
FOR SPECIAL MEETING OF STOCKHOLDERS
TO BE HELD OCTOBER 9, 1961

There is enclosed herewith a Notice of a Special Meeting of Stockholders of The Martin Company (herein called "Martin") to be held at the offices of the Company, Middle River, Baltimore County, Maryland, at 11 o'clock A.M. Eastern Daylight Saving Time October 9, 1961, and a proxy for the special meeting. The meeting has been called to take action on the proposed consolidation of Martin with American-Marietta Company (herein called "American-Marietta"), an Illinois corporation, into a new corporation to be designated Martin-Marietta Corporation (herein called the "Consolidated Company") which will be formed under the laws of the State of Maryland, the Consolidated Company to succeed to all of the assets of Martin and American-Marietta and assume all of their respective liabilities.

At the Special Meeting Articles and Plan of Consolidation will be submitted to the stockholders for adoption.

REASONS FOR CONSOLIDATION

During the past decade, Martin has experienced rapid growth in the fields of missiles, aerospace and allied electronics and nucleonics activities. The management of Martin is confident that it has the technological capability to remain in the forefront of these activities.

Martin management feels that it now has reached the size and financial position where, for the long term, it should broaden the base of its operations to include major participation in the industrial and commercial growth of the economy. Diversification now and new growth areas for the future are the primary factors which influenced the directors of both companies to approve the proposed consolidation.* American-Marietta's sales in the past decade have grown from $66 million to $368 million and its profits have increased from $2.8 million to $24 million. It is a leading factor in a number of basic growth industries, including paints, industrial finishes, household cleaning products, synthetic resins and adhesives, chemicals as more fully described below, cement, printing inks and a wide variety of building and construction materials. The proposed consolidation offers a unique opportunity to establish a broadly diversified company and there are additional benefits mentioned below that Martin's management believes will result from the consolidation.

Research and New Markets

Both Martin and American-Marietta maintain strong research programs in the development of new materials and products, but to date, Martin because of its lack of commercial outlets, has not been able to translate the application of its technical activities in the commercial market. Its management envisages new opportunities in research and product dvelopment that should result in the application of some of Martin's technical developments for civilian application. There can be no assurance, however, that the consolidation will enable Martin to find commercially profitable outlets for the application of its technical activities. Likewise, American-Marietta's improvements in materials and structural design may fill some of the complex needs of aerospace technology.

Depth of Management

It is believed there is strength and depth of management in both companies—each fully competent in its primary fields of activity and each able to complement the other in achieving the objectives of the Consolidated Company. Under the leadership of Mr. Grover M. Hermann, American-Marietta management has accomplished the growth set forth above.

In the organization and operating structure of the Consolidated Company, it is contemplated that Martin and American-Marietta will each maintain its identity with respect to the management, conduct of its business and customer relations. It is presently contemplated that all of the executive officers of each company will be retained in an executive or administrative capacity and that the various divisions of each of the companies will continue to be operated as separate divisions under the supervision of

* Announcement of these approvals on June 23, 1961 was the first public disclosure of the proposed consolidation.

the persons presently charged with primary responsibility for the conduct of the same. The existing employment agreements between Martin and Messrs. George M. Bunker and Clarence W. Miles (hereinafter on page 22 more fully described) will be assumed by the Consolidated Company which becomes responsible for the compliance with the terms and conditions thereof.

Stronger Corporate Structure

The financial structure of the Consolidated Company, with estimated annual sales based on present operations in excess of $1 billion and total assets of over $500 million, will provide a strong base for such future activities as may be desirable to permit the further growth of the company's business. In addition, the consolidation will generate a cash flow of sizeable proportion, a total of $68 million for the two companies in 1960.

Benefits To Martin Stockholders

Under the terms of the consolidation, Martin stockholders would receive 1.3 shares of common stock of the Consolidated Company for each share presently held, and American-Marietta common stockholders would receive a share-for-share exchange. In arriving at such exchange ratios, consideration was given to the diversity of the businesses of the constituent companies, the earnings of each company for the current and preceding five (5) years, the market values of the shares of each company prevailing during the said period, the book value of each company's common stock and the prospective earnings for each company for 1961 and 1962. Such consideration resulted in the conclusion by the respective managements of the two companies that the aforementioned basis of exchange was an equitable one. (See pages 17-19 hereof with respect to Per Share Earnings, Book Value of Common Stocks and Price Range of Common Stocks). The American-Marietta Class B stock would be eliminated and its holders would receive 4½% Cumulative Preferred Stock (non-convertible) of the Consolidated Company. The book value of such stock at November 30, 1960 was $13.09 per share or an aggregate book value of $42,106,637. It was the best judgment of the respective managements of the two companies, having in mind the dividend limitation (See page 24) and the lack of a market for the Class B Common Shares, as well as the probability that the 4½% Cumulative Preferred Stock to be issued would have a market value less than the par value thereof, that a fair and equitable basis of exchange would be one whereby holders of Class B Common Shares would receive shares of 4½% Cumulative Preferred Stock (non-convertible) of the Consolidated Company representing approximately 90% of the book value of said Class B Common Shares or $38,000,000. This basis of exchange represents approximately 12/100ths of a share of the new preferred stock for each Class B Common Share. American-Marietta will redeem its outstanding 5% Cumulative Preferred Shares prior to the consolidation.

The effect of the consolidation at the outset would be a reduction in Martin's anticipated per-share earnings for 1961 to about the level of last year's per-share earnings which reflected an increase of 70 per cent over the past five years. However, the consolidation would provide Martin stockholders with an immediate 30 per cent increase in cash dividends based on the recent historical dividend record of both of the constituent companies, increased book value and prospects of long-term stability through immediate diversification and possible future expansion into new growth areas. Payment of dividends by the Consolidated Company is, of course, subject to future business conditions, the Company's earnings and financial condition.

It is the considered opinion of Martin's directors and management that the consolidation is in the best interest of all stockholders.

SUMMARY OF THE PLAN

At meetings held on August 3, 1961, the Boards of Directors of Martin and American-Marietta approved and recommended an Agreement of Consolidation dated as of August 1, 1961 (the Agreement), pursuant to which Martin and American-Marietta (the constituent companies) will be consolidated into a new Maryland corporation to be known as Martin-Marietta Corporation. At the same meeting the Martin Board of Directors adopted a resolution approving proposed Articles and Plan of Consolidation of the constituent companies (the Articles), setting forth the terms of such consolidation and declaring that the proposed consolidation is advisable substantially upon the terms and conditions set forth in the Articles. Copies of the Agreement and the Articles are attached hereto and marked

as Appendix 1 and Exhibit A to Appendix 1, respectively. The American-Marietta Board has approved the Agreement and the Articles.

Briefly stated, the Agreement provides that the title to all of the assets of the constituent companies will devolve upon the Consolidated Company, and the Consolidated Company will assume all of the liabilities of the constituent companies. The Consolidated Company will issue new shares of its capital stock to the holders of the common stock of the constituent companies. The presently outstanding 5% Cumulative Preferred Shares of American-Marietta will be redeemed and retired prior to the consolidation.

Capital Stock Outstanding before and after the Consolidation

On July 31, 1961 Martin had outstanding 6,258,829 shares of Common Stock without par value, which will be converted (on a 1.3 for 1 basis) into 8,136,478 shares of Common Stock of the par value of $1 per share of the Consolidated Company. Arrangements will be made for the matching and combination or the purchase and sale of fractional interests in respect of Martin certificates surrendered for exchange within 60 days after the consolidation becomes effective.

On July 31, 1961, American-Marietta had outstanding: (a) 200,599 5% Cumulative Preferred Shares, $100 par value per share. These shares will be redeemed. (b) 3,191,189 Class B Common Shares, $2 par value. It is anticipated that prior to the consummation of the consolidation but after the approval thereof by the stockholders of the constituent companies, 70,314 of these shares will be converted into an equal number of Common Shares and simultaneously therewith 70,314 of the outstanding Common Shares of American-Marietta will be surrendered to it as a capital contribution, with the result that there will be no net increase in the number of American-Marietta Common Shares outstanding. The remaining 3,120,875 Class B Common Shares will be converted into 380,000 shares of 4½% Cumulative Preferred Stock, $100 par value of the Consolidated Company. (c) 13,199,875 Common Shares, $2 par value, which will be converted into a like number of shares of Common Stock, $1 par value of the Consolidated Company.

The preferred stock to be issued by the Consolidated Company will not be convertible into shares of Common Stock. The terms, conditions and provisions of the 4½% Cumulative Preferred Stock are fully set forth in Article IV, subdivision SIXTH, of the Articles hereto attached.

Warrants and Stock Options

Holders of Warrant Certificates issued by Martin pursuant to its Indenture dated as of November 1, 1958, to Fidelity-Baltimore National Bank, as Trustee, will be entitled to subscribe for shares of Common Stock of the Consolidated Company in accordance with the terms of the Indenture.

Each Warrant upon the consolidation becoming effective will entitle the holder to subscribe for 2.73 shares of Common Stock of the Consolidated Company for $40 to and including November 1, 1963, and for $45 thereafter and to and including November 1, 1968. Shares of Common Stock will be reserved by the Consolidated Company for issuance upon the exercise of such Warrants.

Holders of stock options granted by Martin, upon the consolidation becoming effective, will be entitled to purchase from the Company 1.3 shares of Common Stock of the Consolidated Company in the place and stead of each share of Common Stock without par value of Martin which such holder was entitled to purchase immediately prior to the consolidation, subject, however, to such minor adjustment as may be necessary to preserve the "restricted" status of the stock options under the United States Internal Revenue Code. Shares of Common Stock will be reserved by the Consolidated Company for issuance upon the exercise of such stock options.

Effective Date

The consolidation will become effective after approval by the stockholders of the constituent companies at the special meetings to be held on October 9, 1961, and upon compliance with the laws of the States of Maryland and Illinois in relation to the filing of the Articles with the public authorities in those states.

Termination and Abandonment of the Consolidation

The Agreement may be terminated and the consolidation abandoned by resolution of the Board of Directors of either of the constituent companies if certain conditions of that company's obligations set forth in the Agreement are not satisfied. The Agreement may be terminated and the consolidation abandoned by the two constituent companies (each acting by its Board of Directors) by mutual consent, at any time before the consolidation becomes effective. In the event of any termination of the Agreement and abandonment of the consolidation, neither of the constituent companies shall have any liability to the other for costs, expenses, loss of anticipated profits, or otherwise, in connection with the Agreement.

It is not contemplated that the Agreement will be terminated or abandoned for any reason other than the failure on the part of either of the constituent companies to comply with its covenants and obligations thereunder.

BUSINESS AND PROPERTIES OF AMERICAN-MARIETTA

American-Marietta is engaged directly and through subsidiaries in the production, manufacture and sale of construction materials and products, a wide variety of chemicals and chemical products sold to numerous industries, and other miscellaneous products, all as more fully described below. The approximate percentage contribution of these three groups to consolidated net sales for the fiscal year ended November 30, 1960 were as follows: construction materials—44%, chemicals and chemical products—41%, miscellaneous products—15%. The number of persons employed by American-Marietta as of June 30, 1961 was 16,247.

Construction Materials

Cement. Portland cement is widely used in many types of construction. It is sold in bulk to ready-mix concrete producers and to contractors for use in building highways, airports, bridges, dams, waterways, military installations and other structures. Portland cement and mortar cement, used in brick and stone construction, are also sold to independent distributors and dealers.

Cement is produced by the following divisions of American-Marietta: Dragon Cement, with plants in Northampton, Pennsylvania, and Thomaston, Maine; Standard Lime & Cement, with a plant at Martinsburg, West Virginia; Southern Cement, with two plants near Birmingham, Alabama; and Dewey Portland Cement, with plants in Dewey and Tulsa, Oklahoma, and Davenport, Iowa. American- Marietta believes that reserves of limestone and cement rock adjacent to its various plants are sufficient for many years of operations at current levels.

Concrete products. These include machine and precast concrete pipe for sewers, culverts, water mains, irrigation lines and other uses; pre-stressed concrete bridge sections; concrete cribbing; and other structural elements of precast concrete. American-Marietta and its subsidiaries operate a large number of concrete products plants in the United States and Canada. The cement for American-Marietta's concrete products is largely purchased from other suppliers and not from American-Marietta's own plants. The products are generally sold direct to contractors and to states, municipalities and other governmental units.

Aggregates. Aggregates, meaning crushed stone, sand and gravel, are used in building highways, in other types of heavy construction and in making concrete. American-Marietta's principal quarries and crushing plants for producing these products are in North Carolina and Iowa.

Other construction materials and products. These include common and face brick; hollow and drain tiles; aluminum and architectural products and electrical construction products of American-Marietta's subsidiary, Steel City Electric Company, such as electrical outlet and switch boxes, floor boxes, conduit and cable fittings, and pipe and conduit hangers. The Master Builders Company division produces "Pozzolith", an additive to promote dispersion in concrete, which American-Marietta classifies as a chemical product.

Chemicals and Chemical Products

Paint, finishes and coatings. These products include primers, surfacers and finishes for use on automobiles, trucks, buses, farm machinery, railroad cars, prefabricated houses, office equipment, furni-

ture and appliances; heavy duty maintenance paint for industrial use; and chemical coatings made by the Stoner-Mudge division for lining cans and other metal containers for foods and beverages. A large part of the products in this group are produced to customers' specifications and sold directly to manufacturers, not only in the United States and Canada but also to a limited extent in France, Holland and other foreign countries.

Chemical lime, refractories and silica sand. The Standard Lime & Cement and Southern Cement divisions produce chemical lime, which is sold to the chemical and paper industries and to municipalities and industries for water and waste treatment; fluxing lime, crushed stone and magnesite for the steel industry; and clinkered dolomite used in refractories. Other divisions produce silica sand used in the manufacture of glass and for other purposes. As in the case of cement, American-Marietta believes that its reserves of raw materials for these products are adequate for many years of operations.

Printing inks. Many types of printing inks are manufactured by the Sinclair and Valentine division for use in printing and packaging. This division has numerous plants in the United States, a number in Canada, and operations in Mexico, Germany, Switzerland and South America.

Adhesives, resins and chemicals. This group of products includes synthetic resins, glues and adhesives which are sold to the plywood, paper and hardboard industries for bonding purposes.

Dyestuffs. The Southern Dyestuff ("SODYECO") division manufactures ready-to-use sulphur and vat dyes and other coloring materials for the textile industry.

Miscellaneous Products

Other industrial products. American-Marietta and its subsidiaries also manufacture sealants for the aircraft, automotive, construction, electrical communications, foundry, and household appliance industries; metallurgical products such as metal powders, pigments, abrasives and alloys used in the aircraft, missile, and automotive and other industries; machinery and equipment used in heavy construction and metal fabrication; and industrial cleaning products.

Consumer Products. Latex, Alkyd and oil base paints for use by consumers are produced and sold under a variety of trade names, including "American-Marietta", "Arco", "Valdura", "Rev Satin", "Jelled Magic", "Sewall", "O.P.W." and "Berry Bros." Sales are principally to jobbers and retail outlets. The O-Cedar division manufactures mops, polishes, waxes and other household institutional cleaning products.

Federal Trade Commission Proceedings

American-Marietta's business in cement, concrete products and aggregates and in lime and limestone products herein described stems originally from its acquisitions of numerous companies engaged in these businesses, although the acquired properties have been substantially enlarged under American-Marietta's ownership. On January 27, 1961 the Federal Trade Commission issued a complaint under Section 7 of the Clayton Act charging that American-Marietta's acquisitions may lessen competition or tend to create a monopoly in the above lines of commerce in various sections of the country and constitute unfair methods of competition under Section 5 of the Federal Trade Commission Act. To date, no hearings have been held, and American-Marietta has advised Martin that it cannot predict the outcome of the proceedings at this time. If the charges in the complaint were sustained, the remedies available to the Commission might include divestiture of certain of the acquired businesses. Under the provisions of American-Marietta's long term notes, if such a divestiture involved sale of a substantial part of the company's assets, the company would have to offer to apply the proceeds to retirement of an equal amount of its long term debt.

Research

American-Marietta puts substantial emphasis on research. New products and product improvements are sought through a program related closely to customer activities and requirements. To implement this program research activity is decentralized in 25 laboratories run by the operating divisions and subsidiaries. The approximate dollar amount spent on reasearch during the 1960 fiscal year was $4,150,000 not including dues paid trade associations, a substantial portion of which is spent on research in their respective industries.

Plants and Facilities

The plants of American-Marietta and its subsidiaries differ greatly in size and importance, depending upon the nature of the product manufactured. Its management considers them to be well maintained and in satisfactory condition. Most of the manufacturing facilities of American-Marietta are owned by it and, for the most part, are unencumbered. However 32 of the printing ink plants, 16 of the concrete products plants, 26 of the aggregates plants and 1 other plant are operated in leased premises. The locations of the principal plants and facilities are listed below.

CONSTRUCTION MATERIALS AND PRODUCTS

Cement

Alabama—North Birmingham and Roberta
Iowa—Davenport
Maine—Thomaston
Oklahoma—Dewey and Tulsa
Pennsylvania—Northampton
West Virginia—Martinsburg

Concrete Products

Alabama 3	Indiana 2	New Jersey 3	Tennessee 5
Alaska 2	Iowa 2	New Mexico 2	Texas 3
Arizona 1	Kentucky 3	New York 9	Vermont 1
California 7	Maryland 2	North Carolina 3	Washington 2
Colorado 1	Michigan 3	Ohio 4	West Virginia 3
Delaware 1	Minnesota 2	Oklahoma 6	Wisconsin 3
Florida 5	Missouri 2	Oregon 1	Ontario, Canada 3
Georgia 1	Nebraska 2	Pennsylvania 5	
Illinois 4	Nevada 2	South Carolina 1	

Aggregates (crushed stone, sand and gravel)

Georgia 1	Kansas 5	Missouri 1	Pennsylvania 6
Iowa 15	Maryland 4	North Carolina 24	Virginia 3
		West Virginia 1	

Brick, Tile and Other Construction Material

Kansas—Coffeyville, Iola and Weir
Missouri—Harrisonville and Vale
Oklahoma—Britton, Collinsville and Tulsa
Canada—Streetsville, Ontario

Electrical Construction Products

California—Los Angeles
Pennsylvania—Pittsburgh

CHEMICALS AND CHEMICAL PRODUCTS

Paint, Finishes and Chemical Coatings

California—Azusa
Illinois—Kankakee
Missouri—Kansas City (2)
North Carolina—High Point
Ohio—Cleveland (2) and Marietta
Pennsylvania—Colebrookdale, Pittsburgh and Rochester
Canada—Ottawa and Walkerville, Ontario

Chemical Lime and Silica Sand:

Alabama 1	Michigan 2	Pennsylvania 1	West Virginia 2
Illinois 3	Missouri 1	Tennessee 1	Wisconsin 1
Indiana 1	Ohio 1	Virginia 1	

Printing Inks

Alabama 2	Georgia 2	Minnesota 1	Oregon 1
Arizona 1	Illinois 1	Missouri 2	Pennsylvania 3
California 3	Louisiana 2	New Jersey 1	Tennessee 2
Colorado 1	Maryland 1	New York 2	Texas 2
Connecticut 2	Massachusetts 2	North Carolina 1	Virginia 2
Florida 4	Michigan 1	Ohio 3	Washington 1

Canada:

Alberta 2	Manitoba 1	Ontario 3	Quebec 1
British Columbia 1			

Adhesives, Resins, Chemicals

California—Richmond
Ohio—Newark
Oregon—Portland
Washington—Seattle
Canada—New Westminster, B.C.; Edmonton, Alberta

Dyestuffs

North Carolina—Mt. Holly

MISCELLANEOUS PRODUCTS

Sealants

California—El Segundo
Illinois—Chicago Heights
Michigan—Jackson
Missouri—St. Louis

Metal Powders and Metallurgical Products

California—Berkeley
Illinois—Wheeling
New Hampshire—Manchester
New Jersey—Summit and Union

BUSINESS AND PROPERTIES OF MARTIN

General

Martin is now primarily engaged in the design, development and production of guided missiles, electronics equipment, communications equipment, aerospace vehicles, and nuclear products.

Martin's military sales and sales to other customers for the past five calendar years and for the first six months of 1961 were as follows:

Year	Military		Other	Total
	Missiles, Electronics and Nuclear	Aircraft		
1956	$126,171,000	$231,869,000	$ 922,000	$358,962,000 *
1957	245,796,000	177,054,000	1,075,000	423,925,000
1958	287,347,000	192,390,000	3,907,000	483,644,000
1959	410,125,000	111,083,000	2,499,000	523,707,000
1960	601,306,000	48,676,000	1,246,000	651,228,000
January } June } 1961...	398,739,000	8,611,000	843,000	408,193,000

* Before adjustment of $2,387,891 as a result of renegotiation for the year 1956.

Martin's backlog of military and other orders at the end of each of the past five calendar years and at June 30, 1961 were as follows:

Year	Military		Other	Total
	Missiles, Electronics and Nuclear	Aircraft		
1956	$ 521,866,000	$289,148,000	$ 379,000	$ 811,393,000
1957	496,978,000	297,900,000	176,000	795,054,000
1958	597,934,000	232,071,000	1,514,000	831,519,000
1959	814,563,000	85,623,000	368,000	900,554,000
1960	1,004,081,000	22,283,000	414,000	1,026,778,000
June 30, 1961....	996,663,000	14,886,000	705,000	1,012,254,000

As the above tables indicate, missiles, associated equipment, electronic systems and nuclear products accounted for approximately 98% of Martin's total backlog of orders at June 30, 1961.

Martin's missile business includes a variety of products and weapons, those capable of massive destruction and usable as aerospace vehicles, and those capable of use in limited warfare. The missiles include those powered with jet engines, those powered with liquid fueled rockets and those powered with solid fueled rockets.

Mace

The Mace is an outgrowth of the Matador, one of the earliest missiles produced by Martin. The Mace is a highly mobile surface-to-surface tactical missile designed in two types (the Mace A and the Mace B) both of which have self-contained guidance systems. Associated with the Mace is a substantial volume of ground support equipment produced by Martin.

Bullpup

The Bullpup is a short-range, air-to-surface missile first developed and produced by Martin under contracts with the Navy. Versions of the missile are produced for use by the Air Force as well as the Navy, and it is now in operational use with the Navy, Marine Corps and Air Force. The function of the missile is to provide light attack aircraft with greater capability than was formerly available against tactical targets.

Lacrosse

The Lacrosse is a mobile and highly accurate surface-to-surface guided missile developed as a close support weapon for combat troops. The missile and its associated ground equipment have been

in production since 1957. The missile is propelled by a solid fuel rocket motor and is capable of delivering both nuclear and conventional warheads.

Titan

The Titan Intercontinental Ballistic Missile is a two-stage liquid fueled rocket powered missile designed to deliver a thermonuclear warhead to a predetermined point more than 6,000 miles from the launching site. Martin is responsible for the airframe, controls and associated ground support and launching equipment, as well as for the functioning of the system as a whole. Martin holds contracts with the Air Force for two types of the Titan missile. The first type, Titan I, is in production and is undergoing advanced flight tests. The Titan II will be larger than Titan I and will be able to carry a heavier payload over even greater distances than the Titan I. It is designed to utilize storable fuels which will make it possible to maintain the missile in a ready-firing condition for long periods of time at ordinary temperatures. It is also being designed for firing from underground sites.

Pershing

Pershing is the United States Army's selective range, surface-to-surface ballistic missile system having a "built-in" jam-proof guidance system. It consists of two stages employing solid propellants and is lighter, smaller, and more mobile than the Army's Redstone system which it is scheduled to replace. As systems contractor, Martin is responsible for research and development, reliability, testing and production of the missile and associated ground equipment.

Dyna-Soar

Dyna-Soar is an advanced boost-glide space vehicle. The Air Force has retained responsibility for the integration of the complete system. Martin has been selected to build the booster portion of the program and holds a contract for the Dyna-Soar launch rocket. The Titan II design will be modified to meet the requirements of the Dyna-Soar Program.

Electronics

Martin's capability in the field of electronics is founded on intensive research and development work begun during World War II and many years of experience in the design, testing, packaging, manufacture and field support of a wide diversity of electronic systems and components.

Martin's electronics activity is staffed by over three thousand five hundred engineers, supported by a full complement of technicians, apart from manufacturing and field service personnel. The engineers average five years of electronics experience with Martin. Electronic engineers in supervisory capacities average more than ten years of experience with Martin.

Major electronics programs have been conducted at Baltimore since 1946, at the Denver Division since its founding in 1956 and at the Orlando and Cocoa Divisions since 1957. A complete electronics staff and facility has been established in Baltimore.

One of Martin's major programs is the electronic system known as Missile Master, developed, produced and serviced under contract with the Army. The function of the system is the integration of anti-aircraft missile batteries for the air defense of the nation's principal industrial and population centers. Martin has completed delivery of the systems originally ordered, and now has an order for additional systems known as "BIRDIE", more compact but similar to the Missile Master.

Nuclear Activities

Martin's nuclear activities are centered at Baltimore where the Nuclear Division was formed in 1954 to provide emphasis on and control over those activities. Today the Division is organized in five product departments. During 1961 the Nuclear Powerplant Department is scheduled to complete two "packaged powerplants" under contract with the Atomic Energy Commission. The first of those, designated PM-1, will be installed at an Air Force radar station near Sundance, Wyoming. The other, known as PM-3A, will be shipped to McMurdo Sound, Antarctica. The advanced Reactor Systems Department is engaged under contract in research and development for a liquid fluidized bed reactor, the goal of which is to provide basically simpler operating techniques and significantly lower fuel costs than those involved in existing systems. The propulsion Systems Department is at work on several classified government projects, including its contribution to a study contract for the National Aeronautics and Space Agency in the RIFT (Reactor in Flight Test) program, under which plans are

being formulated for the flight testing of the first nuclear rocket engine. The Auxiliary Power Systems Department is producing a variety of direct conversion generators which require no moving parts. SNAP-3, the first such generator to use the decay heat of radioisotopes as a basic energy source, was delivered to the AEC early in 1959. As a result of the pioneer efforts in the development of SNAP-3, the Company has since developed similar generators that have been used in the first nuclear powered satellite (the Transit) and in the world's first radioisotope fueled weather station.

Research and Development

Martin's business depends greatly upon technological progress and great emphasis is placed upon research, engineering, development and testing. Therefore Martin has spent and expects to continue spending substantial sums of money in these areas. In addition to the programs described above, Martin has other research and development programs, some of which are in the very early research stage preparing Martin for future competitions for military products, while other programs have reached the stage of development, including the design and building of prototype military equipment. Among the outgrowths of these research and development efforts are two study contracts received within the past year: Project Apollo, designed to provide the capability for manned reconnaissance flights to the vicinity of the moon; and a contract for a study of SLOMAR, seeking the solution to the problems of providing freight, passenger, maintenance and rescue service for orbiting satellites and space stations.

As a part of its activities in the field of research, Martin's RIAS division is staffed with a selected group of scientists who create and conduct their own programs of research, including both theoretical and experimental studies.

Government Contracts

Substantially all of Martin's contracts with the Government are either the cost reimbursement type (cost-plus-a-fixed-fee) or the fixed priced incentive type.

The cost reimbursement type contract provides for reimbursement of costs (with certain exceptions) incurred in connection with the performance of the contract and a fixed fee specified in each contract. The fixed price incentive type contract provides for participation by Martin and the Government in either savings or excess costs with relation to an established target price.

Under fixed price incentive type contracts, Martin receives progress payments, generally in an amount equal to 70% of costs incurred. Martin's definitive cost reimbursement type contracts now provide for current reimbursement by the Government of 100% of costs incurred, and during the period of negotiation letter contracts provide for reimbursement of 70% of costs incurred.

The Renegotiation Act of 1951 as amended makes subject to renegotiation by the Government substantially all of Martin's profits through June 30, 1962, the present expiration date of the Act. Clearances under the Renegotiation Act have been received through the year 1952 with no refunds being required. Reference is made to Note A to Martin's earnings under "Summaries of Earnings" regarding required refunds and other information with respect to years subsequent to 1952 and for the year 1957.

Property

The Company's principal manufacturing plants are located near Baltimore, Maryland; Denver, Colorado and Orlando, Florida. Corporate offices, the Baltimore Division, and the Nuclear Division are located at Middle River, Maryland, approximately 12 miles east of the center of Baltimore. The facilities there provided comprise approximately 3,240,000 square feet owned by the Company and 157,000 square feet owned by the Government and operated by the Company under a Use Agreement. Property owned by the Government is made available to the Company without payment of rental unless the facilities are used for other than Government purposes. The land at Middle River owned by the Company aggregates approximately 1,000 acres and includes a modern military airport. In addition to the property at Middle River, the Company leases in the Baltimore area approximately 284,000 square feet of space for office and storage purpose. A new Corporate Administrative Headquarters is presently being constructed at Baltimore Friendship International Airport. The building will contain approximately 80,000 square feet.

The Company in 1955 acquired by purchase approximately 3,860 acres of land near Denver, Colorado, which has been improved by the construction of administration, engineering and manufacturing

buildings containing in the aggregate approximately 1,396,000 square feet. The Company leases approximately 2,500 acres of land adjacent to the Denver plant site and also for its activities in the Denver area, office and storage space containing approximately 540,000 square feet. Some 140,000 square feet of government-owned space is used by the Company in the Denver area.

The Company acquired in 1956 by purchase approximately 6,770 acres of land near Orlando, Florida for use of the Orlando Division in the production of guided missiles and electronics. A fully integrated plant containing approximately 760,000 square feet has been completed at this location. In addition to the property owned by the Company, the Orlando Division utilizes for office and storage purposes leased areas containing approximately 371,000 square feet.

Leased offices are maintained at Cocoa Beach, Florida for the Cocoa Division, and at Boston, Massachusetts; Chicago, Illinois; Cleveland and Dayton, Ohio; Los Angeles, California; New York City; Honolulu, Hawaii; Washington, D. C.; Hampton, Virginia; Huntsville, Alabama; Red Bank, New Jersey; Omaha, Nebraska; Rome, New York, and Wiesbaden, Germany, for representatives of the Company in those areas. The Company also leases facilities at Quehanna, Pennsylvania, for the use of its Nuclear Division.

During the five years ended December 31, 1960 the Company and its subsidiaries made gross property additions of $76,492,905 and property retirements aggregating $6,037,814.

Substantially all of the above buildings are of modern fireproof construction and have been maintained in good operating condition.

The Company knows of no material defects in title to any material portions of the properties owned by it nor of any material encumbrances thereon. No special examinations of title to properties have been made in connection with this offering.

CAPITALIZATION

The capitalization of the Constituent Companies (Martin as of June 30, 1961, American-Marietta as of May 31, 1961) and pro-forma of the Consolidated Company based on the combination of the foregoing is as follows:

	(In Thousands)		
	Martin	American-Marietta	Consolidated Company
Long Term Debt (exclusive of amounts payable within one year)			
Unsecured notes held by financial institutions		$ 67,930(1)	$ 67,930
5½% Sinking Fund Debentures due November 1, 1968 held by the public	$ 15,500(2)		15,500
Other		956	956
Preferred Stock			
5% Cumulative, $100 par value, 200,599 shares outstanding		20,060(3)	
4½% Cumulative, $100 par value, 380,000 shares outstanding			38,000(4)
Stockholders' Equity			
Common Stock, No Par value, 6,258,387 shares outstanding	3,129(5)		
Common Stock, $2 par value, 13,200,796 shares outstanding		26,402(6)	
Class "B" Common Stock, $2 par value, 3,191,189 shares outstanding		6,382(7)	
Common Stock, $1 par value, 21,336,699 shares outstanding			21,337
Additional paid-in capital	40,367	88,926	105,869
Earnings reinvested	58,322(8)	94,474(9)	151,793
	$117,318	$305,130	$401,385

NOTES:

(1) Consists of long term debt of American-Marietta, which will be assumed by the Consolidated Company. The interest rates, maturities and payments required in the next five years are shown in the Notes to American-Marietta's balance sheet in this Proxy Statement.

(2) Consists of long term debt of Martin, which will be assumed by the Consolidated Company. The sinking fund requirements are shown in the Notes to Martin's balance sheet in this proxy statement.

(3) To be redeemed prior to consolidation.

(4) The terms of the 4½% Cumulative Preferred Stock provide for an annual sinking fund of $1,150,000 and limit dividends and other payments in respect of the Common Stock to net income subsequent to November 30, 1961 plus $45,000,000.

(5) Each share to be exchanged for 1.3 shares of Common Stock, $1 par value, of the Consolidated Company.

(6) Each share to be exchanged for 1 share of Common Stock, $1 par value, of the Consolidated Company

(7) To be exchanged for 380,000 shares 4½% Cumulative Preferred Stock, $100 par value.

(8) Under the terms of the Debenture Agreement covering the 5½% Sinking Fund Debentures, $13,707,517 of the earnings reinvested are not available for the payment of dividends.

(9) Under the terms of notes payable to financial institutions, payments which may be made for the payment of dividends (other than on preferred shares) and for the acquisition of capital shares were limited to $14,000,000.

(10) The Consolidated Company, by operation of law, will assume the obligations of Martin in respect of the warrants and options described in the Notes to Martin's balance sheet herein. The number of shares of the Consolidated Company's Common Stock covered by the warrants will be 1.3 times the number of Martin's shares now covered. The number covered by the options will be approximately 1.3 times the number now covered, with such adjustment as may be necessary to preserve the "restricted" status for purposes of the Internal Revenue Code. All figures are based on shares outstanding June 30, 1961 as to Martin and May 31, 1961 as to American-Marietta, and would be changed by exercise of options, warrants and conversion rights after those dates.

PRO FORMA COMBINED SUMMARY BALANCE SHEET

(Giving effect to the proposed consolidation of The Martin Company and American-Marietta Company)

The pro forma combined summary balance sheet, giving effect to the proposed consolidation of The Martin Company and American-Marietta Company on a "pooling of interests" basis, combines the balance sheet of Martin and the consolidated balance sheet of American-Marietta and consolidated subsidiaries as of the end of the first six months of each of their respective 1961 fiscal years. The pro forma balance sheet should be read in conjunction with the aforementioned separate balance sheets of Martin and American-Marietta and the related notes to the respective financial statements appearing elsewhere in this proxy statement.

(In Thousands)

	The Martin Company June 30, 1961	American-Marietta Company and Consolidated Subsidiaries May 31, 1961	Pro Forma Adjustments Add (Deduct)	Pro Forma Combined
ASSETS				
CURRENT ASSETS				
Cash and prime commercial paper	$ 28,968	$ 16,126		$ 45,094
Receivables	116,667	56,408		173,075
Inventories	10,142	69,577		79,719
Prepaid expenses	1,278	3,805		5,083
TOTAL CURRENT ASSETS	$157,055	$145,916		$302,971
INVESTMENTS AND OTHER ASSETS	4,659	26,348		31,007
PROPERTY, PLANT AND EQUIPMENT—net	50,391	196,999		247,390
	$212,105	$369,263		$581,368
LIABILITIES AND STOCKHOLDERS' EQUITY				
CURRENT LIABILITIES				
Notes payable to banks		$ 34,000		$ 34,000
Accounts payable and accrued expenses	$ 73,594	19,814		93,408
Taxes on income	13,550	8,189		21,739
Long-term debt—current portion	2,250	2,130		4,380
Preferred stock redemption			$21,063(1)	21,063
TOTAL CURRENT LIABILITIES	$ 89,394	$ 64,133	$21,063	$174,590
RENEGOTIATION REFUND	5,393			5,393
LONG-TERM DEBT	15,500	68,886		84,386
STOCKHOLDERS' EQUITY				
Preferred shares:				
5% cumulative		$ 20,060	$(20,060)(1)	
4½% cumulative			38,000 (2)	$ 38,000
Common shares	$ 3,129	26,402	(8,194)(3)	21,337
Class B Common shares		6,382	(6,382)(2)	
Additional paid-in capital	40,367	88,926	(23,424)(4)	105,869
Earnings reinvested	58,322	94,474	(1,003)(1)	151,793
	$101,818	$236,244	$(21,063)	$316,999
	$212,105	$369,263		$581,368

The pro forma adjustments give effect to the following:

1. Retirement of 5% Cumulative Preferred Shares at $105 per share prior to the consolidation, either from cash on hand and/or proceeds of short term bank loans. The retirement premium of $1,003,000 has been charged to earnings reinvested.

2. Conversion of all of the outstanding American-Marietta Class B Common Shares, $2 par value, for 380,000 new 4½% Cumulative Preferred Stock, $100 par value (aggregate par value $38,000,000), of the Consolidated Company.

3. Conversion (on the basis of 1.3 shares for 1 share) of all of the 6,258,387 outstanding shares of Martin Common Stock, without par value (aggregate stated value $3,129,193), for 8,135,903 common shares, $1 par value of the Consolidated Company, and conversion (on a 1 for 1 basis) of all of the 13,200,796 outstanding American-Marietta Common Shares, $2 par value (aggregate par value $26,401,592), for 13,200,796 shares of Common Stock, $1 par value of the Consolidated Company. The aggregate par value, $21,336,699, of all of the 21,336,699 shares of Common Stock of the Consolidated Company to be outstanding will be $8,194,086 less than the combined aggregate of the stated value of Martin Common Stock and the par value of American-Marietta Common Shares outstanding.

4. Reduction of additional paid-in capital by $23,423,536, representing the amount by which the combined aggregate par value of the new 4½% Cumulative Preferred Stock and Common Stock of the Consolidated Company exceeds the combined aggregate par value of Martin Common Stock and American-Marietta Common and Class B Common Shares outstanding.

STATEMENTS OF EARNINGS

The Martin Company

The following statement of earnings of the Company for the five years ended December 31, 1960 has been reviewed by Touche, Ross, Bailey & Smart, independent certified public accountants, whose opinion appears elsewhere in this Proxy Statement; the information for the six-month periods ended June 30, 1960, and June 30, 1961, has not been audited. The statement of earnings should be read in conjunction with the financial statements and related notes included elsewhere in this Proxy Statement. The unaudited figures for the six months ended June 30, 1960 and June 30, 1961 include all known adjustments (consisting only of normal recurring accruals) considered necessary for a fair presentation of earnings for the respective periods.

During the period from January 1, 1956 through October 31, 1958 the Company had certain subsidiaries, the operations of which are included in the statement of earnings for the years ended December 31, 1956, 1957 and 1958. All of these subsidiaries were merged into the Company October 31, 1958.

The accompanying earnings statement for the year 1956 has been restated to give effect to the renegotiation refund described in Note A and the effect of such refund upon the federal taxes applicable to that year.

(In thousands)

	Year ended December 31,					(Unaudited) Six months ended	
	1956	1957	1958	1959	1960	June 30, 1960	June 30, 1961
Sales and other income:							
Sales (including costs and fees under cost-plus-fixed-fee contracts) (A)	$356,574	$423,925	$483,644 (B)	$523,707	$651,228	$301,986	$408,193
Other income	1,081	807	694	1,119	1,351	773	750
	$357,655	$424,732	$484,338	$524,826	$652,579	$302,759	$408,943
Costs and expenses:							
Cost of sales, exclusive of depreciation and amortization	$334,869	$397,964	$449,524	$484,129	$604,579	$280,574	$380,706
Depreciation and amortization	1,865	4,738	8,650	9,654	10,619	5,085	5,551
Interest	—	464	1,379	1,831	2,192	1,133	1,196
Other costs and expenses	269	636	859	1,475	535	319	312
	$337,003	$403,802	$460,412	$497,089	$617,925	$287,111	$387,765
Earnings before federal taxes on income (A)	$ 20,652	$ 20,930	$ 23,926	$ 27,737	$ 34,655	$ 15,648	$ 21,178
Provision for federal taxes on income (A)	10,958	11,050	12,200	14,400	17,800	8,000	11,390
Net earnings, before extraordinary profit (A)	$ 9,694	$ 9,880	$ 11,726 (B)	$ 13,337	$ 16,855	$ 7,648	$ 9,788
Profit on sale of investment—net of taxes							3,750
Net earnings (A)	$ 9,694	$ 9,880	$ 11,726 (B)	$ 13,337	$ 16,855	$ 7,648	$ 13,538

NOTES

(A) Under the Renegotiation Act of 1951, the Company has received clearance from The Renegotiation Board for 1952 and prior years and for the year 1957. The Renegotiation Board has made unilateral determinations that the Company's profits were excessive for the years 1953 to 1956. The effect of the Board's actions is summarized below:

	Excessive Profits Determined By Board	Requested Refund, Net of Federal And State Tax Credits	Liability In Accounts As Of Dec. 31, 1960 and June 30, 1961
1953	$3,500,000	$1,526,192	$ (1)
1954	6,250,000	2,816,793	2,816,793
1955	3,500,000	1,430,279	1,430,279
1956	4,796,101	2,008,316	1,146,188 (2)
			$5,393,260

(1) Year 1953 paid under protest—Company has a claim for Federal income tax refundable in the amount of $1,636,567.

(2) Amount provided for 1956 is net of a claim which was before the Armed Services Board of Contract Appeals to recover certain contract costs previously disallowed. The claim has been denied and the requested refund should be correspondingly reduced by The Renegotiation Board.

The Company believes that no excessive profits were realized for the years 1953 to 1956 and has appealed to the Tax Court for a redetermination of the Board's findings for these years. The Renegotiation Act provides that on appeal, if the Tax Court shall find excessive profits were realized, it has the power to determine that the amount of such excessive profits is less than, equal to or greater than that determined by the Board.

The earnings statement for 1956 has been restated to reflect the Board's determination in the accounts, and the federal income taxes for 1956 have been reduced by $1,241,703 to reflect the refundable federal taxes applicable to such renegotiation refund.

Sales and profits for 1958 and subsequent years are also subject to renegotiation. The Company has no basis for anticipating the final actions of The Renegotiation Board and intends to take such actions as may be required to sustain its position that no excessive profits have been realized for any year. Accordingly, no provisions have been made in the accounts for 1958 or subsequent years.

(B) The Company incurred production costs of approximately $92,000,000 to December 31, 1958 (of which $40,000,000 was incurred in the prior year) under a letter contract, originally contemplating a definitive fixed price contract. In subsequent negotiations the Company and the Government agreed that the definitive contract would be of a cost reimbursement type. Accordingly, pursuant to its regular accounting policy in accounting for contracts of this type, during 1958 sales were recorded in the amount of approximately $98,000,000 on which the net income was approximately $3,165,000 of which approximately $1,375,000 relates to costs incurred in the prior year.

(C) The caption Selling, General and Administrative Expenses has been omitted as being inapplicable since substantially all of the Company's costs and expenses are incurred in connection with production under sales contracts and accordingly have been consistently considered to be directly applicable to performance under such contracts and are, therefore, classified in the financial statements as work in process or cost of sales.

(D) Cost of sales includes provisions for Maryland and Colorado State income taxes as follows: years ended December 31, 1956, $718,500; 1957, $605,883; 1958, $717,970; 1959, $523,649; 1960, $744,906, and for the six months ended June 30, 1961, $694,900.

American-Marietta Company and Consolidated Subsidiaries

The following statements of consolidated income of American-Marietta and consolidated subsidiaries for the five (5) years and six (6) months ended May 31, 1961 include the results of operations from dates of acquisitions of companies acquired, except as to companies merged during the years 1956 to 1960 which were treated for accounting purposes as "poolings of interests", the results of operations of which have been included for all periods. In annual reports of American-Marietta to its shareholders for the years 1956 through 1959, the results of operations of these companies have been included only from the beginning of the fiscal year in which the acquisition took place; and to this extent results of operations shown herein differ from those reported in such years.

The statements reflect certain retroactive adjustments relating to earnings of foreign (except Canadian) subsidiaries and to federal income taxes and interest thereon as described in Notes A and B of Notes to Financial Statements on page 41.

The statements have been examined for the five years ended November 30, 1960, by Ernst & Ernst and other independent accountants, whose reports with respect thereto are included elsewhere in this Proxy Statement. The statements for the periods of six months ended May 31, 1960, and May 31, 1961, respectively, are unaudited, but American-Marietta Company believes that they reflect all adjustments (consisting only of normal recurring accruals) necessary to present a fair statement of the results of operations for these periods. The statements should be read in conjunction with the related consolidated financial statements of American-Marietta Company and consolidated subsidiaries and notes thereto included elsewhere in this Proxy Statement.

(In Thousands)

	Year ended November 30					(Unaudited) Six months ended	
	1956	1957	1958	1959	1960	May 31, 1960	May 31, 1961
Net sales—Note 5	$246,943	$259,948	$278,286	$340,173	$368,107	$160,915	$157,230
Other income	3,566	2,805	2,923	3,987	4,049	1,680	2,317
TOTAL INCOME	$250,509	$262,753	$281,209	$344,160	$372,156	$162,595	$159,547
Costs and expenses—Notes F and I:							
Cost of products sold	$157,004	$169,414	$180,454	$222,086	$241,167	$105,791	$104,823
Selling, advertising, administrative, and general expenses	37,148	38,975	41,119	47,771	56,430	27,215	27,426
Depreciation, depletion, and amortization	7,680	9,030	10,685	13,187	16,248	7,591	8,853
Interest	1,383	1,714	1,959	2,525	4,041	1,541	2,397
Other deductions	3,952	3,336	3,963	4,497	4,841	2,245	2,537
	$207,167	$222,469	$238,180	$290,066	$322,727	$144,383	$146,036
INCOME BEFORE TAXES THEREON	$ 43,342	$ 40,284	$ 43,029	$ 54,094	$ 49,429	$ 18,212	$ 13,511
Taxes on income—estimated:							
Federal—Note B	$ 19,842	$ 18,732	$ 19,910	$ 25,642	$ 22,200	$ 8,450	$ 6,600
State and Canadian	1,474	1,657	1,820	2,110	2,800	800	600
	$ 21,316	$ 20,389	$ 21,730	$ 27,752	$ 25,000	$ 9,250	$ 7,200
NET INCOME—Note 5	$ 22,026	$ 19,895	$ 21,299	$ 26,342	$ 24,429	$ 8,962	$ 6,311
Deduct dividends on 5% Cumulative Preferred Shares—Note 2	789	1,053	1,126	1,037	1,004	504	500
NET INCOME APPLICABLE TO COMMON AND CLASS B COMMON SHARES—Note 3	$ 21,237	$ 18,842	$ 20,173	$ 25,305	$ 23,425	$ 8,458	$ 5,811

NOTES:

(1) Alphabetical notes refer to notes to financial statements of American-Marietta Company and consolidated subsidiaries included elsewhere in this proxy statement.

(2) Amounts deducted for dividends on Preferred Shares include an adjustment for Preferred Shares issued in connection with the acquisition of one company which for accounting purposes was treated as a "pooling of interests."

(3) For information as to dividend restrictions on Class B Common Shares and the basis upon which Class B Common Shares may be converted into Common Shares, reference is made to Note D of notes to financial statements.

(4) The annual dividend requirement on Preferred Shares outstanding at November 30, 1960, was $994,860 and at May 31, 1961, $1,002,995.

(5) Net sales and net income for the six months ended May 31, 1961, are not necessarily indicative of the results of operations which may be expected for the entire year ending November 30, 1961.

The decline in net income for the six months ended May 31, 1961, as compared to the six months ended May 31, 1960, is attributable to the deferment of building and road construction activities due to unfavorable weather in the early part of the period and to a decline in the volume of business in certain products. This decline, however, has not continued into the current quarter, and sales and net income in the months of June and July 1961, have been greater than in the corresponding months of 1960.

PRO FORMA COMBINED SUMMARY OF EARNINGS

The following pro forma combined summary of earnings has been prepared by combining amounts shown in separate statements of earnings of Martin and of American-Marietta and consolidated subsidiaries (without regard for differing fiscal periods and before deduction of dividends on preferred shares of American-Marietta) after giving effect in all periods to a 5% interest charge (net of income taxes) which would have been incurred had amounts of debt existed equal to the aggregate par value of the American-Marietta 5% Cumulative Preferred Shares then outstanding. The pro forma combined summary of earnings should be read in conjunction with the separate statements of earnings of Martin and of American-Marietta and consolidated subsidiaries and notes thereto included elsewhere in this Proxy Statement.

	(In Thousands)						
						First Six Months	
	1956	1957	1958	1959	1960	1960	1961
Sales	$603,517	$683,873	$761,930	$863,880	$1,019,335	$462,901	$565,423
Net earnings	31,341	29,270	32,485	39,181	40,802	16,368	19,609(1)
Dividend requirements on proposed 4½% Cumulative Preferred Stock of Consolidated Company	1,710	1,710	1,710	1,710	1,710	855	855
Net earnings applicable to common shares	29,631	27,560	30,775	37,471	39,092	15,513	18,754

(1) Includes extraordinary profit of $3,750,000 from sale of investment.

PER SHARE EARNINGS

The following tabulation, based on the Pro Forma Combined Summary of Earnings set forth above, compares, for the periods indicated, the net earnings per share of Common Stock of Martin and of Common and Class B Common Shares of American-Marietta and pro forma combined. The per share earnings for American-Marietta are based on the average shares outstanding during each period, after adjustment for stock splits of 5 for 4 in 1956, 3 for 2 in 1957 and 5 for 4 in 1959; shares issued in acquisition of companies treated for accounting purposes as "poolings of interests" have been considered outstanding from the beginning of the fiscal years of such companies in 1956. The per share earnings for Martin are based on the number of shares outstanding at the end of the respective periods (changes during the periods are not considered to be material), after adjustment for stock dividends of 5% in 1956 and 1959, and stock split of 2 for 1 in 1961. The per share earnings, pro forma, repre-

sent the earnings for each period which would have been allocable to each share of Martin and American-Marietta respectively had the consolidation become effective at the beginning of the fiscal year 1956.

	The Martin Company		American-Marietta Company	
	Before Consolidation	Pro Forma (Based on 1.3 for 1 Conversion)	Before Consolidation Applicable to Common and Class B Common	Pro Forma (Based on 1 for 1 Conversion of Common)
1956	$1.59	$2.09	$1.54	$1.61
1957	1.61	1.90	1.33	1.46
1958	1.91	2.03	1.34	1.56
1959	2.17	2.38	1.61	1.83
1960	2.71	2.43	1.46	1.87
First six months:				
1960	1.24	.98	.54	.75
1961	1.56(1)	.92(1)(2)	.36(2)	.71(1)(2)

(1) Exclusive of extraordinary profit of $3,750,000 from sale of investment equivalent to $.60 per share of Martin before consolidation, and $.23 per share of Martin and $.18 per share of American-Marietta on the pro forma basis.

(2) Per share earnings for the six months ended May 31, 1961, are not necessarily indicative of the results of operations which may be expected for the entire year ending November 30, 1961. The decline in per share earnings for the six months ended May 31, 1961, as compared to the six months ended May 31, 1960, is attributable to the deferment of building and road construction activities due to unfavorable weather conditions prevailing in the early part of the period and to a decline in the volume of business in certain products.

BOOK VALUE OF COMMON STOCKS

There is set forth below a comparison of book values per share of Common Stock of Martin at June 30, 1961 with Common Shares (including Class B) of American-Marietta as of May 31, 1961 and pro-forma for the Consolidated Company.

	Martin June 30, 1961	American-Marietta May 31, 1961	Consolidated Company (Pro-forma)
Common stock equity	$101,817,926	$216,184,171	$278,999,097
Shares of Common Stock outstanding at end of period	6,258,387	16,391,985	21,336,699
Book value per share of Common stock	$16.27	$13.19	$13.08
Book value per share of Martin common stock based on exchange ratio of 1.3 to 1			$17.00

PRICE RANGE OF COMMON STOCKS

The Common Stock of Martin is listed on the New York, Philadelphia-Baltimore and Pacific Coast Stock Exchanges and it is anticipated that the Common Stock of the Consolidated Company will be similarly listed. The Common Shares of American-Marietta are traded in the Over-the-Counter Markets in New York and Chicago and other financial centers. The high and low sale prices of the Common Stock of Martin on the New York Stock Exchange by quarterly periods during the two years 1959 and 1960, and the six months ended June 30, 1961, and on June 30, 1961, are shown below. Market quotations on the Martin Common Stock are reported on the basis of the published closing sale prices on the New York Stock Exchange; whereas quotations on the American-Marietta Common Shares for the

same periods are reported on the basis of bid and asked prices as reported by the National Quotation Bureau, Incorporated of New York City, as follows:

	Martin (1)		American-Marietta (2)			
			Bid		Asked	
Quarter ended	Low	High	Low	High	Low	High
March 31, 1959	$16.19	$22.69	$32.00	$44.00	$32.20	$44.20
June 30, 1959	21.31	31.38	41.20	46.40	41.60	46.80
September 30, 1959	17.69	26.75	37.25	44.00	37.50	44.50
December 31, 1959	19.00	25.38	37.63	42.00	37.75	42.25
March 31, 1960	18.63	22.13	34.00	38.38	34.13	38.50
June 30, 1960	18.00	24.43	31.75	36.50	32.00	36.75
September 30, 1960	22.56	29.31	28.75	34.38	29.00	34.50
December 31, 1960	24.13	32.69	27.63	34.13	27.88	34.25
March 31, 1961	29.31	37.88	30.88	40.50	31.00	40.75
June 30, 1961	30.50	39.00	29.00	37.00	29.75	37.13
On August 15, 1961	35.63	36.50	30.13	30.38	30.50	31.00

(1) Adjusted to reflect the two-for-one split effected on February 10, 1961, for stockholders of record January 20, 1961.

(2) Adjusted to reflect five-for-four split in July, 1959.

The Class B Common Shares of American-Marietta are not listed on any exchange, and there has been no trading in such shares.

DIVIDENDS

The constituent companies since December 21, 1960 as to Martin and February 1, 1960 as to American-Marietta have paid quarterly cash dividends on their respective Common Stocks at the annual rate of $1 per share. Subject to future business conditions and the financial condition of the Consolidated Company which may change from time to time, the managements contemplate the continuance of quarterly dividends on the Common Stock of the Consolidated Company at the same rate.

A summary of cash dividends paid per share, adjusted for stock dividends and splits, is presented below:

	The Martin Company	American-Marietta Company
1956	$ .73	$ .58
1957	.76	.68
1958	.76	.80
1959	.76	.85
1960	.85	1.00
First six months:		
1960	.40	.50
1961	.50	.50

MANAGEMENT

Directors

When the consolidation becomes effective, the Board of Directors of the Consolidated Company will consist of eighteen members, nine of whom are present Directors of Martin and nine of whom have been designated by the Board of Directors of American-Marietta.

The following information is presented in respect of the Martin Directors who will become Directors of the Consolidated Company* and will serve as such until the annual meeting in April, 1962:

Name	Principal occupation for last five years	Martin Director Since	Shares of Martin Common Stock beneficially owned August 4, 1961
George M. Bunker	Chairman of the Board and Chief Executive Officer of The Martin Company	1952	186,490
William B. Bergen	Executive Officer of The Martin Company	1958	23,418
William A. Burns	President and Director, Trailmobile, Inc. (Manufacturers truck-trailers)	1957	420
Clarence W. Miles	General Counsel of The Martin Company and Partner of Miles & Stockbridge (Attorneys)	1958	20,265
John E. Parker	Independent Business Consultant	1956	4,000
Everett H. Pixley	Vice President, Mellon National Bank and Trust Company (Banking)	1949	256
Alexander B. Royce	Partner of Chadbourne, Park, Whiteside & Wolff (Attorneys)	1953	508
Duncan M. Spencer	Chairman of the Board and Executive Officer, Fiduciary Trust Company of New York (Banking)	1952	1,000
John L. Sullivan	Partner of Sullivan, Shea & Kenney and of Sullivan & Wynot (Attorneys)	1952	20,004

*Mr. Frank F. Russell, a director of Martin for many years, was unable to accept a place on the Board of Directors of the Consolidated Company due to the fact that he is a director of another corporation whose business is competitive in certain respects with that of the Consolidated Company.

The following information is presented in respect of the American-Marietta Directors and officers who will become Directors of the new company and will serve as such until the annual meeting in April, 1962:

Name	Principal occupation for last five years	American-Marietta Director Since	American-Marietta Shares beneficially owned July 20, 1961 (1)	
			Common	Class B
Grover M. Hermann	Chairman of the Board of American-Marietta Company	1930	11,671	2,445,650
Robert E. Pflaumer	President of American-Marietta	1954	15,826	70,314
Harry N. Huntzicker	Executive Vice President of American-Marietta, previously Vice President of United States Gypsum Company	1961	600	
William J. Cabaniss	President of Southern Cement Company, now a division of American-Marietta	1956	30,000	
John F. Donoho	Financial Vice President of American-Marietta	——	1,365	
Leigh R. Gignilliat, Jr.	Vice President of American National Bank & Trust Company of Chicago	1953	1,272	
J. Clifford Knochel	Vice President of American-Marietta, previously Vice President of Devoe & Reynolds, Inc.	1959	1,701	
Ray L. Oughton	Director and Vice Chairman of the Board of American-Marietta until his voluntary resignation April 18, 1961, and since then Divisional President of the Madison Silo Division of American-Marietta.	1934	5,372	
W. Trent Ragland	President of Superior Stone Company, now a division of American-Marietta	1960	87,535	

(1) Except as otherwise indicated, includes shares owned by trusts in which the person named has an interest, but does not include shares owned by members of the family of the person named in which such person has no interest.

(2) Does not include Common Shares and Class B Common Shares owned by trusts for members of Mr. Hermann's family in which Mr. Hermann has no beneficial interest and by a charitable foundation which was created by him.

(3) Before the consolidation becomes effective, Mr. Pflaumer expects to convert his Class B Common Shares into Common Shares. After the consolidation becomes effective, Mr. Pflaumer will have an option to purchase 19,125 shares of Common Stock of the Consolidated Company from certain other stockholders.

Holders of Class B Common Shares of American-Marietta as of July 20, 1961

Beneficial owner	Number of Shares
American National Bank and Trust Company, et al. Trustees for benefit of Shirley Hermann	311,275
American National Bank and Trust Company, et al. Trustees for benefit of Robert Hermann	340,061
Grover M. Hermann	2,445,650
Grover M. Hermann Foundation	11,720
Robert Hermann	12,169
Robert Pflaumer	70,314
Total	3,191,189

Election of Officers of Consolidated Company

It is presently intended that the directors named above will meet promptly after the consolidation becomes effective and will elect the following executive officers:

George M. Bunker, President and Chief Executive Officer
Grover M. Hermann, Chairman of the Board
William B. Bergen, Vice-President
Robert E. Pflaumer, Vice-President
John F. Donoho, Financial Vice-President and Treasurer
William L. Lucas, Secretary

At the same time it is intended that Clarence W. Miles will be designated as General Counsel of the Consolidated Company.

Remuneration of Directors and Officers

The following table shows certain information with respect to remuneration paid by Martin to its officers and Directors during the year 1960:

Name of individual or identity of group and capacity in which remuneration was received	Aggregate remuneration	Premium paid by Martin under Employees' Pension Fund Plan (1)
George M. Bunker, Chairman of the Board	$150,000(2)	$16,009
William B. Bergen, President and Director	100,000	9,209
Clarence W. Miles, General Counsel and Director	80,000(3)	None
George T. Willey, Vice President	57,000	9,872
All officers and directors as a group (including above) ..	848,001(4)	68,901

(1) The annual benefit estimated to be payable under the Employees' Pension Plan upon retirement at normal retirement age for George M. Bunker and William B. Bergen is $25,000 and for George T. Willey is $13,377. Clarence W. Miles is not eligible under the Plan.

(2) As of April 1, 1959, the Company entered into a five-year contract with George M. Bunker. Under the terms of the contract Mr. Bunker will devote substantially his entire business time as chief executive and general manager of the Company at an annual salary of $120,000 subject to such increases and additional payments as may be determined by the Board of Directors. If he should be permanently disabled or die during the term of the contract the compensation provided thereby shall be continued for a period of six months.

(3) On October 1, 1960 the Company entered into an employment agreement with Clarence W. Miles by which Mr. Miles agreed to serve as General Counsel for a term of 10 years at an annual salary of not less than $80,000. Either party has the right to terminate the agreement after the expiration of 5 years in which event it is agreed that Mr. Miles shall serve in a consulting capacity at an annual salary of $30,000. In the event that Mr. Miles shall be permanently disabled the Company may terminate the agreement and thereupon the Company shall be obligated to pay the compensation as General Counsel to Mr. Miles for a period of 6 months or in the event of his death during the 6 months period to his widow or his estate.

(4) Does not include $40,900 paid for legal services to Sullivan, Shea & Kenney, of which firm John L. Sullivan, a Director, is a partner; or $32,142 paid for legal services to Miles & Stockbridge, of which firm Clarence W. Miles is a partner.

The following table shows certain information with respect to remuneration paid by American-Marietta to certain of its officers and Directors who will become Directors of the Consolidated Company, during the fiscal year ended November 30, 1960:

Name	Title	Salaries and Fees	Bonuses	Pension, Profit Sharing and Retirement Benefits: Accrued for Year 1960	Pension, Profit Sharing and Retirement Benefits: Estimated Annual Benefits
Grover M. Hermann	Chairman of Board of Directors	$ 98,333	$ —	—	$ 6,000(1)(2)
Robert E. Pflaumer	President and Director	80,000	40,000	$ 3,917	22,064(1)
William J. Cabaniss	Divisional General Manager and Director	36,000	—	1,718	5,220(1)
John F. Donoho	Financial Vice President	40,000	10,000	—	—
J. Clifford Knochel	Vice President and Director	45,000	5,000	2,168	7,000(1)
All Directors and Officers	Directors and Officers	1,108,503	333,210		

(1) Including benefits from contributions by participants under Company's Salaried Employees' Retirement Plan.
(2) Maximum vested benefits under Company's Salaried Employees' Retirement Plan.

Stock Options of Martin

During the period from January 1, 1960 to August 4, 1961, (i) Mr. Bunker exercised options to purchase 42,000 shares (representing all of his then remaining unexercised options) at $15.89 per share, the closing market value on the date of exercise being $36.63; (ii) Mr. Bergen exercised options to purchase 9,260 shares at $12.15 per share, the market value on the date of exercise being $26.88; (iii) Mr. Miles exercised options to purchase 12,600 shares at $15.89 per share and 7,665 shares (representing all of his then remaining unexercised options), at $19.52 per share, the market value per share on the dates of exercise ranging from $27.88 to $36.63; and (iv) Mr. Willey exercised options to purchase 2,100 shares at $15.89 per share, the market value on the date of exercise being $32.31 per share.

During the same period all officers and directors of Martin as a group, including those previously set forth in detail, exercised options as follows:

Quarter or Period Ended	Shares	Option Price	Market Price on Date Purchased
Sept. 30, 1960	19,032	$12.15—15.89	$26.88—28.13
Dec. 31, 1960	21,000	15.89—19.52	25.94—31.44
Mar. 31 1961	2,100	15.89	32.31
June 30, 1961	14,700	15.89	37.50—38.00
Aug. 4, 1961	45,465	15.89—19.52	36.63
	102,297		

During the same period options expiring April 30, 1968 to purchase 6,000 shares at $19.38 per share and 16.000 shares at $23.13 per share were granted to all officers and directors as a group, the price per share being the market price on the date options were granted.

During February 1961 Mr. Willey sold 1,000 shares of Martin Common Stock, the net proceeds of which sale amounted to $34,555.42. This sale was within less than 6 months of the date when he exercised an option to purchase 1,050 shares (2,100 shares after giving effect to the 2 for 1 stock split effected on February 10, 1961 for stockholders of record January 20, 1961) and under the provisions of Section 16(b) of the Securities Exchange Act of 1934 any profit realized from such sale inures to and is recoverable by the Company. Based on the provisions of Rule X 16B-6 of the Securities and Exchange Commission the profit on the sale amounted to $10,119.82. Appropriate steps are being taken by the Company to recover the short term profit.

The number of shares issued and the price per share have been adjusted for stock dividends subsequent to the issuance of the respective stock options.

Subsequent to June 30, 1961, Martin has granted options or agreed to grant options to 2 employees other than officers and directors, to purchase in the aggregate 10,000 shares of its Common Stock at the closing market price on the date of the grant. After the effective date of the consolidation no further options will be granted under the Stock Option Plans of Martin. No shares of Common Stock will be reserved by the Consolidated Company for issuance upon options in lieu of the 19,000 shares of Common Stock of Martin which were still reserved for the granting of options when its plans terminate on the effective date of the consolidation.

All of the foregoing transactions reflect the 2-for-1 stock split effected on February 10, 1961, for stockholders of record January 20, 1961.

DESCRIPTION OF COMMON STOCK OF MARTIN

The only class of capital stock of Martin authorized and outstanding is the Common Stock without par value which has exclusive voting rights. The holders of Common Stock are entitled to receive such dividends as are declared by the Board of Directors out of any funds of Martin legally available therefor and are entitled to share pro rata in the distributable assets of Martin in the event of any liquidation, dissolution or winding up of Martin. Martin may not declare any dividend or make any distribution on its shares of stock for value, or permit a Subsidiary to purchase, redeem or otherwise acquire or retire for value any shares of stock of Martin, if upon giving effect thereto the aggregate amount expended for such purposes subsequent to December 31, 1957, shall exceed the sum of (a) the accumulated consolidated earnings (or deficit) of Martin and its Subsidiaries earned subsequent

to December 31, 1957 (without taking into consideration any net refunds made by Martin under the Renegotiation Act of 1951, for periods prior to 1958), (b) the aggregate net consideration realized from the sale after December 31, 1957, of stock of Martin, (c) the aggregate net consideration realized from the sale after December 31, 1957, of any indebtedness of Martin which has been converted into shares of stock of Martin subsequent to December 31, 1957, and (d) the sum of $5,000,000. Each holder of Common Stock is entitled to one vote for each share of stock outstanding in his name. Without assent or other action of the stockholders, the Board of Directors may from time to time receive subscriptions for or sell any or all of the then unissued shares of Common Stock, whether the same be any of the originally authorized shares or any increase thereof, and shall be under no obligation to offer the same to existing stockholders. In the opinion of Counsel for Martin, the presently outstanding shares of Common Stock are, and the shares to be issued on exercise of the Warrants to purchase shares of Common Stock issued November 1, 1958, will upon compliance with the terms of the Warrants be fully paid and nonassessable.

DESCRIPTION OF COMMON SHARES AND CLASS B COMMON SHARES OF AMERICAN-MARIETTA

Certain provisions applicable to the Common Shares and the Class B Common Shares of American-Marietta are hereafter summarized. Such summary does not contain all of the terms and provisions applicable to said shares and no summary and no effect is given as to the provisions applicable to the 5% Cumulative Preferred Shares because those shares will be redeemed prior to the special meeting of stockholders of American-Marietta.

Dividends

Dividends may be paid on Common Shares and Class B Common Shares out of any funds legally available for such purpose when and as declared by the Board of Directors, except that no dividends may be declared or paid on Class B Common Shares in any year unless an equal amount plus $2 is paid for that year on the Common Shares, and except that any dividend or distribution on the Common Shares in Common Shares or on the Class B Common Shares in Class B Common Shares may be made only so long as there is no greater proportionate increase in the number of Class B Common Shares outstanding than in the Common Shares outstanding as a result of such dividend or distribution.

The terms of the Unsecured Notes referred to under the caption "Capitalization" of American-Marietta payable to insurance companies set forth certain minimum requirements as to consolidated working capital and restrict the payment of cash dividends and purchases or other retirements of Capital Shares. In this connection, reference is made to Note "C" to Financial Statements.

Voting Rights

The holder of each outstanding share regardless of class is entitled to one vote for each share held on each matter submitted to a vote at a meeting of shareholders and may cumulate votes for the election of directors.

Liquidation Rights

In the event of any dissolution, liquidation or winding up, the remaining assets of the Company shall be distributed to the holders of the Common Shares of both classes, without preference between the holders of the Common Shares and Class B Common Shares. Neither a merger nor consolidation of the Company with or into any other corporation, nor a reorganization, nor a purchase or redemption of all or a part of the outstanding shares of any class, nor the sale of the property and business of the Company substantially as an entirety, shall be considered a liquidation or winding up of the Company.

Preemptive Rights

No holder of any shares of any class of the Company has any right, as such holder, to purchase or otherwise acquire any shares of any class of the Company, now or hereafter authorized, of any se-

curities convertible into any such shares, or warrants or other instruments to subscribe for or otherwise acquire any such share, whether the same be unissued or issued and thereafter acquired by the Company.

Conversion Rights

Under the Articles of Incorporation of the Company, the Class B Common Shares are convertible, subject to the restrictions of such conversion set forth in the Articles of Incorporation, into Common Shares on a share for share basis. The conversion rights of certain of these shares are further restricted by an Agreement dated November 1, 1958, between Grover M. Hermann, Shirley Hermann and Robert Hermann. At this date 340,523 Class B Common Shares are eligible for conversion and the remaining shares are subject to the conversion restrictions of the Agreement and may not be converted until they become eligible for conversion thereunder as follows: 62,500 shares on each January 1 and July 1 to and including July 1, 1969. The conversion restrictions terminate completely on January 1, 1970. The agreement provides that the shares eligible for conversion thereunder shall be proportionately increased in the event of stock dividends, stock splits or other increases in the outstanding Class B Common Shares; that the restrictions of the Agreement shall continue in effect with respect to the shares subject thereto irrespective of any transfers of shares by the original parties; and that the Agreement shall be irrevocable except that it may be amended or terminated with the consent of the holders of not less than ⅔ of the outstanding Class B Common Shares, as a class, and of the holders of not less than ⅔ of the outstanding Common Shares, as a class.

The Agreement further provides that if, as a result of certain mergers or consolidations or acquisitions of assets, the persons who were the shareholders of the Company immediately prior to any such transaction shall not be or become the holders of shares representing at least 60% of the voting power of all shares, and at least 50% of each class of shares (other than Preferred Shares, as defined) of the Company, or of the acquiring or surviving corporation, outstanding immediately after, or issuable as a part of, such transaction, the conversion restrictions imposed by the Agreement may be modified or terminated by the holder or holders of not less than 60% of the then outstanding Class B Common Shares subject to the Agreement.

DESCRIPTION OF STOCK OF CONSOLIDATED COMPANY

Dividends

After cumulative dividends have been paid at the rate of 4½% on the Preferred Stock, dividends may be paid on the Common Stock, when and as declared by the Board of Directors and subject to the limitations provided in the terms of the Preferred Stock and the 5½% Sinking Fund Debentures and in A-M's long term notes. See footnotes to Capitalization of Consolidated Company and to Financial Statements of the Constituent Companies in this Proxy Statement.

Voting Rights

The holders of Common Stock will be entitled to one vote per share, but will not have cumulative voting rights. The holders of Preferred Stock will have no voting rights except as specifically provided by law and except that in the event of default in payment of dividends on the Preferred Stock in an amount equal to four quarterly dividends or in the event of a default in the Sinking Fund provided for the Preferred Stock, the Preferred Stock will have the right to elect one-third of the board of directors.

Liquidation Rights

After payment to the Preferred Stock of $100 per share plus accrued dividends plus $5 per share if the liquidation is voluntary, the Common Stock will be entitled to all remaining assets of the Company properly distributable to stockholders upon any liquidation of the Consolidated Company.

Miscellaneous

The Preferred Stock is subject to redemption as a whole, but not in part, at any time after October 1, 1964, at $105 per share plus accrued dividends. The Preferred Stock is entitled to a sinking fund as set forth under "Capitalization of the Consolidated Company". The Company may not change its stock provisions in certain respects adverse to the Preferred Stock or issue or sell any additional Preferred Stock or stock ranking prior thereto or on a parity therewith without the consent of the holders of two-thirds of the Preferred Stock. There are no preemptive rights.

Reference is made to the stock terms of the Consolidated Company set forth in full in the Articles included in Appendix A.

TAX CONSEQUENCES

In the opinion of counsel for the constituent companies the consolidation will not result in taxable gain to either of the constituent companies and stockholders of the constituent companies will not realize any taxable gain or deductible loss as a result of the conversion of their stock into stock of the Consolidated Company. Gain or loss will be recognized to stockholders who may dissent and receive in cash the value of their stock in appraisal proceedings, and gain, if any, will be recognized to stockholders of Martin with respect to the proceeds of sale of any fractional share interest, but not in excess of the amount received upon such sale.

RIGHTS OF DISSENTING STOCKHOLDERS

Stockholders of Martin who object to the consolidation have such rights as objecting stockholders in respect of the proposed consolidation as are provided by Section 73 of Article 23 of the Annotated Code of Maryland (1957 Edition). Under this Section, objecting stockholders shall be entitled to demand and receive payment of the amount equal to the fair value of their stock. If such stockholders (1) shall prior to, or at, the special meeting of stockholders, file with Martin objection in writing to the proposed consolidation; (2) shall not vote in favor of the consolidation; (3) shall within twenty days after the Articles of Consolidation and Plan have been accepted for record by the Department of Assessments and Taxation of Maryland, make upon the Consolidated Company written demand for payment for his stock, stating the number and class of shares for which payment is demanded. Any stockholder, who fails to comply with the requirements of this Section within the time specified, shall be bound by the terms of the consolidation, merger or transfer. Merely voting against, or a direction in a proxy to vote against, the adoption of the Articles of Consolidation and Plan will not comply with the conditions required of objecting stockholders by Section 73 of Article 23 of the Annotated Code of Maryland (1957 Edition).

The Consolidated Company must deliver or mail to each objecting stockholder written notice of the date of acceptance for record of the Articles of Consolidation and Plan by the Department of Assessments and Taxation of Maryland, and may also deliver or mail to each such stockholder a written offer to pay for his stock at a price deemed to be the fair value thereof.

Within fifty days after the acceptance of the Articles of Consolidation and Plan for record by the Department of Assessments and Taxation of Maryland, either the Consolidated Company or any objecting stockholder who has not received payment for his stock may petition a court of equity in the City of Baltimore to determine the fair value of such stock. If such court finds that any objecting stockholder is entitled to have the value of the stock determined, it shall appoint three disinterested appraisers to determine the fair value of such stock. Such value shall be determined as of the close of business on the day of the stockholder's vote on the Articles of Consolidation and Plan to which objection was made, excluding any appreciation or depreciation, directly or indirectly, consequent upon such action or the proposal thereof. The appraisers are required to file a written report of their findings as to the fair value of the stock of the objecting stockholder, and the statute provides for appropriate action to be taken by the court in relation to such report of the appraisers.

The costs of valuation proceedings, which will include the costs of making the appraisal, are determined by the Court and will be assessed against the Consolidated Company; provided, that all or any part of the costs may be apportioned and assessed as the Court deems equitable against any or

all of the objecting stockholders parties to the proceedings, if, taking into consideration the price which the Consolidated Company offered for such stock, the financial statements and other information furnished, and such other circumstances as the Court deems relevant, the Court finds that the action of the stockholders, in failing to accept the offer was arbitrary and vexatious or not in good faith.

OTHER MATTERS

Vote needed to approve Proposed Consolidation

The affirmative vote of a majority of the outstanding shares is required to authorize the proposed consolidation.

Voting Rights

As of the close of business on July 31, 1961, Martin had outstanding 6,257,739 full shares of Common Stock and Scrip Certificates for 10,901 tenths of a share. Shareholders are entitled to one vote for each full share registered in their names. There are no classes of stock of Martin other than Common Stock. Shareholders of record at the close of business on August 30, 1961, the record date fixed by the Board of Directors, will be entitled to vote at the meeting.

Miscellaneous

The Management knows of no business constituting a proper subject for action by the stockholders which will be presented for consideration at the meeting other than that shown above.

The proxies are solicited by the Management of Martin and the cost of such solicitation has been or will be paid by Martin. In addition to solicitation by mail, arrangements may be made with brokerage houses and other custodians, nominees, and fiduciaries to send proxy material to their principals, and Martin may reimburse them for their expense in so doing. Martin has retained Georgeson and Company of New York City to aid in the solicitation of proxies at a cost estimated to be about $3,000. To the extent necessary in order to assure sufficient representation, officers and regular employees of Martin may request the return of proxies personally, by telephone or telegram. The extent to which this will be necessary depends entirely upon how promptly proxies are received, and stockholders are urged to send in their proxies without delay.

Any proxy given pursuant to this solicitation may be revoked by the person giving it at any time before its exercise. The shares of Martin's outstanding Common Stock represented by each proxy received before the Special Meeting and not revoked will be voted in favor of the proposed Consolidation Agreement and Plan set forth in the accompanying Notice of Special Meeting of Stockholders and in this statement, unless the proxies are instructed in the proxy to do otherwise.

W. L. Lucas, *Secretary*

August 30, 1961

IMPORTANT

TO INSURE REPRESENTATION AT THE SPECIAL MEETING, STOCKHOLDERS ARE REQUESTED TO SIGN AND MAIL PROMPTLY THE ACCOMPANYING PROXY FOR WHICH A RETURN ENVELOPE IS PROVIDED. NO POSTAGE IS REQUIRED IF MAILED IN THE UNITED STATES. IF YOU DO ATTEND THE MEETING, YOU MAY VOTE THERE IN PERSON SHOULD YOU SO DESIRE.

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OPINION OF INDEPENDENT CERTIFIED PUBLIC ACCOUNTANTS

Board of Directors,
The Martin Company,
Baltimore, Maryland

We have examined the balance sheet of The Martin Company as of December 31, 1960, and the related statements of earnings, additional paid-in capital and earnings reinvested for the five years then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances; although we were unable to obtain satisfactory confirmation of accounts receivable from the Government, we satisfied ourselves as to these accounts by other means.

In our opinion, subject to such adjustments (which neither we nor the Company are able to evaluate) as may be required as a result of renegotiation as described in Note A, the accompanying balance sheet and statements of earnings (set forth in the Proxy Statement under the heading "Statement of Earnings"), additional paid-in capital and earnings reinvested present fairly the financial position of The Martin Company at December 31, 1960, and the results of its operations for the five years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

TOUCHE, ROSS, BAILEY & SMART

Baltimore, Maryland
July 24, 1961
As of February 20, 1961

THE MARTIN COMPANY

COMPARATIVE BALANCE SHEETS

ASSETS

	(Unaudited) June 30, 1961	December 31, 1960
CURRENT ASSETS:		
Cash	$ 24,056,497	$ 16,934,296
Prime commercial paper, at cost and accrued interest	4,911,250	
Accounts receivable, including amounts due from the United States Government of $73,339,710 at June 30, 1961 and $98,251,167 at December 31, 1960	75,573,529	99,845,948
Unbilled costs under cost-type contracts	41,093,999	57,885,827
Materials, labor and other costs incurred on contracts in progress (including advances to subcontractors) less estimated costs applied to deliveries—not in excess of realizable value (Note B), less progress payments of $5,836,127 at June 30, 1961 and $6,894,815 at December 31, 1960	10,142,217	8,312,863
Prepaid expenses	1,277,687	906,900
TOTAL CURRENT ASSETS	$157,055,179	$183,885,834
FEDERAL INCOME TAX REFUNDABLE ON RENEGOTIATION PAYMENT FOR 1953 (Note A)	1,636,567	1,636,567
INVESTMENTS—at cost:		
General Precision Equipment Corporation		10,103,002
EPSCO, Incorporated	2,050,000	
Nuclear Corporation of America	972,563	850,776
PROPERTY, PLANT AND EQUIPMENT, at cost:		
Land, including $533,884 not used in operations	3,583,473	3,584,103
Buildings, including $501,899 at June 30, 1961 and $632,941 at December 31, 1960 not used in operations	52,740,530	48,753,961
Machinery and equipment	39,828,289	38,358,380
	$ 96,152,292	$ 90,696,444
Less accumulated depreciation and amortization	45,761,096	40,564,908
	$ 50,391,196	$ 50,131,536
	$212,105,505	$246,607,715

See notes to financial statements.

THE MARTIN COMPANY
COMPARATIVE BALANCE SHEETS

LIABILITIES AND STOCKHOLDERS' EQUITY

	(Unaudited) June 30, 1961	December 31, 1960
CURRENT LIABILITIES:		
Notes payable to banks	$ —	$ 33,000,000
Accounts payable, including amounts repayable under target incentive contracts	42,158,721	65,615,964
Salaries, wages and withheld taxes	26,682,932	19,897,639
Federal taxes on income	13,550,105	11,375,437
Other taxes and miscellaneous	4,752,561	2,980,219
5½% Sinking Fund Debentures—current portion	2,250,000	2,250,000
TOTAL CURRENT LIABILITIES	$ 89,394,319	$135,119,259
RENEGOTIATION REFUND, net of taxes (Note A)	5,393,260	5,393,260
5½% Sinking Fund Debentures, due November 1, 1968, less current portion (Note C)	15,500,000	15,500,000
STOCKHOLDERS' EQUITY:		
Capital stock:		
Authorized 12,000,000 shares of common stock without par value at June 30, 1961, and 6,000,000 shares of $1 par value Capital Stock at December 31, 1960 (Notes D, F)		
Outstanding:		
6,258,387 shares at June 30, 1961	3,129,193	
3,105,217 shares at December 31, 1960		3,105,217
Additional paid-in capital	40,366,775	39,583,769
Earnings reinvested (Note C)	58,321,958	47,906,210
	$101,817,926	$ 90,595,196
	$212,105,505	$246,607,715

See notes to financial statements.

THE MARTIN COMPANY

STATEMENTS OF ADDITIONAL PAID-IN CAPITAL AND EARNINGS REINVESTED

	Year ended December 31,					(Unaudited) Six months ended	
	1956	1957	1958	1959	1960	June 30, 1960	June 30, 1961
ADDITIONAL PAID-IN CAPITAL:							
Balance, beginning of period	$26,631,655	$32,381,899	$32,541,595	$32,575,377	$38,702,716	$38,702,716	$39,583,769
Excess of proceeds over par value of capital stock issued:							
On exercise of stock warrants	14,056			62			195,960
On exercise of stock options	484,740	159,696	33,782	125,041	884,718	65,740	587,046
Excess of amount assigned to stock dividends over par value of stock-transferred from earnings reinvested	5,251,448			6,002,236			
Amount assigned to scrip certificates cancelled-transferred to earnings reinvested					(3,665)		
Balance, end of period	$32,381,899	$32,541,595	$32,575,377	$38,702,716	$39,583,769	$38,768,456	$40,366,775
EARNINGS REINVESTED:							
Balance, beginning of period (Note A)	$21,573,647	$21,533,461	$26,739,106	$33,788,269	$36,294,070	$36,294,070	$47,906,210
Add:							
Net earnings for the period	9,693,468	9,879,638	11,725,555	13,336,981	16,854,540	7,647,710	13,538,418
Cancellation of scrip certificates for 166.6 shares					3,832		
Deduct dividends paid:							
Cash (per share—1956/59, $1.60; 1960, $1.70; 1961, $.50)	4,344,010	4,673,993	4,676,392	4,682,548	5,246,232	2,460,058	3,122,670
Stock (5% in 1956, 138,196 shares; 5% in 1959, 146,396 shares)	5,389,644			6,148,632			
Balance, end of period	$21,533,461	$26,739,106	$33,788,269	$36,294,070	$47,906,210	$41,481,722	$58,321,958

See notes to financial statements

THE MARTIN COMPANY

NOTES TO FINANCIAL STATEMENTS

(A) Renegotiation:

See Note (A) to Statement of Earnings included elsewhere in this Proxy Statement.

(B) Inventories:

Title to inventories in the amount of approximately $7,600,000 at June 30, 1961 and $8,100,000 at December 31, 1960 had passed to the United States Government as consideration for progress payments. Material, labor and other costs incurred on contracts in progress less estimated costs applied to deliveries, not in excess of realizable value, used in determining cost of sales for each of the six years ended December 31, 1960 were, respectively, $82,524,902; $55,610,080; $39,168,843; $43,060,212; $36,374,520; $15,207,678 and for the six months ended June 30, 1961, $15,978,344.

(C) Debentures:

Sinking fund provisions of the Debentures require annual redemptions of $2,250,000. Among other restrictions under the Debenture Agreement, $14,514,499 of the earnings reinvested at December 31, 1960 and $13,707,517 of the earnings reinvested at June 30, 1961 were not available for the payment of dividends.

(D) Shares of capital stock were reserved for issuance as follows:

	12/31/60	6/30/61
(a) At a price of $7.47 per share at December 31, 1960 and $3.74 at June 30, 1961 upon presentation of capital stock purchase warrants expiring April 10, 1962, issued in connection with the sale of Ten-Year 4% Convertible Subordinated Notes	6	12
(b) Upon exercise at $40.00 per unit (consisting of 1.05 shares at December 31, 1960 and 2.10 shares at June 30, 1961) to and including November 1, 1963, and at $45.00 per unit thereafter to and including November 1, 1968, of warrants issued in connection with the Company's 5½% Sinking Fund Debentures	210,000	409,435
(c) Under a restricted stock option plan for officers and other key employees	134,792	232,199
Total	344,798	641,646

(E) Stock Options

In 1952 and 1958 stock option plans for officers and key employees were approved by the stockholders providing for the granting of options to purchase 200,000 and 140,000 shares respectively of the Company's capital stock. The plans provided that the number of shares and the issue price were subject to adjustments as might be necessary to protect the optionee against dilution. Accordingly, because of stock dividends declared and a 2 for 1 stock split subsequent to granting of options, the total number of shares subject to option under the 1952 plan was increased to 225,930 and under the 1958 plan to 265,680, and the effect of such adjustments is reflected in the information presented below. The option price under both plans is the closing price of the Company's stock on the New York Stock Exchange on the day when the particular option is granted; options may not expire more than ten years from the date of grant, nor may they be exercised in less than one year from the date of grant under the 1952 plan nor two years under the 1958 plan.

The number of shares with respect to which options under the plans were granted through June 30, 1961 and the years that such options became or will become exercisable, are as follows:

Date of Grant	Date Exercisable	Number of Shares	Option Price Per Share	Option Price Total	Market Quotations at Date Exercisable Per Share	Market Quotations at Date Exercisable Total
1952	1954–1957	95,877	$ 8.04– 9.75	$ 828,750	$18.63–43.50	$3,412,868
1952	1953	75,675	9.66–10.63	799,531	13.75	1,034,687
1953	1954	18,300	11.03–13.38	215,469	24.88–28.63	418,281
1955	1956	18,048	12.15–28.13	360,000	34.00	456,960
1957	1958	16,030	18.69–39.25	387,113	32.13–33.25	318,419
1958	1960	154,980	15.89–33.10	2,838,375	44.25–56.88	3,973,331
1959	1961	14,700	18.39–46.91	317,500		
1960	1962	64,000	19.00–56.63	1,400,625		
1961	1963	10,000	32.62–38.00	357,750		
		467,610		$7,505,113		

Since inception of the plans through June 30, 1961, options under the plans were exercised as follows:

Year Exercised	Number of Shares	Option Price Per Share	Option Price Total	Market Quotations at the various dates Options were Exercised Per Share	Market Quotations at the various dates Options were Exercised Total
1953	1,350	$10.63	$ 14,344	$14.63–15.88	$ 19,869
1954	89,650	$ 9.75–13.38	951,281	19.38–33.00	2,389,868
1955	16,500	8.86–12.16	152,688	28.13–38.38	486,613
1956	62,948	8.44–11.58	547,688	40.88–43.13	2,578,197
1957	18,742	8.04–25.51	178,438	42.38–46.63	831,457
1958	2,094	11.03–25.51	35,875	31.75–33.25	69,157
1959	4,116	25.51–39.25	129,156	42.75–59.75	219,766
1960	29,985	24.30–39.05	914,700	38.75–63.88	1,681,382
1961	34,026	12.12–31.79	605,738	31.63–65.25	1,342,702
	259,411		$3,529,908		$9,619,011

At June 30, 1961, options not yet exercised under the plans were as follows:

Date of Grant	Date Exercisable	Number of Shares	Option Price Per Share	Option Price Total	Market Quotations at Date of Grant Per Share	Market Quotations at Date of Grant Total
1955	1956	4,524	$12.12	$ 54,844	$12.12	$ 54,844
1957	1958	10,815	$18.69–19.52	205,024	$18.69–19.52	205,024
1958	1960	108,360	15.89–16.55	1,722,837	15.89–16.55	1,722,837
1959	1961	10,500	19.82–23.45	234,125	19.82–23.45	234,125
1960	1962	64,000	19.00–28.31	1,400,625	19.00–28.31	1,400,625
1961	1963	10,000	32.63–38.00	357,750	32.63–38.00	357,750
		208,199		$3,975,205		$3,975,205

Capital stock issued upon exercise of options was recorded at amounts received; no charges have been reflected in income with respect to stock options. Options cancelled have been reflected by reducing the number of shares originally covered by options.

(F) On January 9, 1961 the Certificate of Incorporation was amended to change the previously authorized 6,000,000 shares of capital stock of the Company to 12,000,000 shares of common stock without par value. A 2 for 1 stock split was effected on February 10, 1961 for stockholders of record on January 20, 1961.

(G) **Pensions:**

A pension plan was established for employees as of July 1, 1943, providing for pension payments and death benefits through an annuity contract with a legal reserve insurance company. Effective May 1, 1951, additional pension plans were established for hourly employees providing maximum benefits, as now amended, of $67.50 per month, reduced by any retirement benefits accrued under the earlier plan. Maximum benefits under the latter plans are payable after 30 years of credited service with the Company and retirement at or after age 65. Disability benefits are likewise provided. Unfunded past service costs under the latter plans estimated to be $5,179,000 at December 31, 1960 and $8,030,000 at June 30, 1961 are being funded over a period not to exceed 30 years. The earlier pension plan has been amended so as to cover salaried employees only, providing at or after age 65 for monthly benefit payments based upon compensation and length of service. The plans are non-contributory. The aggregate cost of these plans for 1960 was $5,209,984 and it is estimated the aggregate cost of these plans for 1961 will be approximately $5,900,000. The Company has the right to discontinue these plans at any time, except that it has agreed not to change or terminate the Pension Plans for hourly paid employees prior to December 31, 1963.

(H) **Property, plant and equipment:**

The cost of facilities which are owned by the Company, other than those covered by certificates of necessity, is depreciated over estimated useful lives on a straight-line basis for assets acquired prior to January 1, 1954 and on a sum of the years-digits basis for assets acquired after that date, as permitted by the Internal Revenue Code.

These rates may be summarized as follows:

Class of assets	Rate of depreciation
Building and building equipment	2% to 10%
Other land improvements	4% to 11¼%
Machinery and equipment	5% to 25%
Office equipment	6⅔% to 10%
Automobiles, trucks and tractors	25%
Airplanes and boats	20% to 25%

Amortization is computed in accordance with the provisions of the Internal Revenue Code on assets covered by certificates of necessity.

Maintenance and repairs are charged to income as incurred and expenditures for major renewals and betterments are capitalized.

At the disposal or retirement of properties, the difference between the depreciated value of assets and the amount realized is charged against, or credited to, revenue.

Effective with December 31, 1953, fully depreciated property, plant and equipment was eliminated from the accounts.

(I) Supplementary profit and loss information:

	Year Ended December 31,					(Unaudited) 6 Months Ended June 30,
	1956	1957	1958	1959	1960	1961
Maintenance and repairs	$4,727,777	$5,284,499	$5,713,805	$6,156,011	$ 5,794,036	$3,432,504
Depreciation and amortization of property, plant and equipment	$1,864,672	$4,738,304	$8,650,197	$9,654,192	$10,618,657	$5,550,985
Taxes, other than income and excess profits taxes:						
Real estate and personal property, etc.	$ 852,002	$1,512,807	$2,308,548	$2,497,422	$ 2,929,573	$1,131,572
Federal and state social security	2,740,454	3,788,603	4,056,717	5,886,716	7,287,253	6,919,148
	$3,592,456	$5,301,410	$6,365,265	$8,384,138	$10,216,826	$8,050,720
Rents	$1,123,739	$1,897,492	$2,039,383	$2,529,297	$ 3,518,589	$2,567,475
Royalties	729,990	94,750	—	—	—	—
	$1,853,729	$1,992,242	$2,039,383	$2,529,297	$ 3,518,589	$2,567,475

The major portion of the above charges has been charged to cost of sales. Amounts charged to other accounts were not material. There were no management or service contract fees.

ACCOUNTANTS' REPORT

Board of Directors
American-Marietta Company
Chicago, Illinois

We have examined the consolidated balance sheet of American-Marietta Company and consolidated subsidiaries as of November 30, 1960, and the related statements of consolidated income, additional capital and accumulated earnings for the period of five years then ended. Our examinations were made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. The accounts of one company and its subsidiary for the years ended December 31, 1956, 1957, and 1958, and the accounts of another company and its subsidiaries for the years ended December 31, 1956, 1957, 1958, and 1959, were examined by other independent accountants, and the financial statements of these companies have been incorporated in the aforementioned consolidated financial statements in reliance on the reports, included elsewhere in this proxy statement, of such accountants.

In our opinion, based upon our examinations and the reports of the other accountants referred to above, the accompanying balance sheet and statements of income, additional capital and accumulated earnings present fairly the consolidated financial position of American-Marietta Company and consolidated subsidiaries at November 30, 1960, and the consolidated results of their operations for the period of five years then ended (including on a combined basis the operations of the merged companies referred to in Note A to the financial statements) in conformity with generally accepted accounting principles applied on a consistent basis.

ERNST & ERNST

Chicago, Illinois
July 24, 1961
(As of January 16, 1961)

ACCOUNTANTS' REPORT

Board of Directors
American-Marietta Company
Chicago, Illinois

We have examined the statements of consolidated earnings and retained earnings of Dewey Portland Cement Company and subsidiaries for the four years ended December 31, 1959. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We have not examined financial statements of the Company and subsidiaries for any period subsequent to December 31, 1959.

In our opinion, such financial statements (not shown separately herein) present fairly the results of operations of Dewey Portland Cement Company and subsidiaries for the four years ended December 31, 1959, in conformity with generally accepted accounting principles applied on a consistent basis.

PEAT, MARWICK, MITCHELL & CO.

Kansas City, Missouri
July 24, 1961
(As of January 25, 1960)

ACCOUNTANTS' REPORT

Board of Directors
American-Marietta Company
Chicago, Illinois

We have examined the financial statements of Superior Stone Company and subsidiary for the three years ended December 31, 1958. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the statements of income and accumulated earnings of Superior Stone Company and subsidiary (not shown separately herein) present fairly the results of operations of Superior Stone Company and subsidiary for the three years ended December 31, 1958, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

W. M. RUSS & CO.

Raleigh, North Carolina
July 24, 1961
(As of February 19, 1959)

AMERICAN-MARIETTA COMPANY AND CONSOLIDATED SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

ASSETS

	(Unaudited) May 31, 1961	November 30 1960
CURRENT ASSETS		
Cash	$ 16,126,154	$ 26,452,714
Trade receivables, less allowances of $800,000	56,407,937	52,760,689
Inventories—Note E	69,577,416	60,808,475
Prepaid expenses	3,804,582	2,334,683
Total Current Assets	$145,916,089	$142,356,561
INVESTMENTS AND OTHER ASSETS		
Investments in and advances to foreign (except Canadian) subsidiaries—Note A	$ 3,188,688	$ 2,911,643
Intangibles arising upon acquisition of companies, less amortization	14,351,267	13,482,415
Sundry investments and accounts	8,808,414	8,989,576
	$ 26,348,369	$ 25,383,634
PROPERTY, PLANT, AND EQUIPMENT—principally on the basis of cost		
Land, limestone reserves, and other deposits	$ 22,179,538	$ 21,047,562
Buildings and improvements	68,795,687	65,298,907
Machinery and equipment	193,896,296	185,414,330
Construction in progress (estimated additional cost to complete at May 31, 1961—$7,500,000)	31,061,100	23,700,775
	$315,932,621	$295,461,574
Less allowances for depreciation, depletion, and amortization	118,933,936	109,711,346
	$196,998,685	$185,750,228
	$369,263,143	$353,490,423

See notes to financial statements.

AMERICAN-MARIETTA COMPANY AND CONSOLIDATED SUBSIDIARIES

CONSOLIDATED BALANCE SHEETS

LIABILITIES AND SHAREOWNERS' INVESTMENT

	(Unaudited) May 31, 1961	November 30, 1960
CURRENT LIABILITIES		
Notes payable to banks	$ 34,000,000	$ –0–
Accounts payable	11,592,812	11,819,356
Accrued compensation and other expenses	8,221,686	11,452,878
Federal, state, and Canadian taxes on income—estimated—Note B	8,188,639	25,589,471
Long-term debt payable within one year	2,130,359	2,160,897
Total Current Liabilities	$ 64,133,496	$ 51,022,602
LONG-TERM DEBT—Note C	68,885,576	69,844,789
SHAREOWNERS' INVESTMENT—Notes C and D		
Capital Shares:		

	Shares Outstanding			
	May 31, 1961	November 30, 1960		
Preferred, 5% cumulative, par value $100 a share—authorized 495,408 shares—Note J	200,599	198,972	$ 20,059,900	$ 19,897,200
Common, par value $2 a share—authorized 25,000,000 shares	13,200,796	13,030,265	26,401,592	26,060,530
Class B Common, par value $2 a share—authorized 4,200,000 shares	3,191,189	3,215,720	6,382,378	6,431,440
			$ 52,843,870	$ 52,389,170
Capital in addition to par value of shares			88,926,235	85,021,379
Accumulated earnings used in the business			94,473,966	95,212,483
			$236,244,071	$232,623,032
			$369,263,143	$353,490,423

See notes to financial statements.

AMERICAN-MARIETTA COMPANY AND CONSOLIDATED SUBSIDIARIES

STATEMENTS OF CONSOLIDATED ADDITIONAL CAPITAL AND ACCUMULATED EARNINGS

	Year Ended November 30					(Unaudited) Six Months Ended
	1956	1957	1958	1959	1960	May 31, 1961
CAPITAL IN ADDITION TO PAR VALUE OF SHARES						
Balance at beginning of period.	$14,256,119	$17,287,198	$27,591,045	$50,536,833	$ 67,847,968	$ 85,021,379
Amounts, in excess of par value, recorded in respect of:						
Common Shares issued in connection with acquisition of companies and investment, less merger costs in 1960	5,069,789	10,143,430	22,925,644	23,022,666	17,148,657	5,104,233
Common Shares issued for cash	161,150	6,740,139	–0–	–0–	–0–	–0–
Credits arising upon repurchase of Preferred Shares	–0–	–0–	20,144	21,344	24,754	623
	$19,487,058	$34,170,767	$50,536,833	$73,580,843	$ 85,021,379	$ 90,126,235
Deduct:						
Cost in excess of par value of reacquired Common Shares	$ –0–	$ –0–	$ –0–	$ –0–	$ –0–	$ 1,200,000
Amounts transferred to capital share accounts in connection with stock splits (1956—5 for 4; 1957—3 for 2; 1959—5 for 4) of Common and Class B Common Shares	2,199,860	6,579,722	–0–	5,732,875	–0–	–0–
	$ 2,199,860	$ 6,579,722	$ –0–	$ 5,732,875	$ –0–	$ 1,200,000
BALANCE AT END OF PERIOD	$17,287,198	$27,591,045	$50,536,833	$67,847,968	$ 85,021,379	$ 88,926,235
ACCUMULATED EARNINGS USED IN THE BUSINESS						
Balance at beginning of period	$42,632,238	$58,033,664	$59,978,915	$70,139,572	$ 84,708,389	$ 95,212,483
Net income for the period	22,025,608	19,895,310	21,299,249	26,341,575	24,429,357	6,310,854
	$64,657,846	$77,928,974	$81,278,164	$96,481,147	$109,137,746	$101,523,337
Deduct:						
Cash dividends:						
On shares of American-Marietta Company:						
Preferred	$ 763,009	$ 1,033,454	$ 1,125,959	$ 1,036,426	$ 1,004,854	$ 500,223
Common	4,171,493	5,790,241	7,791,302	9,184,223	12,563,632	6,549,148
On shares of merged companies prior to acquisition	1,689,680	1,481,046	2,221,331	1,552,109	356,777	–0–
Cost of preferred shares reacquired by subsidiary, less equity in net assets applicable to such shares	–0–	5,185,593	–0–	–0–	–0–	–0–
Amount transferred to capital share accounts of merged company in connection with recapitalization	–0–	4,459,725	–0–	–0–	–0–	–0–
	$ 6,624,182	$17,950,059	$11,138,592	$11,772,758	$ 13,925,263	$ 7,049,371
BALANCE AT END OF PERIOD	$58,033,664	$59,978,915	$70,139,572	$84,708,389	$ 95,212,483	$ 94,473,966

See notes to financial statements.

AMERICAN-MARIETTA COMPANY AND CONSOLIDATED SUBSIDIARIES
NOTES TO FINANCIAL STATEMENTS

Note A—Principles of Consolidation:

In accordance with the policy consistently followed, the consolidated financial statements include on a consolidated basis the accounts of the domestic and Canadian subsidiaries of American-Marietta Company.

Results of operations of companies acquired during the five years and six months covered by the statements of income have been included therein from dates of acquisition, except as to companies merged during the years 1956 to 1960 which were treated for accounting purposes as "poolings of interests," the results of operations of which have been included for all periods and the accumlated earnings accounts of which have been combined with the statements of accumulated earnings of the consolidated companies from the beginning of the periods.

The Company's equity in the underlying net assets of the consolidated subsidiaries as shown by their books exceeded the carrying amount (cost) of the Company's investments therein by $6,676,522 at November 30, 1960, and $7,458,153 at May 31, 1961. The disposition of this difference in the consolidated financial statements was as follows:

	May 31 1961	November 30 1960
Undistributed earnings of the consolidated subsidiaries since acquisition, included in "accumulated earnings used in the business"	$10,360,993	$9,626,640
Cost of investments in excess of amounts ascribed to net tangible assets acquired, included in "intangibles arising upon acquisition of companies"	2,902,840	2,950,118
	$ 7,458,153	$6,676,522

The investments in and advances to foreign (except Canadian) subsidiaries are stated at cost (November 30, 1960—$1,486,649; May 31, 1961—$1,356,938) plus the Company's equity (November 30, 1960—$1,424,994; May 31, 1961—$1,831,750) in accumulated earnings of the subsidiaries. The statements of consolidated income and accumulated earnings have been adjusted to reflect in applicable prior fiscal years the Company's equity in the earnings of the foreign subsidiaries.

Note B—Federal Income Tax:

Federal income tax returns as originally filed by the Company and subsidiaries for the fiscal years 1957 to 1959 reflected percentage depletion allowances for cement and limestone products computed generally in accordance with the principle established in the Dragon Cement Company case.

In 1960, the United States Supreme Court rendered a decision which adversely affected the Company's position with respect to the use of the liberalized percentage depletion method established in prior lower court decisions. Also, in 1960, amendments to the Internal Revenue Code were enacted, requiring a new method for taxable years beginning after December 31, 1960, and permitting taxpayers to elect to recompute percentage depletion deductions for all unsettled prior years by this method. The Company made the election and provision has been made in the accompanying financial statements for the resultant additional tax and interest thereon applicable to prior years.

Note C—Long-Term Debt:

Long-term debt consisted of the following obligations:

Notes payable to insurance companies and banks:

Interest Rate	Maturity	Amount May 31 1961	Amount November 30 1960
4⅜%	August 1, 1978	$25,000,000	$25,000,000
5½%	June 1, 1980	15,000,000	15,000,000
5½%	December 1, 1980	10,000,000	10,000,000
5⅜%	December 1, 1978	9,260,000	9,630,000
4¼%	April 15, 1964	4,500,000	4,500,000
4¾%	December 20, 1971	1,610,000	1,720,000
5¼%	June 1, 1973	1,480,000	1,605,000
4¼%	June 1, 1967	1,080,000	1,320,000
Other indebtedness		955,576	1,069,789
	TOTAL	$68,885,576	$69,844,789

Payments required in the year ending November 30, 1961 (after May 31, 1961) and in the next five fiscal years with respect to long-term debt are as follows: 1961, $1,160,635; 1962, $2,251,792; 1963, $2,926,691; 1964, $7,402,888; 1965, $2,888,952; 1966, $2,822,600.

The terms of the notes payable to insurance companies and banks set forth certain minimum requirements as to consolidated working capital and place restrictions on the payments of cash dividends (other than on Preferred Shares) and purchases or retirements of capital shares. Under the consolidated working capital requirements, the most restrictive of the debt provisions, payments which may be made in respect of cash dividends on Common Shares and for the acquisition of capital shares were limited to approximately $23,000,000 at November 30, 1960 and $14,000,000 at May 31, 1961.

Note D—Capital Shares:

No dividends may be declared or paid on any Class B Common Share in any year unless an equal amount plus $2 a share is paid for that year on the Common Shares. Dividends in excess of $2 a share may be paid on the Common Shares regardless of whether any are paid on Class B Common Shares.

Under the Articles of Incorporation, Class B Common Shares are convertible into Common Shares on a share-for-share basis, with certain limitations. However, holders of substantially all of the Class B Common Shares have entered into an agreement deferring their conversion rights so that 278,023 shares were eligible for conversion as of May 31, 1961, with not to exceed 62,500 additional shares becoming eligible for conversion during each six months cumulatively from July 1, 1961, to January 1, 1970, at which latter date the restrictions terminate.

Holders of Preferred Stock are entitled in liquidation to, and the stock is callable at, $105 a share plus dividends. Provisions of the Articles of Incorporation relating to a sinking fund for the redemption of Preferred Shares require a noncumulative annual payment equal to 3% of consolidated net income for the preceding fiscal year in excess of dividends on such shares, or, if less, 2% of the largest aggregate par value of Preferred Shares outstanding at any time prior to the close of the preceding fiscal year. A sinking fund payment of approximately $430,000 is required to be made prior to November 30, 1961. At November 30, 1960, 16,248 Preferred Shares, and at May 31, 1961, 14,621 Preferred Shares were held in the treasury by the Company, which shares may be used, in lieu of cash, to meet sinking fund requirements.

Note E—Inventories:

The amounts of inventories used in the determination of cost of products sold for the period covered by the statements of income were as follows:

December 1, 1955	$28,745,252
November 30, 1956	38,854,133
November 30, 1957	43,358,883
November 30, 1958	46,954,141
November 30, 1959	59,439,051
November 30, 1960	60,808,475
May 31, 1960	68,857,311
May 31, 1961	69,577,416

The inventories at these dates were priced on the basis of the lower of cost (principally first-in, first-out method) or market (replacement cost or estimated net realizable amount, whichever was appropriate).

At November 30, 1960, the inventories consisted of $37,338,021 finished and in-process products and $23,470,454 raw materials and supplies. It was not practicable to segregate amounts for inventories as between finished and in-process products and raw materials and supplies at May 31, 1961.

Note F—Policies Regarding Depreciation, Depletion, Amortization, Maintenance, and Repairs:

The Company and consolidated subsidiaries have provided for depreciation (generally straight-line method) on a basis calculated to amortize the cost of the various classes of depreciable assets over their estimated useful lives.

The estimated useful lives of the principal classifications of depreciable properties follow:

Buildings and improvements:	
Principally	20 to 40 years
Other	5 to 50 years
Machinery and equipment:	
Principally	7 to 20 years
Other	3 to 33⅓ years
Furniture and fixtures	5 to 20 years
Automobiles and trucks	3 to 5 years

Depletion of limestone and other deposits was computed on a unit rate of production basis applied to the cost of individual properties. Amounts so determined were less than percentage depletion allowances claimed for income tax purposes.

Maintenance and repairs, and expenditures for renewals and betterments not calculated to extend the useful lives or materially increase the productivity of the properties affected, were charged to costs and expenses as incurred. Other renewals and betterments were capitalized. Generally, at the time of sale or abandonment of equipment or building units, the applicable amounts of costs and accumulated depreciation were eliminated from the accounts and the net carrying amounts less proceeds of disposal were charged or credited to income.

Amounts of intangibles arising upon acquisition of companies, representing cost of investments in excess of amounts ascribed to net tangible assets acquired, are being amortized on a straight-line basis over forty years as to approximately 60% of the total and over twenty years as to the remainder.

Note G—Retirement Plans:

The Company and certain subsidiaries have contributory and noncontributory retirement plans, terminable at the option of the companies, for salaried employees. Other retirement plans have been established on behalf of hourly-paid employees.

The estimated annual cost of the plans, based upon present participation, is approximately $2,500,000. Unfunded past service costs were estimated to be approximately $8,000,000 at May 31, 1961.

Note H—Federal Trade Commission Proceedings:

Reference should be made to the paragraph captioned "Federal Trade Commission Proceedings," included in the section "Business and Properties of American-Marietta" elsewhere in this Proxy Statement, for information concerning a Federal Trade Commission complaint pending against the Company.

Note I—Supplementary Income Statement Information:

	(In Thousands)		
	Charged to Cost of Product Sold	Charged to Other Expenses	Total
Year ended November 30, 1956:			
Maintenance and repairs	$ 8,997	$ 106	$ 9,103
Depreciation, depletion, and amortization	7,029	651	7,680
Taxes (other than income taxes):			
Payroll	1,024	324	1,348
Other, principally real estate and personal property	990	669	1,659
Rents	616	571	1,187
Royalties	199	258	457
Year ended November 30, 1957:			
Maintenance and repairs	$10,108	$ 93	$10,201
Depreciation, depletion, and amortization	8,226	804	9,030
Taxes (other than income taxes):			
Payroll	1,254	254	1,508
Other, principally real estate and personal property	1,355	508	1,863
Rents	661	569	1,230
Royalties	109	235	344
Year ended November 30, 1958:			
Maintenance and repairs	$ 9,750	$ 136	$ 9,886
Depreciation, depletion, and amortization	9,565	1,120	10,685
Taxes (other than income taxes):			
Payroll	1,295	328	1,623
Other, principally real estate and personal property	1,488	571	2,059
Rents	791	620	1,411
Royalties	82	254	336
Year ended November 30, 1959:			
Maintenance and repairs	$12,630	$ 271	$12,901
Depreciation, depletion, and amortization	11,908	1,279	13,187
Taxes (other than income taxes):			
Payroll	1,950	457	2,407
Other, principally real estate and personal property	1,803	661	2,464
Rents	1,132	744	1,876
Royalties	179	271	450

Note I—Supplementary Income Statement Information (cont'd):

	(In Thousands)		
	Charged to Cost of Product Sold	Charged to Other Expenses	Total
Year ended November 30, 1960:			
Maintenance and repairs	$13,509	$ 383	$13,892
Depreciation, depletion, and amortization	14,719	1,529	16,248
Taxes (other than income taxes):			
Payroll	2,432	829	3,261
Other, principally real estate and personal property	2,118	940	3,058
Rents	1,789	1,034	2,823
Royalties	540	284	824
Six months ended May 31, 1961 (unaudited):			
Maintenance and repairs	$ 6,831	$ 159	$ 6,990
Depreciation, depletion, and amortization	7,934	919	8,853
Taxes (other than income taxes):			
Payroll	1,441	451	1,892
Other, principally real estate and personal property	1,173	300	1,473
Rents	829	710	1,539
Royalties	211	110	321

Note J—Retirement of 5% Cumulative Preferred Shares:

On August 3, 1961, the Board of Directors authorized the officers and the Executive Committee to take such action as may be necessary or desirable in order to redeem the outstanding 5% Cumulative Preferred Shares of the Company prior to October 9, 1961. The redemption price of the Preferred Shares is $105 per share. The long-term debt restrictions referred to in Note C have been waived with respect to such redemption.

AGREEMENT OF CONSOLIDATION

AGREEMENT dated as of August 1, 1961, between AMERICAN-MARIETTA COMPANY ("A-M"), an Illinois corporation, and THE MARTIN COMPANY ("Martin"), a Maryland corporation, such corporations being hereinafter called the "Constituent Companies."

1. Consolidation

Upon the terms and subject to the conditions hereinafter stated, A-M and Martin will be consolidated into a new Maryland corporation to be known as Martin-Marietta Corporation and hereinafter called the "Consolidated Company." Proposed Articles and Plan of Consolidation complying with the requirements of the Maryland Corporation Law and the Illinois Business Corporation Act are attached as Exhibit A to this Agreement and are hereinafter referred to as the "Articles."

2. Retirement and Conversion of Stock

Before the consolidation, A-M will retire its 5% Cumulative Preferred Shares. In the consolidation the then stock of the Constituent Companies will be converted into stock of the Consolidated Company provided for in the Articles as follows:

Each Share of Each Class of Stock of the Constituent Companies Shown Below	Shall be	The Number of Shares of Stock of the Consolidated Company Shown Below
A-M Stock:		
All Class B Common Shares, $2 par value, outstanding at the effective date	Converted into	380,000 shares of 4½% Cumulative Preferred Stock, $100 par value
Each Common Share, $2 par value	Converted into	1 share of Common Stock, $1 par value
Martin Stock:		
Each Share of Common Stock without par value	Converted into	1.3 shares of the aforesaid Common Stock
Each Warrant to purchase a Current Stock Unit now consisting of 2.10 shares of the aforesaid Common Stock	Shall entitle the holder to purchase	a Current Stock Unit consisting of 2.73 shares of the aforesaid Common Stock

3. Procedure:

This Agreement has been approved by the boards of directors of the Constituent Companies. The A-M Board, by vote of a majority of its members, has approved the Articles as a plan of consolidation under the Illinois Business Corporation Act and has directed that the plan be submitted to a vote at a special meeting of shareholders to be held October 9, 1961. The Martin Board has adopted a resolution declaring that the proposed consolidation is advisable upon the terms and conditions set forth in the Articles as required by the Maryland Corporation Law and has directed that the Articles be submitted for action thereon at a special meeting of the Martin stockholders also to be held October 9, 1961.

If the Articles receive the favorable vote of the holders of two-thirds of the outstanding A-M Common Shares and Class B Common Shares voting together and as separate classes at the A-M meeting and the holders of a majority of the outstanding shares of Martin stock at the Martin meeting, then, on the closing date established under paragraph 4 hereof, articles of consolidation embodying the Articles in substantially the form attached hereto will be delivered to the Secretary of State of Illinois as provided by Illinois law and the Articles in substantially the form attached hereto will be filed with the Department of Assessments and Taxation of Maryland as provided by Maryland law. The consolida-

tion will be effective upon the issuance of a certificate of consolidation by the Secretary of State of Illinois and the acceptance of the Articles for record by the Department of Assessments and Taxation of Maryland, and shall thereupon be deemed to have been in effect as of the first day of the month in which it becomes effective.

The effectuation of the consolidation will not cause any interruption of the business of either Constituent Company. Officers and employees of each Constituent Company on the day on which the consolidation becomes effective will thereupon become employees of corresponding divisions of the Consolidated Company.

4. Closing Date and Closing

The closing date has been initially established as October 10, 1961, but may be postponed up to one week by either Constituent Company if it is unable to satisfy the conditions of the other Company's obligation on that date and may also be postponed in one or more postponements to a date not later than December 31, 1961, by mutual agreements of the boards of directors of both Companies. On the closing date a closing will be held at Baltimore National Bank, Baltimore, Md., at 10:00 A. M., local time, at which the Constituent Companies will exchange opinions of counsel and other documents required to satisfy the conditions of their obligations. Arrangements will be made for the concurrent filing of the Articles in Illinois and Maryland immediately following closing.

5. Proxy Material, Representations and Warranties

Each of the Constituent Companies has supplied to the other for inclusion in the other's proxy statement the information, including financial statements, called for by the rules of the Securities and Exchange Commission applicable to Martin. Each of the Constituent Companies represents and warrants that the proxy information supplied by it is an accurate description of its business and property and does not contain any material misstatement of fact or omit to state any material fact necessary to make the statements therein not misleading; that the financial statements included therein were prepared in conformity with generally accepted accounting principles applied on a consistent basis and present fairly the results of operations and financial position of the Company in question for the periods and at the dates shown; and that the Company has no material liabilities, contingent or otherwise, not disclosed in the proxy information and financial statements supplied by it. In addition, each Constituent Company represents and warrants that

(a) the Company and (in the case of A-M) each of its active subsidiaries is a corporation validly organized and existing in good standing under the laws of the jurisdiction of its incorporation and duly qualified to do business in all states or countries where it owns or leases real property of material importance to its business, maintains a substantial inventory or conducts manufacturing operations;

(b) the Company or (in the case of A-M) one of its subsidiaries has good and marketable title to all assets reflected in the balance sheet included in the proxy information submitted by it except assets disposed of since the balance sheet date in the ordinary course of business and holds such assets free of liens, encumbrances and adverse claims other than (i) those shown on the balance sheet; (ii) such encumbrances as result from taxes not yet due; (iii) easements, rights of way and other minor encumbrances which in the aggregate do not impair the use of the assets in the business; (iv) the Company and (in the case of A-M) each of its active subsidiaries has properly prepared and filed all required tax returns and paid the amounts shown due thereon (except, in the case of Martin, certain state taxes the applicability of which has not been finally determined), the provisions for federal income taxes in the financial statements submitted in its proxy material are adequate to cover such taxes (whether or not disputed), and its federal income tax returns have been examined by the Internal Revenue Service through 1955 in the case of A-M and 1957 in the case of Martin and no deficiency resulting from such examinations has been proposed which has not been paid or settled;

(c) since the date of the balance sheet of the Company included in its proxy material there has been no material adverse change in the business, properties or financial condition of the Company (including, in the case of A-M, the Company and its subsidiaries, considered as a whole), and no material change in its assets or liabilities other than in the ordinary course of business, and

since that date the Company has not (A) issued, sold or purchased any shares of its capital stock or any options, warrants or rights to purchase any such shares (except, in the case of Martin, shares issued upon exercise of options and warrants outstanding on the balance sheet date and options granted under its restricted stock option plans subsequent to such date as shown in its proxy material) or (B) paid or declared any dividend or made any distribution to its stockholders except as set forth in the schedule of dividends in subparagraph (d) below, and neither the Company nor (in the case of A-M) any of its subsidiaries has (C) incurred or agreed to incur any long-term indebtedness for borrowed money, or (D) mortgaged or pledged any of its assets or contracted to do so, or (E) sold or disposed of any material assets or contracted to do so other than in the ordinary course of business, or (F) incurred any material liability or commitment or entered into any material transaction except in the ordinary course of business or in relation to this Agreement, or (G) made any substantial change in the manner of conducting its business; and

(d) between the date hereof and the date when the consolidation actually becomes effective, neither of the Constituent Companies will take any action of the kinds specified in clauses (A) through (G) of subparagraph (c) above without the concurrence of the other, except that (i) A-M may retire its 5% Cumulative Preferred Shares and issue additional Common Shares upon conversion of Class B Common Shares provided that an equal number of Common Shares are surrendered as a capital contribution so that there is no net increase in the number of A-M Common Shares outstanding, (ii) Martin may issue options for a number not to exceed 5,000 shares of its Common Stock under its 1958 Stock Option Plan, and (iii) the dividends listed below may be paid:

A-M dividends:

(a) Regular $1.25 per Preferred Share on or about August 1, 1961

(b) Regular $.25 per Common Share on or about August 1, 1961

(c) Special $.17 per Common Share on or about October 1, 1961 to cover extra two months between A-M's regular dividend date of August 1 and the Consolidated Company's proposed first dividend date of approximately December 31, 1961

Martin dividends:

(a) Regular $.25 per share at end of September 1961.

6. Examinations by Constituent Companies

Before the closing date each Constituent Company may examine the properties and records of the other Constituent Company and (in case of A-M) its subsidiaries (except as such examination may be restricted for security reasons) to determine the accuracy of the other Company's representations and warranties, and each Constituent Company will cause its officers and employees to cooperate in such examination and disclose pertinent and unrestricted information. If for any reason the consolidation does not become effective, information obtained through such examination shall be retained in confidence.

7. Conditions of Constituent Companies' Obligations

The obligation of each Constituent Company to execute and deliver the Articles and make the consolidation effective is subject to the approval of stockholders of both Constituent Companies specified in paragraph 3 and to the satisfaction in all material respects of the following conditions at or before closing; provided, however, that the board of directors of either Company, in its discretion, may waive the failure of the other Company to fulfill any of the conditions set forth below:

(a) The Company's examination shall not have disclosed any inaccuracy in the other Company's representations and warranties set forth in paragraph 5, such representations and warranties shall be correct on and as of the closing date, and the Company shall have received a certificate of the President or a Vice President of the other Company to that effect;

(b) The other Company shall not have defaulted in any obligation hereunder required to be performed by it before closing;

(c) The Company shall have received an opinion of counsel for the other Company (Ballard, Spahr, Andrews & Ingersoll, Philadelphia, Pa. being counsel for A-M, and Miles & Stockbridge, Baltimore, Md. being counsel for Martin) to the effect that:

(i) the Company represented by such counsel and (in the case of A-M) each of its domestic and Canadian subsidiaries holding material property or contributing materially to income (if any) is a duly organized corporation existing in good standing under the laws of its jurisdiction of incorporation with corporate power to own its properties and conduct its business as now conducted and is qualified to transact business and in good standing in jurisdictions where it owns or leases real property of material importance to its business, maintains a substantial inventory or conducts manufacturing operations, and the stock of each such subsidiary owned by its parent is validly issued, fully paid and non-assessable. [In giving such opinion with respect to A-M subsidiaries, Ballard, Spahr, Andrews & Ingersoll may rely on opinions of counsel for such subsidiaries.]

(ii) such counsel does not know or have reason to believe that there is any pending or threatened litigation, proceeding or investigation not disclosed in the proxy information supplied by the Company represented by such counsel which might result in a material adverse change in the business, properties or financial condition of such Company (including, in the case of A-M, the Company and its subsidiaries, considered as a whole), or which questions the validity of this Agreement or the consolidation to be effected hereunder.

(iii) the Company represented by such counsel has full power and authority to become party to the consolidation to be effected hereunder; such consolidation will not be a breach of, or result in a default or any accelerated liability under, such Company's charter or any indenture, loan agreement, pension trust, government contract, or other instrument by which such Company is bound on the closing date; all corporate and other proceedings required to be taken by such Company to authorize this Agreement and the consolidation have been validly taken; and no filing with or consent of any governmental or other authority is required in connection with the consolidation other than the listing of the Consolidated Company's stock and warrants on the appropriate stock exchanges and registration thereof under the Securities Exchange Act of 1934, and such listing and registration will become effective on notice of the effectiveness of the consolidation; and

(iv) the vote of stockholders of the Company represented by such counsel provided for in paragraph 3 operates to authorize the consolidation as far as such Company is concerned and binds all such Company's stockholders except for the statutory right of dissenters to receive the appraised value of their shares.

In giving the foregoing opinion Ballard, Spahr, Andrews & Ingersoll may rely as to Illinois law on the opinion of Illinois counsel satisfactory to them and to Miles & Stockbridge;

(d) At the closing date there shall be no litigation pending or threatened in which an injunction is or may be sought against the consolidation;

(e) The Company shall have received satisfactory assurances that no person deemed to be in control of either of the Constituent Companies within the meaning of the Securities Act of 1933, as amended and the Rules thereunder will make distribution to the public of securities of the Consolidated Company received by him in the consolidation without registration thereof under said Act, except as permitted by paragraph (d) of Rule 133 under said Act.

(f) All proceedings and documents in connection with this Agreement and the consolidation shall have been approved by counsel for the Company in question.

8. Management of Consolidated Company

The directors of the Consolidated Company shall be as set forth in the Articles hereto attached. It is the present intention of the parties that George M. Bunker will be elected President and chief executive officer of the Consolidated Company and that Grover M. Hermann will be elected Chairman of the Board.

9. Termination

This Agreement shall terminate automatically if closing is not held on or before December 31, 1961. Either of the Constituent Companies, by resolution of its board of directors, may terminate this Agree-

ment if the conditions required to be fulfilled by the other Company as specified in paragraph 7 are not satisfied on the closing day. The two Constituent Companies, each acting by its board of directors, may also terminate this Agreement and abandon the consolidation by mutual consent at any time before the consolidation becomes effective. In the event of any termination under this paragraph, neither of the Constituent Companies will have any liability to the other in connection with this Agreement for costs expenses, loss of anticipated profits or otherwise.

10. Issuance of Stock Certificates of the Consolidated Company

After the consolidation becomes effective, holders of certificates for shares of stock of the Constituent Companies will be entitled to receive in exchange therefor certificates for the shares of stock of the Consolidated Company into which their shares of the Constituent Companies have been converted, except that holders of certificates for shares of Martin Common Stock will not be entitled to receive certificates for fractional shares of the Consolidated Company's Common Stock. Arrangements will be made for the matching and combination or the purchase and sale of fractional interests in respect of Martin certificates surrendered for exchange within 60 days after the consolidation becomes effective.

11. Miscellaneous

(a) Each Constituent Company represents that it has not dealt with any broker in connection with this Agreement or the consolidation contemplated hereunder and that, insofar as is known to its management, no broker or other person is entitled to or claiming any commission or finder's fee in connection therewith.

(b) Neither Constituent Company may assign its rights hereunder and nothing herein contained shall confer any rights on any person not a party hereto.

(c) Notices in connection with this Agreement will be sufficiently delivered if delivered or mailed to A-M at 101 East Ontario Street, Chicago 11, Illinois, with a copy to John F. Donoho, Vice President, at 80 Pine Street, New York 5, New York; and to Martin at Friendship International Airport, Maryland, Attention: W. L. Lucas, Secretary, with a copy to Clarence Miles, Esq., Miles & Stockbridge, 10 Light Street, Baltimore 2, Maryland.

(d) This Agreement supersedes all previous negotiations and contains the entire understanding between the parties. It may be modified only in writing signed by the party against which the modification is asserted.

IN WITNESS WHEREOF the Constituent Companies have caused this Agreement to be signed in their names by the Chairmen of their respective Boards of Directors, each thereunto duly authorized, and their corporate seals to be affixed hereto and duly attested.

AMERICAN-MARIETTA COMPANY

[Corporate Seal]

By GROVER M. HERMANN .....
Chairman of the Board

Attest:

PAUL P. WEBER .....
Secretary

THE MARTIN COMPANY

[Corporate Seal]

By GEORGE M. BUNKER .....
Chairman of the Board

Attest:

W. L. LUCAS .....
Secretary

Exhibit A
to Appendix 1

ARTICLES AND PLAN OF CONSOLIDATION
CONSOLIDATING
THE MARTIN COMPANY AND AMERICAN-MARIETTA COMPANY
TO FORM
MARTIN-MARIETTA CORPORATION

Articles and Plan of Consolidation, entered into this .....day of ....., 19...., between The Martin Company, a Maryland corporation, and American-Marietta Company, an Illinois corporation.

ARTICLE I

The corporations which are parties to these Articles and Plan of Consolidation are The Martin Company (hereinafter called "Martin"), a corporation, having capital stock, organized and existing under the laws of the State of Maryland, and American-Marietta Company (hereinafter called "A-M"), a corporation, having capital stock, organized and existing under the laws of the State of Illinois. Martin and A-M have agreed, pursuant to requisite authority, to consolidate and thereby form a new corporation. The terms and conditions of the consolidation and the mode of carrying the same into effect shall be as herein set forth.

ARTICLE II

The name of the new corporation, resulting from the said consolidation, shall be "Martin-Marietta Corporation" (hereinafter called "Corporation"), and shall be formed under the laws of the State of Maryland.

ARTICLE III

Martin was incorporated on December 5, 1928, under the general statutes of the State of Maryland authorizing the formation of corporations. A-M was incorporated on September 12, 1930, under the general statutes of the State of Illinois, authorizing the formation of business corporations. A-M is qualified to do business in the State of Maryland, having so qualified on November 28, 1955.

ARTICLE IV

The charter of the Corporation shall be as stated in this ARTICLE IV:

FIRST: **Name.** The name of the corporation (which is hereinafter called "Corporation") is Martin-Marietta Corporation.

SECOND: **Period of Duration.** The period of duration of the Corporation is perpetual.

THIRD: **Purposes, Objects and Powers.** The purposes for which the Corporation is formed and the business or objects to be carried on and promoted by it are as follows:

Clause (1). To engage in and carry on the business of creating, developing, manufacturing, testing, transporting and making ready for use all kinds of missiles, electronics, electronic devices and substances, spacecraft, defense equipment and systems, and nuclear reactors and devices, and modifying, repairing, altering, licensing, buying, selling and dealing in all such articles and other property of every kind and character used in connection therewith.

Clause (2). To engage in and carry on the business of manufacturing, repairing altering, using, licensing, buying, selling and dealing in and with vehicles of all kinds, engines, motors, machinery, in-

struments, parts, equipment, appliances, devices, articles and materials of all kinds for use on or in connection therewith and the manufacture thereof.

Clause (3). To manufacture, buy, sell and deal in and with limestone, lime, concrete, concrete admixtures, cement, magnesite, brick, tile, refractories, asphalt, mortar, and products thereof; pipes, tubes, conduits and fittings, building materials and products thereof; chemicals; paints, pigments, coatings, finishes, resins and adhesives; shot, grit and metal powders; agricultural, road building, pipe laying, pulverizing, dust collecting and other machinery and equipment; mops, polishes, cleaners and waxes; and any and all other similar or related products.

Clause (4). To engage in and carry on the business of importing, exporting, manufacturing, producing, buying, selling and otherwise dealing in and with, goods, wares, and merchandise of every class and description.

Clause (5). To engage in and carry on any other business which may conveniently be conducted in conjunction with any of the business of the Corporation.

Clause (6). To buy, quarry, mine, grow, manufacture, process, own, invest in, sell, mortgage, pledge, lease, assign, transfer or otherwise deal in or with goods, wares, merchandise, supplies, materials, trees, crops, minerals, parts, machinery, equipment, products and other personal property of every kind, class and description.

Clause (7). To purchase, lease, hire or otherwise acquire, hold, own, develop, improve and dispose of, and to aid and subscribe toward the acquisition, development or improvement of real and personal property and rights and privileges therein, suitable or convenient for any of the business of the Corporation.

Clause (8). To purchase, lease, hire or otherwise acquire, hold, own, construct, erect, improve, manage and operate, and to aid and subscribe toward the acquisition, construction or improvement of, plants, mills, factories, works, buildings, machinery, equipment and facilities and any other property or appliances which may appertain to or be useful in the conduct of any of the business of the Corporation.

Clause (9). To acquire all or any part of the good will, rights, property and business of any person, firm, association or corporation heretofore or hereafter engaged in any business similar to any business which the Corporation has the power to conduct, and to hold, utilize, enjoy and in any manner dispose of, the whole or any part of the rights, property and business so acquired, and to assume in connection therewith any liabilities of any such person, firm, association or corporation.

Clause (10). To apply for, obtain, purchase, or otherwise acquire, any patents, copyrights, licenses, trade marks, trade names, rights, processes, formulas, and the like, which may seem capable of being used for any of the purposes of the Corporation; and to use, exercise, develop, grant licenses in respect of, sell and otherwise turn to account, the same.

Clause (11). To acquire by purchase, subscription or otherwise, and to hold, sell, assign, transfer, exchange, lease, mortgage, pledge, or otherwise dispose of, any shares of stock of, or voting trust certificates for any shares of stock of, or any bonds or other securities or evidences of indebtedness issued or created by, any other corporation or association, organized under the laws of the State of Maryland or of any other state, territory, district, colony or dependency of the United States of America, or of any foreign country; and while the owner or holder of any such shares of stock, voting trust certificates, bonds, or other obligations, to possess and exercise in respect thereof any and all the rights, powers, and privileges of individual holders, including the right to vote on any shares of stock so held or owned; and upon a distribution of the assets or a division of the profits of the Corporation, to distribute any such shares of stock, voting trust certificates, bonds or other obligations, or the proceeds thereof, among the stockholders of the Corporation.

Clause (12). To issue shares of its stock of any class, in the manner permitted by law, to raise money for any of the purposes of the Corporation, or in payment for property purchased, or for any other lawful consideration.

Clause (13). To borrow or raise money for any of the purposes of the Corporation and to issue bonds, debentures, notes or other obligations of any nature, and in any manner permitted by law, for money so borrowed or in payment for property purchased, or for any other lawful consideration, and to secure the payment thereof and of the interest thereon, by mortgage upon, or pledge or conveyance or assignment in trust of, the whole or any part of the property of the Corporation, real or personal,

including contract rights, whether at the time owned or thereafter acquired, and to sell, pledge, discount or otherwise dispose of such bonds, notes or other obligations of the Corporation for its corporate purposes.

Clause (14). To aid in any manner any corporation or association, any bonds, or other securities or evidences of indebtedness of which, or shares of stock in which, are held by or for the Corporation, or in which, or in the welfare of which, the Corporation shall have any interest, and to do any acts or things designed to protect, preserve, improve, or enhance the value of, any such bonds or other securities or evidences of indebtedness, or such shares of stock, or any property of the Corporation.

Clause (15). To guarantee the payment of dividends upon any shares of stock of, or the performance of any contract by, any other corporation or association and to endorse or otherwise guarantee the payment of the principal and interest, or either, of any bonds, debentures, notes, securities, or other evidences of indebtedness created or issued by any other corporation or association.

Clause (16). To carry out all or any part of the foregoing objects as principal, factor, agent, contractor, or otherwise, either alone or through or in conjunction with any person, firm, association or corporation, and in any part of the world, and, in carrying on its business and for the purpose of attaining or furthering any of its objects and purposes, to make and perform any contracts and to do any acts and things, and to exercise any powers suitable, convenient or proper for the accomplishment of any of the purposes herein enumerated or incidental to the powers herein specified, or which at any time may appear conducive to or expedient for the accomplishment of any of such purposes.

Clause (17). To carry out all or any part of the aforesaid purposes, and to conduct its business in all or any of its branches in any or all states, territories, districts, colonies and dependencies of the United States of America and in foreign countries; and to maintain offices and agencies in any or all states, territories, districts, colonies and dependencies of the United States of America and in foreign countries.

It is the intention that the objects and purposes specified in the foregoing clauses of this subdivision THIRD shall not, unless otherwise specified herein, be in any wise limited or restricted by reference to, or inference from, the terms of any other clause of this or any other article in this charter, but that the objects and purposes specified in each of the clauses of this subdivision THIRD shall be regarded as independent objects and purposes. It is also the intention that said clauses be construed both as purposes and powers; and generally, that the Corporation shall be authorized to exercise and enjoy all other powers, rights, privileges granted to, or conferred upon, corporations of this character, by the laws of the State of Maryland, and the enumeration of certain powers as herein specified is not intended as exclusive of, or as a waiver of, any of the powers, rights or privileges granted or conferred by the laws of said state now or hereinafter in force.

FOURTH: **Principal Office and Resident Agent.** The post office address of the place in which the principal office of the Corporation in the State of Maryland is located is 10 Light Street, Baltimore, Maryland. The Resident Agent of the Corporation is Clarence W. Miles, whose post office address is 10 Light Street, Baltimore, Maryland; said Resident Agent is a citizen of the State of Maryland and actually resides therein.*

FIFTH: **Directors.** The number of Directors of the Corporation shall be eighteen (18), which number may be increased or decreased pursuant to the By-Laws of the Corporation but which never shall be less than five (5); and the names of the directors who shall act until their successors are duly chosen and qualified are: **

William B. Bergen	Leigh R. Gignilliat, Jr.	Clarence W. Miles	Alexander B. Royce
George M. Bunker	Grover M. Hermann	John E. Parker	Duncan M. Spencer
William A. Burns	H. N. Huntzicker	Robert E. Pflaumer	John L. Sullivan
William J. Cabaniss	J. Clifford Knochel	Everett H. Pixley	
John F. Donoho	Ray L. Oughton	W. Trent Ragland, Jr.	

* Differs from form of Articles and Plan of Consolidation attached to executed Agreement of Consolidation in that addresses in FOURTH have been changed.

** Differs from form of Articles and Plan of Consolidation attached to executed Agreement of Consolidation, in that one substitution has been made in the persons listed in FIFTH.

SIXTH: **Authorized Shares of Stock.** The total number of shares of stock of all classes which the Corporation has authority to issue is 40,380,000 shares, divided into 380,000 shares of 4½% Cumulative Preferred Stock of the par value of $100 per share and 40,000,000 shares of Common Stock of the par value of $1 per share. The aggregate par value of all shares having par value of all classes is $78,000,000.

A description of each class with the preferences, conversion and other rights, voting powers, restrictions, limitations as to dividends and qualifications of each class is as follows:

4½% Cumulative Preferred Stock

1. *Dividends.*

The holders of 4½% Cumulative Preferred Stock (hereinafter called "Preferred Stock") shall be entitled to receive, when and as declared by the Board of Directors, dividends at the rate of 4½% of the par value thereof per year, and no more. Such dividends shall be cumulative from the first day of the month in which the Corporation comes into existence and shall be payable quarterly on the first days of January, April, July and October in each year. The Corporation shall not declare or pay any dividend or make any distribution on the Common Stock or on any other class of stock, ranking as to dividends or assets subordinate to the Preferred Stock, other than dividends and distributions (herein called "unrestricted stock dividends and distributions") paid or made solely in Common Stock or another class of stock of the Corporation ranking as to dividends and assets subordinate to the Preferred Stock, and neither the Corporation nor any subsidiary of the Corporation shall make any payment or apply any of its assets to purchase or redeem any Common Stock or any other class of stock of the Corporation ranking as to dividends or assets on a parity with or subordinate to the Preferred Stock, unless at the time dividends for all past quarterly dividend periods and the then current quarterly dividend period on all outstanding shares of Preferred Stock have been paid, or declared and set aside for payment, in full and unless, after giving effect to such action, the sum of

(a) the aggregate amounts declared and paid or payable as dividends or distribution (other than unrestricted stock dividends and distributions) on all shares of stock of all classes of the Corporation subsequent to the date on which it came into existence; plus

(b) the excess of the aggregate amounts applied to ,or set apart for, the purchase or redemption of shares of Common Stock or any other class of stock of the Corporation ranking as to dividends or assets subordinate to the Preferred Stock subsequent to the date on which the Corporation came into existence over the net cash proceeds or fair value (as determined by the Corporation's board of directors) of property received by the Corporation subsequent to that date as consideration for the issuance or delivery of Common Stock or any other class of stock of the Corporation ranking as to dividends and assets subordinate to the Preferred Stock

will not exceed the consolidated net income (determined in accordance with generally accepted accounting principles) of the Corporation and its subsidiaries (if any) subsequent to November 30, 1961 plus $45,000,000.

2. *Liquidation.*

In the event of voluntary or involuntary liquidation, dissolution or winding up of the Corporation, the holders of Preferred Stock shall be entitled to receive in cash from the assets of the Corporation (whether capital or surplus), prior to any payment to the holders of Common Stock or of any other class of stock of the Corporation ranking as to assets subordinate to the Preferred Stock, the sum of $100 for each share thereof, plus an amount equal to accrued and unpaid dividends thereon computed to the date at which payment thereof is made available (whether or not earned or declared), plus, if the liquidation, dissolution or winding up is voluntary, a premium of $5 per share. A consolidation or merger to which the Corporation shall be a party shall not be deemed a liquidation of the Corporation within the meaning of this paragraph.

3. *Redemption and Purchase.*

The Corporation may, at its option, redeem all, but not less than all, the shares of Preferred Stock outstanding at any time after October 1, 1964, at a price equal to $105 per share plus an amount equal to accrued and unpaid dividends thereon computed to the date fixed for redemption (whether or not earned or declared). Notice of such redemption shall be given to the holders of record of the Preferred Stock by mailing such notice at least 30 and not more than 60 days before the redemption date to such holders at their addresses appearing on the books of the Corporation. The Corporation, upon mailing such notice or irrevocably authorizing the bank or trust company hereinafter mentioned to mail the same, may deposit an amount equal to the redemption price with a bank or trust company in Chicago, Illinois having a combined capital and surplus reported in its last published report in excess of $5,000,000 to be held in trust for payment to the holders of Preferred Stock at any time after such deposit. Upon such deposit, or if no deposit is made, then from and after the date fixed for redemption (unless the Corporation shall default in paying the redemption price), the Preferred Stock shall cease to be outstanding and the holders thereof shall cease to be stockholders with respect thereto. All shares of Preferred Stock redeemed or purchased by the Corporation, whether through the sinking fund hereinafter provided for or otherwise, shall be cancelled and shall not be reissued.

4. *Voting Rights.*

The holders of shares of the Preferred Stock shall have no right to vote and shall not be entitled to notice of any meeting of stockholders of the Corporation or to participate in such meeting, except as required by law or as herein otherwise expressly provided. If at any time the Corporation shall have failed (a) to pay, or declare and set apart for payment, dividends on the Preferred Stock and such default (whether or not in respect of consecutive dividends) shall be in an aggregate amount equal to four quarterly dividends on all outstanding shares of Preferred Stock, or (b) to set aside or apply, when required, the sinking fund hereinafter provided for, then in any such event, the number of directors of the Corporation shall forthwith be automatically increased by the smallest number that will be not less than one-third of the total number of directors after giving effect to such increase. The holders of Preferred Stock shall have the right, voting as a class, to elect such additional directors at a special meeting of the holders of Preferred Stock, which shall be called by the Secretary of the Corporation upon demand of the holders of 10% or more of the outstanding shares thereof, and at each subsequent annual meeting of stockholders of the Corporation until such time as dividends payable for all past quarterly dividend periods and the then current quarterly dividend period on all outstanding shares of Preferred Stock shall have been paid, or declared and set apart for payment, in full, and the Corporation shall have set aside an amount equal to all arrearages in the sinking fund and applied the same to the redemption of Preferred Stock as provided in paragraph 7, at which time the terms of the additional directors elected by the holders of Preferred Stock shall terminate, the number of directors shall be correspondingly reduced, and the voting rights of the holders of Preferred Stock shall cease, subject to revesting in the event of each additional default in payment of dividends in an amount equal to four quarterly dividends or in setting aside or applying the sinking fund as aforesaid.

5. *Action by the Corporation Requiring Approval of Preferred Stock.*

The Corporation shall not, without the affirmative vote or written consent of the holders of at least two-thirds of the then outstanding shares of Preferred Stock:

(1) By charter amendment or in a merger or consolidation or in any other manner: (a) increase the number of authorized or outstanding shares of Preferred Stock, or (b) decrease the par value of shares of Preferred Stock, or (c) effect an exchange or reclassification of any outstanding shares of Preferred Stock, or a cancellation of any of such shares except upon purchase or redemption thereof, or (d) change the designations, preferences, qualifications, limitations, restrictions or special or relative rights of the Preferred Stock, or (e) change the outstanding shares of Preferred Stock into the same or a different number of shares of any other class of stock, or (f) create any shares of stock of any other class, or any obligations, exchangeable for or convertible into shares of Preferred Stock, or (g) create or authorize or permit to

be outstanding any kind of stock, or any obligations or other securities exchangeable for or convertible into any kind of stock, having rights or preferences prior or superior to, or on a parity with, the Preferred Stock, or increase the rights or preferences of any class of stock having rights or preferences prior or superior to, or on a parity with, the Preferred Stock, or (h) cancel or otherwise affect dividends on the Preferred Stock which have accrued but have not been paid, or

(2) Issue or sell any shares of Preferred Stock (including shares acquired through the sinking fund) or of any class of stock ranking as to dividends or assets prior to or on a parity with the Preferred Stock or in any other manner increase the number of outstanding shares of Preferred Stock or of any class of stock ranking as to dividends or assets prior thereto or on a parity therewith.

6. *Merger or Consolidation.*

In the event of any merger or consolidation of the Corporation any holder of Preferred Stock shall be entitled to receive payment in cash of the amount to which he would then be entitled upon a voluntary liquidation of the Corporation unless by the terms of the merger or consolidation he is entitled to shares or securities (which may be his shares of Preferred Stock) of the corporation resulting from the merger or consolidation which have a relative position and priority and rights and preferences as to other classes of capital stock of such corporation at least equal to those of the Preferred Stock immediately before the merger or consolidation.

7. *Sinking Fund.*

So long as any shares of Preferred Stock are outstanding, the Corporation shall, not later than October 1 in 1962 and in each year thereafter, set aside as a sinking fund for retirement of the Preferred Stock the amount of $1,150,000; provided, however, that the Corporation may credit against such amount the par value of any shares of Preferred Stock theretofore acquired by it otherwise than through the sinking fund and not previously used as the basis for such a credit, and provided further that the Corporation may omit provision for the sinking fund in any year with written consent of the holders of all shares of Preferred Stock then outstanding. The Corporation shall not declare or pay any dividend or make any distributions on the Common Stock or any other class of stock ranking as to dividends or assets subordinate to the Preferred Stock other than unrestricted stock dividends and distributions, and neither the Corporation nor any subsidiary of the Corporation shall make any payment or apply any of its assets to purchase or redeem any Preferred Stock (other than through the sinking fund) or any Common Stock or any other class of stock of the Corporation ranking as to dividends or assets on parity with or subordinate to the Preferred Stock, at a time when the Corporation is in default in respect of the sinking fund herein provided for.

The Corporation shall apply the sinking fund within 45 days after the setting aside thereof to the redemption of Preferred Stock at a sinking fund redemption price equal to the par value thereof plus an amount equal to accrued and unpaid dividends computed to the date fixed for redemption (whether or not earned or declared). The shares of Preferred Stock to be redeemed through the sinking fund shall be selected by lot or other equitable method; provided, however, that the holder of any share so selected shall have the right, by written notice given to the Corporation prior to the redemption date, to substitute for redemption any other share of Preferred Stock held of record by him on the redemption date; and further provided that the Corporation may, with the written consent of the holders of all shares of Preferred Stock then outstanding, redeem through the sinking fund shares of Preferred Stock which prior to the redemption date are surrendered to it for such redemption without regard to the method or equity of the selection thereof. The procedure for giving notice of redemption and the effect of depositing the redemption price shall be the same in the case of sinking fund redemptions under this paragraph as in the case of an optional redemption under paragraph 3.

Common Stock

Each outstanding share of Common Stock shall be entitled to one vote on each matter submitted to a vote at a meeting of stockholders. In all elections for directors every holder of Common Stock

shall have the right to vote, in person or by proxy, the shares owned of record by him, for as many persons as there are directors to be elected and for whose election he has a right to vote, but he shall have no right to cumulative voting.

SEVENTH: **Provisions Defining, Limiting and Regulating Powers.** The following provisions are hereby adopted for the purpose of defining, limiting and regulating the powers of the Corporation and the Directors and Stockholders, subject, however, to the provisions, conditions and restrictions set forth in subdivision SIXTH hereof:

Clause (1). The Board of Directors of the Corporation is hereby empowered to authorize the issuance from time to time of shares of its stock of any class, whether now or hereafter authorized, and securities convertible into shares of its stock of any class, whether now or hereafter authorized, for such considerations as said Board of Directors may deem advisable, subject to such limitations and restrictions, if any, as may be set forth in the by-laws of the Corporation.

Clause (2). No holders of shares of stock of the Corporation of any class shall have any preemptive or other right to subscribe for or purchase any part of any new or additional issue of stock of any class or of securities convertible into stock of any class, whether now or hereafter authorized or whether issued for money, for a consideration other than money or by way of dividend.

Clause (3). The Board of Directors shall have the power, from time to time, to determine whether any, and if any, what part, of the surplus of the Corporation shall be declared in dividends and paid to the stockholders; and to direct and determine the use and disposition of any of such surplus. The Board of Directors may in its discretion use and apply any of such surplus in purchasing or acquiring any of the shares of the stock of the Corporation, or any of its bonds or other evidences of indebtedness, to such extent and in such manner and upon such lawful terms as the Board of Directors shall deem expedient.

Clause (4). The Corporation reserves the right to make from time to time any amendments of its charter which may now or hereafter be authorized by law, including but not restricted to, any amendments changing the terms of any class of its stock by classification, reclassification or otherwise.

Clause (5). Notwithstanding any provision of law requiring any action to be taken or authorized by the affirmative vote of the holders of a designated proportion of the shares of stock of the Corporation, or to be otherwise taken or authorized by vote of the stockholders, such action shall be effective and valid, except as otherwise required by provisions of this charter relating to the Preferred Stock, if taken or authorized by the affirmative vote, at a meeting, of the holders of a majority of the total number of shares outstanding and entitled to vote thereon.

EIGHTH: **By-Laws.** The Board of Directors shall have the power, at any regular or special meeting thereof, to make and adopt by-laws, or to amend, alter or repeal any by-laws of the Corporation. The by-laws may contain any provision for the regulation and management of the affairs of the Corporation not inconsistent with law or the provisions of this charter.

NINTH: **Inspection of Records by Stockholders.** The Board of Directors shall have power to determine from time to time whether and to what extent and at what times and places and under what conditions and regulations the books, records, accounts, and documents of the Corporation, or any of them, shall be open to the inspection of stockholders, except as otherwise provided by law or by the by-laws; and, except as so provided no stockholders shall have any right to inspect any book, record, account or document of the Corporation unless authorized so to do by resolution of the Board of Directors.

TENTH: **Compensation of Members of Board of Directors and Committees thereof.** The Board of Directors in its discretion may allow, in and by the by-laws of the Corporation or by resolution, the payment of expenses, if any, to members for attendance at each regular or special meeting of the Board of Directors or of any committee thereof, and the payment of reasonable compensation to such members for their services as members of the Board of Directors, or any committee thereof, and shall fix the basis and conditions upon which such expenses and compensation shall be paid. Any member of the Board of Directors or of a committee thereof, also may serve the Corporation in any other capacity and receive compensation therefor in any form.

ELEVENTH: **Indemnification of Officers and Directors.** Each director and each officer of the Corporation, and his heirs, executors and administrators shall be indemnified by the Corporation against all costs and expenses reasonably incurred by him for advice or assistance concerning, or in connection with the defense of, any civil, criminal, administrative, or other claim, action, suit or proceeding in which he may become involved, or with which he may be threatened, by reason of his being, or having been, a director or officer of the Corporation or by reason of his serving or having served any corporation, trust, committee, firm or other organization as director, officer, employee, trustee, member or otherwise at the request of the Corporation, whether or not he continues to be a director or officer at the time of incurring such costs or expenses, except costs and expenses incurred in relation to matters as to which such director or officer shall have been derelict in the performance of his duty as such director or officer.

For the purposes of this subdivision ELEVENTH, a director or officer shall conclusively be deemed not to have been derelict in the performance of his duty as such director or officer

(a) in a matter which shall have been the subject of a claim, suit, action or proceeding to which he was a party disposed of by adjudication on the merits, unless he shall have been finally adjudged in such claim, action, suit or proceeding to have been derelict in the performance of his duty as such director or officer, or

(b) in a matter not falling within (a) next preceding if either all disinterested members of the Board of Directors or a committee of disinterested stockholders of the Corporation (excluding therefrom any director or officer) selected as hereinafter provided, shall determine that he is not derelict.

The selection of the committee of stockholders provided above may be made by unanimous action of the disinterested directors or, if there be no disinterested director or directors, by the chief executive officer of the Corporation, provided that not less than three (3) stockholders shall be selected in any case. A director or stockholder shall be deemed disinterested in a matter if he has no interest therein other than as a director or stockholder of the Corporation, as the case may be. The foregoing shall not constitute exclusive tests as to dereliction and no determination as to dereliction shall be questioned on the ground that it is made otherwise than as provided above. The Corporation may pay the fees and expenses of the stockholders or directors, as the case may be, incurred in connection with making a determination as above provided.

The foregoing indemnification shall include reimbursement of all costs and expenses reasonably incurred in settling any such claim, action, suit or proceeding or in satisfaction of any related judgment, fine or penalty, when the so doing appears to be for the best interests of the Corporation, and shall be in addition to any rights to which any director or officer may otherwise be entitled as a matter of law or otherwise.

TWELFTH: **Informal Action by Board of Directors or Committees thereof.** Any action required or permitted to be taken at any meeting of the Board of Directors, or of any committee thereof, may be taken without a meeting, if a written consent to such action is signed by all members of the Board or of such committee, as the case may be, and such written consent is filed with the minutes of proceedings of the Board or committee.

ARTICLE V

A. The total number of shares of all classes which Martin has authority to issue is 12,000,000 shares of Common Stock without par value.

B. The total number of shares of all classes which A-M has authority to issue is 29,200,000 divided into two classes as follows:

25,000,000 Common Shares of the par value of $2 per share; and

4,200,000 Class B Common Shares of the par value of $2 per share.

The aggregate par value of all such shares is $58,400,000.

ARTICLE VI

Upon the effective date of the consolidation, the authorized Capital Stock of the Corporation shall be 40,380,000 shares divided into 380,000 shares of 4½% Cumulative Preferred Stock of the par value of $100 per share and 40,000,000 shares of Common Stock of the par value of $1 per share. As a result of the consolidation, the Common Stock of Martin and the Common Shares of A-M issued and outstanding on the effective date of the consolidation will be converted into like stock of the Corporation; the Class B Common Shares of A-M issued and outstanding on the effective date of the consolidation will be converted into 380,000 shares of 4½% Cumulative Preferred Stock of the par value of $100 per share; and the holders of the warrants of Martin issued and outstanding on the effective date of the consolidation will be entitled to purchase shares of Common Stock of the Corporation of the par value of $1 per share for each warrant so held, all as hereinafter more specifically set forth:

A. As to the stock and warrants of Martin:

1. Each share of Common Stock, without par value, shall be converted into 1.3 shares of Common Stock of the Corporation, of the par value of $1 per share; provided, however, that holders of certificates of Martin's Common Stock will not be entitled to receive certificates for fractional shares of the Common Stock of the Corporation.

2. Each warrant to purchase a Current Stock Unit, now consisting of 2.10 shares of the said Common Stock of Martin, without par value, shall entitle the holder thereof to purchase a Current Stock Unit consisting of 2.73 shares of Common Stock of the Corporation, of the par value of $1 per share.

B. As to the stock of A-M:

1. The Class B Common Shares outstanding on the effective date of the consolidation shall be converted into 380,000 shares of 4½% Cumulative Preferred Stock of the Corporation of the par value of $100 per share.

2. Each Common Share shall be converted into one share of Common Stock of the Corporation, of the par value of $1 per share.

Except as hereinabove set forth no other consideration shall be paid, transferred or issued by the Corporation for shares of Common Stock and warrants of Martin or for shares of A-M.

ARTICLE VII

The principal office of Martin in the State of Maryland is located in Baltimore County. The principal office of A-M in the State of Maryland is located in Baltimore City, (not located in any county). Martin owns property, the title to which could be affected by the recording of an instrument among the land records in the following counties of the State of Maryland: Baltimore County and Anne Arundel County. A-M owns property, the title to which could be affected by the recording of an instrument among the land records, in the following counties of the State of Maryland: Allegany County, Howard County and Washington County, and in Baltimore City (not located in any county).

ARTICLE VIII

The Articles and Plan of Consolidation were duly advised by the Board of Directors and approved by the stockholders of Martin in the manner and by the vote required by the laws of the State of Maryland and by the charter of Martin.

ARTICLE IX

The Articles and Plan of Consolidation were duly advised, authorized and approved in the manner

and by the vote required by the charter of A-M and by the laws of the State of Illinois, under which A-M was organized.

ARTICLE X

Upon the effective date of the consolidation:

A. The separate existences of Martin and A-M shall cease.

B. All the property, rights, privileges, powers and franchises of Martin and of A-M, of whatever nature and description, of a public as well as of a private nature, shall be transferred to, vest in and devolve upon the Corporation without further act or deed; and all property, rights, privileges, powers and franchises, and all and every other interest of Martin and of A-M shall be thereafter as effectually the property of the Corporation as they were of Martin and of A-M.

ARTICLE XI

On and after the effective date of the consolidation:

A. All debts, obligations, liabilities and duties of Martin and of A-M shall thenceforth attach to the Corporation, and may be enforced against it to the same extent as if said debts, obligations, liabilities and duties had been incurred or contracted by it; and any claim existing or action or proceeding pending by or against either Martin or A-M may be prosecuted to judgment or decree as if the consolidation had not taken place, or the Corporation, upon the motion of the Corporation or of any party, may be substituted as a party in place of Martin or A-M, as the case may be, and any such judgment or decree against Martin or A-M shall constitute a lien upon the property of the Corporation;

B. The title to any real estate shall not revert or be in any way impaired by reason of the consolidation, but all rights of creditors and all liens upon any property of Martin or A-M shall be preserved unimpaired. Nothwithstanding the provisions of Article X hereof, confirmatory deeds, assignments or other like instruments, when deemed desirable to evidence such transfer, vesting or devolution of any property, right, privilege or franchise, may at any time, or from time to time, be made and delivered in the name of Martin or A-M, as the case may be, by the last acting officers thereof, or by the corresponding officers of the Corporation.

ARTICLE XII

Anything herein contained to the contrary notwithstanding, the proposed consolidation herein set forth may be abandoned at any time prior to the effective date of consolidation, (i) by either Martin or A-M, by resolution of its Board of Directors, if the conditions of that Company's obligations, as set forth in the Agreement of Consolidation between the two companies dated as of August 1, 1961, are not satisfied, or (ii) by Martin and A-M, each acting by its Board of Directors, by mutual consent, for any reason; and the proposed consolidation shall be deemed abandoned if the closing provided for in said Agreement of Consolidation is not held on or before December 31, 1961.

ARTICLE XIII

The consolidation referred to herein shall become effective upon the issuance of a certificate of consolidation by the Secretary of State of the State of Illinois and the acceptance of the Articles and Plan of Consolidation for record by the Department of Assessments and Taxation of the State of Maryland.

The corporations party to these Articles and Plan of Consolidation have agreed that, notwithstanding the effective date as hereinabove established, the consolidation, if and when effective under the laws of the States of Maryland and Illinois, shall be effective for accounting purposes only as of the opening of business on October 1, 1961. Appropriate property, financial, accounting, statistical and other corporate records of Martin, A-M and the Corporation shall be adjusted or made, as the case may be, to reflect such effects of the consolidation as of October 1, 1961.

IN WITNESS WHEREOF, Martin and A-M, the parties to the consolidation, have caused these Articles and Plan of Consolidation to be signed in their respective corporate names and on their behalf by their respective President or Vice-President and their respective corporate seals to be hereunto affixed and attested by their respective Secretaries or Assistant-Secretaries, the day and year first above written.

ATTEST: THE MARTIN COMPANY

..... By .....
Secretary President

AMERICAN-MARIETTA COMPANY

..... By .....
Secretary President

STATE OF MARYLAND, COUNTY OF , TO WIT:

On this day of , 1961, before me, the undersigned, a Notary Public of the State and County aforesaid, personally appeared who made oath in due form of law that he is the President of The Martin Company and acknowledged that he executed the foregoing Article and Plan of Consolidation by due authority of said Corporation; at the same time also appeared who made oath in due form of law that he was the Secretary of the meeting duly held by the stockholders of The Martin Company at which the consolidation set forth in the aforegoing Articles and Plan of Consolidation was approved, and that the matters and facts set forth in said Articles and Plan of Consolidation with respect to said authorization and approval are true.

.....
Notary Public

STATE OF , COUNTY OF , TO WIT:

I HEREBY CERTIFY, that on this day of , 1961, before me the undersigned, a Notary Public of the State and County aforesaid, personally appeared who made oath in due form of law that he is the President of American-Marietta Company and acknowledged that he executed the foregoing Articles and Plan of Consolidation by due authority of said Corporation; also personally appeared who made oath in due form of law that he is the Secretary of American-Marietta Company and that the matters and facts set forth in said Articles and Plan of Consolidation with respect to authorization and approval are true.

.....
Notary Public

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

IN REPLY REFER TO:
40-3296
LF L:NC

SOURCE MATERIAL LICENSE

License No. C-4283

Dated:

The Martin Company
Baltimore 3
Maryland

Attention: Mr. J. V. Loppert

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and Section 40.21 of the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive possession of and title to, at the above stated location, one hundred thousand (100,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication in accordance with the procedures described in your letter of December 1, 1958.

You are further licensed to transfer and deliver possession of and title to refined source material to any person licensed by the Atomic Energy Commission, within the limits of his license.

As a condition of this license, you are required to maintain records of your inventories, receipts and transfers of refined source material.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards For Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire September 30, 1961.

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

Aug 70

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

IN REPLY REFER TO:

40-3296
[illegible]

SOURCE MATERIAL LICENSE

License No. C-4283

Dated: [illegible]

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Baltimore 3
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Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire September 30, 1961.

cc: Docket Officer
Document Room
S/N
Compl. w/o appl

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Nuclear Materials Section
Licensing Branch
Division of Licensing & Regulation

Dictator [illegible]

Approved JCD

RADIATION SAFETY BR.
10/25/60

RADIATION SAFETY CHECK

Company The Martin Company Docket No. 40-3296

References Letters dated April 12, 1961, March 9, 1961

Material Requested Th - Mg Quantity 150,000

Weight % 4 Form alloy Quantity on hand at any one time:

Intended Use Outer skins for Titan I missiles

FACILITIES Not Required ✓ See Comments Adequate

In Application:	Not Required:
	Hot Cell
	Vented Area
	Storage

EQUIPMENT Not Required ✓ See Comments Adequate

In Application:	Not Required:
	Processing
	Hood
	Dry box
	Filter
	Resp.Prot.
	Strge.Cont.
	Handling

INSTRUMENTS Not Required See Comments Adequate

In Application:	Not Required:
✓	Beta gamma
✓	Alpha
	Neutron
✓	Air samplers
✓	Countg.(Scalers)
	Fluorimeter

ADMINISTRATIVE PROCEDURES
Not Required See Comments Adequate ✓

RADIATION PROTECTION PROCEDURES
Not Required See Comments Adequate

In Application:	Not Required:
	Shipping
✓	Handling
✓	Processing
	Emergency

A171

RADIATION SAFETY BR.
10/25/60

RADIATION SAFETY CHECK

(Page 2)

ON SURVEY PROCEDURES Not Required ____ See Comments ✓ Adequate ✓

i- Not
: Required:
✓ Rad. levels ____
__ Contamination ____
✓ Air Sampling ____
__ Effluents ____
__ Leak testing ____

Surveys are conducted at storage locations and work areas to measure radiation levels & airborne concentration by health physics group.

EL MONITORING Not Required ✓ See Comments ____ Adequate ____

i- Not
: Required:
__ Film badges ____
__ Dosimeters ____
__ Calculations ____
__ Urinalysis ____

ISPOSAL No Waste ____ See Comments ____ Adequate ✓

ed Quantity 3000 Method: O.K. with Part 20 ____
antities (solution samples) Burial ____
posed in sewer system Sewer ✓ Requires approval ____
Transfer ✓
Incineration ____

G & EXPERIENCE AVAILABLE
i- Not Not Required ____ See Comments ____ Adequate ✓
: Required
__ Rad. safety officer ____
__ Supervision ____
✓ Instruc. of Personnel ____

NAL INFORMATION REQUESTED none (date)

viewed by Harmon Date approved 19 April 6

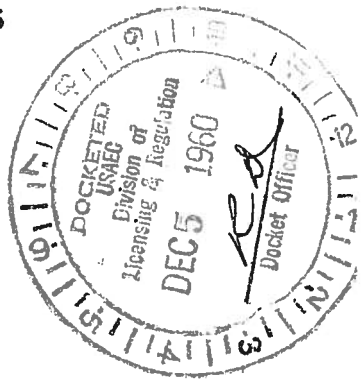
DOCKET NO. 70-58
File G

THE MARTIN COMPANY

Baltimore 3, Maryland

December 1, 1960
Mail Number W722

Refer to: NMC-135



Director
Division of Licensing & Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention: Mr. J. C. Delaney,
Chief, Nuclear Materials
Licensing Branch

Gentlemen:

Reference is made to our Special Nuclear Material License SNM-53 as amended, which authorizes Martin to receive and store five hundred (500) kilograms of U-235 contained in uranium as UO_2 and metal. We request to further amend this license to add storage facilities in addition to the Vault described in our License Application dated December 12, 1957, as follows:

1) In order to store feed material and finished products (fuel elements) a storage area has been established for contract material in a munitions bunker area located on Martin property. This area has been approved by the New York Operations Office. Enclosure 1 gives a detailed description of the facility, quantity and type of material to be stored and a procedure for the Administrative Control.

2) As a result of the expanded fuel element fabrication work at the Martin Company, we require an area to store scrap and waste Special Nuclear and By-Product material prior to shipment to a reprocessor. Enclosure 2 gives a detail description of the facility, quantity and type of material to be stored and a procedure for the Administrative Control.

We are also submitting a request to the New York Operations Office for approval of this facility.

Please direct any questions concerning these facilities to Mr. W. W. Wachtl, Chairman Nuclear Material Control

A/72

I certify that the statements made in this letter and enclosures are true, complete and correct to the best of my knowledge and belief and are made in good faith.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert,
Licensing Officer
Nuclear Division

WW/JVL/plm

FILE NO. [illegible]

File G

Nuclear Feed Material and Finished Product Storage Area

The Nuclear Feed Material and Finished Product Storage Area is located on Martin property in the Revetment Area which was previously a munitions bunker. As shown on the attached photograph this Revetment Area consists of eight bunkers. Each bunker cell measures 13' x 15' x 11' high. (See attached sketch.)

It is planned that up to three of the bunker cells will be utilized for nuclear storage. A small amount of explosive material including emergency flares, jet starter cartridges, fuse chord, small arm ammunition is currently being stored in the remaining bunkers. The area is separately fenced and locked within the Martin property periphery fence. A flood light system has been installed for security purposes. An ADT Alarm system will be located on each access door.

This area will provide storage for up to seventy-five (75) kilograms of contained U-235 per bunker depending upon storage container limitations. Both License and Contract SS Materials will be stored including feed material in shipping birdcages and finished products in approved shipping containers. Feed materials will be stored as required prior to production storage in the Manufacturing Vault. Finished fuel elements will be stored prior to shipment to other contractors. The storage of these materials will be in accordan with criteria presented in TID-7019, TID-7016 and Title 10 Code of Federal Regulations Part 70 and 71. It is not planned to include a radiation alarm system for the following reasons:

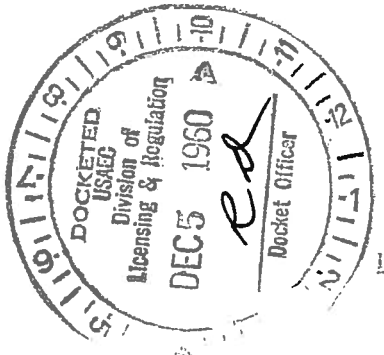
1. Remoteness of location and shield properties of the storage rooms.

2. Special administrative control exercised, restricting access.

3. Limited variety of SS material storage.

All packaging for shipment is controlled to insure compliance with Title 10 Parts 20, 70 and 71 Code of Federal Regulations and ICC Regulations (including Bureau of Explosives Permits when necessary).

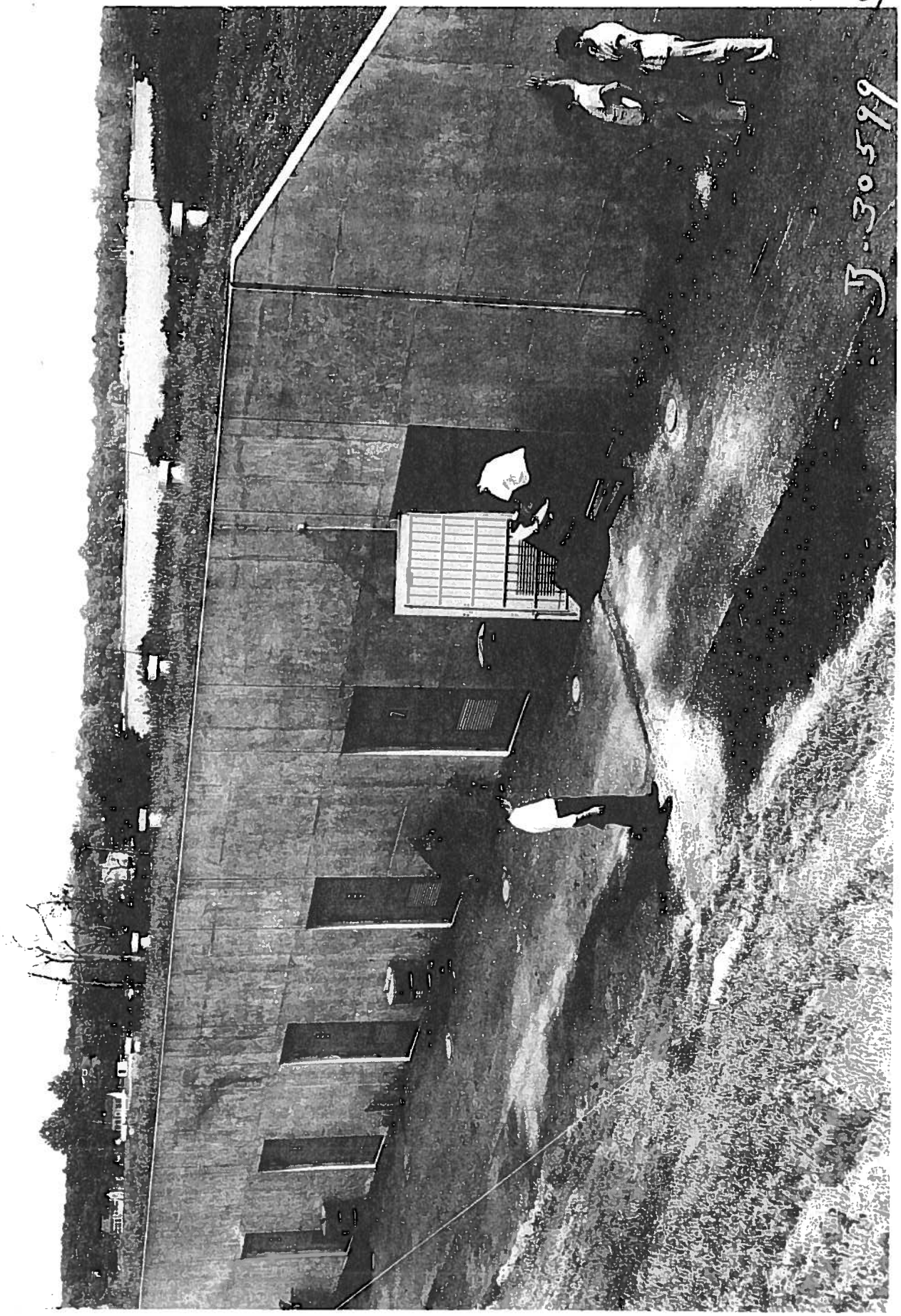
Administrative Control of this area will be maintained according to the attached procedure entitled "Regulations and Control for Revetment Storage Area".

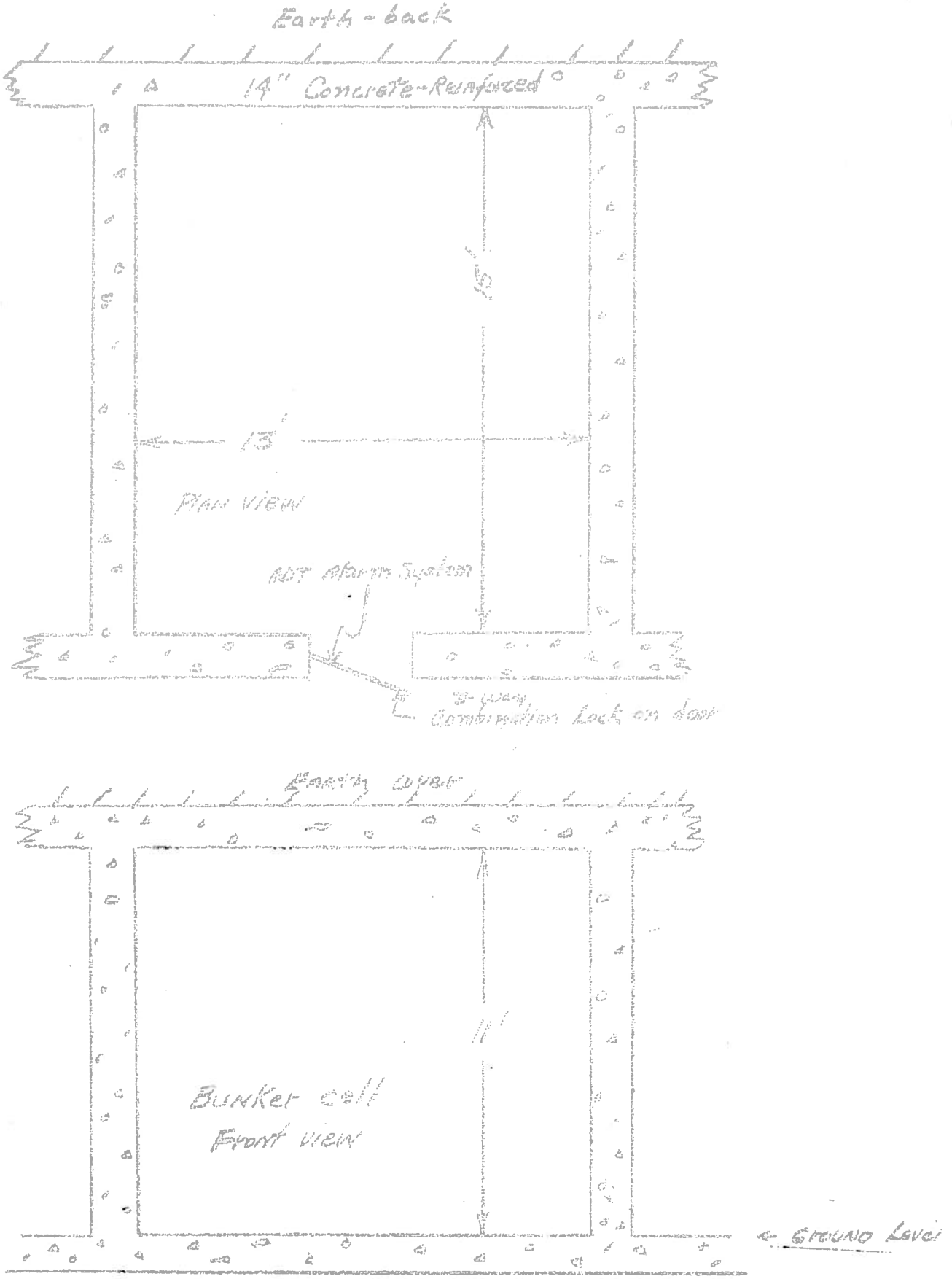


DOCKETED USAEC Division of Licensing & Regulation DEC 5 1960 Docket Officer

Enclosure 1

TO-58
File Cy - Only
Cy Rec
R





Revetment Storage Area

REGULATIONS FOR CONTROL OF REVETMENT STORAGE AREA

The following procedures are to be followed for transfer of nuclear material within the storage area, periodic inventories, and any emergencies occurring at the storage location.

1. General

The specific purpose of the area is to provide storage for Special Nuclear Material. Control of the area has been delegated to the Accountability Representative who will physically control all access to the area. The combination for the 3-way lock will be kept by the Accountability Representative. The following personnel should be contacted in this order for admittance: (Line supervision control)

R. L. Metzger (Accountability Representative)
Ext. 9725
Badge No. 1170-82304

W. W. Wechtl (Chairman, Nuclear Materials Control Committee) - Ext. 8203
Badge No. 1170-83724

J. V. Loppert (Operations Manager) Ext. 8281
Badge No. 1170-82060

Visits include once-a-month inventories and periodic transfer of material.

2. Storage and Transfer of Material

Physical movement will be preceded by application to the Accountability Representative. The Accountability Representative will review all applications for movement of SS material within the area with the Nuclear Materials Control Committee, consisting of Health Physics, Criticality, Security, Accountability and Waste Control.

The Accountability Representative will be in attendance for all movement of mater within the area. He will obtain a key to the Revetment periphery fence from the Security Department and all transfers of nuclear materials to this area will require that the shipment be accompanied by a Martin guard escort in a radio car. On all visits, Health Physics personnel will be in attendance, with portable radiation monitoring equipment. Prior to entry the area is surveyed, and any movement of material is monitored.

3. Inventory

Inventory of nuclear materials in the Magazine will be made at least on a monthly basis. The Accountability Representative will perform the inventory. Inventory will be conducted in accordance with procedures as stated in Nuclear Procedures Control Manual MND-1069, revised July 1959. MBA books will be maintained in the Vault Annex.

4. Emergency Procedures

In the event of any emergency occurring at the location, the following departments should be contacted:

Security Department - Ext. 280, 730
Health Physics Dept. - Ext. 9517, 9518

70-58
File Cy

Nuclear Waste Storage Area

The Nuclear Materials Scrap Storage Area is to be located on Martin property on the south side of "D" Building and within the periphery security fence (see attached sketch). The area will consist of five thousand (5000) square feet of the present concrete pad and will be contained in a regular chain link fence, six feet high. An eight foot gate will be centered on the north side and will be secured by a chain and padlock.

Scrap SS and By-product solutions and solid compounds will be stored in a 55-gallon steel drum or equivalent. Burnable low level wastes if to be shipped away for disposal will be bailed and packed in containers and protected from the weather by water-proof coverings.

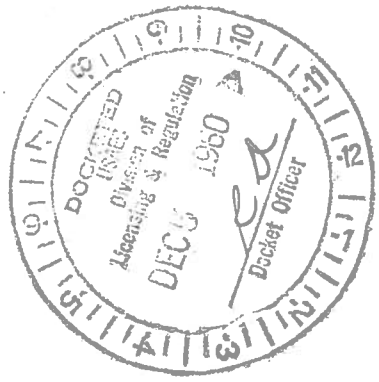
Storage of waste will be in accordance with criteria presented in TID-7019, TID-7016 and Title 10 Code of Federal Regulations Parts 20 and 70. The area will provide storage for up to one hundred (100) kilograms of contained U-235.

Both License and Contract SS material and By-product as scrap will be stored prior to shipment to other contractors for recovery or disposal purposes. Scrap will be segregated by project and type clearly labeled on each storage drum.

All waste packaging for shipment is checked to insure compliance with regulations in Title 10, Parts 20 and 71, Code of Federal Regulations and ICC Regulations (including Bureau of Explosives Permits when necessary.)

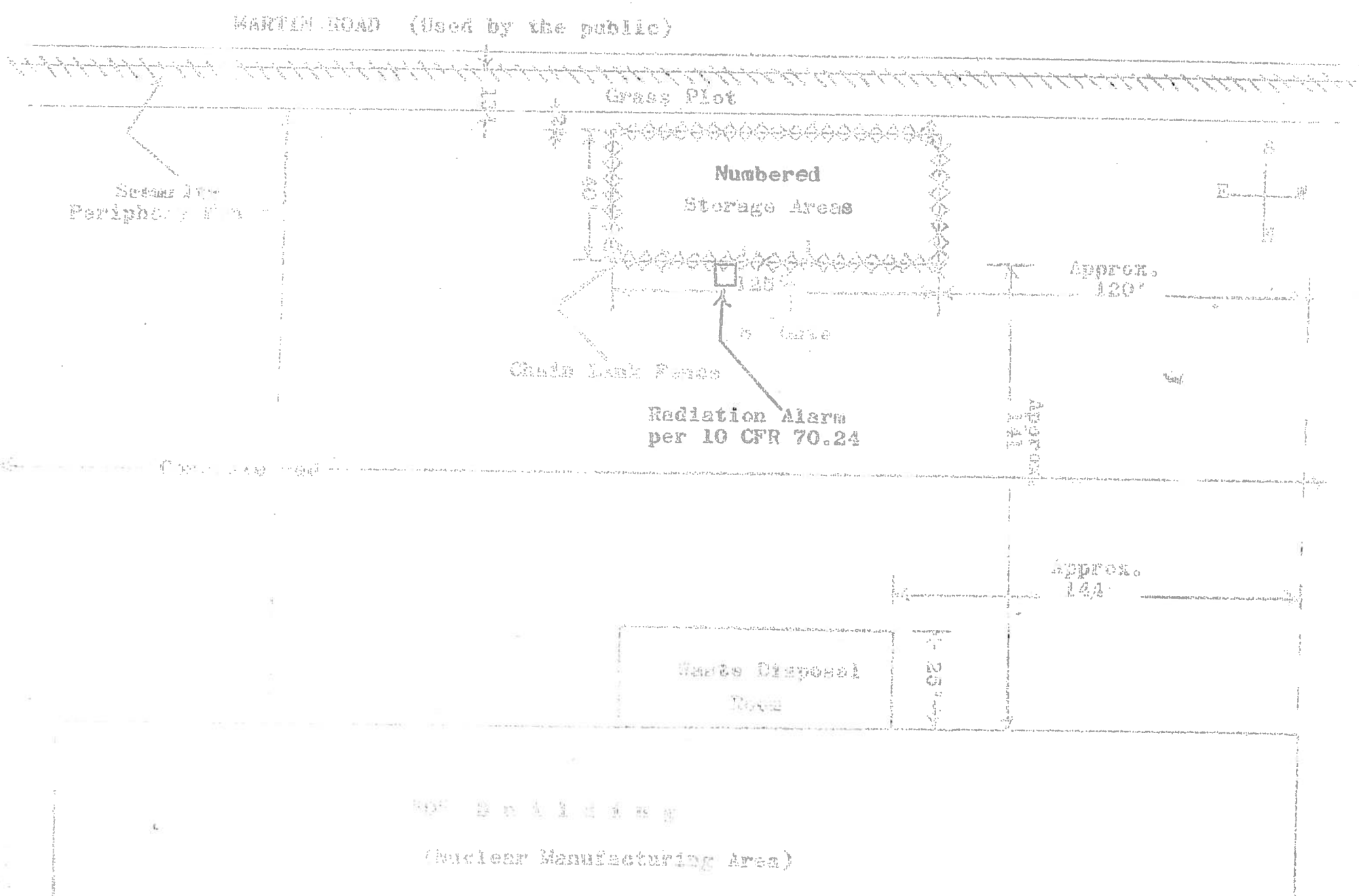
Storage of SS materials and quantities will be restricted to fall within the definitions and limits of Inaccessible and/or Workable forms. This facility will be added to the regular guard clock patrol assuring observation at least once each hour.

Administrative control of this storage area will be maintained according to the attached procedure entitled "Regulations for Control of Waste Storage Area".



Enclosure 2

PROPOSED NUCLEAR WASTE STORAGE AREA



REGULATIONS FOR CONTROL OF WASTE STORAGE AREA

The following procedures are to be followed for transfer of nuclear material within the storage area, periodic inventories, and any emergencies occurring at the storage location.

1. General

The specific purpose of the area is to provide storage for Special Nuclear and By-Product material waste. Control of the area has been delegated to the Accountability Representative who will physically control all access to the area. The combination for the 3-way lock will be kept by the Accountability Representative. The following personnel should be contacted in this order for admittance: (Line supervision control)

R. L. Metzger (Accountability Representative) Ext. 9725
Badge No. 1170-82304

W. W. Wachtl (Chairman, Nuclear Materials Control Committee) Ext. 8203
Badge No. 1170-83724

J. V. Loppert (Operations Manager) Ext. 8281
Badge No. 1170-82060

2. Storage and Transfer of Materials

Physical movement will be preceded by application to the Accountability Representative. The Accountability Representative will review all applications for movement of SS or By Product material within the area with the Nuclear Materials Control Committee, consisting of Health Physics, Criticality, Security, Accountability and Waste Control. Regulatory measures include control of material by type, quantity and segregation in the area by numbered sub-areas.

3. Inventory

Inventory will be conducted in accordance with procedures as stated in Nuclear Procedures Control Manual MND-1069, revised July 1959. MBA books will be maintained by the Waste Control chemist.

4. Emergency Procedures

In the event of any emergency occurring at the location the following departments should be contacted:

Security Department, Ext. 280, 730
Health Physics, Ext. 9517, 9518

Charles Luke
Chief, Criticality Evaluation Branch

December 5, 1960

J. C. Delaney
Chief, Nuclear Materials Branch

THE MARTIN COMPANY APPLICATION DATED DECEMBER 1, 1960, DOCKET NO. 70-58.

L&R:JJL

Please review the subject request for the adequacy of the applicant's procedures to avoid a condition of accidental criticality. The enclosed copy of the application may be retained for your files.

Enclosure:
Cy appl. dtd 12/5/60

Distribution:
Suppl.
Br. & Div. Rdgs.
J. J. Lane

OFFICE ▶	L&R				A/D	
SURNAME ▶	JJLane:sjs					
DATE ▶	12/5/60					

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62701-3

Project S-16
Docket 70-58

1-12-6/

Lyall Johnson, Assistant Director
Facilities and Materials Licensing

Clifford K. Beck, Assistant Director
Nuclear Facilities Safety

THE MARTIN COMPANY - December 1, 1960 - Docket 70-58

Please refer to your December 5, 1960 memorandum, forwarding the subject application for review.

The Martin Company wishes to convert several munitions bunker cells into special nuclear material storage vaults. The new area has already been approved for this purpose by the New York Operations Office, and we have no objection to this site.

However, we wish clarification of several phases of the Martin application, as follow:

1. The application merely states that up to 75 kg of contained U-235 will be stored in each of three bunkers, and in accordance with safety guides and regulations. However, in order to complete our evaluation, we must have detailed information on the nuclear material to be stored, to include quantity, physical description, storage geometry, moderator content, etc. The applicant must further demonstrate the critical safety of such materials, as regards both the individual units and the storage arrays of such units, by specific references to reliable data, nuclear safety guides, or by calculation.

2. Martin states that a radiation alarm system will not be installed in the proposed vault area, in view of remoteness of location, shield properties, and other considerations. From examination of a photograph of the facility, it is evident that the bunkers are vented and are located adjacent to a populated area and a waterway. For both the safety of the community and personnel who may be within the bunkers, we feel that detection chambers should be placed within each of the bunkers and connected to an alarm system.

3. In addition to the bunker-vault storage area, Martin proposes an outdoor, fence-enclosed concrete storage pad for scrap nuclear materials. A sketch of this area shows it to be within 15 to 20 feet of a public road. Martin merely states that it wishes to store up to 100 kg of U-235 scrap in 55-gallon drums, in accordance with safety guides and regulations. Again,

(continued)

OFFICE ▶						
SURNAME ▶					A/74	
DATE ▶						

we would wish to have complete description of and justification for the specific storage pattern contemplated. Such justification should also consider the danger of accidental moderation due to outdoor storage and consequences of an inadvertent criticality in proximity to a public thoroughfare.

Upon receipt of information as indicated above, we will resume our study of this application. The docket is returned with this memorandum.

OFFICE ▶	CFH:DTAR	CFH:DTAR	NFS:DTAR			
SURNAME ▶	Hlogroian:bh	CDLuke	CKBeck			
DATE ▶	1/11/61	1/11/61	1/ /61			

OPTIONAL FORM NO. 10

UNITED STATES GOVERNMENT

Memorandum

JAN 1961

TO : Lyall Johnson, Assistant Director DATE:
Facilities and Materials Licensing

FROM : Clifford K. Beck, Assistant Director CKB
Nuclear Facilities Safety

SUBJECT: THE MARTIN COMPANY - December 1, 1960 - Docket 70-58

Please refer to your December 5, 1960 memorandum, forwarding the subject application for review.

The Martin Company wishes to convert several munitions bunker cells into special nuclear material storage vaults. The new area has already been approved for this purpose by the New York Operations Office, and we have no objection to this site.

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(continued)

A/75

JAN 1961

We would wish to have complete description of and justification for the specific storage pattern contemplated. Such justification should also consider the danger of accidental moderation due to outdoor storage and consequences of an inadvertent criticality in proximity to a public thoroughfare.

Upon receipt of information as indicated above, we will resume our study of this application. The docket is returned with this memorandum.

Charles Luke
Chief, Criticality Evaluation Branch

January 30, 1961

J. C. Delaney
Chief, Nuclear Materials Branch

MARTIN COMPANY APPLICATION DATED JANUARY 17, 1961, DOCKET 70-58

L&R:JJL

Please review the subject request for the adequacy of the applicant's procedures to avoid a condition of accidental criticality. The enclosed copy of the application may be retained for your files.

Enclosure:
Cy appl. dtd 1-17-61

Distribution:
Suppl.
Br. & Div. Rdgs.
J. J. Lane

OFFICE ▶	L&R				A76	
SURNAME ▶	JJLane:sjs					
DATE ▶	1-30-61					

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Joseph Delaney, Chief
Nuclear Materials Branch

DATE: FEB 1 1961

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch CDL

SUBJECT: THE MARTIN COMPANY - December 1, 1960

Please refer to my memorandum of January 12, 1961, on the above subject. Subsequent to that date, Mr. W. W. Wachtl, Chairman of the Martin Company's Nuclear Materials Control Committee, visited us to further discuss their application. To confirm the position we took at that meeting, we suggest that the following be included in your reply to the Martin application:

"In order to continue the review of your application, the following information is required concerning your proposal to convert an ammunition bunker to a nuclear materials and finished product storage area:

"(1) A description of special nuclear materials to be stored in the bunker, with as much detail as possible. This description should include the chemical and physical state of the materials (eg., UO_2 powder, apparent density 3.2 grams/cm^3); their isotopic content (eg., 93% U-235); moderator content or ratio (eg., 0.1% H_2O, or H/U-235 < 2); data pertaining to other materials which may be present or intermingled (eg., aluminum alloyed with uranium to the extent of 20% U-80% Al by weight); and geometry of individual pieces (eg., ½" pellets, 3" x 24" x 0.020" plates, etc.).

"(2) A description of the individual storage units of special nuclear material, their containers, and birdcages. This should include, for each type of unit, mass and other pertinent data for special nuclear material, and container and birdcage dimensions and structural details.

"(3) The number of individual storage units described in (2) above that comprise an array, and their spacing or arrangement within the array. Further, the number and arrangement of such arrays within the bunker.

"(4) Justification, from the viewpoint of critical safety, of both the individual storage units described in (2) and the arrays described in (3), while taking into account whether or not accidental moderation by flooding is credible.

(continued)

A177

This justification should cite applicable criteria for critical safety (such as mass or volume control) and an evaluation of how the proposed storage procedures will satisfy such criteria.

"(5) Despite the fact that the bunkers are well shielded by earth and concrete, and will be under the close surveillance of your Accountability Representative, we feel that a radiation monitor alarm system should be provided, for the safety of personnel who may be in the area. Further, since the bunkers are vented and located on a waterway, the public safety is also involved.

"With regard to the nuclear waste storage area proposed in your application, the same type of information described in items (1) through (4) above is required. In addition, justification of nuclear safety should take into account the consequences of an inadvertent criticality at your selected site, which is in proximity to a public thoroughfare.

"We recognize that it is often difficult to provide descriptions, such as those we have outlined in items (1) through (4), when the nature of materials to be stored will be largely determined by activities now unforeseen. However, if the safety criteria were clearly delineated over a reasonable range, it is quite possible that a variety of materials or arrangements could be justified."

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Joseph Delancy, Chief
Nuclear Materials Branch

DATE: FEB 17 '61

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch CDL

SUBJECT: THE MARTIN COMPANY - January 17, 1961 - Docket 70-58

Please refer to your memorandum of January 30, 1961, forwarding the subject application for review.

The Martin Company proposes to fabricate uranium-aluminum alloy fuel plates. In all identified manufacturing areas, they have invoked mass limitation as the means for prevention of criticality. The masses in any one such area would be safe even in the event they were arranged in the most reactive configuration, water moderated and reflected.

We therefore have no objection to this application.

A/78

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : Files

DATE: February 20, 1961

FROM : J. J. Lane

SUBJECT: MARTIN COMPANY APPLICATION DATED JANUARY 17, 1961, FOR AMENDMENT TO LICENSE SNM-53 - DOCKET NO. 70-58

LJL:JJL

ANALYSIS AND FINDINGS

By application dated January 17, 1961, Martin Company requests amendment to License SNM-53 to authorize an increased U-235 limit in the melt and ingot processes during fabrication of U-Al fuel plates.

Based on our review of the information submitted by the applicant, it is hereby determined that their license SNM-53 may be amended to authorize an increase in the U-235 quantity during melt and ingot processing steps.

APPROVED:

J. C. Delaney
Chief, Nuclear Materials Branch

A/79

L&R:JJL
70-58

Distribution:
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S. R. Gustavson, L&R, w/encl.
H. Abel, L&R, w/encl.
J. O. Delaney, L&R, w/encl.
J. J. Lane, L&R, w/encl.

The Martin Company
Baltimore 3, Maryland

Attention: Mr. J. V. Loppert,
Licensing Officer
Nuclear Division

Gentlemen:

Enclosed is Special Nuclear Material License No. SNM-53, as amended.

Very truly yours,

J. O. Delaney
Chief, Nuclear Materials Branch
Division of Licensing & Regulation

Enclosure:
SNM-53, as amended

A/80

OFFICE ▶	L&R	FIN	L&R			
SURNAME ▶	JJLane:sis		Delaney			
DATE ▶	2-20-61	2-21-61	2-21-61			

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

Form AEC 401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Name The Martin Company

2. Address Baltimore 3, Maryland

[illegible]

3. License No.

[illegible], as amended

4. Expiration Date

April [illegible], 1963

5. Docket No.

70-58

6. Special Nuclear Material

Uranium enriched in the U-235 isotope, and plutonium

7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license [illegible] kgs U-235 contained in uranium enriched in the U-235 isotope as UO_2 and metal, 160 grams Pu-239 as an encapsulated Pu-Be neutron source, and .7 milligrams Pu-239 as a Pu-alpha source.

8. Authorized use In accordance with the procedures described in the licensee's applications dated Oct. 11 and Oct. 26, 1956; applications executed Dec. 6, 1957, and Jan. 15, 1958; procedures filed Dec. 16, 1958; applications dated March 23, June 17, 1960; and Jan. 17, 1961, [illegible]

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part

None herein allocated

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

Place of use: Licensee's Middle River Plant, Maryland

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance [illegible] 2/24/61

[illegible] 8/22/61

U. S. GOVERNMENT PRINTING OFFICE : 1956—O-471648

J. [illegible] Delaney,
Division of Licensing and Regulation

DOCKET NO. 40-3296

THE MARTIN COMPANY

Baltimore 3, Maryland

March 9, 1961
Mail Number W722

Refer to: LSS-4

U. S. Atomic Energy Commission
Division of Licensing & Regulations
Washington 25, D. C.

Attention: Mr. J. C. Delaney,
Chief Materials Section
Licensing Branch

Subject: Source Material License C-4283

Gentlemen:

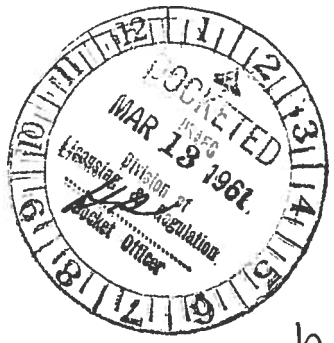
Pursuant to the provisions of Section 40-26 of The Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40, The Martin Company requests that the subject license be revised to increase the amount of Thorium-Magnesium Alloy (containing not more than 4% Thorium) from 100,000 pounds to 150,000 pounds. It is further requested that the expiration date be extended from September 30, 1961 to September 30, 1962.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert,
Licensing Officer
Nuclear Division

RLM/JVL/plm



A181

40-3296
LAR:ND

MAR 3 1961

The Martin Company
Baltimore 3, Maryland

Attention: Mr J. V. Loppert
Licensing Officer
Nuclear Division

Gentlemen:

Receipt is acknowledged of your request of March 9, 1961, for an amendment to License C-4283.

Enclosed is a copy each of AEC Regulations 10 CFR 20 and 10 CFR 40 entitled "Standards for Protection Against Radiation" and "Licensing of Source Material", respectively. Compliance with Part 20 is made a condition of all material licenses issued by the Commission.

In addition to the information you have submitted, we require the following information which should be submitted in letter form, in quadruplicate. (1) The maximum quantity of source material you wish to possess at any one time. (2) A detailed description of the activities you will perform. (3) The procedures you intend to employ in safeguarding employees against dust and contamination exposure through the escape of radioactive materials in the use of such material. (4) A general description of the types of instruments you have available to perform necessary health and safety surveys and the surveys that will be conducted. (5) If waste products are anticipated, the volume and concentration of radioactive materials and the method by which you intend to dispose of this waste.

Very truly yours,

J. C. Delaney
Chief, Nuclear Materials Branch
Division of Licensing & Regulation

Enclosures:
10 CFR 20 & 40

A/82

40-3296
L&R:ND

The Martin Company
Baltimore 3, Maryland

Attention: Mr. J. V. Loppert
Licensing Officer
Nuclear Division

Gentlemen:

Receipt is acknowledged of your request of March 9, 1961, for an amendment to License C-4283.

Enclosed is a copy each of AEC Regulations 10 CFR 20 and 10 CFR 40 entitled "Standards for Protection Against Radiation" and "Licensing of Source Material", respectively. Compliance with Part 20 is made a condition of all material licenses issued by the Commission.

In addition to the information you have submitted, we require the following information which should be submitted in letter form, in quadruplicate. (1) The maximum quantity of source material you wish to possess at any one time. (2) A detailed description of the activities you will perform. (3) The procedures you intend to employ in safeguarding employees against dust and contamination exposure through the escape of radioactive materials in the use of such material. (4) A general description of the types of instruments you have available to perform necessary health and safety surveys and the surveys that will be conducted. (5) If waste products are anticipated, the volume and concentration of radioactive materials and the method by which you intend to dispose of this waste.

Very truly yours,

BCC: Div. of Compliance, w/cy of
ltr. dtd 3-9-61

J. C. Delaney
Chief, Nuclear Materials Branch
Division of Licensing & Regulation

Enclosures:
10 CFR 20 & 40

OFFICE ▶		L&R	L&R			
SURNAME ▶		Doulos/mad	JCDelaney			
DATE ▶		3-31-61	3/31/61			

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

DOCKET NO. 40-3296

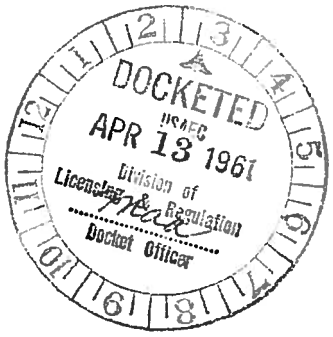
THE MARTIN COMPANY

Baltimore 3, Maryland

April 12, 1961
Mail No. W722

Refer to: LSS-5

DOCKETED
USAEC
APR 13 1961
Division of Licensing & Regulation
Docket Officer



U. S. Atomic Energy Commission
Division of Licensing & Regulation
Washington 25, D. C.

Attention: Mr. J. C. Delaney,
Chief Materials Section
Licensing Branch

Subject: Source Material License C-4283

Reference: a) USAEC Letter 40-3296 L & R:ND dated March 31, 1961

b) Martin Letter LSS-4 dated March 9, 1961

Gentlemen:

In accordance with reference (a) we submit additional information for your use in consideration of the requests stated in reference (b) concerning the subject license.

Reference (b) requests a limitation of procurement quantity at 150,000 pounds. The Martin Company has, since inception of the subject license procured 100,000 pounds of Thorium-Magnesium alloy in various sheet stock sizes. A review of our perpetual inventory records indicate that there are approximately 10,000 pounds of material currently in Stores. This material in various sheet stock sizes has been procured for use as outer skins for Titan I Missiles. This material will also be required for use in Research and Development for missile applications.

Martin Procurement is currently holding unplaced Purchase Requisitions totaling 6600 pounds. No attempt has been made to inventory the Work-In-Process or Finished Product in Storage. Such an inventory would be extremely difficult to obtain, due to the vast manufacturing, assembly and storage areas existing at the Martin Company. We estimate that 15,000 pounds of material is in process and in finished product. A summary of material in possession or to be ordered is as follows:

A/83

O.K.
D.F.H.

Nick - refer them to Section 23.103 in your cover letter

In Inventory	10,000 pounds
Unplaced Purchase Requisitions	6,600 pounds
Work in-process and finished product (estimated)	15,000 pounds
Total	31,600 pounds

Answers to your specific questions 1-5 are as follows:

1. On the basis of the new requirement for possession limits a possession limit of 100,000 pounds is requested.

2. Activities to be performed:

   a. Shearing
   b. Drilling
   c. Forming

      1) Bend on brake
      2) Hydroform press
      3) Stretch form
      4) Marform
      5) Drop hammer form
      6) Punch press

   d. Machining

      1) Skin milling
      2) Routing

   e. Burring and Grinding

      1) Belt sander

   f. Cleaning

      1) Vapor degreasing - Trichlorethylene
      2) Alkaline cleaner
      3) Rinse
      4) Chromic acid pickle

   g. Assembly

      1) Rivet
      2) Shielded Heli-arc welding

h. Protective coating

1) Dichromate treatment
2) Zinc chromate primer
3) Enamel

3. Procedures for personal safety are attached as Appendix 1.

4. A description of survey equipment is attached as Appendix 2.

5. Waste products consisting of chips, clippings, dust, offal, etc., is accumulated up to 3000 pounds maximum. Waste is stored in a secured area and is sold to a licensed scrap dealer. Disposal occurs at 6 to 10 months intervals. Solution samples are submitted periodically for Health Physics analysis. Concentration has been low enough to permit disposal into the sanitary sewer system.

Internal control of Magnesium-Thorium is described in Martin Baltimore Product Procedure Number OP-B4.104, attached as Appendix 3.

Should you have any further questions, please do not hesitate to contact us.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert,
Licensing Officer
Nuclear Division

RLM/JVL/plm

Appendix 1

MAGNESIUM-THORIUM HANDLING PROCEDURES - HEALTH PHYSICS ASPECTS

1. Health Physics will inspect and report specifically on any new process or location involving this material.

2. Injuries involving this material will receive immediate attention of the Medical Department (as should all injuries) with notice to Health Physics and special effort to remove splinters, etc.

3. Standard procedures will be used in any operation to confine and remove dust, filings, etc. This is necessary because of the fire hazard of the magnesium and to prevent the accumulation of even these small amounts of radioactive material.

4. In general, the welding of Magnesium-Thorium will require respiratory protection or a well designed local exhaust.

5. The local ventilation provided for pickling baths, etc. will suffice in general for protection against radioactive material from these baths. Respirators are relatively ineffective against chemical vapors.

Appendix 2

HEALTH PHYSICS SURVEY INSTRUMENTS

Listed below are descriptions of the types of instruments available to perform necessary health and safety surveys and the surveys to be performed.

Instrument	Radiation Detected	Manufacturer	Type	Use
G.M. Survey Meter	Beta-Gamma	Nuclear-Chicago Model No. 2612	Geiger Muller	General Survey
G.M. Survey Meter	Beta-Gamma	Eberline Model E-500B	Geiger Muller	General Survey
Scaler-Detector	Beta-Gamma	Tracerlab Model No. 1000	Geiger Muller	Counting Smears & Air Samples
Scaler-Detector	Alpha	TMC & NRD Detector	Scintillator	Counting Smears & Air Samples
Alpha Survey Meter	Alpha	Eberline PAC-1SA	Scintillator	General Survey
Alpha Survey Meter	Alpha	Eberline PAC-3G	Gas Proportional	General Survey
Air Sampler	-	Gast	Air Pump	Collection of Air Samples

Surveys are conducted at storage locations and work areas to measure radiation levels and levels of surface and air contamination to employees in the vicinity.

MARTIN
BALTIMORE

☐ OPERATING INSTRUCTION	NO. OP-B4.104
☐ ADMINISTRATIVE PROCEDURE	REVISION Original
☒ PRODUCT PROCEDURE	ISSUED 9-15-60
	PAGE 1 OF 2

SUBJECT: MATERIALS, MAGNESIUM-THORIUM - CONTROL OF

REMARKS This procedure establishes the method of handling and processing alloys of Magnesium-Thorium containing 4% or less Thorium.

This procedure establishes that:

1. Materiel & Procurement shall purchase and identify Magnesium-Thorium material upon receipt and shall store and maintain a record by weight of all material purchased, in stock, and issued.
2. Manufacturing shall control all Magnesium-Thorium in process through the use of colored and stenciled Shop Order folders, color coding material, special notes, and instructions on the Process Planning Sheets, special handling of offal and work in process, special disposition of scrap and color identification spots on finished parts.
3. Quality shall inspect incoming material, check identification and notify Conservation whenever Magnesium-Thorium scrap is generated as a result of rejected material or parts.
4. Health Physics shall monitor the handling, storage, manufacturing operations and scrap disposition of Magnesium-Thorium to ensure the safety of personnel and proper handling of material.

Atomic Energy Commission approval of this procedure has been obtained by the Legal Department.

Additional copies of this Product Procedure may be obtained by calling Extension 9295 or 9327.

D. J. Desandro
Management Studies

Reference: Standard Process - P75007

PROCEDURE

I Materiel & Procurement

A Specify in the purchase of all Magnesium-Thorium materials that material must be so designated and that all shipping papers must be marked with the net weight of the material.

B All Magnesium-Thorium material in STORES must be properly designated and may not be mixed with other types of materials.

C Keep stock records on all orders, receipts, and issues, returns and excess materials.

D Initiate Inventory Schedules or Excess Lists on obsolete, canceled, and terminated raw sheet stock.

II Manufacturing Planning

A Flag all primary data sheets where there are detail parts to be made from Magnesium-Thorium.

B Mark each page of the Process Planning Sheets in bold letters - "MAGNESIUM-THORIUM".

C Provide the following note in first step of the process plan:

"After each operation that requires removing material such as cuttings, chips, or residual remnant material, clean machine and floor thoroughly and put all cuttings, chips, and residual material in designated Magnesium-Thorium container. All offal 8" x 10" or larger is to be returned to STORES."

D Include in the process plan a step requiring that all completed parts be identified with a Magnesium-Thorium identification spot.

III Production Control

A Provide special colored and stenciled Shop Order folders marked "MAGNESIUM-THORIUM" to identify detail parts that are to be made from Magnesium-Thorium alloy.

III (Cont'd)

B Deliver Magnesium-Thorium materials with the color coded Magnesium-Thorium folder to DETAIL MANUFACTURING.

C Have all parts moved as an integral package - do not permit losses of material due to rejections, split folders, or other reasons.

D Process rework or scrap on details and assemblies resulting from Engineering design changes to maintain segregation of material.

E Initiate Inventory Schedules or Excess Lists on obsolete, canceled, and terminated parts in process and completed assemblies.

IV Factory

A Handle Magnesium-Thorium in accordance with instructions in the process plan, Safety Bulletins, and instructions of the Health Physics representative.

B Account for all material and parts as finished parts, rejected parts, scrap, or offal.

C Return offal 8" x 10" or larger to STORES.

V Conservation

A Provide containers for Magnesium-Thorium material, cuttings, trimmings, clippings, and floor sweepings.

B Store Magnesium-Thorium material until sufficient quantity is available for shipment to a designated scrap dealer.

C Package the Magnesium-Thorium in containers to ensure against loss.

D Weigh all scrap and maintain a record of the weight of scrap sold.

NOTE: All rejected parts, scrap, offal, or surplus materials will be kept separate from other materials and will be disposed of only to a licensed scrap dealer in accordance with normal excess and scrap disposition procedure.

VI Quality

A Inspect incoming material and assure that the required Magnesium-thorium material is received and identified.

B Any Magnesium-Thorium required for test purposes must be disposed of in Magnesium-Thorium scrap containers.

C Notify CONSERVATION whenever scrap is generated as a result of rejected material or parts, indicating the contract number involved.

VII Health Physics - Safety

A Monitor the handling of Magnesium-Thorium as required to assure that prescribed safety measures are followed and that no health hazards exist. In particular, monitor all operations involving welding, grinding, polishing, etc., to ensure that no harmful fumes or dusts are present in work areas.

B Periodically monitor scrap metal containers as required, to prevent accidental mixing of Magnesium-Thorium with other materials.

FORMS USED

Purchase Order	- Form 061226
Inventory Schedule	- Form 060830-060838
Detail Process Plan	- Form 060480
Assembly Process Plan	- Form 060485
Shop Order	- Form 060500

40-3296
L&R:ND

APR

The Martin Company
Baltimore 3, Maryland

Attention: Mr. J. V. Loppert
Licensing Officer
Nuclear Division

Gentlemen:

Enclosed is Source Material License No. STB-187. As of January 1, 1961, a new numbering system for source material licenses is being used and accordingly, you will note that a new license number has been assigned to you.

Please note that Section 20.103 stipulates that no allowance shall be made for the use of protective equipment in determining whether an individual is exposed to airborne concentrations in excess of the limits specified in Appendix B, Table I, Part 20, unless authorized by the Commission. However, this in no way implies that the Commission does not encourage the use of respirators to further reduce individual exposures to airborne radioactivity concentrations.

Very truly yours,

DISTRIBUTION:
Formal & Suppl. Dockets, w/encl.
Document Room, w/encl.
Div. of Compliance, w/encl.
Br. & Div. Reading files w/o encl.

J. C. Delaney
Source & Special Nuclear Materials Brand
Division of Licensing & Regulation

Enclosure:
License STB-187

17/84

OFFICE ▶	L&R	L&R				
SURNAME ▶	Doulos/mad	JCDelaney				
DATE ▶	4-20-61	4/20/61				

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

40-3296
L&R:ND

The Martin Company
Baltimore 3, Maryland

Attention: Mr. J. V Loppert
Licensing Officer
Nuclear Divis on

Gentlemen:

Enclosed is Source Material License No SMB-187. As of January 1, 1961 a new numbering system for source material licenses is being used and accordingly, you will note th t new license number has been assigned to you.

Please note that Secti 20.103 stipulates that no allowance shall be made for the use of protect ve e pment in determining whether an individual is exposed to airborne concentrations in excess of the limits specified in Appendix B, Table I, Part 20, unless authorized by the Commission. However th is in no way implies that the Commission does not encourage the use of respirators to further reduce individual exposures to airborne radioacti ty concentrations.

Very truly yours

J. . Ba aney
Source & Special Nuclear Mate Brandh
Division of Licensing & Regulation

Enclosure:
License SMB-187

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

IN REPLY REFER TO:
40-3296
I&R:ND

SOURCE MATERIAL LICENSE

License No. STB-187

Dated:

The Martin Company
Baltimore 3
Maryland

Attention: Mr. J. V. Loppert

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive, possess, and use, at the above stated location, one hundred thousand (100,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication in accordance with the procedures described in your application of April 12, 1961.

Any transfers of the above licensed source material shall be in accordance with the provisions of Section 40.51 of Title 10, Code of Federal Regulations.

You are required to maintain records showing the receipt, transfer, export and disposal of the above licensed source material in accordance with the provisions of Section 40.61 of 10 CFR.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards for Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire April 30, 1964.

CC: Docket Officer
Document Room
S/H
Compl. w/c appl

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Nuclear Materials Branch
Division of Licensing & Regulation

Dated 4/20/61

Approved

A/85

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

IN REPLY REFER TO:
40-3296
LAB:HD

SOURCE MATERIAL LICENSE

License No. STB-187

Dated:

The Martin Company
Baltimore 3
Maryland

Attention: Mr. J. V. Lappert

Gentlemen:

Pursuant to the Atomic Energy Act of 1954 and the Code of Federal Regulations, Title 10 - Atomic Energy, Chapter 1, Part 40 - Control of Source Material, you are hereby licensed to receive, possess, and use, at the above stated location, one hundred thousand (100,000) pounds of thorium magnesium alloy containing not more than 4% thorium for fabrication in accordance with the procedures described in your application of April 12, 1961.

Any transfers of the above licensed source material shall be in accordance with the provisions of Section 40.51 of Title 10, Code of Federal Regulations.

You are required to maintain records showing the receipt, transfer, export and disposal of the above licensed source material in accordance with the provisions of Section 40.61 of 10 CFR.

This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, "Standards for Protection Against Radiation."

Neither this license nor any right under this license shall be assigned or otherwise transferred in violation of the provisions of the Atomic Energy Act of 1954.

This license shall expire April 30, 1964.

FOR THE ATOMIC ENERGY COMMISSION

J. C. Delaney
Chief, Nuclear Materials Branch
Division of Licensing & Regulation

Region - 2

THE MARTIN COMPANY

Baltimore 3, Maryland

July 21, 1961

Amend # 6

REFER TO:
RHB:M-729

United States Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that By-Product Material License No. 19-1398-19 be amended to permit the use of by-product material for radiography operations at the PM-1 Reactor which is being constructed near Sundance, Wyoming. The following sources are to be used:

A. Iridium 192
B. Cobalt 60

The sources are to be shipped according to I.C.C. Regulations from the Middle River Plant to the point of commercial delivery nearest the Reactor Site and transported by the user from the point of nearest delivery to the construction site.

Should you require any further information, please contact me or Mr. Richard H. Boutelle at MUrdock 7-3800, extension 9517 or 9518.

Very truly yours,

THE MARTIN COMPANY

J. V. Poppert
Licensing Officer
Nuclear Division

A186

RHB:ebc

RECEIVED
JUL 24 1961
U.S.A.E.C.
Isotopes Branch
Div. of L & R

DUPLICATED
FOR PURPOSES OF COMPLIANCE

OPTIONAL FORM NO. 10
5010-104
UNITED STATES GC .RNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch

DATE: AUG 4

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch CDL

SUBJECT: MARTIN CO. APPLICATION DATED JULY 20, 1961, FOR AMENDMENT OF SNM-53 (70-58)

Please refer to your memorandum of July 31, 1961, regarding the subject application.

The Martin Company requests amendment of their special nuclear materials license to permit processing of highly enriched uranium oxide powder to a spherical form. They propose to employ mass control, based on optimum moderation (300g UO_2 limit), for all operations excepting their drying ovens where limited moderation is assumed (600g limit). The total operation will be limited to less than 4000g of UO_2 material in process at one time. These procedures are satisfactory for prevention of nuclear criticality.

A187

THE MARTIN COMPANY

Baltimore 3, Maryland

September 1, 1961

REFER TO:
RHB:W-729

United States Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that Byproduct Material License No. 19-1398-19 be amended to permit the use of a Technical Operation, Inc. Model 498 Projector with fifty (50) curies of Iridium 192. This projector is to be used under the same program and conditions as those devices which were previously licensed.

It is also requested that Item A be amended to permit the possession of two hundred (200) curies of Iridium 192 in the form of Technical Operations, Inc. Model A-424-1 Sealed Sources.

Should you require any additional information, please contact me or Mr. Richard H. Boutelle at 687-3800 extension 9517 or 9518.

Yours very truly,

THE MARTIN COMPANY

J. V. Loppert
Director,
Nuclear Operations

RHB:ebc

RECEIVED
SEP 5 1961
U.S.A.E.C.
Isotopes Branch
Div. of L & R

October 6, 1961

THE MARTIN COMPANY

BYPRODUCT MATERIAL

License No.	Location	Description	
9-7729-1	The Martin Company Sand Lake Road Orlando, Florida	Sealed Source - Stronium 90 Gas Chromatograph Gauge	
5-3010-3	The Martin Company Denver Division Littleton Plant Denver, Colorado	Cobalt 60 Strontium 90 Thulium 170	Calibration sources for Test Laboratory
5-3010-4	The Martin Company Denver Division Littleton Plant Denver, Colorado	Cesium 137	Sealed source for gauge
5-3010-5	The Martin Company Denver Division Waterton Plant	Tritium	Source for ionizing air - animal study in Space Medicine Lab.
5-3010-6	The Martin Company Denver Division Waterton Plant	Cesium 137	Sealed source for calibration
19-1243-2	RIAS, Inc. Department of Physics 7212 Bellona Avenue Baltimore, Maryland	Any Atomic Numbers between 3 - 83 Irradiated Metal Wire 100 milicuries each - 1 curie total Basic Research Lab	
19-1243-3	RIAS, Inc. Biochemistry Dept. 7212 Bellona Avenue Baltimore, Maryland	Carbon 14 Iron 59 Arsenic 76 Sulphur 35 Phosphorous 32 Research	100 millicuries 20 " 10 " 100 " 250 "
19-1398-1	The Martin Company Nuclear Division Baltimore 3, Maryland Critical Experiment Facility	Sealed Sources for Calibration	

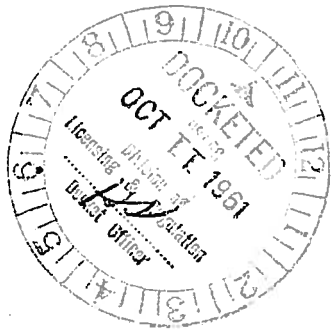
7/89

License No.	Location	Description
19-1398-3	Middle River Plant	Sealed Cobalt Sources
19-1398-9	Middle River Plant	Sealed Sources for Instrument Calibration
19-1398-12	Middle River Plant	Sealed Sources Krypton 85 (Light Source)
19-1398-14	Middle River Plant	Research & Development
19-1398-15	Middle River Plant	Radioisotopic Heat Sources
19-1398-17	Middle River Plant	Sealed Strontium Sources Calibration
19-1398-18	Middle River Plant	Sealed Source for Density Gauge
19-1398-19	Middle River Plant PM-1 Reactor Site Sundance, Wyoming	Sealed Sources for Radiography
19-1398-20	Middle River Plant	For preparation of sealed source for irradiation
19-1398-21	Middle River Plant	Thermoelectric Converters
19-1398-22	Quehanna Nuclear Facility Quehanna, Pennsylvania	Decontamination
19-1398-23	Middle River Plant	Sealed H^3 Standard Light Source
19-1398-24	Quehanna Nuclear Facility	Assembly of Thermoelectric Converters
19-1398-25	Middle River Plant (Baltimore Division)	Sealed Source Density Gauge
19-1398-26	PM-1 Power Plant Sundance, Wyoming	Sealed Sources for Calibration

38105

THE MARTIN COMPANY

Baltimore 3, Maryland



Refer to: MB-0797 OCT 19 1961

U. S. Atomic Energy Commission
Germantown, Maryland

Attention: Mr. R. L. Lowenstein

Ref: (a) Source Material Licenses
Number SUB-313, Docket No. 40-577
Number STB-187 — 40-3296
Number SMB-112 — 40-397 file cy

Gentlemen:

The Martin Company is in the late stages of concluding arrangements for consolidation with the American-Marietta Company to form a new corporation to be known as Martin-Marietta Corporation. The new corporation will be incorporated under the laws of the State of Maryland and its address will be Box 988, Baltimore 3, Maryland. We request that you grant authority for the transfer of the above described licenses from The Martin Company to the Martin-Marietta Corporation.

The stock of the new company will be listed on the New York Stock Exchange and the predominant ownership and control will be by American citizens.

It is expected that the consolidation will be effective on October 10, shortly after which time you will receive the request from the new corporation to receive the licenses. The existing operations will continue unchanged in the name of the new corporation. The health and safety requirements, the nature of the operations, and the general management of the programs for which the licenses were issued will be in no way effected by the consolidation. I am enclosing herewith, three copies of the Proxy Statement which has been issued to all stockholders which, in effect, confirms this fact. I refer you to pages 20 through 22 for information as to the officers

A/90

and directors and advise you that they are all citizens of the United States. I also refer you to page 13 and succeeding pages for the proforma combined summary balance sheet giving effect of the consolidation and other financial information.

We shall appreciate your prompt consideration of this request for permission to transfer the licenses.

Very truly yours,

W. L. Lucas
Secretary

JTE/ab
Encl.

MARTIN MARIETTA CORPORATION

Box 988
Baltimore 3, Maryland

Refer to: MM- 0824 OCT 17 1961

40-577
40-3296
40-397
file

U. S. Atomic Energy Commission
Germantown, Maryland

Attention: Mr. R. L. Lowenstein

Ref: (a) Source Material Licenses
Number SUB-313, Docket No. 40-577
Number STB-187
Number SMB-112

Gentlemen:

Reference is made to The Martin Company's letter of October 10, 1961 requesting your consent to the transfer of the licenses described above from The Martin Company to Martin-Marietta Corporation.

You are advised that the consolidation described in the above referenced letter has been accomplished and your assent to the previously requested transfer is now requested in the name of Martin-Marietta Corporation.

Very truly yours,

W. L. Lucas
Secretary and Treasurer

JTE/ab

OCT 19 1961

[illegible]
70-[illegible]
40-3896
40-397
40-577

NOV 1 6 1961

Martin Marietta Corporation
Box 988
Baltimore 3, Maryland

Attention: Mr. [illegible]
Secretary and Treasurer

Gentlemen:

Pursuant to the request contained in The Martin Company's letter of October 10, 1961, and in your letter of October 17, 1961, the Atomic Energy Commission has transferred the following licenses from The Martin Company to Martin Marietta Corporation:

Special Nuclear Material License SNM-[illegible]

Source Material Licenses SMB-[illegible], STB-[illegible], and SMB-[illegible]

The expiration dates of these licenses have not been changed. Application for renewal of the special nuclear material license should be submitted in accordance with Section 70 [illegible], 10 CFR 70. Applications for renewal of the source material licenses should be filed on Form AEC-2 pursuant to Section 40 [illegible], 10 CFR 40. Copies of Form AEC-2 and of the regulations 10 CFR, Parts [illegible], [illegible], and 70 are attached.

Very truly yours,

Distribution:
H.J.McAlduff,OROO,w/encl. 1
D.George,NMM,w/encl. 1
H.Steele,LR,w/encl. 1
Compliance, w/encl. 1 & 2 & cy 10-10 & 10-17-61 appl.
H.D.Thornburg,CO,w/encl.1

[illegible]
Source and Special Nuclear Materials Branch
Division of Licensing and Regulation

Enclosures:
1. SNM-[illegible]
2. SMB-[illegible], STB-[illegible], and SMB-[illegible]
3. Form AEC-2 (3 sets)
4. 10 CFR [illegible], 40, and 70

Formal,w/encl. 1 & 2
Doc. Rm.,w/encl. 1 & 2
Suppl,w/encl. 1 & 2
Br. & Div. rfs, w/encl. 1
St. Health - lic. only
Doulos,LR,w/encl. 2 (3)
Nussbaumer,LR,w/encl. 1

OFFICE ▶	LR	Fin	LR	OCC		
SURNAME ▶	Delaney/je	G Smith	Nussbaumer	see 7 for [illegible]		
DATE ▶	10/24/61	10/25/61	10/16/61	10/ /61		

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

NOV 16 1961

40-3296
40-
40-

Martin-Marietta Corpora
Box
timore 3 Maryland

Attention: Mr. L. Lucas
Secretary and Treasurer

Gentlemen:

uant to the request contained in Th Martin Company s letter of October 10, 1961 and in your letter of October 1961, the Atomic Energy Commission has transferred the following licenses from The Martin Company to Martin Mariet on

Special Nuc Mat License SNM-53

Source Mater Licenses SUB-313 1 and SUB-112

The expiration dates of licenses have not been
Application for renewa of the special nuclear materi
should be submitted accordance with Section 70
Applications for of the source material licenses
be filed on Form pursuant to Sectio CFR
Copies of orm AEC the regulations
and are

Very truly yours,

Donald A Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division Licensing and Regulation

Enclosures:
1. SNM-53
SUB-112, SUB-197, and SUB-313
Form AEC-2 (3 sets)
10 CFR 20, 40 and

Form AEC—410
(1-61)

UNITED STATES
ATOMIC ENERGY COMMISSION

SOURCE MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954, and Title 10, Code of Federal Regulations, Chapter 1, Part 40, "Licensing of Source Material," and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, possess and import the source material designated below; to use such material for the purpose(s) and at the place(s) designated below; and to deliver or transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954 and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission, now or hereafter in effect, including Title 10, Code of Federal Regulations, Chapter 1, Part 20, "Standards for Protection Against Radiation," and to any conditions specified below.

Licensee	3. License No.
1. Name **Martin-Marietta Corporation**	**STB-187**
2. Address **Baltimore, Maryland**	4. Expiration Date **April 30, 1964**
	5. Docket No. **40-3296**

6. Source Material	7. Maximum quantity of source material which licensee may possess at any one time under this license
Thorium	**100,000 pounds of Th-Mg alloy containing not more than 4% thorium.**

CONDITIONS

8. Authorized use (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.)

Possession and use of source material described in Items 6 and 7 shall be in accordance with statements, representations, and procedures contained in the application for license submitted by the licensee's predecessor, The Martin Company, dated April 12, 1961; The Martin Company's letter of October 10, 1961; and in the letter dated October 7, 1961, submitted by the licensee in applying for the transfer of this license.

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance NOV 16 1961

U.S. GOVERNMENT PRINTING OFFICE: 1961—O-581691

Donald A. Nussbaumer
Division of Licensing and Regulation

Form AEC—410
(1-61)

UNITED STATES
ATOMIC ENERGY COMMISSION

SOURCE MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954, and Title 10, Code of Federal Regulations, Chapter 1, Part 40, "Licensing of Source Material," and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, possess and import the source material designated below; to use such material for the purpose(s) and at the place(s) designated below; and to deliver or transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954 and is subject to all applicable rules, regulations, and o ders of the Atomic Energy Commission, now or hereafter in effect, including Title 10, Code of Federal R gulations, Chapter 1, Part 20, "Standards for Protection Against Radiation," and to any conditions specified below.

Licensee	3. License No.
1. Name Martin-Marietta Corporation	STB-187
2. Address Baltimore, Maryland	4. Expiration Date April 30, 1964
	5. Docket No. 40-3296

6. Source Material	7. Maximum quantity of source material which licensee may possess at any one time under this license
Thorium	100,000 pounds of Th-Mg alloy containing not more than 4% thorium.

CONDITIONS

8. Authorized use (Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.)

Possession and use of source material described in Items 6 and 7 shall be in accordance with statements, representations, and procedures contained in the application for license submitted by the licensee's predecessor, The Martin Company, dated April 12, 1961; The Martin Company's letter of October 19, 1961; and in the letter dated October 17, 1961, submitted by the licensee in applying for the transfer of this license.

Date of issuance NOV 16 1961

For the U. S. ATOMIC ENERGY COMMISSION

Donald A. Nussbaumer
Director of Licensing and Regulation

☆ U.S. GOVERNMENT PRINTING OFFICE: 1961—O-581691

LR:JCD
70-58
40-3290
40-397
40-577

NOV 16 1961

Martin-Marietta Corporation
Box 988
Baltimore 3, Maryland

Attention: Mr. [illegible] Lucas
Secretary and Treasurer

Gentlemen:

Pursuant to the request contained in The Martin Company's letter of October 10, 1961, and in your letter of October 17, 1961, the Atomic Energy Commission has transferred the following licenses from The Martin Company to Martin Marietta Corporation:

Special Nuclear Material License SNM-53

Source Material Licenses SUB-313, [illegible]-187, and [illegible]-112

The expiration dates of these licenses have not been changed. Application for renewal of the special nuclear material license should be submitted in accordance with Section 70.33, 10 CFR 70. Applications for renewal of the source material licenses should be filed on Form AEC-2 pursuant to Section 40.43, 10 CFR 40. Copies of Form AEC-2 and of the regulations 10 CFR, Parts 20, 40, and 70 are attached.

Distribution:
H.J.McAlduff,OROO,w/encl. 1
D.George,MMM,w/encl. 1
H.Steele,LR,w/encl. 1
Compliance, w/encl. 1 & 2 & cy 10-10 & 10-17-61 appl.
H.D.Thornburg,CO,w/encl.1

Very truly yours,

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Licensing and Regulation

Enclosures:
1. SNM-53
2. [illegible]-112, [illegible]-187, and [illegible]-313
3. Form AEC-2 (3 sets)
4. 10 CFR 20, 40, and 70

Formal,w/encl. 1 & 2
Doc. Rm.,w/encl. 1 & 2
Suppl,w/encl. 1 & 2
Br. & Div. rfs, w/encl. 1
St. Health - lic. only
Doulos,LR,w/encl. 2 (3)
Nussbaumer,LR,w/encl. 1

A/92

OFFICE ▶	LR	[illegible]	LR	CCC		
SURNAME ▶	Delaney/le	[illegible]	Nussbaumer	(TH)		
DATE ▶	10/24/61	10/25/61	10/16/61	10/14/61		

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

LR:JCD
70-58
40-3296
40-397
40-577

NOV 16 1961

Martin-Marietta Corporation
Box 988
Baltimore 3, Maryland

Attention: Mr. W. L. Lucas
Secretary and Treasurer

Gentlemen:

Pursuant to the request contained in The Martin Company's letter of October 10, 1961, and in your letter of October 17, 1961, the Atomic Energy Commission has transferred the following licenses from The Martin Company to Martin Marietta Corporation:

Special Nuclear Material License SNM-53

Source Material Licenses SUB-313, SFB-187, and SMB-112

The expiration dates of these licenses have not been changed. Application for renewal of the special nuclear material license should be submitted in accordance with Section 70.33, 10 CFR 70. Applications for renewal of the source material licenses should be filed on Form AEC-2 pursuant to Section 40.43, 10 CFR 40. Copies of Form AEC-2 and of the regulations 10 CFR, Parts 20, 40, and 70 are attached.

Very truly yours,

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Licensing and Regulation

Enclosures:
1. SNM-53
2. SMB-112, SFB-187, and SUB-313
3. Form AEC-2 (3 sets)
4. 10 CFR 20, 40, and 70

Form AEC-401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Name: Martin-Marietta Corporation

2. Address: Baltimore, Maryland

3. License No.: [illegible]-33

4. Expiration Date: April 30, 1961

5. Docket No.: 70-36

6. Special Nuclear Material

Uranium enriched in the U-235 isotope, and plutonium

7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license 500 kgs U-235 contained in uranium enriched in the U-235 isotope as UO_2 and metal, 100 grams Pu as an encapsulated Ra-Be neutron source, (con'd

8. Authorized use: The licensee shall possess and use special nuclear material described in Items 6 and 7 in accordance with statements, representations and procedures contained in the application for license and amendments thereto submitted by ~~the licensee's predecessor, The Martin Company~~, dated (con'd)

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part

---

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above. Authorized place of use: Licensee's Middle River Plant, Maryland

7. (con'd) and 0.7 mg Pu-239 as a Pu alpha source.

8. (con'd) October 11 and 24, 1956; executed December 6, 1957, and January 15, 1958; filed December 16, 1958; dated March 23, and June 17, 1960, and January 17, July 20, and August 31, 1961; The Martin Company's letter of October 10, 1961; and in the letter dated October 17, 1961, submitted by the licensee in applying for the transfer of this license.

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance: [illegible] 1961

Donald A. Nussbaumer
Division of Licensing and Regulation

U. S. GOVERNMENT PRINTING OFFICE : 1958—O-471648

SNM 20

Form AEC-401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Name: Martin-Marietta Corporation

2. Address: Baltimore, Maryland

3. License No.: SNM-53

4. Expiration Date: April 30, 1963

5. Docket No.: 70-58

6. Special Nuclear Material

Uranium enriched in the U-235 isotope, and plutonium

7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license 500 kgs U-235 contained in uranium enriched in the U-235 isotope as UO_2 and metal, 160 grams Pu as an encapsulated Pu-Be neutron source, (con'd

8. Authorized use The licensee shall possess and use special nuclear material described in Items 6 and 7 in accordance with statements, representations and procedures contained in the application for license and amendments thereto submitted by the licensee's predecessor, The Martin Company, dated (con'd)

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part

---

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above. Authorized place of use: Licensee's Middle River Plant, Maryland

7. (con'd) and 0.7 mg Pu-239 as a Pu alpha source.

8. (con'd) October 11 and 24, 1956; executed December 6, 1957, and January 15, 1958; filed December 16, 1958; dated March 23, and June 17, 1960, and January 17, July 20, and August 31, 1961; The Martin Company's letter of October 10, 1961; and in the letter dated October 17, 1961, submitted by the licensee in applying for the transfer of this license.

For the U. S. ATOMIC ENERGY COMMISSION

Date of issuance NOV 1 6 1961

10/24 DAN 11/16/61

U. S. GOVERNMENT PRINTING OFFICE : 1959—O-471646

Donald A. Nussbaumer
Division of Licensing and Regulation

Form AEC 401
(1-56)

UNITED STATES
ATOMIC ENERGY COMMISSION

SPECIAL NUCLEAR MATERIAL LICENSE

Pursuant to the Atomic Energy Act of 1954 and Title 10, Code of Federal Regulations, Chapter 1, Part 70, "Special Nuclear Material Regulations," a license is hereby issued authorizing the licensee to receive and possess the special nuclear material designated below; to use such special nuclear material for the purpose(s) and at the place(s) designated below; and to transfer such material to persons authorized to receive it in accordance with the regulations in said Part. This license shall be deemed to contain the conditions specified in Section 70.32(a) of said regulations, and is subject to all applicable rules, regulations, and orders of the Atomic Energy Commission now or hereafter in effect and to any conditions specified below.

Licensee

1. Name The Martin Company

2. Address Baltimore 3, Maryland

Attention: Mr. W. Wachtl
Chairman, NMC Committee

3. License No.

SNM-53, as amended

4. Expiration Date

April 30, 1963

5. Docket No.

70-58

6. Special Nuclear Material

Uranium enriched in the U-235 isotope and plutonium

7. Maximum quantity of special nuclear material which licensee may possess at any one time under this license 500 kgs U-235 contained in uranium enriched in the U-235 isotope as UO_2 and metal, 160 grams Pu-239 as an encapsulated Pu-Be neutron source, and .7 milligrams Pu-239 as a Pu-alpha source.

8. Authorized use In accordance with the procedures described in the licensee's applications dated Oct. 11 and Oct. 24, 1956; applications executed Dec. 6, 1957, and Jan. 15, 1958; procedures filed Dec. 16, 1958; applications dated March 23, June 17, 1960; and Jan. 17, July 20, and August 31, 1961.

9. Quantity of special nuclear material allocated to licensee pursuant to Section 70.31(b) of said part

None herein allocated

CONDITIONS

10. Unless otherwise specified, the authorized place of use is the licensee's address stated in Item 2 above.

Place of use: Licensee's Middle River Plant, Maryland

Distribution:
Doc. Rm.
Formal
Suppl.
S/Health
Compl., w/cy appl. dtd 9-1-61
H. J. McAlduff, Jr., OROO

D. George, NMM
S. R. Gustavson, L&R
H. Steele, L&R
D. A. Nussbaumer, L&R

Date of issuance

For the U. S. ATOMIC ENERGY COMMISSION

CONCURRENCES

L&R
JGDeManey:sjs

CEB
8/4/61

L&R
DANussbaumer
9/13/61

Donald A. Nussbaumer
Division of Licensing and Regulation

☆ U. S. GOVERNMENT PRINTING OFFICE : 1958—O-471648

Suppl. ~~C-15~~/

MARTIN MARIETTA CORPORATION
AEROSPACE CHEMICALS CONSTRUCTION MATERIALS

NUCLEAR
DIVISION
Baltimore 3,
Maryland

January 24, 1962

REFER TO:
RHB:W-729

United States Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Attention: Mr. James R. Mason, Chief
Isotopes Branch

Gentlemen:

It is requested that Byproduct Material License No. 19-1398-19 (B62) be amended to extend its expiration date. No other amendments are requested at this time.

Should you require any further information, please contact me or Mr. Richard H. Boutelle, 687-3800 extension 9517.

Yours very truly,

F. G. Myers

F. G. Myers
Assistant General Manager
Administration

RHB:ebc

DUPLICATED
FOR DIV. OF COMPLIANCE

A/93

40484

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Files

FROM : Frances K. Durkan
Criticality Evaluation Br.

DATE: March 23, 1962

SUBJECT: VISIT FROM THE MARTIN COMPANY TO DISCUSS AMENDMENT OF LICENSE SNM-53 (DOCKET 70-58)

Participants: The Martin Company - Bill Wachtl and Ed Scicchitano
DL&R: Dr. Charles D. Luke, Bill Layfield, Frances Durkan

Reference: LICENSE REPORT MND-2603, dtd 7/18/61

The Martin Company outlined their proposed operating procedure changes involved in the fabrication of spherical uranium dioxide sintered powder. Only two steps in the process flow will be affected.

Formerly, the two intermediate process steps were as follows:

1) A 300 gram batch of UO_2 material is transferred to the spheridizing apparatus and manufactured into spherical UO_2 powder;

2) After manufacturing, the spherical powder is washed in a 3" diameter stainless steel pipe with approximately six liters of water cycled through an inline filter and then the holdup water, removed in a centrifugal filter.

The operating procedure approved for these steps in the process flow specified that one batch of 300 grams must be completely through the manufacturing, washing and filtering steps and the whole system cleaned before another batch could be processed.

In the interest of economy and production, The Martin Company wishes to incorporate the following operational procedure change as a license amendment:

Transferral of UO_2 to spheridizing and washing apparatus (extended to include two spray wash towers, an absolute air filter, an 8 1/2" x 12" water filter, 3 1/2" x 8" water trap, 4 3/4" x 42" heat exchanger, and two pumps) in 100 gram lots of 300 gram batches. The total feed not to exceed 1400 grams between wash down of apparatus and filter change. Experience has shown an 80% yield from each 100 g lot of UO_2 introduced into the apparatus with the 20% residue

A194

distributed between the absolute air filter and the water filter, the former collecting slightly more of the residue.

The Martin Company suggested establishing the H_2O filter as the determining unit. Administrative control would restrict the accumulation of UO_2 residue to not more than 280 grams before clean-up. This 280 g maximum corresponds to a total of 1400 grams of feed material assuming the H_2O filter accumulates the total 20% residue from each 100 g lot of feed material. Strict administrative control will be enforced as regards the absolute air filter which in reality is accumulating slightly more than half of the residue from each 100 g of UO_2 lot introduced into the apparatus. The middle filter of the 3-tier absolute air filter will be removed along with the water filter when the control sheets indicate a 280 gram UO_2 residue accumulation in the H_2O filter. The absolute air filter which has a 500 gram accumulation capacity becomes ineffective when saturated (point at which H_2O filter record indicates a 280 gram accumulation) and must be removed for drying, hence, a double check on administrative controls is inherent. The air filter may be reused after drying until its useful life has expired (point at which its total accumulation = 500 g UO_2). The air filter accumulation will be accurately recorded by calculating the difference between feed introduced and amount of residue collected on water filter. When the control sheets indicate 500 g UO_2 accumulation, the air filter will be replaced.

The schedule proposed by Martin will insure that no more than 370 g fully enriched oxide (300 g U-235) can be accumulated with water in any piece of the equipment (limit is 500 g for air filter - see above). The following table will illustrate the operating schedule:

	Feed Addition	Product*	Accumulated Collection in Water Filter
	300 g	240 g	60
	300	240	120
	200	160	160
	200	160	200
	100	80	220
	100	80	240
	100	80	260
	100	80	280 **
Total	1400 g	1120 g	

* Remove after each feed addition.

** At this point, shut down and clean out all equipment, since another 100 g feed may go into water filter and exceed 370 UO_2 limit. Dry and weigh water filter elements and get exact weight. Get U-235 in air filter by difference. 500 g limit on air filter.

OPTIONAL FORM NO. 10
5010-101

UNITED STATES GOVERNMENT

Memorandum

TO : Charles Luke, Chief
Criticality Evaluation Branch

DATE: MAR 27 1962

FROM : John Lane for
Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch

SUBJECT: MARTIN MARIETTA CORPORATION APPLICATION DATED MARCH 22, 1962
DOCKET NO. 70-58

LR:JJL

Please review the subject request for the adequacy of the applicant's procedures to avoid a condition of accidental criticality. The file copy of the application should be returned with your comments. Call if you need the docket - JJL

Attachment:
As stated

A195

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Br. DATE: APR 2 1962

FROM : Charles D. Luke, Chief
Criticality Evaluation Br. CDL

SUBJECT: MARTIN MARIETTA CORPORATION APPLICATION DATED MARCH 22, 1962 - DOCKET NO. 70-58

We have reviewed the subject application requesting approval of a process change in connection with the manufacture of spherical uranium dioxide powder.

We agree with applicant that the revised process will be safe from accidental criticality if carried out in accordance with the plans set forth in the application. No more than 370 grams of UO_2 to be collected in the wet system and no more than 600 grams of uranium dioxide will accumulate in the absolute air filter system.

We recommend approval of the application.

Attachment:
Application dtd 3/22/62

A/96

3-16

OPTIONAL FORM NO. 10
1010-101

UNITED STATES GOVERNMENT

Memorandum

TO : Charles Luke, Chief
Criticality Evaluation Branch

DATE: MAY 8 1962

FROM : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch

SUBJECT: MARTIN MARIETTA CORPORATION LETTER DATED MAY 3, 1962 - DOCKET 70-53

LR:JJL

Please review the subject request for the adequacy of the applicant's procedures to avoid a condition of accidental criticality.

Please return the file copy with your comments.

Attachment:
As stated

A/97

MAY 11 1962

Charles Luke, Chief
Criticality Evaluation Branch

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

MARTIN MARIETTA CORPORATION LETTER DATED MAY 8, 1962 - DOCKET 70-58

LR:JJL

Please review the subject request for the adequacy of the applicant's procedures to avoid a condition of accidental criticality.

Please return docket 70-58 and file copy of letter dated May 8, 1962, with your comments. You may retain the extra copy of letter dated May 8, 1962, for your files.

Attachments:
As stated

17/98

OFFICE ▶	LR					
SURNAME ▶	JJLane/ey					
DATE ▶	5/11/62					

Form AEC-318 (Rev. 9-53)

U.S. GOVERNMENT PRINTING OFFICE 16—62761-3

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Alexander R. Aikens, Jr. Chief
Process Evaluation Branch

DATE: MAY 2 1962

FROM : John Lane for
Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

SUBJECT: SUPPLEMENT TO LICENSE REPORT MND-2789 - DOCKET 70-58

LR:JJL

Please review the structural integrity of the shipping container proposed by the applicant with respect to a 30 foot drop test. Please return the compliance copy with your comments.

Attachment:
Letter dated May 21, 1962 w/enc

A/99

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Br.

DATE: June 11, 1962

FROM : Frances K. Durkee for
Charles D. Luke, Chief
Criticality Evaluation Br.

SUBJECT: AMENDMENT TO LICENSE SNM-53 FOR SHIPMENT OF URANIUM DIOXIDE STAINLESS STEEL CLAD FUEL PLATES TO ROME, ITALY - MAY 8, 1962 - DOCKET 70-58

Ref: DLR:FKD

Reference: (1) Report, MND-2789 dtd May 7, 1962
(2) Dwg., No. 1883-342

In response to your memorandum of May 11, 1962, we have reviewed the subject application.

The Martin Marietta Corporation proposes to ship to Comitato Nazionale Per L'Energia Nucleare, fuel plates which are UO_2 stainless steel cermet stainless steel clad. The plates consist of approximately 22 weight percent UO_2 enriched to 89.85 ± .15 weight percent U-235. It is planned to pack 75 of the described fuel plates (3.06 kgs U-235) in each of the 14 containers required for the total shipment of 1,000 fuel plates (41.8 kgs U-235).

The shipping containers will be made from 55-gallon, 18 gauge steel drums. The fuel container will consist of 4" I.D. Schedule 40 pipe, 44" in length centered in the drum thus insuring a 9" spacing between the fuel container and the drum wall. Structural integrity and stress analysis have been referred to Mr. Chris Beck for evaluation.

The shipping container and shipping procedures are considered safe in accordance with the recommended nuclear safety limits given in Table IV and Figure 23 of TID-7016, Rev. 1.

The fuel plates will be loaded in the shipping container at the Martin Marietta Corp., Baltimore, Maryland and to guarantee against commingling, shipment will be via exclusive-use of a common carrier van to Idlewild Airport where the fuel will then be transferred and shipped via Alitalia Airlines to Rome, Italy.

(Continued)

A/100

We have no objection to the shipping container and shipping procedures as proposed. However, prior AEC approval must be obtained for future shipments other than the one described herein.

Enclosures:
Docket 70-58

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Br.

DATE: June 14, 1962

FROM : Frances K. Kirkham for
Charles D. Luke, Chief
Criticality Evaluation Br.

SUBJECT: MARTIN MARIETTA CORP. APPLICATION TO AMEND LICENSE SNM-53 TO INCREASE MASS LIMITS OF ENRICHED URANIUM DIOXIDE POWER IN BLENDING OPERATION FROM 800 GRAMS U-235 TO 3.5 KGS CONTAINED U-235. MAY 3, 1962 - DOCKET 70-58

Ref: DLR:FKD

Reference: (1) Report MND-2603 dtd 7/18/61
(2) Ltr fm Martin Marietta to USAEC-DLR dtd 5/3/62
(3) Report MND-2788 dtd 5/2/62

In response to your memorandum of May 8, 1962, we have reviewed the subject application (references 2 and 3).

The Martin Marietta Corporation requires a larger blended batch (3.5 kgs contained U-235 in the form of highly enriched uranium dioxide power) for reasons of (1) accuracy in sampling, and (2) maintenance of specified particle distribution prior to breakdown from outside vendor birdcage to permissible storage limits.

The blending will be accomplished in the manufacturing area in ventilated hoods and no other special nuclear material will be present in this area during the sequence of the blending process. The elbow blender is an L-shaped construction, 3 3/4" in diameter. The wall thickness of the 8" long, stainless steel tubular arms, is 1/16".

In view of the fact that the 3 1/4" diameter blender has a total capacity limit of approximately 2.2 liters, the process is considered safe and within the nuclear safety limits of Figures 2 and 3 of TID-7016, Rev. 1. In addition, 3.5 kgs of contained U-235 in the form of compounds or mixtures is a safe mass with $2 < \frac{H}{X} < 20$, according to Table IV of TID-7016, Rev. 1. Assuming limited moderation, the resultant $\frac{H}{X}$ ratio is less than 20 for the subject material.

We recommend approval of the subject application as proposed.

Attachment:
Ltr fm Martin Marietta dtd 5/3/62

A/101

SEP 4 1962

Alexander E. Aikens, Jr., Chief
Process Evaluation Branch

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

MARTIN-MARIETTA APPLICATION OF AUGUST 29, 1962, FOR APPROVAL OF SHIPPING PROCEDURES (70-58)

LR:JCD

The subject application is transmitted herewith for your review. Please return the application with your comments.

Attachment:
As stated

A/102

OFFICE ▶	LR					
SURNAME ▶	JCDelaney/ey					
DATE ▶	9/4/62					

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

E. J. Rebol, Chief, Materials Br.
Division of International Affairs

September 11, 1962

Charles D. Luke, Chief
Criticality Evaluation Br.

SHIPMENT OF FUEL PLATES TO ROME, ITALY, LETTER FROM MARTIN-MARIETTA CORP. DATED AUGUST 17, 1962

We have reviewed the subject letter from W. W. Wachtl of Martin Marietta Corp. concerning the proposed shipment of 1,000 fuel plates to Rome, Italy.

Shipment from Martin Marietta in Baltimore to Port of Embarkation has been approved under license SNM-53. These procedures, as amended by TWX of September 6, 1962, cover the packaging of 1,000 fuel plates in 17 containers with a maximum of 62 plates per container. The shipping container consists of a 4" I.D. 'Schedule 40' pipe, 44" in length, centered in a 55-gallon, 18 gauge steel drum. Subsequent to Mr. Chris Beck's evaluation, this container has been judged to meet AEC structural requirements. A single exclusive-use truck shipment had previously been approved for the subject transport to the Port of Embarkation. This approval was subsequently modified to permit multiple shipments by exclusive-use truck to enable Martin Marietta Corp. to deliver the 17 containers at the staggered rate of 9 containers one week, and the remaining 8 containers approximately one week later. For air transport to Rome, Italy one shipment from Martin Marietta will be further subdivided such that the total 17 containers will constitute 4 separate plane shipments.

We see no objection to the mode of transfer proposed, provided the Italians exercise supervision over the transport procedures to assure that the 4 subject shipments will not be commingled with other special nuclear material shipments during transport or at points of transshipment or delivery.

A1103

OFFICE ▶	DLR:MS:CEB	DLR:MS:CEB				
SURNAME ▶	FKDurkan/vj	CDLuke				
DATE ▶	9/11/62	9/11/62				

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

Files
70-58

OCT 10 1962

R. Handler, Enforcement Branch
Division of Licensing and Regulation

MARTIN-MARIETTA COMPANY
BALTIMORE, MARYLAND

B. Cavanaugh, CO, notified the writer October 9, 1962 of the following occurrence:

Region I, CO, was informed by Martin-Marietta Company, Baltimore, Maryland that its film badge supplier reported a badge reading in excess of 100 rem for a Dr. McKerney of the Metalgraphic Laboratory for the 13 week period just ended. The report from the film badge supplier indicated that the exposure was probably due to beta radiation or soft X-ray. According to the licensee, McKerney does not work in or have access to any area in which there is radiation that could cause such a reading on the film badge. It is the licensee's feeling that the exposure was caused by storing the film badge in a desk drawer with several enriched uranium samples. Martin-Marietta plans to conduct some experiments with the uranium specimens and other film badges to compare exposed film. Region I will await results of the licensee's experiment before taking any action on the matter. Examination of Dr. McKerney's blood indicated no abnormality. The employee concerned is working and feels no ill effects.

CC: R. Lowenstein
B. R. Price
L. G. Rogers
L. E. Johnson
R. E. Cunningham
D. A. Nussbaumer

LR:SB LR:SB

RHandler:jlc RCPage
10/10/62

AL104

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Br.

DATE: November 23, 1962

FROM : Charles D. Luke, Chief
Criticality Evaluation Br. 602

SUBJECT: MARTIN-MARIETTA CO. AUGUST 17, 1962 APPLICATION REQUESTING AMENDMENT TO SNM-53 - FRESH PM-3A SHIPPING PROCEDURES - DOCKET 70-58

Ref: DLR:FKD

The applicant requests authorization to ship and receive two central core fuel bundles of the PM-3A Reactor.

The shipping container consists of a 3 1/2" Schedule 40 stainless steel pipe, 38" in length, centered in a 55-gallon, 18"gauge steel drum. Shipment of one fresh bundle of PM-3A fuel elements (93.2 w/o U-235 in UO_2 stainless steel cermet) will be transferred by exclusive use truck from Andrews Air Force Base to the Martin Company. After reworking, this bundle will be returned to Andrews Air Force Base and the second central fuel bundle will be shipped in an identical manner, round trip.

In view of the fact that the total U-235 per shipment will not exceed 602 grams U-235 in solid form, we are in agreement with the applicant that the shipment does not present a nuclear safety hazard. You may want Mr. Christian Beck to look over the design of this fuel bundle container, but we see no reason for requiring that this particular single shipping container meet the 30' drop test specifications.

Attachment:
Ltr dtd 3/29/62

A/105

MARTIN COMPANY
Mail No. 729

NUCLEAR
DIVISION
Baltimore 3,
Maryland

January 29, 1963

United States Atomic Energy Commission
Division of Licensing and Regulation
Washington 25, D. C.

Gentlemen:

Transmitted herewith are three (3) copies of an application for renewal of Byproduct Material License No. 19-1398-19 and three (3) copies of an application for renewal of Byproduct Material License No. 19-1398-27.

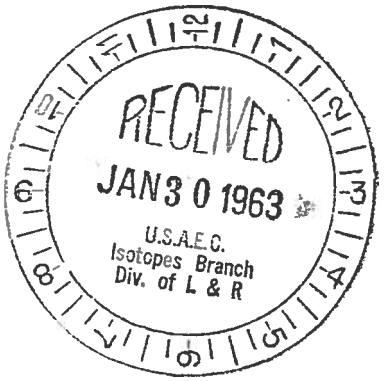
Yours very truly,

Richard H. Boutelle

Richard H. Boutelle, Chief
Health Physics Section

RHB:ebc

Enclosures (6)



A/106

THE AEROSPACE
DIVISION OF
MARTIN
MARIETTA

Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

Form approved.
Budget Bureau No. 38-R027.4.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. *(Institution, firm, hospital, person, etc.)*

Martin-Marietta Corporation
Nuclear Division
Baltimore 3, Maryland

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. *(If different from 1 (a).)*

Middle River Plant
Middle River, Maryland

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Nuclear Components Department

3. PREVIOUS LICENSE NUMBER(S). *(If this is an application for renewal of a license, please indicate and give number.)*

Renewal of Byproduct Material License
No. 19-1398-19

4. INDIVIDUAL USER(S). *(Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)*

C. E. Hollens
Glenn Schaeffer

5. RADIATION PROTECTION OFFICER *(Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)*

Richard H. Boutelle

6. (a) BYPRODUCT MATERIAL. *(Elements and mass number of each.)*

A. Iridium 192

B. Cobalt 60

C. Thulium 170

D. Strontium-Yttrium 90

E. Any byproduct material between Atomic Nos. 3 and 83 inclusive

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. *(If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)*

Sealed sources (Technical Operations Model A-424-1
Four sources not to exceed 50 curies each. Total 200 c.

Sealed Sources (Technical Operations Model A-424-2
Two sources not to exceed 10 curies each. Total 20 c.

Sealed Sources (Technical Operation Type A
120 curies, not to exceed 60 curies per source.

Sealed Sources (Tracerlab Model RA-2 or Model S-1)
300 millicuries, not to exceed 150 millicuries per source.

Irridiated tool tips and irridiated Hastelloy C
2 curies total

DUPLICATED
FOR DIV. OF COMPLIANCE

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. *(If byproduct material is for human use, Supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)*

A. To be used in Technical Operations Models 412 or 498 exposure device for industrial radiography and in Technical Operations Model 414 source changer for source replacement and storage.

B. To be used in Technical Operations Model 402 exposure device for industrial radiography, and in Technical Operations Model 416 source changer for source replacement & storage.

C. To be used for instrument calibration, research and development, and industrial radiography.

D. To be used for instrument calibration and research and development programs.

E. To be used for laboratory studies of wear and corrosion.

MARTIN COMPANY

HPP-1 REVISION A JJB
August 28, 1962

GENERAL PROCEDURES FOR LEAK TESTING SEALED RADIATION SOURCES

I. Purpose

Sealed radiation sources are leak tested for the purpose of detecting faulty or damaged source encapsulation which would allow release of radioactive material to the environment thereby creating a hazard to working personnel and possibly the public.

II. Sealed Sources Utilized in Remotely Operated Radiographic Devices

A. General

The sources included in this section are all sealed radiography sources incorporated in remotely operated radiographic equipment.

B. Procedure

1. At the time of the initial survey of a new radiographic exposure device, the Health Physicist will designate the nearest accessible area(s) which makes intimate contact with the source. This appropriate measuring point(s) shall be used thereafter as the location to be inspected by the wipe technique.
2. Wipes shall be taken using a cotton swab attached to a wooden stick, ("Q-Tip"). The swab shall be dipped in acetone or alcohol prior to wiping the area(s).
3. The swab shall be placed in an envelope and taken to the Health Physics Laboratory for counting.
4. The dry swab shall be counted using a thin window geiger-mueller or gas flow proportional counter and associated scaler. The counter shall be sufficiently sensitive to detect contamination levels far less than those specified in 10 CFR 31.105.

DUPLICATED

5. Results of all radiographic source leak tests shall be recorded in the Health Physics Monthly Source Inventory Log in units of microcuries and maintained for future reference. In the event that activity is measured, its significance will be noted and a recommended course of action will be followed. If the activity measured equals or exceeds the limits specified in the Commission regulations, the source will immediately be removed from service and sealed in a container to prevent the spread of contamination. As soon as practicable, the leaking source will be decontaminated and repaired or disposed of in accordance with 10 CFR 20.301 and 31.105.

C. Hazards and Precautions

The main hazard associated with leak testing these sources is the possibility of the surveyor's hand becoming contaminated. Immediately after performing the test and sealing the swab in the envelopes provided, the person shall monitor his hands and thoroughly wash them, if necessary.

D. Test Frequency

All sources shall be leak tested upon delivery to the Plant. Thereafter, they shall be leak tested with a frequency depending upon utilization. The more frequently a source is used, the more frequently it shall be tested. However, all sources shall be tested at least once every six month and at any time at the request of a user. The testing frequency shall be determined by the Health Physicist.

DUPLICATED

E. Sensitivity

The test described above will detect down to 10^{-5}uc on a cotton swab.

F. Pertinent Experience of Personnel Performing Leak Testing

All Health Physics Personnel having demonstrated proficiency in the use and operation of all types of health physics survey and counting equipment and completed a minimum of 6 months on-the-job training will be assigned the task of leak testing radiation sources. Although some personnel have specialties within the scope of the health physics operations, every man must be able to perform all of the tasks required. This is done in order to establish a desirable degree of flexibility within the Health Physics Section. All leak testing will be performed under the Supervision of the Chief, Health Physics Section.

III. Sealed Sources Utilised in a Gamma Pool Facility

A. General

The sources included in this section are all sealed sources utilized in a pool type irradiator.

B. Procedure

1. a. Circulate the pool water using the circulation pump for 30 minutes prior to sampling in order to obtain a representative sample. Obtain a one (1) liter sample, after mixing, for analysis.

b. Alternate method for obtaining a representative sample in the event of power or pump failure, obtain three one (1) liter samples from the following depths:

(1) 4 feet below the pool surface.

DUPLICATED FOR DIV. OF COMPLIANCE

(2) 8 feet below the pool surface.

(3) directly above the source configuration

Mix the three samples together and pour off a one (1) liter composite sample for analysis.

2. Place the liter sample in a poly bag.

3. Take several smears on the floor area adjacent to the sampling location.

4. Transport both the liquid and smear samples to the Health Physics Laboratory for analysis.

5. Transfer the pool sample to an evaporation vessel, add 2 milliliters of 1 N-HNO_3 and evaporate same down to approximately 50 ml. Transfer the 50 ml volume to a smaller vessel, rinse the large vessel thoroughly with demineralized water ($\leq$ 10 ml) and continue the evaporation to 5 ml. Transfer the 5 ml sample to a counting planchet, rinse the evaporation vessel to insure complete transfer ($\leq$ 2 ml) and evaporate to dryness.

6. The evaporated sample shall be counted using a thin window geiger-mueller or gas flow proportional counter and associated scaler. The counter shall be sufficiently sensitive to detect contamination levels far less than those specified in 10 CFR 20.303.

7. The results of all leak tests shall be recorded in the Gamma Pool Shield Water Log in units of microcuries per milliliter and maintained as permanent records for future reference. The results of previous analyses shall be compared with the present sample analysis to determine continued source integrity allowing for the fluctuations caused by the deionizer or addition of new

DUPLICATED

sources. The Health Physicist shall be notified in the event that the activity measured approaches 1/10 the limit specified in 10 CFR 20.303. If the activity measured exceeds the limit specified in the Commission regulations, the sources will be isolated one at a time and analyses will be performed to determine which source has ruptured. As soon as the faulty source has been identified, it will be removed from service and sealed in a container to prevent further spread of contamination. The leaking source will either be decontaminated and repaired by persons specifically authorized to do so by the Commission or it shall be disposed of in accordance with 10 CFR 20.301.

C. Hazards and Precautions

The main hazard associated with leak testing these source is the possibility of the surveyor's hand becoming contaminated while sampling. Care shall be exercised not to drip pool water on the floor adjacent to the pool facility. Immediately after obtaining the sample and placing it in the poly bag, the surveyor shall monitor his hands and thoroughly wash them, if necessary.

D. Test Frequency

The Gamma Pool Shield Water shall be analyzed at least once every six months. Additional analyses are conducted on a schedule consistent with sound radiological safety practices to ensure protection against radiation.

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FOR DIV. OF COMPLIANCE

IV. Sealed Sources Utilized in a Shielded Gamma Irradiator for Dry Sample Irradiation.

A. General

The sources included in this section are all sealed sources utilized in a shielded dry irradiator.

B. Procedure

1. At the time of the initial survey of a new gamma irradiator, the Health Physicist will designate the nearest accessible area (s) which makes intimate contact with the source. This appropriate measuring point(s) shall be used thereafter as the location(s) to be inspected by the wipe technique.
2. Wipes shall be taken using a cotton swab attached to a wooden stick ("Q-Tip"). The swab shall be dipped in acetone or alcohol prior to wiping the area(s).
3. The swab shall be placed in an envelope and taken to the Health Physics Laboratory for counting.
4. The dry swab shall be counted using a thin window geiger-mueller or gas flow proportional counter and associated scaler. The counter shall be sufficiently sensitive to detect contamination levels far less than those specified by the Commission.
5. Results of all dry irradiator source leak tests shall be recorded in the Health Physics Source Inventory Log in units of microcuries and maintained as permanent records for future reference. In the event that activity is measured, its significance will be noted and compared with previous test results to determine source integrity. If the activity measured equals or exceeds

DUPLICATED

the limit specified by the Commission, the source will immediately be removed from service and sealed in a container to prevent the spread of contamination. As soon as practicable, the leaking source will be decontaminated and repaired by persons specifically authorized to do so by the Commission or disposed of in accordance with 10 CFR 20.301.

C. Hazards and Precautions

The main hazard associated with leak testing these sources is the possibility of the surveyor's hand becoming contaminated. The person performing the test shall monitor his hands and thoroughly wash them, if necessary, immediately after performing the test and sealing the swab in the envelope.

D. Test Frequency

The shielded gamma dry irradiator assembly(s) shall be leak tested at least once every six months. Additional analyses are conducted on a schedule consistent with sound radiological safety practices to ensure protection against radiation.

V. Sealed Sources Utilized for Instrument Calibration, Reactor Startup, Density Gauging, Space Experimental Studies and Thermo-Electric Devices.

A. General

The sources included in this section are all licensed alpha, beta gamma and neutron sources used for instrument calibration, reactor startup, density gauging, space radiation simulation studies and thermo-electric devices.

B. Procedure

1. The Health Physicist will designate the area(s) on the source or the nearest accessible area(s) which makes intimate contact with the source at the time of the initial survey of a new source, or shield assembly containing a new source. The designated measuring point(s) shall be used thereafter as the location(s) to be inspected by the wipe technique.
2. Wipes shall be taken using either a Q-Tip dipped in acetone or a dry 4.25 cm chemical filter paper attached on an extension rod, if necessary.
3. The Q-Tip or filter paper shall be placed in an envelope and taken to the Health Physics Laboratory for counting.
4. The wipe(s) shall be counted using a thin window geiger-mueller or gas flow proportional counter and associated scaler. The counter shall be sufficiently sensitive to detect contamination levels far less than those specified by the Commission.
5. The results of all source leak tests shall be recorded in the Health Physics Source Inventory Log in units of microcuries and maintained as permanent records for future reference. In the event that activity is measured, its significance will be noted and compared with previous test results to determine source integrity. If the activity measured equals or exceeds the limits specified by the Commission, the source will immediately be removed from service and sealed in a container to prevent the spread of contamination. As soon as practicable, the leaking source will be decontaminated and repaired by persons specifically authorized to do so by the Commission, or

DECLASSIFIED
OR DIV. OF COMPLIANCE

disposed of in accordance with 10 CFR 20.301.

C. Hazards and Precautions

The main hazards associated with leak testing these sources is the potential exposure and possibility of the surveyor's hand becoming contaminated. The person performing the test shall exercise care to minimize his exposure and shall monitor his hands and thoroughly wash them, if necessary, immediately after performing the test and sealing the wipes in the envelope.

D. Test Frequency

All licensed sources shall be leak tested at least once every six months. Additional leak tests are conducted on a schedule consistent with sound radiological safety practices to ensure protection against radiation.

Richard J. Brisson
Richard J. Brisson
Sr. Health Physicist

Approved:

Richard H. Boutelle
Richard H. Boutelle, Chief
Health Physics Section

RJB:ebc

DUPLICATED
BY DIV. OF COMPLIANCE

A/107

Ellyson G. Outten, Inspection Specialist (Compliance) Division of Compliance, HQ

April 19, 1963

Jack R. Roeder, Radiation Specialist (Supervisory) Region I, Division of Compliance

OUR 4/16/63 TYPE "B" INVESTIGATION REPORT; MARTIN-MARIETTA CORPORATION, BALTIMORE, MARYLAND; LICENSE SNM-53

CO:I:JRP

Reference is made to paragraph 30 of the subject report details and the second paragraph on page 2 of the memorandum of transmittal. Attached is a copy of a 4/16/63 letter from the licensee. Paragraph C of this letter contains the results of the smear survey taken in the ducts. Paragraphs A and B of the letter are confirmation of information already contained in the report.

Attachment:
cy 4/16/63 ltr

Leo Dubinski, Assistant Director for
Materials, Division of Compliance, HQ

April 16, 1963

Robert W. Kirkman, Director
Region I, Division of Compliance

TRANSMITTAL OF TYPE "B" INVESTIGATION REPORT

CO:I:JRR

Transmitted herewith is the investigation report of a Type "B" incident:

MARTIN-MARIETTA CORPORATION
Baltimore, Maryland

License No. SNM-53

All Martin personnel interviewed emphasized that they considered all references to the spheroidizing operation as proprietary information. For this reason, we are recommending that the entire report and the exhibits be considered "company confidential" inasmuch as there are references to this operation throughout the entire report.

This report has been classified as a Type "B" incident, however, we feel that this is subject to interpretation (i.e., that it is possibly a Type "A" incident) inasmuch as the use of the spheroidizing equipment was lost for more than one week.

We concur with licensee personnel that the explosion was probably caused by a build-up of acetylene gas in the system. Please note that the licensee's corrective action, as indicated in paragraph 36 of the report details, includes purging the system with air before ignition of the acetylene gun and turning off the acetylene and oxygen tank valves after a shut down.

As indicated in paragraph 7 of the report details, three referenced documents (MND 2603, MND 2603B and MND 2603C) describe the spheroidizing process. However, none of these documents contains a hazards evaluation relating to the actual spheroidizing of the UO_2 powder with burning acetylene gas. Inasmuch as the license comes up for renewal on 4/30/63, we believe that L&R may wish to consider requesting a hazards evaluation from the licensee, in view of this incident. Please note that an inspection of SNM-53 will be conducted on 4/30/63 by Mr. R. Chitwood of Compliance, Headquarters. Mr. D. Nussbaumer of L&R has been advised of this inspection.

A1108

Licensee personnel were advised of the provisions of 20.405(a). Boutelle said that he intended to comply with this requirement. As of the date of this memo, however, no report has been received by this office.

Please note that we are not citing the licensee for 20.201(b) for failure to determine if there was any release of UO_2 through the stack. As indicated in paragraph 30 of the report details, the force of the explosion displaced the filters and Boutelle indicated that he would take a smear survey on the stack side of the final filters in an effort to determine if there had been any release of UO_2. In a telephonic conversation on 4/1/63, Boutelle said that the survey was completed and that the results would be sent to this office. As of the date of this memo, however, these results have not been received. The licensee's air evaluation procedures will be reviewed during the next inspection.

The results of the investigation were discussed with Dr. Ralph D. Bennett, Vice President of the Martin-Marietta Corporation. Bennett confirmed that a constant stack monitor had been ordered and would be installed as soon as it was received. Bennett expressed concern that the explosion had occurred and added that he hoped that the corrective action would preclude any recurrences.

Enclosure:
4 cys rpt

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Eber R. Price, Assistant Director
Division of Licensing and Regulation

DATE: APR 19 1963

FROM : Leo Dubinski, Assistant Director for Materials
Division of Compliance

SUBJECT: MARTIN-MARIETTA CORPORATION, BALTIMORE, MARYLAND - LICENSE NO. SNM-53 - TYPE B INCIDENT (EXPLOSION)

CO:EGO

On March 19, 1963, we transmitted to LR a copy of a TWX, dated March 18, 1963, as received from Region I, Division of Compliance. This communication related that an explosion involving highly enriched uranium oxide powder had occurred at the licensee's facility on March 17, 1963.

Attached is a copy of an investigation report, dated April 16, 1963, from Region I, with regard to this incident. The report sets forth the details in connection with the explosion and shows this occurrence probably resulted from a build-up of acetylene gas in the system used to spheroidize highly enriched uranium oxide powder. There were no injuries to personnel, although one employee was contaminated, and clean-up action was accomplished in this respect. There was contamination of the immediate area and this was decontaminated. Damage is estimated to range from $4,000.00 to $7,000.00.

Region I has classified this as a Type B incident, but points out that it could be interpreted as a Type A incident. The extended shutdown of the equipment involved more than seven days, due to need for certain new parts unrelated to radioactive materials, and we concur in the category of Type B. Please note that the entire report is classed as "Company Confidential".

For your information.

Attachment:
Cpy report fm CO:I to Dubinski
dtd 4/16/63

cc: R. W. Kirkman, CO:I, w/o att
H. H. Shapar, OGC, w/att



A1109

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Eber R. Price, Assistant Director
Division of Licensing and Regulation

DATE: APR 2 4 1963

FROM : Leo Dubinski, Assistant Director for Materials
Division of Compliance

SUBJECT: MARTIN-MARIETTA CORPORATION, BALTIMORE, MARYLAND - LICENSE NO. SNM-53 - TYPE B INCIDENT (EXPLOSION)
70-58
CO:EGO

By memorandum, dated April 19, 1963, we transmitted to your office a copy of an investigation report dated April 16, 1963, concerning subject matter. Attached is a copy of a letter dated April 16, 1963, as received by Region I from the licensee with further regard to this incident. Also attached is a copy of the transmittal memorandum from Region I.

The letter sets forth urinalyses and film badge results for licensee employee, C. Schmeizel. Also shown are the results of smear surveys of the filter system at the licensee's facility.

For your information.

Attachments:
1. Cpy ltr to CO:I fm subject licensee
   dtd 4/16/63
2. Cpy memo to Outten fm Roeder, CO:I
   dtd 4/19/63

cc: J. R. Roeder, CO:I w/o att
H. K. Shapar, GC, w/att



A/110

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Files

DATE: APR 26 1963

FROM : R. Handler, Enforcement Branch
Division of Licensing and Regulation RH

SUBJECT: MARTIN-MARIETTA CORPORATION
BALTIMORE, MARYLAND
INVESTIGATION CONDUCTED ON
MARCH 20 AND 21, 1963

LICENSE NO. SNM-53 - 70-58

LR:RH

Inasmuch as no items of noncompliance were found during the subject investigation, no enforcement action is appropriate.

CC: Division of Compliance (2)
D. A. Nussbaumer, S&SNB

A/111

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

To 70-58

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DLR

DATE: APR 30 1963

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch, DLR

CDL

SUBJECT: MARTIN COMPANY, DOCKET 70-58, APPLICATION DATED MARCH 29, 1963

SYMBOL: DLR:TGM

As requested by your memorandum dated March 29, 1963, we have reviewed the subject application which provided procedures to be followed in using a "work box" both for storage of fuel at a processing location and also as a storage container in the in-process storage area.

We have concluded that the procedures described are adequate to prevent a condition of accidental criticality for fuel material which contain uranium fully enriched in U-235 isotope as UO_2 stainless steel rolled cermets.

The applicant should be advised that fuel materials which differ in enrichment or chemical and physical form than that described in the subject application must be covered by a request for license amendment including a complete description of fuel material and a nuclear safety analysis.

A/112

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DLR

DATE: June 17, 1963

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch, DLR CDL

SUBJECT: MARTIN COMPANY, DOCKET 70-58, APPLICATION DATED JUNE 7, 1963

SYMBOL: DLR:TGM

We have reviewed the subject application requesting use of approximately 50 in-process storage racks, each with a two box capacity. These boxes are to contain up to 1100 grams of U-235 per box in the form of UO_2 (93%). The UO_2 comprises 16.5 weight percent of the total UO_2 SS rolled cermet.

The applicant has demonstrated through interaction calculations that the in-process racks will be safe even if four racks are pushed together and if each box is filled with water. We agree and recommend your approval of the proposed procedures.

A113

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Files

DATE: July 1, 1963

FROM : Richard H. Odegaarden
Criticality Evaluation Branch, DLR

SUBJECT: MARTIN COMPANY - SHIPPING CONTAINER FOR PATHFINDER FUEL ELEMENTS DOCKET 70-58, JUNE 25, 1963

A meeting was held at Bethesda on the subject license amendment application on June 25, 1963. Messrs. C. W. Keller and John Wachter of Martin Company, and Messrs. Christian Beck. R. L. Layfield, and R. H. Odegaarden of AEC-DLR participated in the discussion.

The shipping container consists of a 5 inch steel pipe centrally positioned in a 22.5 inch diameter container. The container wall is fabricated of modified 18 gauge, 55 gallon drums, and the overall length of the container is 90 inches.

The 5 inch inner container contains 14 tube-in-tube fuel elements, each fuel element containing 10 w/o UO_2 (120 g U-235/element and 1680 g U-235/container). The applicant calculated a multiplication factor of 0.43 for each shipping container.

The applicant stated for 6 containers in a close packed array, the solid angle is 2.5 steradians. This would permit each container to have a multiplication factor of 0.65. The applicant's calculation was well below this.

The applicant assumed a homogeneous system for his calculations. I pointed out to the applicant that a hetrogeneous system can be more reactive than a homogeneous system, but because of the 5 inch inner container, I saw no criticality problem.

Mr. Christian Beck was asked to comment on the structural integrity of the container to ascertain that it will meet the 30 foot drop test. He recommended that the supports which extend radially every 12.8 inches be rotated 45 degrees from each adjacent set to increase the container's resistance to crushing. The steel channel, which now runs the full length of the container, could be welded in one foot lengths to the container wall for each radial support to keep its weight down.

A/114

The inner container is closed at one end by reinforced 18 gauge steel. Mr. Beck recommended that this end cap be increased to 1/4 inch steel. He was not positive the 18 gauge outer container would meet the fracture requirements. The applicant seemed reluctant to go to 16 gauge steel drums. Mr. Beck thought the 18 gauge container might meet our requirements, but desired to examine the modified container which they agreed to submit.

I pointed out to the applicant that they should submit procedures to prevent commingling of this material with all other special nuclear material during shipment, transshipment and delivery. I stated what our requirements are and referred them to Part 71.66.

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DLR

DATE: July 2, 1963

FROM : T. G. McCreless, Jr., Acting Chief
Criticality Evaluation Branch, DLR

SUBJECT: MARTIN COMPANY, DOCKET 70-58, APPLICATION DATED JUNE 24, 1963

We have reviewed the subject application requesting use of shipping containers intended for the shipment of Pathfinder fuel elements. No more than 6 containers will be in any one shipment. Each container is designed to hold a maximum of 14 Pathfinder superheater fuel elements. Each element contains approximately 120 grams of U-235.

The applicant has stated that shipments will be made by railway express or exclusive van. We can not conclude that the use of railway express will prevent commingling with other special nuclear material unless written certification as described in Section 71.66(a)(3) is obtained from a responsible agent acting for the Railway Express Agency.

The applicant has, however, demonstrated through interaction calculations that 12 such containers in a planar array are safe. We agree and recommend approval of the proposed procedures subject to our above comments on the use of railway express and the adequacy of the structural integrity.

A/112

Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DLR

July 2, 1963

T. G. McCreless, Jr., Acting Chief
Criticality Evaluation Branch, DLR

MARTIN COMPANY, DOCKET 70-58, APPLICATION DATED JUNE 24, 1963

We have reviewed the subject application requesting use of shipping containers intended for the shipment of Pathfinder fuel elements. No more than 6 containers will be in any one shipment. Each container is designed to hold a maximum of 14 Pathfinder superheater fuel elements. Each element contains approximately 120 grams of U-235.

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The applicant has, however, demonstrated through interaction calculations that 12 such containers in a planar array are safe. We agree and recommend approval of the proposed procedures subject to our above comments on the use of railway express and the adequacy of the structural integrity.

OFFICE ▶	DLR:CEB					
SURNAME ▶	McCreless:bar					
DATE ▶	7/2/63					

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DLR

DATE: July 19, 1963

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch, DLR

SUBJECT: MARTIN COMPANY, DOCKET NO. 70-58, APPLICATION FOR RENEWAL DATED MARCH 28, 1963

SYMBOL: DLR:TCM

We have reviewed the subject application and have concluded that there is insufficient information to determine the adequacy of the applicant's procedures to prevent a condition of accidental criticality.

In order that we may continue our analysis, the following additional information is required:

1. Sufficient information has not been presented to verify the U-235 work area mass limits as established by the applicant in Table IV B-1D. Examples of information required which have not been included are percentage void fraction, moderation control and reflector description used in the calculation. In addition, there is apparent discrepancy between the use of some of the basic formulae and subsequent steps followed, as well as confusion as to the numbering of steps. Therefore, we require the applicant clarify the steps followed in the use of the basic formulae. Finally, we request submission of representative calculations and the derived curves of mass versus fuel density and volume percent of fuel.

2. "Work area" as described by the applicant is not sufficiently definitive to assure nuclear safety. As an example, a cubic array of an unsafe number of units may be formed and still adhere to the applicant's definition of work area. Therefore, we request the applicant re-evaluate this term and provide a definition which will assure nuclear safety. It would be helpful to our nuclear safety analysis if the various work areas were identified in plan drawings.

A/114

3. Procedures for preventing unsafe U-235 concentrations during chemical cleaning, pickling and any other operations in which U-235 may go in solution, and the associated nuclear safety analysis.

4. The information delineated in paragraphs IV, 1, 2, 4, 6, 7, 8, 9 and V.5, of "Information to be Contained in an Application for Renewal of a Special Nuclear Material License . . .". Also included should be an engineering assessment confirming the integrity of the packaging based on calculations, accident experience or results of testing programs.

5. The description of the storage areas and vaults as presented by the applicant is not sufficiently clear and in some instances inconsistant. The maximum permissible number of units in cubic array as shown in Table VI - 1, page 33, does not agree with any of the generally accepted limits for cubic arrays. Therefore, we require a more detailed description and nuclear safety analysis of each storage area and vault including the information delineated in paragraph II 2.B of "Information to be Contained . . . ".

6. The information delineated in paragraph II 2(e) of "Information to be Contained . . .".

7. The procedures for handling and storage of the requested 2 kgs of plutonium and 500 grams of U-233.

8. Apparently contract operations are to be conducted in the same facility. Therefore, we request that the applicant include the information on combined operations in accordance with paragraph III of "Information to be Contained . . . " .

9. Finally, we suggest that you send the applicant a copy of "Information to be Contained . . .", and ask him to revise the subject application including, for example, the information on receiving shipments requested in paragraph II - 2.

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : A. E. Aikens, Jr., Chief
Fuels Processing Branch

DATE: JUL 30 1963

FROM : Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

SUBJECT: MARTIN COMPANY SHIPPING CONTAINER FOR PATHFINDER FUEL, APPLICATION DATED JUNE 25, 1963 AND AMENDMENT DATED JULY 19, 1963. DOCKET NO. 70-58.

DLR:FLL

Please review the structural integrity analysis of this container. Please note that the amendment dated July 19, 1963, incorporates the changes suggested by Mr. C. Beck to Martin personnel during their visit on June 25, 1963.

Your expeditious handling of this review would be appreciated.

A1117

DOCKET NO. 20-58

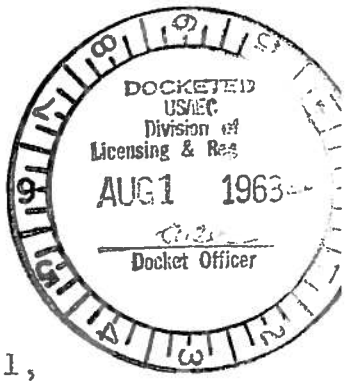
L&R File Copy

MARTIN COMPANY

NUCLEAR DIVISION
Baltimore 3, Maryland

Refer to: ACC-210

Mail No. 807
30 July 1963



U. S. Atomic Energy Commission
Division of Licensing & Regulation
Washington 25, D. C.

Attention: Mr. Robert Layfield

Subject: Proposed Title 10 Code of Federal Part 71, Paragraph 71.66 - Class III Transportation Procedures

Reference: (a) Martin Letter to Donald A. Nussbaumer dated 25 June 1963 Acc-200, Proposed Amendment Number 19 to Special Nuclear Material License No. 53

Gentlemen:

In connection with the shipment of Pathfinder fuel elements from Baltimore to Sioux Falls, South Dakota as described in our proposed Amendment No. 19 to SNM-53, reference (a), we have considered the three basic shipping criteria outlined in the subject paragraph. Our review from cost and shipping schedule standpoints determined that shipment by exclusive use of vehicle or under courier escort was not feasible.

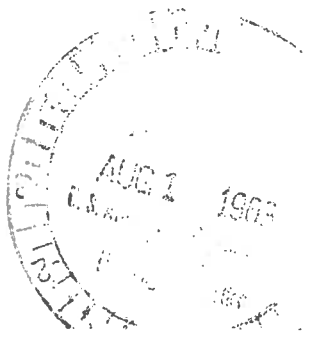
We contacted REA Express, and requested that they determine their ability to comply with the proposed Criteria in subparagraph a-3 of paragraph 71.66. A copy of their reply is enclosed. It is evident that there is a slight misunderstanding on the part of REA Express with regard to licensed inspectors and we will clarify this point with them.

The only basic difficulty for compliance with the Criteria in subparagraph a-3 is the requirement prohibiting intermediate unloading enroute. As outlined in the schedule from REA Express, transfers would be required at Baltimore, Washington and Chicago for the Limited Carload Shipments which we will require to expeditiously transfer the fuel. We plan to obtain individual shipment certification from REA that commingling with other special nuclear material or explosives will not occur.

A1118

ACKNOWLEDGED

Copy Supplied
Public Document Room
Div. of Compliance 2
8/6/63
RRL



THE AEROSPACE DIVISION OF MARTIN MARIETTA

5375

...e request that you consider the letter from the ... Express as the certification of the courier for the transfer of Pathfinder fuel elements from Baltimore, Md. to Sioux Falls, South Dakota.

Very truly yours,

C. W. Keller

C. ... Keller
Nuclear Materials Manager

C.K:bv

Encl: (6) - ... Express Letter,
16 July 1963 - Subj:
The Martin Co. - Routing
and Train Schedule - LCL
and Carload Shipments

R E A EXPRESS
210 E. CENTRE STREET, BALTIMORE 2, MD.

Winner of the Government's "E" award for outstanding contribution to the Export Expansion Program

OPERATIONS DEPARTMENT
A. V. AUGUSTINE
GENERAL AGENT

July 16, 1963 - 2

The Martin Co. - Routing and Train
Schedule - LCL and Carload Shipments

The Martin Co.
State Systems Division
Baltimore,
Maryland 21203

Attn: Mr. L. [illegible] Altenburger, [illegible] Mgr.
Material - Procurement Dept.

Dear Sir:

In reference to our recent telephone conversation concerning subject matter.

We are able to furnish you adequate transportation from Baltimore to Sioux Falls, South Dakota, both as an LCL shipment and carload shipment. The only difficulty we would encounter would be on the LCL movement, where you state that the Atomic Energy Commission requires one vehicle to transport this material from origin to destination, and a licensed inspector to supervise the loading.

LCL shipments to the above mentioned point require at least three transfers, namely: Baltimore, Washington and Chicago. Also, we have no licensed inspectors to supervise this loading, even if the one van move was dropped by the Atomic Energy Commission.

As for the carload shipment, we would place a car at your facilities for loading and inspection at your licensed inspector. The car would then move to destination without any difficulty.

We are attaching herewith a schedule for both the carload and LCL shipments, and would be pleased to handle this business for you, either as a carload movement or LCL, if the Atomic Energy Commission will drop the requirements on LCL shipments.

Yours truly,

A. V. Augustine
General Agent

R E A EXPRESS is the new name for the [illegible] domestic and international surface and air services of Railway Express Agency

ROUTING AND TRAIN SCHEDULE

CARLOAD

Depart Baltimore	PRR Train	571	7:15 A.M.
Arrive Harrisburg	" "	571	9:45 A.M.
Depart "	" "	25	10:30 A.M.
Arrive Pittsburgh	" "	25	4:00 P.M.
Depart "	" "	45	6:50 P.M.
Arrive Chicago	" "	45	4:15 A.M. (Tues.)
Depart "	PRR "	19	7:00 P.M. (Tues.)
Arrive Destination	"	219	10:45 A.M. (Wed.)

LCL

Depart Baltimore	[illegible] (CTP)		4:30 P.M.
Arrive Washington	"	"	6:00 P.M.
Depart "	P&O Train	7	10:10 P.M. (Mon.)
Arrive Chicago	" "	7	2:45 P.M.
Depart "	NIL "	19	7:00 P.M. (Tues.)
Arrive Destination	" "	219	10:45 A.M. (Wed.)

AUG 6 1963

C. D. Luke, Chief
Criticality Evaluation Branch

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

MARTIN COMPANY, DOCKET NO. 70-58, LETTER DATED JULY 30, 1963.

DLR:PLL

Please review the information contained in this letter from the standpoint of adequate control to prevent commingling of SNM shipments.

There is a probability that the Martin container and shipping procedures may be used by Pathfinder group to return any rejected elements since some of the Boiler fuel assemblies were returned to M&C.

You may keep this copy of the July 30, 1963, letter for your files.

A1119

OFFICE ▶	LP	LP				
SURNAME ▶	PLayfield/jc	DNussbaumer				
DATE ▶	8/6/63	8/6/63				

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DLR

DATE: August 9, 1963

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch, DLR

SUBJECT: MARTIN COMPANY, DOCKET NO. 70-58, LETTER DATED JULY 30, 1963

SYMBOL: DLR:TGM

We have reviewed the subject letter and attachment thereto and have determined that the letter from REA Express is not adequate evidence of compliance with the provisions of sub-paragraph 71.66(a)(3).

We would, however, re-evaluate the proposed LCL shipment provided that Martin Company obtain and submit for our review a written certificate from REA Express describing the general route to be followed and specifying that:

> "The Martin Company shipment will not be placed in any vehicle containing other special nuclear material, or flammable or explosive cargo, nor at any time during loading, transhipment or delivery closer than 20 feet from such material."

The written certificate from REA Express should include the administrative procedures to insure that the requirements are communicated to and understood by the personnel involved on all carriers and at all terminals, and that there will be a person on every carrier and at every terminal responsible for assuring that the shipment is controlled in accordance with the above certificate.

Martin Company proposes that each shipment comprise a maximum of six packages, each 22.5 inches diameter x 90 inches long and containing 14 fuel elements. We have determined that the six packages would be safe in any arrangement under accident conditions (10% reduction in any edge-to-edge spacing of the inner containers).

We believe the solid angle calculations of Martin Company are in error because of the improper equation on p. B 3. Consequently, we request that Martin Company recompute the maximum number of damaged containers in an array. We will be pleased to assist the applicant in this determination.

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Files

DATE: AUG 1 3 1963

FROM : Robert L. Layfield
Robert L. Layfield
Source and Special Nuclear Materials Branch

SUBJECT: MARTIN COMPANY, DOCKET 70-58, SHIPMENT OF PATHFINDER FUEL.

DLR:RLL

C. Keller of Martin was called on August 12, 1963, by Tom McCreless and me. It was requested that Martin procure from REA Express or some carrier (if they intend to ship by certification) a written certificate describing the general route of the subject shipment and specifying that the shipment would not be placed in any vehicle containing ~~of~~ other SNM, or flammable or explosive cargo, nor at any time during loading, transshipment or delivery closer than 20 feet ~~from~~ of such material. It was also requested that the certificate from REA include the administrative procedures to ensure that the requirements are communicated to and understood by the personnel involved on all carriers and at all terminals, and that there will be a person on every carrier and at every terminal responsible for assuring that the shipment is controlled in accordance with the above certificate.

Martin was also requested to compute the maximum number of damaged containers in any array. In Martin's original submission it appeared that they had an error in their calculations. CEB determined the shipment safe by independent calculations.

A1121

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DLR

DATE: December 11, 1963

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch, DLR CDL

SUBJECT: THE MARTIN COMPANY, MEETING TO DISCUSS MARCH 28, 1963 RENEWAL APPLICATION, DOCKET NO. 70-58

SYMBOL: DLR:FKD

On December 5, we met with Mr. Charles Keller of Martin Company to discuss the March 28, 1963 renewal application. Our review of this application dated July 19, 1963, concluded that insufficient information had been supplied, and specified the required additional information. We suggest that the points raised in our July 19 memorandum be confirmed in writing to the applicant, with the following additions to our July 19 memorandum:

Add on to paragraph 1 - "We suggest presentation of the limits by categories, e.g., enrichment (0-5, 5-10, 10-20, 85-93), physical form of material (oxide, pellets, metal), etc., in order to permit authorization of a wide range of operating parameters."

Add on to paragraph 3 - ". . ., taking into consideration the reactivity of materials being treated, when immersed in solutions containing U-235."

Insert in paragraph 7 after procedures ". . . and nuclear safety analyses . . .".

At the close of the meeting, we offered our assistance to Martin's new nuclear safety man, Charles Osmir, as regards presentation of calculative techniques derived in conjunction with Martin's experimental background with super-heat type elements.

A/122

DLR:KEL
70-58

Martin Company
Nuclear Division
Baltimore 3, Maryland

Attention: Mr. R. D. Bennett
Vice President
Your reference: LSN-23

Gentlemen:

This refers to the discussion on December 3, 1963, between your Mr. Charles Keller and Miss F. K. Durkan and Mr. K. E. Lauterbach of this Division, regarding your application dated March 28, 1963 for renewal of License No. SNM-53. As a result of this discussion, we understand that you will re-submit this application to provide additional information, including the following:

1. A detailed description of all processes conducted under this license involving uranium enriched in the U-235 isotope, U-233 and plutonium.

2. The specific locations at which each of the special nuclear materials will be received, handled, used, or stored.

3. Further description and identification of the plutonium and U-233 including source specifications, chemical and physical form, isotopic content and the maximum quantity of each material to be possessed at any time.

4. Technical qualifications of personnel who will have health and safety responsibility for the use of licensed material.

5. Handling and shielding devices for using and storing plutonium neutron sources and U-233.

6. A detailed description (including a plan view) of the ventilating system for the control of airborne radioactivity in each process area, including the specifications of glove boxes and hoods, building exhaust fans, dust collecting and air cleaning systems and air discharge stacks.

OFFICE ▶

A1123

7. A description of the air sampling program to determine the concentrations of airborne radioactivity in work areas and effluents, including the locations at which air samples are taken, the frequency of such surveys and instrumentation used.

8. Procedures for controlling surface contamination, including the method of preventing the spread of contamination to unrestricted areas and procedures for decontamination of floors and equipment.

9. Procedures and equipment for surveying the work area for fixed and removable radioactive contamination, the locations and frequency of such surveys and the contamination criteria which will be applied.

10. A description in further detail of the types and quantities of radioactive waste, the methods of collection and storage, and procedures for ultimate disposal, including procedures for determining concentrations of radioactive material released to unrestricted areas.

11. An evaluation of the effects of fire, explosion and other accidents and the probability of release of radiation or radioactive material as a result of such accidents.

12. Confirmation that all special nuclear material held under the authority of this license will be isolated from other special nuclear material in accordance with the provisions of Section III of the Renewal Application Guide, copy enclosed.

13. A nuclear safety analysis of procedures for receiving special nuclear material in the facility and inspecting the shipment on receipt, including the information contained in Section II, B, 1 of the Renewal Application Guide.

14. Further information on the parameters used to calculate mass limits in Table IV-B-1d, including percent enrichment, physical form of material, percent void fraction, moderation control and reflector description. We suggest presentation of the data y categories, e.g. percent enrichment (0-5, 5-10, 10-20, 85-93), physical form of material (oxide, pellets, metal, etc.). Also please clarify the steps followed in the use of basic formula and submit your derived curves, including representative calculations, for mass versus fuel density and volume percent of fuel.

15. Clarification of the definition of "work area" and "operational work area" in terms of the quantity of material assigned to these

areas. Include also plan drawings showing the locations of the various work areas.

16. Procedures for preventing unsafe U-235 concentrations during pickling, cleaning and other operations in which U-235 may be dissolved, and a nuclear safety analysis taking into consideration the reactivity of materials being treated when immersed in solutions containing U-235.

17. The information on shipment of special nuclear material contained in Section IV of the enclosed Renewal Application Guide, and an engineering appraisal of your shipping containers demonstrating that they meet the structural integrity criteria of Section V.

18. A more detailed description and nuclear safety analysis of each storage area and vault, including the information contained in Section II, B, 2 of the enclosure.

19. A further description of the moniter alarm system including the information in Section II, B, 5 of the enclosed Renewal Application Guide.

20. A description of the procedures for handling and storing pyrophoric special nuclear materials.

Distribution
Doc. Rm.
Suppl.
Br. & Div. rfs
Compliance
CEB

Very truly yours,

Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch
Division of Licensing and Regulation

Enclosure:
Renewal Application Guide

OFFICE ▶	DL&R	DL&R	CEB			
SURNAME ▶	CMLauterbach/cvd	DNussbaumer				
DATE ▶	1/28/64	1/28/64				

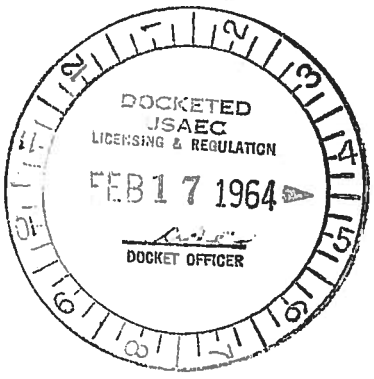
Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62701-3

70-58

MARTIN COMPANY

L&R File Copy

NUCLEAR
DIVISION
Baltimore,
Maryland
21203



Refer to:
ACC-260

February 14, 1964

U. S. Atomic Energy Commission
Source & Special Nuclear Materials Branch
Washington 25, D. C.

Attention: Mr. Donald A. Nussbaumer, Chief,
Source and Special Nuclear Materials Branch

Subject: Proposed Amendment Number 20 to Special
Nuclear Material License No. 53

Enclosure: (1) Shipment of excess uranium bearing
material for reprocessing (6 copies)

Gentlemen:

See Reports File

We submit as Enclosure (1) our application to amend the Martin Marietta Special Nuclear Material License No. 53. This submission describes the proposed shipping containers and shipping methods to be utilized in the shipment of excess uranium bearing material to an off-site facility for uranium recovery processing. We have negotiated with Davison Chemical Company, Erwin, Tennessee for processing of uranium contained in air filters and shipment is desired as soon as possible. We have selected Mason Dixon for the shipment, by exclusive use of van, of the filters. The routing from Baltimore as supplied by Mason Dixon will be as follows:

U.S. Route 40 to Frederick, Maryland
U.S. Route 340 to U.S. Route 11
U.S. Route 11 to Erwin, Tennessee (Destination)

Approval for shipment of the filters by the method described in the enclosure is requested as soon as possible. Since the quantity of other types of excess material has not been finalized at this time, we will submit additional shipping information as the quantities and shipping arrangements become firm.

Very truly yours,

FOR

C. W. Keller
Nuclear Materials Manager

CWK/nj

Encl.

A1124

ACKNOWLEDGED

THE AEROSPACE
DIVISION OF
MARTIN
MARIETTA

MARTIN COMPANY
Mail No. 729

Baltimore 3,
Maryland

February 21, 1964

United States Atomic Energy Commission
Division of Licensing & Regulation
Washington 25, D. C.

Re: Applications for Byproduct Material, Licenses #19-1398-19 and #19-1398-27

Gentlemen:

It is requested that License No. 19-1398-27 be combined with License No. 19-1398-19, thereby, eliminating License No. 19-1398-27 since both of these radiographic programs are similar.

Pursuant to a recent telephone conversation with Mr. W. Haddington of your branch; the following additional information is submitted to correct and/or amplify the information contained in our Application for Renewal of Byproduct Material Licenses No. 19-1398-19 and No. 19-1398-27 dated 23 January 1964.

1. All radiation detection instruments used in the radiographic program will be checked at two or more points on each scale.

2. Please change all references to paragraph V.E.3 in the Submittal to V.E.2.

3. Presentation of the training program described in Item VI B of the submittal will normally require 40 hours to complete. However, this requirement could be changed depending upon the individual's ability, experience, educational background and attitude.

4. Retraining sessions will be conducted periodically. The need, frequency and formality of these sessions will be determined by Health Physics surveillance of radiographers on-the-job performance and changes in operating and emergency procedures, radiographic equipment, radiation detection instrumentation, regulatory requirements and radiographic sites.

DUPLICATE FOR DEPT. OF COMMERCE

A/125

5. The Health Physics Section is responsible for inspecting radiographic operations. These inspections are conducted regularly to monitor radiographers performance to assure compliance with operating and emergency procedures, license provisions, Commission Regulations, and to provide increased assurance that unsafe practices or conditions do not develop. The frequency of these inspections will be governed by conditions such as; degree of source utilization, location of the radiographic site in relation to personnel occupancy adjacent to the site, source strength, degree of shielding or collimation, ease of controlling the exclusion area.

6. Please change answer a. of question #17 on page 27 of our submittal to read: "Leave the radiographic site only after properly securing the radiographic source."

7. Please change question and answer #19 on page 27 to read:

   "What is the title of the Federal Regulation dealing only with radiography?

   Ans. 10CFR31- Radiation Safety Requirements for Radiographic Operations."

Should any additional information be required, please contact me at AC 301, 687-3800, Ext. 9517.

Very truly yours,

Richard J. Brisson

Richard J. Brisson, Chief
Health Physics Section

RJB/js

DOCKET NO. 70-58

MARTIN COMPANY

NUCLEAR DIVISION
Baltimore, Maryland
21203

L&R File Copy



Refer to:

ACC-262

February 25, 1964

U. S. Atomic Energy Commission
Source & Special Nuclear Materials Branch
Washington 25, D. C.

Attention: Mr. Donald A. Nussbaumer, Chief,
Source and Special Nuclear Materials Branch

Subject: Allocation of Enriched Uranium

Gentlemen:

Please establish an allocation for 5000 kgs of approximately 5% enriched Uranium to be used by Martin Marietta in the fabrication of the 10,000 K W Floating Nuclear Power Plant designated MH-1A. This allocation is equivalent to 250 kgs U-235. The fabrication will be performed under the Martin Marietta Corporation Special Nuclear Material License Number 53 in accordance with Lease Number 144 with the AEC, under prime Contract DA-36-109-ENG-7454 with the U. S. Army, Corps of Engineers.

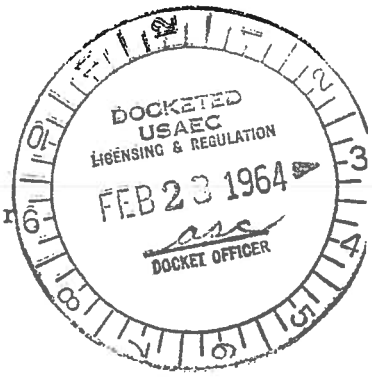
Conversion of UF_6 to UO_2 and subsequent pellet fabrication, which is scheduled for April, 1964, will be performed by a vendor yet to be selected by Martin.

It is the sole purpose of this letter to establish an allocation for the U-235 at this time to assure that proper authorizations are in effect for the withdrawal of the UF_6 when it is needed in April. If you require any further substantiation of these requirements, please contact Captain R. A. Farmer at the address shown below.

Very truly yours,

C W Keller

C. W. Keller
Nuclear Materials Manager



CWK/nj

cc: Captain R. A. Farmer
Nuclear Power Field Office
Fort Belvoir, Virginia

A/126

Copy Provided Compliance K.L.L. 3/23/64

A DIVISION OF MARTIN MARIETTA

ADVANCED PROG

RECORD OF TELEPHONE CONVERSATION

DATE Feb 25, 1964

DOCKET 70-58

COMPANY Martin

PERSON C. Keller

SUMMARY OF CALL:

Requested info on the status of their application dated Feb 14, 1964 to ship air filters containing 22 kg U-235.

Also, since the large air filters will not fit into 110 gal drums, Mr. Keller asked us to consider packaging these filters (each containing < 300 gms U-235) in ICC approved wooden boxes.

March 6, 1964

Mr. Keller informed me that the container for the large filters will be made of steel.

K.L.L.

A/127

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

IN REPLY REFER TO: 40-3296

MAR 2 1964

Martin-Marietta Corporation
Baltimore, Maryland

Attention: Mr. W. L. Lucas

SUBJECT: NOTICE OF LICENSE EXPIRATION

Gentlemen:

Notice is given that Source Material License Number SFB-187 expires on Aptil 30, 1964.

If you desire to continue your program using source material(s), an application for renewal of the license should be filed with this office. It is to your advantage to file such an application at least thirty (30) days before the expiration date of your existing license. The application should be submitted using Form AEC-2, enclosed, in accordance with the instructions provided with the form. Your program will then be covered by your existing license until action is taken on your application for license renewal. (Title 10, Code of Federal Regulations, Part 40, Section 40.43(b)). If an application is received less than 30 days prior to the expiration date of your license and cannot be processed before your existing license expires, this could result in your possessing source material without a valid license.

If you do not wish to renew your license, please complete the enclosed form "Certification of Status of Source Material Activities Under United States Atomic Energy Commission Source Material License Number SFB-187", and return it to this office.

If you have obtained an amendment which has extended the expiration date of the above license or if a new license has been issued which supersedes the above license, please disregard this notice.

This notice of your license expiration is sent for your convenience and it should not be interpreted that similar notices will be sent in the future. The responsibility for timely submission of an application for license renewal remains with the licensee.

Very truly yours,

BCC: Document Room
Div. of Compliance

Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch
Division of Licensing & Regulation

Enclosures:
10 CFR, 20 & 40
Form AEC-2
"Certification. . ."

DW

A/128

A. E. Aikens Jr, Chief
Fuels Processing Branch

March 3, 1964

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

MARTIN COMPANY APPLICATION, DATED FEBRUARY 14, 1964, REQUESTING AUTHORIZATION TO SHIP AIR FILTERS CONTAINING U-235 TO ERWIN, TENNESSEE, LICENSE SNM-53, DOCKET NO. 70-58.

DLR:KEL

Please review the subject application with reference to structural integrity and shoring of the shipping containers.

A/129

OFFICE ▶	LR					
SURNAME ▶	K.L.K KLauterbach/jc					
DATE ▶	3/3 /64					

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

DOCKET NO. 40-3296

1 File Copy

MARTIN COMPANY

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

Refer to:
ACC-267



March 20, 1964

U. S. Atomic Energy Commission
Division of Licensing & Regulation
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch

Reference: AEC letter dated March 2, 1964
Reference 40-3296

Enclosure: Three (3) copies - "Certification of Status of Source Material Activities Under United States Atomic Energy Commission Source Material License Number STB-187"

Gentlemen:

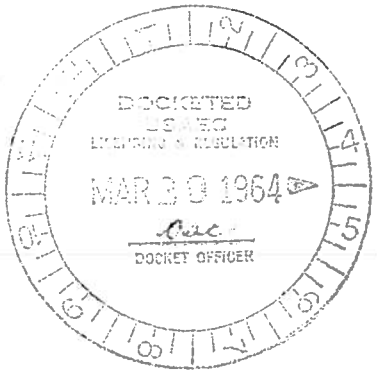
Thank you for your notification of the expiration of the Martin Marietta License STB-187 which authorizes the utilization of magnesium-thorium alloy.

Since there appears to be no further application for this alloy at the Martin Marietta facilities at Middle River, Maryland, we have executed and enclosed three copies of "Certification of Status of Source Material Activities Under United States Atomic Energy Commission Source Material License Number STB-187" to terminate license number STB-187.

Very truly yours,

C W Keller

C. W. Keller, Manager
Nuclear Materials



CWK/mc

Enclosure

A/130

A DIVISION OF MARTIN MARIETTA

ACKNOWLEDGED

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

IN REPLY REFER TO:
40-3296

L&R File Copy

CERTIFICATION OF STATUS OF SOURCE MATERIAL ACTIVITIES UNDER UNITED STATES ATOMIC ENERGY COMMISSION LICENSE NO. STB-187

RECEIVED
DIVISION OF
LICENSING & REGULATION
MAR 30 1964
DOCKET OFFICER

LICENSEE: Martin-Marietta Corporation

ADDRESS: Baltimore, Maryland

The licensee and any individual executing this certification on behalf of the licensee certify that (check appropriate item(s) below):

____ No source materials have been procured and/or possessed by licensee.

All source materials procured and/or possessed by licensee under source material license No. _____

____ (1) have been or will be, prior to expiration of the above license, transferred to _____
(Institution, firm, hospital, person, etc.)

which has source material license No. _____

__X__ (2) have been or will be disposed of in compliance with 10 CFR 20 prior to expiration of this license.

____ (3) will be possessed under the general license of Section 40.22, 10 CFR 40.

____ (4) Other _____

C W Keller
Certifying Official

Date: March 20, 1964

Please return three copies to:
U. S. Atomic Energy Commission
Division of Licensing & Regulation
Washington 25, D. C.

1493

MAR 24 1964

Charles D. Luke, Chief
Criticality Evaluation Branch

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

LETTER DATED MARCH 20, 1964, FROM THE MARTIN COMPANY SUPPLYING ADDITIONAL INFORMATION ON SHIPMENT OF AIRFILTERS. LICENSE SNM-53. DOCKET 70-58.

DLR:KEL

Please review from the standpoint of criticality control. Please return the docket with your comments. The extra copy of the subject letter may be retained for your files.

Attachments:
Docket & extra cy of lttr.

A/131

OFFICE ▶	LR					
SURNAME ▶	Klaaterbach/jc					
DATE ▶	3/24/64					

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DML

DATE: April 6, 1964

FROM : Charles D. Luke, Chief
Criticality Branch, DML

SUBJECT: THE MARTIN COMPANY, DOCKET NO. 70-58, SUPPLEMENTARY INFORMATION DATED MARCH 20, 1964

SYMBOL: DML:TGM

We have reviewed the subject information which supplements The Martin Company application of February 14, 1964, for the shipment of air filters containing enriched uranium oxide.

Subject to the approval of the tie-downs by Christian Beck, we have no further objection to the proposed shipment. However, we do feel that the applicant should be advised that the calculations for determining geometric buckling were in error. The filter dimensions must be increased by two times the 3cm extrapolation distance. As a result, the proper k_{eff} for a bare moderated filter is considerably greater than Martin's 0.455. We suggest that k_{eff} be computed in accordance with DP-532. On the other hand, Martin was overly conservative in applying the solid angle criterion. We suggest determining a solid angle between actual filters and not between the total packages as Martin has evidently done.

cc: Christian Beck, DML

A1132

Charles D. Luke, Chief
Criticality Branch

April 8, 1964

Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch

APPLICATION DATED APRIL 1, 1964, FROM THE MARTIN CO. REQUESTING AMENDMENT OF SNM-53, DOCKET NO. 70-58

DML:KEL

Please review the subject application from the standpoint of criticality control. The extra copy of the application may be retained for your files.

Attachment:
As stated above

133

OFFICE ▶	DML:	DML				
SURNAME ▶	K.E.L. Lauterbach/cvd	DNussbaumer				
DATE ▶	4/8/64	4/ /64				

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

DOCKET NO. (70-58) + 40-577

File Copy

MARTIN COMPANY

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

Mail No. 805
April 14, 1964

United States Atomic Energy Commission
Division of Licensing & Regulation
Washington, D. C. 20545

Attn: Mr. Lyall Johnson, Acting Director for
Materials Licensing

Dear Mr. Johnson:

Martin Company has centralized all Radioactive Materials Management within the Contracts Department. This includes coordination of all licensing activities within the Nuclear Division. The By-product Material Licensing which was previously handled by Mr. Richard J. Brisson, Supervisor of Health Physics, will now be the responsibility of Nuclear Accountability and Licensing Representative, Mr. Charles W. Keller. Mr. Brisson will continue to be responsible for radiological safety at the Martin Company. All correspondence should be addressed as follows:

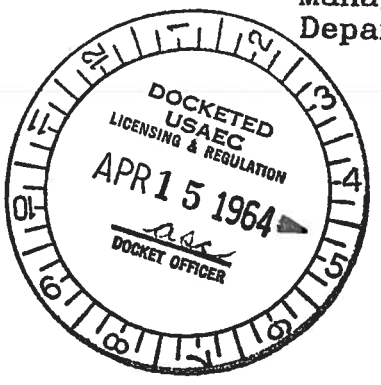
Mr. Charles W. Keller
Nuclear Acct. & Lic. Representative
Mail No. 807
Martin Company
Baltimore, Md. 21203

Phone: 687-3800, Ext. 513
(Area Code 301)

Very truly yours,

William H. Alper
Manager, Contracts
Department





A/134

THE AEROSPACE
DIVISION OF
MARTIN
MARIETTA

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DML

DATE: April 15, 1964

FROM : Charles D. Luke, Chief
Criticality Branch, DML

SUBJECT: THE MARTIN COMPANY, DOCKET NO. 70-58, APPLICATION DATED APRIL 1, 1964

SYMBOL: DML:TGM

We have reviewed the subject application for amendment of Special Nuclear Material License No. SNM-53 to authorize the fabrication of a nuclear core of tubular design employing $U(5\%)O_2$ pellets and have the following comments:

1. We request information to demonstrate that each incoming shipment will be placed in an array no more reactive than as received and will be isolated from every other array of special nuclear material by:

   a. A distance of 12'; or

   b. The greater distance across an orthographic projection or either array or a plane perpendicular to a line joining their centers, whichever is greater; or

   c. Eight inches of full density (140 lb/cu ft) concrete. Where concrete of less density is used, thickness must be increased proportionately.

   We also request a description of procedures for identifying, isolating, and handling wet or damaged packages.

2. We request a description and nuclear safety analysis of procedures to assure that unsafe concentrations of U-235 in solution are not accumulated during cleaning operations.

In addition, we feel that the applicant should be advised of the following:

"Figures 14, 15 and 16 of TID-7016, Rev. 1, which pertain to lattices of slightly enriched uranium rods are considered non-conservative and a proposed revision is currently under consideration. The revised values are lower than the safe diameter and thickness quoted in your application. However, with allowance for the reduced reactivity of the oxide rod lattices, as compared with metal rods, we agree that the values established in your application are adequate."

A/135

Charles D. Luke, Chief
Criticality Branch

April 29, 1964

Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch

LETTER FROM MARTIN CO. DATED APRIL 24, 1964, FURNISHING FURTHER INFORMATION IN REPLY TO OUR LETTER DATED APRIL 20, 1964.
DOCKET NO. 70-58

DML:KEL

Please review the subject application from the standpoint of criticality control. The extra copy of the letter may be retained for your files.

Attachment:
As stated above

A/136

C.S.M/a

OFFICE ▶	DML KEL.	DML DN				
SURNAME ▶	KLauterbach/cvd	DNussbaumer				
DATE ▶	4/29/64	4/ 29 /64				

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-8

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

IN REPLY REFER TO:

DML:KEL
70-58
40-577

APR 30 1964

Martin Company
Nuclear Division
Baltimore, Maryland 21203

Attention: Mr. William H. Alper
Manager, Contracts Department

Gentlemen:

Thank you for your letter dated April 14, 1964, advising us that you have appointed Mr. Charles W. Keller as Nuclear Accountability and Licensing Representative for the Nuclear Division, Martin Company. This information has been made a part of our records on your Source, Special Nuclear and Byproduct Material Licenses.

Sincerely yours,

(Signed) L. Johnson

Lyall Johnson
Acting Director
Division of Materials Licensing

Copies provided for
Byproduct Licenses: 19-1398-1,-3,-9,-14,-15,-17
19-1398-19,-20,-21,-22,-23,-24,-25
19-1398-26,-27,-28,-29,-30,-31
19-6870-1
19-1243-3

A1137

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVE MENT

Lauterbach

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DML

DATE: May 15, 1964

TGMcCreless

FROM : T. G. McCreless, Acting Chief
Criticality Branch, DML

SUBJECT: THE MARTIN COMPANY, DOCKET NO. 70-58, APPLICATION DATED MAY 11, 1964

We have reviewed the subject application for amendment of Special Nuclear Material License No. SNM-53 to authorize the shipment of uranium solutions and conclude that the procedures are adequate.

A/138

OPTIONAL FORM NO. 10
5010-104

Lautaback

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, ML

DATE: June 9, 1964

FROM : Charles D. Luke, Chief
Criticality Branch, ML

CDL

SUBJECT: THE MARTIN COMPANY, DOCKET NO. 70-58, TELEGRAM OF JUNE 1, AS SUPPLEMENTED BY TELEGRAM OF JUNE 8, 1964

SYMBOL: ML:TGM

We have reviewed the subject information requesting authorization for Class III shipment of 15 drums of uranium solution, 21 drums of solid and powder uranium scrap and six metal containers for large ductwork filters.

Subject to the approval by Christian Beck of the structural integrity of the solid and powder uranium scrap container and the tie-downs to assure a planar array, we have no objection to the proposed shipment.

A/139

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, ML

DATE: June 12, 1964

FROM : Charles D. Luke, Chief
Criticality Branch, ML

SUBJECT: THE MARTIN COMPANY, DOCKET NO. 70-58, APPLICATION DATED JUNE 9, 1964

SYMBOL: ML:TGM

We have reviewed the subject application requesting authorization for shipment of ten containers in two rows of five each of uranium scrap.

Subject to the approval by Christian Beck of the structural integrity of the shipping containers and the proposed tie-downs to assure a planar array of two rows of five containers each, we have no objection to the proposed shipment if made by one of the acceptable procedures for Class III shipments.

cc: Christian Beck, ML

A1140

CLASS OF SERVICE
This is a fast message unless its deferred character is indicated by the proper symbol.

WESTERN UNION
TELEGRAM

W. P. MARSHALL, PRESIDENT

SF-1201 (4-60)

SYMBOLS
DL = Day Letter
NL = Night Letter
LT = International Letter Telegram

The filing time shown in the date line on domestic telegrams is LOCAL TIME at point of origin. Time of receipt is LOCAL TIME at point of destination

DOCKET NO. 70-58

1049A EDT JUN 19 64 PB090

P BRMN001 DL PD WUX BRMN BALTIMORE MD 19 1045A EDT

File Copy

K E LAUTERBACH

4915 ST ELMO BETHESDA MD

REVISION OF REQUEST FOR SHIPMENT OF SCRAP TO ERWIN, TENNESSEE.
TWO SHIPMENTS WILL BE REQUIRED AS FOLLOWS:

1. 10 CONTAINERS AS DETAILED IN JULY 19, 1963 SUBMISSION AND APPROVED FOR SHIPMENT OF TUBULAR FUEL ELEMENTS.
2. 7 CONTAINERS AS DETAILED IN SOME REFERENCE AS FINAL SHIPMENT.

CONTAINER PALLETS WILL BE BANDED TO VAN FLOOR USING 1 1/4" X 0.050" BANDING USED IN PREVIOUS SHIPMENTS. CONTAINERS WILL ALSO BE BANDED ACROSS WIDTH OF TRUCK. MAXIMUM LIMIT OF 3500 GMS U-235 PER CONTAINER REQUESTED IN SUBMISSION DATED JUNE 9, 1964, APPLIES FOR ALL

3334

CONTAINERS. FIRST SHIPMENT TENTATIVELY SCHEDULED FOR JUNE 24, 1964.

MARTIN CO C W KELLER 807 6/19 0915E

1. 10 19 1963 2. 7 1 1

/4" X 0.050" 3500 GMS U-235

9 1964 24 1964 807 6/19 0915E.

DOCKETED
USAEC
LICENSING & REGULATION
JUN 19 1964
DOCKET OFFICER

3334

A141

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, ML

DATE: June 22, 1964

FROM : Charles D. Luke, Chief
Criticality Branch, ML

SUBJECT: MARTIN COMPANY, DOCKET NO. 70-58

During the visit of Messrs. R. L. Layfield and R. H. Odegaarden to NFS, Erwin, Tennessee, last Thursday and Friday, NFS commented upon a shipment of filters recently received from Martin. Their comments included:

1. A question concerning the ability of the shoring to withstand the one-hour fire test. This shoring was required to assure spacing and a planar array of packages on the vehicle.

2. The eight large filters contained a total of 5 kg U-235 corresponding to an average of something over 600 grams in each filter. We approved the nuclear safety of the shipment based on a maximum U-235 content of 300 grams per filter. Of course, if the U-235 were not uniformly distributed among the eight large filters, one or more of the filters would each have contained more than 600 g U-235.

We suggest a discussion of this problem in order to determine what further action on our part is required.

A/142

To: Files

From: K.E.L

Subject: Memo to DAN dated June 22, 1964 from C.D. Luke regarding shipment of U-235 containing air filters from Martin Co. to Erwin Tenn.

1. The wood shoring in this shipment consisted of 4x4" and 2x4 members, nailed to the floor of the truck; with steel tie-downs over the tops of the shipping containers. In view of the size of the shoring and the method of tie down, it appears that the shoring would withstand a one hour fire, at least as well as the wooden floor of the truck.

2. The licensee requested authorization to ship eight (8) drums each containing one medium size filter (maximum 870 gms U-235/filter, calculated) and thirteen (13) metal containers each containing one large filter (maximum 300 gms U-235/filter, estimated). Since NFS reported that 8 filters contained over 600 gms U-235 each, it is possible that they incorrectly identified the filters in question as the large filters. Further information would be required in order to confirm this point.

Since there is no evidence indicating that licens

A1143

conditions were violated, or that the equipment as performed invalid a criticality risk, I suggest that the matter be dropped.

DOCKET NO. 70-58

File Copy

MARTIN COMPANY

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

In reply
refer to: ACC-310

July 7, 1964

RECEIVED
1964 JUL 7 PM 2 57
U.S. ATOMIC ENERGY COMM.
REGULATORY
MAIL SECTION

U. S. Atomic Energy Commission
Division of Materials Licensing
Washington 25, D. C.

Attention: Mr. Kenneth Lauterbach

Subject: Proposed Amendment No. 22 to Martin Marietta Special Nuclear Material License No. 53.

Gentlemen:

With the change in policy by the AEC to establish all health and safety aspects of special nuclear material processing under license, we request license approval for several processing steps previously approved by the New York Operations Office of the AEC through the feasibility report mechanism. These steps will be included in our overall SNM-53 renewal, but prior approval is required to permit fabrication of preliminary nuclear components for the Argonne Advanced Research Reactor. The steps include coating, tube extrusion, and hydrostatic pressing, which will be discussed in this submission.

Since we consider these steps basic and straightforward, approval by July 24th is desired.

Very truly yours,

C W Keller

C. W. Keller
Nuclear Accountability and
Licensing Representative

CWK/nj

Encls.

RECEIVED
USAEC
JUL 7 1964
REGULATORY
MAIL SECTION
DOCKET CLERK

A/144

70-58

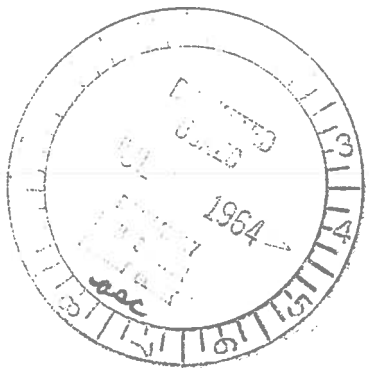
File Copy

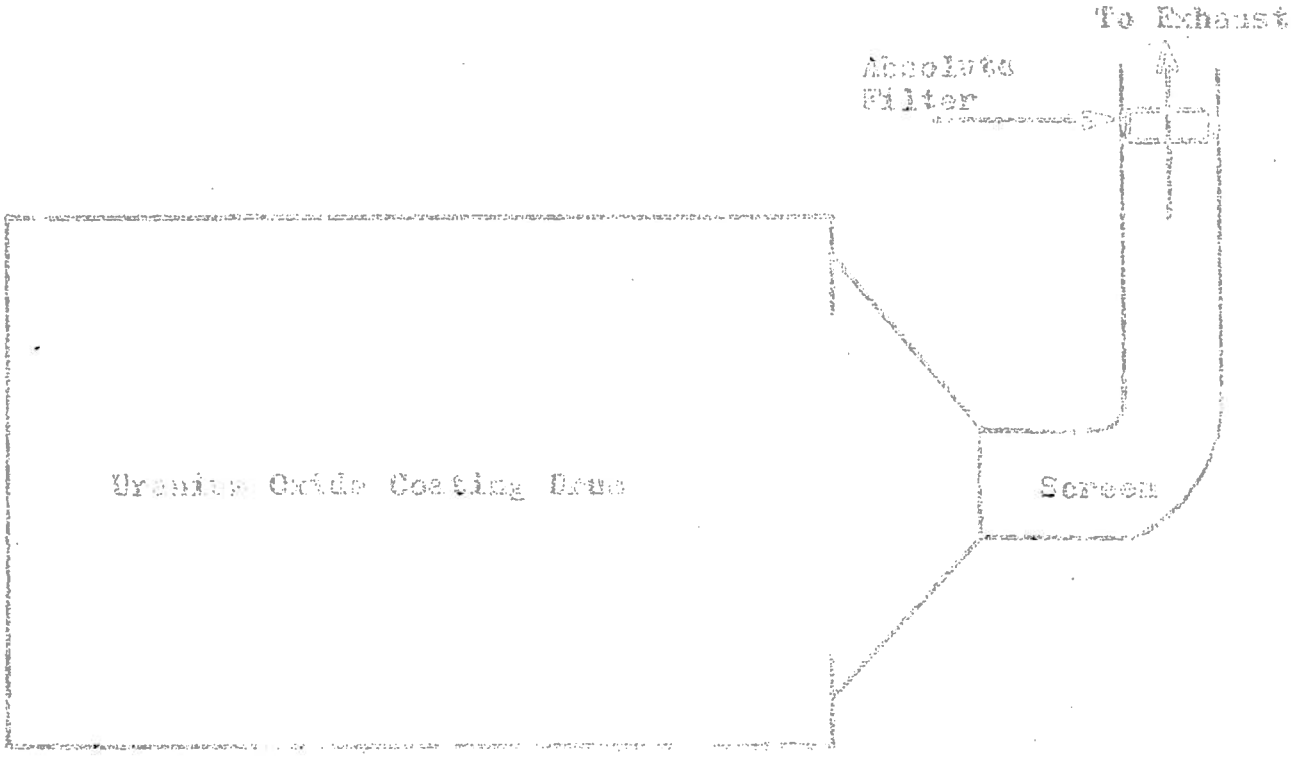
COATING OF URANIUM OXIDES

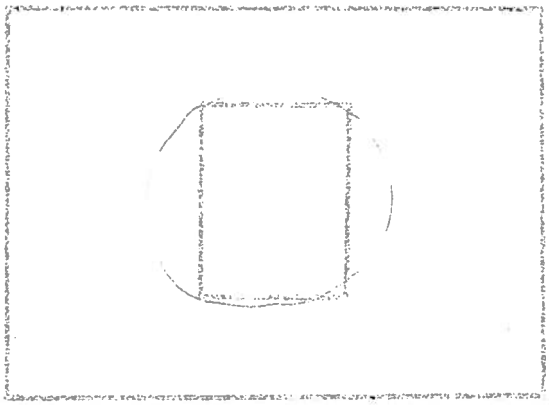
To provide a more homogeneous fuel matrix, highly enriched spherical uranium oxides are coated with various metals, such as stainless steel, tungsten, molybdenum, and others dependent on the final application of the matrix. The coating of the primary uranium oxides also improves bonding qualities in connection with the fabrication of completed fuel components.

Coating is accomplished through spraying the uranium oxide in a revolving drum contained in a separate exhaust hood fabricated for this purpose. The picture and drawing of the installation show the details of the operation. Spray apparatus, located outside the revolving drum, is used to introduce the metal powder for coating of the uranium oxide contained in the drum. Exhaust draft is such to prevent escape of the uranium oxide through the opening of the drum and to minimize removal of material to the exhaust ductwork. An adequate filter system, as depicted in the drawing, prevents any escape of coated particles. Uranium balance between uncoated and coated material has shown insignificant uranium loss to the exhaust system.

A mass limit of 800 gms U-235 which corresponds to approximately 950 gms of UO_2 has been established for the coating operation. Thorough removal of all coated material shall be made between processing batches of 800 gms U-235 and it is Martin line responsibility to assure that inadvertent mixing with other powder does not occur. This responsibility is also supported by strict material control by Martin Nuclear Materials Management. It shall be the responsibility of Martin Nuclear Materials Management to assure that coated material has been removed from the coating drum, prior to issuing additional material for coating. This will normally be defined by return of coated material to the vault, prior to issuing additional starting material. There is no internal sprinkling system installed in the general work area to provide inadvertent flooding of the coating hood, which is separated from other processing hoods by a minimum of two feet. Final composition of coated material will usually not exceed 50% uranium oxide in coated powder.




To Exhaust
Absolute Filter
Uranium Oxide Coating Pans
Screen



Front View

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27

5010-107

UNITED STATES GOVERNMENT

Memorandum

TO : Charles D. Luke, Chief
Criticality Branch

DATE: July 8, 1964

FROM : Donald A. Nussbaumer, Chief K.E.L. for
Source & Special Nuclear Materials Branch

SUBJECT: **LETTER DATED JULY 7, 1964 FROM MARTIN CO. REQUESTING AMENDMENT OF SNM-53 TO INCLUDE PARTICLE COATING, EXTRUSION, & HYDROSTATIC PRESSING OF ENRICHED U**
DOCKET 70-58

Please review the subject application from the standpoint of criticality control. The extra copy of the letter may be retained for your files.

Attachment:
As stated above

K.E.L.



Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

A/145

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

MARTIN COMPANY

July 20, 1964

U. S. Atomic Energy Commission
Division of Material Licensing
Washington, D. C. 20545

Attention: Mr. Lyall Johnson

Subject: By Product Material License No. 19-1398-20

Gentlemen:

We request that Martin-Marietta By Product Material License No. 19-1398-20 be amended to permit the measuring of basic spectrum derived from radioactive decay of several radioisotopes and are enclosing a description of the procedures which will be used for this work.

Very truly yours,

C W Keller

C. W. Keller
Nuclear Accountability
& Licensing Representative

CWK/plm

A/146

A DIVISION
MARTI
MARIET

PROPOSED AMENDMENT TO

BY PRODUCT MATERIAL LICENSE 19-1398-20

Use of Radioisotopes:

1. To define and measure the basic spectrum derived from the radioactive decay of radioisotopes.

2. Measure the attenuation of the radiations resulting from radioactive decay by varying thicknesses of shielding type materials.

By Product Materials and Quantities to be Used:

Isotope	Amount	Form
Curium-244	5 mc	Electrodeposited isotope on planchet
Polonium-210	0.06 mc	Electrodeposited or evaporated isotope on planchet
Cesium-137	0.03 mc	Electrodeposited or evaporated isotope on planchet
Promethium-147	0.02 mc	Electrodeposited or evaporated isotope on planchet

Users:

1. M. Kniedler

2. V. Truscello

Place at Which By Product Material Will be Utilized:

Martin-Marietta Corporation, Middle River Plant, Middle River, Maryland. The experimentation will be perfromed primarily in the radioisotopes laboratory previously described in April 4, 1960 submission in connection with By Product License No. 19-1938-20. An updated drawing of the laboratory is included with this submission.

General Procedures:

Prepared sources will be received from off site facilities if available. If preparation at Martin is necessary, useful counting sources will be prepared by electroplating or evaporation of the radioisotopes on appropriate planchets or platinum disks.

Electroplating procedures will be similar to those described in Radioisotopes Techniques by Overman and Clark, Page 194-195. Evaporation techniques similar to those described in Radioisotope Techniques by Overman and Clark, Chapter 5, Page 191.

Unpackaging of all sources or solutions received from off site facilities shall be under the strict surveillance of the Martin Health Physics Section. Primary source containers shall be stored in a secondary metal container in a ventilated facility when not in use. All source preparation at Martin shall be in a hood equipped with an absolute filter, except Curium which will be prepared within an absolute filter equipped glove box. Prepared sources will be checked by Health Physics for removable contamination, and cleaned as required prior to removing them from the preparation area to the counting room. Preparation areas will be decontaminated as required to preclude the transfer of contamination to the laboratory. All transfers of sources from the laboratory to the counting area will be accomplished by use of a closed container. When not in use the sources will be stored in a closed container in a hood ventilated through an absolute type filter. The laboratory facility is equipped with operating area radiation monitors, alpha-beta air particulate monitor and fire detection devices which are connected to a central alarm system.

Health Physics:

Mr. Richard J. Brisson, Supervisor, Health Physics Section is the designated Radiation Protection Officer for the Martin Company. The basic function of the Health Physics Section including related Health Physics information was supplied in the April 4, 1960 submission in connection with By Product Material License No. 19-1398-20 with specific reference to Supplemental Sheets Nos. 1, 2, 3 and 4. Health Physics shall instruct laboratory personnel regarding the precautions to be taken during operations involving the handling of radioactive solutions and sources and shall monitor for alpha, beta, gamma and neutron radiations during source preparation, decontamination, and waste removal. Air samples shall be collected from the laboratory and the laboratory exhaust system and analyzed for alpha and beta radioactivity during the operations.

Radioactive Waste Disposal:

Solid radioactive waste generated during source preparation shall be removed utilizing standard bag out methods. Liquid wastes will be poured into an absorbing media and handled as solids. The waste shall be sealed in a plastic bag and placed in a closed I.C.C. approved waste container for ultimate disposal at an approved disposal site.

RESUME

NAME: Kniedler, M.

POSITION: Engineering Specialist

EDUCATION: Bachelor of Science Washington & Jefferson College - Washington, Pennsylvania Mathematics and Physics

Master of Science West Virginia University Morgantown, West Virginia - Mathematics and Physics

Three years graduate Study at University of Maryland College Park, Maryland - Goal PhD in Nuclear Engineering

TRAINING & EXPERIENCE: University of Maryland formal one year course in Principles of Nuclear Reactor Engineering.

University of Maryland formal one year course in Radioisotope Uses.

Use of Cobalt-60 and Cesium-137 as sealed sources at Martin Marietta Corporation for energy spectrum counting and analysis.

Since 1957 as a member of the Nuclear Engineering Department at Martin Marietta Corporation have developed and supervised the use of codes in connection with the solution of neutron criticality and shielding problems.

RESUME

NAME: Truscello, V.

POSITION: Acting Supervisor

EDUCATION: Bachelor of Science in Mechanical Engineering from Drexel Institute of Technology

Master of Science in Mechanical Engineering from Drexel Institute of Technology

Additional Graduate Study at University of Maryland

TRAINING & EXPERIENCE: Have completed two formal courses at the University of Maryland dealing with the uses of radioactive isotopes including measuring and monitoring techniques, radiation detecting instruments and the biological effects of radiation.

Joined Martin Marietta Corporation in 1959 and have been active in design and development of radioisotope thermoelectric systems, preparation of radioisotope sources, and spectroscopic measurements of several isotopes including Promethium-147, Strontium-90 and Cesium-137.

Have obtained knowledge of the nuclear and biological properties of Promethium-147, Stronium-90, Cerium-144, Cesium-134 & -137 and Curium-242 and -244.

ORNL SITES - SUMMARY

License No.:	SNM-00053	ORNL Score:	70,494
Docket No.:	070-00058		
Licensee:	The Martin Company Isotopes, Inc.	Review Status:	~~File Reviewed~~ Complete MB
Site Address(es):	Middle River, Maryland 110 West Timonium Road Timonium, Maryland 21093		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s):	19-01398-20, 19-01398-32, SNM-00011, SNM-00849, SNM-00907, SNM-01150, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		

Review Abstract: License No. SNM-00053 authorized the possession of special nuclear material in Building D at Middle River, Maryland and at Timonium, Maryland. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.

Licensee, NRC, and Maryland State surveys indicate that the Timonium site is suitable for unrestricted use.

Recommendations: NONE

Summary: License No. SNM-00053 authorized possession and use of up to 1,000 kilograms of uranium enriched in U-235 as UO_2 and metal and 160 grams of plutonium in the form of a plutonium-beryllium source. Licensed activities included fuel element development and fabrication at the Middle River facility. On September 23, 1969 License No. SNM-01150 was issued pursuant to an amendment to License No. SNM-00053 to permit the transfer and use of up to 100 grams of U-235, at any enrichment and in any chemical form, for research and development activity, and 171 grams of Pu-235 for neutron and alpha instrument calibration sources, from the Middle River facility to the Timonium facility. Concurrently, SNM-00053 was amended in its entirety to authorize the storage of U-235 in the form of contamination in Building D at Middle River. License No. SNM-00053 (Teledyne-Isotopes) was terminated May 26, 1970. There is no termination or confirmatory survey for License No. SNM-01150.

A/291

March 10, 1995

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License Nos. SNM-1192 and SNM-01150 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Licensee letter dated March 25, 1975 documents a survey of the Timonium site consisting of 67 wipes and a portable instrument alpha/beta/gamma survey of "all areas that had been subject to use of radioactive materials" which identified no residual contamination. An NRC letter dated April 15, 1975 of an inspection to confirm disposition of license material under License No. SNM-0849 and an examination of the licensees contamination survey reported that "no items of noncompliance were observed". The State of Maryland terminated License MD-05-014-01 (formerly USNRC License No. 19-01398-34) covering the whole site after performing a confirmatory survey on July 19, 1993 of the licensee's termination survey of June 8 and 9, 1993. The site is suitable for unrestricted use.

Reviewed by: Stephen W Holmes **Date** 10 MARCH 95

Approved by: Joel D Kramer **Date** 3/10/95

ORNL SITES - SUMMARY

License No.:	SNM-01150	ORNL Score:	23
Docket No.:	070-01211		
Licensee:	Isotopes, Inc.	Review Status:	Complete NRB ~~File Reviewed~~ **File located with SNM-00053**
Site Location(s):	110 West Timonium Road Timonium, Maryland 21093		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related Licenses:	19-01398-20, 19-01398-32, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01192, STB-00187		
NRC Reviewer:	David F. Limroth, Stephen W. Holmes		
Review Abstract:	License No. SNM-01150 authorized the transfer and use of small amounts (grams) of special nuclear material from Building 'D' of the Middle River facility to the Timonium facility. There is no termination or confirmatory survey under this license number. Licensee, NRC, and Maryland State surveys indicate that the Timonium site is suitable for unrestricted use.		

Recommendations: NONE

Summary: License No. SNM-01150 was issued September 23, 1969 pursuant to an amendment to License No. SNM-00053 to permit the transfer and use of up to 100 grams of U-235, at any enrichment and in any chemical form, for research and development activity, and 171 grams of Pu-235 for neutron and alpha instrument calibration sources, from the Middle River facility to the Timonium facility.

The license information for License No. SNM-01150 is docketed with License No. SNM-00053. There is no termination or confirmatory survey for this license.

Licensee letter dated March 25, 1975 documents a termination survey of the Timonium site consisting of 67 wipes and a portable instrument alpha/beta/gamma survey of "all areas that had been subject to use of radioactive materials" which identified no residual contamination. An NRC letter dated April 15, 1975 of an inspection to confirm disposition of license material under license SNM-0849 and an examination of the licensee's contamination survey reported that "no items of noncompliance were observed". The State of Maryland terminated License No. MD-05-014-01 (formerly USNRC License No. 19-01398-34), covering the whole site, after performing a confirmatory survey on July 19, 1993 of the licensee's termination survey of June 8 and 9, 1993 which encompassed the entire facility. The site is suitable for unrestricted use.

Reviewed by: Stephen W Holmes **Date** 10 March 95

Approved by: _____ **Date** 3/10/95

ORNL SITES - SUMMARY

License No.:	SNM-01192	ORNL Score:	0.57
Docket No.:	070-00058		
Licensee:	Martin Marietta	Review Status:	**Complete**
Site Address(es):	Middle River, Maryland		
Site Contact:	none		
Telephone No.:	none		
SDMP Site:	no		
Related License(s):	19-01398-20, 19-01398-32, SNM-00011, SNM-00053, SNM-00849, SNM-00907, SNM-01150, STB-00187		
NRC Reviewer:	David F. Limroth, Stephan W. Holmes		
Review Abstract:	License No. SNM-01192 was issued for the decontamination of Building D at the Middle River facility. The report of a final survey of Building D in 1970 indicates that some contamination remained in drains and on surfaces. The building was demolished following that survey. In 1982 Region I staff concluded that the site met the current criteria for release for unrestricted use. The results of a NRC site visit and survey on November 3, 1994 indicate that the site is suitable for unrestricted use.		
Recommendations:	None.		

Summary: License No. SNM-01192 was issued for the decontamination of Building D at the Middle River (Chesapeake Park) facility. Operations authorized under various licenses had been conducted at this location.

Information from various docket files indicates that a variety of activities with large amounts of byproduct, source, and special nuclear material were authorized at Building D at the Middle River facility. Activities with licensed material at Building D ceased prior to 1970. License No. SNM-1192 was issued to Martin-Marietta on May 22, 1970 and authorized the decontamination of the Martin-Marietta, Middle River, Maryland facility. License No. SNM-1192 has the same Docket No. (70-58) as License No. SNM-53 and all records for License No. SNM-1192 are contained in the docket file for License No. SNM-53. Apparently only Building D was decontaminated under License No. SNM-1192. Building D was decontaminated from June to September 1970 and a final survey report provided to the AEC with a letter dated September 22, 1970. The final survey report states that a total of 29 μCi of U-235 remained in five drains which were to be were sealed with concrete; one small area of fixed Sr-90 contamination (0.5 mrad/hr) also remained. The building was demolished after the survey, leaving only the concrete pad. Region I staff reviewed the available documentation in 1982 and concluded in Combined Inspection Report Nos. 40-3296/82-01 and 40-2308/82-01 that the site met NRC criteria for unrestricted use.

An NRC site visit and survey was performed on November 3, 1994 to assure that the

site meets current NRC guidelines for release for unrestricted use. Buildings C and D at the Middle River facility and Buildings KJ and KC at the Martin State Airport were surveyed. The results of the surveys indicate no radiation or contamination levels above background in any of the buildings surveyed, including the concrete pad remaining from Building D. The contaminated drains discussed in the final survey report regarding Building D were not located, although a number of openings in the pad which had been filled with concrete were identified. Therefore, it seems apparent that the drains identified as contaminated during the final survey were plugged with concrete, as proposed by the licensee. Based on the fact that no radiation or contamination levels above background were detected, it seems unlikely that U-235 contamination in the drains, if present, is a significant hazard. Therefore, the site is suitable for unrestricted use.

Reviewed by: _____ **Date** 1/22/95

Approved by: _____ **Date** 1/23/95

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

William Donald Schaefer
Governor

Robert Perciasepe
Secretary

August 2, 1993

Mr. John Vogt, Radiation Safety Officer
Teledyne Energy Systems
10707 Gilroy Road
Hunt Valley MD 21031

RE: Radioactive Material License Number MD-05-014-01

Dear Mr. Vogt:

On July 19, 1993 the Maryland Department of the Environment's Radiological Health Program completed a confirmatory radiological close-out survey of your facility which is authorized under the above referenced license and located at 110 W. Timonium Road in Timonium, Maryland.

Results of this survey indicate that this facility meets the Department's requirements for future unrestricted use. Should there be any questions concerning this letter, please contact Mr. Raymond Manley or me, at (410) 631-3301.

Sincerely,

Raymond E. Manley Jr.

Carl E. Trump, Jr., Administrator
Radioactive Materials Inspection and Enforcement

CET/REM/dpn

7/6/93 JFV

TELEDYNE
ENERGY SYSTEMS

110 W. TIMONIUM RD.
TIMONIUM, MD 21093-3163
PHONE: (410) 252-8220
TELEX: 8-7780 (TDYENER TIMO)
FAX: (410) 252-5514

6 July 1993
Refer to: RSO-JFV-066

RECEIVED

JUL 7 1993

RADIOLOGICAL
HEALTH PROGRAM

Mr. Carl Trump
Radiation Health Program
Department of the Environment
State of Maryland
2500 Broening Highway
Baltimore, Maryland 21224

Subject: BYPRODUCT LICENSE NO. 05-014-01

Dear Mr. Trump:

Enclosed is the report of the survey conducted to support our request for termination of the subject license.

As I mentioned in my first letter to Mr. Flynn, our plans are to vacate the Timonium facility at the end of this month. If additional information is required, please let me know.

Sincerely,

John F. Vogt
Radiation Safety Officer

JFV:dh

Enclosure: JSB letter dated June 30, 1993, enclosing "Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093"

Mr. John Vogt
Radiation Safety Officer
Teledyne Energy Systems
110 W. Timonium Road
Timonium, MD 21093-3163

June 30, 1993

RE: Results of Radiological Survey of Teledyne Facility
Located at 110 W. Timonium Road, Timonium, MD

Dear Mr. Vogt:

Please find enclosed the report on the results of the radiological survey I performed at your facility on June 8th and 9th, 1993. If you require any editorial changes to the report please let me know as soon as possible.

As I mentioned during our telephone conversation, the issue of the need for a Maryland license to perform surveys appears to be resolved. If you have any questions about the report please do not hesitate to call me. I can be reached at (215) 873-9464. Thank you again for choosing JSB Associates for your radiological consulting needs.

Sincerely,

Joseph W Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant
J. Stewart Bland Associates, Inc.

ATTACHMENT: Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093

Mr. John Vogt
Radiation Safety Officer
Teledyne Energy Systems
110 W. Timonium Road
Timonium, MD 21093-3163

June 15, 1993

RE: Results of Radiological Survey of Teledyne Facility
Located at 110 W. Timonium Road, Timonium, MD

Dear Mr. Vogt:

At the request of your firm, I performed a third party independent radiological survey of the Teledyne facility located at 110 W. Timonium Road, Timonium, MD on June 8th and 9th, 1993.

The extensive direct radiation measurements made at the facility with field instrumentation and analysis of the numerous swipe samples by sensitive laboratory instrumentation confirm that no licensed radioactive materials are detectable above the ambient background level. This being the case, the facility has met the free release criteria as described in NRC Regulatory Guide 1.86, Table I by a wide margin of safety and is therefor suitable for occupation by another leaseholder.

This facility close-out survey was authorized by Teledyne Energy Systems under purchase order 28900 dated May 27, 1993.

All instrumentation used was calibrated under the program authorized by the State of Maryland Department of the Environment license # MD-33-021-01.

I hereby state that I am a Heath Physicist Certified by the American Board of Health Physics with extensive experience in the area of industrial facility contamination assessment and decontamination and am therefor adequately qualified to perform this building close-out survey.

Sincerely,

Joseph W Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant
J. Stewart Bland Associates, Inc.

ATTACHMENT: Close-out Survey of the Teledyne Energy Systems Facility at 110 W. Timonium Road, Timonium, MD 21093

CLOSE-OUT RADIOLOGICAL SURVEY OF THE TELEDYNE ENERGY SYSTEMS FACILITY AT 110 W. TIMONIUM ROAD, TIMONIUM, MD 21093

Prepared by:

Joseph W. Moon, CHP

J. Stewart Bland Associates, Inc.

June 30, 1993

CLOSE-OUT RADIOLOGICAL SURVEY OF THE TELEDYNE ENERGY SYSTEMS FACILITY AT 110 W. TIMONIUM ROAD, TIMONIUM, MD 21093

1.0 HISTORICAL PERSPECTIVE AND APPROACH

Only two radionuclides were historically present at the facility. These radionuclides were strontium-90 (Sr-90) and plutonium-238 (Pu-238). Sr-90 was received at the facility already loaded into thermo-electric devices to be performance tested. The actual sealed sources in these devices were never removed from the devices. Pu-238 was received only as sealed sources under Department of Energy (DOE) authorization for loading into thermo-electric devices. The loading of these sources was performed within a glove box containment structure with full radiological control practices applied. At the time these operations were terminated, the containment was shipped to Mound Laboratory. The former Pu-238 containment filtration/exhaust system was renovated to fit a new "glove box" when the old containment structure was removed. At that time all filtration elements were exchanged. The areas of the building where Pu-238 activities had been conducted were surveyed by Teledyne Energy Systems personnel and were found to be free of contamination. All of the thermo-electric devices of both types have been transferred to end users and none remain at the facility.

The licensed radioactive material retained on site consists of sealed sources used for the calibration of radiological survey instrumentation, and a variety of check sources used for the same purpose under the existing license. The integrity of these sources is assured under the licensee's source inventory control program and all of these sources will be either disposed of or transferred to another licensee prior to vacating the current building. With regard to the remaining licensed sources, the scope of this survey has only addressed the possibility of facility contamination around the source storage locations as identified by the facility Radiation Safety Officer. There are various articles (2% thoria welding rods and items composed of magnesium-thoria metal) at the facility containing various amounts of naturally occurring thorium that is not subject to licensed regulation (< 5% thoria) but are nevertheless radioactive. Each of these articles has been identified and will be removed prior to vacating the premises. The close-out survey verified that each of these articles effectively contained the naturally occurring activity such that there is not a possibility that residual radioactive material will remain in the facility when these articles are removed.

It was impractical to dismantle the piping of the old Pu-238 containment exhaust system as it was still in use at the time of the survey. The internal surfaces of this piping were not included in the scope of this survey. Although unlikely considering that only sealed sources were handled, the internal surfaces of this piping below the High Efficiency Particulate Absorber (HEPA) filters are still potentially contaminated. These sections of the piping will be isolated disassembled and removed prior to vacating the premises.

The approach taken for this close-out survey did not assume credit for anticipated conditions but was conducted as though contamination was expected to be present at some detectable level. The scope of the final close-out survey encompassed the entire facility and not just those areas where radioactive sources were handled.

2.0 SELECTION OF SURVEY INSTRUMENTATION

The instrumentation used for this survey was selected specifically for its capacity to detect the radionuclides historically handled at the facility (Pu-238, and Sr-90) but was also suitable to detect naturally occurring thoria compounds. All instrumentation used was calibrated under the program authorized by the State of Maryland Department of the Environment license # MD-33-021-01. Each field survey instrument was source checked both prior to and following use to assure they were properly functioning during the survey. Background readings for each of the instruments used were also determined and recorded. The following is a listing of the field survey instrumentation used to perform this survey.

- Alpha: Ludlum 50 cm^2 zinc-sulfide detector (Model 43-1 Serial Number 020791) attached to a Ludlum count rate meter (Model 3 Serial Number 91842). Calibration Date: 6/3/93
  Efficiency for Pu-238 5.5 MeV alpha - 33% determined by calibration with Am-241 (5.49 MeV)
  Sensitivity: 60 dpm/100 cm^2 fixed contamination
  10 dpm/100 cm^2 loose surface on 300 cm^2 swipe
  Reg. Guide 1.86 Criteria: 200 dpm/100 cm^2 ave. fixed
  300 dpm/100 cm^2 max. fixed
  20 dpm/100 cm^2 loose surface

- Beta/Gamma Bicron Surveyor count rate meter (Serial Number AHS-A198A) with standard 17 cm^2 GM Pancake Probe detector (Serial Number 2081)
  Calibration Date: 5/18/93
  Efficiency for Sr/Y-90 Beta particles - 46%
  Sensitivity (@ equilibrium): 10 dpm/ probe area (60 dpm/100 cm^2)
  Reg. Guide 1.86 Criteria: 5000 dpm/100 cm^2 fixed
  1000 dpm/100 cm^2 loose surface

- Gamma Background Victoreen Pressurized Ion Chamber (Model 450 P/Serial Number 583)
  Calibration Date: 2/24/93
  Sensitivity: 10 μR/hr nominal
  Reg. Guide 1.86 Criteria: None

Remote instrumentation used for swipe analysis in off site laboratory

(RSO, Inc., Laurel, MD)

- Liquid Scintillation counter set-up for Am-241 alpha Beckman LS-6000
  Sensitivity: 50 dpm/swipe area

- Gas Flow Proportional counter (Baird Atomic Model SSC-3)
  10 minute counts (nominal efficiency 46% for Thorium-230 alpha 2 pi geometry)
  Sensitivity: < 10 dpm/swipe area

3.0 SURVEY PLAN

The basis of the survey plan was determined by the nature of operations at the facility. A semi-biased survey was warranted since only sealed sources were handled at the facility with full source inventory and contamination controls in place during operations.

Prior to the initiation of the survey, instrument operability checks (e.g. battery checks and source checks where appropriate) were performed and instrument background readings were made in an area not suspected to be affected by former facility operations.

The criteria used for determining suitability for unrestricted use is that specified in Nuclear Regulatory Commission Regulatory Guide 1.86 unless otherwise specified by the concerned regulatory authorities.

3.1 Preliminary Survey

A preliminary survey was performed and was focused on the areas most likely to contain radioactive contamination from licensed operations conducted at the facility. The purpose of this focus was to determine at an early stage of the survey work the worse case radiological conditions that would be encountered at the facility should any residual radioactivity be detected. The preliminary survey entailed a detailed survey of seven designated "Radioactive Material areas" areas (R.A.M.) identified by the facility Radiation Safety Officer (Mr. John Vogt). In addition, the scope of the preliminary survey included a moderately conservative assessment of the entire former source security control area (the effective Radiological Control Area).

The nature of the seven designated R.A.M. was described as follows:

Area 1 White Room - A room used for the preparation of device subassemblies. Some radioactive Material is known to have been in this room and therefor it was designated as a primary survey area.

Area 2 — Pu-238 Device Assembly Area (Submarine Room) - The Pu-238 sealed sources were loaded into the thermo electric devices inside a containment structure known as the "submarine" located in the room. The containment was maintained under negative pressure by a ventilation system having HEPA filters in line prior to the roof discharge vents. Access and contamination controls were in place during these operations.

Area 3 — Facility Security Vault - The vault located in the administrative area contains a triply contained vessel containing approximately 740 grams of thoria. The container was opened and the integrity of the internal packaging was verified. The area was surveyed solely due to the presence of this material currently in the vault.

Area 4 — Pu-238 Source Storage Area - This area was controlled under heavy security during operations and contained all Pu-238 sealed sources not yet assembled into devices. The area is currently in use as a high security storage area and also contains the 1 mCi Radium source used for instrument calibration.

Area 5 — Pu-238 Source Testing and Measurement Area - This area is basically a floor space designated for the use of testing and measurement of the Assembled devices. The devices were lifted from a pedestal by and overhead crane where they were tested and measured while suspended above the floor.

Area 6 — Strontium Device Testing Area - This area is a sunken truck bay with a roll-up door access to the east end of the facility. The assembled Strontium devices were placed in the truck bay, tested and then repackaged for shipment all in the same area. No strontium containing devices were ever disassembled at the facility.

Area 7 — Source Storage Locker - This area is a locked file cabinet containing various check sources for use with the facility radiation detection instrumentation.

If the results of the preliminary detailed surveys in the seven designated R.A.M. areas and the conservative survey of the remainder of the former source security area did not indicate the presence of residual radioactive material, there would be little probability that the rest of the facility would have been adversely affected by the licensed operations. The survey plan for the rest of the facility would only be cursory in nature with several direct measurements and smears being assessed by field counting in each room or general activity area. The measurements taken in these areas would be focused on high traffic areas where it is likely that contamination, if spread to other sections of the facility, would be present in detectable quantities (see section on survey techniques).

The general plan for those areas designated as RAM locations include an initial gamma background rate measurement followed by local instrument background determinations for the other survey instruments. A detector window integrity test for the zinc sulfide α instrument would the be performed by holding the detector up to a source of fluorescent light. An increase in the background rate would indicate a loss of window integrity and the use of the instrument.

Randomly selected locations on horizontal and vertical surfaces in the rooms with areas of 100 cm^2 would then be measured directly with field instrumentation. At each location where the initial direct measurement is in excess of the background level, the measurement will be recorded. A swipe of each area would then be made to assess the levels of loose contamination on the surface. These swipes would be set aside for a period of 4 hours to allow for the decay of naturally occurring radionuclides (e.g. Radon progeny). After the decay period each swipe would be measured for alpha and beta contamination in a location that is not expected to have been affected by facility operations. A direct measurement of the surface would be made after the swipe was obtained to assess the level of fixed contamination at the location. If the results of any of the surveys presented evidence of unanticipated contamination above the surface contamination release guidelines (NRC Reg. Guide 1.86 criteria) at any of the measured locations, this would be an indication that further assessment would be required to allow a statistical characterization of the areas containing detectable activity. Swipes of the areas would be counted in either a proportional counter (set up for the detection of alpha particle emissions after a minimum decay period of 24 hours) or a liquid scintillation counter set up for the measurement of Pu-238 α emissions. Some portion of the population of swipes taken would be assessed by the proportional counter and some taken near the same locations will be assessed by liquid scintillation counting as a qualitative cross check of instrument reliability. Whereas the sensitivity of the hand held α detector is greater than that of either of the two laboratory instruments, the measurement of large area swipes (not a suitable media for assessment in the lab counters) using this field instrument was considered to be an acceptable alternative to exhaustive swipe collection and analysis if no measurable α activity could be found by direct measurements. Even in the case that no detectable activity would be discovered by field instrumentation on large area swipes, a suitable number of swipes will be analyzed by the laboratory instrumentation to document the status of the targeted R.A.M. areas.

If any of the "RAM" areas were found to be contaminated, a full survey would be performed to characterize the area and any affected adjacent areas until the full extent of the contamination could be determined. If no detectable contamination was found in the "RAM" areas the survey of the adjacent room will focus on common traffic patterns for personnel carrying radioactive material.

Following the surveys instrument operability checks will be repeated to demonstrate operability at the end of the survey.

TELEDYNE
ENERGY SYSTEMS

DATE: 7/19

TO: RAY MANLEY

FOR:

☐ ACTION ☐ COMMENT ☐ INFORMATION ☐ SIGNATURE

ATTACHED IS THE DOC-
UMENTATION YOU REQUESTED.
PLEASE CALL ME @
771 8606 IF YOU
HAVE ANY QUESTIONS.

THANKS

J. F. VOGT

3.2 Contingencies and Extended Survey Work

The nature and extent of any additional survey work required (characterization) would only be apparent when the results of the preliminary survey are known.

If long-lived alpha contamination was detected at the facility, provisions for the assessment of samples by alpha spectroscopy could be made to positively identify the contaminant as Plutonium-238.

Extended survey work necessary for the characterization of the contamination in the facility would be performed along the guidelines provided by the Nuclear Regulatory Commission. This type of survey was recommended (NUREG/CR 2082 1981) to document that a facility can be released to perform operations not involving the use of radioactive material and would require a much more extensive framework of area mapping and characterization. This extensive type of survey is meant to be used to document the effectiveness of a decontamination effort when it is known that a facility was at one time contaminated. The focus of the preliminary survey is to demonstrate that the facility has never been contaminated with the material it was licensed to handle.

Areas above any suspended ceilings and inside ventilation duct work would need to be assessed should any unanticipated contamination be found. Access to these areas and other normally inaccessible areas of the facility would be required in this unlikely circumstance.

4.0 SURVEY RESULTS AND SPECIALIZED SURVEY TECHNIQUES

The extensive direct radiation measurements made at the facility with field instrumentation and analysis of the numerous swipe samples by sensitive laboratory instrumentation confirm that no licensed radioactive materials are detectable above the ambient background level. This being the case, the facility has met the free release criteria as described in NRC Regulatory Guide 1.86, Table I by a wide margin of safety and is therefore suitable for occupation by another leaseholder.

Standard radiological survey techniques were employed to avoid cross contamination of swipe samples and to make direct measurements of surface activity (< 0.5" from surface without contact). Initially, small area tack cloth swipes (300 cm^2) of the targeted R.A.M. were taken and measured for both α and β/γ with the field instrumentation to assess the status of an area. These small area swipes would be appropriate in the event an area was found to be contaminated requiring detailed characterization of the distribution of activity on room surfaces. When no detectable radioactive material was found by direct measurements or on the small area tack cloth swipes, large area swipes (> 500 cm^2) were taken of the areas. In all cases these large area swipes were also found to be free of any detectable radioactive material.

The process of collection and analysis of large numbers of swipes (for area characterization) on media suitable for analysis by proportional counter and by liquid scintillation counting in this situation seemed pointless. A suitable number of these type of swipes were then taken in each area to verify the findings of the field instrument assessments and to provide a representative number of measurements of each area to allow an assessment of the radiological conditions in the unlikely event that the field instrument readings were faulty. All of these swipe samples were also measured for detectable α and β/γ activity prior to being sent to the laboratory for analysis. None of these swipe samples contained any activity detectable with the field instrumentation.

Other survey techniques employed for this survey involved measurements of locations in the facility where radioactive materials if present would have been concentrated. Specifically, drain traps, subfloor piping recesses, surfaces above suspended ceilings, room air exhaust duct work and associated air filtration support members were surveyed. In addition, work station vacuum cleaners, grime accumulations on old fan blade shields, and fume hood exhaust plenums were measured as areas where if loose surface contamination by licensed radioactive material had been present at any time it would be unlikely that these areas would have been affected by subsequent decontamination efforts. No evidence of residual licensed radioactive material was found in any of these locations

The majority of the floor surface of the former source security area including the workshop, shipping and receiving areas, tool cribs and material storage areas was unsealed concrete. Tack cloth was used to acquire large area swipes on these surfaces. No detectable activity either α or β/γ were detected on any of these swipes. On this type of surface, loose surface activity, if present, would have accumulated in corners and in cracks and crevices in the flooring. Extraction of some of this material from crevices and direct measurement of this material with field instruments would reveal the presence of historical facility contamination if it had been present. No evidence of licensed radioactive material was found in the crud residue excavated from these recesses or on any of the direct measurements made along these crevices.

The horizontal and vertical surfaces of all laboratories where radioactive material was present during facility operations were assessed by direct measurements and by swipe samples for the presence of residual activity. Where new surfaces had been applied since the cessation of radiological operations , the original surfaces were sought out and assessed. No evidence of residual licensed radioactive material was found in any of these measurements.

In the administrative areas of the facility, measurements of large area tack cloth swipes taken along major foot traffic patterns and in the relatively inaccessible areas below the stairwells did not indicate the presence of any residual contamination. Direct measurements of the areas along the bases of the walls and in corners where routine cleaning efforts were noticeably ineffective were also found to be free of residual

radioactive material. In areas where carpeting was installed, direct measurements of high traffic areas indicated by carpet wear, accumulations of sticky grime embedded into carpet fibers, and lower door closure recesses were assessed with no positive indications found.

None of the direct measurements of gamma background made with the pressurized ion chamber in any part of the facility (administrative or security areas) were in excess of 25 μR/hr with most of the measurements falling within the 10 to 20 μR/hr range.

The attached survey maps detail the survey work done in the six primary designated R.A.M. areas. On the maps of areas 1 and 2, the locations where the small area tack cloth wipes were taken are not indicated as they would unnecessarily clutter the diagram and interfere with the documentation of the locations where the proportional and liquid scintillation counter swipes were taken. No small area tack cloth swipes were taken in area 5 where large area swipes were used for the initial assessment. No map is attached for area 7 due to the small area involved. No fixed or loose surface activity was detected on any of the surfaces adjacent to this area (current source storage locker).

Survey performed by:

Joseph W. Moon, CHP

Joseph W. Moon, C.H.P.
Senior Consultant,
JSB Associates, Inc.

ATTACHMENTS: Six Survey Maps

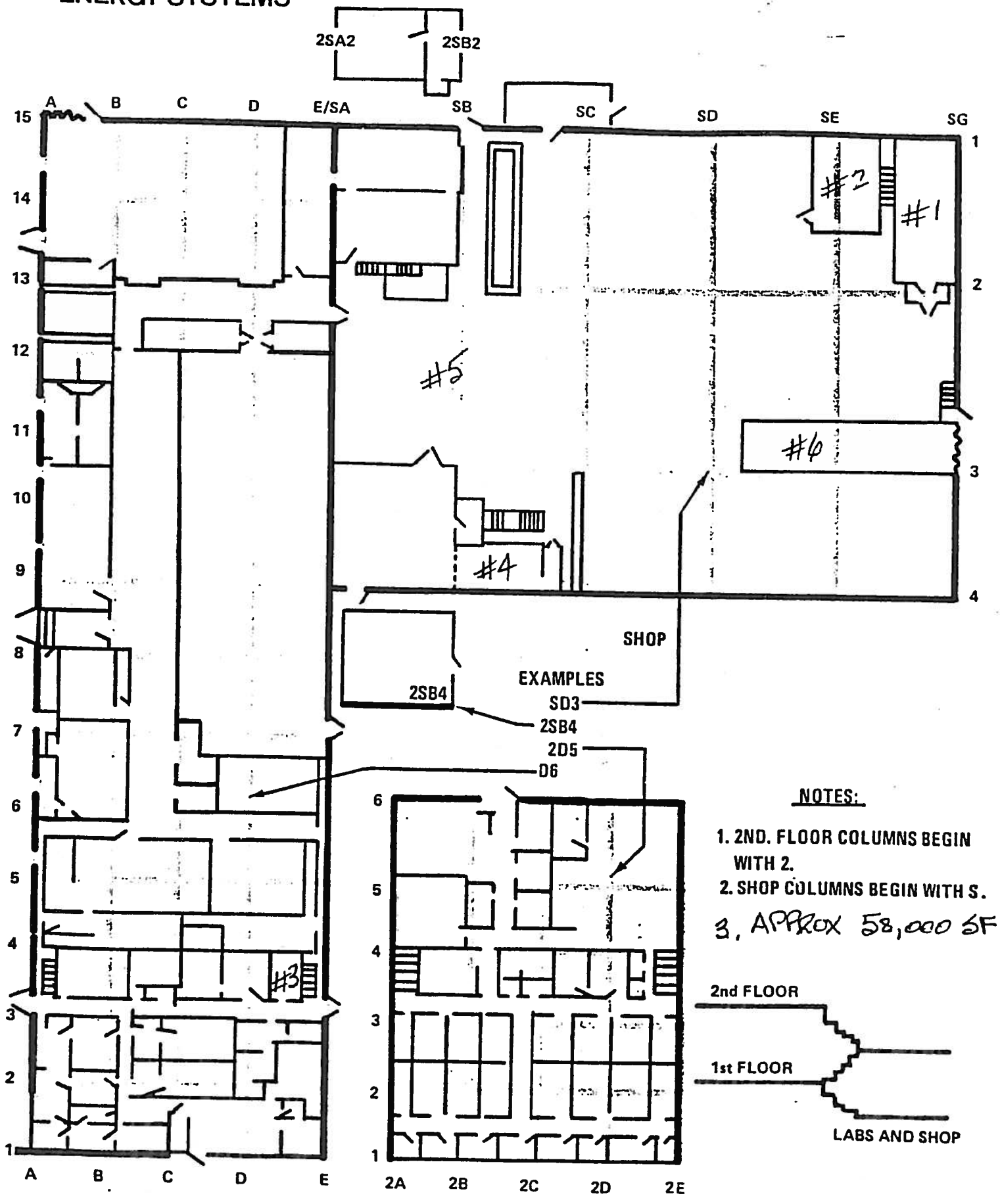
Facility Layout Diagram

Results of Laboratory Analysis of the Swipe Samples performed by RSO, Inc. Maryland Department of the Environment License # MD-33-021-01.

Three Calibration Certificates for Field Instrumentation

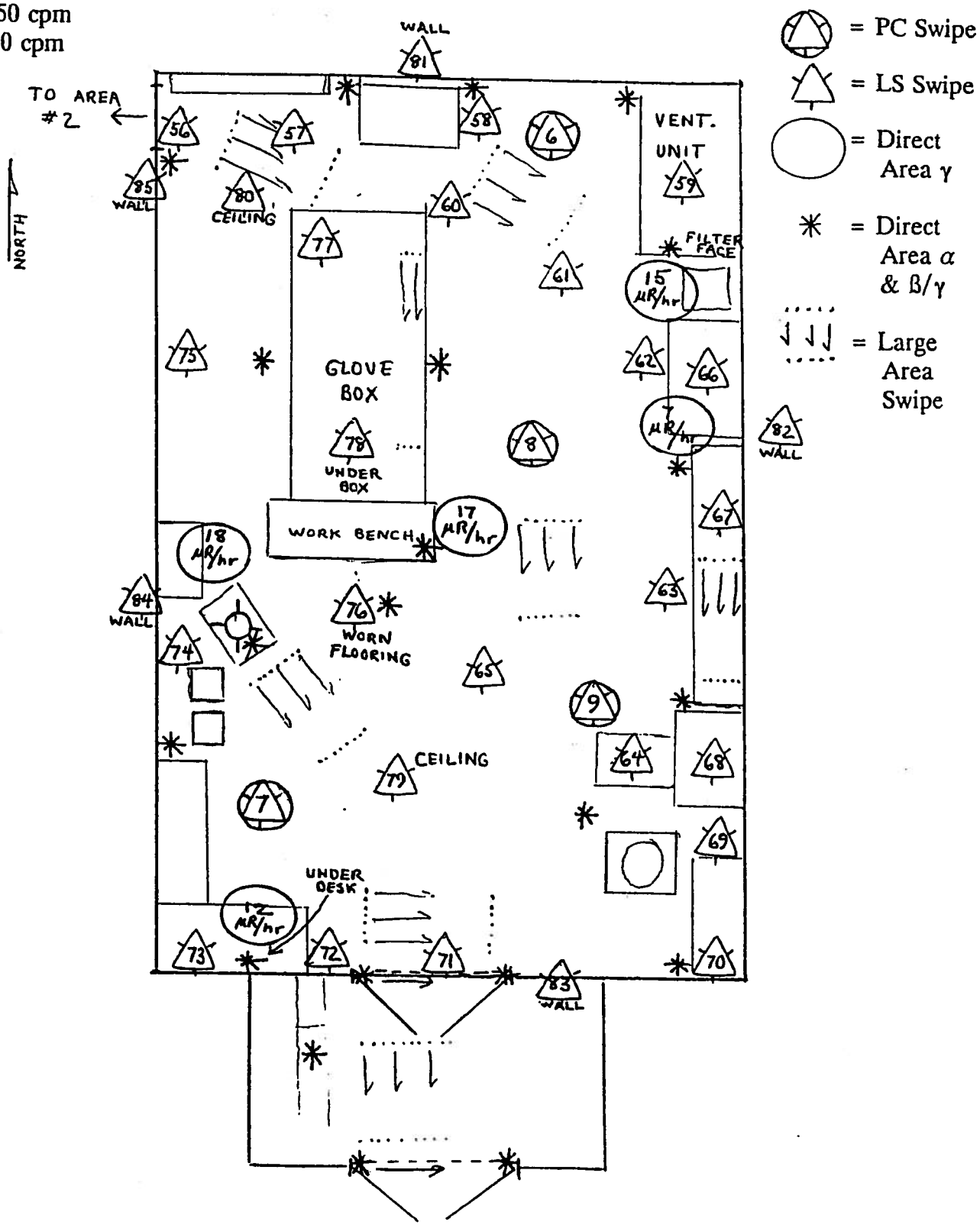
TELEDYNE
ENERGY SYSTEMS

BUILDING COLUMN GRID



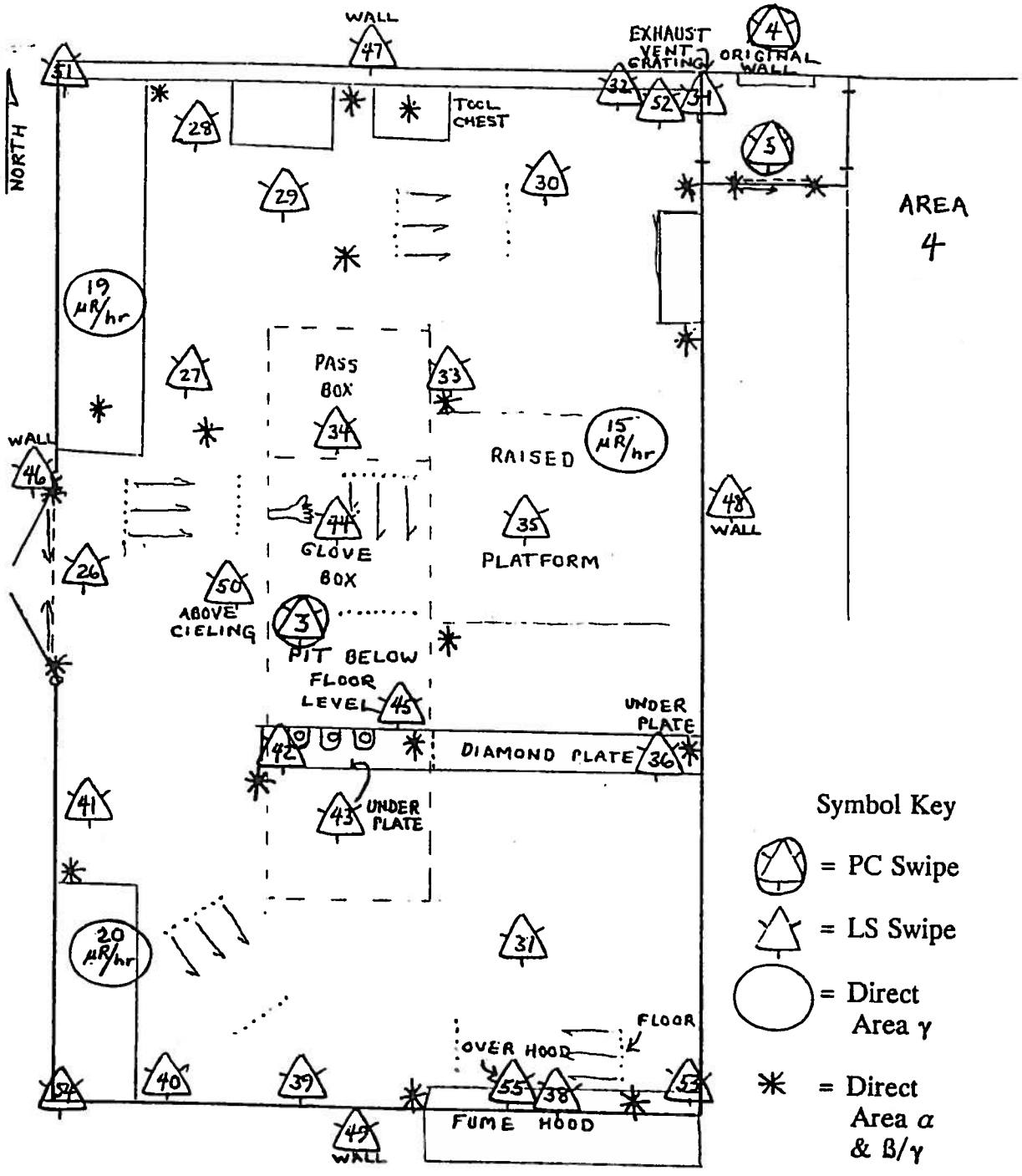
AREA 1 - White Room

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



AREA 2 - Pu-238 Device Assembly Area

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



Symbol Key

= PC Swipe

= LS Swipe

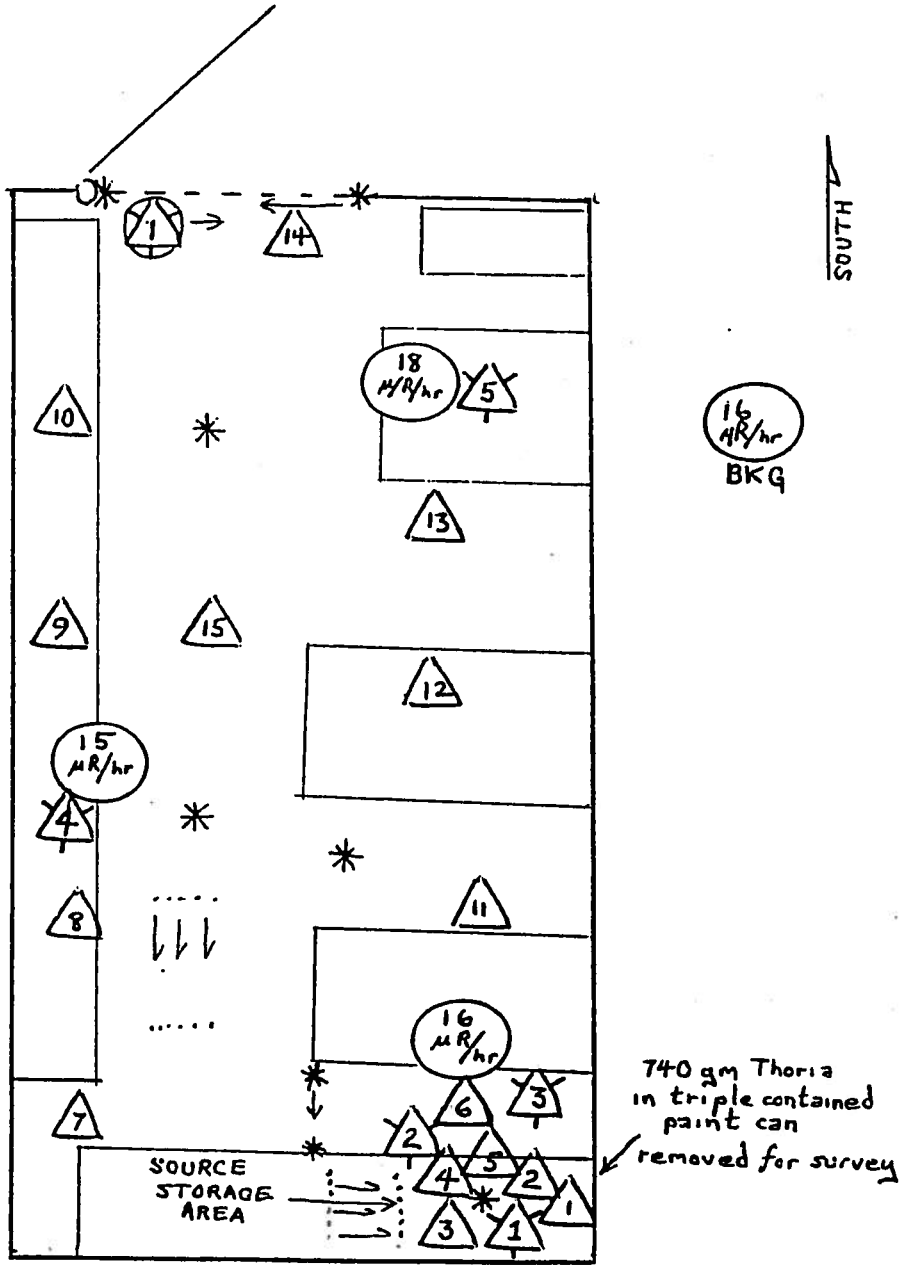
= Direct Area γ

= Direct Area α & β/γ

= Large Area Swipe

AREA 3 - Facility Security Vault

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



Symbol Key

= PC Swipe

= LS Swipe

= Direct Area γ

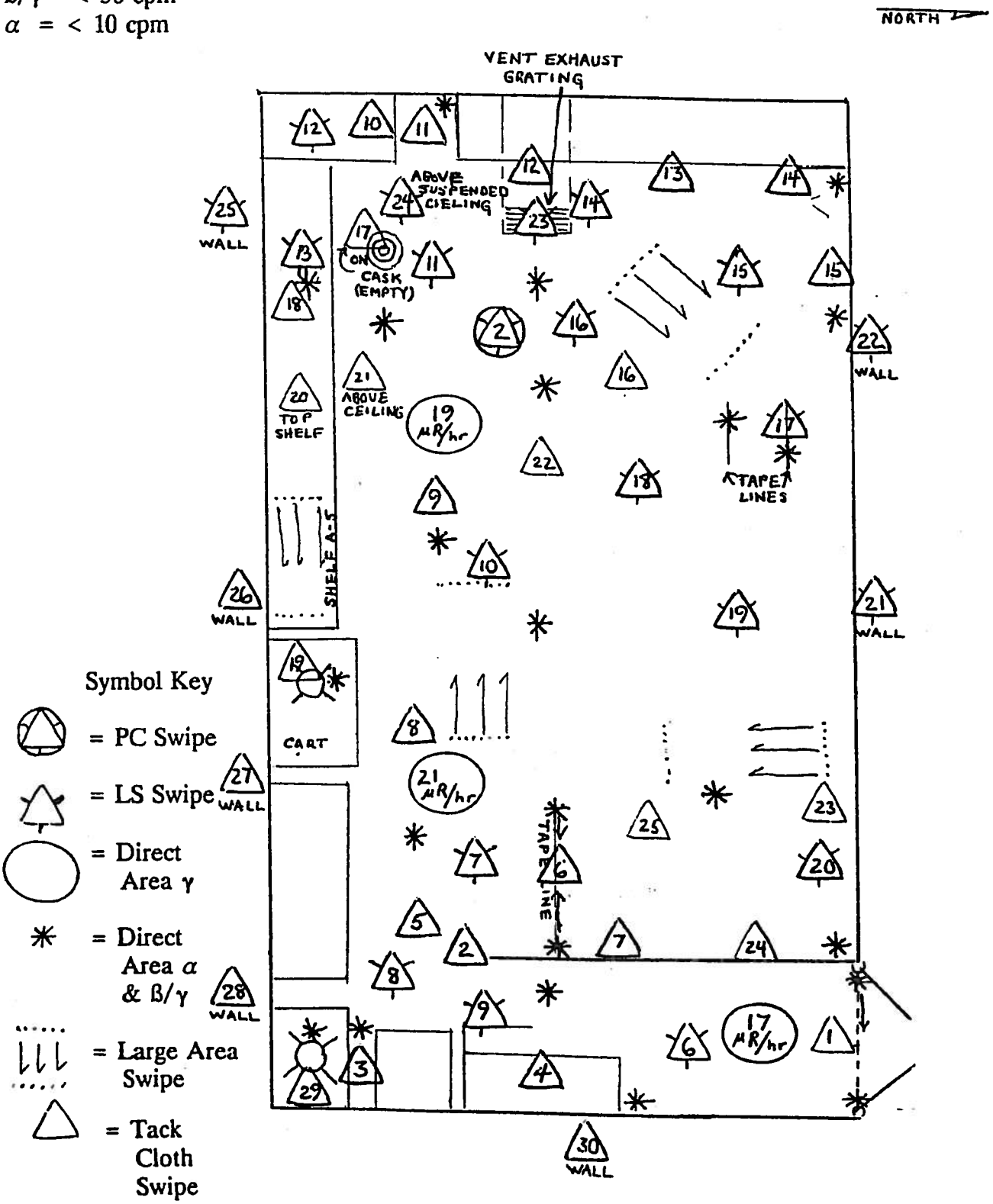
= Direct Area α & β/γ

= Large Area Swipe

= Tack Cloth Swipe

AREA 4 - Pu-238 Source Storage Area

Instrument Background Levels
γ = < 20 μR/hr
β/γ = < 50 cpm
α = < 10 cpm



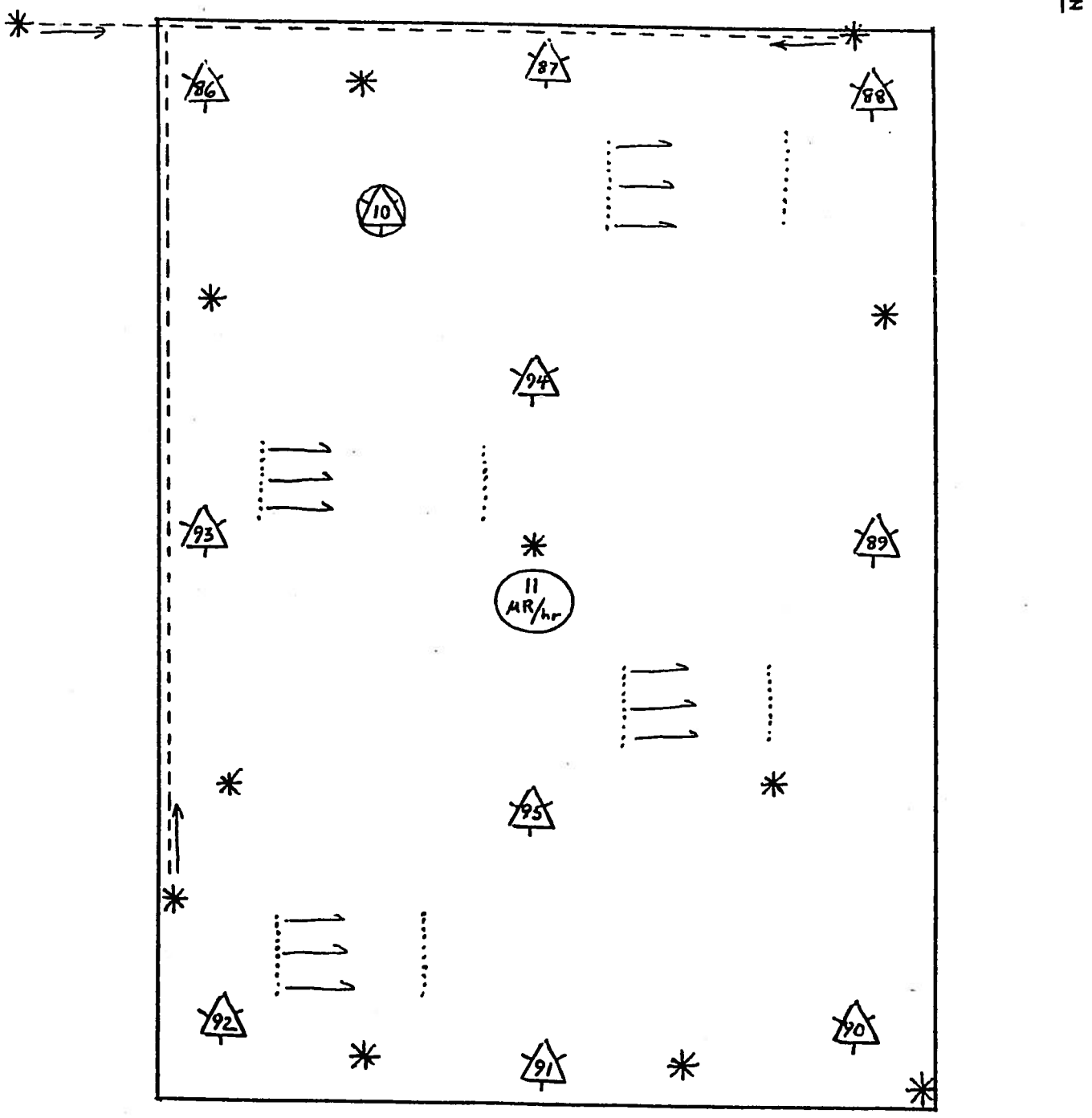
AREA 5 - Pu-238 Source Testing and Measurement Area

Instrument Background Levels
γ = < 20 μR/hr
ß/γ = < 50 cpm
α = < 10 cpm

Symbol Key

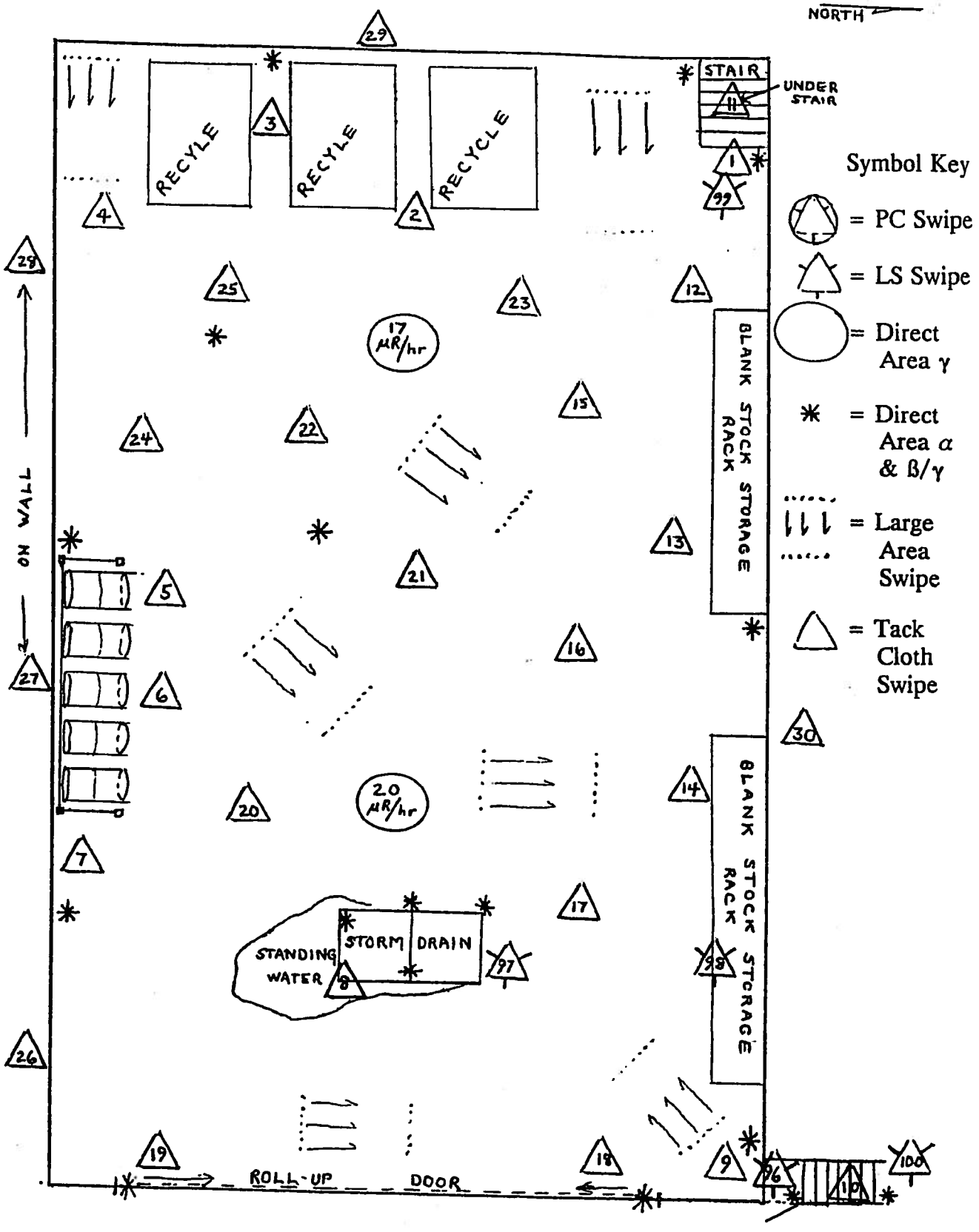
= PC Swipe = LS Swipe = Direct Area γ

= Direct Area α & ß/γ = Large Area Swipe



AREA 6 - Strontium Device Testing Area

Instrument Background Levels
γ = < 20 μR/hr
ß/γ = < 50 cpm
α = < 10 cpm



RSO, Inc.

Radiation Service Organization

June 11, 1993

Joe Moon
J. Stewart Bland Associates, Inc.
133 Defense Highway, Suite 208
Annapolis, MD 21401

Dear Mr. Moon,

Thank you for choosing RSO, Inc. to provide you with radioanalytical services. The results for the 110 samples you recently delivered to our laboratory are summarized below.

The 100 paper wipes were analyzed using a Beckman LS6000 Liquid Scintillation Counter (LSC). The counter was properly calibrated and standardized to identify the alpha emissions of Pu-238. The minimum detectable activity for this analysis was 50 disintegrations per minute (DPM). None of the 100 wipes exceeded 50 DPM.

The 10 adhesive backed wipes were analyzed using a Baird-Atomic Gas Flow Proportional Counter (GFPC). This analysis is not isotope specific, the measurement is for gross alpha activity only. The MDA for this instrument was 2.8 DPM. None of the 10 wipes exceeded 2.8 DPM.

If you have any questions about this report or our analysis protocol, please call me. Thank you again for choosing RSO, Inc.

Respectfully,

Myke Beard
Manager, Laboratory Services

P.O. Box 1526, Laurel, Maryland 20725-1526
Washington (301) 953-2482 Fax (301) 498-3017 Baltimore (410) 792-7444

EXPERT SYSTEM LICENSE EVALUATION
EVALUATION REPORT FOR LICENSE SNM-01150
Licensee: ISOTOPES INCORPORATED
Site of operation: TIMONIUM MARYLAND

The final ranking for SITE CONTAMINATION is: 23

DESCRIPTION OF ACTIVITY OR FACILITY: LABORATORY/RESEARCH

--Type and form of materials licensed--

Material--	--Form--
PU-BE PELLETS	Sealed
SEALED PU-239 SOURCE	Sealed
U-235<500 GMS	Loose material

--For evaluation purposes, amounts of the following materials were obtained--

Material--	--Form--	Amount	Unit	Score
U-235	LOOSE	100.00	GR	~~0.0~~
PU-BE PELLETS	SEALED	159.94	GR	~~0.0~~
SEALED PU-239 SOURCE	SEALED	10.41	GR	0.0

INITIAL SITE SCORE, based on LOOSE material possession limits: 5.0
INITIAL SCORE of the SEALED sources is: 34.57
FINAL SCORE of the SEALED sources is: 0.00

---

1. License included both sealed and loose materials

2. There was at least one sealed source authorized on this license which was not accounted for by the disposition information.

3. Sealed sources or shielding on the license contained large amounts of extremely hazardous materials

4. There was one identifiable site with this license.

5. FIRST SITE: Some likelihood that building onsite could have been left with contamination. Score=score*1.0

6. FIRST SITE: There was NO verifiable decontamination of the site at closeout. Score=score*1.2

7. FIRST SITE: No closeout survey was conducted for this site. Score=score*2.

8. FIRST SITE: There was NOT an NRC FINAL INSPECTION of the facility.

9. FIRST SITE: There was no evidence of releases at this site. Score not changed.

10. Information insufficient to judge frequency of turnover for operation Score not changed

11. FIRST SITE: There was significant generation of waste material in routine cleanup of facility. Score=score*1.5

12. FIRST SITE: Possible inappropriate disposal or abandonment of contaminated material from cleanup. Score=score*1.2

13. FIRST SITE: There was either no documentation of materials disposition or the documentation was inadequate. Score=score*1.2

14. FIRST SITE: There was no available information indicating onsite disposal of material or waste at the site. Score not changed

15. FIRST SITE: There were no verifiable intermediate decontamination efforts. No change in score

16. Class 1 category of license is due primarily to supporting info which indicates that contamination of the site may be present

FINAL DECISION FOR LOOSE MATERIALS:

POTENTIAL SITE CONTAMINATION:
HIGH PRIORITY FOR REVIEW

The final SCORE for SITE CONTAMINATION is: 23

FINAL DECISION FOR SEALED MATERIALS

Category for sealed sources: HAZARDOUS SOURCES UNACCOUNTED FOR

Reviewer's comments concerning license SNM-01150

This license gave permission to possess and use in nuclear programs(at Timonion, MD.) some of the materials which had been in use at the Middle River ffacility. There was no final inspection or survey and the license is assumed to have expired.

EXPERT SYSTEM EVALUATION WAS BASED ON THE
INVENTORY RECORD IN JOB 0275, BOX 03

Docket 70-01211

Licensee: ISOTOPES INCORPORATED
Address: TIMONIUM MARYLAND Zip: 21093
State of operation: MD
Site used: TIMONIUM MARYLAND
Disposition information present: NO DISPOSITION INFORMATION GIVEN

This license was listed as expired on 09/30/74
Remarks:ISSUED FOR AMENDMENT OF LIC #SNM-53 ONLY AT TIMONIUM MARYLAND
JOB NUMBER: 0275 BOX NUMBER: 03

Date of last evaluation or revision: 08/11/92

7419

THE MARTIN COMPANY

Refer to:
PRG:W729

Baltimore 3, Maryland

August 26, 1959

Radiography Sources

Mr. W. O. Miller
Division of Licensing and Regulation
U. S. Atomic Energy Commission
Washington 25, D. C.

Dear Bill:

Enclosed please find two copies each of the following manuals:

MND 2078 - "A General Outline of the Martin Health Physics Program"

MND 2109 - "Health Physics Procedures During the Use of Radiography Sources"

Manual 2078 is intended as an official outline of our Health Physics Program. It will serve as a guide for all of our projects that involve materials or equipment that emit ionizing radiation. You will note that the manual has been approved by the responsible managers. We believe this manual gives a good picture of our program here.

Manual 2109 is the one you requested several months ago. We incorporated several suggestions by some of your people as well as those received from various Martin personnel. We certainly hope this fulfills your request.

I appreciate your many helpful suggestions during the past two years. If you are down Oak Ridge way be sure to stop by to see me.

Sincerely yours,

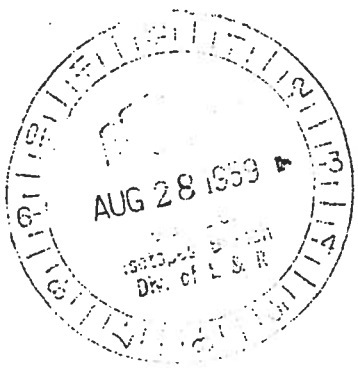
THE MARTIN COMPANY

Paul R. Guinn

Paul R. Guinn
Chief, Health Physics

PRG:mnh

Encl: (4)



B/2

HEALTH PHYSICS PROCEDURES

DURING THE USE OF

RADIOGRAPHY SOURCES

Prepared by Paul R. Guinn
Paul R. Guinn
Chief, Health Physics

MND 2109

AUGUST 1959

DUPLICATED
FOR DIVISION

HEALTH PHYSICS PROCEDURES
during the use of
RADIOGRAPHY SOURCES

I Introduction

This manual contains a general outline of the controls necessary to provide maximum protection to personnel during the use of radiography sources and to assure compliance with all Federal, State and local laws pertaining to the use of radioactive materials. All personnel using radiography sources shall be cognizant of the contents of this manual and comply fully with all provisions.*

*Other manuals which may be consulted for additional information are MND 2078 "A General Outline of the Martin Health Physics Program" and MND 2108 "Health Physics Handbook for the Radioisotopes Facility".

II General Information

A. Individuals Responsible for use of Sealed Sources

George Samos

C. E. Hollens

B. Name of the Person Directly Responsible for Over-all Radiation Protection

~~Paul R. Quinn~~ Richard H Bartelle

C. Instructions of Personnel

All personnel handling radioactive materials shall be instructed as to the hazards of ionizing radiation and the procedures to follow to prevent overexposures. Each person shall be instructed to maintain total body exposures within the permissible limits of 5 rems per year. All work with radioactive materials shall be under the supervision of experienced personnel who are expected to instruct less experienced personnel on the job as to safe handling procedures. At periodic intervals Health Physics will meet with personnel to discuss handling procedures, emergency procedures, and other topics pertaining to radiation protection.

III Security of Sources During Use and Storage

During the use and storage of sources maximum precautions must be taken to assure that only authorized personnel have access to the sources.

A. Storage

1. Radioactive materials, including sealed sources, must never be left unattended in an unlocked room, vault, or cell, except as approved by Health Physics. Access to these areas is by permission of the responsible supervisor or a Martin Health Physicist.

2. Under normal conditions sources are stored in a specially designed shielded room in the Radioisotopes Laboratory which is locked during off-duty hours. Another door through which access to the storage room is gained is also locked during off duty hours.

3. All areas containing radioactive materials, including sealed sources, are clearly identified by magenta and yellow radiation and/or radioactive material signs.

B. In Use

During the use of radiography sources, qualified personnel are in attendance except where it is possible to perform the work in a locked room where unauthorized personnel would not be able to gain entrance without approval. During open air radiography (i.e. work outside the Radioisotopes Laboratory) a responsible person shall be present at all times.

IV Exposure Equipment and Safe Handling Procedures

Exposure equipment is available which makes it possible to use radiography sources with a minimum of exposure to personnel.

A. Description

The exposure equipment used in "open air" radiography consists of a Model 412-Iridium 192 and a Model 402-Co 60 projector mechanism as manufactured by the Technical Operations Company. Attachment 1 and 2 are operational manuals for these projectors.

B. Open Air Radiography

(1) The Responsible Supervisor, in the area in which radiography work is to be conducted, is notified of the location, time and date the work is to be performed.

(2) The equipment is moved into position and the two cables are attached.

(3) The source cable is placed in the desired position and all except operating personnel are moved to a distance of 50 feet or more from the source.

(4) The Health Physics representative stands with the operator who operates the crank mechanism which moves the source through the cable to the desired exposure point. At this point the flashing light on the control box should be in operation.

(5) With the source in the desired position the Health Physics representative makes a quick radiation survey of all work areas to determine what areas, if any, exceed an average of 2 mr/hr. After the Health Physics survey, the operator turns the crank which moves the source back into the container. At this point the flashing light should not be showing. As an added precaution, the Health Physics representative always walks along the cable to the exposure point to determine that the source has, in fact, been returned to the shielded container. No deviation is permitted from this procedure.

(6) All areas above an average of 2 mr/hr are now roped off and tagged. Personnel are also placed in positions to observe the entire radiography area. This is to prevent anyone from entering the roped off area while the source is "out". It should be emphasized that all personnel entering an area where the radiation levels exceed 2 milliroentgens per hour must wear a film badge.

(7) With the area roped off and the cables in position, the photographic film is mounted in position for the first shot.

(8) During radiography work the operators and the Health Physics representative wear film badges, two pocket chambers and a self-reading dosimeter. The latter is checked frequently during the operations.

On special occasions sealed sources may be used without benefit of a remote handling device. In work of this kind the source would be handled with a remote tool of sufficient length to insure that personnel would not receive an over-exposure. Careful monitoring of the radiation levels and, in some instances, adjustments of working times are made to prevent over-exposures.

C. Radiography in the Radioisotopes Laboratory

(1) The same procedures are followed as in "open air" work with the exception that a Health Physics representative will "spot check" the work instead of being continuously present.

(2) The crank mechanism is activated at the entrance to the specially shielded room. At this point the operator is shielded by approximately 23" of concrete. (See Attachment No. 4.)

(3) A Nuclear Chicago Laboratory Monitor with visual and audible indicator is in operation in the laboratory at the entrance to the shielded room. This serves as a warning to personnel whenever the source is out of the shield and is also used to monitor for personal contamination.

(4) A chain with a sign reading: "CAUTION: RADIATION AREA - NO ADMITTANCE" is placed across the entrance door whenever a source is "out" in the specially shielded room. This sign also contains the magenta and yellow radiation symbol.

(5) A remote monitoring system is installed in the Nuclear facilities. One detector unit, complete with warning light and buzzer is located in the Radioisotopes Laboratory. The light and buzzer are activated when the gamma radiation levels exceed 10 mr/hr. The light is mounted above the door into the shielded room.

(6) All radiography work is performed within the area outlined by painted lines on the floor in the specially shielded room. Health Physics surveys show that radiography work performed within the area outlined by the painted lines on the floor does not result in a radiation level exceeding 1 mr/hr in adjacent areas where other personnel are working. The latter was determined by placing a 3 curie cobalt 60 source in the specially shielded room and then making measurements of the radiation levels in all adjacent areas.

(7) After each "shot" the crank mechanism is activated to return the source to the container. At this point the operator enters the shielded room with a "Cutie Pie" to insure that the source has in fact been returned to the shield.

V Use of Radiation Survey Equipment

All personnel engaged in radiography operations are required to familiarize themselves with the use and operation of various types of radiation survey equipment by studying the Instrument Handbooks and by personal instructions from experienced personnel, usually a Health Physicist. The Martin Radioisotopes Laboratory has the following instruments permanently assigned to the facility:

1 - Nuclear Chicago "cutie pie" - reads up to 2.5 r/hr

1 - Nuclear Chicago Survey Meter -- reads up to 20 mr/hr.

2 - Nuclear Chicago Laboratory Monitors - read up to 20 mr/hr.

In addition to the above, Health Physics has numerous types of survey instruments as well as air samplers and counters available for use.

VI Survey and Restriction of Radiographic Areas

Areas in which sources are used are thoroughly monitored to assure that exposures to personnel do not exceed permissible levels.

A. Permanent Radiography Area

At the present time the Radioisotope Laboratory is sufficiently shielded to handle up to 5 curies of CO 60. This was verified by measuring the radiation levels in the areas adjacent to the Radioisotopes Laboratory while a 3 curie Cobalt 60 source was mounted in various locations in the specially shielded room. By referring to the attached diagram covering this survey (Attachment No. 4) it will be observed that in all unrestricted areas (i.e. areas in which personnel do not normally wear film badges) the radiation levels did not exceed 1 mr/hr.

As previously mentioned, during the time that a radiography source is "out" in the specially shielded room, a chain must be placed across the entrance door with a sign reading: "CAUTION: RADIATION AREA - NO ADMITTANCE". The door to the specially shielded room and the main entrance door to the facility are both locked whenever facility personnel are absent. A gamma detector with warning light and buzzer are also installed.

B. Source Changing Procedure

Sources are usually changed by means of source changing devices such as the "Model 414 Iridium 192 Source Changer" (See Attachment 3) as manufactured by the Technical Operations Company. This also serves as a shipping container. The source is replaced remotely without exposing personnel to radiation above permissible limits. If necessary to change sources by other methods, Health Physics approval is required.

C. Temporary Radiography Area

Whenever radiography sources are used outside the permanent radiography area they may be stored temporarily in a locked room provided Health Physics has determined that no serious health hazard would result and that the sources would not be disturbed by unqualified personnel. Radiography sources are used at the Martin Middle River Plant, and on rare occasions at Cape Canaveral, Florida. All storage containers are tagged with radiation warning signs.

D. Leak Testing of Sealed Sources

All sealed sources (except as approved by the AEC) are leak tested each 30 days. This consists of rubbing the surface of the source capsule with a filter disc (smear) and counting in a gas-flow proportional counter. Leaking sources will be sealed in a suitable container and held for decay or returned to the manufacturer for encapsulation.

VII Personnel Monitoring Equipment

All personnel engaged in radiography work are required to wear a film badge and two pocket chambers. Personnel temporarily assigned to work in the radiography areas and personnel who will observe radiography work in areas exceeding an average of 2 milliroentgen per hour will also wear a film badge and two pocket chambers. Personnel who perform the actual radiography work are also required to wear a self-reading dosimeter which is read several times during the radiography operations.

A. Determination of Exposure Totals

Pocket chambers are read daily while film badges are developed routinely each thirteen weeks but will also be developed and read anytime one or more of the following conditions exist:

(1) The two pocket chambers both read "off scale".

(2) The two pocket chambers are damaged or lost.

(3) During any given week that the daily pocket chamber totals reach 100 milliroentogens or more.

(4) At anytime during the 13 week period that the daily pocket chamber totals reaches 500 milliroentogens or more.

(5) Personnel are involved in a significant incident such as a spill, air contamination, high radiation level, etc.

Permanent records are maintained of radiation exposures and resumes are submitted to all individuals annually as required by the U. S. Atomic Energy Commission.

B. Visitor Monitoring

Visitors* to the Radioisotopes Laboratory are required to wear film badges and pocket chambers when entering any area where the radiation levels exceed 2 milliroentogens per hour and/or where an exposure in excess of 100 millirems is likely to be received in any seven consecutive days.

*For the purposes of this manual a visitor is defined as anyone not permanently assigned to work in the Radioisotppes Laboratory.

VIII Transportation of Sources to Field Locations

Radiography sources are moved within the Martin Middle River Plant in approved source containers. These are usually the same shielded containers in which the sources were originally shipped from the supplier. Generally, the radiation levels do not exceed 20 mr/hr on the surface of the container. However, each container has a radiation sign attached with the radiation level reading and a statement of the contents of the container.

Sources transported from the Martin Middle River Plant are packaged and labeled to comply with all ICC Regulations. The radiation levels on the surface of the containers must not exceed 200 milliroentgens per hour at contact and/or 10 milliroentgens per hour at one meter. All source containers are monitored by Health Physics before removal from the Plant. Generally, the containers will be carried to Cape Canaveral, Florida in a company owned plane. However, it may be necessary in the future to send the source via air or railway express. Upon arrival, the sources are picked up by Martin Baltimore radiography personnel.

The sources in transport would be under surveillance of Martin personnel and/or Air-Railway Express personnel and will be shipped in full compliance with all ICC regulations. The sources will be stored in a locked room or vault at the temporary radiography site.

IX Radiation Surveys

The Martin Health Physics Section has the responsibility for monitoring all areas where radioactive materials are used or stored to evaluate the radiation hazards present. Permanent records are maintained of survey results.

A. Survey Methods

(1) The air in all work areas is sampled periodically as deemed necessary by Health Physics, to determine the air concentration in microcuries per milliliter of air. This is accomplished by means of small portable air samplers and/or continuous air monitors.

(2) Radiation surveys are conducted in all areas on a routine schedule to determine the external radiation levels. This is accomplished by means of portable type instruments and fixed monitoring systems.

(3) "Smear" surveys are conducted in all work areas to determine the levels of surface contamination. "Smears" are made on floors, equipment, table tops, etc. and counted in sensitive counters.

(4) Corrective measures must be taken, as directed by Health Physics, to eliminate sources of air contamination, surface contamination and/or direct radiation readings above permissible limits.

B. Posting of Radiation and/or Radioactive Material Areas

All areas in which radioactive materials are used or stored will be posted with a radiation warning sign in accordance with the following:

(1) A radiation symbol and sign with the words: CAUTION-RADIOACTIVE MATERIALS. This sign is used in all low radiation level areas.

(2) A radiation symbol and sign with the words: CAUTION-RADIATION AREA. This sign is used in areas where a dose in excess of 5 mrem/hr or 100 mrem in 5 consecutive days could be received.

(3) A radiation symbol and sign with words: CAUTION: HIGH RADIATION AREA. This sign is used in areas where a dose could be received in excess of 100 mrem/hr.

X Emergency Procedures

The following is a brief outline of procedures to follow in the event of emergencies involving radiography sources. It is an absolute requirement that Health Physics be notified immediately of all emergencies involving radioactive materials.

A. Persons to be Notified of Emergencies

1. Richard H. Boutelle LYric 2-9874 Baltimore, Md.
2. George Samos - VA 5-8756 - " "
3. C. E. Hollens - Franklin 4-4735 " "

B. Procedures

1. Fires

(a) Remove all people from vicinity of the source.

(b) Take radiation level readings to determine whether fire fighters can safely approach vicinity of source. Avoid breathing of smoke or fumes. Use extreme caution to avoid exposing personnel to radioactive fumes or dusts.

(c) After fire is out, approach source with survey instrument to determine that source container is undamaged. If container is damaged, secure a replacement.

(d) Investigate to determine whether personnel may have exceeded exposure limits.

2. Damaged container:

(a) Remove all personnel from the vicinity of the source container.

(b) Make survey of area to determine whether source is still in the container. If not, find source and rope off area and keep personnel away from the source.

(c) Determine if source is damaged. If it appears that source is damaged make a survey to determine if contamination is present in the area. Be especially careful to avoid spreading of contamination.

(d) Secure a suitable source container and replace source by means of remote handling tool. Place contaminated equipment, soil, etc. (if any) in containers.

(e) Investigate to determine whether personnel may have exceeded exposure limits.

3. Lost Source (Plant Area)

(a) Evacuate all people from all areas in which source was used or through which source was moved.

(b) Make an immediate survey to find source by walking through all areas with a survey instrument.

(c) If this fails, notify plant security to alert all personnel immediately that source is missing.

(d) After source is located, immediately isolate the site, move container to site and replace source.

(e) Check area for contamination.

(f) Investigate to determine whether personnel may have exceeded exposure limits.

4. Lost Source - Off Plant

(a) If high level source, notify local police and health department to aid in finding source.

(b) Use radiation survey instrument to attempt to find source. Carefully check all areas in which source was used.

(c) When found, place source in container and determine possible exposure level to personnel. If necessary, initiate immediate medical attention.

(d) Check area in which source was found for contamination.

5. Source Out of Container - Exposure Device Will Not Return Source To Shield.

(a) Keep personnel away from source until plan of action is determined.

(b) Use long pipe or extension to attempt to shake source loose by tapping on cable.

(c) If above fails, disconnect cap on end of cable and shield "hot" spot on cable in which source is lodged. Use flexible wire in attempt to push source back into the container.

(d) If above fails, disconnect cable from source container and attempt to shake source loose.

(e) If above fails, transport to a shielded area in which source can be removed by cutting cable.

(f) Determine if source is damaged. If so, place in proper container for return to supplier to be re-encapsulated. Monitor all areas for contamination.

XI Compliance with Federal Regulations

All work involving radioactive materials, including sealed radiography sources, will be conducted in full compliance with all sections of Title 10, Part 20 of the Code of Federal Regulations.

A. Waste Disposal

Disposal of all radioactive wastes are conducted in full compliance with all Federal, State and local regulations.

B. Reporting of Incidents

AEC will be notified of any significant incident or loss of licensed materials as required in Title 10, Part 20, Code of Federal Regulations.

ATTACHMENT 1

OPERATION MANUAL FOR

MODEL 402 GAMMA RAY PROJECTOR

TECHNICAL OPERATIONS INCORPORATED
SOUTH AVENUE · BURLINGTON · MASSACHUSETTS
TELEPHONE BURLINGTON 7-2261

OPERATION MANUAL FOR

MODEL 402

GAMMA RAY PROJECTOR

NOTE

Do NOT attempt to set up or operate this machine without reading this Operation Manual.

DESCRIPTION

The Technical Operations' Model 402 Gamma Ray Projector consists of three basic assemblies:

1. The cabinet contains a lead filled steel shell to shield the gamma ray emitting source and provides storage space for the control cable, source tube and control unit. Wheels and lifting eyes are provided for easy transport. The door of the cabinet has a lock to prevent unauthorized use.

2. The control unit consists of a source cable control unit and a battery-operated electrical signal system to indicate source position. It is connected to the source storage shield with three parallel cables. One is an electrical cable connected to the source position switches. The other two are housings for the flexible cable. The flexible cable engages a hobbed wheel in the control unit and is actuated by rotating a crank.

3. The source tube is a flexible metallic hose consisting of three sections. One section (7 feet) is attached to the source storage shield. Two extension sections may be coupled to this to extend the range of the source from the cabinet to 21 feet. The source position switch (Part No. 40205) is used on the extreme end of the source tube. This source position switch must be used in all machine applications. It contains electrical contacts which are closed when the source is correctly positioned within it. Refer to Figure 1 to identify the parts of this unit and to Figure 2 which is a schematic diagram of the Gamma Ray Projector.

UNCRATING

The unit is shipped in a wooden crate on skids. Remove the crating and lift the unit off the skid.

Open the door of the cabinet. Keys will be found with the packing slip. Remove the packing material and the control unit. Examine carefully for any damage that may have occurred in shipment. Check material against packing

list. Use Figure 1 of this Manual to identify parts. Any shortages or damaged material should be reported to Technical Operations immediately.

PREPARATION FOR USE

This unit is shipped with the source tube removed and a shipping plug is installed in its place. This shipping plug is fastened in place with two screws and sealed with a tamperproof seal. To prepare the unit for use, first remove the source control unit from the cabinet. The shipping plug should then be removed by cutting the wire of the tamperproof seal and removing the two bolts which hold it in place. Install the flanged source tube over the exit tube of the shield in place of the shipping plug. Socket head cap screws and wrench are provided. Couple to this first section of source tube one or two source tubes as required. Affix the source position switch to the end of the source tube and connect the source position switch lead (red wire) at the switch, at each source tube section junction and at the shield. Test this by pulling the tip of the source position switch. This closes the contacts in the switch and should cause the "ON" light on the control unit to flash.

Do not operate the unit without the source tube or without the source position switch in place. Failure to observe this may permit the source and source cable to be completely ejected from the unit.

OPERATION

Do not attempt to operate this machine without a radiation measuring instrument. We recommend a gamma survey meter of the ionization chamber type that has a full scale range of at least 500 MR/HR. Geiger counters are, as a rule, unsatisfactory for this purpose.

Place the cabinet conveniently near the radiograph location. Place the conical tip of the source position switch at the position the source should occupy during exposure. The source position switch should be clamped or supported in this position so that it cannot move during exposure. Locate the control box as far from the cabinet as is practicable. Easiest operation will be obtained if the

connecting cables and source tube are laid in straight lines without twist or with the longest practicable radius bends.

The source is actuated by turning the crank in a counter clockwise direction. Turn steadily at about 60 R. P. M. If undue resistance is encountered, reverse direction of cranking until the unit operates smoothly. DO NOT FORCE THE CRANK.

When the source reaches the source position switch, it enters the tip of the switch, pushing it outward and indicating that the unit is "ON". An "OPEN" indication means that the source has started to leave the safely stored position. "SAFE" indication means that the source is fully retracted within the storage container.

When the exposure is completed, retract the source by turning the crank clockwise until indication of safe storage is obtained.

The operator should use a survey meter or other rate indicating devices to measure the radiation when the unit is "ON" or in "OPEN" position.

Normally the radiation level 25 feet from the unshielded, exposed source will be about 22 milliroentgens per hour per curie of cobalt 60.

Absorbing or scattering materials will affect this reading. It may be necessary for the operator to move away from the unit when exposures are made so as not to exceed the maximum prescribed operating dose of 300 milliroentgens per week.

The operating dose should be determined by a personnel monitoring film badge or pocket dosimeter.

MAINTENANCE

The Technical Operations' Model 402 Gamma Ray Projector is designed to operate with a minimum of maintenance. Regular inspection of the unit for signs of damage to the connecting cables and source tube is recommended. Do not attempt to operate the unit if cables or tubes should become crushed or cut.

LUBRICATION

The Model 402 Gamma Ray Projector has been lubricated with a Texaco uni-temperature grease. Should further lubrication be necessary, use either the uni-temperature grease or a three-in-one spray oil. DO NOT USE GRAPHITE.

INDICATOR CIRCUIT

The indicator circuit is shown in Figure 3. It consists of a battery power supply and a relaxation oscillator circuit that causes the indicator lights to flash approximately twice per second. This type of circuit requires very little power and batteries should last about one year. The batteries may fail sooner if the unit is used in extreme cold. Replacement batteries (Burgess XX45 or equivalent) are available at all radio stores.

The lamps (type NE-51) are also available at most radio and appliance stores. Batteries may be changed by removing the cover of the control box located beneath the handle. See Figure 4. Note position of the batteries and their connections before removing. The replacement batteries should be placed in the same position. NOTE: Avoid touching the battery terminals as a moderate shock hazard exists.

SAFETY

Do not attempt to operate the unit without adequate distance from the exposed source to areas where personnel have access. Determine, with a survey meter of the ionization chamber type, the areas that must be denied during exposures. Personnel should not be exposed to fields greater than 7-1/2 mr/hr on a continuous basis (40 hour week) OR more than 300 mr in a week.

Typical radiation rates from a 4 curie cobalt 60 source are given below. These figures are for a source exposed in open space and do not include the reinforcing effect of scattering or the diminishing effect of absorbers that may be noticed when walls or structures are near the source.

Distance from Source	Radiation in MR/HR
5 feet	2200
10 feet	560
25 feet	88
50 feet	22

Personnel using the equipment or working near it should wear a film badge to provide a continual record of the radiation they receive.

"Pocket Dosimeters" allow exposed personnel to read at any time the total dose received.

The film badge service and monitoring instruments are described in the general catalog of Technical Operations, Incorporated.

WARRANTY

Technical Operations guarantees this equipment to be free of defects in material and workmanship for a period of one year from the date the equipment was received.

In the event the equipment described above proves, during the guarantee period, to be defective in material or workmanship Technical Operations will undertake to repair or replace the parts which prove defective.

Technical Operations does not assume any liability or responsibility for usage of the Cobalt 60. Any use of the Cobalt 60 other than that described in the Atomic Energy Commission Authorization Form 374 is forbidden without specific Atomic Energy Commission authorization.

SHIPPING INSTRUCTIONS

If unit is shipped by carrier subject to Interstate Commerce Commission, it must have the shipping plug installed and be crated. The outside of the container should be labelled "RADIOACTIVE MATERIAL" and be plainly marked "BUREAU OF EXPLOSIVES PERMIT NO. 143".

Pages 26 through 30 redacted for the following reasons:

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ATTACHMENT 2

OPERATION MANUAL FOR

MODEL 412 GAMMA RAY PROJECTOR

OPERATION MANUAL

for the

MODEL 412

Panoramic GAMMA RAY PROJECTOR

NOTE

Read these instructions carefully
before attempting to set up or
operate this equipment.

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I. DESCRIPTION

A. General

The Model 412 Panoramic Gamma Ray Projector is an advanced isotope handling unit developed to provide safe storage and accurate remote positioning of industrial radiographic sources.

Designed for use with Iridium 192 sources, the Model 412 features maximum operator protection, together with unusual flexibility of application. In use, the equipment positions the radioactive source at the end of a long, flexible tube, where its 360° (panoramic) radiation pattern may be used to full advantage, either for multiple specimen work or for circumferential exposure techniques. Positive mechanical control of the source and visual indication of its location is maintained at all times.

The relatively light weight of the equipment (when stored in its compact cabinet it is easily carried by two men) plus a battery-operated indicator system, make the Model 412 well-suited for field work as well as for permanent and semi-permanent installation. Provisions for safe replacement of the source in the field by the user make it unnecessary to return the unit periodically to the manufacturer for this purpose.

B. Specifications

1. Source Data
   a. Isotope: Iridium 192
   b. Source Dimensions: 1/8" dia. x 1/8" long
   c. Maximum Source Strength: 50 curies
   d. Shielding: Adequate to limit surface radiation to 2 milliroentgens per hour per curie.

2. Operating Specifications
   a. Maximum distance, Source Shield to Control Unit: 25 ft.
   b. Distance, Source Shield to exposure position: 7, 14 or 21 ft.
   c. Source Position Reproducibility: ± 1/16"

3. Physical Specifications

   a. Weight

      1) Source Shield, Control Unit and Control Cable: 145 lbs.

      2) Complete equipment, packed in storage cabinet: 205 lbs.

      3) Shipping Weight: 258 lbs.

   b. Dimensions

      (Storage Cabinet): 34" long x 12" high x 17" deep

C. Equipment Supplied

1. Source Shield with Control Unit (complete with batteries) and Control Cable.
2. Three 7-foot Source Tube sections (Part No. A-40209).
3. Source Switch (Part No. 40205).
4. Clamp (Part No. 40201-7).
5. Clamp Holder (Part No. 40201-8).
6. Tripod Stand. (Part No. 40201-9).

D. Accessory Equipment (available on order)

1. Iridium 192 Sources

Catalog Number	Strength
RS-1	1 curie
RS-2	2 curies
RS-4	4 curies
RS-10	10 curies
RS-20	20 curies
RS-40	40 curies

2. Dose Rate Meter (Victoreen Model 592). Ranges: 0-10, 0-100, 0-1000 mr/hr.
3. Dosimeter (Victoreen Model 541A). Range: 0-200 mr/hr.
4. Dosimeter Charger (Victoreen Model 561A).
5. Film Badge Service (T.O. No. FB-20).
6. Exposure Calculator (Catalog No. 426).

E. Construction Details

The Model 412 Gamma Ray Projector consists of three basic assemblies:

1. The Source Shield is a welded shell of 1/4" steel, containing approximately 115 lbs of lead. A curved channel through the center of the shield, which may be sealed by a metal plug for shipment or storage, houses the radioactive source. When the source is fully retracted into the shield it actuates a microswitch which causes the "SAFE" lamp on the control panel to flash. Built-in connectors at each end of the unit provide for attaching the Source and Control Tubes and electric cable.

2. The Control Assembly consists of a Control Unit and a 25 ft. composite control cable. The Control Unit contains the batteries and circuitry for the signal system which indicates source position. A hand-operated crank on one side of the unit permits the operator to move the source from the shield to its exposure position and back, from a remote position.

The Control Cable consists of three parallel sections. One is an electric cable which connects the signal circuit to the source position switches. The other two serve as housings for the flexible Drive Cable which, when actuated by a hobbed wheel connected to the hand crank, mechanically positions the source.

Three neon lamps, mounted on the top of the unit, flash to indicate whether the source is safely stored in the shield ("SAFE"), is in transit through the Source Tube ("OPEN"), or is in exposure position ("ON").

3. The Source Tube is a flexible, metallic hose consisting of one, two or three 7-foot sections, through which the source is moved by the Drive Cable. One end of the tube is connected to the Source Shield. At the other end is connected the Source Switch. When the source enters this switch, at the end of its travel, it closes a set of contacts which cause the "ON" lamp to flash at the Control Unit, indicating that the exact exposure position has been reached. (CAUTION: At no time should this equipment be operated without the Source Switch attached, or with more than three sections (21 ft.) of Source Tube connected to the shield.)

Parallel with each section of the Source Tube is an electric cable which serves to connect the Source Switch to the signal circuit.

II. OPERATING INSTRUCTIONS

A. Unpacking

The Model 412 Gamma Ray Projector is shipped in a wooden crate. After inspection for external signs of possible damage in shipment, the crate should be opened and the locked storage cabinet removed. Keys for the padlock will be found in an envelope taped to the storage cabinet cover. NOTE: The cabinet should be unlocked only by authorized personnel, trained in the handling of radioactive isotopes.

Unfasten the canvas securing straps and remove the Control Unit and the Control and Source Tubes, extending the latter to their full length. Remove the Source Shield. Examine all items carefully for any damage that may have occurred in shipment. Check the material included against the packing list, Using Figure 1 of this manual to identify parts. Any shortages or damage should be reported to Technical Operations immediately.

B. Preparation for Use

Locate the Source Shield at the desired distance from the specimens to be radiographed. Remove the shipping plug by cutting the seal wire and unscrewing the plug from the connector. Attach one section of the Source Tube in place of the plug, and add one or two additional sections if needed. The red signal cables should be connected together at each junction, and to the Source Switch and Source Shield at either end.

Attach the Source Switch to the end of the last section. The Control Unit should be located at the maximum distance (25 ft.) from the Source Shield, with the Control Tubes laid out as straight as possible. (Too many bends or a bend of small radius in either Control or Source Tubes may restrict the movement of the Drive Cable). Where practicable, it is recommended that the operator and Control Unit be located behind a protective shield, such as a concrete wall.

Mount the Source Switch firmly (using the tripod stand and clamp, or a permanent mounting jig) with the tip of the switch in the exact exposure position.

As soon as the signal cables are connected, the "SAFE" lamp on the Control Unit should begin flashing. The operation of the "ON" lamp should be checked at this point by pulling outward on the Source Switch tip.

C. Operating Procedure

(NOTE: This equipment should be operated only when monitored by a suitable radiation measuring instrument, in accordance with standard isotope handling practice. Technical Operations recommends a gamma survey meter of the ionization chamber type, having a full-scale range of at least 500 mr/hr. Geiger Counters are, as a rule, unsatisfactory for this purpose).

Turn the hand crank steadily in a counter-clockwise direction to move the source out of the Source Shield toward the exposure position. If undue resistance is encountered, reverse direction of cranking until the unit operates smoothly. DO NOT FORCE THE CRANK. If, after several reversals, cranking is still difficult, return the source to the "SAFE" position (by cranking clockwise) and check the Source Tube and Control Cables for bends which may be too sharp.

When the source leaves the "SAFE" position in the Shield, the "OPEN" lamp flashes on the Control Unit. This lamp continues to flash until the source enters the tip of the Source Switch. As it reaches exposure position, the "ON" lamp will begin to flash.

The operator should monitor the activity with a survey meter at all times when the source is in "OPEN" or "ON" position. Normally the radiation level at a distance of 25 feet from the exposed source will be about 9.2 milliroentgens per hour per curie of Iridium 192, although absorption or scattering effects of nearby materials may affect this value. It may be necessary for the operator to move away from the Control Unit while exposures are being made, to avoid exceeding the maximum prescribed dose of 300 mr/week.

The exposure time required for a given specimen will be a function of the specimen material and thickness, the source-to-film distance, and the strength of the source in curies. The time may be computed (when the exposure factor is known) by the relation,

$$\text{Exposure time (minutes)} = \frac{\text{exposure factor} \times (\text{source-to-film dist.})^2}{\text{strength of source (millicuries)}}$$

where the source strength may be estimated from the Iridium 192 decay curve (Fig. 5). For rapid, convenient calculation of exposure time, Technical Operations offers a slide-rule-type calculator for radiography with Iridium 192 sources.

When the exposure is completed, retract the source by turning the crank clockwise until "SAFE" storage is indicated.

III. MAINTENANCE

A. General

The Model 412 is designed to operate with a minimum of maintenance. Regular inspection is recommended for signs of damage to the Control Cables and Source Tube. Do not attempt to operate the equipment if cables or tubes should become crushed or cut.

B. Source Replacement

The equipment is designed so that the source replacement may be safely accomplished by the user in the field. By arrangement with Technical Operations, renewal sources will be shipped, either at regular intervals (dictated by the half-life of the source) or on individual order.

Shipment of renewal sources is made in a specially-designed shielded container. This container has two separate source pockets, one containing the renewal source and the other empty. The old source is simply cranked through the Model 412's Source Tube into the empty pocket and decoupled from the Drive Tube (in accordance with instructions furnished with the container). The new source is coupled in its place and retracted into the Source Shield.

C. Lubrication

Lubricate the inside of each Source Tube section, as needed with no more than a pinch of dry graphite. Do not use oil or grease, which may break down into corrosive or tar-like compounds in the presence of the strong radiation field around the source. No other lubrication is required.

D. Signal Circuit

The Signal Circuit consists of a battery power supply and a relaxation oscillator circuit which causes the indicator lights to flash approximately twice a second. This type of circuit requires very little power, and batteries should last for about a year. Replacement batteries (Burgess XX45 or equivalent) are available at all radio stores.

The neon indicator lamps (type NE-51) are also available at most radio and appliance stores.

Access to the batteries may be obtained by removing the Control Unit cover, located beneath the handle. (See Fig. 4). Before removing the batteries, note their relative positions and the locations of the connecting leads. The new batteries should be replaced in an identical manner. (Note: avoid touching the battery terminals, as a moderate shock hazard exists.)

IV. SAFETY

The Model 412 is designed to afford the operator maximum protection from radiation. However, normal precautions, consistent with accepted isotope handling practices, must be observed at all times in operating this equipment.

1. Every precaution should be taken to insure adequate distance between the exposed source and areas accessible to personnel. Prohibited areas should be determined with a survey meter, and should be plainly marked.

2. Personnel should not be exposed to fields greater than 7-12 mr/hr on continuous basis (40-hour week) OR more than 300 mr in any one week.

3. Personnel using the equipment or working near it should wear a film badge to provide a permanent, running record of the radiation dosage received.

4. Pocket Dosimeters, which allow exposed personnel to read, at any time, the total dose received, are also recommended.

WARRANTY

The product is guaranteed by us to be free from defects of manufacture subject to the following:- Our responsibility under this warranty is limited solely to replacement of any or all defective parts for a period of one year after delivery. This warranty does not apply if the defect has been produced through misuse, alteration or abnormal conditions of operation. The warranty is limited solely to the workmanship and materials in the product and shall not extend in any way to the uses to which it may be put or as to its suitability for such uses.

WAIVER

By accepting delivery of the product, you agree that we shall not be liable to you or anyone claiming through you with respect to any claims for injuries alleged to be due to the use of the product. We sell the product on the condition that we shall not be liable for any claims for injuries alleged to be due to the use of the product whether or not such use is in accordance with instructions given by or referred to by us.

VI. SHIPPING INSTRUCTIONS

If this equipment is to be shipped by a carrier subject to Interstate Commerce Commission, it must have the shipping plug installed and must be crated. The outside of the container should be labelled "RADIOACTIVE MATERIAL" and be plainly marked "I.C.C. 55". Standard shipping labels are available for this purpose and it is recommended that they be used. The container or shield holding the source must be securely locked.

Pages 43 through 46 redacted for the following reasons:

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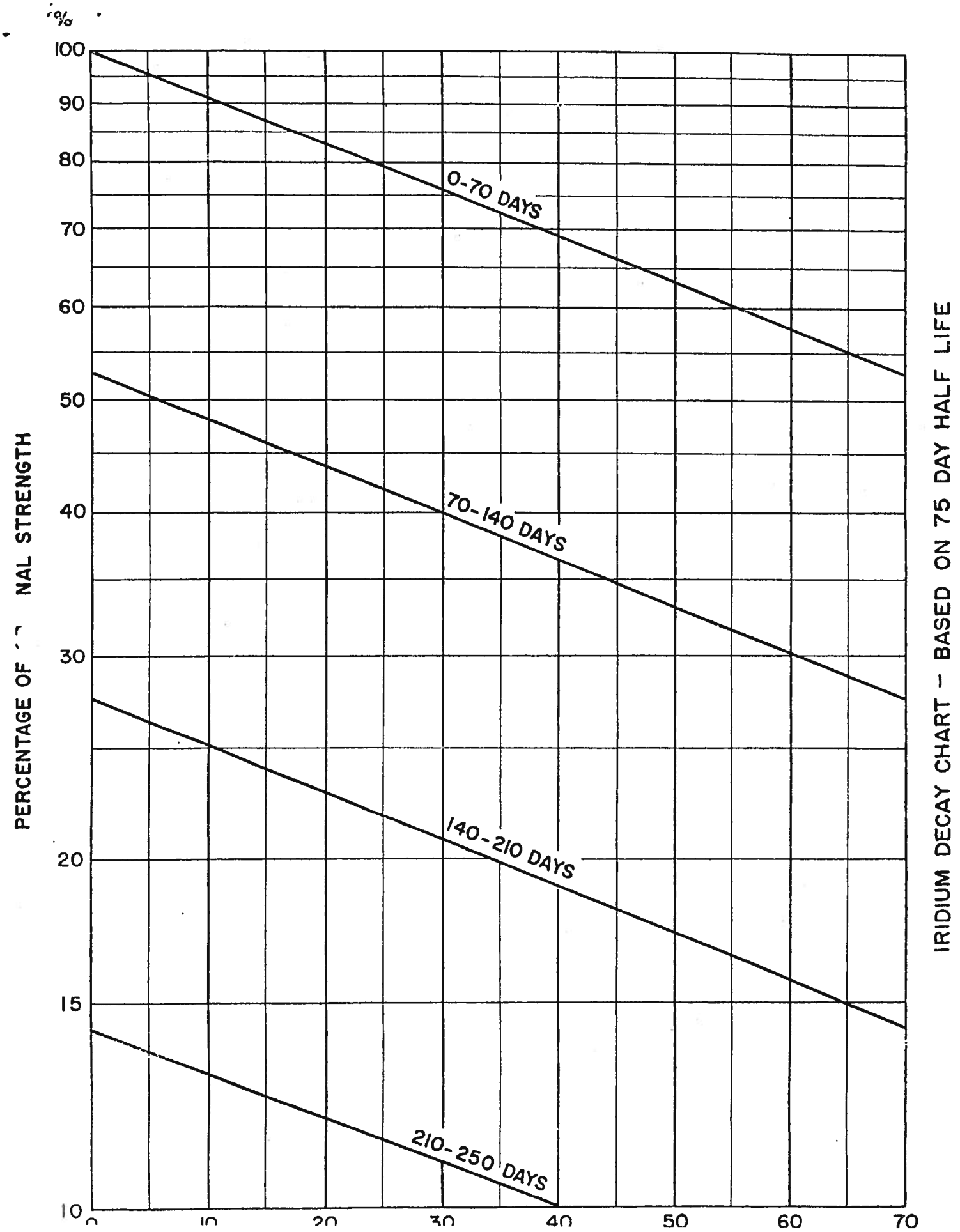
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PERCENTAGE OF NAL STRENGTH
IRIDIUM DECAY CHART - BASED ON 75 DAY HALF LIFE

Pages 48 through 50 redacted for the following reasons:

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IMPORTANT

Observe these precautions when changing sources.

1. NEVER attempt to release coupling with any tool other than the release tool furnished. Release tool fits the grooves of the connector. Hold the release tool so that the index finger can press the connector against the release tool as shown in the illustration.
2. If the connector is clogged with dirt the spring may not engage the groove in the mating part. Clean, if necessary, with gasoline or carbon tetrachloride.
3. *When source and connector are engaged be sure spring of connector has dropped into groove of the mating part.* Test for proper engagement by pulling between source assembly and connector.

   CAUTION Do not allow source assembly to be withdrawn more than ½ inch from the storage container while testing for proper engagement.

ATTACHMENT 3

OPERATION MANUAL FOR THE

MODEL 414 IRIDIUM 192 SOURCE CHANGER

ATTACHMENT 4

Co 60 SURVEY IN THE

RADIOISOTOPES LABORATORY

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Form AEC-313
(5-58)

ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE

19-1398-19

Form approved.
Budget Bureau No. 38-R027.3.

INSTRUCTIONS.—Complete Items 1 through 16 if this is an initial application. If application is for renewal of a license, complete only Items 1 through 7 and indicate new information or changes in the program as requested in Items 8 through 15. Use supplemental sheets where necessary. Item 16 must be completed on all applications. Mail three copies to: U. S. Atomic Energy Commission, Washington 25, D. C. Attention: Isotopes Branch, Division of Licensing and Regulation. Upon approval of this application, the applicant will receive an AEC Byproduct Material License. An AEC Byproduct Material License is issued in accordance with the general requirements contained in Title 10, Code of Federal Regulations, Part 30 and the Licensee is subject to Title 10, Code of Federal Regulations, Part 20.

1. (a) NAME AND STREET ADDRESS OF APPLICANT. (Institution, firm, hospital, person, etc.)

THE MARTIN COMPANY
Baltimore 3, Maryland

Attn: Mr. R. G. Macaulay
Licensing Officer

(b) STREET ADDRESS(ES) AT WHICH BYPRODUCT MATERIAL WILL BE USED. (If different from 1 (a).)

Middle River Plant
Middle River, Maryland

2. DEPARTMENT TO USE BYPRODUCT MATERIAL

Isotope Power Department
Nuclear Division
The Martin Company

3. PREVIOUS LICENSE NUMBER(S). (If this is an application for renewal of a license, please indicate and give number.)

Twelve Byproduct Material Licenses are currently in effect.

4. INDIVIDUAL USER(S). (Name and title of individual(s) who will use or directly supervise use of byproduct material. Give training and experience in Items 8 and 9.)

Canie E. Hollens
Engineer

5. RADIATION PROTECTION OFFICER (Name of person designated as radiation protection officer if other than individual user. Attach resume of his training and experience as in Items 8 and 9.)

Paul R. Guinn - See Resume Submitted With Martin Application Dtd. 11/13/57
Re: License No. 19-1398-9, Amend. No. 2

6. (a) BYPRODUCT MATERIAL. (Elements and mass number of each.)

Any byproduct material having Atomic Number between 3 and 83, inclusive.

(b) CHEMICAL AND/OR PHYSICAL FORM AND MAXIMUM NUMBER OF MILLICURIES OF EACH CHEMICAL AND/OR PHYSICAL FORM THAT YOU WILL POSSESS AT ANY ONE TIME. (If sealed source(s), also state name of manufacturer, model number, number of sources and maximum activity per source.)

A maximum of 15 grams of irradiated Hastelloy C - 500 millocuries (See attachment for composition of Hastelloy C).

7. DESCRIBE PURPOSE FOR WHICH BYPRODUCT MATERIAL WILL BE USED. (If byproduct material is for "human use," supplement A (Form AEC-313a) must be completed in lieu of this item. If byproduct material is in the form of a sealed source, include the make and model number of the storage container and/or device in which the source will be stored and/or used.)

15 grams of Hastelloy C (consisting of three pieces @ approximately 4½ grams and one piece @ .1455 grams) will be shipped to Brookhaven National Laboratory, there to be irradiated in a reactor for a period of approximately nine days. After a cooling period of about fourteen days, the pieces will be returned to The Martin Company in a 2 inch lead pig. The pieces thus irradiated will then beimmerged in beakers containing sea water in order to study the effects of corrosion on Hastelloy C.

DUPLICATED 20859

(Continued on reverse side)

Form AEC-313 (5-58)

TRAINING AND EXPERIENCE OF EACH INDIVIDUAL NAMED IN ITEM 4 (Use supplemental sheets if necessary)

8. TYPE OF TRAINING	WHERE TRAINED	DURATION OF TRAINING	ON THE JOB (Circle answer)	FORMAL COURSE (Circle answer)
a. Principles and practices of radiation protection	See License Application dtd. 9/3/58		Yes No	Yes No
b. Radioactivity measurement standardization and monitoring techniques and instruments	Re: Amendment No. 3 to Byproduct Material License No. 19-1398-10A60		Yes No	Yes No
c. Mathematics and calculations basic to the use and measurement of radioactivity			Yes No	Yes No
d. Biological effects of radiation			Yes No	Yes No

9. EXPERIENCE WITH RADIATION. (Actual use of radioisotopes or equivalent experience.)

ISOTOPE	MAXIMUM AMOUNT	WHERE EXPERIENCE WAS GAINED	DURATION OF EXPERIENCE	TYPE OF USE
	See License	Application referred to in number 8 above.		

10. RADIATION DETECTION INSTRUMENTS. (Use supplemental sheets if necessary.)

TYPE OF INSTRUMENTS (Include make and model number of each)	NUMBER AVAILABLE	RADIATION DETECTED	SENSITIVITY RANGE (mr/hr)	WINDOW THICKNESS (mg/cm²)	USE (Monitoring, surveying, measuring)
See list submitted with Martin Application dated September 22, 1958					

11. METHOD, FREQUENCY, AND STANDARDS USED IN CALIBRATING INSTRUMENTS LISTED ABOVE.

See Application referred to in number 10 above.

12. FILM BADGES, DOSIMETERS, AND BIO-ASSAY PROCEDURES USED. (For film badges, specify method of calibrating and processing, or name of supplier.)

See Application referred to in number 10 above.

INFORMATION TO BE SUBMITTED ON ADDITIONAL SHEETS

13. FACILITIES AND EQUIPMENT. Describe laboratory facilities and remote handling equipment, storage containers, shielding, fume hoods, etc. Explanatory sketch of facility is attached. (Circle answer) Yes (No) See Attachment

14. RADIATION PROTECTION PROGRAM. Describe the radiation protection program including control measures. If application covers sealed sources, submit leak testing procedures where applicable, name, training, and experience of person to perform leak tests, and arrangements for performing initial radiation survey, servicing, maintenance and repair of the source. See Application referred to in number 10 above.

15. WASTE DISPOSAL. If a commercial waste disposal service is employed, specify name of company. Otherwise, submit detailed description of methods which will be used for disposing of radioactive wastes and estimates of the type and amount of activity involved. Same as number 10 above.

CERTIFICATE (This item must be completed by applicant)

16. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

THE MARTIN COMPANY
Applicant named in item 1

By: Ross G. Macaulay
Ross G. Macaulay
Licensing Officer
Title of certifying official

Date August 25, 1959

WARNING.—18 U. S. C., Section 1001; Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1959 O—491408

Attachment to Byproduct Material License Application Dated August 25, 1959

6.(b)

Composition of Hastelloy C

Ni	-	54%
Co	-	2.5%
Cr	-	14.5% - 16.5%
W	-	3.0% - 4.5%
Fe	-	4% - 7%
Si	-	1%
Mn	-	1%
C	-	.08%
Va	-	.35%
P	-	.04%
S	-	.03%

13. FACILITIES AND EQUIPMENT

Extension tongs will be used for transferring pieces of Hastelloy C from lead pigs to the beakers containing sea water. The beakers, in turn, will be shielded by 2 inch lead bricks.

DUPLICATED
FOR DIV. OF INSP.
20859

Docket No. 70-58
File Cy

THE MARTIN COMPANY

Baltimore 3, Maryland

Mail No. W-722
April 18, 1960

Refer to: NMC-113

Director, Division of Licensing & Regulations
U. S. Atomic Energy Commission
Washington 25, D. C.

Attn: Mr. Lyle Johnson, Chief
Licensing Branch

Gentlemen:

Reference is made to our special Nuclear Material License SNM-53 as amended. We desire to further amend this license in order that we can proceed to ship uranium-aluminum type fuel elements to the Universities of California and Washington. For your information we have enclosed a write-up describing our proposed shipping plan and have included drawings of the proposed shipping container.

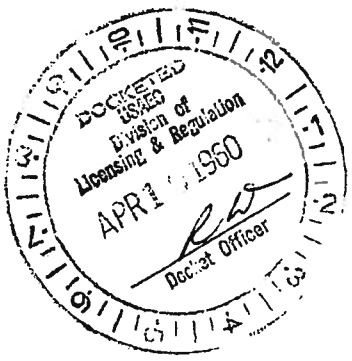
I certify that the statements made in this letter and referenced enclosures are true, complete and correct to the best of my knowledge and belief and are made in good faith.

Very truly yours,

THE MARTIN COMPANY

J. V. Loppert
Licensing Officer
Nuclear Division

JVL:WWW:cg



Cy of this request sent Inspection 4-20-60

RB

70-20
File 9.

PROCEDURE FOR SHIPPING URANIUM-ALUMINUM FUEL ELEMENTS

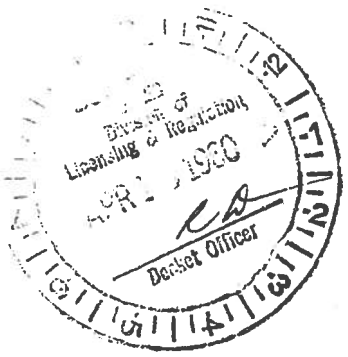
AMENDMENT TO MARTIN LICENSE SNM-5

The shipment to the Universities of California and Washington will consist of 24 each, 11 plate fuel assemblies. Each fuel plate, whether in the assembly or separate, will contain 13.2 ± 1.0 grams of U235 as 93+% enriched uranium metal in a uranium-aluminum alloy. Therefore, the 11 plate assemblies will each contain a maximum of 156 grams of U235.

Each shipment will consist of four 11 plate assemblies in the proposed container. The nominal U235 in each shipping container is 581 grams. Based on the tolerance the maximum would be 624 grams.

The shipping containers will be made from 55 gallon steel drums. The four contained fuel elements will be packed in a wooden box and located in the center of the drum by wooden separators as shown in the attached drawings. Each element measures 2.85 x 2.44 x 26 inches long. Each element will be completely enclosed by corrugated cardboard and the four elements will be packed in a central box which measures 6" x 7" 28" long allowing for ½" of insulation the fuel portions measure 5.4" x 6.25" x 24". The rigid plywood supports will maintain a 4" space between the fuel elements and the top and bottom of the shipping container. The space between the box and the side of the 55 gallon drum is 8" and 8½" respectively as shown on the attached drawings.

With the space that the shipping container maintains internally, and the quantity of fuel contained in the 4 elements, multiple containers can be placed against each other in any arrangement and will be sub-critical even under flooding conditions. Since each delivery is limited to 24 elements and the delivery dates are spaced by several months, the maximum number of containers that can be shipped at any one time is six. Since the shipping containers are constructed of steel they provide good resistance to fire and wreckage.



Pages 3 through 4 redacted for the following reasons:

(b)(4)

70-58
File G.

INTER-DEPARTMENT COMMUNICATION

April 18, 1960

To: W. Wachtl

From: E Scicchitano

Subject: AMF Storage Box Nuclear Calculations-Summary of Results

---

I. Multiplication Factor

A. 6.25" X 5.4" X 24" box containing 4-11 plate assemblies.

		$\mathcal{K}_{eff}$
1)	Dry	.01
2)	Wet	.40
3)	Wet with ∞ water reflector	.64

B. 55 gal. drum

		$\mathcal{K}_{eff}$
1)	Infinite array of homogeneous mixture	.40
2)	Infinite array of homogeneous with double loading (by mistake)	[illegible]

Multiplication factor calculations were based on three group diffusion theory calculations. The distributions of the materials within the box and drum were assumed to be homogeneous

II. Interaction Calcuations*

		Ω(Steradians)
A.	3 X 2 array of 6.25" X 5.4" X 27" boxes in 55 gal. drums. (24 cm.)	1.4

* Ref. I TID 7019-Guide to Shipment of U235 Enriched Uranium Material
Page 74 Appendix 4

Conclusions

As seen from results in I above, the shipping containers are safe under flooded conditions.

From results of interaction calculations (II above) and Appendix 5 in Ref. I, the shipping containers are still safe.

E. Scicchitano

E. Scicchitano

LYALL JOHNSON ASSISTANT DIRECTOR FOR
MATERIALS LICENSING, DIVISION OF LICENSING
AND REGULATION, U S ATOMIC ENERGY COMMISSION
WASHINGTON D C ROUTINE

E J MCALDUFF
PRODUCTION DIVISION
U S ATOMIC ENERGY COMMISSION
OAK RIDGE OPERATIONS OFFICE
OAK RIDGE TENNESSEE

REFERTT 2 OCTOBER FINANCIAL LIMITATIONS FOR THE COOPER UNION AND THE MARTIN COMPANY HEREBY ESTABLISHED AT (b)(4) [redacted] RESPECTIVELY END

EX4

Ecc: F. L. Hiser, FIN

LJohnson:mjw
3:00 p.m. 10/3/81
B-134, Ext. 3411
DL&R FIN

LJohnson/mjw
10/3/81

B|4

DOCKET [illegible] 70-51

E N File Copy

MARTIN MARIETTA CORPORATION

AEROSPACE CHEMICALS CONSTRUCTION MATERIALS

NUCLEAR
DIVISION
Baltimore 3
Maryland

March 22, 1962

Refer to: LSN-15
Mail No: X839

Director
Division of Licensing & Regulations
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention: Mr. Donald A. Nussbaumer, Chief
Nuclear Material Licensing Branch

Subject: Special Nuclear Material License SNM-53, Amendment

Gentlemen:

On July 20, 1961 and August 31, 1961 we submitted an amendment to add the process, description and SS material flow chart for fabrication of a uranium fuel form not previously described. This submission was in the form of a report, number MND-2603 and was approved by the AEC September 13, 1961.

We wish to further amend this process by revising a portion of MND-2603. The revision is described in the attached License Report MND-2603C, dated March 21, 1962.

I certify that the statements made in this letter are true, complete and correct, to the best of my knowledge and belief, and are made in good faith.

Very truly yours,

F. G. Myers

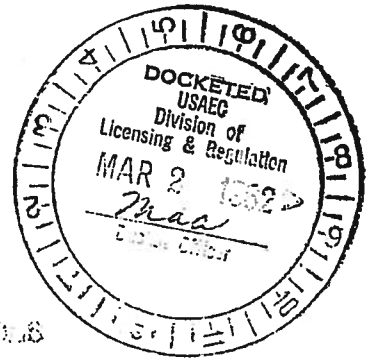
F. G. Myers
Assistant General Manager
Administration

RLM/FGM/plm

Enclosure

B/5

3161



DOCKET NO. 70-58

DOCKETED
USAEC
Division of
Licensing & Regulation
MAR 2 1962
Maa
Docket Officer

LICENSE REPORT MND-2[illegible]

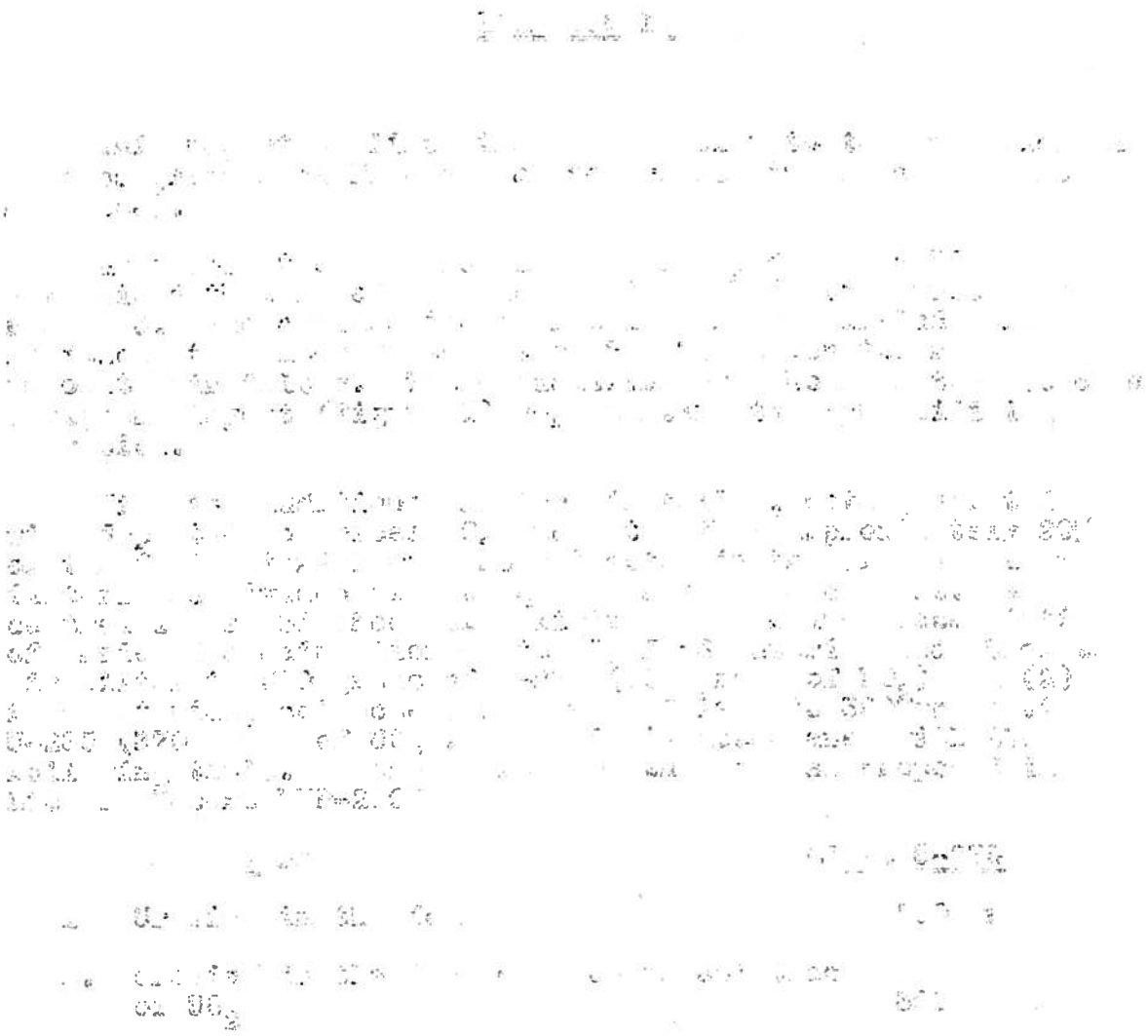
NUCLEAR NAVAL SAFETY CONTROLS

FOR FABRICATION OF

SPHERICAL URANIUM DIOXIDE POWDER

MARCH 21, 1962

3184



PROCESS CONTROL FOR AREA [illegible]

1. All water and air filters are dried 24 hours at 120°F prior to installation. Filters are weighed, identified and weights recorded.

2. For spheroidization a lot will consist of 100 grams. Three (3) lots or 300 grams will comprise one batch.

3. At the start of each run a new data sheet is attached to the hood [illegible] (See attached Figure I). A run commences after new water and air filters are installed, the system has been flushed and any total fuel accounting is made.

4. After a 300 gram batch is spheroidized in 100 gram lots the product is removed from the collector. Each lot is entered on the data sheet.

5. A balance is made whereby the total material removed from the collecting unit is weighed and deducted from the feed input. The difference is assigned to "In System". (See Form No. NA-[illegible])

6. Steps 4 and 5 are repeated until the assigned "In System" accumulation plus 300 grams of UO_2 is greater than 370 grams of UO_2.

7. The batch size will then be reduced to two (or one) 100 gram lots such that the assigned "In System" accumulation plus the new batch is less than 370 grams of UO_2.

8. Step 7 is repeated until the "In System" accumulation of UO_2 plus 100 grams of UO_2 is greater than 370 grams of UO_2. Then the water and air filters are removed from the system, dried and weighed.

9. The entire system is washed down and the UO_2 collected is dried and weighed.

10. A total fuel balance is made.

11. After drying air filters are stored. If UO_2 in the air filters is less than 200 grams UO_2 per three filter group they may be reused for later runs.

12. When an individual air filter reaches 100 grams it is dried, weighed, and stored for reprocessing.

13. Water filters are dried, weighed, and stored for reprocessing.

14. An example run [illegible] 80% yield is shown on the data sheet in Figure III.

Page 14 redacted for the following reason:

(b)(4)

MBA RECORD - SPHEROIDIZING DATA SHEET

All Weights in Grams UO_2

INPUT				COLLECTED		IN SYSTEM		RECOVERY				REMARKS
Lot #	Quantity	Oper. Init's	Accum.	Current	Accum.	Current	Accum.	Water Filter #	Quantity	Air Filter #	Quantity	

MBA RECORD - SPHEROIDIZING DATA SHEET

All Weights in Grams UO_2

INPUT				COLLECTED		IN SYSTEM		RECOVERY				REMARKS
Lot #	Quantity	Oper. Init.	Accum.	Current	Accum.	Current	Accum.	Water Filter #	Quantity	Air Filter #	Quantity	
1	100	RM	100	X								
2	100	RM	200	X								
3	100	RM	300	240	240	60	60					
4	100	RM	400	X								
5	100	RM	500	X								
6	100	RM	600	240	480	60	120					
7	100	JA	700	X								
8	100	JA	800	160	640	40	160					
9	100	JA	900	X				W-1	20			
10	100	JA	1000	160	800	40	200	W-2	22			
11	100	SK	1100	80	880	20	220	W-3	27			
12	100	SK	1200	80	960	20	240	W-4	24	A-1	35	
13	100	SK	1300	80	1040	20	260	W-5	17	A-2	68	
14	100	SK	1400	80	1120	20	280	W-6	20	A-3	37	
								TOTALS →	130		140	

FUEL BALANCE

Accumulated Input		1400
Accumulated Collected	1120	
Amount in Water Filters	130	
Amount in Air Filters	140	
Total Accounted For		1390
Amount In System - MUF		10
System Clean Out - Recovery		5
Revised MUF		5

Figure III

Form NA-3

10 - 58 L&R File Copy

DOCKET NO

MARTIN MARIETTA CORPORATION

AEROSPACE CHEMICALS CONSTRUCTION MATERIALS

NUCLEAR
DIVISION
Baltimore 3,
Maryland

May 21, 1962
Mail No. 839
Refer to: LSN-19

Division of Licensing & Regulations
U. S. Atomic Energy Commission
Washington 25, D. C.

Attention: Mr. Donald A. Nussbaumer
Chief Material Licensing Branch

Subject: Supplement to License Report MND-2789

Gentlemen:

Reference is made to our Special Nuclear Material License SNM-53 as amended. We submitted a request to further amend this license on May 8, 1962 in our letter LSN-17. We wish to supplement this application by transmitting copies of the container design, drawing number 1883-342 dated April 4th and fuel element shipping container stress analysis as referenced in our application.

As indicated in our application for amendment we had submitted an application for a Bureau of Explosives Permit on the proposed shipping containers and have received this permit, number BE-1411.

Very truly yours,

N. W. Hachtl

N. W. Hachtl
Contracts Manager

NWH/plm
Enclosures

MAY 22 1962
U.S.A.E.C.
Division of Licensing and Regulation

DOCKETED
USAEC
Division of Licensing & Regulation
MAY 22 1962
Docket Officer

B/16

Page 18 redacted for the following reason.

(b)(4)

MARTIN
BALTIMORE

70 58

L&R File Copy

MODEL
ER. NO.
PAGE

DOCKETED
USAEC
Division of
Licensing & Regulation
MAY 22 1962
Docket Officer

ANALYSIS
OF

FUEL ELEMENT SHIPPING CONTAINER ANALYSIS

THE FOLLOWING ANALYSIS IS MADE FOR A 55 GAL DRUM SHIPPING CONTAINER TO BE USED IN TRANSPORTING FUEL ELEMENTS. THE OIL DRUM ITSELF IS USED AS A SPACER TO INSURE THAT [illegible] SPACING OF RADIOACTIVE MATERIAL IS MAINTAINED DURING SHIPMENT. THE DRUM IS REINFORCED ON TOP AND BOTTOM WITH 1/8" STEEL PLATE WELDED AROUND THE CIRCUMFERENCE OF THE DRUM. THE FUEL ELEMENTS ARE CONTAINED WITHIN A SCHEDULE [illegible] WELDED TO THE 1/8" [illegible] AT BOTH THE TOP AND BOTTOM OF THE DRUM AND [illegible] CALLY LOCATED AROUND THE AXIS OF THE DRUM.

THE LOAD TO BE ANALYZED IS A SIDE LOAD ON THE DRUM IN A FLAT SURFACE. DUE TO THE [illegible] INVOLVED IN DETERMINING IMPACT STRESSES AND CORNER DROPS, THE CALCULATIONS UTILIZE STATIC LOADS TO DETERMINE ALLOWABLE LOADINGS.

ASSUMPTIONS

1. THAT THE LOAD IS TAKEN IN A THIN PLATE TYPE COLUMN 1/8" THICK X 4" WIDE X 15" LONG WHICH HAS SOME EDGE CONSTRAINT DUE TO THE FACT THAT THE PLATE IS WELDED TO THE DRUM.
2. THAT THE WEIGHT OF THE COMPLETE ASSEMBLY IS APPROXIMATELY 200 POUNDS.

MAY
Division of Licensing and Regulation

PREPARED BY W. BRITTAIN CHECKED BY _____ REVISED BY _____

Pages 20 through 22 redacted for the following reasons:

(b)(4)

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
DL&R

DATE: June 4, 1962

FROM : Alexander E. Aikens, Jr., Chief
Process Evaluation Branch, DL&R

SUBJECT: SUPPLEMENT TO LICENSE REPORT HED-2789 - DOCKET 70-53

In accordance with your request we have reviewed the structural integrity of subject shipping container, and have the following comments:

a. The strength of the shipping package does not meet the proposed requirement (May 24, 1962 Draft of Part 71) of a 30 foot drop with no more than 10% reduction in the minimum spacing as measured from the outside of the inner container to the outside of the outer container.

b. The above requirement means in subject case that only a 1" deformation of the 55 gallon drum may be allowed. The strength of the outer container must, for the 1" deformation, be equal to an impact force of (b)(4) s, assuming uniform resistance during deformation. As the main body of the drum is only able to resist an impact force of about (b)(4) s (based on the 200# weight of the package), the ends of the drum must be able to take the brunt of the (b)(4) s impact. The buckling strength of the 4" x 1/8" spider frames at top and bottom is calculated to be about (b)(4) s. If the thickness of these 1/8" bars were increased to 3/16", the total buckling strength would be increased to about (b)(4) s. Also, in order to avoid excessive deformation between the spider bars (i.e., in case of impact in that area), it is suggested that a solid 3/16" plate be used between inner and outer container, instead of the spider frame.

c. Reference is made to an apparent discrepancy in the size shown for the 55 gallon drum. The standard 55 gallon drums have an inside diameter of 22-1/2", whereas the 55 gallon drum shown on the applicant's drawings shows an apparent diameter of close to 30".

B/7

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald M. Nussbaumer, Chief
Source and Special Nuclear Materials Branch, DL&R

DATE: June 7, 1962

FROM : Alexander E. Aikens, Jr., Chief
Process Evaluation Branch, DL&R

SUBJECT: SUPPLEMENT TO LICENSE REPORT MND-2789 - DOCKET 70-58

Reference is made to our June 4, 1962 memorandum with comments regarding structural integrity of subject shipping container. Chris Beck's telephone conversation on June 6 with Mr. Wachtl of Martin-Marietta Corporation satisfactorily cleared up the design details we questioned.

We find that the design complies with the (b)(4) impact requirement. We also find that with some minor strengthening (such as increasing the thickness of the 1/8" end plates to a 3/16" thickness), the design will satisfy the 30 ft. drop test requirement as specified in the May 24, 1962 Draft of Part 71.

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief, Source and Special Nuclear Materials Branch, DLMA
Attn: J. C. Delaney

DATE: September 20, 1962

FROM : Christian Loch, Staff Engineer - Structural
Fuels Processing Branch, DLMA

SUBJECT: [illegible] APPLICATION OF AUGUST 29, 1962, FOR APPROVAL OF SHIPPING PROCEDURES (70-5)

I have reviewed the data presented and offer the following comments:

a. It is suggested that the drum be strengthened to be capable of resisting a 30 foot drop on the side without exceeding the required 10% reduction in the minimum spacing.

b. The applicant has not furnished any analysis data to back up his contention that the impact forces from 30 foot drop would be less than (b)(4) Ex This and other assumptions made in their analysis should be substantiated, preferably by tests.

B/9

LR:JCD
70-58

SEP 24 1962

Martin-Marietta Corporation
Baltimore 3, Maryland

Attention: Mr. [illegible]. Wachtl
Contracts Manager

Gentlemen:

Pursuant to 10 CFR 71, you are hereby authorized under License SNM-53 to ship at any one time one PM-3A central core bundle in accordance with the procedures and conditions described in your request of August 29, 1962.

The granting of this authorization does not imply a determination by AEC that the package you propose to ship will withstand a thirty foot fall on a flat unyielding surface with no more than a 10% reduction in the minimum spacing measured from the outside of the inner container to the outside of the outer container. We find no basis in your request for the assumption that the impact forces from a thirty foot drop would not be greater than (b)(4) s. We believe this and other assumptions made in your analysis E-4 should be substantiated, preferably by tests, in the event you would want approval in the future for shipments involving greater quantities of U-235, more than a single container, or by other than exclusive use vehicle.

FOR THE ATOMIC ENERGY COMMISSION

Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Licensing and Regulation

Distribution:
Compliance (Field) (Hdqrs) (2) w/cy ltr & appl dtd 8/29/62
H/ J. McAlduff, OROO
D. George, NMM
H. Steele, LR
D. A. Nussbaumer, LR
State Health
Formal
Doc. Rm.
Suppl.
Br & Div Rfs

B/10

OFFICE ▶	LR	LR	LR			
SURNAME ▶	JCDelaney/ey	DANussbaumer	C.D.Luke			
DATE ▶	9/21/62	9/24/62	9/24/62			

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

Docket No. 70-58

L&R File Copy

MARTIN COMPANY

NUCLEAR DIVISION
Baltimore 3, Maryland

Refer to:
ACC-190

Mail No. 807
May 17, 1963

U. S. Atomic Energy Commission
Source and Special Nuclear Materials Branch
Washington 25, D. C.

RECEIVED
MAY 20 1963
U. S. ATOMIC ENERGY COMMISSION
Division of
Licensing & Regulation

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear
Materials Branch

Subject: Additional Information for
Amendment No. 18 to SNM-53

Enclosure: (1) Nuclear Safety Evaluation

Gentlemen:

As you will recall, we recently submitted our application for Amendment No. 18 to SNM-53 to obtain approval for use of storage racks and boxes both during manufacturing operations and for an in-process storage area. In discussions with Mr. John Lane of your office, it was determined that your criticality review included evaluation of only one rack with two storage boxes in the entire manufacturing area.. Actually, we plan to use approximately 50 racks. Individual racks with capacity for 2 boxes will be located at the various machine locations throughout the fabrication area.

Our criticality engineer has just completed additional calculations to show that safety is assured even if 4 completely filled racks are placed as close as physically possible. To complete your analysis, we are furnishing this additional data as Enclosure (1).

Since placement of the racks in close proximity would not permit easy access to the fabricated pieces, any utilization of the racks in this manner is not a logical utilization in a manufacturing process. Space considerations prohibit any such occurrence at the machine locations.

DOCKETED
USAEC
Division of
Licensing & Regulation
MAY 20 1963
Docket Officer

ACKNOWLEDGED

THE AEROSPACE DIVISION OF MARTIN MARIETTA

Refer to:
ACC-190

May 17, 1963

Further, each box is considered a work area which, under our basic criticality philosophy, will be separated from any other box or work area by a distance of two feet. Administrative control will assure that this spacing is maintained.

Since utilization of the boxes and racks is becoming a critical item in our fabrication of Pathfinder fuel, approval is requested as soon as possible.

Very truly yours,

C. W. Keller
SS Representative

CWK/men

Encls.

Docket No. 70-58

5/17/63 L&R File Copy

NUCLEAR SAFETY EVALUATION

The method used to evaluate safety of an array of storage racks and boxes shown in Fig. 1 is that recommended in TID-7016, "Nuclear Safety Guide", 1961. The multiplication factor of the most reactive container in an array is plotted against the total fractional solid angle (Ωf) of the container in the array. The two are related by Fig. 26 of TID-7016 in which a combination of k and Ωf producing a point below the curve indicates a safe array while a point located above the line indicates an unsafe combination.

DOCKETED
USAEC
Division of
Licensing & Regulation
MAY 20 1963
Docket Officer

The multiplication factors and interaction calculations are summarized below in tabular form. These data are plotted on Fig. 2.

The calculations for k eff and interaction calculations for the array shown in Fig. 1 are also presented.

The data shown in Fig. 2 indicates that at least four and probably five racks can be merged under the optimum conditions for criticality without producing a criticality hazard.

SUMMARY OF k eff AND Ω f CALCULATIONS

Item No.	U-235	k eff	Ωf	
				Short Containers
1	670	.592*	.271	Total Ωf for containers (2), (3), (4), (5) and (6)
2	670	.642*	.138	Total Ωf for containers (2), (5), and (6)
3	670	.772*	.013	Total Ωf for container (5).
				Long Containers
4	1210	.527*	.271	Total Ωf for containers (2), (3), (4), (5), and (6)
5	1210	.527*	.213	Total Ωf for containers (2), (5), and (6).
6	1210	.527*	.013	Total Ωf for container (5).

*Only largest value of k eff and other lower values represent safe condition.

Page 8 redacted for the following reason:

(b)(4)

Calculation of K eff

The container configuration, shown below, consists of two standard in-process boxes contiguous on their long side. The container dimensions then become 5-7/16" x 14-1/2" x (45-7/8" or 81-3/8"). The two lengths represent short and long containers. The system is considered to be homogeneous.

(b)(4)

Ex 4

The method of analysis used is identical to that presented in Amendment #18. The total U-235 weight is 2000 grams. Each fuel element consists of 14.5 w/o UO_2 and 83.5 w/o SS.

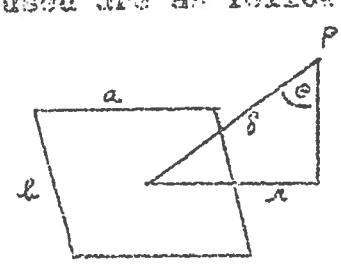
The H/U ratios and corresponding multiplication factors are as follows:

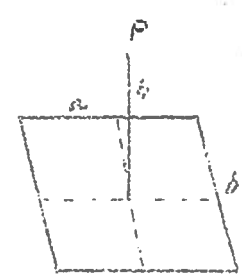
H/U	K eff	Short Container
679	.642	when full
340	.398	when 1/2 full
226	.130	when 1/3 full
		Long Container
1218	.527	when full
609	.299	when 1/2 full
406	.182	when 1/3 full

Solid Angle Calculation

The array considered is shown in Fig. 1 and is the product of six racks. Container (1) is taken as the most central and the solid angle subtended by containers (2), (3), (4), (5) and (6) determined. The equations used are as follows

Planes





$\Omega = (\pi h/\rho^2)\cos\theta$

$\Omega = 4\sin^{-1}\dfrac{(a/2)(b/2)}{\sqrt{(a/2)^2+h^2}\sqrt{(b/2)^2+h^2}}$

The fractional solid angles subtended at container (1) by the other containers are shown in the following table for both long and short containers.

Container No.	Fractional Solid Angle (Ωf)	
		Short Container
2	.068	
3	.058	
4	.041	
5	.053	
6	.041	
		Long Container
2	.073	
3	.073	
4	.072	
5	.069	
6	.072	

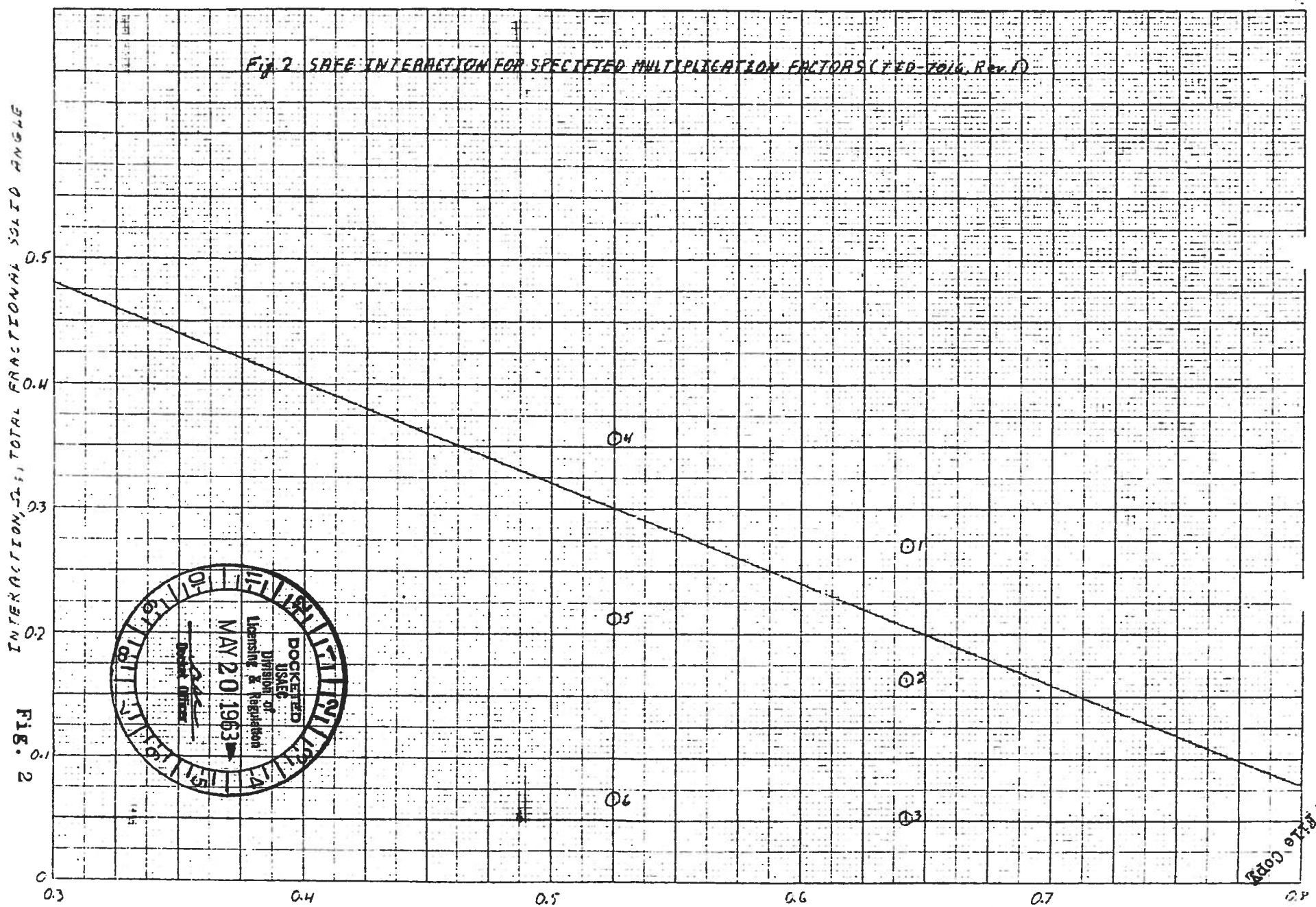


Fig. 2

FILE COPY

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief, Source and Special Nuclear Materials Branch, DLR

DATE: JUL 3 0 1963

FROM : Christian Beck, Staff Engineer - Structural Fuels Processing Branch, DLR

SUBJECT: MARTIN CO. SHIPPING CONTAINER FOR PATHFINDER FUEL

DLR-FPB-CB

ATTN: R. L. Layfield

I have reviewed the revised design of subject shipping container and found that the strengthening of the design, as suggested at the June 25th meeting, has been taken care of. The only comment I have concerns the structural analysis (Appendix A) in Martin Co.'s report, dated June 24, 1963. The analysis is based on a combination of the structural requirements of both Part 71 and 72. The (b)(4) Ex 4 loading as specified in Part 72 has nothing to do with subject design, which should be based entirely on the requirements specified in Part 71.

B/2

DOCKET NO. 2-35

L&R File Copy

NUCLEAR
DIVISION
Baltimore 3,
Maryland

MARTIN COMPANY

October 8, 1963

U. S. Atomic Energy Commission
Division of Licensing & Regulation
Washington 25, D. C.

Attention: Mr. Robert Layfield

Subject: Proposed Amendment Number 19 to Special Nuclear Material License No. 53

Reference: (a) Martin letter ACC-200 to Donald A. Nussbaumer, Chief, Source and Special Nuclear Materials Branch, dated June 25, 1963

In the reference letter we initiated our request for AEC approval for shipment of Pathfinder fuel assemblies from the Martin site in Baltimore to the Northern States Power Company facility in Sioux Falls, North Dakota. Shippage in the shipping schedule and determination of method of shipment have delayed submission of additional information to you.

We have now negotiated with the Tri State Motor Transit Company of Joplin, Missouri for exclusive use of van shipments. Enclosed is the routing which they will use.

We plan to ship no more than 10 shipping containers each containing 14 fuel assemblies, in any one shipment. Spacing in a 40 foot van will accommodate the ten containers on the floor of the van in a two wide by five long arrangement. Exclusive use of van shipments for less than ten containers may be made. Present planning calls for the initial shipment in mid-November, with another in December, and two in February - March 1964.

Copy Supplied
Public Document Room
Div. of Comp. No. (2) 10/14/63 RRR

DOCKETED
USAEC
Division of
Licensing & Regulation
OCT 10 1963
Docket Officer

B/B

THE AEROSPACE
DIVISION OF
MARTIN
MARIETTA

We have completed fabrication of twenty (20) shipping containers with pallets for use in shipping both finished product as well as reject tubular material for subsequent uranium recovery. Enclosed is the criticality evaluation for the most reactive array of seven containers with consideration of a 10% deformation criteria. Evaluation has also been made for a planar array of twenty-four (24) containers which is shown to be safe from a criticality standpoint. Since the proposed shipment will be made under controlled array conditions and will contain a maximum of ten (10) containers, nuclear safety is assured.

We regret the delay in supplying you additional information. We trust that your evaluation can now be completed and a timely approval granted for the proposed Amendment No. 19 to Special Nuclear Material license No. 53.

Very truly yours,

C. W. Keller

C. W. Keller, Manager
Nuclear Materials

CWK/mfp

70-58
LOR 211

ATTACHMENT NO. 1

Criticality Evaluation

Proposed Shipment of Pathfinder Fuel Assemblies

This submittal presents supplementary information for the proposed Amendment No. 19 to Special Nuclear Material License No. 53.

Interaction Calculations: -

Two interaction calculations were performed, namely;

1. Evaluation of seven containers in the most reactive array.

2. Evaluation of a 24 container planar array.

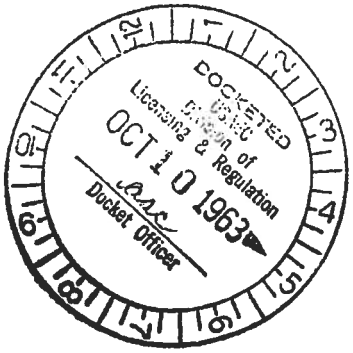
Figure 1 depicts the axial view of a planar array of the shipping container. The plot of the multiplication factor, k eff. for a single container and the total fractional solid angle, Ωf, is shown in Figure 2. The value of k eff, 0.425, was determined in the original evaluation.

The following discussion outlines the methods used in the calculations utilizing the 10% deformation criteria.

Dimensions:

Undeformed container diameter	= 22.5"
Central pipe diameter	= 5.0"
Separation diameter	= 17.5"
10% deformation	= 1.75"
Modified separation diameter	= 15.75"
Modified container diameter	= 20.75"

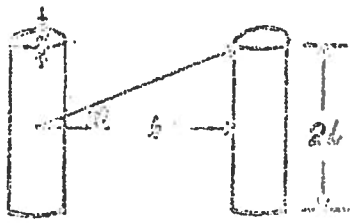
The separation distances shown in Figure 1 are based on the modified container diameter.



ATTACHMENT D-1, 1 (Continued)

The fractional solid angle, Ω_f, was computed by means of the relationship

$$\Omega_f = \frac{dl}{2\pi h \sqrt{h^2 + l^2}}$$



where: d = pipe diameter = 5 inches

l = half the length of the active fuel element = 36 inches

h = separation distance, inches.

Ω_f (Control 7 containers) = .3338

Ω_f (24 containers) = .3760

70-58

L&R File Copy

[illegible] Co.

[illegible]

Sept. 27, [illegible]

[illegible]

[illegible] we will use the [illegible], Maryland to [illegible]

[illegible]

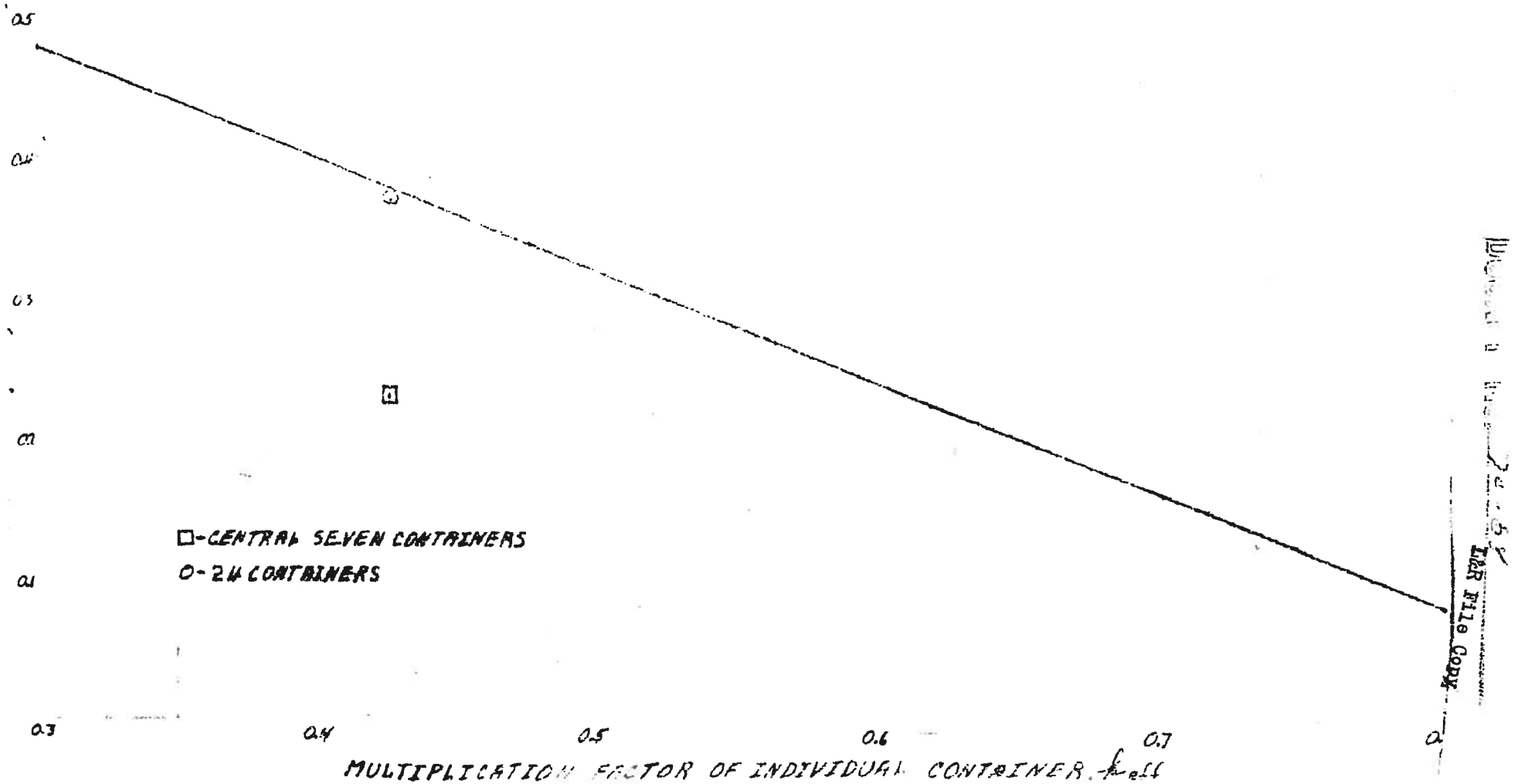
[illegible] MOTOR TRANSIT CO.

[illegible]

Page 6 redacted for the following reason:

(b)(4)

Fig.2 SAFE INTERACTION FOR SPECIFIED MULTIPLICATION FACTORS



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MARTIN COMPANY

Baltimore 3,
Maryland

Refer to: RJB-729

23 January 1964

United States Atomic Energy Commission

Division of Licensing & Regulation

Washington 25, D. C.

Gentlemen:

Re: (Renewal of Byproduct Material
License No. 19-1398-19)

Transmitted herewith are three (3) copies of an application for renewal of Byproduct Material License No. 19-1398-19.

All byproduct material previously authorized and possessed under 6 C and E of the expiring license have been disposed of; these radioactive materials were packaged in approved containers and shipped in compliance with I.C.C. regulations to Oak Ridge for land burial.

All byproduct material previously possessed under 6 D of the expiring license is currently authorized and possessed under license 19-1398-9.

Should any additional information be required, please contact me at AC 301, 687-3800, Ext. 9517.

Very truly yours,

Richard J. Brisson

Richard J. Brisson, Chief
Health Physics Section

RJB/js

B/14

THE AEROSPACE
DIVISION OF
MARTIN
MARIETTA

Form AEC-313R
(9-62)

UNITED STATES ATOMIC ENERGY COMMISSION

APPLICATION FOR BYPRODUCT MATERIAL LICENSE— USE OF SEALED SOURCES IN RADIOGRAPHY

Form approved.
Budget Bureau No. 38-R137

SEE ATTACHED FORM AEC-313R INSTRUCTIONS—USE SUPPLEMENTAL SHEET WHERE NECESSARY

BE SURE ALL ITEMS ARE COMPLETED AND THAT ALL NECESSARY ATTACHMENTS ARE FURNISHED. IF ANY PORTION OF THE APPLICATION IS NOT APPLICABLE SPECIFICALLY SO STATE. DEFICIENT OR INCOMPLETE APPLICATIONS MAY BE RETURNED WITHOUT CONSIDERATION.

1(a) NAME AND ADDRESS OF APPLICANT

Martin Marietta Corporation
Baltimore 3, Maryland

2. PREVIOUS LICENSE NUMBER(S) *(Indicate if application is for renewal or amendment of an existing byproduct material license.)*

19-1398-19 (renewal)

1(b) APPLICANT IS: An individual ☐ A partnership ☐ A Corporation ☒ An Unincorporated Association ☐ Other ☐ If applicant is other than an individual, the applicable section on the reverse side must be completed.

3. LOCATION(S) WHERE SEALED SOURCES WILL BE USED AND/OR STORED. *(If use will be made in states other than named in 1(a), they should be listed here.)*

Middle River Plant
Middle River, Md.

4. SEALED SOURCES TO BE USED IN RADIOGRAPHY

	BYPRODUCT MATERIAL (Element and Mass No.)	SOURCE MODEL NUMBER	NAME OF MANUFACTURER	MAXIMUM ACTIVITY PER SOURCE	NUMBER OF SOURCES
A.	Ir 192	A-424-1	Technical Ops.	50 c	4
B.	Co 60	A-424-2	Tech Operations	10 c	2
C.					

5. RADIOGRAPHIC EXPOSURE DEVICES AND/OR STORAGE CONTAINERS TO BE USED WITH SOURCES LISTED ABOVE

	MODEL NUMBER	NAME OF MANUFACTURER (If custom made, attach complete design specification.)
A.	Model 412 or 498, Model 414 Storage	Technical Operations Co.
B.	Model 402, Model 416 Storage	Technical Operations Co.
C.		

6. THE FOLLOWING INFORMATION IS ATTACHED AS A PART OF THIS APPLICATION: *(Check appropriate blocks and attach information called for in the instructions with this form.)*

	Not Applicable	Attached	Previously Submitted
(a) Description of radiographic facilities (Instruction 6-a)	☐	☒	☐ on (DATE)
(b) Description of radiation detection instruments to be used (Instruction 6-b)	☐	☒	☐ on (DATE)
(c) Instrument calibration procedures (Instruction 6-c)	☐	☒	☐ on (DATE)
(d) Personnel monitoring equipment (Instruction 6-d)	☐	☒	☐ on (DATE)
(e) Operating and emergency procedures (Instruction 6-e)	☐	☒	☐ on (DATE)
(f) Training program (Instruction 6-f)	☐	☒	☐ on (DATE)
(g) Internal inspection system or other management control (Instruction 6-g)	☐	☒	☐ on (DATE)
(h) Overall organizational structure (Instruction 6-h)	☐	☒	☐ on (DATE)
(i) Leak testing procedures (Instruction 6-i)	☐	☐	☒ on (DATE) 1/29/63

CERTIFICATE (This item must be completed by applicant)

7. THE APPLICANT AND ANY OFFICIAL EXECUTING THIS CERTIFICATE ON BEHALF OF THE APPLICANT NAMED IN ITEM 1, CERTIFY THAT THIS APPLICATION IS PREPARED IN CONFORMITY WITH TITLE 10, CODE OF FEDERAL REGULATIONS, PART 30, AND THAT ALL INFORMATION CONTAINED HEREIN, INCLUDING ANY SUPPLEMENTS ATTACHED HERETO, IS TRUE AND CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF.

Martin Marietta Corporation
Applicant Named in Item 1

By: [signature]
Richard J. Brisson, Chief
Health Physics Section
Title of Certifying Official

DATE 1/23/64

WARNING.—18 U.S.C., Section 1001, Act of June 25, 1948; 62 Stat. 749; makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

FORM AEC-313R (9-62)

LEGAL STRUCTURE OF APPLICANT

If applicant is a corporation, complete Items 8 through 11; if applicant is a partnership, complete Items 12 through 14; if applicant is an unincorporated association or a legal entity other than a partnership or corporation, complete Items 15 and 16. Attach separate sheets where space provided proves inadequate.

CORPORATION

8. STOCK OF APPLICANT CORPORATION

NO. OF SHARES AUTHORIZED	NO. OF SHARES ISSUED	NO. OF SHARES SUBSCRIBED	TOTAL NUMBER OF:	
			(a) Stockholders	(b) Subscribers
40,000,000 c.s.	21,488,239 (as of 11-30-63)	none	87,500	none

9. Is applicant corporation directly or indirectly controlled by another corporation or other legal entity? ..... YES ☐ ..... NO ☒

If answer is "YES" give name and address of other corporation or other legal entity and describe how such control exists and the extent thereof.

10. (a) Identify by name and address any individual, corporation, or other legal entity (1) owning 10 percent or more of the stock of applicant corporation issued and outstanding or (2) subscribing to 10 percent or more of the authorized but unissued stock of the corporation. None

(b) Identify by name and address all officers and directors of the corporation.

(See attached sheet)

11. Identify the State, District, Territory, or possession under the laws of which the applicant is incorporated.

Maryland

PARTNERSHIP

12. Name and address of each individual or legal entity owning a partnership interest in the applicant.

13. State the percent of ownership of the applicant partnership held by each of the individuals or legal entities listed in Item 12.

14. Identify the State, District, Territory, or possession under the laws of which the applicant partnership is organized.

OTHER

15. Describe the nature of the applicant and identify the State, District, Territory, or possession under the laws of which it is organized.

16. State the total number of members or persons holding an ownership in the applicant, identify each by name and address, and indicate the ownership interest thereof.

U.S. GOVERNMENT PRINTING OFFICE : 1962 OP—659351

December 1963

MARTIN-MARIETTA CORPORATION

OFFICERS AND DIRECTORS

NAME	BUSINESS ADDRESS	RESIDENCE
George M. Bunker* (President & Chief Executive Officer)	350 Park Avenue New York, New York 10022	(b)(6)
Grover M. Hermann* (Chairman of the Board)	101 East Ontario Street Chicago, Illinois 60611	
William B. Bergen (Vice President)	Friendship International Airport 40, Maryland	
Harry N. Huntzicker (Vice President)	101 East Ontario Street Chicago, Illinois 60611	
Paul A. Johnston (Vice President)	750 Third Avenue New York, New York 10017	
Joseph E. Muckley (Vice President)	350 Park Avenue New York, New York 10022	
C. Raymond Smith (Vice President)	350 Park Avenue New York, New York 10022	
Jess W. Sweetser (Vice President)	1120 Connecticut Ave., N. W. Washington, D. C. 20006	
William L. Lucas (Secretary & Treasurer)	350 Park Avenue New York, New York 10022	
William A. Burns (Director)	Trailmobile, Inc. Cincinnati, Ohio 45209	
Leigh R. Gignilliat, Jr. (Director)	American National Bank & Trust Company Chicago, Illinois 60690	
Clarence W. Miles (Director)	350 Park Avenue New York, New York 10022	
John E. Parker (Director)	2139 Wyoming Avenue, N. W. Washington, D. C. 20008	

x6

* Also a Director

DUPLICATED
FOR DIV. OF COMPLIANCE

NAME	BUSINESS ADDRESS	RESIDENCE
Everett H. Pixley (Director)	Mellon National Bank and Trust Company Pittsburgh, Pennsylvania 15230	(b)(6)
Alexander B. Royce (Director)	Chadbourne, Park, Whiteside & Wolff 25 Broadway New York, New York 10004	
Duncan M. Spencer (Director)	Fiduciary Trust Company of New York One Wall Street New York, New York 10005	
John L. Sullivan (Director)	Sullivan, Shea & Kenney 804 Ring Building Washington, D. C. 20006	

I. Description of Radiographic Facilities

A. Shielded Facility

The Martin Company Radiography Facility is located adjacent to the southwest corner of "D" Building at ground level. (Fig. 1, Plan view of Martin Complex)* The facility abuts a machine shop on the north wall and an earth hillside on the west wall. The south wall is adjacent to a locked fenced truckwell used for moving equipment in and out of the facility. The east wall adjoins a laboratory, an office and film processing area. (Fig. 2, Radiography Facility) Personnel entry into the facility is through a door from the laboratory through a mazed hall. A six-inch thick steel door locked from the inside is located on the south wall facing the truckwell. Access to the facility roof from the earth hillside on the westside is controlled by a fence and locked gate. The keys to these locks are controlled by the Senior Radiographer. The walls of the Radiography Facility are 24 inches of poured concrete. The north wall abutting the "D" Building Machine Shop benefits from an additional 10" of poured concrete making up the foundation support for "D" Building. The shielded facility roof is constructed of 6" thick poured concrete. An 18" wide, 12" thick strip is provided along the westside of the roof to reduce radiation streaming to the adjacent hillside. A right angle maze of 24" concrete at the entrance hall to the shielded room prevents direct streaming of radiation to the laboratory-office area.

1. Area Security Safeguards.

   a. An area radiation monitor-alarm is installed inside the facility with a slave unit located outside above the personnel entrance. During radiographic exposure operations, the radiation above a preset level activates an audible (bell) and visual (red light) alarm system when the facility door is opened, thus warning the personnel of the presence of radiation.

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* All figures attached at the end of this document.

b. Locks - A special high integrity locking system has been established to control access to the radiographic facility, areas adjacent to this facility, radiographic sources and source storage area (s). This system consists of multi-combinated interchangeable core locks. Keys issued to allow facility access will not permit access to radiographic sources, etc.

All keys and spare lock cores are maintained, inventoried and issued (signature required) by the Chief, Health Physics Section. No keys are issued without the specific direction of the Senior Radiographer. In the event a key is lost, the lock core can be changed promptly, thereby re-establishing absolute control.

c. Signs in conformance with 10 CFR 20 are posted on the gates of the fenced truckwell, roof of the facility and upon the personnel entry door.

d. Position of Operator Relative to Source Exposure Point - When a radiographic exposure is conducted, the source holder and source cable are positioned inside the shielded facility and the source cranking mechanism and cable are threaded through the mazed hall to the laboratory area and the source is cranked out from this position.

B. Open Air Radiography

On occasion, it may be necessary to perform radiographic operations outside of the shielded radiographic facility. In cases of Open Air Radiography, the following shall apply:

1. The radiographer shall consult with Health Physics to review the radiographic location.
2. Personnel performing the operation at a new location, shall be reinstructed concerning proper safeguards and control of the operation.

3. When required, Health Physics shall assist in conducting initial radiation surveys of the radiographic site. The source will be exposed in the position most likely to reflect the highest radiation levels. Ropes and signs shall be adjusted in order to establish the restricted area.
4. The method for source surveillance and control during periods of non-use shall be clearly indicated to all personnel involved.
5. Martin Company Security and Fire Protection personnel shall be informed of the area where work is to be performed, their participation, if required, and the nature of the hazard in the event of emergency.
6. A restricted area as defined in 10 CFR 20 shall be established around the radiographic exposure site. This zone shall be clearly posted with ropes and/or other barricades and radiation signs. Radiography personnel shall maintain visual surveillance during each source exposure to exclude unauthorized personnel from the area.

II. Radiation Detection Instruments

The following list represents some of the radiation detection instruments available at Martin Company for use during isotopic radiographic operations:

Manufacturer	Model No.	Radiations Detected	Range, mr/hr	No. Available	Use
Victoreen Inst. Co.	592	Gamma, X-ray	0-1000	3	Operational surveys
Victoreen Inst. Co.	740	Gamma, Beta X-ray	0-10,000	1	"
Eberline Inst. Co.	E-500B	Gamma, X-ray	0-2000	4	"
Victoreen Inst. Co.	CDV-715	Gamma, X-ray	10-500,000	6	Emergency

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III. Calibration of Instruments

The Health Physics Section shall perform the calibration of the portable instruments used for detecting and measuring radiation during radiographic operations. Calibration shall be performed at least once every three months or oftener as required. Dkt. Note: Instrument calibration is authorized under Lic. No. 19-1558-5 WEK.

A. Procedure:

The following procedures shall apply:

1. A curve of radiation versus distance from the Health Physics calibration source should be consulted prior to using the source for calibrating radiation detection instruments. If this curve is not readily available, a curve may be generated in accordance with the following:

   a. Obtain latest source strength in curies from source inventory information in the Health Physics Office.

   b. The following information may be used to calculate radiation levels in R/hr at one foot distance.

      Cobalt 60 - Multiply source strength in curies by 14.

      Cesuim 137 - Multiply source strength in curies by 3.3.

      Iriduim 192 - Multiply source strength in curies by 5.9.

      Radium 226 - Multiply source strength in curies by 9.0.

   c. When the radiation output has been determined at one foot from a source (or any other known distance) the inverse square law for reduction of radiation intensity may be used to determine the intensity at any desired distance from the source. The inverse square law states that radiation intensity from a point source varies inversely as the square of the distance from the source:

$$\frac{I}{I_o} = \frac{(d_o)^2}{(d)^2}$$

Where I_o is the radiation intensity at distance d_o from the source, and I is the radiation intensity at distance d, from the source. This formula shows that doubling the distance decreases the intensity by a factor of four; increasing the distance by a factor of three, reduces the radiation intensity to one-ninth of its value, etc.

d. Plot a curve of source radiation level versus distance from the source on graph paper.

2. Check the calculated values by exposing a Condenser "R" meter chamber of appropriate energy range at the various distances from the source and plot this information on the same graph.

Note: The Condenser "R" meter has been calibrated by the National Bureau of Standards and is used as a secondary calibration standard.

3. Compare the curve generated from the Condenser "R" meter chamber readings versus distance to the curve of the calculated values.

4. Calibrate the instruments by placing them at various distances from the source in order to get meter readings on all scales. Adjust the appropriate calibration potentiometer to correct the meter reading when the reading varies more than ± 20% from the values obtained from the calibration curve.

5. If the instrument cannot be adjusted in order for the readings to fall within this range, it shall be submitted to the Instrument Shop for repairs.

6. Attach a calibration tag to the instrument and record the calibration information on the appropriate instrument data card located in the Health Physics Office.

IV. Personnel Monitoring Equipment

A. Film Badge and Dosimeter Description

All isotopic radiography personnel shall wear the film badge supplied by the Health Physics Section (presently Martin Co. is utilizing film badges provided by Health Physics Services, Inc., Baltimore, Maryland) and a self-reading dosimeter (Bendix Model 862, 866 or equivalent) or two pocket chambers (non self-reading type Victoreen, Model 362) while performing radiographic operations.

B. General Instructions

Dosimeters shall be read and the reading recorded daily on the gamma radiography data sheet. Film badges shall be processed immediately after noting off-scale or unusual dosimeter readings. Film badge results shall be maintained by Health Physics.

V. Operating and Emergency Procedures

A. Operating Instructions for Use of Personnel Monitoring Equipment

1. Dosimeters:

a. Dosimeters are available through Health Physics. These dosimeters measure the amount of gamma and x-ray radiation received up to 200 mr (Model 862), or 500 mr (Model 866).

b. All radiography personnel shall wear a self-reading dosimeter or two non-self readers at all times while conducting radiography.

c. Dosimeters are delicate instruments, and should be treated as such. Jarring or dropping the dosimeter may cause a high reading. Furthermore excessive humidity may also cause a high reading. Immediately notify your supervisor and/or Health Physics if you suspect malfunction of your dosimeter.

d. If a dosimeter should go off-scale, stop work and immediately notify your supervisor and Health Physics. This condition will be thoroughly investigated by Health Physics.

e. All dosimeters shall be charged daily at the start of each shift. At the end of each shift the radiographer in charge shall read the self reading dosimeter. If non-self reading dosimeters were worn, they shall be read in the Health Physics Office. All dosimeter readings shall be recorded on the Gamma Radiography Data Sheet.

2. Operating Instructions for Dosimeter Chargers: (Self-reading dosimeters)

a. Insert dosimeter into charging socket.

b. Hold dosimeter in contact (pressure required against spring).

c. Turn knob or adjust pulsing lever to set dosimeter to zero. (follow instructions on the charger).

d. Remove dosimeter from charger and check hairline position by looking through dosimeter at a source of light.

3. Film Badges

Film badges shall be worn during working hours. These badges are issued by Health Physics and changed on a periodic schedule prescribed by the Health Physics Section. If a Film Badge is lost, damaged or misplaced, the Health Physics Section shall be notified immediately before radiographic operations continue. A new badge will be assigned and an investigation will be conducted to ascertain the radiation exposure the badge received up until the time it was lost, damaged or misplaced.

4. Placement of Film Badges and Dosimeters

Personnel film badges and dosimeters shall be worn affixed to that portion of the body that is most likely to receive the highest radiation exposure.

B. Operating procedures for Ir 192, Model 412, 498 and Co 60, Model 402 projectors in the Shielded Facility, Southwest Corner "D" Building

1. Film badges and dosimeters shall be worn at all times while conducting radiography as per paragraph V. A.

2. Turn survey instrument on, allow at least 1 minute warm-up time, then check zero. If instrument does not function properly, or has not been calibrated within the last 3 months, secure another one from Health Physics that is calibrated and functioning properly.

3. Check the radiation detector slave unit mounted above the door to the shielded room. If the amber light is on, there is a malfunction in the circuitry. If the red light is on, the radiation level in the room is greater than normal background*. In either case, don't enter the room, notify Health Physics.

4. If there is no indication of radiation or malfunction on the detector slave unit, unlock the door and enter the facility carrying an operating survey instrument. If the reading on the instrument does not exceed normal background, it can be assumed it is safe to enter.

5. Survey the projector that is to be used to confirm the location of the radioactive source and note the maximum reading for future reference. (Radiation levels should not exceed the maximum level as posted by Health Physics on the radiation tag attached to the projector.)

6. Remove the cables and cranking device from storage and thread them through the entrance maze, taking care that the cables are not kinked or twisted.

7. Make the radiographic set-up on item (s) to be radiographed, using lead collimator when appropriate. Make sure that the source cable is free from sharp bends and is securely fastened in the exposure position.

8. (a) On the Ir 192, Model 412, 498 projectors, unlock the padlock and unscrew the retaining nut while observing the survey instrument to assure that the source has not moved from its shielded position. Attach the source cable to the projector by turning the nut on the projector counter-clockwise.

* Normal background radiation level, just inside the room at Location A (Fig. 3) is generally less than 2 mr/hr.

(b) On the CO 60, Model 402 projector, it is necessary to unlock the cabinet before the cables can be removed. The retaining plug is held in place by two bolts which have to be removed and the source cable can then be fastened by two Allen head bolts.

9. Take the survey instrument and leave the area via the entrance maze, hook the chain with radiation sign across the entrance to the shielded facility.

10. Expose the source by turning the crank counter-clockwise, lay crank assembly inside the door at location B (refer to Fig. 3). Close and lock the door.

11. Survey outside of the building to determine that the radiation is 2 mr* or less in any given hour at the boundary of the restricted area. This survey must be made each time the position of the source is changed in the room.

12. After the desired exposure time, return the source to the projector by turning the crank clockwise.

13. Check the detector slave unit over the entrance door to determine that the radiation has returned to normal background. (If the radiation level has not returned to normal, this could be an indication that the source has not returned to its shielded position.)

14. Open the door, remove the chain and cautiously enter the room carrying an operating survey meter.

* Note 1: The Commissions Regulations pertaining to permissible levels of radiation in unrestricted areas, as set forth in Section 20.105 (b) of Part 20, are 2 millirem in any one hour or 100 millirem in any seven consecutive days. It should be noted, therefore that the regulations do not limit radiation dose rates to a maximum of 2 mr/hr, but permit higher dose rates providing that the total quantity of radiation in any unrestricted area during any one hour does not exceed 2 millirem; and during any seven consecutive days does not exceed 100 millirem.

a. If radiation is no greater than normal background, proceed to the projector and monitor it, taking note that the reading is the same as it was on the initial survey. Survey the source cable from the projector to the cable termination to ensure that the entire source has returned to the projector.

b. If the radiation level is greater than normal background, immediately lock the personnel entry door and notify Health Physics.

15. All projectors shall be monitored and locked, in addition all shielded facility doors shall be locked unless the radiographer can maintain visual surveillance and control access.

16. A log shall be kept of each exposure in accordance with the data required on sample form, Fig. #4.

C. "Open Air" radiography using Cobalt 60, Projector Model 402 or Ir 192 Projectors, Model 412 or 498.

1. Film badges and dosimeters shall be worn at all times while conducting radiography in accordance with paragraph V. A.

2. Notify Health Physics prior to operation giving the following information:

a. Job location

b. Starting time

c. Radioactive source to be used

d. Number of personnel to be utilized to control access to the radiographic site.

Note: Health Physics and the Senior Radiographer shall judge the adequacy of the number of personnel utilized to control the restricted area.

3. Turn survey meter on and allow at least 1 minute warm-up time, check the zero, if the instrument does not function properly, or has not been calibrated within the last 3 months, obtain another one from Health Physics that is calibrated and is functioning properly.

4. Check the detector slave unit over the door to the shielded room. If the amber light is on, it indicates a malfunction in the circuitry, if the red light is on, the radiation level is above normal background. In either case, don't enter the room, notify Health Physics.

5. If there is no indication of radiation or malfunction on the detector slave unit, unlock the door and cautiously enter the room with survey meter on. If the reading on the instrument does not exceed normal background, it can be assumed it is safe to enter.

6. Survey the projector to be used to confirm the location of the radioactive source, note the maximum reading for future reference. (Radiation levels should not exceed the maximum level as posted by Health Physics on the radiation tag attached to the projector.)

7. Take all necessary items to be used, i.e., radiation rope and signs, film packs, timer, log book containing gamma radiography data sheets, nomenclature and a minimum of 2 calibrated, operable survey instruments.

8. (a) The Ir 192 projectors will normally be transportated to the radiographic site by the radiographic personnel.

   (b) If the CO 60 projector is to be used, it will be necessary to call in-plant transportation, precautions as stated in paragraph V. G. shall be followed.

9. In case of an accident in transportation of the radioactive source, the procedures in paragraph V. H.5 shall be followed.

10. Immediately upon arrival of the projector at the radiographic site, it shall be surveyed to determine if damage occurred during transportation.

11. It is the radiographer's responsibility to notify the area supervisor and call the Security Dispatcher, Ext. 280 and give the radiographic location and approximate length of time the area will be restricted.

12. By calculations, determine the approximate dimensions of the area to be restricted. Refer to chart in paragraph V. E.3.

13. Rope off this area and hang radiation signs on it in such a manner that they can be easily read outside the restricted area.

14. Evacuate the area of all unauthorized and/or unmonitored personnel.

15. Make the radiographic set-up, taking advantagesof all possible shielding i.e., collimators, heavy equipment, etc. Do not place the film on the part to be radiographed at this time.

16. Unwind crank assembly and straighten the cables.

17. Unlock the projector and unscrew the retaining plug.

18. If Ir 192 projectors are being used, connect source cable by turning the large nut on the projector counter-clockwise. If CO 60 projector is being used, the cabinet must be unlocked to gain access to the crank assembly. Two bolts must be removed from the retaining plug. The source cable is held in place by two Allen head bolts.

19. The set-up should be made in such a manner that the crank assembly is the maximum distance possible from the exposed source, also taking advantage of any local shielding.

20. Post personnel at strategic points on the restricted area boundaries to control access to the area.

21. Make sure the area is evacuated of unauthorized and/or unmonitored personnel.

22. Expose the source by turning crank counter-clockwise. Place an operating survey meter near the operator. Note the dose rate to the operator.

23. After the source is in the exposed position, survey and adjust restricted area to confirm with paragraph V. E.3 and record the survey including a sketch of the area on the back side of the Gamma Radiography Data Sheet. (Fig. 4)

24. Return the source to the projector by turning crank clockwise, monitor projector and source cable, radiation level should be the same as the initial survey on the projector.

25. In case the source did not return to the projector, maintain control of the area and initiate the emergency procedures set forth in paragraph V. H. 2d.

26. When the source has been returned to the projector, place the film on part to be radiographed.

27. Conduct radiographic exposure and return the source to the projector as previously described in 24 and 25 above.

28. The radiographer is always responsible for maintaining control and surveillance of the restricted area.

29. In the event that unauthorized personnel insist upon entering the restricted area during source exposure, the source is to be immediately returned to its shielded container. The individual's name and badge number shall be taken and his supervisor notified.

30. In the event that an unauthorized person enters the restricted area during source exposure, immediately obtain the individual's name and clock number, and notify Health Physics.

31. The projector is never, under any circumstances, to be left unattended while unlocked. If the radiographer must leave the area, the projector must be locked, monitored and secured in accordance with 10CFR31.

32. Upon completion of the radiography or at the end of a working shift, the projector shall be locked, monitored and secured as above.

33. The supervisor of the area and the Security Dispatcher, Ext. 280 shall be notified of the status of the area.

34. Rope and radiation signs shall be removed when the projector is removed from the radiographic site.

35. The projector shall be stored in the shielded facility located southwest corner "D" Building, or other storage facility established in compliance with the applicable sections of 10CFR20, 31. Notify Health Physics and Security Dispatcher (Ext. 280) if stored in a facility other than the shielded facility.

36. Complete the final survey required and sign the Gamma Radiography Data Sheet. (Fig. 4)

D. Changing the Radiographic Sources

Upon receiving a new radiographic source, the following shall apply:

1. Do not open the source container.
2. Place the new source storage container/changing device in the shielded facility.
3. Notify Health Physics.
4. Health Physics shall monitor during the removal of the metal seal and the four bolts holding the cover of the source changer in place.
5. Lift cover and remove the manufacturer's instructions which includes source changing procedures, source specification sheet, decay curve and leak test results. Monitor the interior for the presence of surface contamination.
6. If the container is contaminated, Health Physics shall prescribe the appropriate course of action.
7. When cleared by Health Physics, follow the manufacturer's procedure for changing the source.
8. After completing the change, the projector shall be locked and monitored.
9. Health Physics shall supply and attach to the projector a tag containing information pertinent to the source, i.e., source strength, maximum radiation level and date.
10. Enter this survey data in the radiographic log book.

11. The changer/storage container containing the decayed source shall be monitored and a tag with all pertinent data attached to the chamber holding the source.

12. Replace the cover, tighten the four bolts, seal container with wire/lead seal and prepare for return to manufacturer. (Health Physics shall survey and place appropriate ICC shipping label on container prior to shipment)

E. Instructions for Posting and Restricting Radiographic Areas

1. Radiation Areas

Radiation Areas are those areas which contain radiation levels such that a person continuously present in the area could receive an exposure in excess of 5 millirem in any one hour. Radiation areas must be posted with signs bearing the radiation caution symbol and the words "CAUTION RADIATION AREA." Use these signs to mark the perimeter of the restricted area.

2. Restricted Area

A restricted area is that area into which the radiographer must control access for purposes of radiation safety. This restriction must be extended to include those areas containing radiation levels such that a person continuously present in the area could receive an exposure in excess of 2 millirem in any one hour. Normally, the perimeter of the restricted area would be at the 2 mr/hr* isodose line, but for exposure of short duration, the following charts may be used to determine the distance from the source to the perimeter of the restricted area. The chart may be used for Cobalt 60 sources of five and ten curies strength and for Iridium 192 sources of twenty, thirty, forty and fifty curies strength. If the source strength is between those given in the table, use the higher source strength.

* Refer to Note 1, Page 9.

Cobalt 60

5 Curies Strength			10 Curies Strength		
Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr Level	Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr Level
60 min.	190 ft.	2 mr/hr	60 min.	270 ft.	2 mr/hr
30 min.	135 ft.	4 mr/hr	30 min.	190 ft.	4 mr/hr
10 min.	80 ft.	12 mr/hr	10 min.	110 ft.	12 mr/hr
5 min.	60 ft.	24 mr/hr	5 min.	80 ft.	24 mr/hr

Iridium 192

20 Curies Strength			30 Curies Strength		
Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr Level	Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr Level
60 min.	245 ft.	2 mr/hr	60 min.	300 ft.	2 mr/hr
30 min.	170 ft.	4 mr/hr	30 min.	210 ft.	4 mr/hr
10 min.	100 ft.	12 mr/hr	10 min.	120 ft.	12 mr/hr
5 min.	70 ft.	24 mr/hr	5 min.	85 ft.	24 mr/hr

Iridium 192

40 Curies Strength			50 Curies Strength		
Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr Level	Exposure Time In Any One Hour	Distance From Perimeter of Restricted Area	mr/hr Level
60 min.	345 ft.	2 mr/hr	60 min.	385 ft.	2 mr/hr
30 min.	245 ft.	4 mr/hr	30 min.	280 ft.	4 mr/hr
10 min.	145 ft.	12 mr/hr	10 min.	160 ft.	12 mr/hr
5 min.	100 ft.	24 mr/hr	5 min.	110 ft.	24 mr/hr

F. Physical Radiation Surveys

1. Physical radiation survey during exposure period

   a. Determine from calculations of source strength the restricted area required.

   b. Rope off and post this area as required.

   c. Expose source as outlined in Part A or B of these procedures.

   d. Survey boundaries determined in Part (a) above using survey meter.

   e. Make adjustments to boundary as necessary to maintain readings at 2 mr/hr* or less, or as otherwise authorized by paragraph V. E.3 of the procedures for exposures of short duration.

   f. A record of these surveys must be maintained and should contain sketches and instrument readings, and explanatory notes if area was restricted to other than the 2 mr/hr* isodose line.

   g. If more than one exposure is taken in the same identical position, it is not necessary that the restricted area be resurveyed. Information as to the number of exposures and total exposure time in any one hour should be included on the Gamma Radiography Data Sheet. (Fig. 4)

2. Physical radiation survey of projector after completion of exposures.

   a. Return source to projector.

   b. Approach projector with operating survey meter and monitor the surface of the projector and source cable to determine the radiation levels. (Radiation level should not exceed the maximum reading posted on the Health Physics Radiation Tag)

   c. After determining that the source is in a safe condition, lock the projector.

3. Physical radiation survey prior to storage of projector after last exposure.

* Refer to Note 1, Page 9.

a. After determining from radiation survey, that source is in a safe condition in the projector, screw in safety plugs and lock projector.

b. Return projector to storage area.

c. Resurvey projector and record on the Gamma Radiography Data Sheet. (Fig. 4)

G. Movement of radiographic projectors, in-plant locations

1. Projector shall be surveyed by a radiographer, using an operating, calibrated, survey meter, prior to removal from any storage area.

2. No projector shall be moved unless all safety plugs are inserted, and projector is locked.

3. In-plant transportation will be accomplished under the supervision of a radiographer utilizing company vehicles clearly marked with the radiation caution symbol and the words "CAUTION RADIOACTIVE MATERIAL."

4. Call plant transportation to have projector moved to radiographic site, as required and instruct the driver regarding safety precautions.

5. In case of an accident involving in-plant transportation of radiographic projectors, the emergency procedures specified in V. H.5 should be followed.

H. Emergency Procedure for Radiographic Personnel

1. In the event of a plant emergency, such as a fire or an accident in an area where radiography is being conducted, immediately do the following:

a. Return source to the shielded position in the projector.

b. Perform physical radiation survey of the projector to assure that the source is in the shielded position.

c. Remove source cables and insert safety plugs. Lock projector.

d. Remove projector from danger area and if possible return to storage area.

e. Notify Health Physics.

f. If a radiographic projector cannot be removed from a danger area, do the following:

(1) Set up a restricted area if not already established as specified in V. E.3.

(2) Notify Security Dispatcher, Ext. 280 and request Health Physics assistance.

(3) Health Physics in conjunction with radiography supervision shall determine further course of action.

2. In the event of an accident involving a radiographic projector, such as a falling object hitting the projector or controls, immediately do the following:

a. Return source to shielded position in the projector if possible. Conduct a physical radiation survey to assure that the source is fully shielded and lock the projector.

b. Immediately notify Health Physics and supervision.

c. Do not use the projector until supervision and Health Physics have made an inspection and authorized continued use of the equipment.

d. In the event the source cannot be returned to the projector, immediately do the following:

(1) Set up and post a restricted area (if not already established).

(2) Do not allow unauthorized entry into this area.

(3) Notify Security Dispatcher, Ext. 280 and request Health Physics assistance.

3. In the event of incident involving the exposure of un-monitored personnel to radiation, immediately do the following:

a. Set up and maintain a restricted area (if not already established).

b. Record names and clock numbers of un-monitored personnel involved.

c. Notify your supervisor and Health Physics.

d. Supervisor and Health Physics shall investigate the incident.

e. Health Physics shall determine the course of action and shall notify the appropriate regulatory agency (s).

4. In the event of loss of source:

   a. Notify Security Dispatcher, Ext 280 and request Health Physics assistance.

   b. The following shall be performed by Health Physics and the radiographer:

      (1) Obtain all information on the last known location of the source.

      (2) Monitor the suspect location to locate the source, and replace it in a shielded container as soon as possible.

      (3) Check un-monitored personnel and handle as in paragraph 3 above.

      (4) Health Physics shall notify the appropriate regulatory agency (s).

5. Vehicular accident involving in-plant transportation of radiographic projectors.

   a. Upon notification of an accident involving the in-plant transportation of radiographic projectors, the following procedures shall be followed:

      (1) Restrict the area of the accident.

      (2) Notify Health Physics.

      (3) Use an operating calibrated survey meter to ascertain whether the source is in a safe condition within the projector.

         (a) If the source is safely within the projector and the vehicle is operable, continue to move the projector to radiographic site.

         (b) If source has become separated from the projector, follow instructions in paragraph V. H.2 or V. H.4 above.

6. Notification and reports of incidents to A. E. C.

   a. Health Physics shall notify the AEC in accordance with the current applicable regulations.

VI. Training Program

A. Conduct of Training Program

The Training Program shall be conducted by Martin Company Education Section under the direct supervision of the Chief, Health Physics in conjunction with radiography supervisory personnel.

B. Description of Radiography Training Program

1. Fundamentals of Radiation
   a. Atomic Structure
   b. Ionization
   c. Radioactivity - Radioisotopes
2. Characteristics of Gamma Radiation
   a. The Curie
   b. Specific Activity
   c. Half Life
   d. Energies of Gamma Radiation
3. Units of Radiation Dose
   a. The Roentgen (R)
   b. The RAD (Radiation Absorbed Dose)
   c. The REM (Roentgen Equivalent Man)
   d. Dose and Dose Rate
4. Detection and Measurement of Radiation
   a. Portable Instruments (Typical)
      (1) Basic Operating Principles
      (2) Calibration
      (3) Limitations
   b. Fixed Monitoring System
      (1) Basic Operating Principle
      (2) Alarm Function

c. Personnel Monitoring Devices

(1) Film Badge

(2) Dosimeters (self-reading)

(3) Pocket Chambers

5. Levels of Radiation from Common Gamma Sources

a. Cobalt 60

b. Iridium 192

c. Thulium 170

d. Cesium 137

e. Radium

6. Methods of Controlling Radiation Exposure

a. Time

b. Distance

(1) Inverse Square Law

c. Shielding

(1) Half value, Tenth value layers

(2) Material - Lead, Iron, Concrete

(3) Collimation

d. Use of Nomographs

7. Exposure of Radiation

a. Atomic Energy Commission Regulations

(1) Part 20 Requirements

(2) Part 30 Requirements

(3) Part 31 Requirements

b. Maximum Permissible Doses

c. Chronic Radiation Exposure

d. Acute Radiation Exposure

(1) Biological Effects

(2) Degree of Injury

8. Radiographic Facilities

   a. Description of Martin Shielded Facility

   b. Open Air or Field Radiography Sites

      (1) Distance

      (2) Local Shielding (Collimators)

      (3) Posting

      (4) Surveillance

      (5) Unauthorized Entry

   c. Source Control

      (1) In Use

      (2) Not In Use - Storage

9. Radiographic Equipment to be Used

   a. Martin Company Radiographic Exposure Devices

      (1) Description

      (2) Operating Principles

      (3) Practical Training

   b. Control Procedures

10. Emergency Procedures

   a. Emergency Call List

   b. Typical Emergency Conditions

      (1) Source Stuck Outside Container

      (2) Damaged Cable

      (3) Lost Source

      (4) Shielding - Time - Distance

11. Final Examination

In lieu of conducting the previously outlined program, personnel may attend Picker Radiography School or an equivalent training school. Upon completion of the Training School Program, additional training on Martin Co. equipment

would be provided and such personnel must demonstrate competence in handling the equipment in addition to successfully completing a written and/or oral examination.

All radiographers must continue to maintain and periodically demonstrate a thorough familiarity with Radiographic Equipment, Operating and Emergency procedures and current applicable Federal Regulations supplied through the Health Physics Section.

C. Samples of typical examination Questions and Answers

1. What is ionization?

   Ans. The process or the result of any process by which a neutral atom or molecule acquires either a positive or a negative charge.

2. Define the term "half-life". What are the half-lives of Co^{60} and Ir^{192}?

   Ans. The time required for a radioisotope to lose 50% of its activity.

   Co^{60} Half-life 5.3 yrs.

   Ir^{192} Half-life - 74 days

3. Define a Curie.

   Ans. The quantity of a radioactive nuclide disintegrating at a rate of 3.7×10^{10} atoms per second.

4. Explain the difference between dose and dose rate.

   Ans. Dose Rate - The measure of radiation dose delivered per unit time, i.e., mr/hr.

   Dose - The radiation delivered to the specific area of interest.

5. What is meant by "chronic exposure?"

   Ans. Low doses of radiation received over long periods of time.

6. What are the three (3) means of controlling external radiation dose?

   Ans. Time, Distance and Shielding

7. What is meant by the term "Half Value Layer" and what are the half value layers of lead for Co^{60} and Ir^{192}?

   Ans. The thickness of material which will reduce the radiation by one

half its original intensity.

Co^{60} Lead HVL = 1/2 inch

Ir^{192} Lead HVL = 1/6 inch

8. What is the purpose of a collimator?

Ans. To reduce radiation scattering and focus the radiation to a single area.

9. What is the normal allowable annual dose of ionizing radiation to the whole body or critical organs permitted by Federal Regulations?

Ans. 5 REM/yr.

10. What is the Martin Company emergency dose limit?

Ans. 25 REM whole body.

11. Assume a person is exposed to a very high dose rate from a Co^{60} or Ir - 192 source.

a. Can this person become radioactive?

Ans. No

b. Can this person become contaminated?

Ans. No, unless the sealed source has ruptured.

c. When the source is no longer present, is ionization from gammas still taking place in his body?

Ans. No

12. List several advantages and disadvanteges of film badges and dosimeters?

Ans. Film Badge Advantages - a. Lasting record of exposure

b. Measures total cumulative exposure

c. Can be used to differentiate between types of radiations

d. Not shock sensitive

Disadvantages - a. Film subject to environmental and external damage. (fading, fogging, etc.)

b. Must wait for processing to get dose results.

c. Energy dependent.

d. Orientation of film during exposure is a problem.

Ans. Dosimeter Advantages - a. May be used (self-reader) to keep track of exposure during operation.

b. Can be recharged as required.

c. May be used to measure dose rate in extreme emergency condition.

Disadvantages - a. Energy dependent (generally gamma only)

b. Can be accidently discharged.

c. Off scale total exposure cannot be determined.

13. Noticeable blood changes occur at what general levels of acute radiation exposure?

Ans. 25 to 50 REM.

14. Who must be notified by the radiographer prior to making "Open Air" exposures, and what information is given?

Ans. a. Health Physics, Security, Area Supervision

b. Source to be used and type of operation

c. Starting time

d. Precautions

e. Length of time to complete operation

15. Each radiation survey instrument shall be calibrated at intervals not to exceed what time period?

Ans. 3 months

16. What is the general course of action you would follow if a source became stuck out at the end of the source tube after a routine exposure?

Ans. a. Attempt to crank the source back to its shield.

b. Notify Health Physics and radiography supervision.

c. Maintain surveillance over the area until assistance arrives.

d. Carefully shield the exposed source with available shielding, i.e., earth, concrete block, sand bags, lead, etc.

e. Carefully disconnect source tube at the projector and attempt to loosen source by wriggling the drive cable.

17. What is the procedure required when a radiographer loses a film badge during a shift?

Ans. a. Leave the radiographic site.

b. Notify Health Physics.

c. Obtain a new film badge.

18. Who has the responsibility for securely locking the source container and performing the final survey on the projector and where is this information recorded?

Ans. The Radiographer - final survey on Gamma Radiography Data Sheet.

19. What is the title of the Federal Regulations governing use of radiography sources?

Ans. Title 10, Part 31.

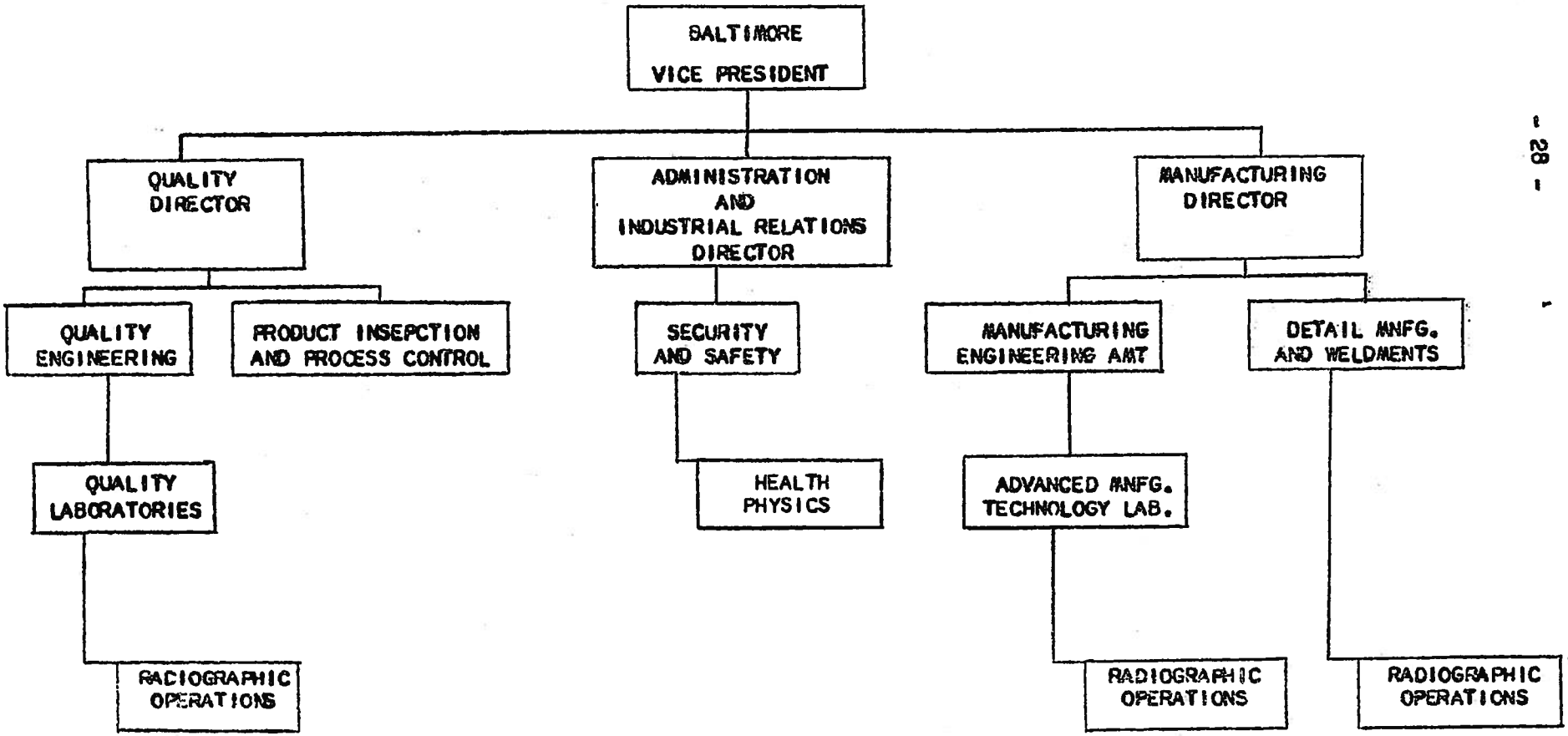
20. What is the LD - 50 Dose?

Ans. 400 R whole body.

VII. Description of Overall Organization Structure and Internal Inspection System.

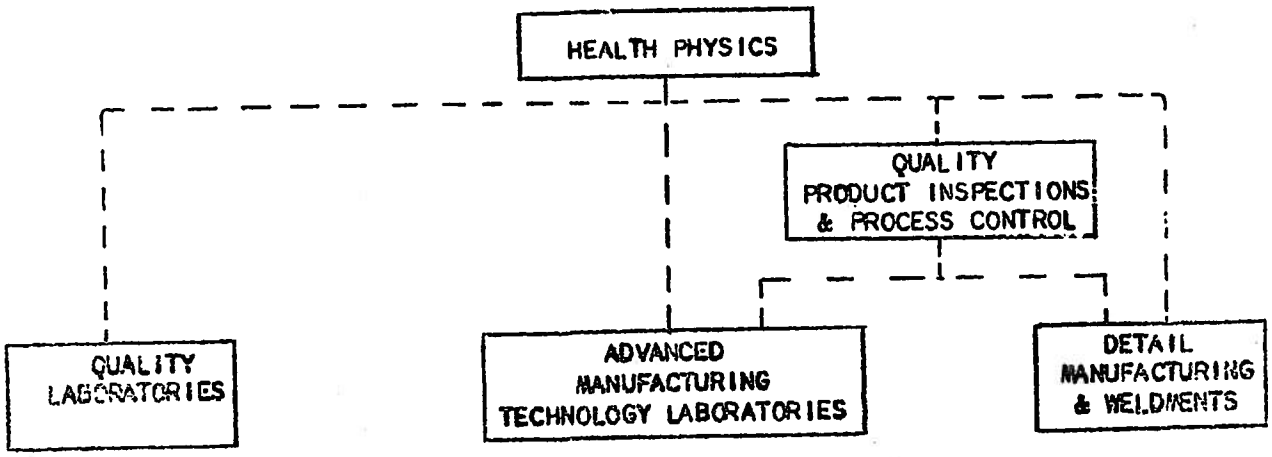
A. Organizational Structure

The following diagram shows the organizational relationships as they affect radiographic operations conducted by the Baltimore Divisions of the Martin-Marietta Corporation.



B. Internal Inspection System

The following diagram shows the management system established to control the potential hazard resulting from radiographic operation.



1. The Chief, Health Physics Section is responsible for the development and conduct of an effective radiological safety program. He is delegated the authority for this program through several official company organizational documents.

   (a) Operating Instruction No. ER-0-0-83 entitled - Health and Safety Administration.

   This document provides for the establishment and surveillance of radiological safety practices and procedures. It also provides that the Chief, Health Physics Section represent the Director, Administration and Industrial Relation on radiological safety matters with Government agencies.

   (b) Procedure No. OP-84.107 entitled - Control of Radioactive Isotope Materials

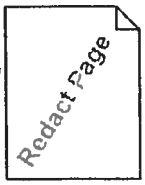
   This document establishes that the Chief, Health Physics Section shall review and approve Byproduct Material purchase requests and the plans for the use of these materials to assure that employees are properly educated to handle equipment and/or work in areas where radioactive materials are used; monitor employees handling such materials and the controlled area in which they work to assure compliance with radiological safety requirements; obtain governmental approvals authorizing purchase, use transfer and disposal of such materials; check all incoming and outgoing shipments of radioactive material to ensure compliance with Federal and State regulations. Radioactive materials shall only be used in controlled areas by personnel who have been approved to handle such materials by the Chief, Health Physics Section.

2. The Chief, Quality Laboratories supervises the development of non-destructive testing techniques. He is responsible for the safe conduct of radiographic operations in accordance with company procedures and other regulatory requirements.

3. The Chief, Advanced Manufacturing Technology Laboratories supervises the developmental testing of new manufacturing techniques. He is responsible for the safe conduct of radiographic operations in accordance with company procedures and other regulatory requirements.

4. The Superintendent, Weldments supervises the production and radiography of manufactured items. He is responsible for the safe conduct of radiographic operations in accordance with company procedures and other regulatory requirements.

5. Personnel representatives from the Quality Products Inspection and Process Control Department inspect to assure that radiographic operations within manufacturing are conducted only by certified radiographers.



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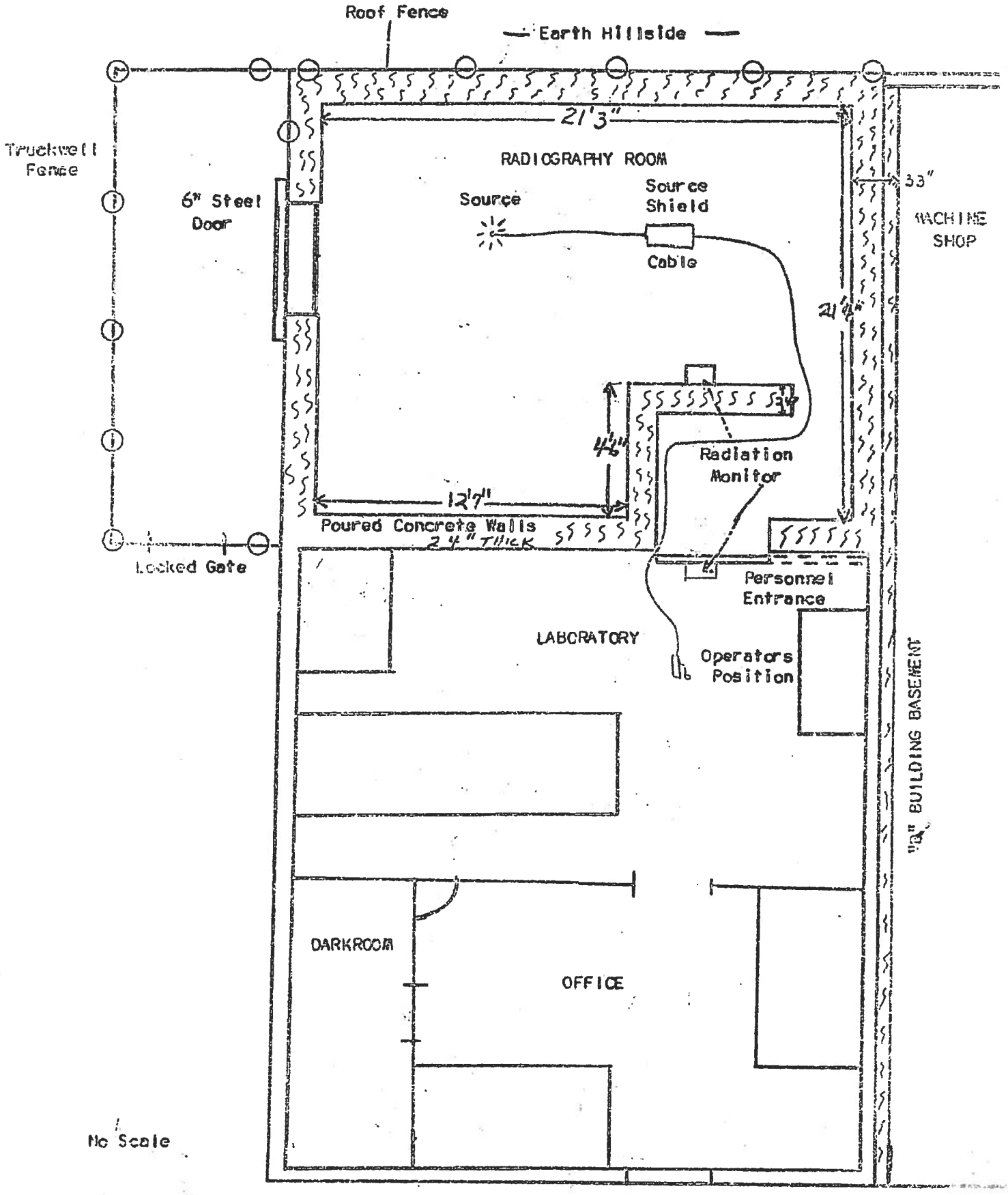

FIG. 2 RADIOGRAPHY FACILITY

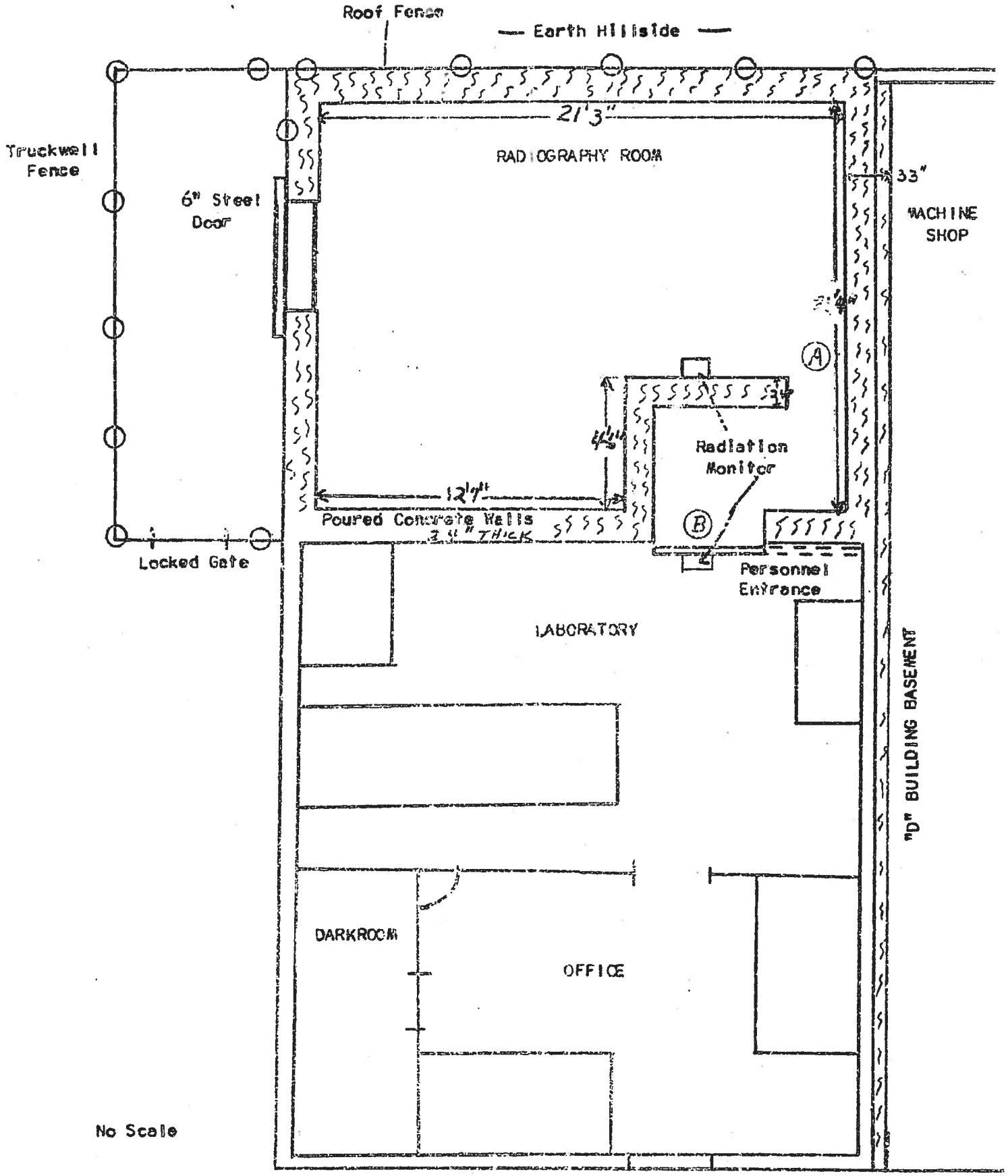

FIG. 3 RADIOGRAPHY FACILITY

FIG. 4

GAMMA RADIOGRAPHY DATA

AEC LICENSE NO. _____

Survey Instrument	Ser. No.

Dept.	Tele. Ext.	Order No.	Radiography Location	Date	Source, Serial No. & Strength	Projector Make & Model	Security Notified	Personnel	Dosimeter Reading Start	Dosimeter Reading Finish
						T.O. 412/498 Ir. 192 T.O. 402 Co 60				

Code	Film Size	Source/ Film Distance	Exposure Time Start	Exposure Time Finish	Exposure Time Total	Material	Thickness	Maximum Dose Rate To Operator	Max. Dose Rate at Restricted area Boundary	Source Returned To Projector & Monitored	Comments

FINAL PROJECTOR SURVEY (LOCKED AND MONITORED)

Radiographer's Signature

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief
Source & Special Nuclear Materials Branch, DLR

DATE: February 28, 1964

FROM : Charles D. Luke, Chief
Criticality Evaluation Branch, DLR

SUBJECT: THE MARTIN COMPANY, SHIPMENT OF URANIUM BEARING EXCESS MATERIAL FROM MARTIN-MARIETTA CORPORATION, DOCKET NO. 70-58, AMENDMENT NO. 20, DATED FEBRUARY 14, 1964

REFERENCES: (1) 2/17/64 Meeting, Bethesda, Charles Keller and DLR personnel
(2) 2/25/64 Telecon with Charles Keller and K. E. Lauterbach, DLR
(3) 2/26/64 Telecon with Charles Keller and K. E. Lauterbach, R. L. Stevenson and C. D. Luke

SYMBOL: DLR:RLS

Martin-Marietta proposes to ship air filters containing enriched uranium oxide to Davison Chemical at Erwin, Tennessee. The filters would be packaged in 55 gallon drums and wooden boxes and shipped with exclusive use of the van in a single shipment. (The proposed amendment described other waste materials and containers that have not been considered in this evaluation.)

Based upon our review of the application, we see no objection to that part of the shipment comprising 25 drums of small filters subject to the proviso that each 55-gallon drum containing 20 filters will contain no more than a total of 800 grams U-235. If the drum is to contain less than 20 filters then the 800 gram limit must be scaled down proportionately.

Martin Company proposed (Ref. 1) that the large filters be packaged in 110 gallon steel drums to which we had no objection. However, the large filters would not fit the 110 gallon drums and Martin (Ref. 2) proposed to package the large filters in wooden boxes. In order to permit our nuclear safety analysis of this modification, we request that Martin analyze the hazards, taking into consideration the effects of accidental impact, fire and wetting. The safety analysis should evaluate carefully any possible re-orientation of the uranium resulting from the series of accident conditions. If the large filters were packaged in steel drums, we would see no objection to shipment of these filters and can see no credible likelihood of hazards due to neutron interaction between 13 packages of the large filters and 25 packages of the small filters.

The medium size filters, packed one to a 55 gallon drum and each containing a maximum of 870 grams U-235, represent a serious problem and we are unable to agree with the applicant as to the safety of the eight packages. We do not agree with his assumed multiplication factor for a unit and we are convinced that further information is required on the structural integrity of the placement of these packages on the vehicle, inasmuch as nuclear safety of this part of the shipment is based on spacing being maintained between the eight packages. We request that the applicant include in his nuclear safety analysis the assumption that water would leak into each drum thoroughly wetting the filters, but that the accident would not necessarily involve complete flooding to the extent of isolating one unit from another. The applicant should compute by acceptable procedure the value of k_{eff} for the filter with all voids filled with water and assuming no reflector. He may use this k_{eff} to obtain the corresponding maximum solid angle, and space the eight packages so as not to exceed this solid angle. From the standpoint of neutron interaction with the other two types of packages on the vehicle, we would consider it acceptable if the medium filters were shored in one end of the vehicle, the large filters shored in the center and the small filters in the other end. Both this shoring and the fixment of the medium size filter packages should be designed to maintain separations in the event of credible accident. We feel that this would involve design taking into consideration a force of (b)(4) Ex4 Martin should be informed that we would be pleased to assist them in any way we can. I told Mr. Keller that Mr. Christian Beck would review the structural integrity and would be pleased to lend his assistance on this particular aspect of the problem.

Mr. Keller stated that one of his associates would telephone us next Monday afternoon, March 2, but I suggest that you refer the results of our present review, as outlined above, to Martin at the earliest opportunity.

cc: C. Beck, DLR

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Files

DATE: March 9, 1964

FROM : R. L. Stevenson
Criticality Evaluation Branch
Division of Licensing and Regulation

SUBJECT: TELECON WITH C. W. KELLER AND W. OSMYER OF MARTIN-MARIETTA CORPORATION OF MARCH 2, 1964, REGARDING SHIPMENT OF AIR FILTERS VIA MOTOR TRUCK FROM BALTIMORE, MARYLAND, TO ERWIN, TENNESSEE

The applicant was informed that his proposed Amendment No. 20 to SNM License No. SNM-53 should consider the following:

1. Shoring of containers on the truck should be adequate to withstand an impact causing a (b)(4) deceleration.

2. The total mass of U-235 in a 55-gallon drum of small filters should not exceed 800 grams and should be scaled down as the number of filters per drum is reduced from 20.

3. The medium size filters, at a maximum 870 grams U-235 per drum, should be spaced according to the k_{eff}-omega criterion with k_{eff} calculated based on water soaking of filters but without water between filters or drums.

4. The analysis of the hazards of shipping large filters, if these are packed in wooden boxes instead of metal drums, should be based on a possible impact, fire, and wetting.

5. The preferred over-all arrangement would be that in which the large filters in metal drums separate the drums of small filters from the drums of medium filters.

cc: D. A. Nussbaumer, DLR

MAR 12 1964

LR:KEL
70-58

Martin Company
Nuclear Division
Baltimore, Maryland 21203

Attention: Mr. C. A. Keller
Nuclear Materials Manager
Your reference: ACC-260

Gentlemen:

This refers to your application dated February 14, 1964, for amendment of License SNM-53 to authorize shipment of air filters containing uranium to the Davison Chemical Company. In order to continue our review of your application we require the following information:

1. Confirmation that each of the drums containing 20 small (8" x 8" x 6") filters will contain no more than a total of 800 grams of U-235. If any drum is to contain less than 20 filters, please confirm that 800 gram limit will be reduced proportionately.

2. Further description of the packaging of the filters including the gauge of the 55 gallon drums, the design of the container for the large (24" x 24" x 12") filters and the average weight of container and contents for the small, medium and large filters.

3. With reference to the containers for the medium size filters (18" x 18" x 6") please provide calculations of the K_{eff} for the filter with all voids filled with water and assuming no reflector. Submit also the proposed spacing of the eight containers demonstrating that the maximum solid angle corresponding to the K_{eff} will not be exceeded.

Doc. Rm.
Suppl
Br. & Div. rfs
Compliance

4. Your method of securing the drums to the floor of the vehicle to withstand a horizontal impact force of (b)(4) s acting at the center of gravity of the package without significant reduction in spacing between the drums. Ex 4

Very truly yours,

Donald A. Nussbaumer, Chief
Source and Nuclear Materials Branch
Division of Licensing and Regulation

OFFICE ▶	LR	LR	
SURNAME ▶	K.E.L. Lauterbach/js	DN Nussbaumer	
DATE ▶	3/11/64	3/12/64	

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—63761-3

DOCKET NO. 2058

L&R File Copy

MARTIN COMPANY

NUCLEAR DIVISION
Baltimore, Maryland
21203

Refer to: ACC 269

March 20, 1964

U.S.A.E.C.
Division of Licensing & Regulation
Washington, D. C.

Attention: Donald A. Nussbaumer, Chief
Source and Nuclear Materials Branch

Subject: Proposed Amendment No. 20 to Special Nuclear Material License No. 55

Gentlemen:

We are happy to supply the additional information requested in your March 12, 1964 letter, in order that you may complete your review and authorize shipment of air filters to Davison Chemical Company for uranium recovery. Our discussion will follow the format of your letter.

We trust that this additional information will permit you to authorize shipment of the filters in the very near future.

Very truly yours,

Martin Marietta Corporation

C W Keller

C. W. Keller,
Nuclear Materials Manager

CWK/nj

DOCKETED
USAEC
LICENSING & REGULATION
MAR 20 1964
DOCKET OFFICER

B/18

ACKNOWLEDGED

THE AEROSPACE DIVISION OF MARTIN MARIETTA

1494

DOCKET NO. 70-58

L&R File Copy

ADDITIONAL INFORMATION TO PROPOSED AMENDMENT NO. 20 TO SPECIAL NUCLEAR MATERIAL LICENSE NO. 53

1. Packaging of Filters

In the packaging of the small (8" x 8" x 6") filters, no more than twenty filters, containing a maximum of 600 gms U-235, will be packaged in any one 55 gallon drum. Preliminary packing has indicated that a maximum of 16 filters can be packed orderly in a drum. The following proportionate U-235 limits shall apply for drums containing less than 20 filters:

16 filters per drum	600 gms U-235
14 filters per drum	[illegible] gms U-235
12 filters per drum	[illegible] gms U-235

The filters will also be packed such that no drum will contain only filters with the higher concentrations of U-235.

2. Calculation of Shipping Containers

The following calculation describes the shipping containers to be used in the shipment of the air filters. A [illegible] of the [illegible] containers for the 24" x 24" x 12" [illegible] is included.

[illegible]	Container	Number	Average Total Weight	
[illegible]	[illegible] gal. drum	[illegible]	[illegible]	LBS.
[illegible]	[illegible] gal. drum	[illegible]	[illegible]	LBS.
[illegible]	[illegible]	16 container [illegible] lid	[illegible]	LBS

3. [illegible] Calculation [illegible] Filter [illegible]

For the [illegible] diffusion method of calculating steady [illegible] conditions, the standard effective multiplication factor ([illegible]) is given by:

$$P = \frac{k_0 C^{-B^2 \tau}}{1 + L^2 B^2} \qquad \text{(Reference 1)} \qquad (1)$$

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LICENSING & REGULATION
MAR 20 1964
DOCKET OFFICER

However, when ordinary water is the moderator, the spatial distribution of neutrons cannot be described by a simple exponential of the form e^{-Bzt}. Therefore, the following equation must be used:

$$K_{eff} = \frac{K_{\infty}}{(1+L^2B^2)\,(1+L_1^2B^2)\,(1+L_2^2B^2)\,(1+L_3^2B^2)\,(1+L_4^2B^2)} \qquad (2)$$

(Reference 2)

Where: K_{∞} = epfn, four factor equation

L_{∞} = 2.3[illegible] cm, diffusion length for thermal neutrons
($L^2 = \frac{[illegible]}{[illegible]}$ where [illegible] or [illegible] for [illegible])
(Reference 3)

L_1 = [illegible] cm

L_2 = [illegible] cm — Experimental spatial distribution for fast neutrons in ordinary water.

L_3 = 2.[illegible] cm

L_4 = 1.00 cm — (Reference 2)

B^2 = Geometric Buckling factor

The buckling for an 18" x 18" x 6" filter is given as follows:

$$B^2 = \left(\frac{\pi}{[illegible]}\right)^2 + \left(\frac{\pi}{[illegible]}\right)^2 + \left(\frac{\pi}{[illegible]}\right)^2 \qquad (3)$$

[illegible] in centimeters.

[illegible] $= 0.0[illegible]$ cm^{-2}

[illegible] (2) reduces to:

[illegible]

where,

e = 1.0 (fast fission factor)

p = 1.0 (Resonance Escape)

n = 2.1 (Fast Fission Neutrons)

f = 1.0 (Thermal Utilization - The maximum of 1.0 has been chosen for conservation in the final determination of [illegible])

Therefore:

$$\text{Eff} = \frac{2.1}{[illegible]} = 0.[illegible]$$

Conclusion:

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

4. Methods of Shoring:

We have recently negotiated with Tri State Motor Transit Company of Joplin, Missouri to obtain their specialized equipment for this shipment. The routing will be the same as that in our original submission.

To prevent shifting of the containers while in transit, wood blocking will be secured to the bed of the truck. The blocking will be installed in a manner to prevent shifting of the containers in all directions. 4 x 4 longitudinal blocking and 2 x 4 cross blocking will be installed between each container and/or group of like containers. To provide additional restraint, top hold-down blocking will be installed. Metal banding will be employed to secure the top hold-down. The truck is equipped with 42 tie-down fittings of 5000 lbs. capacity each. The metal banding will be attached to the tie-down and tensioned. For maximum safety, all restraining devices will be attached to the bed of the truck. As an additional safety measure, a wood bulk-head will be installed between the radiro nine fifters and the lamp fifters, as indicated on the drawing.

Pages 10 through 11 redacted for the following reasons:

(b)(4)

20-58

MARTIN COMPANY

NUCLEAR DIVISION
Baltimore,
Maryland
21203

File Copy

Refer to:
ACC-266

April 1, 1964

U. S. Atomic Energy Commission
Source and Special Nuclear Materials Branch
Washington, D. C.

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Proposed Amendment No. 21 to Martin Marietta
Special Nuclear Material License No. 53

Enclosure: (1) Proposed Amendment No. 21 to SNM-53
(six (6) copies)

Gentlemen:

We submit as Enclosure (1) our application to amend the Martin Marietta Special Nuclear Material License No. 53. This submission describes the fabrication steps and control criteria to be employed in the fabrication of a nuclear core of tubular design employing approximately 5% enriched uranium dioxide pellets. Immediate application will be for the MH-1A Floating Nuclear Power Plant. We intend to include this amendment as part of the overall revision of our Special Nuclear Material License No. 53, but are submitting this amendment at this time, because of delays encountered in editing our license revision.

You have recently approved an allocation of 250kgs U-235 for the MH-1A fabrication and we will appreciate receiving your approval of this proposed amendment by April 24, 1964.

Very truly yours,

C W Keller

C. W. Keller
Nuclear Materials Manager

CWK/nj

Encls.

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B/19

ACCEPTED

A DIVISION OF MARTIN MARIETTA

19[illegible]

DOCKET NO. 70-58

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PROPOSED AMENDMENT NO. 22
TO SPECIAL NUCLEAR MATERIAL LICENSE NO. SNM-95

It is the purpose of this proposed Amendment No. 22 to SNM-95 to describe the [illegible] criteria, which will be used in the fabrication of [illegible] core of a [illegible] employing slightly enriched uranium [illegible] plates.

Design and Nuclear Parameters

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. [illegible]
7. [illegible]
8. [illegible] Fuel Element - [illegible]

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LICENSING & REGULATION
APR 8 1964
DOCKET OFFICER

Completed fuel elements will be stored in the nuclear storage area in the D Building. Since safe geometry is the controlling factor for individual elements, a maximum total solid angle of 1.0 steradians is required. Vertical storage of the elements on five foot centers will be maintained by Martin Nuclear Materials Management, which has jurisdiction over the storage area. Calculation of the storage array is presented in Figure 3.

Pages 5 through 9 redacted for the following reasons:

(b)(4)

OPTIONAL FORM NO. 10
5010-104

UNITED STATES GOVERNMENT

Memorandum

TO : Donald A. Nussbaumer, Chief, Source and Special Nuclear Materials Branch, DML

DATE: April 7, 1964

FROM : Christian Beck, Staff Engineer - Structural
Irradiated Fuels Branch, DML

SUBJECT: MARTIN COMPANY LETTER DATED MARCH 20, 1964
SUPPLYING FURTHER INFORMATION ON SHIPMENT OF
U-BEARING AIR FILTER, SNM-53 - DOCKET 70-58

DML:IFB:CB

Based on the information furnished in subject letter and in TWX, dated 6 April, 1964, the strength of the tiedown of the filter packages satisfies our tentative impact force requirements of (b)(4) E4 to the direction of traffic.

It is understood that my structural integrity review was supposed to be confined to the tiedown only.

B/20

DOCKET NO. 70-58

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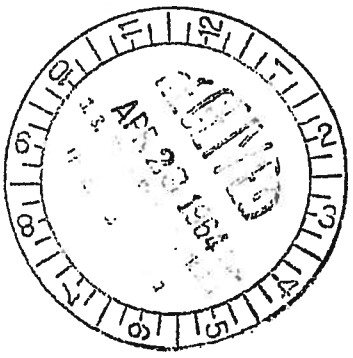
MARTIN COMPANY

NUCLEAR DIVISION
Baltimore, Maryland
21203

In reply refer to:
ACC-281



April 24, 1964

Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C.

Attention: Mr. Donald A. Nussbaumer, Chief,
Source and Special Nuclear Materials Branch

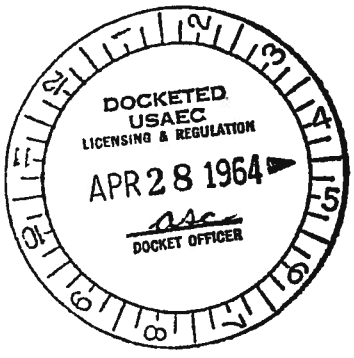
Subject: Proposed Amendment No. 21 to Special Nuclear Material License No. 53.

Gentlemen:

Thank you very much for your prompt attention to our April 1, 1964 application for proposed amendment no. 21 to Special Nuclear Material License Number 53. Mr. Lauterbach's efforts are especially appreciated. In reply to your April 20, 1964 letter we are supplying the additional information in the order of your request.

1. The U-235 loading for the MF-1A Core and spares will approximate 160 kgs U-235. We request authorization for possession of a maximum of 200 kgs U-235 to permit possession of excess pellets which may be required for replacement of rejected material.

2. Receipt of an incoming shipment of special nuclear material is the responsibility of Martin Nuclear Materials Management. After appropriate survey by Health Physics to ascertain any contamination or radiation levels, bulk receipts of special nuclear material are stored within the boundaries of a storage bay as indicated on the enclosed drawing of the nuclear storage area. The storage area is under the jurisdiction of Martin Nuclear Materials Management which verifies uranium quantities and controls spacing requirements. This



B/21
ACKNOWLEDGED

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& PDR

A DIVISION OF MARTIN MARIETTA

2288

procedure will be in effect for the MI-1A program and material will be stored in a planar array, if possible, but in no case in an array more reactive than as received.

3. Inspection of containers and their condition is performed in connection with receipt of special nuclear material described in point number 2. Containers whose integrity appears questionable are isolated and appropriate health physics action is taken. Nuclear safety analysis is performed if deemed necessary.

4. Cleaning operations indicated in the process flow are of completed fuel tubes and no direct contact of fuel with the cleaning media is anticipated. Identity and accountability of tubes will be maintained by immersion of the tubes into the cleaning media by utilization of a wire type basket.

Very truly yours,

C. W. Keller

C. W. Keller
Nuclear Accountability
& Licensing Representative

CWK/mc

Page 13 redacted for the following reason:

(b)(4)

DOCKET NO. 70-58

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DIVISION
Baltimore,
Maryland
21203

MARTIN COMPANY

Refer to:
ACC-287

May 11, 1964

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USAEC
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MAY 12 1964
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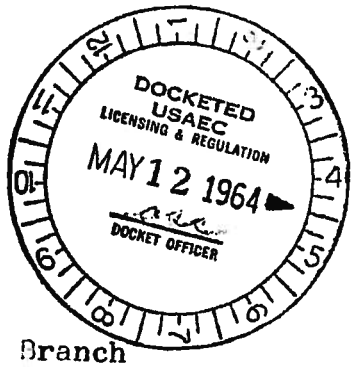

U. S. Atomic Energy Commission
Source and Special Nuclear Materials Branch
Washington, D. C.

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Information for Shipment of Uranium bearing solutions.

Reference: Shipment of Uranium Bearing Excess Material from Martin Marietta Corporation (Proposed Amendment No. 20 to SNM-53)

Gentlemen:

In our letter of February 14, 1964, we transmitted the reference document which, in general, described the Martin plans for shipment of excess uranium bearing material to a recovery site. Since that time an approved shipment of uranium bearing air filters has been accomplished. We are now submitting detailed shipping information for uranium bearing solutions. Shipment will be made to Erwin, Tennessee via the following route:

U.S. Route 40 to Frederick, Maryland
U.S. Route 340 to U.S. Route 11
U.S. Route 11 to Erwin, Tennessee (Destination)

General Discussion -

The solution, which results from fabrication activity including pickling and cleaning operations, approximates 20,000 liters and is contained in polyethlene lined 55 gallon drums. Inventory of solution on hand as of May 1, 1964 is shown in the following table:

No. of 55 Gallon Drums	Type of Solution	Percent Acid Content	Grams of Uranium in solution
9	Water	none	1939
4	Perchloric Acid and Water	16%	680
43	Nitric Acid and Water	14%	8285
37	Sulfuric Acid and Water	18%	3395

Compliance K.E.K.
& PDR

B/22

ACKNOWLEDGED
A DIVISION OF
MARTIN MARIETTA

Minor additional quantities will be generated during the completion of the program.

Containers.-

The detail of the polyethlene lined 55 gallon drum shipping container consists of a specification 2S polyethlene liner in an 18 gauge 55 gallon drum as shown in the attached drawing. Although all containers are considered in sound condition, a thorough inspection of each individual drum will be performed by Martin Nuclear Materials Management to further insure drum integrity prior to shipment.

Method of Shipment.-

Each filled container which weighs approximately 500-600 pounds will be banded to an individual pallet and placed within the shipping van as depicted in the attached drawing. Tie down of the entire shipment within the van is also shown. Stacking of drums will not be permitted and shipment of the solution previously indicated on inventory will be made by exclusive use of a van. Two such shipments are anticipated. Smaller residual quantities resulting during the completion of the program which will not constitute a van load will be included with other type material in order that exclusive use of a van may be economically employed. Shipment of all solutions is expected within a six month period.

Hazard Evaluation.-

(1) Criticality

The uranium content of each drum has been established by chemical analysis and no individual drum contains more than 350 gms of U-235. U-235 content in the drums ranges from 2-350 grams distributed as follows:

2-100 gms	U-235	34
100-200	"	27
200-300	"	20
300-350	"	12

Since each 55 gallon drum contains no more than 350 gms U-235 in solution the moderator to fuel atom ratio has been calculated to be 17,900.

Referencing Figure 1 of TID-7016, Rev. 1, "Nuclear Safety Guide" shows that moderator to fuel ratios greater than 2,000 cannot achieve criticality. Therefore, these solutions are approximately a factor of 9 overmoderated.

In addition the overall uranium concentration in the approximate 20,000 liters is less than 1 gram U-235 per liter of solution an always safe condition. Also a severe rupture of several drums by some unpredicted accident during transport would only spread the solution over the truck bed in a slab array too thin to support a nuclear chain reaction.

(2) Chemical Hazard

Recent inspection of polyethlene liners which have been used for storage of similar acid solutions over a period of two years has shown compatability of the solution with the polyethlene liner. Acid solution inspected after storage has been clear and no settling of uranium sludge has been evident. A recent shipment of similar solution in this type container was approved and made without incident at the direction of the AEC.

We have submitted similar information to the Bureau of Explosives and would appreciate receiving approval in order that shipment may be made during the week of May 25, 1964.

Very truly yours,

C. W. Keller

C. W. Keller
Nuclear Accountability &
Licensing Representative

CWK/mc

DOCKET NO. 70-58

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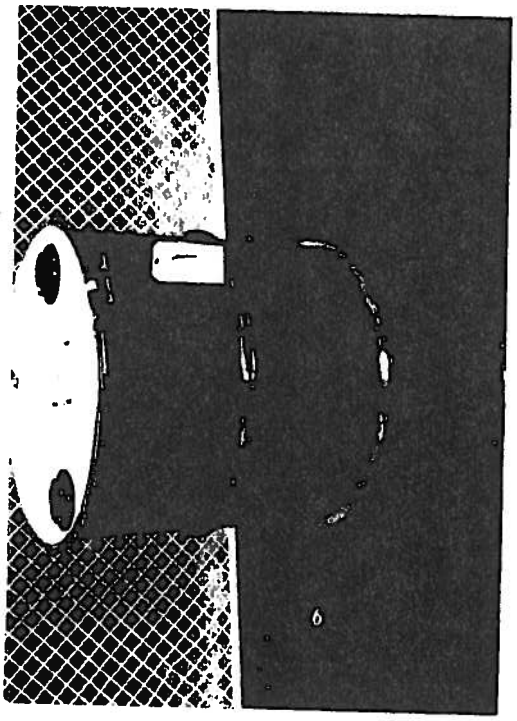

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MAY 12 1964
arc
DOCKET OFFICER

STORAGE CONTAINERS

(b)(4)

Ex4

2501

Page 18 redacted for the following reason:

(b)(4)

CLASS OF SERVICE
This is a fast message unless its deferred character is indicated by the proper symbol.

WESTERN UNION
TELEGRAM

W. P. MARSHALL, PRESIDENT

SF-1201 (4-60)

SYMBOLS
DL = Day Letter
NL = Night Letter
LT = International Letter Telegram

The filing time shown in the date line on domestic telegrams is LOCAL TIME at point of origin. Time of receipt is LOCAL TIME at point of destination

545P EDT JUN 1 64 PA394

DOCKET NO. 70-58

P BRMN002 NL PD
WUX BRMN BALTIMORE MD 6/1
DIVISION OF MATERIAL LICENSING ATTN: MR KENNETH LAUTERBACH
4915 ST ELMO AVE
BETHESDA MD
THANKS FOR SOLUTION SHIPMENT APPROVAL. REQUEST TWX APPROVAL FOR SHIP-

'File Copy

MENT OF SOLUTION AND SOLID SCRAP TO UTILIZE VAN LOAD. SHIPMENT TO BE AS FOLLOWS:
APPROX. 15 SOLUTION DRUMS EACH 350 GMS U-235 AS PREVIOUSLY PRESENTED.

APPROX. 25-55 GALLON DRUMS 4 INCH-40 SCHEDULE PIPE SHIPPING CONTAINERS

FOR 3000 GMS U-235 AS SOLID AND POWDER SCRAP.

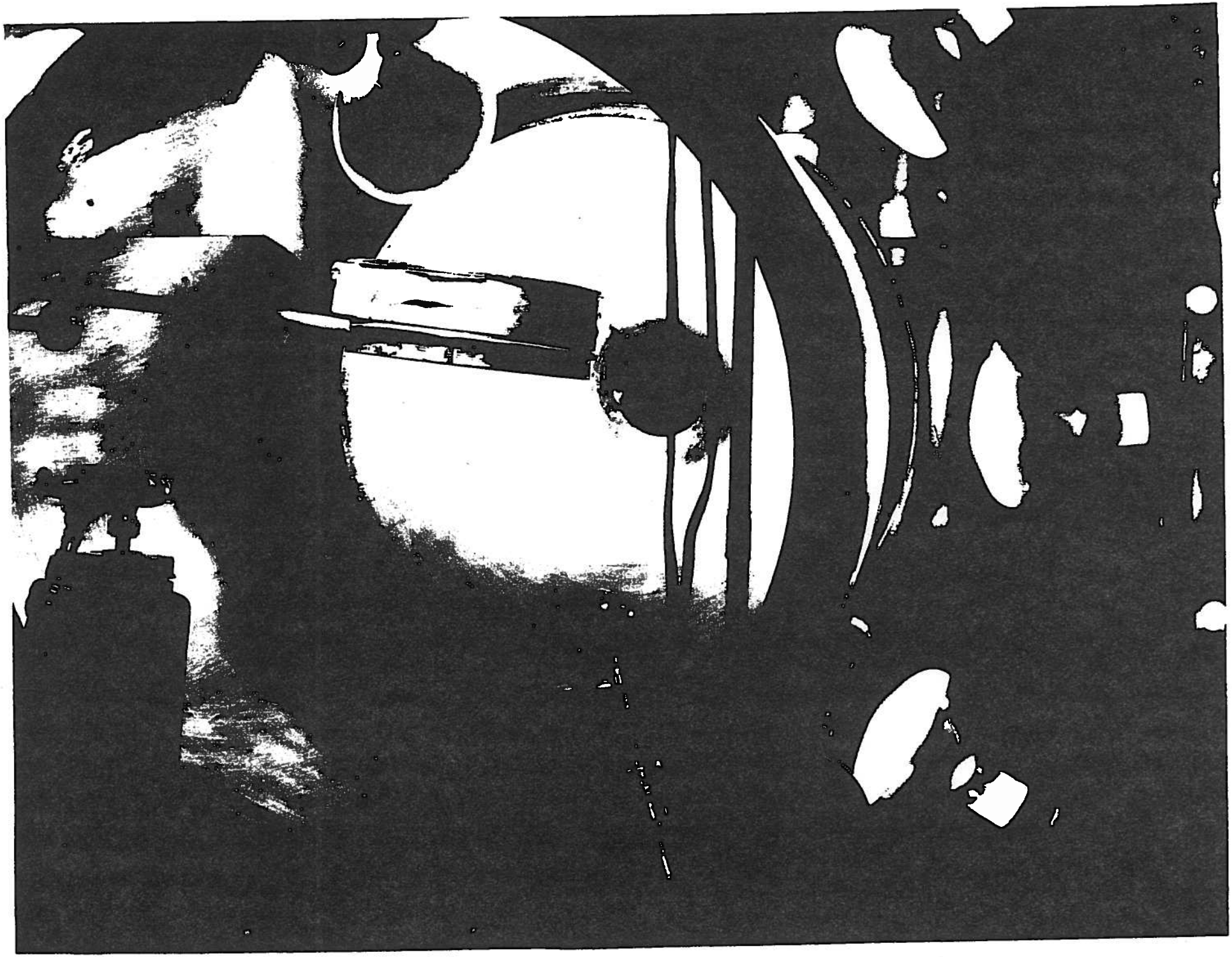
APPROVAL FOR THIS CONTAINER GIVEN FOR FUEL PLATES UNDER AMENDMENT 15 TO SNM-53. TIE-DOWNS SIMILAR TO PREVIOUSLY PRESENTED. BOE PERMITS IN EFFECT. WOULD LIKE APPROVAL BY JUNE 5 TO KEEP TRUCK ROLLING AND MAKE SHIPMENT ON JUNE 8.
MARTIN CO C W KELLER 807 6/1

15 350 U-235 25-55 4 40 3000 U-235 15 SNM-53 5 8 807 6/1.

DOCKETED USAEC LICENSING & REGULATION JUN 2 1964 DOCKET OFFICER

Copy Provided Compliance & CEB K.E.L. 6/2/64

B/22



DOCKET NO. 70-58

File Copy

MARTIN COMPANY

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

Mail No. 845
Refer to: ACC-324
26 August 1964

RECEIVED
REGULATORY
MAIL SECTION

Division of Material Licensing
U. S. Atomic Energy Commission
Washington, D. C.

Attention: Mr. Kenneth Lauterbach

Subject: Drop Test of Shipping Container - Proposed Amendment No. 21 to SNM-53

Gentlemen:

As a result of our discussion in Bethesda on August 20, 1964 we have conducted a drop test for the container designated A in support of our request for shipment approval for loaded tubular elements containing approximately 5% enriched UO_2 pellets. We selected Container A since it represents the container having the lesser structural strength of the two containers proposed for this shipment. All calculations have been based on the drop test results for Container A. A steel rod weighing approximately 75 pounds and filling the inner 40 schedule pipe was used to simulate the loading of the container with fuel. The first drop was made to provide a side impact on the shipping container from a height of 30 feet measured to the bottom of the drum. The diameter of the drum prior to the drop was 22.75 inches and a deformation of 3.25 inches was determined after the drop. Since the container remained intact another drop on the top was performed in the same manner with the same container. Except for an approximate 2½ inch protrusion from the bottom of the drum no significant deformation was produced.

Our nuclear safety calculation, considering a cubic array of the deformed containers, was performed using the dimensions resulting from the drop test. Since this calculation has shown that the most reactive array of the deformed containers will not produce criticality, we request that your approval of this shipment be made without a requirement for shoring as described in our August 14, 1964 submission. Fuel is ready for shipment at Nuclear Fuel Services and we request immediate approval for shipment of the tubular elements.

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USAEC
AUG 26 1964
REGULATORY
MAIL SECTION
DOCKET CLERK

1cy to CB 8/26/64
2cy to Compliance 8/28/64
1cy to PDR

B/30
ACKNOWLEDGED

A DIVISION OF
MARTIN
MARIETTA

We appreciate very much the excellent cooperation of all AEC personnel who have reviewed our submissions. Their comments have been very helpful.

Very truly yours,

C. W. Keller

C. W. Keller
Nuclear Accountability &
Licensing Representative

CWK/mc

DOCKET NO. 71-58

Nuclear Safety Evaluation

Discussion

Nuclear safety calculations have been completed for the MH-1A shipping container using the dimensions obtained from the 30-foot drop test. The container consists of a 4-inch inside diameter pipe centered in a 55 gallon drum. The maximum deformation of the diameter was 3.25 inches.

The calculations were based on a 19.5 inch center-to-center drum spacing for the most reactive array assuming that the shipping containers were stacked two high as shown in the solid angle calculations.

The calculations assumed that:

(1) each container contained a maximum of 27 fuel tubes which limited the U-235 content to 1.11 kilograms

(2) the active fuel region was a 4 inch cylinder 40 inches in length*, and

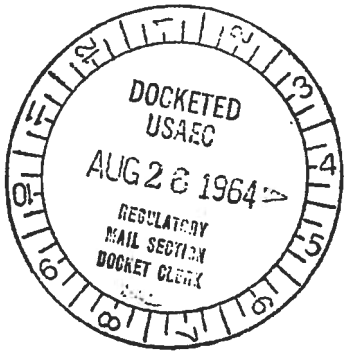
(3) the container was flooded with water

The effective multiplication factor for the most reactive unit in the array was 0.35. A unit consisted of shipping containers stacked two high.

Conclusions

The total allowable solid angle is equal to 9-10 k_{eff} or 5.5 steradians. The total calculated solid angle was 4.7 steradians for the previously described array. Therefore, the use of the shipping containers described in this letter presents no potential hazards from the nuclear safety standpoint.

*The 4-inch diameter center pipe is actually 42 inches long. However, the active fuel is actually 36 inches long with a 2 inch end-cap welded onto each fuel tube.



DOCKET NO. 70-58

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EFFECTIVE NEUTRON MULTIPLICATION CALCULATION

MATERIAL	VOLUME (cm^3)	VOL. FRACTION	Σ_a	Σ_f
H_2O	19,350.333	.43010	.0321	.0195
347 SS	1,072.822	.04512	2.57	.0195
U-238	3,017.989	.14870	.121	.0130
U-235	113.783	.00692	2.091	.0135
VOIDS AND IMPURITIES	2,435.973	.14914	0	0

THERMAL UTILIZATION

$$f = \frac{\Sigma_{a_1} \phi_1 V_1}{\Sigma_{a_1} \phi_1 V_1 + \Sigma_{a_2} \phi_2 V_2} = \frac{.41334}{27.666} = .327$$

FAST FISSION FACTOR

$$\epsilon = 1 + \frac{\nu_2 \Sigma_{f_2}}{\Sigma_{a_1} \phi_1 \left(\frac{V_1}{V_2}\right) + \nu_2 \Sigma_{f_2}} = 1 + \frac{.2452}{\Sigma_{a_1} \phi_1 \left(\frac{V_1}{V_2}\right) + .2452}$$ 1.2

RESONANCE ESCAPE

$$p(\ell) = \exp\left(-\frac{\ell}{\bar{\ell}}\right)$$

$$\frac{1}{\bar{\ell}} = .229$$

$$\ell_2 = \frac{4 V_2}{S_2} = \frac{4(2)}{\pi(5/12)} = \frac{4(2)}{\pi(5/12)}$$

$$\ell_1 = \frac{4(\pi r_1 h_1)}{S_1 \left(\frac{V_1}{V_2}\right)} = \frac{4\pi(5/12)(10.5)}{\pi(5/12)\left(\frac{V_1}{V_2}\right)} = \frac{4(2)}{\pi(5/12)}$$

$$\bar{\ell} = \frac{1}{\Sigma_{a_1} + \Sigma_{a_2}} \left[\Sigma_{a_1} \ell_1 + \Sigma_{a_2} \ell_2\right] = .4367$$

$$p = 1 - \frac{(\Sigma_{f_1} \ell_1)^2 - (\Sigma_{f_2} \ell_2)^2}{\Sigma_{f_1}} = .8031$$

$$E_2 = 1 + (\Sigma_{f_2} \ell_2)^2 \left[\frac{\Sigma_{f_1}}{\Sigma_{f_2}} \frac{\ell_1}{\ell_2} + \left(\frac{\Sigma_{f_1}}{\Sigma_{f_2}}\right)^2 - 1\right]$$

$$E_2 = 1 + .1912\left[.099 - 1.0 + 4(.038)^2\right] = 1.015$$

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$$\frac{1}{f_r} = 1 + \frac{V_1}{V_0}\frac{\Sigma_{a1}}{\Sigma_{a0}} E_r + (E_r - 1) = 1 + (2.237)(2.9[illegible])(1.004) - (1.005 - 1)$$

$$\frac{1}{f_r} = 13.550$$

$$f_r = .0738$$

$$p(E) = \exp\left(-\frac{.0738}{.9262}\right) = .923$$

NEUTRONS LIBERATED PER THERMAL NEUTRON ABSORBED IN FUEL

$$\eta = 1.928$$

INFINITE MULTIPLICATION FACTOR

$$k_\infty = \epsilon\,\eta\,f\,p = (1.042)(1.928)(.937)(.923) = 1.645$$

CHECKING

$$e^2 = \left(\frac{2.405}{H}\right)^2 + \left(\frac{\pi}{B}\right)^2 = .0774 + .0[illegible] = .07770$$

WHERE: $H = 30 + 2.54 + 24 = 216.21$

$R = 3 + 2.54 + 3.5 = [illegible]$

EFFECTIVE MULTIPLICATION FACTOR

$$k_{eff} = \frac{k_\infty}{(1+L_1^2B^2)(1+L_2^2B^2)(1+L_3^2B^2)} = \frac{1.645}{4.755} = .346$$

WHERE:

$L_1^2 = 2.625$

$L_2^2 = 26.539$

$L_3^2 = L_{eff}^2(1-f) = 8.1225(1-.[illegible]) = .[illegible]$

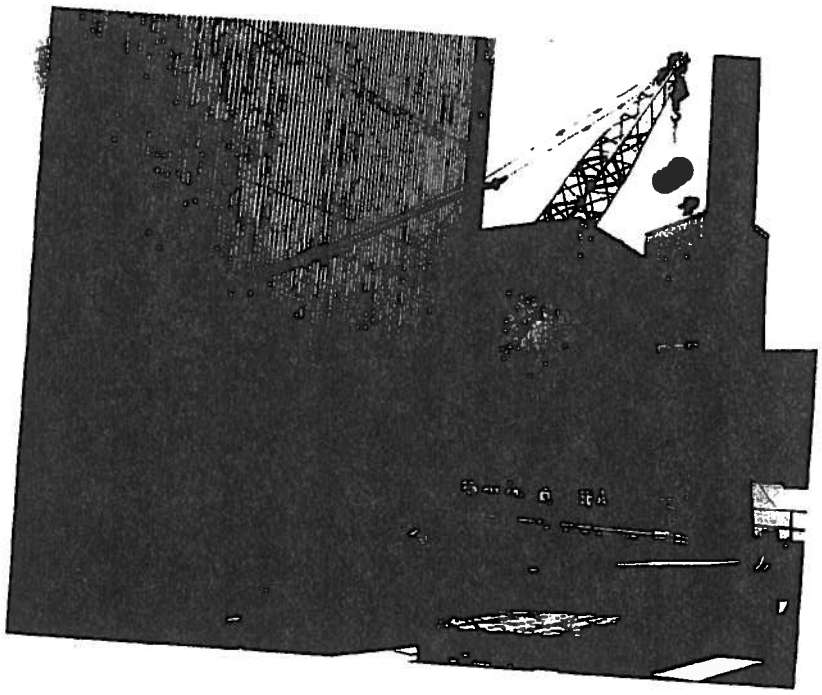
$(1+L_1^2B^2)^2 = (1+2.625 \times .07770)^2 = 1.4495$

$(1+L_2^2B^2) = (1+26.539 \times .07770) = 3.0621$

[illegible]

Pages 6 through 7 redacted for the following reasons:

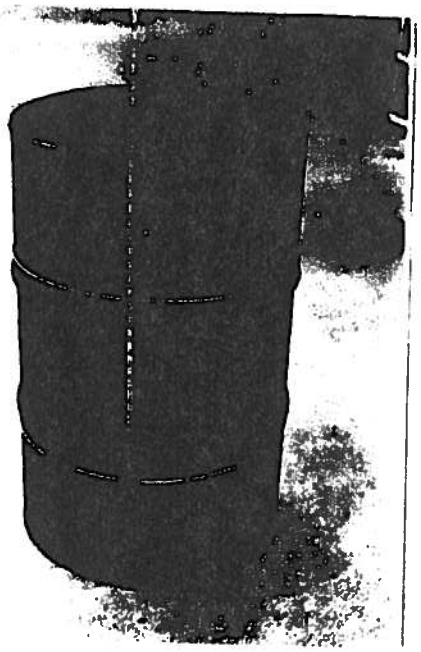
(b)(4)



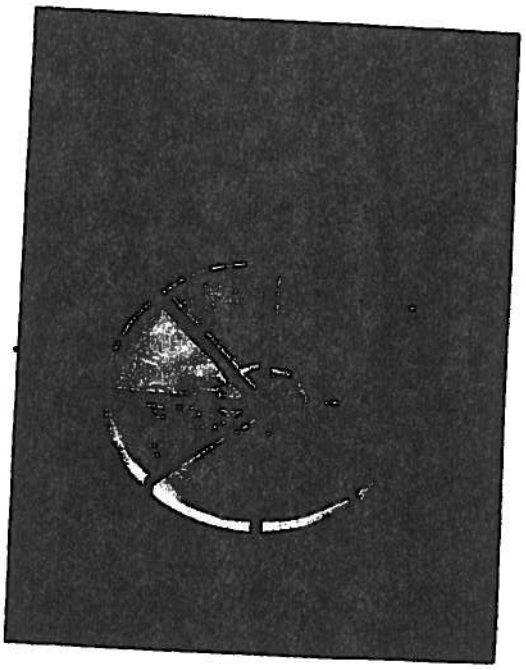
Shipping Container 30 Feet
Above Ground Level



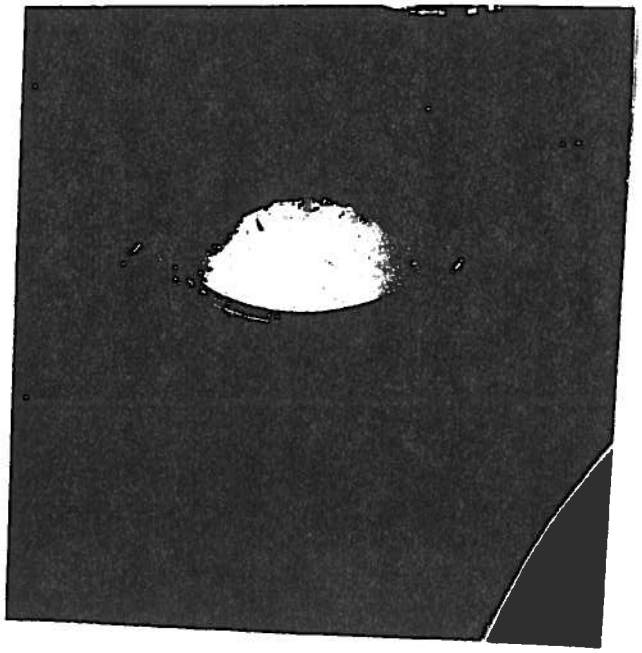
Top View of Shipping Container
After 30 Foot Drop Test
(Max. Deformation 3½ Inches)



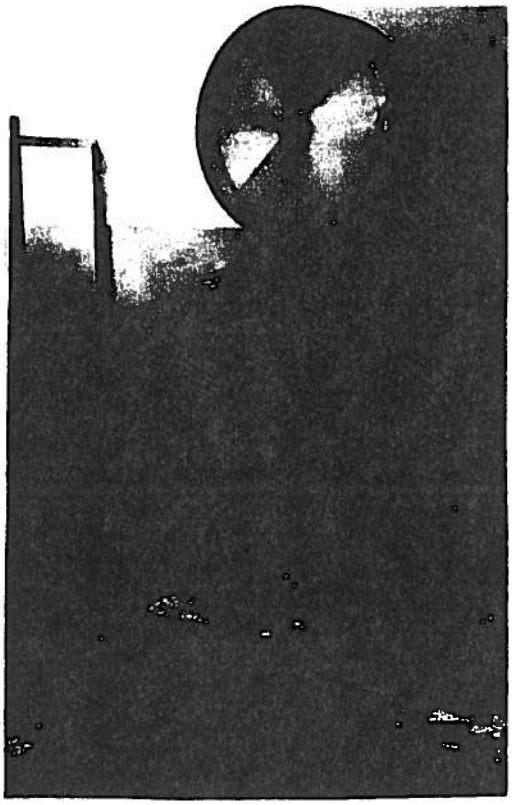
[illegible]



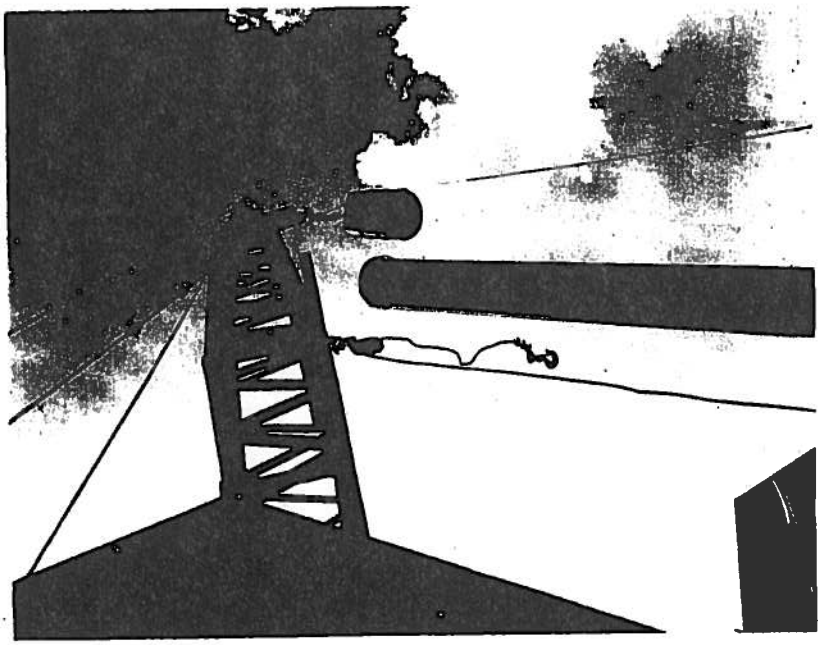
[illegible]



Top View of Shipping Container
and 3 inch Diameter Steel Rod

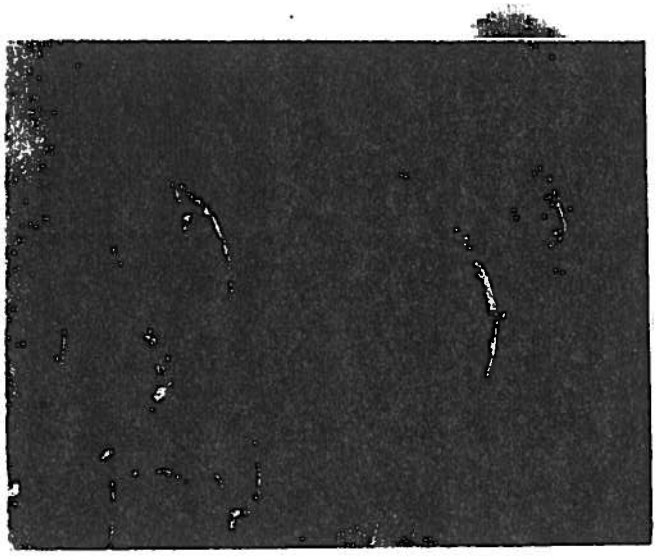


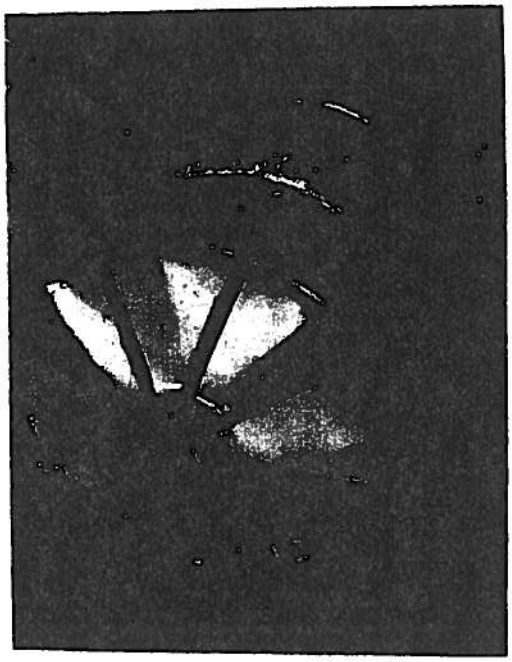
3 inch Diameter [illegible]
[illegible] inches in Length
Weighting [illegible] pounds



Shipping Container Prior to Second 30 Foot Drop Test

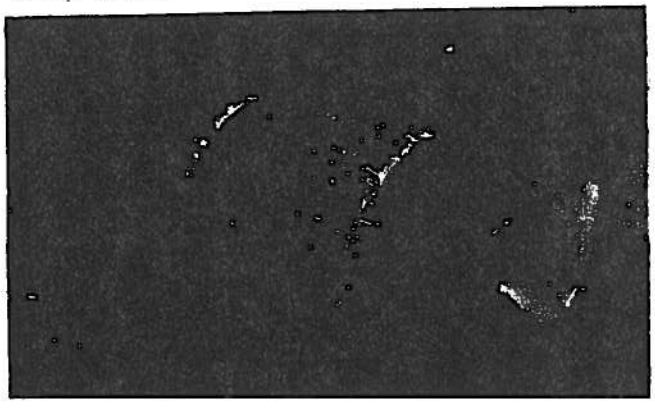
(Container dropped from vertical position with top facing downward)





Top View After 30 Foot Drop Test

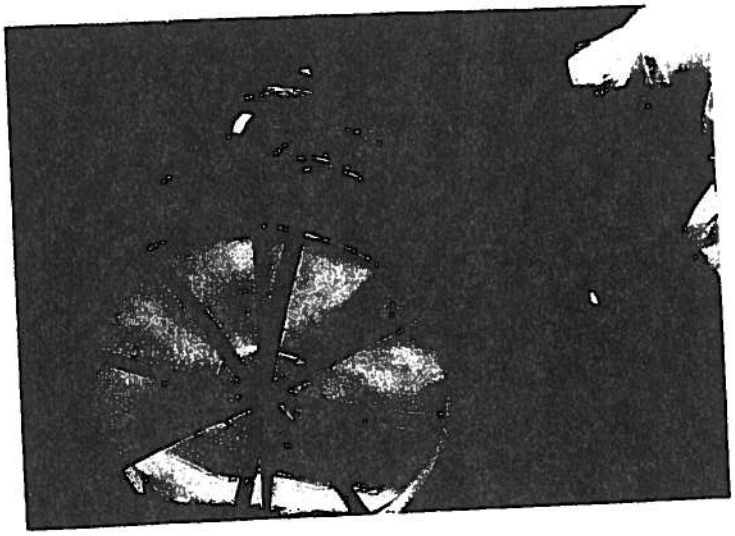
Side View After 30 Foot Drop Test



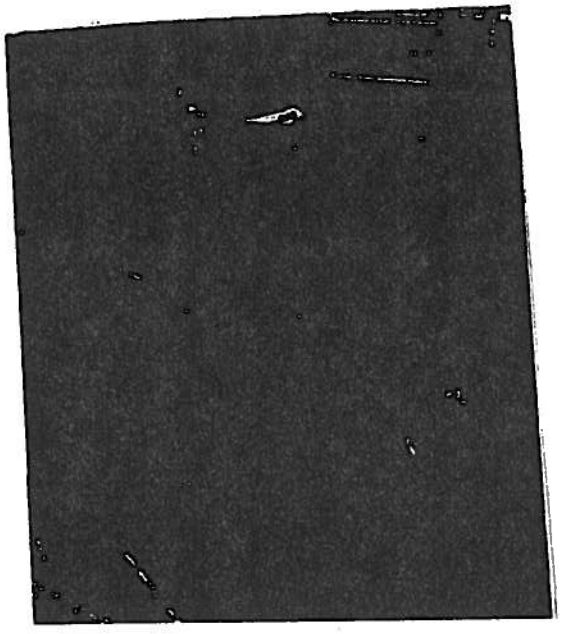
Side View After 30 Foot Drop Test

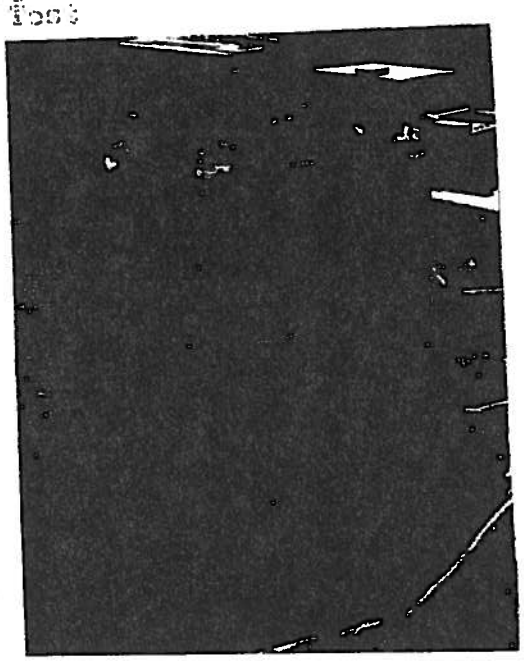


Side View of Shipping Container
After 30 Foot Drop Test



End View of Shipping Container
After 30 Foot Drop Test





MARTIN COMPANY

NUCLEAR
DIVISION
Baltimore,
Maryland
21203

Refer to:
ACC-332

Mail No. 845
September 11, 1964

DOCKET 70-54

File Copy

U. S. Atomic Energy Commission
Division of Material Licensing -
Washington, D. C. 20545

Attention: Mr. Kenneth Lauterbach

Subject: Additional Information for Amendment No. 21 to SNM-53

Gentlemen:

In our August 4 and 19, 1964 letters to you we described the process and control criteria to be used in the fabrication of a nuclear core of tubular design employing slightly enriched uranium oxide pellets. These criteria were approved by your telegram dated August 28, 1964.

Anticipating possible production bottlenecks in several of the operations, the Martin Manufacturing Department has requested that we obtain AEC approval for increased limits in several of the previously approved process steps. We have also included several additional steps which have been added in the processing. Changes in this submission from previous submissions are appropriately indicated in the flow chart and in the nuclear safety evaluation.

Since the approved possession limit of 127 kgs U-235 includes only the quantity which will be contained in the fabricated core, we request that this limit be increased to 175 kgs U-235 to provide proper approval for excess fuel which may be required. This increase in U-235 limit does not affect the overall possession limit for the Martin Marietta facility under SNM-53.

To afford proper coordination of the revised limits in the processing schedule, we will appreciate receiving your approval by September 23, 1964.

Very truly yours,

C W Keller

C. W. Keller
Nuclear Accountability &
Licensing Representative

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1cy cB, 1cy PDR, K.L. 9/17/64

8/31

A DIVISION OF MARTIN MARIETTA

4540

DOCKET NO. 70-58

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NUCLEAR SAFETY EVALUATION

[illegible]

[illegible]

[illegible]

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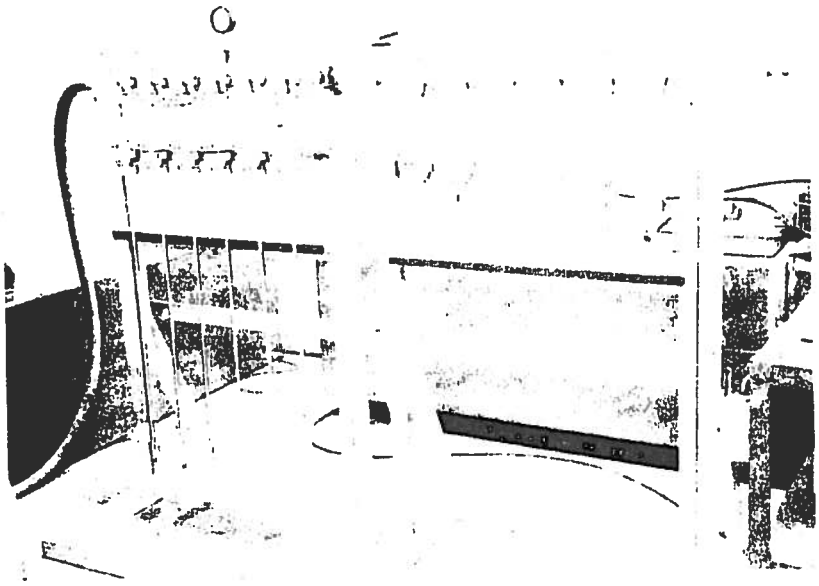
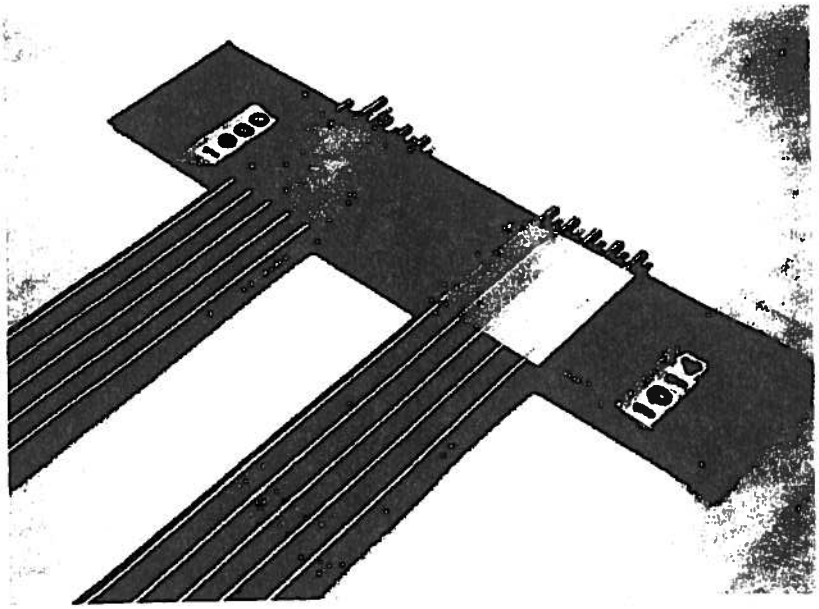
USAEC
SEP 4 1964
REGULATORY
MAIL SECTION
DOCKET CLERK

Pages 3 through 6 redacted for the following reasons:

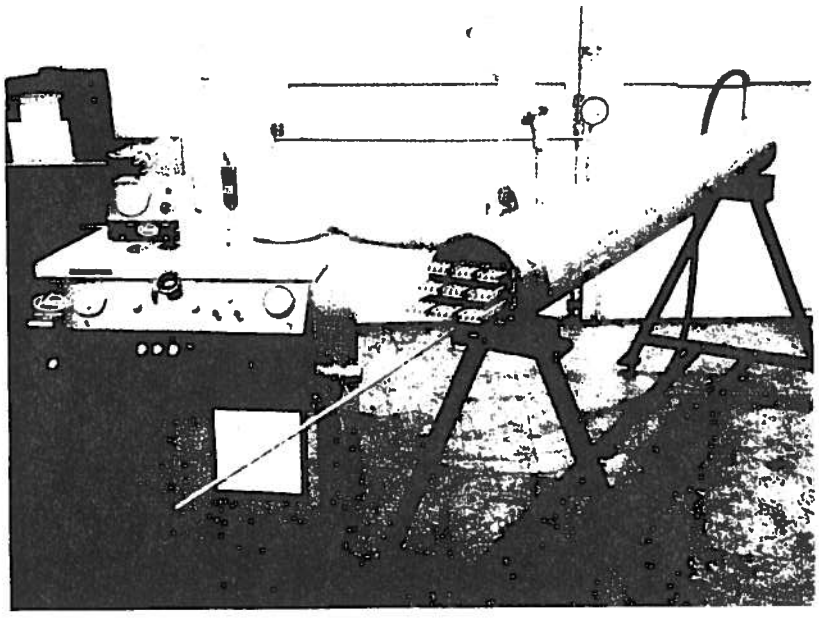
(b)(4)



Welding Rack



Typical Radiography Racks



Helium Leak Test Chamber

(70-55)
70-522
50-[illegible]

SEP 24 1964

X

DONALD A. NUSSBAUMER, CHIEF
SOURCE & SPECIAL NUCLEAR MATERIALS BR.
DIVISION OF MATERIALS LICENSING
USAEC, GERMANTOWN, MARYLAND

H. J. McALDUFF, JR.
PRODUCTION DIVISION
USAEC, OAK RIDGE OPERATIONS OFFICE
OAK RIDGE, TENNESSEE

REUTT SEPTEMBER 22, 1964, FINANCIAL LIMITATION HEREBY INCREASED FOR THE FOLLOWING, UP TO THE DOLLAR VALUE SHOWN, MARTIN-MARIETTA CORPORATION, LICENSE NUMBER SNM-53 TO (b)(4) [redacted] WESTERN NEW YORK NUCLEAR RESEARCH CENTER LICENSE NUMBER R-77 TO (b)(4) [redacted] WELEX, A DIVISION OF HALIBURTON COMPANY, LICENSE SNM-504 TO (b)(4) [redacted]

REFERENCE DML:[illegible]

Ex 4

BCC: F. L. Hiser, OC
L. Johnson, DML

B/32

OFFICE ▶	DML	OC	DML			
SURNAME ▶	Doulos:jb	[illegible]	DNussbaumer			
DATE ▶		9/23/64				

Form AEC-318 (Rev. 9-53)

U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

EXTRUSION OF TUBULAR COMPONENT

Tubular nuclear components can be formed by either forming a tube from a flat plate or through direct extrusion of a tube by pressure. In the formation of a tube by extrusion, nuclear safety is governed by the diameter of the extrusion dye. An always safe five inch diameter shall be maintained for any extrusion. Normally, the always safe diameter will not exceed that of a 1½ inch diameter tubular component. A limit of 800 gms U-235 has been established, as the batch limit for extrusion, which is based on an always safe mass, which during extrusion, will comply with an always safe diameter configuration.

HYDROSTATIC PRESSING

To densify the tubular component, resulting from extrusion or a cermet plate, a hydrostatic pressing operation is employed. The component is assembled in appropriate framework and enclosed in a rubber capsule, prior to the pressing operation.

Nuclear safety is defined by the always safe 2½ inch inner diameter of the hydrostatic press. A maximum limit of 2000 gms U-235 has been established for the operation. The hydrostatic fluid is a mixture of a special oil and kerosene. The maximum internal volume of the press with 2½ inch diameter and 40 inch length is calculated to approximate 197 cubic inches or 3.2 liters. The quantity of fluid used will, of course, always be less than the 3.2 liters dependent on the number of components being pressed. The following sketch details the hydrostatic press and shows a typical placement of tubes in the press.

TELEDYNE ISOTOPES

110 WEST TIMONIUM ROAD
TIMONIUM, MARYLAND 21093
TELEPHONE: (301) 252-8220
TELEX: 87-780

RECEIVED
MAR 30 1976
U. S. Nuclear Regulatory Commission
NMSS

March 25, 1975
Refer to: TES-JWM-1251

U. S. Nuclear Regulatory Commission
Division of Material Licensing
Washington, D. C. 20545

Attention: Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch

Subject: Cancellation of License No. SNM-849, Docket 70-908

Gentlemen:

The requirement for Teledyne Isotopes' Timonium, Maryland facility to retain a Special Nuclear Materials license has been critically evaluated. As a result of this evaluation, the decision has been made to terminate our SNM-849 license. Currently, three amendments to the license cover four items and these items will be discussed individually so that the rationale behind our conclusion can be presented.

1. Amendment 05, dated October 19, 1970, Items 6C, 7C and 8C covering 100 micrograms of elemental plutonium counter standards. Four counter standards are involved. The total activity is 6.5×10^{-8} Ci, considerably less than a licenseable quantity. The counter standards were never required to be on the license.

2. Amendment 05, dated October 19, 1970, Items 6E, 7E and 8E covering 100 grams of contained U-235, any enrichment, any form. The initial purpose was Research and Development as defined in 10 CFR 70.4 (j) and a later purpose was to demonstrate the capability of a thermal ionization source mass spectrometer which we manufacture for domestic and international sale. Currently, it is planned to do the calibration and demonstration of this device at the purchaser's facility because the RF noise in our own facility precludes that activity. We currently have no U-235 in house for this purppse. Regarding the R&D activity with U-235, none is currently underway and none is contemplated.

3. Amendment 10, dated June 6, 1974, Items 6F, 7F and 8F covering 100 micrograms of plutonium, any form. The purpose was to calibrate and demonstrate the mass spectrometer discussed in the previous paragraph. This activity cannot be accomplished because of the reason presented previously. We currently have no plutonium in house for this purpose.

3541

4. Amendment 12, dated November 1, 1974, Items 6G, 7G and 8G covering 300 grams total plutonium enriched in the isotope Pu-238 in seven sealed sources. This program is now concluded and we currently have no sealed source in house.

A comprehensive radiation survey has been made at the Teledyne Isotopes facility at 110 West Timonium Road, Timonium, Maryland. The survey consisted of a general portable instrument monitor supplemented by an extensive wipe test survey.

Instrumentation for the survey included:

Eberline E500B	Geiger Counter
Eberline PAC-1SA	Alpha Scintillation Meter
Eberline SAC-2	Scintillation Alpha Counter
NMC PCC-10A	Internal Proportional Counter

All areas that had been subjected to the use of radioactive materials were initially checked for contamination with the portable instruments, i.e., the E500B and PAC-1SA. All results of this survey were negative - no contamination was detected by the use of portable instruments.

The wipe test technique utilized for this survey consisted of smearing a dry filter paper over an area of approximately 100 cm^2 and counting the wipe in both the SAC-2 and the PCC-10A for alpha and beta/gamma activity, respectively. The SAC-2 operates with 35% efficiency and a background of $\sim$ 4 counts/minute. The PCC-10A operates with 50% efficiency and a background of $\sim$62 counts/minute. Efficiency and background readings were taken on both counters prior to counting the wipes and after the wipe counting had been concluded.

A total of 67 wipes were taken at various locations throughout the entire facility, concentrating on those areas where radioactive materials had been present. Results of this survey indicated minimal removable surface contamination. The maximum net results were less than 10 d/m/100 cm^2 for both alpha and beta/gamma activity from any one wipe. The details of this comprehensive survey are recorded in our permanent Health Physics Log.

The cancellation of our SNM-849 license is, of course, contingent upon approval of our survey results by the Division of Fuel Cycle and Material Safety and the Office of Inspection and Enforcement. Please let me know if further information is required.

Sincerely,

TELEDYNE ENERGY SYSTEMS

John W. McGrew

John W. McGrew,
Licensing & Accountability
Representative

4/12/76
John Kinneman Region I,
called - Inspected work of 4/[illegible]/76 and
all material properly disposed of.
[illegible]

ek

cc: Chief, Materials Branch
Division of Fuel Cycle and Material Safety
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Region 1
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

JAN 25 1995

License Nos.		Docket Nos.
	19-01398-20 (Retired)	None
	19-01398-32 (Retired)	None
	SNM-11 (Retired)	070-00014
	SNM-53 (Retired)	070-00058
	SNM-849 (Retired)	070-00908
	SNM-907 (Retired)	070-00932
	SNM-1192 (Retired)	070-00058
	STB-187 (Retired)	040-03296

Ms. Joanne Brooks
Environmental Specialist
Maryland Aviation Administration
3rd Floor Terminal Building
P.O. Box 8760
BWI Airport, Maryland 21240

SUBJECT: NRC REGION I INSPECTION NO. 94-001

Dear Ms. Brooks:

As Stephen Holmes of my staff discussed with you by telephone on October 20, 1994, the Nuclear Regulatory Commission (NRC) has been reviewing records to ensure that facilities, where activities were authorized by Atomic Energy Commission (AEC) and NRC licenses that have been terminated, are suitable for release for unrestricted use in accordance with current NRC guidelines. As you may be aware, the NRC and its predecessor, the AEC, issue licenses that authorize the use of various radioactive materials.

A contractor for the NRC, Oak Ridge National Laboratory (ORNL), initially reviewed each terminated license file and scored it according to a system designed to identify facilities that require additional review by the NRC staff. In general, files that indicate that radioactive material may have been used at particular facilities, but which do not include adequate final survey records for those facilities, are identified for additional review. The review by ORNL identified License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192 and STB-187 as files describing sites that require additional review. These licenses were issued to Martin-Marietta, Isotopes, Inc., and Ebasco and authorized activities at the Martin-Marietta Middle River Facility and the Martin State Airport. The Region I staff reviewed these files and determined that additional action was necessary since the information in the files did not provide sufficient detail to conclude that Buildings C, D, KJ and KC meet current guidelines for release for unrestricted use.

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PDR ADOCK 04003296
C PDR

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REGION 1

IE 07

On November 3, 1994, Mr. Holmes and Mr. Ray Manley of the Maryland Department of the Environment conducted an inspection at the Martin-Marietta Middle River Facility and Martin State Airport to determine whether radioactive contamination remains at those facilities as a result of activities previously authorized by these licensees. The findings of this inspection were discussed with a member of Mr. Jake West's staff, Glen Peregoy, at the conclusion of the inspection. The inspection report is enclosed with this letter.

As described in the enclosed report, the inspectors conducted a survey of each of the facilities and contacted and interviewed current and former employees of the licensees noted above. No radiation levels above background were identified at any of the sites. Only one building (C), in which only sealed sources were used, is presently being utilized. Another building (D) had been demolished and now only a concrete pad remains. The two remaining buildings (KJ and KC), on the Martin State Airport, have been abandoned and are scheduled for demolition pending remediation of asbestos and funding. Based on these facts and the findings described in the enclosed report, we plan no further action on these sites. They are suitable for unrestricted use.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed report will be placed in the Public Document Room. We will also provide copies to representatives of the State of Maryland.

No reply to this letter is required. Your cooperation with us is appreciated. If you have any questions, please contact Stephen Holmes at (610) 337-5390 or me at (610) 337-5252.

Sincerely,

Original Signed By:
John D. Kinneman

John D. Kinneman, Chief
Site Decommissioning Section
Division of Radiation Safety
and Safeguards

License Nos.		Docket Nos.	
	19-01398-20 (Retired)		None
	19-01398-32 (Retired)		None
	SNM-11 (Retired)		070-00014
	SNM-53 (Retired)		070-00058
	SNM-849 (Retired)		070-00908
	SNM-907 (Retired)		070-00932
	SNM-1192 (Retired)		070-00058
	STB-187 (Retired)		040-03296

Enclosure: NRC Region I Inspection Report No. 94-001

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cc w/encl:
Jake West, Manager, Martin State Airport
R. Manley, State of Maryland

Distribution w/encl:
PUBLIC
Nuclear Safety Information Center (NSIC)
Region I Docket Room (w/concurrences)
P. Goldberg, NMSS
C. Gordon, RI

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DATE	01/23/95		01/24/95							

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 94-001

Docket Nos. None, None, 070-00014, 070-00058, 070-00908, 070-00932, 070-00058, 040-03296

License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, STB-00187

Licensee: Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, MD 21220

Facility Name: Middle River Facility and Martin State Airport

Inspection at: 2323 Eastern Blvd
Baltimore, MD
and
701 Wilson Point Road
Baltimore, MD

Inspection Conducted: November 3, 1994

Inspector: Stephen W. Holmes, Radiation Specialist — 01/23/95 date

Approved by: John D. Kinneman, Chief
Site Decommissioning Section — 1/23/95 date

Inspection Summary: Closeout Verification Inspection No. 94-001.

Areas Inspected: Announced, inspection and survey of Buildings C and D at the Martin-Marietta Middle River facility and Buildings KJ and KC at the Martin State Airport.

Results: No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from the present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

9501316857

DETAILS

1.0 Persons Contacted

Joseph Alcarese, Esq.
Joanne Brooks, Environmental Specialist, Environmental Program Manager, Maryland Aviation Administration
Richard Brisson, former Acting Program Administrator, Maryland Dept. of the Environment, Radiological Health Program and former Martin-Marietta/Isotopes,Inc. employee
Thomas Flynn, Jr., Engineer, Raytheon (formally Ebasco Services, Inc.)
* Ray Manley, Inspector, Maryland Department of the Environment
Glen Peregoy, Engineer, Martin State Airport
* Jeffrey G. Smith, Manager Environmental Affairs, Martin Marietta
Jake West, Manager, Martin State Airport

* denotes those present at exit interview

2.0 Background

2.1 General

As part of a program to ensure that facilities where activities authorized by AEC and NRC licenses that have been terminated were suitable for release for unrestricted use as specified in current NRC criteria, the docket files for License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192, and STB-187 were reviewed. Based on information in the files, the radiological status of four buildings could not be determined with certainty. These are Buildings C, D, on the Martin Marietta Corporation Middle River Facility and KJ (critical facility), and KC (radioisotope laboratory) on the Martin State Airport. Therefore, an onsite inspection was conducted. Prior to the on-site inspection, available records pertaining to the licensing, operation, and decommissioning of the activities in and around these buildings were reviewed by the inspector. Additionally, the inspector contacted two persons who had direct contact with these sites during actual operations or decommissioning: Mr. Thomas A. Flynn, Jr. the Project Manager of the 1965 "dismantling" of the Liquid Fluidized Bed Reactor (LFBR) at Building KC and Mr. Richard Brisson, a former employee of both Martin-Marietta, and Isotopes, Inc. Information obtained from these sources is documented in pertinent sections of this report.

2.2 Building D

Building D was located at the Martin-Marietta's Middle River, Maryland facility which is also called Chesapeake Park. Under License Nos. 19-01398-32, SNM-11, SNM-53, SNM-1192 and STB-187 a wide range of byproduct, source and special nuclear material were used in connection with various research and development activities in addition to work under government contracts. The facility was decontaminated in late 1970 under License No. SNM-1192, the license terminated, and the building subsequently demolished, leaving only the concrete basement floor/pad. An NRC inquiry regarding the site in June 1982 concluded that the site met the then current criteria for unrestricted use (Report Nos. 040-

03296/82-01 and 040-02308/82-011). However, there was no indication that a verification of the licensee's commitment to seal five contaminated drains with concrete was made.

2.3 Building C

Building C, also located at the Middle River site, was to have been used under License No. SNM-849 for operations involving encapsulated Pu-238 in conjunction with SNAP reactors and testing of fuel capsules and radioisotope generators containing Pu-238. This was reported to have occurred in the Environmental Test and Large Vacuum Chamber Laboratories. The building, which was being used as a warehouse at the time of this inspection, is a very large hanger type structure with a corresponding large basement. No records were available regarding the location of the laboratories within the building nor were any records of a termination or confirmatory survey of the facility available. Mr. Brisson stated that, to the best of his knowledge, only environmental and physical testing of the fueled SNAP and other radioisotope generators was performed in Building C and that no unsealed radioisotopes were used there. Additionally, he stated that the laboratories were located in the basement at the south west corner of the building and occupied an area no larger than 100' x 150' or 5 support pillars by 6 support pillars.

2.4 Building KJ

License No. 19-01398-20 was issued to Martin-Marietta for processing of Am-241 and Cm-242 in Building KJ which was designated the Radioisotope Laboratory and is located on the Martin State Airport property referred to as Strawberry Point, on a dirt access road off Strawberry Point Road, 330' S.W. of Building KC. This type of work had been previously performed in Building "D". The license was transferred to Isotopes, Inc. without a change in license number or location of work. In late 1969, Isotopes, Inc. requested termination of the license, simply stating that all radioactive material possessed under the license had been disposed of in accordance with 10 CFR 20 by transfer to a company authorized to receive the licensed material. The AEC terminated the license without comment. No record of a termination or confirmatory survey is in the docket file. Mr. Brisson stated that production processing did not occur in Building KJ and that only small source (μCi amounts of Am-241, no Cm-242) developmental operations to verify the chemistry were performed in the building. He and one other member of the Isotopes, Inc. staff performed the final cleanup and survey of the facility, including the removal and disposal of the HEPA filters. According to his memory, the survey demonstrating that the facility was ready for unconditional release was sent to the AEC contracting office on Hudson St., N.Y., N.Y.

2.5 Building KC

Building KC, the Critical Test Facility, was located 330' North East of Building KJ. The Martin-Marietta LFBR was situated in one of the building's three "test cells". Under License No. SNM-53 completed MH-1A fuel assemblies were stored in the test cells. License No. SNM-907 was issued to Ebasco Services, Inc. in 1965 for dismantling and removing the LFBR. The license included a provision to provide records of a post removal survey to the AEC's New York Operations Office and to Martin Marietta. Although a pre-dismantling survey was performed, no records of the required post removal survey could be found in the docket file. However, it was noted in the file that the LFBR never achieved criticality. Mr. Flynn stated that meticulous care was taken during the dismantling to prevent the spread of any contamination. Further, he stated that an AEC Inspector/Health Physicist from the New York Field Office/Laboratory was on site, oversaw the final survey, and signed the final report that asserted the dismantling of the LFBR had not added to or increased the contamination from the levels measured before the operation. Mr. Brisson confirmed that Ebasco's work produced no contamination throughout the rest of the building. Mr. Brisson also stated that his group decontaminated the underground LFBR water dump/holding tank by sandblasting the insides and disposing of the residue at a licensed burial site.

3.0 Instruments Used in Survey

During the survey three instruments were used, an Eberline PRM-6 with a 1" scintillator probe and a Ludlum Micro R meter Model 19 were used by the state inspector while a Ludlum Micro R meter Model 12 was used by the NRC inspector. The meters were calibrated, functional, and would detect gamma emitters of low energy and with good sensitivity. Based on the isotopes in question, these instrument were appropriate for this survey.

4.0 Survey Results

4.1 General

On November 3, 1994 surveys of each building/site were performed jointly by the NRC and State of Maryland inspectors. The inspectors surveyed each facility thoroughly and kept each other informed as to the results. The surveys were performed with the Micro R meters held at 0.5 meters above the surface with a forward movement of about 1.0 meters per second. In addition to Mr. Smith, who accompanied the inspectors to each site, Mr. Peregoy was present during the surveys of Buildings KC and KJ on the Martin State Airport property.

4.2 Building D

The Building D site was being use to store trailers under contract with the Army. The site consisted of a large concrete pad, the leftover basement floor of the old building. The pad had numerous cracks, holes, and was very weathered after two decades of exposure to the elements.

The inspectors surveyed the concrete pad along parallel lines 5 meters apart, paying attention to drains, clean-outs, and holes in the pad. In addition to measurements taken at drains and clean-outs, surface contact readings were also taken at approximately 10 meter intervals. Numerous sealed/filled in drains/clean-outs/penetrations/holes in the pad were located. Although a few places were found where a hole in the pad had been filled with concrete, it could not be determined if these were any of the drains referred to in the closeout survey. Martin Marietta staff stated that the rubble from the demolition of the building was the responsibility of the contractor and was removed and believed to have been disposed of in a landfill. No detectable radiation levels above background (5μR/hr) were found. No development or other use of the site is planned by Martin Marietta.

4.3 Building C

The Building C area where the old Environmental Test and Large Vacuum Chamber Laboratories were located is now warehouse space and a large empty room. With the exception of the support columns, no original walls, floors, ceiling, or ducts are left. The inspectors surveyed the area along parallel lines at 5 meter intervals with surface contact measurements every 5 meters and at drains and original concrete support columns. No radiation levels above background (5μR/hr) were detected.

4.4 Building KC

Building KC is at the end of a dirt access road off Strawberry Point road just east of the eastern most taxi way. The property was purchased in toto by the State of Maryland in 1975 and although the building was used in the past for storage, it has been abandoned and left open to the elements for the past ten to fifteen years. The site was completely abandoned, overgrown, exposed to the elements (of the three "test cells" only the one where the LFBR had been housed still had it's outer doors). The inspectors performed a walk-through survey of all three cells, the entrance way and connecting halls. Surface contact measurements were performed randomly throughout the building. The office/control room area was not entered due to the cluttered condition of and the layer of asbestos ceiling tiles covering the floor. No radiation levels above background were detected. Although an attempt was made to locate the underground dump/hold-up tank described by Mr. Brisson, the inspectors were unable to locate the tank or any indication that it had been removed. Based on discussion with Martin-Marietta and Martin State Airport personnel, it is believed that the tank was abandoned in place after the decontamination described in Section 2.5. The planning representative of Maryland Aviation stated that the building had been scheduled for demolition after remediation of the asbestos, but the plans were delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

4.5 Building KJ

Building KJ is 300' S.W. of building KC along the dirt access road. The

site was also completely abandoned, overgrown, exposed to the elements. The doors into the laboratory and, mechanical equipment room and office were ajar leaving the interior open to the outside. The inside was littered with "junk", leaves, bird and animal droppings, and dirt. A fair number of 100 lb. bags of "solidified" lime were present, as the building had been use for storage by the State of Maryland in the past. Rusted laboratory furniture and discarded fire extinguishers also littered the floor. The stainless steel ventilation duct-work and the laboratory hoods were still present less the duct-work section that had contained the HEPA filters. The inspectors surveyed the remains as well as possible given the state of the building. No radiation levels above background were detected. The planning representative of Maryland Aviation stated that the building, just like Building KC, had been scheduled for demolition after remediation of the asbestos, but the demolition was delayed due to finances. He stated that the building would be razed and the rubble disposed of as normal waste.

5.0 Conclusions

No radiation levels above background were detected and no indication of contamination was found in any of the buildings. Based on information obtained from NRC files, Martin-Marietta and Raytheon (formerly EBASCO) employees and former employees, statements from present owners, and the inspectors' surveys, these facilities are suitable for unrestricted use.

6.0 Exit Interview

The inspector met with the Martin-Marietta and Maryland Department of the Environment representatives listed in Section 1.0 of this report and discussed the scope and findings of this inspection. They acknowledged the inspection findings and the statements documented in this report. Messrs. Flynn and Brisson were contacted by telephone and also confirmed their statements in this report.

JAN 25 1995

License Nos. 19-01398-20 (Retired)
19-01398-32 (Retired)
SNM-11 (Retired)
SNM-53 (Retired)
SNM-849 (Retired)
SNM-907 (Retired)
SNM-1192 (Retired)
STB-187 (Retired)

Docket Nos. None
None
070-00014
070-00058
070-00908
070-00932
070-00058
040-03296

Joseph Alcarese, Esq.
Martin-Marietta Aero & Naval Systems
103 Chesapeake Park Plaza
Baltimore, Maryland 21220

SUBJECT: NRC REGION I INSPECTION NO. 94-001

Dear Mr. Alcarese:

As Stephen Holmes of my staff discussed with you by telephone on October 20, 1994, the Nuclear Regulatory Commission (NRC) has been reviewing records to ensure that facilities, where activities were authorized by Atomic Energy Commission (AEC) and NRC licenses that have been terminated, are suitable for release for unrestricted use in accordance with current NRC guidelines. As you may be aware, the NRC and its predecessor, the AEC, issue licenses that authorize the use of various radioactive materials.

A contractor for the NRC, Oak Ridge National Laboratory (ORNL), initially reviewed each terminated license file and scored it according to a system designed to identify facilities that require additional review by the NRC staff. In general, files that indicate that radioactive material may have been used at particular facilities, but which do not include adequate final survey records for those facilities, are identified for our additional review. The review by ORNL identified License Nos. 19-01398-20, 19-01398-32, SNM-11, SNM-53, SNM-849, SNM-907, SNM-1192 and STB-187 as files describing sites that require additional review. These licenses were issued to Martin-Marietta, Isotopes, Inc. and Ebasco and authorized activities at the Martin-Marietta Middle River Facility and the Martin State Airport. The Region I staff reviewed these files and determined that additional action was necessary since the information in the files did not provide sufficient detail to conclude that Buildings C, D, KJ and KC meet current guidelines for release for unrestricted use.

On November 3, 1994, Mr. Holmes and Mr. Ray Manley of the Maryland Department of the Environment conducted an inspection at the Martin-Marietta Middle River Facility and Martin State Airport to determine whether radioactive contamination remains at the facility as a result of activities previously authorized by these licensees to Martin-Marietta, Isotopes, Inc., and Ebasco.

9501310046 950125
PDR ADOCK 04003296
C PDR

OFFICIAL RECORD COPY

300032 RETURN ORIGINAL TO REGION 1

IE 07

APPENDIX D—
MARYLAND DEPARTMENT OF THE ENVIRONMENT RECORDS

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: _____ Date 85/02/13

Facility Name: Glenn L. Martin State Airport, Box 1, 701 Wilson Point Road, Balto Md 21220

Remarks: John Beazley, Barry Chambers, Valer. Doyle, and Mike Griffen met with J. Leonard Wood and Jake West at the Martin State Airport office on Feb 13 at 1300hrs J. Leonard Wood is the Martin State Airport manager. John Beazley, Barry Chambers, Valeri Doyle, and Mike Griffen accompanied Leonard Wood on a tour of the Facility. [redacted] Tech Sgt. Charles Smith of the Air Guard accompanied us when touring the facility east of the air strip.

From the beach along Frog Motar Creek, concrete rubble, corrugated steel pipe, and a couple of drums were observed in the side of the Fill. Indiscriminate dumping was observed at this site in the past as noted in the inspection report of Sept 16, 1981 by James Curtis from this office.

West of the airstrip several areas of dumping were observed. A deer carcass, cylinders of refrigerant, assorted junk, and rubble were observed. Thirty nine drums were observed by the KJ building; some, but not all, of the drums were empty. One empty drum, denatured ethanol, had a 'Tilly Chemical' label. Drums were observed in the fill area near the KJ building, again demonstrating the indiscriminate waste handling practices at this facility. Photographs were taken by Barry Chambers during this survey.

Mr Griffen discussed the ground water contamination with Mr. Wood and informed Mr. Wood that the airport will have to contract out for surveying and analysis regarding the ground water contamination. Since the Maryland Environmental Service handles the sampling required in the airport's NPDES permit and operates the waste treatment plant at the airport, the recommendation that MES be used as consultant was made.

Mr. Chambers recommends that this site be put on a remedial clean up list such as the State Superfund list and/or the Federal Superfund list.

Observer: _____ Person Interviewed: _____

DHMH 3879

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

TO JK From MQ Date 2.7.85

Subject GLENN L. MARTIN STATE AIRPORT

PHONE CONVERSATION WITH TECH. SGT. C. SMITH, WARFIELD AIR NATIONAL GUARD.

SGT. SMITH HAS LOCATED DESIGN PLANS, CIRCA 1958, FOR A "NEW" ACID PIT (UNLINED, OF COURSE) TO REPLACE ANOTHER ONE THAT WAS "REAL BAD". THE "REAL BAD" ONE WAS CLOSER TO FROG MORTAR CREEK THAN THE 4 ON OUR PLAN COPY AND WAS BULLDOZED IN BY THE AIR NATIONAL GUARD WHEN THEY CONSTRUCTED THE NEW ONE.

INFORMATIONALLY, THE MUNITIONS TESTING PIT WAS ALSO CONSTRUCTED BY THE AIR NATIONAL GUARD (CIRCA 1958) AS WAS THE TAXIWAY.

ONE FINAL TIDBIT: ALL LEFTOVER BOMBS WERE DEACTIVATED (REALLY?) AND DUMPED INTO A HOLE AT THE BOTTOM OF FROG MORTAR CREEK.

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Paul T

Copies { JOHN KOONTZ

TO ~~Mr. Frank Henderson~~ via ~~Mr. John Koonts~~ From ~~Mr. Paul Thompson~~ PT Date 2/7/85

Subject Glenn L. Martin State Airport

Frank we need your section's/assistance in establishing and implementing a sampling plan for:

1. Groundwater Sampling (Two contaminated wells on site).
2. Four (maybe 5) unlined pits - referred to as "Acid Pits" by plans and Maryland Air National Guard Employees.
3. Two known areas of landfill activity (Dredge Spoils, etc.)
4. One area of munitions dumping into Frog Mortar Creek.

We have the permission/cooperation of both the State Aviation Administration (Leonard Wood - 391-9500) as property owner, and the Maryland Air National Guard (Tech. Sgt. Charles Smith - 687-6270 ext. 428) as tenant.

PT/jj

Have OWNERS of site do work per our NORMAL PROCEDURES. Get them UNDER A CONSENT ORDER/AGREEMENT re DUNDALK MARINE TERMINAL.

MIKE,

BACK TO YOU.

P

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies { Mr. Dave Healy
Mr. John Beazley

Thru: Mr. John Koontz

TO Mr. Frank Henderson From Mr. Paul Thompson Date 2/26/85

Subject Glenn L. Martin State Airport, Baltimore County

Staff investigation of this site indicates improper waste disposal practice.

These include:

1. acid and waste oil disposal pits (at least 4)
2. landfilling (indiscriminate)
3. explosives disposal (deactivated bombs, we're told!) into dredge holes in Frog Mortar Creek.

Private labs show trace organic (L 1-ppb range) contamination of two potable wells on site, yet sampling does not substantiate this.

Therefore, this site should be added to your next published list of sites for future assessment and/or investigation.

by who

Archived: Tuesday, April 15, 2014 1:49:04 PM
Importance: Low

Dear Ms. Stephens,

This email is to request a search and retrieval of specific MDE Hazardous and Solid Waste division archived records under the Public Information Act. The subject request was also submitted to MDE's Radiological Health division and Colleen Williams referred my request to you. Tetra Tech is conducting environmental due diligence research for a property in Middle River, Maryland on behalf of a former property owner. The property was located on a former dirt road at the current Martin State Airport, 701 Wilson Point Road, Middle River, Baltimore County, Maryland.

The property of interest may be identified by the above address (Martin State Airport) in MDE records, or listed by name under former tenants of two nuclear fuel research facilities which previously operated at said location between 1957 and 1966, approximately. Former tenant names include Martin Company, Ebasco, Raytheon, Radioisotopes, Inc, and Isotopes, Inc. The facilities were known as the Martin Critical Facility, or Critical Test Facility, and the Radioisotope Lab. After termination of Nuclear Regulatory Commission (NRC) Licenses (est. 1965-1970), these buildings were abandoned for several years before being demolished around 2000 by the State of Maryland (Maryland Aviation Administration). In 1989, while the buildings were still present, MDE was involved in a joint inspection of the facilities with NRC to help determine suitability for unrestricted use. Tetra Tech reviewed a State of Maryland report (report MD-304, "A Preliminary Assessment of Martin State Airport, Middle River, Maryland") prepared by the Maryland Hazardous and Solid Waste Management Administration (MDE/HSWMA) and dated March 1989, which contains reference to two memoranda: (1) Memo dated March 30, 1989 from MDE/HSWMA to the Hazardous Waste Enforcement Division, concerning materials in storage in the abandoned, above-referenced buildings; and (2) Memo dated March 31, 1989 from MDE/HSWMA to the MDE Toxic, Environmental Science and Health, Center for Radiological Health concerning lack of records of past generation and disposal of hazardous and radioactive waste from these facilities. By this PIA request, we are making specific request for these memoranda, any related correspondence or files, and information on the final disposition of these files. We also request any records you may have concerning the demolition of these facilities around 2000.

We sincerely appreciate your assistance with this request. I can be contacted at the number below for more information or with any questions.

Sincerely,

Amy McGivney

Amy McGivney | **Project Manager** | **Engineer III**

Direct: 301.528.3018 | Main: 301.528.5552 | Fax: 301.528.3000

amy.mcgivney@tetratech.com

Tetra Tech, Inc. | Environmental Services

20251 Century Blvd. Suite 200 | Germantown, Maryland 20874 | www.tetratech.com

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Archived: Tuesday, April 15, 2014 2:03:01 PM
Importance: Low

Dear Sir or Madam,

This email is to request a search and retrieval of specific MDE Radiological Health archived records under the Public Information Act. Tetra Tech is conducting environmental due diligence research for a property in Middle River, Maryland on behalf of a former property owner. The property was located on a former dirt road at the current Martin State Airport, 701 Wilson Point Road, Middle River, Baltimore County, Maryland.

The property of interest may be identified by the above address (Martin State Airport) in MDE records, or listed by name under former tenants of two nuclear fuel research facilities which previously operated at said location between 1957 and 1966, approximately. Former tenant names include Martin Company, Ebasco, Raytheon, Radioisotopes, Inc, and Isotopes, Inc. The facilities were known as the Martin Critical Facility, or Critical Test Facility, and the Radioisotope Lab. After termination of Nuclear Regulatory Commission (NRC) Licenses (est. 1965-1970), these buildings were abandoned for several years before being demolished around 2000 by the State of Maryland (Maryland Aviation Administration). In 1989, while the buildings were still present, MDE was involved in a joint inspection of the facilities with NRC to help determine suitability for unrestricted use. Tetra Tech reviewed a State of Maryland report (report MD-304, "A Preliminary Assessment of Martin State Airport, Middle River, Maryland") prepared by the Maryland Hazardous and Solid Waste Management Administration (MDE/HSWMA) and dated March 1989, which contains reference to two memoranda: (1) Memo dated March 30, 1989 from MDE/HSWMA to the Hazardous Waste Enforcement Division, concerning materials in storage in the abandoned, above-referenced buildings; and (2) Memo dated March 31, 1989 from MDE/HSWMA to the MDE Toxic, Environmental Science and Health, Center for Radiological Health concerning lack of records of past generation and disposal of hazardous and radioactive waste from these facilities. By this PIA request, we are making specific request for these memoranda, any related correspondence or files, and information on the final disposition of these files. We also request any records you may have concerning the demolition of these facilities around 2000.

We sincerely appreciate your assistance with this request. I can be contacted at the number below for more information or with any questions.

Sincerely,
Amy McGivney

Amy McGivney | Project Manager | Engineer III
Direct: 301.528.3018 | Main: 301.528.5552 | Fax: 301.528.3000
amy.mcgivney@tetratech.com<mailto:amy.mcgivney@tetratech.com>

Tetra Tech, Inc. | Environmental Services
20251 Century Blvd. Suite 200 | Germantown, Maryland 20874 | www.tetratech.com
<http://www.tetratech.com>

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MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101 • www.mde.state.md.us

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Robert M. Summers, Ph.D.
Secretary

January 30, 2014

Amy McGivney
Tetra Tech
20251 Century Boulevard
Suite 200
Germantown MD 20874

RE: Tracking Number: 2014-56449
Request Received January 17, 2014

MARTIN STATE AIRPORT

Dear Requester:

The Maryland Department of the Environment (MDE) received your recent request for information under the Public Information Act (PIA).

The Land Management Administration has information and data available on the site(s) listed above. Please call me to schedule an appointment for file review or to arrange for photocopies of all releasable materials. You will be invoiced for all applicable search, review, duplication and postage charges. It is requested that you make arrangements to review available files within 30 days of receipt of this letter. After 30 days your request will be closed and it will be necessary to file a new request.

When requesting information regarding this request, please cite the tracking number referenced above. If you have any questions, please call me at (410) 537-3422.

Sincerely,

Maria Stephens
PIA Liaison
Land Management Administration

MDE
MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
410-537-3000 • 1-800-633-6101 • www.mde.state.md.us

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Robert M. Summers, Ph.D.
Secretary

March 20, 2014

Amy McGivney
Tetra Tech
20251 Century Boulevard
Suite 200
Germantown MD 20874

RE: Tracking Number: 2014-56449
Request Received January 17, 2014

MARTIN STATE AIRPORT

Dear Requester:

The Maryland Department of the Environment (MDE) received your recent request for information under the Public Information Act (PIA).

The documents you requested, as a result of your recent file review are enclosed.

✓ You will be invoiced separately for all applicable search, review, duplication, and postage charges

_____ The invoice for all applicable search, review, duplication, and postage charges is enclosed

_____ No charges were incurred

When requesting information regarding this request, please cite the tracking number referenced above. If you have any questions, please call me at (410) 537-3422.

Sincerely,

Maria Stephens
PIA Liaison
Land Management Administration

Archived: Tuesday, April 15, 2014 2:05:29 PM
Importance: Low

Dear Ms McGivney,

The Maryland Department of the Environment (MDE) received your recent request for information under the Public Information Act (PIA). After a thorough search of all available information, the MDE Air & Radiation Management Administration found no records responsive to your request.

I suggest that you submit your request for information to Maria Stephens in MDE's Land Administration, since that is the group that oversees Hazardous and Solid Waste. No charges were incurred.

Thank you,

Colleen Donnelly Williams
Colleen.Williams@Maryland.gov
MDE ARMA Compliance & PIA Liaison
1800 Washington Blvd., Suite 715
Baltimore, MD 21230-1720
(w) 410-537-4127

ATTENTION to our PIA requesters, regarding electronic documents: On the advice of counsel, it is now the Department's policy to provide only PDF or other non-editable versions of data files. We apologize for any inconvenience.

On Fri, Jan 10, 2014 at 7:39 AM, Colleen D. Williams -MDE- < colleen.williams@maryland.gov> wrote:

> Dear Ms McGivney,
>
> The Maryland Department of the Environment (MDE) received your recent request for information under the Public Information Act (PIA). Your request has been assigned the tracking number listed above. Please use this number in all

communications referring to this request.

After the search for information is complete, I will notify you as to whether or not pertinent records exist. We address PIA requests in the order in which we receive them. There may be fees associated with the search or production of documents. If files exist, I will notify you of an estimated cost and you will be required to provide payment authorization before documents will be produced or sent to you.

You may find it helpful to review the following information regarding the PIA process:

http://www.mde.state.md.us/programs/Marylander/PublicInfoAct/Pages/index.aspx

Please contact me with any questions or concerns.

Colleen Donnelly Williams
Colleen.Williams@Maryland.gov
MDE ARMA Compliance & PIA Liaison
1800 Washington Blvd., Suite 715
Baltimore, MD 21230-1720
(w) 410-537-4127

---------- Forwarded message ----------
From: **Amanda Degen -MDE-** <amanda.degen@maryland.gov>
Date: Wed, Jan 8, 2014 at 4:12 PM
Subject: Fwd: PIA Request - Radiological Health Division
To: "Colleen D. Williams -MDE-" <colleen.williams@maryland.gov>

Your assistance with the enclosed request is greatly appreciated.

Thank you,

Amanda R. Degen
Public Information Act Coordinator
Office of Communications
Maryland Department of the Environment
410-537-4120
amanda.degen@maryland.gov

Please consider the environment before printing this e-mail.

---------- Forwarded message ----------
From: **McGivney, Amy** <Amy.McGivney@tetratech.com>
Date: Wed, Jan 8, 2014 at 4:05 PM
Subject: PIA Request - Radiological Health Division
To: "MDE.PIA@maryland.gov" <MDE.PIA@maryland.gov>

Dear Sir or Madam,

This email is to request a search and retrieval of specific MDE Radiological Health archived records under the Public Information Act. Tetra Tech is conducting environmental due diligence research for a property in Middle River, Maryland on behalf of a former property owner. The property was located on a former dirt road at the current Martin State Airport, 701 Wilson Point Road, Middle River, Baltimore County, Maryland.

The property of interest may be identified by the above address (Martin State Airport) in MDE records, or listed by name under former tenants of two nuclear fuel research facilities which previously operated at said location between 1957 and 1966, approximately. Former tenant names include Martin Company, Ebasco, Raytheon, Radioisotopes, Inc, and Isotopes, Inc. The facilities were known as the Martin Critical Facility, or Critical Test Facility, and the Radioisotope Lab. After termination of Nuclear Regulatory Commission (NRC) Licenses (est. 1965-1970), these buildings were abandoned for several years before being demolished around 2000 by the State of Maryland (Maryland Aviation Administration). In 1989, while the buildings were still present, MDE was involved in a joint inspection of the facilities with NRC to help determine suitability for unrestricted use. Tetra Tech reviewed a State of Maryland report (report MD-304, "A Preliminary Assessment of Martin State Airport, Middle River, Maryland") prepared by the Maryland Hazardous and Solid Waste Management Administration (MDE/HSWMA) and dated March 1989, which contains reference to two memoranda: (1) Memo dated March 30, 1989 from MDE/HSWMA to the Hazardous Waste Enforcement Division, concerning materials in storage in the abandoned, above-referenced buildings; and (2) Memo dated March 31, 1989 from MDE/HSWMA to the MDE Toxic, Environmental Science and Health, Center for Radiological Health concerning lack of records of past generation and disposal of hazardous and radioactive waste from these facilities. By this PIA request, we are making specific request for these memoranda, any related correspondence or files, and information on the final disposition of these files. We also request any records you may have concerning the demolition of these facilities around 2000.

We sincerely appreciate your assistance with this request. I can be contacted at the number below for more information or with any questions.

Sincerely,
Amy McGivney

Amy McGivney | Project Manager | Engineer III

Direct: 301.528.3018 | Main: 301.528.5552 | Fax: 301.528.3000
amy.mcgivney@tetratech.com<mailto:amy.mcgivney@tetratech.com>

Tetra Tech, Inc. | Environmental Services
20251 Century Blvd. Suite 200 | Germantown, Maryland 20874 | www.tetratech.com
<http://www.tetratech.com>

PLEASE NOTE: This message, including any attachments, may include privileged, confidential and/or inside information. Any distribution or use of this communication by anyone other than the intended recipient is strictly prohibited and may be unlawful. If you are not the intended recipient, please notify the sender by replying to this message and then delete it from your system.

Archived: Tuesday, April 15, 2014 2:07:12 PM
Importance: Low

Dear Ms McGivney,

The Maryland Department of the Environment (MDE) received your recent request for information under the Public Information Act (PIA). Your request has been assigned the tracking number listed above. Please use this number in all communications referring to this request.

After the search for information is complete, I will notify you as to whether or not pertinent records exist. We address PIA requests in the order in which we receive them. There may be fees associated with the search or production of documents. If files exist, I will notify you of an estimated cost and you will be required to provide payment authorization before documents will be produced or sent to you.

You may find it helpful to review the following information regarding the PIA process:

http://www.mde.state.md.us/programs/Marylander/PublicInfoAct/Pages/index.aspx

Please contact me with any questions or concerns.

Colleen Donnelly Williams
Colleen.Williams@Maryland.gov
MDE ARMA Compliance & PIA Liaison
1800 Washington Blvd., Suite 715
Baltimore, MD 21230-1720
(w) 410-537-4127

---------- Forwarded message ----------
From: **Amanda Degen -MDE-** <amanda.degen@maryland.gov>
Date: Wed, Jan 8, 2014 at 4:12 PM
Subject: Fwd: PIA Request - Radiological Health Division
To: "Colleen D. Williams -MDE-" <colleen.williams@maryland.gov>

Your assistance with the enclosed request is greatly appreciated.

Thank you,

Amanda R. Degen
Public Information Act Coordinator
Office of Communications
Maryland Department of the Environment
410-537-4120
amanda.degen@maryland.gov

Please consider the environment before printing this e-mail.

---------- Forwarded message ----------
From: **McGivney, Amy** <Amy.McGivney@tetratech.com>
Date: Wed, Jan 8, 2014 at 4:05 PM
Subject: PIA Request - Radiological Health Division
To: "MDE.PIA@maryland.gov" <MDE.PIA@maryland.gov>

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radioactive waste from these facilities. By this PIA request, we are making specific request for these memoranda, any related correspondence or files, and information on the final disposition of these files. We also request any records you may have concerning the demolition of these facilities around 2000.

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Amy McGivney

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Direct: 301.528.3018 | Main: 301.528.5552 | Fax: 301.528.3000
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Tetra Tech, Inc. | Environmental Services
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HAZARDOUS AND SOLID WASTE MANAGEMENT ADMINISTRATION
UNDERGROUND STORAGE TANK DIVISION
INITIAL REPORT OF INCIDENT

CASE NO: _____

CALLER

1. Name of HSWMA personnel taking report: HERB MEADE
2. Date of report: 7/1/91
3. Time of report: 1445
4. Name of caller: DON MADDISON
5. Telephone #: 859-7092
6. What agency or company is caller with: STATE AVIATION

DETAILS OF SPILL

7. Date of incident 7/1/91
8. Time of incident: _____
9. Has product been released? YES_____ NO_____
10. Amount released: _____
11. Tank test failure? YES_____ NO_____
12. Tank failure rate: _____
13. Precise location of the release or incident: MAUSIN STATE AIRPORT
14. Nearest crossroad or other identifying mark: _____ County: BT
15. Type of product involved: _____
16. Quantity on board: _____
17. Age of tank system: _____
18. Details of release: DON MADDOX INSTALLING ELECTRICAL LINE FOUND BURIED DRUMS, 4 DRUMS ONE WITH GREEN PAINT, DONMADDOX HAS STOPPED WORK (BETWEEN RUNWAY & TAXI WAY TANGO)
19. Has product entered water? YES_____ NO_____
20. Name of waterway: _____

RESPONSIBLE PARTY

21. Responsible party's name: _____
22. Responsible party's address: _____
23. Responsible party's telephone number: _____
24. Has responsible party taken any action to control the problem? YES_____ NO_____
25. If yes, what: _____

ACTION TAKEN

_____ UST INSPECTOR ASSIGNED CASE: _____

_____ TRANSFERRED CALL TO: _____

_____ DISPATCHED: _____ TIME: _____

_____ NO RESPONSE; Explain why: _____ DATE: _____

_____ OTHER: _____

INITIALS: _____

STATE Aviation
Wilson Pt 30 3/4 mi term & control tower
1st flight of Stinson.

State of Maryland
Department of the Environment
Hazardous and Solid Waste Management Administration
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: RCRA Date 7/2/91

Facility Name: Martin State Airport

Remarks: Received report 7/1/91 thru LUST/UST regarding drums that were uncovered during a trenching operation parallel to the main runway (north side). This trench appears to run through an old fill area. A wide variety of debris was evident including what appeared to be zinc chromate paint. A field test with BPC (& this material indicated high levels of chrome present. The location of this material was approx. 58 yards east from the west end of the trench (Howard Eastern Ave). The contractor requested clearance to backfill the trench with clean fill material. MSA was advised to remove all visibly contaminated / suspect material from the trench and the adjacent areas. This material must be containerized, managed, and disposed of in accordance with applicable laws and regulations. Samples of suspected CHB were taken and split with MAA. EP TOX metals will be run. MAA must further submit to MDE/HSWMA a plan to assess the extent of contamination in this area.

Sample to Lab 7/3/91 RJ 910702-01
TCLP chromium + cadmium

Observer: R Johnson Person Interviewed: Donald F. Blumenthal Jr.

MDE 111
REV. 1/11/88

FILE COPY

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 W. Preston St., Balto. MD 21201

YR MO DY: 8 5 0 9 1 1

TIME: 1 1 3 0

DHS Inspection Form
Generators/TSD Facilities

EPA ID Number: MD0083501023

TELEPHONE: 301-687-6270

Owner/Operator MD AIR NAT'L GUARD Facility Name _____

Address 2701 EASTERN BLVD. BALTO. MD Zip 21220

Description of Work Activity EQUIPMENT MAINTENANCE, PAINTING ACTIVITIES

I. Generators

A. Description (10.51.03.01-.03)

1) Does the Facility generate or has it accumulated those quantities of hazardous waste described in 10.51.02.05 C.? _____Yes, _____No.
2) Has the facility obtained an EPA identification number? ✓Yes, _____No.
3) Describe the amount of waste generated. (day, week or month) VARIABLE
4) Under which category is the waste(s)? ✓Ignitable _____Reactive _____Corrosive _____EP Toxic ✓RCRA Listed

B. Manifest (10.51.03.04)

1) Is Maryland manifest system in operation for off-site shipment? ✓Yes, _____No.
2) Is TSD Facility to receive DHS identified by ✓Name, ✓Address, ✓EPA ID Number?
3) Is alternate facility identified? _____Yes, ✓No.
4) Is generator identified by ✓Name, ✓Address, ✓Telephone Number, ✓MD/EPA ID Number?
5) Is each transporter identified by ✓Name, ✓EPA ID Number, ✓Maryland Certification Number?
6) Is waste property described? ✓Yes, _____No.
7) Is shipment date marked? ✓Yes, _____No.
8) Is quantity of waste described by ✓Unit of Weight, ✓Volume?
9) Are containers to be loaded identified by ✓Type, ✓Number?
10) Is proper certification noted and signed by generator? ✓Yes, _____No.
11) Are adequate copies available for operator, transporter and TSD? ✓Yes, _____No.

C. Pre-Transport Requirements (10.51.03.05)

1) Is each container marked with date accumulation began? ✓Yes, _____No. If yes, has any waste been stored over 90 days? ✓Yes, _____No. How much 17 ALREADY OVER 90 DAYS, SOME DRUMS WILL BE SOON
2) Are containers in good condition? ✓Yes, _____No. If no, explain _____
3) Are containers properly labeled? ✓Yes, _____No.
4) Does generator have approved emergency contingency plan? _____Yes, ✓No.

SEE COMMENTS

D. Recordkeeping and Reporting (10.51.03.06)

1) Does the generator have: copies of all signed manifests from the previous three years? ✓Yes, _____No; copies of each Annual Report and Exception Report? ✓Yes, _____No.
2) Does the generator retain, for a period of three years, all wastes analyses? ✓Yes, _____No.
3) Has the generator filed Exception Reports as required by 10.51.03.06 C? _____Yes, N/A No.

II. Treatment, Storage, Disposal (TSD)

A. Site characterization (10.51.05.02)

1) Facility Type

_____Thermal Treatment
_____Recycling/Recovery
_____Waste Oil
_____Chemical Treatment
_____Physical Treatment
_____Open Pile
_____Surface Impoundment
_____Drums
_____Above Ground Tank(s)
_____Biological Treatment
_____Land Treatment
_____Incineration
_____Landfill Operation
_____Below Ground Tanks
_____Other _____

2) Does facility generate DHS? _____Yes, _____No.
3) Does facility have waste analysis plan? _____Yes, _____No. If yes, are the procedures of that plan being followed? _____Yes, _____No.
4) Can facility personnel identify DHS being handled? _____Yes, _____No.
5) Can facility personnel confirm that DHS received equal those on manifest form? _____Yes, _____No.
6) Is there a 24-Hour surveillance system to monitor active portion of facility? _____Yes, _____No. If No, is there an artificial or natural boundary? _____Yes, _____No. Is there a means to control entry? _____Yes, _____No. Is there a restricted access sign posted? _____Yes, _____No.
7) Does facility have: _____emergency equipment inspection log, _____written schedule for inspections, _____security devices, operating & structural prevention equipment?
8) Have facility personnel completed classroom/on-site training? ✓Yes, _____No. Are records maintained of: ✓Job titles/names of employees ✓Job descriptions, ✓Type/amount of continuing training?
9) Are general requirements for Ignitable, Reactive or Incompatible Wastes as required in 10.51.05.02 H addressed? _____Yes, _____No.

B. Preparedness and Prevention (10.51.05.03)

1) Facility has the following equipment? ✓Internal communication/alarm system for on-site personnel, ✓device for summoning emergency assistance, ✓adequate fire control equipment, water, & suppression chemicals, ✓list of aforementioned equipment.
2) Does facility have adequate area for emergency movement? ✓Yes, _____No.

C. Contingency Plan and Emergency Procedures (10.51.05.04)

1) Does facility have an approved contingency plan for: _____Personnel to implement emergency procedures to fire, explosions, and unplanned releases to air, soil and water? _____Responding emergency units to provide assistance during emergency situations? _____A list of emergency equipment needed to cope with situation?
2) Are emergency response coordinators listed by name, address, & phone number? _____Yes, _____No.
3) Is there an evacuation plan if recommended? _____Yes, _____No.
4) Are emergency coordinators available on twenty-four hour basis? _____Yes, _____No.

D. Manifest System, Recordkeeping, and Reporting (10.51.05.05)

Facility has a written operating record which contains the following information:

1) _____description & quantity of DHS received.
2) _____method & date of DHS treatment, storage, or disposal.
3) _____location & quantity at each DHS location in facility.
4) _____detailed records & results of waste analysis & treatability tests performed.
5) _____detailed operating summary reports.
6) _____description of emergency incidents that required implementation of contingency plan.
7) _____records & results of inspections of emergency equipment, TSD systems & hazardous waste areas.
8) Has facility retained, for at least 3 years, copies of all manifests? _____Yes, _____No.

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E. Groundwater Monitoring (10.51.05.06)

1) Has facility implemented a groundwater monitoring program? _____Yes, _____No, _____N/A.
2) Are samples from the groundwater monitoring system being analyzed according to the groundwater sampling and analyses plan? _____Yes, _____No.
3) Is this plan set up in accordance with 10.51.05.06 C? _____Yes, _____No.
4) Has groundwater quality assessment program been prepared? _____Yes, _____No.
5) Are proper groundwater sampling and analyses records kept? _____Yes, _____No.
6) Are the necessary reports on groundwater monitoring information being forwarded to the Secretary? _____Yes, _____No.
7) Do the reports match the facility records? _____Yes, _____No.

F. Closure, Post-closure, and Financial Requirement (10.51.05.07 & .08)

1) Does the facility have an approved closure plan that meets the financial requirements? _____Yes, _____No.
2) For surface impoundments, land treatment, and landfills, does the facility have an approved post-closure plan that meets the financial requirements? _____Yes, _____No.
3) Does facility maintain liability insurance? _____Yes, _____No.

G. Container Management (10.51.05.09)

1) Are all containers: (a)__✓__ in good condition, i.e., no signs of leakage, corrosion, or any other deterioration/deformation; (b)__✓__ lined or made of compatible material such that hazardous wastes placed into them will not result in reaction or corrosion; (c)__✓__ sealed during storage.
2) Are storage areas for hazardous waste containers inspected by owner/operator at least once a week? ✓ Yes, _____No.
3) Is an inspection log maintained? ✓ Yes, _____No.
4) Are containers holding ignitable or reactive waste located at least 50 feet from the facility's property line? ✓ Yes, _____No.
5) Are incompatible wastes placed in separate containers? _____Yes, N/A No.
6) Are storage containers holding hazardous wastes which are incompatible with nearby materials stored in containers, tanks, piles, or surface impoundments separated by dikes, berms, walls, or other devices? _____Yes, N/A No.

H. Tanks (10.51.05.10)

1) Are all tanks in good condition, i.e., no signs of leakage, corrosion, or any other deterioration: _____Yes, _____No.
2) Are uncovered tanks operated to ensure a minimum of two feet of freeboard? _____Yes, _____No.
   If not, is tank equipped with a containment structure (e.g., dike or trench), a drainage control system, or a diversion structure (e.g., standby tank) with a capacity that equals or exceeds the volume of top 2 ft. of the tank? _____Yes, _____No.
3) Are tanks with continuous inflow of hazardous waste equipped with a means to stop this inflow (e.g., waste feed cut-off system or by-pass to a standby tank)? _____Yes, _____No.
4) Are waste analyses conducted or written documentation obtained before placing a substantially different hazardous waste into tank used for storage or treatment? _____Yes, _____No.
5) Are daily inspections conducted for discharge control equipment (e.g., by-pass systems, waste feed cut-off systems and drainage systems)? _____Yes, _____No.
6) Is data gathered from monitoring equipment (e.g., pressure and temperature gauges) at least once each operating day? _____Yes, _____No.
7) Is the level of waste in the tank checked at least once each operating day? _____Yes, _____No.
8) Is (are) the tank(s) inspected weekly to detect corrosion or leaking of fixtures or seams? _____Yes, _____No.
9) Are the results of these inspections recorded in an inspection log or summary? _____Yes _____No.
10) Are ignitable or reactive wastes stored in tanks? _____Yes, _____No. If yes:
    a) Is the waste treated, rendered, or mixed before or immediately after placement in the tank so that the resulting waste, mixture, or dissolution of materials no longer meets the definition of ignitable or reactive wastes under Parts 261.21 or 261.23 of the RCRA Regulations? _____Yes, _____No.
    b) Is waste stored or treated in such a way that it is protected from material or conditions which may cause the waste to ignite or react? _____Yes, _____No.
    c) Is owner/operator of a facility which treats or stores ignitable or reactive wastes in covered tanks in compliance with the National Fire Protection Association's (NEPA's) buffer zone requirements for tanks contained in tables 2-1 through 2-6 of the "Flammable and Combustible Code—1977"? _____Yes, _____No.

I. Surface Impoundments (10.51.05.11)

1) Is two feet of freeboard maintained in the surface impoundment? _____Yes, _____No.
2) Do all earthen dikes have protective covers (e.g., grass, shale or rock) to minimize wind and water erosion and to preserve dike structural integrity? _____Yes, _____No.
3) Are waste analyses conducted or written documentation obtained before placing a substantially different hazardous waste into a surface impoundment used for storage or treatment? _____Yes, _____No.
4) Is the freeboard level inspected daily? _____Yes, _____No.
5) Is the surface impoundment, including dikes and vegetation, inspected weekly to detect leaks, deterioration, or failures in the impoundment? _____Yes, _____No.
6) Are the results of these inspections recorded in an inspection log or summary? _____Yes, _____No.
7) Are ignitable or reactive wastes stored in a surface impoundment? _____Yes, _____No. If yes:
   a) Is the waste treated, rendered, or mixed before or immediately after placement in the impoundment so that the resulting waste, mixture or dissolution of material no longer meets the definition of ignitable or reactive waste under Parts 261.21 or 261.23 of the RCRA Regulations? _____Yes, _____No.
   b) Are incompatible wastes segregated in separate surface impoundments so that spontaneous reactions are avoided? _____Yes, _____No.

J. Waste Pile (10.51.05.12)

1) Is wind dispersal of the pile controlled? _____Yes, _____No, _____Not Needed.
2) Are additions to the pile being analyzed prior to adding them to the pile? _____Yes, _____No.
3) Is hazardous waste leachate or runoff collected? _____Yes, _____No. Is the pile protected from precipitation and run-on? _____Yes, _____No.
4) Are ignitible or reactive wastes protected from materials or conditions that might cause it to ignite or react? _____Yes, _____No, _____N/A.
5) Are incompatible wastes hauled in a manner as to assure separation? _____Yes, _____No, _____N/A.

K. Land Treatment (10.51.05.13)

1) Will the use of land treatment result in the waste being less hazardous or non-hazardous? _____Yes, _____No.
2) Is run-on diverted away from the active portion of the facility? _____Yes, _____No. Is run-off from the active portion of the facility collected? _____Yes, _____No.
3) Has the proper waste analyses been peformed? _____Yes, _____No.
4) If food chain crops are to be grown on the active portion of the facility has the necessary documentation required been provided? _____Yes, _____No.
5) Has the owner/operator written and implemented an unsaturated zone monitoring plan? _____Yes, _____No.
6) Have the additional requirements for a closure and post-closure plan been addressed? _____Yes, _____No.
7) Are ignitable or reactive wastes immediately incorporated into the soil? _____Yes, _____No.
8) Are incompatible wastes hauled according to 10.51.05.13 I? _____Yes, _____No.

L. Landfills (10.51.05.14)

1) Is run-on diverted away from the facility's active portions? _____Yes, _____No.
2) Is run-off collected from the landfill's active portions? _____Yes, _____No.
3) Has a hazardous waste determination been made on the run-off? (Identification and Listing of Hazardous Waste) _____Yes, _____No.
4) Is the landfill managed so as to control wind dispersal? _____Yes, _____No.

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5) Are the following items maintained in the operating record: _____on a map, the exact location and dimensions, including depth, of each cell with respect to permanently surveyed benchmarks? _____contents of each cell and approximate location of each hazardous waste type within the cell?
6) Are bulk, non-containerized or waste containing free liquids placed in the landfill? _____Yes, _____No. If yes: _____ is a leachate collection system available to remove leachate?, and _____is the liquid stabilized or treated physically or chemically prior to disposal?
7) Are empty containers crushed flat or shredded before burial in the landfill? _____Yes, _____No.
8) Are containers holding liquid wastes (or waste containing free liquids placed in the landfill? _____Yes, _____No. If yes, describe containers on comments below.
9) Are ignitable or reactive wastes placed in a landfill? _____Yes, _____No. If yes: _____Is the waste treated, rendered, or mixed before or immediately after placement in the landfill so that the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive waste? _____Are incompatible wastes segregated in different landfill cells?

M. Incinerator/Thermal Treatment (10.51.05.15 & .16)

1) Prior to burning waste not previously incinerated or thermally processed, does the operator conduct waste analysis for the following:
_____heating value of the waste;
_____halogen content and sulfur in the waste;
_____concentrations of lead and mercury unless documented data is available which show these elements not to be present?
2) Are instruments related to combustion and emission control monitored at least every 15 minutes? _____Yes, _____No.
3) Is the stack plume observed visually at least hourly for color and opacity? _____Yes, _____No, _____N/A.
4) Is the incinerator or thermal process and associated equipment inspected daily for leaks, spills and fugitive emissions? _____Yes, _____No.
5) Is all of the above information documented in the facility's operating record? _____Yes, _____No.

N. Chemical, Physical and Biological Treatment (10.51.05.17)

1) Are all treatment processes or equipment in good condition, i.e., no signs of leakage, corrosion or any other deterioration? _____Yes, _____No.
2) Are treatment processes or equipment with continuous inflow of hazardous waste equipped with a means to stop the inflow? (e.g., waste feed cutoff system or bypass system to a standby containment device) _____Yes, _____No.
3) Are waste analyses performed or written documentation obtained before placing a substantially different hazardous waste into treatment processes or equipment? _____Yes, _____No.
4) Is this information recorded in the facility's operating record? _____Yes, _____No.
5) Are daily inspections conducted for discharge control equipment (e.g., bypass systems, waste feed cutoff systems, drainage systems and pressure relief systems)? _____Yes, _____No.
6) Is data gathered from monitoring equipment (e.g., pressure and temperature gauges) daily? _____Yes, _____No.
7) Are construction materials of the treatment process or equipment and the immediate surrounding area inspected weekly for signs of leakage, corrosion or any other deterioration? _____Yes, _____No.
8) Are the results of these inspections recorded in an inspection log or summary? _____Yes, _____No.
9) Are ignitable or reactive wastes placed in a treatment process? _____Yes, _____No. If yes:
_____Are wastes treated, rendered, or mixed before or immediately after placement in the treatment process or equipment so that the resulting waste, mixture, or dissolution of material no longer meets the definition of ignitable or reactive wastes under Section 261.21 or 261.23 of the RCRA Regulations?
_____Are wastes treated in such a way that they are protected from any material or conditions which may cause the waste to ignite or react?
10) Are incompatible wastes kept from being placed in the same treatment process or equipment? _____Yes, _____No.

O. Permit Requirements (10.51.07)

1) Does the facility have a DHS permit for its activity? _____Yes, _____No.
If no, has the facility submitted an application for a DHS permit? _____Yes, _____No.
2) List any special Permit requirements that are not in full compliance.

Comments: SINCE THE FIRST OF THE YEAR THE FOLLOWING WASTE HAS BEEN SHIPPED BY MANIFEST BY HAZ MAT ENVIRONMENTAL TO CHEMICAL WASTE MANAGEMENT.
NYA 2269098 8-15-85
WASTE FLAMMABLE LIQUID UN 1993 8 DM 3200P
WASTE PAINT THINNER UN 1263 9 DM 3800P
HAZ WASTE LIQUID N.O.S. UN 9189 1 DM 400P
NYA 2269188 8-15-85
WASTE ASBESTOS ORM-C 1 DM 5G
WASTE FLAMMABLE SOLID N.O.S. UN 1325 1 DM 600P
WASTE 1,1,1 TRICHLOROETHANE UN 2831 2 DM 1000P

Inspector's Name: VALERIE DOYLE Title: REGIONAL INSPECTOR

Facility Location: 2701 EASTERN BLVD.

Facility Rep. present during inspection: SCOTT KEARBY Title: ASST BASE ENGINEER

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: ROUTINE Date 9/11/85

Facility Name: MD NAT'L GUARD

Remarks:

WASTE ADHESIVE COMBUSTIBLE LIQ. UN1133 IDM 400P
NYA 2269197 8-15-85
WASTE PAINT ENAMEL FLAM. LIQ. UN1263 2DM 106
17 DRUMS PRESENTLY IN STORAGE OVER 90 DAYS. A PROBLEM IN CONTRACTING A DISPOSAL COMPANY IS THE REASON FOR EXCEEDING THE 90 DAY LIMIT. THE DRUMS WILL BE REMOVED BY THE SECOND WEEK IN OCTOBER. THE DRUMS ARE, HOWEVER, PROPERLY SEALED, LABELED AND SECURED.

THE AREA BEING USED FOR STORAGE OF WASTES DOES NOT MEET REQUIREMENTS FOR CONTAINMENT. PLANS TO COMPLY WITH THE REGULATIONS SHOULD BE MADE BY THE TIME OF THE NEXT QUARTERLY INSPECTION.

A CONTINGENCY PLAN SHOULD ALSO BE COMPLETED BY THE TIME OF NEXT INSPECTION. THE SPCC PLAN IS A PLAN FOR HANDLING WASTE OILS AND IS NOT SUFFICIENT UNLESS IT SPECIFICALLY ADDRESSES HAZARDOUS WASTE.

ANNUALLY AN AUXILIARY SQUAD IS TRAINED IN FIRE SAFETY, CONTINGENCY, EXPLOSION ETC.. QUATERLY, A MANAGEMENT MEETING FOR HAZARDOUS MATERIALS HANDLING IS CONDUCTED

Observer: VALERIE DOYLE Person Interviewed: SCOTT KEARBY

DHMH 3879

STATE OF MARYLAND —:— DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

TO File **From** John Beazley JB **Date** June 27, 1985

Subject Glenn L. Martin State Airport - Air National Guard Baltimore County

Laboratory analysis of the water samples collected February 21, 1985 at the two wells in question at the Glenn L. Martin Air Port - Air National Guard, revealed no purgeable aromatics nor purgeable halocarbons These water samples were collected at first flush and after running the water to flush the lines and draw from the wells. The analysis of water samples collected February 8, 1985, also, revealed no purgeable halocarbons nor purgeable aromatics. This is inconsistant with the sample analysis performed by a private laboratory for the Air Guard, which showed ethylbenzene, benzene, chlorobenzene, and ethylene chloride in low levels. The analysis of samples collected by this department do not indicate any contamination of the groundwater.

A memorandum dated February 26, 1985 from Paul Thompson to Frank Henderson transfered the file to Mr. Henderson to added to his list for future assessment and/or investigation.

JB/jj

STATE OF MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE

LABORATORIES ADMINISTRATION
TRACE ORGANICS LABORATORY
VOLATILE ORGANICS ANALYSIS

BOTTLE NUMBER JB 85 0221 K0-1A+B

Name of County

SOURCE OF SAMPLE Glenn L. Martin ANG COLLECTOR John Beazley

SAMPLE TYPE: _____ DISTRIBUTION _____ SOURCE _____ OTHER (specify) _____

Community _____ noncommunity _____ private _____

Landfill observation well _____ stream _____ tidal waters _____

Industrial effluent _____ STP sampling station _____ STP effluent _____

Chlorinated _____ preserved with thiosulfate _____

Reason for submitting sample: Trihalomethane Survey _____

Suspected Industrial Chemical Contamination _____

Suspected Petroleum (gasoline, etc.) Contamination _____

Other (specify) _____

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REMARKS: _____

1	2 3	4 5 6 7	8 9 10 11	12 13 14 15 16 17	18 19
TRANS TYPE	COUNTY	PLANT NO	SAMPLING STATION	DATE COLLECTED	CARD NO
				0 2 2 1 8 5	

20 21 22 FIELD pH _____ FIELD RESID. CHLORINE: FREE 23 24 _____ TOTAL 25 26 _____

Purgeable Halocarbons (EPA 601)				Purgeable Aromatics (EPA 602)	
Chloromethane	<1	trans-1,3-Dichloropropene	<1	Benzene	<1
Bromomethane		Trichloroethene		Toluene	
Dichlorodifluoromethane		Dibromochloromethane		Ethylbenzene	
Vinyl chloride		1,1,2-Trichloroethane		Total Xylenes	<2
Chloroethane		cis-1,3-Dichloropropene		Total Purgeable Hydrocarbons	
Methylene chloride		2-Chloroethylvinylether		Tetrahydrofuran	
Trichlorofluoromethane		Bromoform		Methylethylketone	
1,1-Dichloroethene		1,1,2,2-Tetrachloroethane		(2-Butanone) (MEK)	
1,1-Dichloroethane		Tetrachloroethene		Methylisobutylketone (MIBK)	
trans-1,2-Dichloroethene		Chlorobenzene			
Chloroform		Total Trihalomethanes			
1,2-Dichloroethane		**Other Purgeable Organics:**			
1,1,1-Trichloroethane					
Carbon Tetrachloride					
Bromodichloromethane					
1,2-Dichloropropane					

Results reported in micograms per liter (parts per billion)

DATE RECEIVED MAR 21 1985 DATE REPORTED 4/11/85 203472

STATE OF MARYLAND

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

LABORATORIES ADMINISTRATION
TRACE ORGANICS LABORATORY
VOLATILE ORGANICS ANALYSIS

BOTTLE NUMBER JB 85-0221-MM-01 (ATE)

Name of County

SOURCE OF SAMPLE GLENN L. MARTIN ANG COLLECTOR JOHN BEAZLEY

SAMPLE TYPE: _____ DISTRIBUTION _____ SOURCE _____ OTHER (specify) _____

Community _____ noncommunity _____ private _____

Landfill observation well _____ stream _____ tidal waters _____

Industrial effluent _____ STP sampling station _____ STP effluent _____

Chlorinated _____ preserved with thiosulfate _____

Reason for submitting sample: Trihalomethane Survey _____

Suspected Industrial Chemical Contamination _____

Suspected Petroleum (gasoline, etc.) Contamination _____

Other (specify) _____

REMARKS: 1305

1	2 3	4 5 6 7	8 9 10 11	12 13 14 15 16 17	18 19
TRANS TYPE	COUNTY	PLANT NO.	SAMPLING STATION	DATE COLLECTED	CARD NO
				0 2 2 1 8 5	

FIELD pH (20 21 22) _____ FIELD RESID. CHLORINE: FREE (23 24) _____ TOTAL (25 26) _____

Purgeable Halocarbons (EPA 601)				Purgeable Aromatics (EPA 602)	
Chloromethane	<1.	trans-1,3-Dichloropropene	<1.	Benzene	<1.
Bromomethane		Trichloroethene		Toluene	<1.
Dichlorodifluoromethane		Dibromochloromethane		Ethylbenzene	<1.
Vinyl chloride		1,1,2-Trichloroethane		Total Xylenes	<2
Chloroethane		cis-1,3-Dichloropropene		Total Purgeable Hydrocarbons	
Methylene chloride		2-Chloroethylvinylether		Tetrahydrofuran	
Trichlorofluoromethane		Bromoform		Methylethylketone	
1,1-Dichloroethene		1,1,2,2-Tetrachloroethane		(2-Butanone) (MEK)	
1,1-Dichloroethane		Tetrachloroethene		Methylisobutylketone (MIBK)	
trans-1,2-Dichloroethene		Chlorobenzene			
Chloroform		Total Trihalomethanes			
1,2-Dichloroethane		**Other Purgeable Organics:**			
1,1,1-Trichloroethane					
Carbon Tetrachloride					
Bromodichloromethane					
1,2-Dichloropropane					

Results reported in micograms per liter (parts per billion)

DATE RECEIVED 2-21-85 DATE REPORTED MAR 5 1985 CHEMIST [illegible] LAB NO 2475

STATE OF MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
LABORATORIES ADMINISTRATION
TRACE ORGANICS LABORATORY
VOLATILE ORGANICS ANALYSIS

BOTTLE NUMBER JB 85-0221-K02 A16

Name of County

SOURCE OF SAMPLE Glenn L. Martin ANG COLLECTOR John Beazley

SAMPLE TYPE: _____ DISTRIBUTION _____ SOURCE _____ OTHER (specify) _____

Community _____ noncommunity _____ private _____

Landfill observation well _____ stream _____ tidal waters _____

Industrial effluent _____ STP sampling station _____ STP effluent _____

Chlorinated _____ preserved with thiosulfate _____

Reason for submitting sample: Trihalomethane Survey _____

Suspected Industrial Chemical Contamination _____

Suspected Petroleum (gasoline, etc.) Contamination _____

Other (specify) _____

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REMARKS: _____

1	2 3	4 5 6 7	8 9 10 11	12 13 14 15 16 17	18 19
TRANS TYPE	COUNTY	PLANT NO	SAMPLING STATION	DATE COLLECTED	CARD NO
				0 2 2 1 8 5	

FIELD pH (20 21 22) _____ FIELD RESID. CHLORINE: FREE (23 24) _____ TOTAL (25 26) _____

Purgeable Halocarbons (EPA 601)

Chloromethane	<1	trans-1,3-Dichloropropene	<1
Bromomethane		Trichloroethene	
Dichlorodifluoromethane		Dibromochloromethane	
Vinyl chloride		1,1,2-Trichloroethane	
Chloroethane		cis-1,3-Dichloropropene	
Methylene chloride		2-Chloroethylvinylether	
Trichlorofluoromethane		Bromoform	
1,1-Dichloroethene		1,1,2,2-Tetrachloroethane	
1,1-Dichloroethane		Tetrachloroethene	
trans-1,2-Dichloroethene		Chlorobenzene	
Chloroform		Total Trihalomethanes	
1,2-Dichloroethane			
1,1,1-Trichloroethane			
Carbon Tetrachloride			
Bromodichloromethane			
1,2-Dichloropropane			

Other Purgeable Organics:

Purgeable Aromatics (EPA 602)

Benzene	<1
Toluene	
Ethylbenzene	
Total Xylenes	<2
Total Purgeable Hydrocarbons	
Tetrahydrofuran	
Methylethylketone	
(2-Butanone) (MEK)	
Methylisobutylketone (MIBK)	

Results reported in micrograms per liter (parts per billion)

DATE RECEIVED FEB 21 1985 DATE REPORTED MAR 5 1985 CHEMIST [illegible] LAB NO 002470

STATE OF MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
LABORATORIES ADMINISTRATION
TRACE ORGANICS LABORATORY
VOLATILE ORGANICS ANALYSIS

BOTTLE NUMBER JB-85 0221-MH-02 A+B

Name of County

SOURCE OF SAMPLE Glenn L. Martin ANG COLLECTOR Jean Brazley

SAMPLE TYPE: _____ DISTRIBUTION _____ SOURCE _____ OTHER (specify) _____

Community _____ noncommunity _____ private _____

Landfill observation well _____ stream _____ tidal waters _____

Industrial effluent _____ STP sampling station _____ STP effluent _____

Chlorinated _____ preserved with thiosulfate _____

Reason for submitting sample: Trihalomethane Survey _____

Suspected Industrial Chemical Contamination _____

Suspected Petroleum (gasoline, etc.) Contamination _____

Other (specify) _____

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MAR 5 1985
ENFORCEMENT FILE
FILE COPY ONLY

REMARKS: _____

1	2 3	4 5 6 7	8 9 10 11	12 13 14 15 16 17	18 19
TRANS TYPE	COUNTY	PLANT NO	SAMPLING STATION	DATE COLLECTED	CARD NO
				0 2 2 1 8 5	

FIELD pH (20 21 22) _____ FIELD RESID. CHLORINE: FREE (23 24) _____ TOTAL (25 26) _____

Purgeable Halocarbons (EPA 601)				Purgeable Aromatics (EPA 602)	
Chloromethane	<1	trans-1,3-Dichloropropene	<1	Benzene	<1
Bromomethane		Trichloroethene		Toluene	
Dichlorodifluoromethane		Dibromochloromethane		Ethylbenzene	
Vinyl chloride		1,1,2-Trichloroethane		Total Xylenes	<2
Chloroethane		cis-1,3-Dichloropropene		Total Purgeable Hydrocarbons	
Methylene chloride		2-Chloroethylvinylether		Tetrahydrofuran	
Trichlorofluoromethane		Bromoform		Methylethylketone	
1,1-Dichloroethene		1,1,2,2-Tetrachloroethane		(2-Butanone) (MEK)	
1,1-Dichloroethane		Tetrachloroethene		Methylisobutylketone (MIBK)	
trans-1,2-Dichloroethene		Chlorobenzene			
Chloroform		Total Trihalomethanes			
1,2-Dichloroethane		**Other Purgeable Organics:**			
1,1,1-Trichloroethane					
Carbon Tetrachloride					
Bromodichloromethane					
1,2-Dichloropropane					

Results reported in micrograms per liter (parts per billion)

DATE RECEIVED FEB 21 1985 DATE REPORTED MAR 8 1985 CHEMIST V. Will LAB NO 002471

Program:

RCRA X

NPDES ~~X~~

SPECIFY _____

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Hazardous Waste Laboratory
Organic Analysis Report Form

Lab. No. 002472

Priority _____

Collector John Beazley / 1245 / 850121
Name/time/date

Sample Source Glenn L. Martin ANG

Sample ID No. JB 850221 KO-1-A + B

Preservative Used HCl Used in transit

Sample Alert _____

Chain of Custody sample possession

From John Beazley / 1430 / 850221
Name/time/date

to Gamine Cormier / 14:30 / FEB 21 1985
Name/time/date

From _____
Name/time/date

to _____
Name/time/date

From _____
Name/time/date

to _____
Name/time/date

EP Toxicity Organics

	PPb
endrin	
lindane	
methoxychlor	
toxaphene	
2, 4-D	
2, 4, 5-TP(silvex)	

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MAR 5 1985
ENFORCEMENT FILE
FILE COPY ONLY

Organics Analysis

X	*Purgeable halocarbons	SEE ATTACHED
X	*Purgeable aromatics	
	*Acrolein & Acrylonitrile	
	*Phenols	
	*Phthalate esters	
	*Organochlorine Pesticides & PCB	
	*Nitroaromatics & Isophorone	
	*Polynuclear aromatic hydrocarbons	
	*Haloethers	
	*Chlorinated hydrocarbons	

*see other side for specific compounds

_____

_____

rganic identification and comparison _____

l and grease _____ PPM

ction Chief: [signature]

Authorized By: _____

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Program:
RCRA X
NPDES ____
SPECIFY ____

Lab. No. 002173

Hazardous Waste Laboratory
Organic Analysis Report Form

Priority ____

Collector John Brazley / 1305 / 85-02-21 Sample Source Glenn L. Martin AMC
Name/time/date

Sample ID No. HB-85-0221-MM-01 A+B Preservative Used HCl iced in transit

Sample Alert ____

Chain of Custody sample possession

From John Brazley / 1430 / 85-02-21 to Janice Cormier / 17.30 / FEB 2 1985
Name/time/date Name/time/date

From ____ to ____
Name/time/date Name/time/date

From ____ to ____
Name/time/date Name/time/date

EP Toxicity Organics

	PPb
endrin	
lindane	
methoxychlor	
toxaphene	
2, 4-D	
2, 4, 5-TP(silvex)	

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1985

Organics Analysis

X	*Purgeable halocarbons
X	*Purgeable aromatics
	*Acrolein & Acrylonitrile
	*Phenols
	*Phthalate esters
	*Organochlorine Pesticides & PCB
	*Nitroaromatics & Isophorone
	*Polynuclear aromatic hydrocarbons
	*Haloethers
	*Chlorinated hydrocarbons

*see other side for specific compounds

SEE ATTACHED

Organic identification and comparison ____

Oil and grease ____ PPM

Authorized By: ____

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Program:
RCRA X
NPDES ____
SPECIFY ____

Hazardous Waste Laboratory
Organic Analysis Report Form

Lab. No. 002171

Priority ____

Collector John Beazley / 1315 / 850221 (Name/time/date) Sample Source Glenn L. Martin AAC

Sample ID No. JB-85-0221-MM-02 A&B Preservative Used HCl Iced in transit

Sample Alert ____

Chain of Custody sample possession

From John Beazley / 1430 / 850221 (Name/time/date) to Janine Cormier / 14:30 / FEB 21 1985 (Name/time/date)

From ____ (Name/time/date) to ____ (Name/time/date)

From ____ (Name/time/date) to ____ (Name/time/date)

EP Toxicity Organics

	PPb
endrin	
lindane	
methoxychlor	
toxaphene	
2, 4-D	
2, 4, 5-TP(silvex)	

Organics Analysis

X	*Purgeable halocarbons
X	*Purgeable aromatics
	*Acrolein & Acrylonitrile
	*Phenols
	*Phthalate esters
	*Organochlorine Pesticides & PCB
	*Nitroaromatics & Isophorone
	*Polynuclear aromatic hydrocarbons
	*Haloethers
	*Chlorinated hydrocarbons

*see other side for specific compounds

SEE ATTACHED

rganic identification and comparison ____

il and grease ____ PPM

ection Chief: [signature]

Authorized By: ____

Verified [signature]

MARYLAND [illegible]TE DEPARTMENT OF HEALTH AND M[illegible]AL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Program:
RCRA X
NPDES
SPECIFY

Lab. No. 002470

Hazardous Waste Laboratory
Organic Analysis Report Form

Priority

Collector John Beazley / 1255 / 85-02-21 (Name/time/date) Sample Source Glenn L. Martin ANG

Sample ID No. JB 85-0221-KO 2 A+B Preservative Used HCl Iced in transit

Sample Alert

Chain of Custody sample possession

From John Beazley / 1430 / 85-02-21 (Name/time/date) to Janine Cormier / 14:30 / FEB 2 1985 (Name/time/date)

From (Name/time/date) to (Name/time/date)

From (Name/time/date) to (Name/time/date)

EP Toxicity Organics

	PPb
endrin	
lindane	
methoxychlor	
toxaphene	
2, 4-D	
2, 4, 5-TP(silvex)	

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Organics Analysis

- [x] *Purgeable halocarbons — SEE ATTACHED
- [x] *Purgeable aromatics
- [ ] *Acrolein & Acrylonitrile
- [ ] *Phenols
- [ ] *Phthalate esters
- [ ] *Organochlorine Pesticides & PCB
- [ ] *Nitroaromatics & Isophorone
- [ ] *Polynuclear aromatic hydrocarbons
- [ ] *Haloethers
- [ ] *Chlorinated hydrocarbons

*see other side for specific compounds

rganic identification and comparison

il and grease PPM

Authorized By:

ection Chief: [signature] Date: Verified [signature]

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies { Mr. Dave Healy
Mr. John Beazley

Thru: Mr. John Koontz

TO Mr. Frank Henderson From Mr. Paul Thompson Paul Date 2/26/85

Subject Glenn L. Martin State Airport, Baltimore County

Staff investigation of this site indicates improper waste disposal practice.

These include:

1. acid and waste oil disposal pits (at least 4)
2. landfilling (indiscriminate)
3. explosives disposal (deactivated bombs, we're told!) into dredge holes in Frog Mortar Creek.

Private labs show trace organic (L 1-ppb range) contamination of two potable wells on site, yet sampling does not substantiate this. ?

Therefore, ? this site should be added to your next published list of sites for future assessment and/or investigation.

by who

Paul before this goes:

See me

JK

Mike
Set up meeting w/ you, mk & JK

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: _____ Date 85, 02, 13

Facility Name: Glenn L. Martin State Airport, Box 1, 701 Wilson Point Road, Balto Md 21220

Remarks: John Beazley, Barry Chambers, Valer. Doyle, and Mike Griffen met with J. Leonard Wood and Jake West at the Martin State Airport office on Feb 13 at 1300hrs J. Leonard Wood is the Martin State Airport manager. John Beazley, Barry Chambers, Valeri Doyle, and Mike Griffen accompanied Leonard Wood on a tour of the Facility. [redacted] Tech Sgt. Charles Smith of the Air Guard accompanied us when touring the facility east of the air strip.

From the beach along Frog Mater Creek, concrete rubble, corrugated steel pipe, and a couple of drums were observed in the side of the Fill. Indiscriminate dumping was observed at this site in the past as noted in the inspection report of Sept 16, 1981 by James Curtis from this office.

West of the airstrip several areas of dumping were observed. Adeer carcass, cylinders of refrigerant, aborted junk, and rubble were observed. Thirty nine drums were observed by the KJ building; some, but not all, of the drums were empty. One empty drum, denatured ethanol, had a 'Tilly Chemical' label. Drums were observed in the fill area near the KJ building, again demonstrating the indiscriminate waste handling practices at this facility. Photographs were taken by Barry Chambers during this survey.

Mr Griffen discussed the ground water contamination with Mr. Wood and informed Mr. Wood that the airport will have to contract out for surveying and analysis regarding the ground water contamination. Since the Maryland Environmental Service handles the sampling required in the airports NPDES permit and operates the waste treatment plant at the airport, the recommendation that MES be used as consultant was made.

Mr. Chambers recommends that this site be put on a remedial clean up list such as the State Superfund list and/or the Federal Superfund List.

Observer: _____ Person Interviewed: _____

DHMH 3879

CLOSED

REVISION	DATE	DESCRIPTION	BY
	SEP 1958	AS CONSTRUCTED	
(A) S.A.No.6	3-25-56	ADDED DWG. TO CONTRACT	E.G.H.

WHITMAN, REQUARDT & ASSOCIATES
ARCHITECT - ENGINEERS

CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
BALTIMORE DISTRICT
BALTIMORE, MARYLAND

DRAWN BY: HALLSTEAD
TRACED BY: HALLSTEAD-LEW
CHECKED BY: MYERS
REVIEWED BY SAFETY BRANCH: G.H.L.
SUBMITTED: [signature]
HD. MIL. BR. ENGR. DIVISION
APPROVED: [signature]
CHIEF, ENGINEERING DIVISION

GLENN L. MARTIN AIRPORT
AIR NATIONAL GUARD FACILITIES

OIL AND ACID DISPOSAL PIT AND ACCESS ROAD

APPROVED: [signature]
COLONEL, CORPS OF ENGINEERS, DISTRICT ENGINEER
DATE: 30 AUGUST 1956

APPROVED FOR
DATE

SCALE: AS SHOWN
SPEC. NO.
DRAWING NUMBER: AS-BLT 11-01-01
SHEET 1 OF 1

THIS PLAN ACCOMPANIES CONTRACT NO. DA-18-[illegible]-988

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Program:
CRA ✓
PDES ____
SPECIFY ____

Lab. No. 002370

Hazardous Waste Laboratory
Organic Analysis Report Form

Priority ____

Collector BEAZLEY GRIFFEN 1555 hrs. 2.8.85 Sample Source Glenn L. Martin State Airport
Name/time/date

Sample ID No. MB-85-0208-01 Preservative Used HCl fixed VOA, refrigerated

Sample Alert scan for volatile organics. Benzene (1.2 ppm), Chlorobenzene (1.5 ppm) found before

Chain of Custody sample possession

From M. Griffen 1135 hrs. 2.11.85 to Janine Cormier 11:35 2-11-85
Name/time/date Name/time/date

From ____ to ____
Name/time/date Name/time/date

From ____ to ____
Name/time/date Name/time/date

outside tap at "KO" bldg = bldg # 5045. Sample collected after tap opened for ≈5 min. Field pH ≈ 6.0 NO CHLORINATOR INSTALLED ON THIS SYSTEM.

EP Toxicity Organics

	PPb
endrin	
lindane	
methoxychlor	
toxaphene	
2, 4-D	
2, 4, 5-TP(silvex)	

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Organics Analysis

✓	*Purgeable halocarbons	SEE ATTACHED
✓	*Purgeable aromatics	" "
	*Acrolein & Acrylonitrile	
	*Phenols	
	*Phthalate esters	
	*Organochlorine Pesticides & PCB	
	*Nitroaromatics & Isophorone	
	*Polynuclear aromatic hydrocarbons	
	*Haloethers	
	*Chlorinated hydrocarbons	

*see other side for specific compounds

Organic identification and comparison ____

oil and grease ____ PPM

Authorized By: ____

FEB 22 1985 Verified

STATE OF MARYLAND

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

LABORATORIES ADMINISTRATION
TRACE ORGANICS LABORATORY
VOLATILE ORGANICS ANALYSIS

BOTTLE NUMBER (RC)-85-0208-01

Balt. Co.
Name of County

SOURCE OF SAMPLE Glenn L. Martin State Airport COLLECTOR GAITEN, BEARLEY

SAMPLE TYPE: liquid DISTRIBUTION _____ SOURCE _____ OTHER (specify) _____

Community _____ noncommunity _____ private ✓

Landfill observation well _____ stream _____ tidal waters _____

Industrial effluent _____ STP sampling station _____ STP effluent _____

Chlorinated _____ preserved with thiosulfate _____

Reason for submitting sample: Trihalomethane Survey _____

Suspected Industrial Chemical Contamination ✓

Suspected Petroleum (gasoline, etc.) Contamination _____

Other (specify) _____

REMARKS: scan for volatile priority pollutants

1	2 3	4 5 6 7	8 9 10 11	12 13 14 15 16 17	18 19
TRANS TYPE	COUNTY: SA	PLANT NO.	SAMPLING STATION: 101	DATE COLLECTED: 02 08 85	CARD NO.

20 21 22	23 24	25 26
FIELD pH: 06.0	FIELD RESID. CHLORINE: FREE	TOTAL

Purgeable Halocarbons (EPA 624)

Chloromethane	<1.	trans-1,3-Dichloropropene	<1.	Benzene	<1.
Bromomethane		Trichloroethene		Toluene	<1.
Dichlorodifluoromethane		Dibromochloromethane		Ethylbenzene	<1.
Vinyl chloride		1,1,2-Trichloroethane		Total Xylenes	<2.
Chloroethane		cis-1,3-Dichloropropene		Total Purgeable Hydrocarbons	
Methylene chloride		2-Chloroethylvinylether		Tetrahydrofuran	
Trichlorofluoromethane		Bromoform		Methylethylketone	
1,1-Dichloroethene		1,1,2,2-Tetrachloroethane		(2-Butanone) (MEK)	
1,1-Dichloroethane		Tetrachloroethene		Methylisobutylketone (MIBK)	
trans-1,2-Dichloroethene		Chlorobenzene			
Chloroform		Total Trihalomethanes			
1,2-Dichloroethane		Other Purgeable Organics:			
1,1,1-Trichloroethane					
Carbon Tetrachloride					
Bromodichloromethane					
1,2-Dichloropropane					

Results reported in micrograms per liter (parts per billion)

DATE RECEIVED 2-11-85 DATE REPORTED FEB 22 1985 CHEMIST _____ LAB. NO. 002370

MARYLAND STATE DEPARTMENT OF HEALTH AND MENTAL HYGIENE
Laboratories Administration
Howard and Biddle Streets
P.O. Box 2355, Baltimore, Maryland 21203

Program:
CRA ✓
PDES _____
SPECIFY _____

Lab. No. 002371

Hazardous Waste Laboratory
Organic Analysis Report Form

Priority _____

Collector BEAZLEY GRIFFEN 1605 hrs. 2.8.85 Sample Source Glenn L. Martin State Airport
Name/time/date

Sample ID No. MB-85-0208-02 Preservative Used HCl fixed VOA, refrigerated

Sample Alert scan for volatile priority pollutants. Chlorobenzene (10.5 ppm), Ethylbenzene (1.5 ppm), Methylene Chloride (0.8 ppm), Tetrachloroethylene (0.6 ppm) found before.

Chain of Custody sample possession

From M. Griffen 1135 hrs 2.11.85 to Janine Cormier 11:35 hr 2-11-85
Name/time/date Name/time/date

From _____ to _____
Name/time/date Name/time/date

From _____ to _____
Name/time/date Name/time/date

inside tap (handsink in restroom) at munitions maintenance bldg = bldg # 5100. Sample collected after tap opened for ≈5 min. Field pH ≈ 6.5. CHLORINATOR INSTALLED ON THIS SYSTEM.

EP Toxicity Organics

	PPb
endrin	
lindane	
methoxychlor	
toxaphene	
2, 4-D	
2, 4, 5-TP(silvex)	

RECEIVED
FEB 2[illegible]

Organics Analysis

✓	*Purgeable halocarbons	SEE ATTACHED
✓	*Purgeable aromatics	" "
	*Acrolein & Acrylonitrile	
	*Phenols	
	*Phthalate esters	
	*Organochlorine Pesticides & PCB	
	*Nitroaromatics & Isophorone	
	*Polynuclear aromatic hydrocarbons	
	*Haloethers	
	*Chlorinated hydrocarbons	

*see other side for specific compounds

Organic identification and comparison _____

Oil and grease _____ PPM

Authorized By: _____

[illegible] 2 2 1985 Verified [illegible]

STATE OF MARYLAND

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

LABORATORIES ADMINISTRATION
TRACE ORGANICS LABORATORY
VOLATILE ORGANICS ANALYSIS

BOTTLE NUMBER MCA-85-0208-02

Balt. Co.
Name of County

SOURCE OF SAMPLE Glenn L. Martin State Airport COLLECTOR GRIFFEN, BEARLEY

SAMPLE TYPE: liquid DISTRIBUTION _____ SOURCE _____ OTHER (specify) _____

Community _____ noncommunity _____ private ✓

Landfill observation well _____ stream _____ tidal waters _____

Industrial effluent ✓ STP sampling station _____ STP effluent _____

Chlorinated ✓ preserved with thiosulfate _____

Reason for submitting sample: Trihalomethane Survey _____

Suspected Industrial Chemical Contamination ✓

Suspected Petroleum (gasoline, etc.) Contamination _____

Other (specify) _____

ENFORCEMENT FILE COPY

REMARKS: scan for volatile priority pollutants

1	2 3	4 5 6 7	8 9 10 11	12 13 14 15 16 17	18 19
TRANS TYPE	BA COUNTY	PLANT NO.	02 SAMPLING STATION	020885 DATE COLLECTED	CARD NO.

FIELD pH 20 21 22: 065 FIELD RESID. CHLORINE: FREE 23 24 TOTAL 25 26

Purgeable Halocarbons (EPA ~~601~~ 624)				Purgeable Aromatics (EPA ~~602~~ 624)	
Chloromethane	<1.	trans-1,3-Dichloropropene	<1	Benzene	<1.
Bromomethane		Trichloroethene		Toluene	<1.
Dichlorodifluoromethane		Dibromochloromethane		Ethylbenzene	<1.
Vinyl chloride		1,1,2-Trichloroethane		Total Xylenes	<2.
Chloroethane		cis-1,3-Dichloropropene		Total Purgeable Hydrocarbons	
Methylene chloride		2-Chloroethylvinylether		Tetrahydrofuran	
Trichlorofluoromethane		Bromoform		Methylethylketone	
1,1-Dichloroethene		1,1,2,2-Tetrachloroethane		(2-Butanone) (MEK)	
1,1-Dichloroethane		Tetrachloroethene		Methylisobutylketone (MIBK)	
trans-1,2-Dichloroethene		Chlorobenzene	✓		
Chloroform		Total Trihalomethanes			
1,2-Dichloroethane		Other Purgeable Organics:			
1,1,1-Trichloroethane					
Carbon Tetrachloride					
Bromodichloromethane					
1,2-Dichloropropane	✓				

Results reported in micograms per liter (parts per billion)

DATE RECEIVED 2-11-85 DATE REPORTED FEB 22 1985 CHEMIST [signature] LAB. NO. 002371

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

Paul T — John N Koontz

TO ~~Mr. Frank Henderson~~ via ~~Mr. John Koontz~~ From ~~Mr. Paul Thompson~~ PT Date 2/7/85

Subject Glenn L. Martin State Airport

Frank we need your section's/assistance in establishing and implementing a sampling plan for:

1. Groundwater Sampling (Two contaminated wells on site).
2. Four (maybe 5) unlined pits - referred to as "Acid Pits" by plans and Maryland Air National Guard Employees.
3. Two known areas of landfill activity (Dredge Spoils, etc.)
4. One area of munitions dumping into Frog Mortar Creek.

We have the permission/cooperation of both the State Aviation Administration (Leonard Wood - 391-9500) as property owner, and the Maryland Air National Guard (Tech. Sgt. Charles Smith - 687-6270 ext. 428) as tenant.

PT/jj

Have OWNERS of site do work per our NORMAL procedures. Get them UNDER A CONSENT ORDER/AGREEMENT re DUNDALK MARINE Terminal.

Mike,

BACK TO You.

P

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

TO JK From MQ Date 4.7.85

Subject GLENN L. MARTIN STATE AIRPORT

PHONE CONVERSATION WITH TECH. SGT. C. SMITH, WARFIELD ANG NATIONAL GUARD.

SGT. SMITH HAS LOCATED DESIGN PLANS, CIRCA 1958, FOR A "NEW" ACID PIT (UNLINED, OF COURSE) TO REPLACE ANOTHER ONE THAT WAS "REAL BAD". THE "REAL BAD" ONE WAS CLOSER TO FROG MORTAR CREEK THAN THE 4 ON OUR PLAN COPY AND WAS BULLDOZED IN BY THE AIR NATIONAL GUARD WHEN THEY CONSTRUCTED THE NEW ONE.

INFORMATIONALLY, THE MUNITIONS TESTING PIT WAS ALSO CONSTRUCTED BY THE AIR NATIONAL GUARD (CIRCA 1958) AS WAS THE TAXIWAY.

ONE FINAL TIDBIT: ALL LEFTOVER BOMBS WERE DEACTIVATED (REALLY?) AND DUMPED INTO A HOLE AT THE BOTTOM OF FROG MORTAR CREEK.

Butch
This confusing document
relates to DPDO
waste/material
issue

DEFENSE LOGISTICS AGENCY
DEFENSE PROPERTY DISPOSAL SERVICE
DEFENSE PROPERTY DISPOSAL REGION OFFICE COLUMBUS
3990 EAST BROAD STREET
COLUMBUS, OHIO 43215

REPLY REFER TO DPDR-CRH (Ms. Davis-Hoover/(AV)850-2171/lar) 30 JAN 1985

SUBJECT: Material/Waste Designation Conflicts With States of New Jersey, Missouri, and Maryland

TO: DPDS-H

1. References:

a. New Jersey Department of Environmental Protection, Division of Waste Management, Notice of Violation ID No. 84-10-19-33, dated 2 Nov 84, and applicable responses (Encl 1).

b. Notice of violation pursuant to requirements of the Missouri Hazardous Waste Management Law, Rules and Regulations Numbered 00123, dated 29 Oct 84, and applicable responses (Encl 2).

c. Department of Health and Industrial Hygiene (Maryland) site complaints numbered SC-0-85-217 and SC-0-85-185 dated 4 Dec 84 and 16 Nov 84, respectively, and applicable responses (Encl 3).

2. Referenced violations indicate that several states have asked for clarification by DPDS regarding policy on receiving generator turn-ins of regulated hazardous property as material (with the exception of predetermined waste).

3. DPDR-CRH has met numerous times with subject states to explain this policy. We have further explained that if RTD/S are unsuccessful the DPDO then declares the item a waste and requests removal via service contract. However, referenced violations indicate that conflict still exists over our material/waste designations.

4. Enforcement officials from subject states have requested that our headquarters submit written material/waste designation policy for approval or denial. Please provide subject states with written policy clarification as requested in referenced violations. Addresses and POCs are as follows:

a. New Jersey (Affected DPDOs: Lakehurst and Bayonne; OSBs: McGuire and Dover, NJ)

Bureau Chief
New Jersey Department of Environmental Protection
Division of Waste Management
Bureau of Compliance and Enforcement
R.D. 1, Route 70
Vincentown, NJ 08088

30 JAN

b. Missouri (Affected DPDOs: Whiteman and Leonard Wood)

Chief, Enforcement and Superfund Section
Waste Management Program
P.O. Box 1368
Jefferson City, MO 65102

c. Maryland (Affected DPDOs: Brandywine, Meade, and Aberdeen; OSB: Patuxent River)

Lou Martino, Chief
Hazardous Waste Division
Office of Environmental Programs
O'Conor Building, Second Floor
201 West Preston Street
Baltimore, MD 21201

5. It is important that DPDS and State regulators reach a mutual understanding on definitions of hazardous material and hazardous waste in order for DPDR-CRH to assist DPDOs in complying with State inspectors regulatory interpretations.

6. Please inform DPDR-CRH of your anticipated completion schedule by 1 Mar 85. POC is Wendy Davis-Hoover, or Carrie Groves Reed, (AV)850-2171.

FOR THE COMMANDER:

3 Encl

DARRELL M. CHANCELLOR
MAJ, USA
Chief, Disposal Operations Division

cc:
DPDO Lakehurst
DPDO Bayonne
DPDO Whiteman
DPDO Leonard Wood
DPDO Brandywine
DPDO Meade
DPDO Aberdeen

New Jersey Department of Environmental Protection
Vince town, NJ 08088

Waste Management Program
Jefferson City, MO 65102

Hazardous Waste Division
Baltimore, MD 21201

Form DWM-202 A

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
R.D. 1 ROUTE 70, VINCENTOWN, N.J. 08088

NOTICE OF VIOLATION

ID NO. 84-10-19-35 DATE 11/2/84

NAME OF FACILITY Naval Air Engineering Center

LOCATION OF FACILITY Lakehurst

NAME OF OPERATOR Jim Gardner for Capt. Frank Boyce

You are hereby NOTIFIED that during my inspection of your facility on the above date, the following violation(s) of the Solid Waste Management Act, (N.J.S.A. 13:1E-1 et seq.) and Regulations (N.J.A.C. 7:26-1 et seq.) promulgated thereunder and/or the Spill Compensation and Control Act, (N.J.S.A. 58:10-23.11 et seq.) and Regulations (N.J.A.C. 7:1E-1 et seq.) promulgated thereunder were observed. These violation(s) have been recorded as part of the permanent enforcement history of your facility.

DESCRIPTION OF VIOLATION Disch. of H_2SO_4 (cleaned up)

[illegible]

Illegal disposal of Haz. waste (incineration of [illegible]

at training center for fire [illegible] training)

Remedial action to correct these violations must be initiated immediately and be completed by

30. Within fifteen (15) days of receipt of this Notice of Violation, you shall submit in writing, to the investigator issuing this notice at the above address, the corrective measures you have taken to attain compliance. The issuance of this document serves as notice to you that a violation has occurred and does not preclude the State of New Jersey, or any of its agencies from initiating further administrative or legal action, or from assessing penalties, with respect to this or other violations. Violations of these regulations are punishable by penalties of $25,000 per violation.

[signature]

Investigator, Division of Waste Management
Department of Environmental Protection

[illegible]

JOINT MESSAGEFORM

UNCLASSIFIED

03 03 2620552 NOV 84 RR RR UUUU

1823:CEN

NAVAIRENGCEN LAKEHURST NJ

DPDO LAKEHURST NJ

INFO ZEN DPDO LAKEHURST NJ
COMNAVAIRSYSCOM WASHINGTON DC

NORTHNAVFACENGCOM PHILADELPHIA PA

DPDO DCSC COLUMBUS OH

UNCLAS //N05090//

SUBJ: HAZARDOUS WASTE STORAGE

A. NJDEP NOTICE OF VIOLATION ID NO. 84-10-19-35

1. NAVAIRENGCEN RECEIVED REF A FROM NJ DEPT OF ENVIRONMENTAL PROTECTION ON 02 NOV 84 FOR EXCEEDING 90 DAY PERIOD FOR STORAGE OF DPDO HAZARDOUS WASTE. NAVAIRENGCEN FACES POSSIBLE $25,000 PENALTY.

2. DPDO LAKEHURST MUST REMOVE STORED HAZARDOUS WASTE WITHIN 90 DAY PERIOD PERMITTED BY REGULATIONS.

3. REQUEST ADVISE ALCON ACTION TO REMOVE HAZARDOUS WASTE CITED BY REF A.

ORIG-18 ACTION DPDO TAG

A. GARDNER, DPDO 1823, EXT. 2622, 20 NOV 84

D. L. CARNELL, CDR, CEC, USN

UNCLASSIFIED

DEFENSE LOGISTICS AGENCY
DEFENSE PROPERTY DISPOSAL SERVICE
DEFENSE PROPERTY DISPOSAL REGION COLUMBUS
DEFENSE PROPERTY DISPOSAL OFFICE LAKEHURST
NAVAL AIR ENGINEERING CENTER, BUILDING 75
LAKEHURST, NEW JERSEY 08733-5010

10 DEC 1984

IN REPLY REFER TO DPDO-XPN

6 December 1984

SUBJECT: NJDEP Violation received by NAEC Lakehurst

TO: DPDR-CRH
W. Davis-Hoover

1. Reference: (a) NAEC letter dated 11/9/84 (Enclosure (1))
(b) NJDEP Violation ID NO 84-10-19-35 (Enclosure (2))
(c) NAEC Message R262055Z Nov. 84 (Enclosure (3))
(d) DPDO Conversation Record (Enclosure (4))
(e) DTID N68335-4279-0012 (Enclosure (5))

2. Subject violation is listed as violation 2 on enclosure (1) and again in enclosure (2). The DTID involved (enclosure 5) indicates receipt at 5 October 84 and removal by DPDS service contract DLA-200-84-C-0059 on 16 November 84. This item was on DPDO records for a period of 42 calandar days.

3. The problem in this matter stems from various interpretations of NJDEP and DoD regulations. NAEC Environmental Personnel consider all hazardous material a waste the moment it is no longer required for their use. They consider this mandatory in light of NJDEP regulations which state "Hazardous materials are to be considered wastes when they are no longer needed for their intended purpose". (See enclosure (4))

4. In light of these requirements by the State of New Jersey, NAEC has requested the DPDO to take immediate steps to accept accountability upon notification and place items directly for A&D.

5. Please note that no other generator has yet been sited for this type violation but there is growing concern amoung station environmentalists.

6. Since all generators of DPDO Lakehurst including the DPDO itself are governed by NJDEP regulations it is requested that corrective actions by taken by appropriate authorities to resolve this matter with the State of New Jersey.

Joanne L. Reitemeyer
Environmental Specialist

DEC 10

DEPARTMENT OF THE NAVY

NAVAL AIR ENGINEERING CENTER

LAKEHURST, N. J. 08733

IN REPLY REFER TO
5090
1823

09 NOV 1984

New Jersey Department of Environmental Protection
Division of Waste Management
Mr. Mike Tompkins, Investigator
Bureau of Compliance and Enforcement
R.D. 1, Route 70
Vincentown, New Jersey 08088

Subj: NOTICE OF VIOLATION, I.D. NO. 84-10-19-35

Following an inspection of the Naval Air Engineering Center (NAVAIRENGCEN) on 02 November 1984, a "Notice of Violation" was issued by the Division of Waste Management covering three violations.

The remedial action being taken by the Center for each of the violations is as follows:

VIOLATION 1 - ACID SPILL CLEANUP

On 19 October 1984 the Center had a spill of approximately 800 gallons of sulfuric acid. The spill site has been cleaned up without the contamination reaching the groundwater. Approximately 36 tons of acid contaminated soil have been removed from the site and are ready for disposal. The disposal contractor, O. H. Materials, has notified the Center that the material is scheduled for shipment during the week of 19 November 1984 to Fondessy Enterprises Landfill in Oregon, Ohio for final disposal. You will be notified when the material leaves the Center.

[redacted]

The hazardous waste in question is being temporarily stored under the NAVAIRENGCEN's EPA Hazardous Waste Permit. The material is in the custody of the Defense Logistics Agency (DLA) which is an entity of the Department of Defense seperate from the Navy.

[redacted]

VIOLATION 3 - COMBUSTION OF WASTE OIL FOR RECOVERY OF HEAT ENERGY

The NAVAIRENGCEN has a permit from the Division of Environmental Quality which allows open burning at a permanent fire fighting training area located at the Center. Contaminated aircraft fuel (JP-5 Jet Fuel) is burned at the school during training exercises. Small amounts of waste crankcase and lubricating oils are sometimes mixed with the contaminated aircraft fuel. We do not believe this to be a violation of New Jersey Regulations.

5090
1823

Subj: NOTICE OF VIOLATION, I.D. NO. 04-10-19-35

Recently adopted amendments to N.J.A.C. 7:26-1 ET SEQ permit the combustion of hazardous waste for the recovery of heat energy when performed at the site where the wastes are generated. These amendments became effective on 17 January 1984 (DEP Docket No. 059-82-11).

Based on the above, we request that the Division of Waste Management withdraw Violation 3.

If there are any questions or further information is required, please contact me at telephone (201) 323-2612.

Sincerely,

JAMES A. GARDNER, P.E.
Supervisory Environmental Engineer
Public Works Department
By direction of the Commanding Officer

Copy to:
Naval Facilities Engineering Command (Code 114/DS)
Naval Air Systems Command (AIR-7123F)
✓Defense Property Disposal Office, Lakehurst

CONVERSATION RECORD

TIME: 9:00 AM
DATE: 29 NOV. 84

TYPE: ☐ VISIT ☐ CONFERENCE ☑ TELEPHONE ☐ INCOMING ☑ OUTGOING

Location of Visit/Conference:

NAME OF PERSON(S) CONTACTED OR IN CONTACT WITH YOU	ORGANIZATION (Office, dept., bureau, etc.)	TELEPHONE NO.
Mr. Curt Whitford	NJ DEP. ENV. PROT	AC 609 292-6842

ROUTING: NAME/SYMBOL | INT

SUBJECT: STORAGE OF HAZARDOUS WASTES LONGER THAN 90 DAYS.

NJ VIOLATION ID NO 84-10-19-35

SUMMARY: Mr. Whitford stated that under N.J. State Regulations hazardous materials are considered waste when they are no longer needed for their intended purpose.

I explained that even though the item may be purchased at a specific site for a specific purpose, the intended purpose is for use within the DoD and until the DoD declares no further use the item is not considered waste by DoD.

Mr. Whitford conceded that we may have a grey area subject to interpretation. I questioned how the state of N.J. could possibly issue a fine based on a grey area.

Mr. Whitford requested a letter be sent to his Bureau Chief, SHIRLEE SCHIFFMAN, explaining the above and requesting resolution.

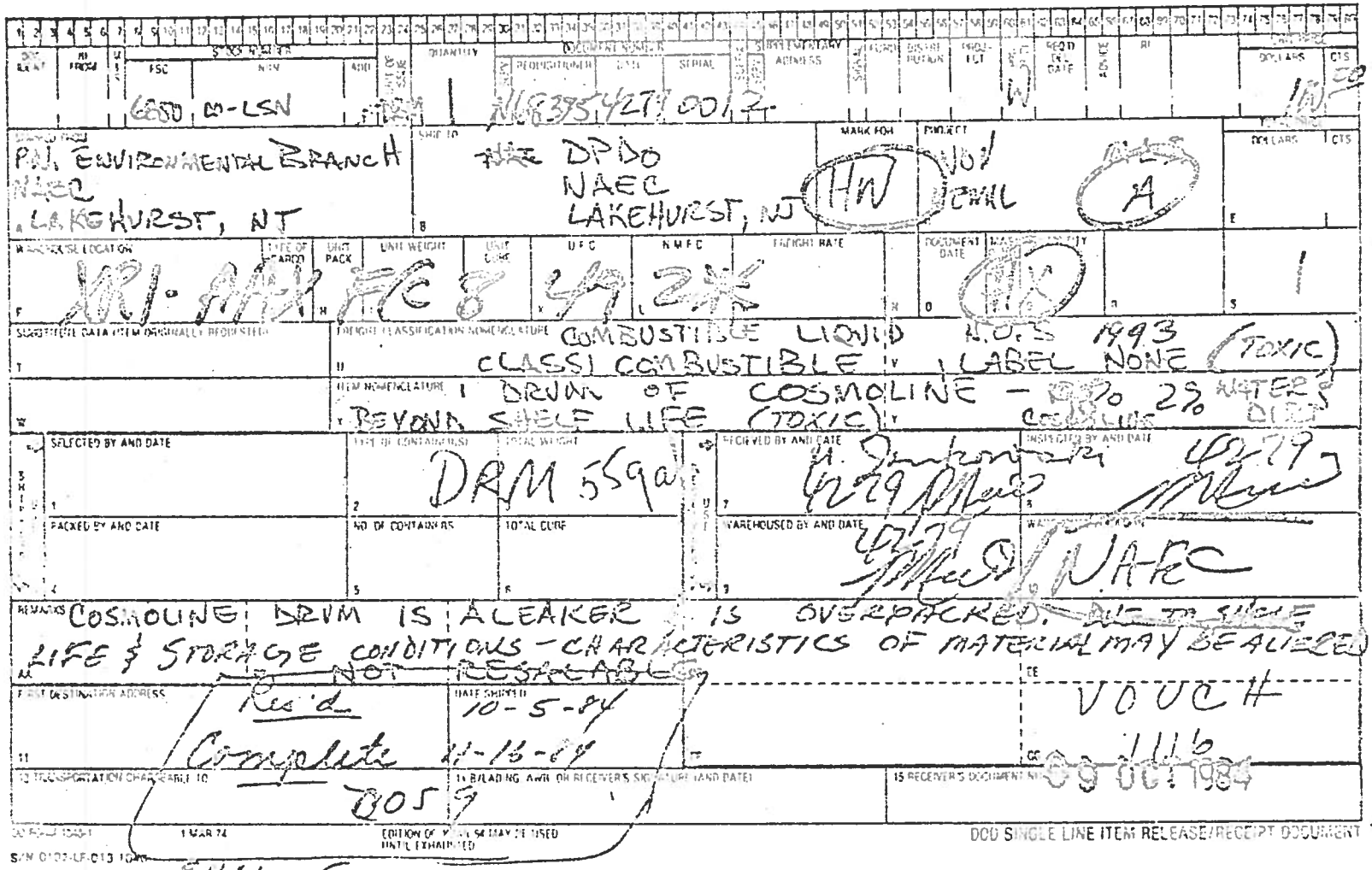
ACTION REQUIRED

NAME OF PERSON DOCUMENTING CONVERSATION	SIGNATURE	DATE
JOANNE REITEMEYER	Joanne Reitemeyer	29 NOV. 84

ACTION TAKEN: RCPT'D CONV. TO W. DAVIS-HOOVER, DPDR-CRH

TO FORWARD ALL COPIES OF INFO TO CRH

SIGNATURE	TITLE	DATE
Joanne Reitemeyer	Env. Prot. Spec.	29 NOV. 84



DOC IDENT	RI FROM	FSC	NIN	ADD	UNIT OF ISSUE	QUANTITY	DOCUMENT NUMBER: REQUISITIONER	DATE	SERIAL	SUPPLEMENTARY ADDRESS	SIGNAL	FUND	DISTRIBUTION	PROJECT	REQ'D DEL DATE	ADVICE	RI	UNIT PRICE: DOLLARS	CTS
		6850	00-LSN		DRM	1	N68395	4279	0012					W				1W	00

SHIPPED FROM	SHIP TO	MARK FOR	PROJECT	TOTAL PRICE: DOLLARS	CTS
P.W. ENVIRONMENTAL BRANCH NAEC LAKEHURST, NJ	DPDO NAEC LAKEHURST, NJ	HW	NON NEMIL	A	

WAREHOUSE LOCATION	TYPE OF CARGO	UNIT PACK	UNIT WEIGHT	UNIT CUBE	UFC	NMFC	FREIGHT RATE	DOCUMENT DATE	MASTER QUANTITY		
XR1-AAX		FC	8		49	2X			HX		1

SUBSTITUTE DATA (ITEM ORIGINALLY REQUESTED)

FREIGHT CLASSIFICATION NOMENCLATURE: COMBUSTIBLE LIQUID N.O.S 1993 CLASS1 COMBUSTIBLE LABEL NONE (TOXIC)

ITEM NOMENCLATURE: 1 DRUM OF COSMOLINE - 2% WATER & DIRT BEYOND SHELF LIFE (TOXIC) COSMOLINE

SELECTED BY AND DATE	TYPE OF CONTAINER(S)	TOTAL WEIGHT	RECEIVED BY AND DATE	INSPECTED BY AND DATE
	DRM 55gal		H. Jankowski 4279	4279

PACKED BY AND DATE	NO. OF CONTAINERS	TOTAL CUBE	WAREHOUSED BY AND DATE	WAREHOUSE LOCATION
			4279	NAEC

REMARKS: COSMOLINE DRUM IS A LEAKER & IS OVERPACKED. ~~DUE TO SHELF~~ LIFE & STORAGE CONDITIONS - CHARACTERISTICS OF MATERIAL MAY BE ALTERED ~~NOT RESALABLE~~

FIRST DESTINATION ADDRESS	DATE SHIPPED		
Rec'd	10-5-84		VOUCH
Complete	11-16-84		1116

13 TRANSPORTATION CHARGEABLE TO	14 B/LADING, AWB, OR RECEIVER'S SIGNATURE (AND DATE)	15 RECEIVER'S DOCUMENT NO.
0059		09 OCT 1984

DD FORM 1348-1 1 MAR 74 EDITION OF 1 JUL 64 MAY BE USED UNTIL EXHAUSTED

DOD SINGLE LINE ITEM RELEASE/RECEIPT DOCUMENT

S/N 0102-LF-013 1040

ENCL 5

Complete 11/16/84

DLA-200-84-C-0059

NOTICE OF VIOLATION PURSUANT TO REQUIREMENTS
OF THE MISSOURI HAZARDOUS WASTE MANAGEMENT LAW, RULES AND REGULATIONS

00123

TO: Facility Name: WHITEMAN AIR FORCE BASE

Address: 351 CSG / DEEV

WHITEMAN AFB, Missouri 65305

Mo. ID #: A-3195 Date of Inspection: _____

During an inspection completed this date to determine compliance with the requirements of t Missouri Hazardous Waste Management Law, Sections 260.350-260.550 RSMo., Rules and Regulati 10 CSR 25 the following violations were identified.

Citation	Description of Violation
RSMo 260.390 (1) and	OPERATION OF UNDERMITTED TSD FACILITY; TREATMENT AN
& 10CSR 25-7.[illegible] (3)	STORAGE OVER 90 DAYS OF REGULATED QUANTITIES
10CSR 25-5.010 (4)	FAILURE TO UTILIZE PROPER MANIFESTS IN TRANSPORT OF HAZ WAS
10CSR 25-5.010 (6)	FAILURE TO PROPERLY LABEL DESIGNATED HAZARDOUS WASTE
~~10CSR 25-7.011 (3)(F)2~~	~~FAILURE TO COMPLY WITH [illegible] INSPECTION REQUIREMENTS~~
10CSR 25-7.011 (5)(C)	DEFICIENCIES IN FACILITY CONTINGENCY PLAN CONTENT (A NON-SPECIFIC FORM
10CSR 25-7.011 (F)	NO FORMAL PERSONNEL TRAINING PLAN ON RECORD
10CSR 25-5.010 (6)(E)	IMPROPER LABELING OF STORED HAZARDOUS WASTES (ON-SITE
10CSR 25-7.050 (3)(E)2E	INADEQUATE REMOVAL & MAINT PLANS FOR WASTE CONTAINMENT STRUCTURE

This information is provided to call your attention to those areas of noncompliance at the earliest possible time. This notice does not constitute a compliance order issued pursuant to Sections 260.230 or 260.410, RSMo. and may not be a complete listing of all violations which may be identified as a result of this inspection.

The owner/operator is hereby requested to submit in writing within 15 days of receipt of this notice a description of all corrective actions taken and/or a schedule for completion of necessary corrective actions to be taken to: Chief, Enforcement and Superfund Section, Waste Management Program, P.O. Box 1368, Jefferson City, MO 65102 with a copy to the Administrator, KANSAS CITY Regional Office.

The corrective actions taken within 15 days of this notice will be considered in determinin whether enforcement action, including the assessment of civil penalties, should be initiate

If you have any questions on this Notice or wish to discuss your response you may call MR. ARTHUR GRONER at (314) 751-3241 or JAMES McCONATHY at (816) 274-6675.

This Notice prepared by STEVE A. JOHNSON [signature] Date OCT. 29, 1984

The undersigned person hereby acknowledges that he/she has received a copy of this Notice a has read same.

Printed Name: DORIS N Hauchen Date: 10/29

Signature: [signature]

Title: Property Disposal Officer

DISTRIBUTION:
White copy-Facility
Yellow copy-Regional Office
Pink copy-Central Office

DEFENSE LOGISTICS AGENCY
DEFENSE PROPERTY DISPOSAL SERVICE
DEFENSE PROPERTY DISPOSAL REGION COLUMBUS
DEFENSE PROPERTY DISPOSAL OFFICE WHITEMAN
POST OFFICE BOX 6010
WHITEMAN AIR FORCE BASE, MISSOURI 65305

IN REPLY REFER TO DPDO-XOG (D. Houchen/AV975-3308/dnh) 23 November 1984

SUBJECT: Notice of Violation Pursuant to Requirements of the Missouri Hazardous Waste Management Law, Rules and Regulations

TO: DPDR-CR

Enclosed is a Notice of Violation resulting from an inspection of the HM/HW facility at DPDO Whiteman. Also enclosed is the host response to the Notice.

Doris N. Houchen

2 Encl

DORIS N. HOUCHEN
Chief

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 351ST COMBAT SUPPORT GROUP (SAC)
WHITEMAN AIR FORCE BASE, MISSOURI 65305

REPLY TO ATTN OF: DEEV (2Lt Harris, 3006)

20 NOV 1984

SUBJECT: Response to Notice of Violation, dated 29 Oct 84

TO: Chief, Enforcement and Superfund Section
Waste Management Program
P.O. Box 1368
Jefferson City, Missouri 65102

1. It is our intent at Whiteman Air Force Base to correct any violations to insure that our facility will meet the laws, rules and regulations that govern that facility. I have enclosed a copy of the notice of violation in order to show my references.

ITEM NO.	CITATION AND DESCRIPTION OF VIOLATIONS	COMMENTS
1	RSMO 260-390 (1) Operation of an Unpermitted Transportation, Storage, and Disposal (TSD) Facility	Army Corps of Engineers and an Architect and Engineering firm are designing a new TSD facility for Whiteman AFB. All members involved with the design are aware of the laws, rules and regulations by which we are governed. We feel there should be no problem getting the new TSD facility permitted. We are currently in contact with the Department of Natural Resources (DNR) offices to get an interim permit. The target date for the permit is 15 Dec 84.
2	10 CSR 35-7-050 (1) (B) Storage Over 90 Days of Regulated Quantities	Upon receipt of the interim TSD permit, DPDO at Whiteman will no longer be in violation of this regulation. If any problems arise in obtaining an interim permit, DPDO at Whiteman

		zardous d to a cility f receipt.
3	10 CSR 25-5-010 (4) Failure to Utilize Proper Manifest in Trasnportation of Hazardous Wastes	received form Man- 84 and the needed.
4	8-10 CSR 25-5-010 (6) Failure to to Properly Label Designated Hazardous Wastes	will have d infor- containers
5	10 CSR 25-7-011 (3) 2 Failure to Comply with Area Inspection Requirements	oris Houchen Steve A. t 84.
6	10 CSR 25-7-011 (5)(C) Deficiencies in the Facility Contingency Plan Content	l update the ency plan in 10 CSR 25-7- etion of the iteman AFB to Mr. Steve inal approval mpleting the 4.
7	10 CSR 25-7-011 (F) No Formal Personnel Training Plan	property nnel have g sponsored Logistic r (ALMC). training developed training, escription, raining he antici- date is
8	10 CSR 25-7050 (3)(G) 2E Inadequate Removal and Maintenance Plans for Waste Containment Structure	ns of both nment ntainers d prior to ncontami- A ction will

be conducted after any heavy precipitation. Any time the waste structure is full of water or waste it will be removed by pumping. The waste will be pumped to proper storage containers and properly identified. The water will be pumped out to the environment. The pump required to complete this effort is scheduled to be installed by 15 Dec 84.

2. Any questions should be directed to 2Lt William Harris at (816) 687-3005.

DANIEL J. BARKER, Lt Col, USAF
Base Civil Engineer

cc: HQ/SAC/DEPVQ
8AF/DE
351 SMW/CV
351 CSG/CC
351 CSG/DPDO

00238

NOTICE OF VIOLATION PURSUANT TO REQUIREMENTS OF THE MISSOURI HAZARDOUS WASTE MANAGEMENT LAW, RULES AND REGULATIONS

TO: Facility Name: WHITEMAN AIR FORCE BASE

Address: 351 CSG/DEEV

WHITEMAN AFB, MISSOURI 65305

Mo. ID #: A-3195 Date of Inspection: _____

During an inspection completed this date to determine compliance with the requirements of the Missouri Hazardous Waste Management Law, Sections 260.350-260.550 RSMo., Rules and Regulations 10 CSR 25 the following violations were identified.

Citation	Description of Violation
RSMo 260.390(1) and 10CSR25-7.265(5)(E)	OPERATING AN UNPERMITTED TSD FACILITY; STORAGE OVER 90 DAYS OF REGULATED QUANTITY
10CSR25-5.262(4)	FAILURE TO UTILIZE PROPER MANIFESTS IN TRANSPORT OF HAZ WASTE
10CSR25-5.262(1)	FAILURE TO PROPERLY LABEL DESIGNATED HAZARDOUS WASTE
10CSR25-7.264(5)(E)	FAILURE TO MAINTAIN CONTINGENCY PLAN AND SPECIFIC FORMS
10CSR25-7.011(5)(C)	DEFICIENCIES IN FACILITY CONTINGENCY PLAN
10CSR25-7.011(E)	NO FORMAL EMERGENCY TRAINING PROGRAM
10CSR25-5.262(1)(E)	IMPROPER LABELING OF USED HAZARDOUS WASTE CONTAINERS
10CSR25-7.264(5)(E)2E	INADEQUATE RECORD KEEPING AND PLANNING FOR HAZARDOUS WASTE CONTAINERS

This information is provided to call your attention to those areas of noncompliance at the earliest possible time. This notice does not constitute a compliance order issued pursuant to Sections 260.230 or 260.410, RSMo. and may not be a complete listing of all violations which may be identified as a result of this inspection.

The owner/operator is hereby requested to submit in writing within 15 days of receipt of this notice a description of all corrective actions taken and/or a schedule for completion of necessary corrective actions to be taken to: Chief, Enforcement and Superfund Section, Waste Management Program, P.O. Box 1368, Jefferson City, MO 65102 with a copy to the Administrator, Kansas City Regional Office.

The corrective actions taken within 15 days of this notice will be considered in determining whether enforcement action, including the assessment of civil penalties, should be initiated

If you have any questions on this Notice or wish to discuss your response you may call Mr. Arthur Brown at (314) 751-3241 or Jerry McConnell at (816) 274-6675.

This Notice prepared by STEVE A. JOHNSON Date: Oct. 29, 1984

The undersigned person hereby acknowledges that he/she has received a copy of this Notice and has read same.

Printed Name: DORIS N. HAUSCHEL Date: 10/29

Signature: _____

Title: Deputy Air Base Operations Officer

DISTRIBUTION:
White copy-Facility
Yellow copy-Regional Office
Pink copy-Central Office

Mailed with Stmt of Compliance on 30 Oct 84

P.O. BOX [illegible]
201 W. PRESTON STREET
BALTIMORE, MARYLAND 21203
(301) 383-6650

SITE COMPLAINT

NUMBER	DATE
BC-0-85-185	11-16-[illegible]

1. Name of violator: Defense Property Disposal Office/MD Air National Guard
   Address: 2701 Eastern Blvd.; Martin State Airport; Balto, Md. 21
   County: Baltimore Phone: 301/687-6270 Ed. 222
2. Violation Type (with reference to Maryland Code)
   - [ ] Water Pollution Control and Abatement (Health Environmental Article, Sections 9-201 through 9-244)
   - [x] Controlled Hazardous Substances (Health Environmental Article, Sections 7-201 through 7-263)
   - [ ] Landfills and Sludge Disposal (Health Environmental Article, Section 9-210)
   - [ ] Other
3. Specifically: Storage of hazardous waste greater than 90 days with a Hazardous Waste Storage Permit; violation of generator storage requirements for containers as found in COMAR 10.51.03.06 E. (Accumulation time)
4. The existence of the above-mentioned violation(s) may subject you to prosecution and penalty. Accordingly, you are a[illegible] that the following corrective actions are necessary to remedy the violation(s):
   (1) Within 30 days remove all hazardous waste stored great[illegible] than 90 days to a facility that is permitted to accept CHS for treatment, storage or disposal. (2) Immediately begin sto[illegible] containers in compliance with COMAR 10.51.03.06E including th[illegible] requirements as found in COMAR 10.51.03.[illegible] or apply for CHS storage Per[illegible]
5. Continuation of the violation(s) or failure to take the corrective action prescribed above may result in the Department [illegible] legal sanctions against you, including the imposition of civil and/or criminal penalties. [illegible]
6. I hereby acknowledge receipt of this Site Complaint by my [illegible], which is not an admission of [illegible]

Person issued to: [signature] Title: [illegible] Base [illegible]
SCOTT A. [illegible]

Authorized by: William [illegible]
Assistant Secretary for [illegible]
Environmental Programs

[illegible]

AIR TECHNICIAN DETACHMENT
MARYLAND AIR NATIONAL GUARD
2701 EASTERN BOULEVARD
BALTIMORE, MARYLAND 21220

REPLY TO
ATTN OF DPE

10 August 1981

SUBJECT Request for Hazardous Waste Disposal

TO DPDO-XFF
Aberdeen Proving Ground

1. I am enclosing disposal turn-in documents, DD 1348-1, for the items listed below:

Waste	Federal Stock Number	Container	Quantity
Methanol	6810-00-221-8353	1 ea 55 Gal Drum	20 Gal
Trichloroethane	6810-00-364-0387	2 ea 5 Gal Can	10 Gal
PD680	6850-00-281-1968	6 ea 55 Gal Drum	300 Gal
Paint Stripper	8010-01-040-1059	3 ea 55 Gal Drum	150 Gal

2. Request that these items be scheduled for pick-up at the earliest opportunity. In order to maintain our small generator status we must not store HW for longer than 90 days.

SCOTT A. NEARBY, Capt., MdANG
Assistant Base Engineer

Atch: DD 1348-1

cc: Base Supply w/o atch

MARYLAND AIR NATIONAL GUARD

REPLY TO ATTN OF: DEE

19 November 1984

SUBJECT: Hazardous Waste Site Complaint

TO: DEE Glenn 19Nov84
Air Commander [illegible] 21 Nov 84
DPDO
IN TURN

1. As a result of a site visit to the Maryland Air National Guard Base, Glenn L. Martin State Airport, 16 November 1984, by the State Department of Mental Health and Hygiene the Defense Property Disposal Office and the Maryland Air National Guard have been jointly issued a site complaint for storage of hazardous waste greater than 90 days without the required permit (see attached site complaint SC-0-85-185).

2. On 10 August 1984 the MdANG requested removal of this HW (see attached letter). On 19 October 1984 John Shafer accepted this material in place. As of 19 November 1984, subject HW is still on site.

3. Request immediate removal of this material. Please note the "show cure" date on the site complaint is 15 December 1984.

Scott A. KEARBY, Capt, MdANG
Assistant Base Engineer

2 Atch:
1. Site Complaint
2. DEE Letter, 10 Aug 84

cc: Department of Mental Health and Hygiene
ANGSC/DEV
MDNG-DI (LT Williams)
State Airport Manager
J. Leonard Wood
175 TFG/CC

STATE OF MARYLAND

DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS
P.O. BOX 13387
201 W. PRESTON STREET
BALTIMORE, MARYLAND 21203
(301) 383-6650

SITE COMPLAINT

NUMBER	DATE
SC-0-85-217	12-4-84

Name of violator: Defense Logistics Agency; Defense Property Disposal Office

Address: Aberdeen Proving Ground, Maryland 21005

County: Harford Phone: 301/278-2235

Violation Type (with reference to Maryland Code)

- [ ] Water Pollution Control and Abatement (Health Environmental Article, Sections 9-301 through 9-344)
- [x] Controlled Hazardous Substances (Health Environmental Article, Sections 7-201 through 7-268)
- [ ] Landfills and Sludge Disposal (Health Environmental Article, Section 9-210)
- [ ] Other

Specifically: storage of hazardous waste in violation of COMAR 10.51.02.06 B.

The existence of the above-mentioned violation(s) may subject you to prosecution and penalty. Accordingly, you are advised that the folllowing corrective actions are necessary to remedy the violation(s).

Within 30 days, manage all generated CHS wastes in compliance with those requirements as found in COMAR 10.51.02.06.

Continuation of the violation(s) or failure to take the corrective action described above may result in the Department seeking legal sanctions against you, including the imposition of civil and/or criminal penalties.

"I hereby acknowledge receipt of this Site Complaint by my signature, which is not an admission of guilt."

Person issued to: C. Gerald Bangluma Title: PROPERTY DISPOSAL OFFICER

Authorized by: William Eichbaum
Assistant Secretary for
Environmental Programs

Issued by: Harold [illegible]
Inspector

Phone: 301/383-6650

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: CDS Storage Date 12/4/84

Facility Name: Defense Logistics Agency/Defense Property Disposal Office (Aberdeen Prov. Ground, Bd. 2

Remarks: Representatives: Mr. Gerald Laughman, DPDO
Mr. John Shafer, DPDO
Mr. Mike Griffen, Waste Management Admin.
Mr. Harold L. Oye, Jr., WMA

Purpose of this inspection and meeting came about as a follow-up to an inspection at Maryland Air National Guard at Martin's Airport in Baltimore County on November 16, 1984. During that inspection, reference was made that the DPDO at Aberdeen Proving Ground had accountability for CDS generated at Martin's Airport Md. Air National Guard facility. Communication between this office (WMA) and DPDO led to this day's meeting and inspection.

Initially the meeting focused on definition of solid waste and hazardous waste as defined by COMAR 10.51 (Hazardous Waste Regulations) and the recyclable or re-use nature of same. DPDO is charged by the U.S. Department of Defense with the responsibility of accounting for material generated by a facility that is considered no longer useful or useable by various operations at the facility and with re-sale or re-use prior to disposal if a buyer or user can be found. Items include equipment, desks, and hazardous materials (solvents, paints, miscellaneous photograph developer, herbicides). These hazardous materials may have expired shelf lives or by facility regulation, may no longer be used by the particular operation. By definition under COMAR 10.51.02.06 these hazardous materials meet the Special Requirements for Hazardous Waste which is Used, Re-used, Recycled, or Reclaimed and Residues from Emptied Drums.

In the case of these materials which are defined by the hazardous waste characteristics of ignitability, reactivity or EP Toxicity, those wastes, if

Observer: _____ Person Interviewed: _____

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: Date 12/4/84

Facility Name: DPDO, Aberdeen Proving Ground.

Remarks: re-used, recycled or reclaimed, are not subject to regulation under COMAR 10.51.03 - 10.51.05. (See COMAR 10.51.02.06 A. However, the hazardous wastes which are listed in Regulations 10.51.02.14 - .17 are subject to those requirements with respect to transportation or storage as found in COMAR 10.51.02.06 B.

Note: Before any material is considered a hazardous waste it must be a solid waste. It is this writer's interpretation, with advice of legal counsel from Md. AAG's office, that the materials in DPDO custody are hazardous wastes as seen under COMAR 10.51.02.B(1): "Has served its original intended use and sometimes is discarded" - can be interpreted as served its period of usefulness.

A tour of 4 warehouses on APG, Buildings 3559, 3560, 3506 and 3511, has found a variety of materials. In particular, in building 3560, 6 drums of 1,1,1-Trichloroethane, and some what appears to be ten 55lb bags of a herbicide. Other items include miscellaneous paints, possible corrosives, ignitables. Most items meet the characteristic hazardous waste criteria, i.e. corrosive, ignitable, EP Toxic or reactive. The 1,1,1-TE is listed, U226. The herbicide is unknown.

As such, the requirements for storage of recyclable materials as found in COMAR 10.51-02.06 B must be met. Site complaint SC-0-85-217 is being issued.

Due to the unique nature of this DPDO activity this writer feels that a meeting is indicated in order to identify positions with regard to compliance with the hazardous waste regulations in the State of Maryland.

A copy of this report was left with Mr. Baughman.

Observer: Harold L. Edgoff Person Interviewed: C. Judd Baughman

DEFENSE LOGISTICS AGENCY
DEFENSE PROPERTY DISPOSAL SERVICE
DEFENSE PROPERTY DISPOSAL REGION COLUMBUS
DEFENSE PROPERTY DISPOSAL OFFICE ABERDEEN
BUILDING 3320
ABERDEEN PROVING GROUND, MARYLAND 21005-5001

IN REPLY REFER TO: DPDO-XPF (C. G. Baughman/2235/scs) 6 December 1984

SUBJECT: DPDO Site Complaint by Maryland EPA

TO: DPDR-CRH
Environmental Branch

1. References:

a. Site complaint, #SC-0-85-185, dated 11/16/84, Enclosure 1.

b. Site complaint, #SC-0-85-217, dated 12/4/84, Enclosure 2.

c. State of Maryland, Office of Environmental Programs, Report of Observations, dated 12/4/84, Enclosure 3.

d. Phonecon to Mr. Dan Bowell from C. Gerald Baughman on 4 Dec 1984.

2. A meeting was held on 4 Dec 1984, attended by Mr. Harold Dye and Mr. Mike Griffin of Maryland Office of Environmental Programs and Mr. C. Gerald Baughman and Mr. John Shafer of DPDO Aberdeen.

3. Mr. Shafer asked Mr. Dye how the material (new/unused original package) relates to the State of Maryland Regulations. Mr. Dye informed us that the interpretation of the State Atty. General's Office was that any hazardous material (HM) which is turned in to the DPDO is considered a hazardous waste (HW). Even with the intent to RTD and Sales, these items would not revert back to HM status until a customer accepts or a buyer accepts these items. Per the state, intent of the original generator (Army, agency, activity, etc.) to discard or turn in their chemical substance/material causes these items to be considered Hazardous Wastes and should be placed in conforming storage. Items where "shelf life" has expired are considered HW because the manufacturer has guaranteed this product only to the life of these items.

4. Identification of these items are checked with the Table of Hazardous Wastes (40 CFR 261:33). If an item is listed in these tables it is considered a HW even if the item is unused and must be placed in conforming storage. If an item is not contained in this table, but meets the definition of a Characteristic Waste, COMAR 10:51-03 through 05 does not apply until these items are placed on a delivery order for removal under our Requirements Contract.

5. Maryland Air National Guard - Citation was made due to non-compliance by both the Air Guard and the DPDO - the "owners" of the waste for storage beyond

90 days. It was stated that the Air Guard must abide by these Regulations (COMAR) whether a small generator or a permitted generator. According to the State people, the DPDO was cited since we had accountability and were the owners of the waste. DoD/DLA/DPDS/DPDR needs to address this issue. I would like to know if DPDOs can or should be cited for violations such as spills, leaks, etc. for property that we do not have physical custody of but accountability only.

6. After the meeting, a site visit to the DPDO's four warehouses, Bldgs. 3558/3560 (receiving/storage) and Bldgs. 3506/3511 (sales) was conducted, during which the state people saw several items which we were calling "Material" that was going through R/T/D or Sales, that they said was a waste. Specifically, one item was 1,1,1-Trichloroethane, un-used, NSN - 6810-00-551-1487, 6 Dr, 55 gal. which we had in Bldg. 3560, on sale 27-5085, item 40. We learned later that this item sold for $68 per drum. Since the state calls this a waste, they said we should not have it and that it should be in conforming storage at the HW storage site at Edgewood. If this is true, then we, the DPDO may as well forget trying to sell any unused, listed, hazardous chemicals because storage in the HW storage facility will not allow easy management of the R/T/D or Sale program, nor can potential buyers inspect the property in that building.

7. This interpretation by the State of Maryland as to what is a waste and when it becomes a waste is in conflict with what the DPDO has been told, is the DoD/DPDS position. Clarification is requested, with specific procedures to follow for unused hazardous chemicals that have high R/T/D or Sales potential.

8. Also, per last paragraph of enclosure 3, Mr. Dye would like a meeting with at least DPDR-CRH personnel. I feel that DPDS representative(s) should also attend since this problem could occur at other DPDOs CONUS wide and at least at the other two Maryland DPDOs.

C. Gerald Baughman

C. GERALD BAUGHMAN
Chief

3 Encls

cc:
APG EMO

Form DWM-002 A

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WASTE MANAGEMENT
R.D. 1 ROUTE 70, VINCENTOWN, N.J. 08088

NOTICE OF VIOLATION

ID NO. 84-10-19-35 DATE 11/2/84

NAME OF FACILITY Naval Air Engineering Center

LOCATION OF FACILITY Lakehurst

NAME OF OPERATOR Jim Gardner for Capt. Frank Royce

You are hereby NOTIFIED that during my inspection of your facility on the above date, the following violation(s) of the Solid Waste Management Act, (N.J.S.A. 13:1E-1 et seq.) and Regulations (N.J.A.C. 7:26-1 et seq.) promulgated thereunder and/or the Spill Compensation and Control Act, (N.J.S.A. 58:10-23.11 et seq.) and Regulations (N.J.A.C. 7:1E-1 et seq.) promulgated thereunder were observed. These violation(s) have been recorded as part of the permanent enforcement history of your facility.

DESCRIPTION OF VIOLATION Disch. of H_2SO_4 (cleaned up)

[illegible] (cleaned [illegible])

Illegal disposal of NAB waste (incineration of [illegible] at training center for fire extinguishing training)

Remedial action to correct these violations must be initiated immediately and be completed by

30. Within fifteen (15) days of receipt of this Notice of Violation, you shall submit in writing, to the investigator issuing this notice at the above address, the corrective measures you have taken to attain compliance. The issuance of this document serves as notice to you that a violation has occurred and does not preclude the State of New Jersey, or any of its agencies from initiating further administrative or legal action, or from assessing penalties, with respect to this or other violations. Violations of these regulations are punishable by penalties of $25,000 per violation.

[signature]

Investigator, Division of Waste Management
Department of Environmental Protection

[illegible]

JOINT MESSAGEFORM

UNCLASSIFIED

PAGE	DTG RELEASER TIME	PRECEDENCE	CLASS	SPECIAL			ORIG MAGNETIC
01 01	262055Z NOV 84	RR RR	UUUU				1823:CEM

NAVAIRENGCEN LAKEHURST NJ

~~DPDO LAKEHURST NJ~~
ZEN DPDO LAKEHURST NJ
INFO COMNAVAIRSYSCOM WASHINGTON DC

NORTHNAVFACENGCOM PHILADELPHIA PA

~~DPDS COLUMBUS OH~~
DPDO DCSC COLUMBUS OH

UNCLAS //N05090//

SUBJ: HAZARDOUS WASTE STORAGE

A. NJDEP NOTICE OF VIOLATION ID NO. 84-10-19-35

1. NAVAIRENGCEN RECEIVED REF A FROM NJ DEPT OF ENVIRONMENTAL PROTECTION ON 02 NOV 84 FOR EXCEEDING 90 DAY PERIOD FOR STORAGE OF DPDO HAZARDOUS WASTE. NAVAIRENGCEN FACES POSSIBLE $25,000 PENALTY.

2. DPDO LAKEHURST MUST REMOVE STORED HAZARDOUS WASTE WITHIN 90 DAY PERIOD PERMITTED BY REGULATIONS.

3. REQUEST ADVISE ALCON ACTION TO REMOVE HAZARDOUS WASTE CITED BY REF A.

DISTR
ORIG-18 ACTION DPDO TAG

J. A. GARDNER,
CODE 1823, EXT. 2612, 20 NOV 84

D. L. CARNELL, CDR, CEC, USN

Carnell

UNCLASSIFIED

DD 173 2 OCT

DEFENSE LOGISTICS AGENCY
DEFENSE PROPERTY DISPOSAL SERVICE
DEFENSE PROPERTY DISPOSAL REGION COLUMBUS
DEFENSE PROPERTY DISPOSAL OFFICE LAKEHURST
NAVAL AIR ENGINEERING CENTER, BUILDING 75
LAKEHURST, NEW JERSEY 08733-5010

10 DEC 1984

IN REPLY REFER TO DPDO-XPN

6 December 1984

SUBJECT: NJDEP Violation received by NAEC Lakehurst

TO: DPDR-CRH
W. Davis-Hoover

1. Reference: (a) NAEC letter dated 11/9/84 (Enclosure (1))
(b) NJDEP Violation ID NO 84-10-19-35 (Enclosure (2))
(c) NAEC Message R262055Z Nov. 84 (Enclosure (3))
(d) DPDO Conversation Record (Enclosure (4))
(e) DTID N68335-4279-0012 (Enclosure (5))

2. Subject violation is listed as violation 2 on enclosure (1) and again in enclosure (2). The DTID involved (enclosure 5) indicates receipt at 5 October 84 and removal by DPDS service contract DLA-200-84-C-0059 on 16 November 84. This item was on DPDO records for a period of 42 calandar days.

3. The problem in this matter stems from various interpretations of NJDEP and DoD regulations. NAEC Environmental Personnel consider all hazardous material a waste the moment it is no longer required for their use. They consider this mandatory in light of NJDEP regulations which state "Hazardous materials are to be considered wastes when they are no longer needed for their intended purpose". (See enclosure (4))

4. In light of these requirements by the State of New Jersey, NAEC has requested the DPDO to take immediate steps to accept accountability upon notification and place items directly for A&D.

5. Please note that no other generator has yet been sited for this type violation but there is growing concern amoung station environmentalists.

6. Since all generators of DPDO Lakehurst including the DPDO itself are governed by NJDEP regulations it is requested that corrective actions by taken by appropriate authorities to resolve this matter with the State of New Jersey.

Joanne L. Reitemeyer
Environmental Specilist

STEPHEN H. SACHS
ATTORNEY GENERAL

DEPUTY ATTORNEY GENERAL
GEORGE A. NILSON

OFFICES OF

THE ATTORNEY GENERAL

PRINCIPAL COUNSEL
RANDALL M. LUTZ
ASSISTANT ATTORNEY GENERAL

DEPUTY COUNSEL
JACK C. TRANTER
ASSISTANT ATTORNEY GENERAL

DEPARTMENT OF HEALTH AND MENTAL HYGIENE
201 WEST PRESTON STREET
BALTIMORE, MARYLAND 21201
AREA CODE 301—383-2815

June 21, 1982

MEMO TO : Rich Steimle

FROM : Jim Lyko

RE : Re-use/Recycling/Reclamation of Hazardous Wastes

Below are a few of my thoughts on the broad issue of the exclusion from regulation of hazardous wastes which are re-used, recycled, or reclaimed. Perhaps these points can serve as a rough agenda for the June 21 meeting on this subject.

I. What are the requirements in the agency's present regulation (COMAR 10.51.02.06)?

A. Subsection A creates a broad exclusion from regulation for all wastes being accumulated, stored, or treated before beneficial use or re-use or legitimate recycling or reclamation, but the exclusion is subject to subsection B.

B. Subsection B, in turn, brings back into the regulatory system listed hazardous wastes (i.e., those listed in regulations .14 through .17, as well as mixtures containing a listed hazardous waste), to the extent of virtually complete regulation of the transportation and storage of these hazardous wastes prior to their being used, re-used, recycled, or reclaimed.

-- Analysis:

(i) Wastes which are hazardous by virtue of exhibiting one of the four characteristics are totally exempt from regulation if intended for beneficial use or re-use or legitimate recycling/reclamation, unless the waste is also hazardous by virtue of containing a listed hazardous waste.

(ii) Wastes (including waste oil) which contain even minute amounts of a listed hazardous waste are subject to the hazardous waste transportation and storage requirements (such as use of the manifest system and the obtaining of storage permits), regardless of whether they are intended for beneficial re-use or legitimate recycling.

II. Evaluation of Maryland's Current Policy.

A. Are Maryland's present regulatory requirements, as described above, sound public policy?

B. Is the Agency willing to accept the permitting and enforcement burdens imposed by even-handed adherence to the present regulations?

III. If the answer to either question A. or B. in item #2 above is "no," define the regulatory policy Maryland wishes to establish regarding re-use/recycling/reclamation of hazardous waste, applying appropriate principles, such as those set forth below.

* * * * *

PRINCIPLES

1. Hazardous waste, regardless of its end use, poses significant health and environmental hazards. Thus, the same standards should govern all transportation and storage of hazardous wastes, regardless of whether the waste is destined for disposal or for re-use/recycling/reclamation.

-- Corollary: Entirely excluding from regulation hazardous wastes which are re-used/recycled creates a major loophole; e.g., if no manifest is required for such wastes, there is no way of ensuring that wastes intended for re-use/recycling are in fact delivered to the intended destination.

2. While there is a need to balance (i) the requirement to properly manage hazardous wastes, against (ii) the objective of promoting re-use/recycling, if a balance cannot be achieved, the overriding consideration must be on ensuring the safe handling of hazardous wastes.

3. The regulation of waste mixtures which contain a percentage of hazardous waste must not impose on both the agency and the regulated industries burdens which are clearly out of proportion to the health and environmental danger posed by the particular waste mixtures.

4. Agency policies, to be enforceable, must be expressed as clear, unambiguous, objective standards pursuant to which a reasonable person can know how to pattern his conduct.

5. Enforcement of regulations must be consistent and even-handed.

JL:jr

GLENN L. MARTIN STATE AIRPORT

STATUS: AS OF 1630 hrs., 1.31.85.

① AFFECTED AREAS OF MD. AIR NATIONAL GUARD (WANG) POST PLACED ON BOTTLED WATER FOR DRINKING PURPOSES. N.A. MAJOR PORTIONS OF POST ON CITY WATER.

② SITE STILL UNDER INVESTIGATION OF HISTORY.

CURRENT ACTIVITY (1.30, 31, 85):

① OBTAINED SAMPLE RESULT COPIES FROM 8.28.84 / 11.27.84 SAMPLING FROM WANG.

② OBTAINED TOPOGRAPHIC PROFILE (1982 SURVEY) OF GLENN L. MARTIN STATE AIRPORT AND WANG PROPERTY FROM WANG. THIS MAP INDICATES LANDFILL AREAS; FOUR (4) PITS, PONDS, LAGOONS OF NOTE.

③ OBTAINED SAMPLING PERMISSION FOR WELLS FROM WANG AND FOR PITS, PONDS, LAGOONS FROM STATE AVIATION ADMINISTRATION.

④ OBTAINED "FALL LINE" INFORMATION AND GENERAL GROUND-WATER FLOW PATTERNS OF AREA FROM STAFF HYDRO-GEOLOGIST, TOM BETTENDORF.

⑤ OBTAINED LIAISON/CONTACTS AS FOLLOWS:

- MARTIN MARIETTA AEROSPACE - JOSEPH ALCARESE - 338-7130
- CHESAPEAKE PARK, INC. — JIM WAGNER - MIKE KELLY
- STATE AVIATION ADMINISTRATION — LEONARD WOOD - 391-9400
- (GLENN L. MARTIN STATE AIRPORT) — JAKE WEST
- WARFIELD AIR NATIONAL GUARD (WANG) — TECH. SGT. CHARLES SMITH - 687-6270; CAPT. SCOTT A. KEARBY

FUTURE ACTIONS: ① DEVELOP AND IMPLEMENT SURFACE SAMPLING PROGRAM ON SITE WITH SUPPORT SERVICES DIVISION.

② CONTACT BALT. CO. PERSONNEL RE: [A] OTHER WELLS IN AREA (SAMPLING?). [B] PAST LANDFILLING ON SITE (PERMITS?). [C] WELL INSTALLATIONS (1982) ON SITE.

TALK TO PAUL S. ↑

③ CONTACT JIMMY'S WASTE OIL, PIKESVILLE, RE: 1960'S CUTTING OILS, etc. REMOVAL.

④ CONTACT DGS (FORMERLY MARTIN MARIETTA - ASSEMBLY DIVISION) RE: 5-8 STORIES UNDERGROUND BUILDINGS, CONCRETE SUMPS, etc.

⑤ CONTACT INSECTICIDE PLANT IN CHESAPEAKE PARK RE: RECENT INCIDENTS, IF ANY.

LABORATORY ANALYSIS REPORT AND RECORD (General)

16 OCT 1984

SAMPLE DATE: 8-28-84

FROM: USAF OEHL/SA
BROOKS AFB TX 78235

DATE RECEIVED: 30 AUG 84

LAB CONTROL NR: 48420, 22, 23

...LE IDENTITY: ...TER

...LE FROM:

...T FOR: ...olatile Halocarbons

...thodology: EPA Method 601

	K109 Munitions	5045 KO	5045KO MD			
...HL NO:	48420	48422	48423			DET.
...SE NO:	GP840024	GP840026	GP840027			LIMIT
...omodichloromethane	ND	ND	ND			0.1
...omoform						0.2
...omomethane						1.0
...rbon Tetrachloride						0.1
...lorobenzene						0.2
...loroethane						0.5
...-Chloroethylvinyl ether						0.1
...hloroform						0.1
...hloromethane						0.1
...ibromochloromethane						0.1
...,2-Dichlorobenzene						0.2
...,3-Dichlorobenzene						0.2
...,4-Dichlorobenzene						0.2
...ichlorodifluoromethane						0.1
...,1-Dichloroethane						0.2
...,2-Dichloroethane						0.2
...,1-Dichloroethene						0.1
...rans-1,2-Dichloroethene						0.1
...,2-Dichloropropane						0.1
...is-1,3-Dichloropropene						0.2
...rans-1,3-Dichloropropene						0.2
...ethylene Chloride	0.8					0.2
...,1,2,2-Tetrachloroethane	ND					0.1
...etrachloroethylene	0.6					0.1
...,1,1-Trichloroethane	ND					0.1
...,1,2-Trichloroethane						0.1
...richloroethylene						0.1
...richlorofluoromethane						0.1
...inyl Chloride						0.2

...esults in Micrograms per Liter

Edward J. Brown 23 OCT 1984
maj, USAF

...EQUESTING AGENCY (Mailing Address)
175 TAC Clinic/SGPB
Warfield ANGB
Baltimore, MD
21220-2899

ND-NONE DETECTED, LESS THAN THE DETECTION LIMIT.

TRACE-PRESENT BUT LESS THAN THE QUANTITATIVE LIMIT.

A. L. Willis
Technician

LABORATORY ANALYSIS REPORT AND RECORD (General)

28 NOV 1984

SAMPLE DATE: 8-28-84

FROM: USAF OEHL/S
Brooks AFB TX 78235-5000

SAMPLE IDENTITY: Water

DATE RECEIVED:

SAMPLE FROM:

LAB CONTROL NR:

TEST FOR: Volatile Aromatics

Methodology: EPA 602

5100 Munitions

OEHL NO:	48421				Detection Limit	
CASE NO:	GP8400025				ND	TR
Benzene	ND				1.0	2.0
Chlorobenzene	ND				1.0	2.0
1,2-Dichlorobenzene	ND				2.0	3.0
1,3-Dichlorobenzene	ND				2.0	3.0
1,4-Dichlorobenzene	ND				2.0	3.0
Ethylbenzene	ND				1.0	2.0
Toluene	ND				1.0	2.0

Results in micrograms per liter.

ND - None detected Less than the detection limit.
Trace - Present but less than the quantitative limit.

Eric Banks 1LT USAF
CHEMIST

28 NOV

Maj, USAF

REQUESTING AGENCY (Mailing Address)
175 TAC CLINIC/SGPB
WARFIELD ANGB
BALTIMORE MD 21220-2899
~~21220-2799~~

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE: 21 JAN 85

SAMPLE DATE: 11.27.84

FROM: USAF OEHL/SA
BROOKS AFB TX 78235-5000

SAMPLE IDENTITY: WATER

DATE RECEIVED: 27 NOV 84

SAMPLE FROM: WARFIELD ANGB, MD

LAB CONTROL NR:

TEST FOR: Volatile Halocarbons

Methodology: EPA Method 601 BLDG 5100 "MANITOBA" BLDG 5045 "KO"

OEHL NO:	67841	67843				DET. LIMIT
BASE NO:	GP840046	GP840048				
Bromodichloromethane	ND	ND				0.1
Bromoform	ND	ND				0.2
Bromomethane						1.0
Carbon Tetrachloride	ND	ND				0.1
Chlorobenzene	ND	ND				0.2
Chloroethane						0.5
2-Chloroethylvinyl ether						0.1
Chloroform	ND	ND				0.1
Chloromethane						0.1
Dibromochloromethane	ND	ND				0.1
1,2-Dichlorobenzene						0.2
1,3-Dichlorobenzene						0.2
1,4-Dichlorobenzene						0.2
Dichlorodifluoromethane						0.1
1,1-Dichloroethane	ND	ND				0.2
1,2-Dichloroethane	ND	ND				0.2
1,1-Dichloroethene	ND	ND				0.1
trans-1,2-Dichloroethene	ND	ND				0.1
1,2-Dichloropropane						0.1
cis-1,3-Dichloropropene	ND	ND				0.2
trans-1,3-Dichloropropene						0.2
Methylene Chloride	ND	ND				0.2
1,1,2,2-Tetrachloroethane						0.1
Tetrachloroethylene						0.1
1,1,1-Trichloroethane						0.1
1,1,2-Trichloroethane						0.1
Trichloroethylene	ND	ND				0.1
Trichlorofluoromethane						0.1
Vinyl Chloride						0.2

Results in Micrograms per Liter

DATE ANALYZED: 1-3-85

Edward J. Brown
21 JAN 1985

* Analysis Completed by Contract Lab. (BIOSPHERICS, ROCKVILLE)

QUESTING AGENCY (Mailing Address)
175 TAC Clinic/SGPB
Warfield ANGB,
Baltimore, MD 21220-2899

ND-NONE DETECTED, LESS THAN THE DETECTION LIMIT.

TRACE-PRESENT BUT LESS THAN THE QUANTITATIVE LIMIT.

FORM

LABORATORY ANALYSIS REPORT AND RECORD (General)

DATE

SAMPLE DATE: 11-27-84

FROM USAF OEHL/SA
Brooks AFB TX 78235-5000

SAMPLE IDENTITY
Water

DATE RECEIVED

SAMPLE FROM

LAB CONTROL NR

TEST FOR
Volatile Aromatics

Methodology: EPA 602

	BLDG 5100 "munitions maint."	BLDG 5045 "K.O."			Detection Limit	
OEHL NO:	67842	67844				
BASE NO:	GP840047	GP840049			ND	TR
Benzene	ND	1.2			1.0	2.0
Chlorobenzene	10.5	1.5			1.0	2.0
1,2-Dichlorobenzene	ND	ND			2.0	3.0
1,3-Dichlorobenzene	ND	ND			2.0	3.0
1,4-Dichlorobenzene	ND	ND			2.0	3.0
Ethylbenzene	1.5	ND			1.0	2.0
Toluene	ND	ND			1.0	2.0

Results in micrograms per liter.

ND - None detected. Less than the detection limit.
Trace - Present but less than the quantitative limit.

DATE ANALYZED: 1-3-85

Edward J. Brown

21 JAN 1985

REQUESTING AGENCY (Mailing Address)

175 TAC CLINIC/SGAB
WARFIELD ANGB
BALTIMORE, MD 21220-2899

Analysis Completed by Contract Lab. (BIOSPHERICS, ROCKVILLE)

JK

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: GROUNDWATER INVESTIGATION Date 1/24/85

Facility Name: MARYLAND AIR NATIONAL GUARD - GLENN L MARTIN STATE AIRPORT

Remarks:

TOURED AREAS OF MARYLAND AIR NATIONAL GUARD LEASED FROM THE STATE AVIATION ADMINISTRATION AND SEVERAL ADJACENT AREAS INCLUDING:

(1) TWO POND AREAS (SAA PROPERTY), ONE OF WHICH IS BELIEVED TO BE AN ACID PIT IN USE IN THE 1950's AND 1960's AND APPEARS UNLINED.

(2) A LANDFILLED AREA (SAA PROPERTY) ALONG FROG MORTAR CREEK AT THE SOUTHEASTERN EDGE OF THE PROPERTY.

(3) A MUNITIONS STORAGE AREA (ANG PROPERTY) WHICH HAS A 198' WELL WHICH SHOWED TRACES OF BENZENE, ETHYL BENZENE, TETRACHLOROETHYLENE, METHYLENE CHLORIDE. THIS AREA HAS TWO 550 GALLON FUEL OIL STORAGE TANKS (ONE UNDERGROUND, ONE ABOVE GROUND) WITH NO LEAKAGE PROBLEMS KNOWN — INSTALLED IN 1982. WELL IS A DRINKING WATER SOURCE.

(4) AN EQUIPMENT SHOP, STORAGE BUILDING (ANG PROPERTY — "KO" BUILDING) WHICH HAS A WELL SERVING THE BUILDING FOR SANITARY PURPOSES ONLY.

(5) A STORAGE BUILDING (ANG PROPERTY - BUILDING #5040) OUTSIDE OF WHICH IS THE HAZARDOUS WASTE STORAGE AREA. TWO OF THE DRUMS STORED THERE (55 GALLON CAP.) WERE PAINT THINNER/WATER MIXTURES WHICH HAD SWELLED THE TOPS AND BOTTOMS OF BOTH DRUMS ALLOWING CONTENTS TO LEAK. THESE WILL BE OVERPACKED WHILE AWAITING SHIPMENT (ACCUMULATION DATE = 12.4.84) TO AN APPROVED TSD FACILITY. SEVERAL (3) OF REMAINING DRUMS IN STORAGE AREA WERE UNLABELED PENDING SAMPLE RESULTS FROM LAB ANALYSIS.

Observer: _____ Person Interviewed: _____

DHMH 3879

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: GROUNDWATER INVESTIGATION Date 1/29/85

Facility Name: MARYLAND AIR NATIONAL GUARD - BALTI. CO.

Remarks:

TECH. SGT. C. SMITH WILL BE CONTACTED FOR COPIES/REVIEW OF ANALYTICAL RESULTS FROM TWO WELLS ON POST.

STATE AVIATION ADMINISTRATION (GLENN L. MARTIN STATE AIRPORT) WILL BE CONTACTED CONCERNING TWO PONDS AND LANDFILLING ON SITE AS WELL AS ANY FURTHER WELLS/SAMPLING OF GROUNDWATER IN AREA.

MARTIN MARIETTA - AEROSPACE WILL ALSO BE CONTACTED FOR GROUNDWATER INFORMATION INPUT.

Observer: M. GLIFFEN

DHMH 3879 Q. ACGNERO

Person Interviewed: CAPT. SCOTT A. KEARBY, P.E.
ASST. BASE ENGINEER

Capt. Kearby says it still is at Glenn L. Martin Natl.

→ Weidle Air Natl. Gd.

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

TO Butch Nye From M. Glaser Date 11-15-89

Subject Air Nat'l Guard paint thinner spill

As this is a Federal installation which utilizes boilers and TSD facility which are also Federal installations, and since you inspect the Aberdeen Proving Ground which is the disposal facility, I am referring this to you.

Let me know if I can help/ accompany you.

MG

FG.D

NON PCB ONE TIME OR DELIVERY ORDER

INSTRUCTIONS ON REVERSE.

GENERATOR: Maryland Air National Guard — EPA# MDD083501023

DRMO: Aberdeen Bldg 3620 Aberdeen Proving Grd., Md. 21005-5001

POINT OF CONTACT FOR PREBID/PROPOSAL SITE VISIT: John Shafer / Harold Hall

COMMERCIAL NO 301-278-2235/2435

AUTOVON NO 283-2235/2435

COMMERCIAL NO 301-278-4456

AUTOVON 283-4456

1 CLIN	2 NSN/LSN	3 ITEM NAME & CONTAMINANTS	4 QTY	5 STORAGE CONTAINER	6 APPROX WEIGHT IN LBS CONTAINERS	7 STORAGE LOCATIONS	8 DTID NUMBER	9 REMARKS
0056	6810 00 224 8313	Methanol	20 Gl.	55 gal. Drum (1 ea.)	0163	JK - Md. Air Guard	FB6191-4222-0185	
0104	6850 00 637 6135	Solvent - PD680	300 Gl.	55 gal. Drum (6 ea.)	0163	"	4222-0240	
0129	6810 00 664 0387	1,1,1-Trichloroethane	10 Gl.	5 gal. Drums (2 ea.) - 0/pack 5 gal. (1 ea.)	0166 & 0163 (2) (1)	"	4222-0196	
0101	8010 01 040 1059	Paint Stripper waste	150 Gl.	55 gal. Drum - (3 ea.)	0163	"	4222-0207	
0106	6850 00 281 1985	Solvent - PD680 w/ Mineral Spirits	100 Gl.	55 gal. Drum (2 ea.)	0163	"	4293-0241	
0102	6810 00 286 0458	Paint Thinner w/ Toluene, Methyl Isobutyl Ketone and paint	50 Gl.	55 gal. Drum (1 ea.)	0163	"	4293-0207	
0151	6850 00 965 2356	Purging Fluid w/ JP 4	700 Gl.	55 gal. Drum (14 ea.)	0163	"	4293-0205	
[redacted]						"		
0151	6850 Liq Reduc	Liquid Reducer w/ Min. Spirits, Unl+P Naptha, Terpene Alcohol, Ethyl Benzene	50 Gl.	5 gal. Cns. (10 ea.)	0166	"	4293-0210	
0016	6850 Asbestos	Asbestos, fibrous - w/ gloves + mask	1 lb.	5 gal. Cn. (1 ea.)	0166	"	4293-0209	

PDS Form Feb 83 1669

Plus Spill Residue

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: CHS spill - phone conversation Date 11/15/84

Facility Name: Aberdeen Prov. Grnd.

Remarks: Edgar L. Martin Airport
Balt. Co., Md.

Spoke with Capt. Kearby (687-6210, ext 224) re: self-reported spill details.

A stripping vat in a block enclosure used to remove paint from aircraft wheels began deteriorating due to age. A leak from the bottom of the vat was discovered today. All spillage, ≈ 20 gallons, was contained on the pavement beneath the vat. "Sorb-all" absorbent was used to clean up the spillage. The cleaned up material and the remaining ≈ 45 gallons in the vat were pumped out into a drum for proper removal by personnel from the Aberdeen Proving Ground where all CHS materials are removed for disposal.

Observer: M. GRIFFEN Person Interviewed: CAPT. KEARBY

DHMH 3879

STATE OF MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS
WASTE MANAGEMENT ADMINISTRATION
201 WEST PRESTON STREET
BALTIMORE, MARYLAND 21201

INCIDENT REPORT

Part I

A. INCIDENT NUMBER 84 (YR) 11 (MO) 15 (DAY) HWIT (REGION) _____ (SEQUENCE)

B. TIME NOTIFIED-24 HOUR CLOCK 11:45 am

C. LEVEL - 1 ___ MINOR 2 ___ MEDIUM 3 ___ MAJOR (SEE REVERSE)

D. NOTIFIER: NAME Capt Kearby ADDRESS Air National Guard
TELEPHONE 687-6270 x 220 Martin Airport (ZIP)

E. LOCATION/ADDRESS OF INCIDENT
1 ___ WATER
2 ___ AIR
3 ___ SOIL
4 ___ GROUNDWATER
5 ✓ SEE PART II
6 Martin State Airport STREET/CROSS STREET
_____ CITY
Balt. COUNTY
_____ ZIP

F. COMPANY RESPONSIBLE
1 Air National Guard NAME
Martin State Airport ADDRESS
_____ (ZIP)
_____ (AREA CODE) (TELEPHONE)
2 ___ UNKNOWN 3 ___ UNDER INVESTIGATION

G. NATURE OF INCIDENT
1 ___ CHS _____ UN NUMBER
2 ✓ CHEMICAL Paint Stripper SPECIFY
3 ___ LANDFILL
4 ___ POINT SOURCE DISCHARGE
5 ___ STORAGE TANK
6 ___ OPEN DUMPING
7 ___ GROUNDWATER
8 ___ SEDIMENTATION
9 ___ SURFACE H_2O QUALITY
10 ___ OIL
11 ___ TRANSFER OPERATION
12 ___ AQUATIC KILL
13 ___ RESCHEDULE PREVIOUS ACTI
14 ___ SLUDGE
15 ___ OTHER
16 ___ UNFOUNDED
17 ✓ SEE PART II

H. CAUSE
1 ___ INDUSTRIAL
2 ___ MARINE
3 ___ TRANSPORTATION
4 ___ APPARENT VANDALISM
5 ___ MYSTERY
6 ✓ SEE PART II

I. MANIFEST
1 ___ GENERATOR _____ NAME
_____ EPA ID NO.
2 ___ HAULER _____ NAME
_____ EPA ID NO.
3 ___ DISPOSAL _____ NAME
_____ EPA ID NO.
4 ___ OTHER STATES
5 ___ N/A
6 ✓ SEE PART II

J. CLEAN UP
1 ___ STATE _____ ORGANIZATION PERSON IN CHARGE
2 ___ LOCAL _____ ORGANIZATION PERSON IN CHARGE
3 ✓ INDUSTRY Air Nat'l Guard - Capt. Kearby ORGANIZATION PERSON IN CHARGE
4 ___ CONTRACTOR _____ ORGANIZATION PERSON IN CHARGE
5 ___ N/A

K. SPILL (ESTIMATED QUANTITY)
1 ___ POTENTIAL _____
2 ✓ SPILLED 20 gal.
3 ✓ RECOVERED 45 gal
4 ___ METHOD _____
5 ___ DISPOSAL _____
6 ___ N/A

L. COSTING
1 ___ MAN-HOURS _____ HOURS
2 ___ VEHICLE _____ HOURS
3 ___ TOTAL INCIDENT COST$ _____ (SUPERVISOR)

M. CASE STATUS
1 ___ OPEN/PENDING
2 ___ CLOSED
3 ___ REFERRED TO OTHER AGENCY
_____

N. PERSON(S) MAKING REPORT
NAME(S) M. Griffin
REGION II

O. REVIEWED FOR CLOSURE
_____ SIGNATURE (REGIONAL CHIEF)

MINOR - LEVEL 1
LOCAL AGENCIES

1 FIRE ALARM

A CORROSIVE, REACTIVE, TOXIC, IGNITABLE, RADIOACTIVE OR BIOLOGICAL INCIDENT THAT MAY PRESENT A HAZARD TO LIFE OR PROPERTY.

MEDIUM - LEVEL 2
MULTI-AGENCY - SMALL SCALE

LESS THAN 6 FIRE ALARMS

A CORROSIVE, REACTIVE, TOXIC, IGNITABLE, RADIOACTIVE OR BIOLOGICAL HAZARD THAT PRESENTS A SIGNIFICANT THREAT TO LIFE OR PROPERTY.

AN INCIDENT THAT THE OSC DESIGNATES AS MEDIUM DUE TO SPECIAL CIRCUMSTANCES.

MAJOR - LEVEL 3
MULTI-AGENCY - LARGE SCALE

6 OR MORE FIRE ALARMS

A CORROSIVE, REACTIVE, TOXIC, IGNITABLE, RADIOACTIVE, OR BIOLOGICAL HAZARD THAT HAS RESULTED IN DEATH OR PRESENTS AN IMMINENT THREAT OF DEATH OR LARGE SCALE PROPERTY LOSS.

AN INCIDENT THAT THE OSC DESIGNATES AS MAJOR DUE TO SPECIAL CIRCUMSTANCES.

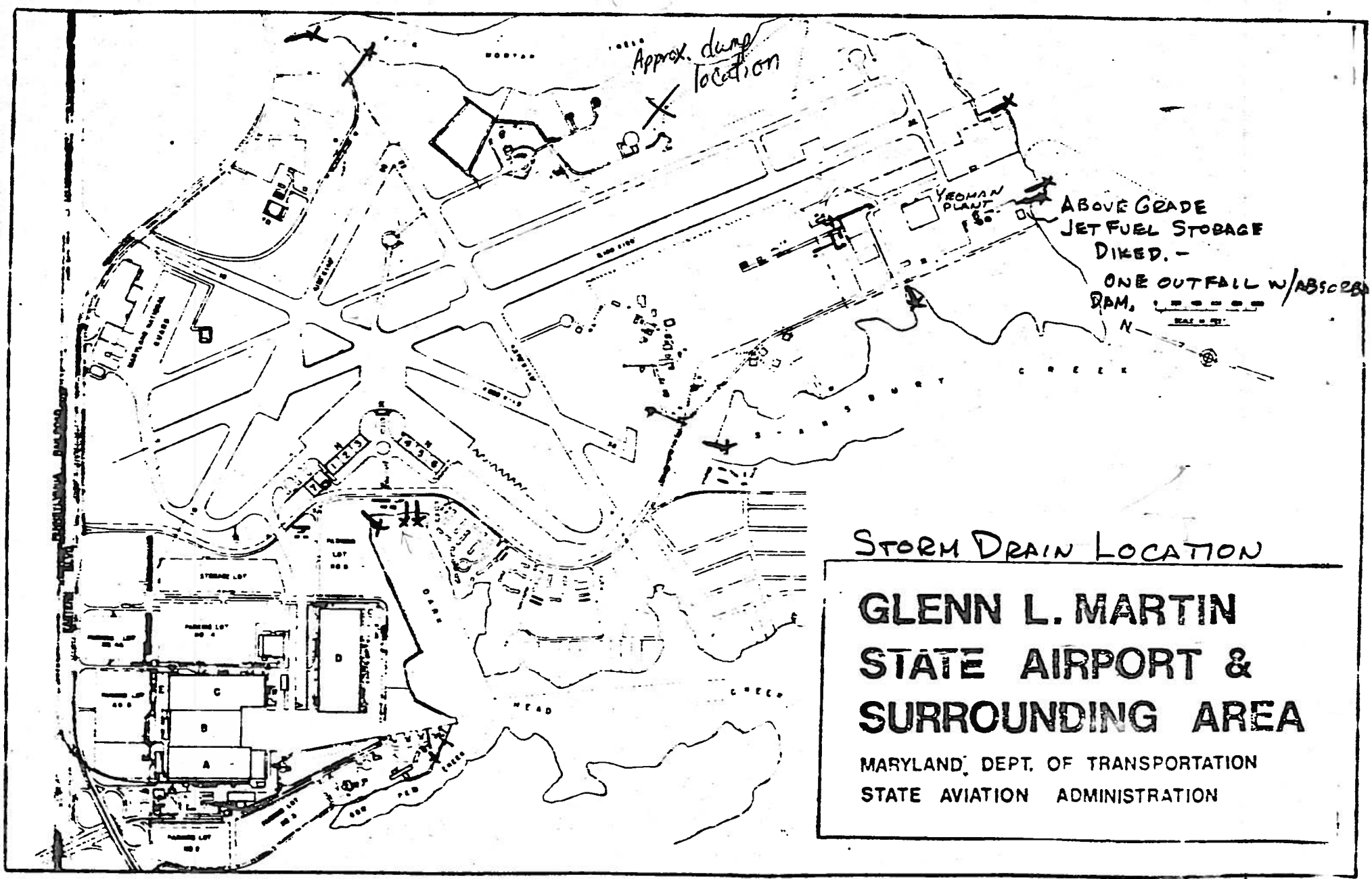
INCIDENT
REPORT

STATE OF MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS
WASTE MANAGEMENT ADMINISTRATION
201 WEST PRESTON STREET
BALTIMORE, MARYLAND 21201

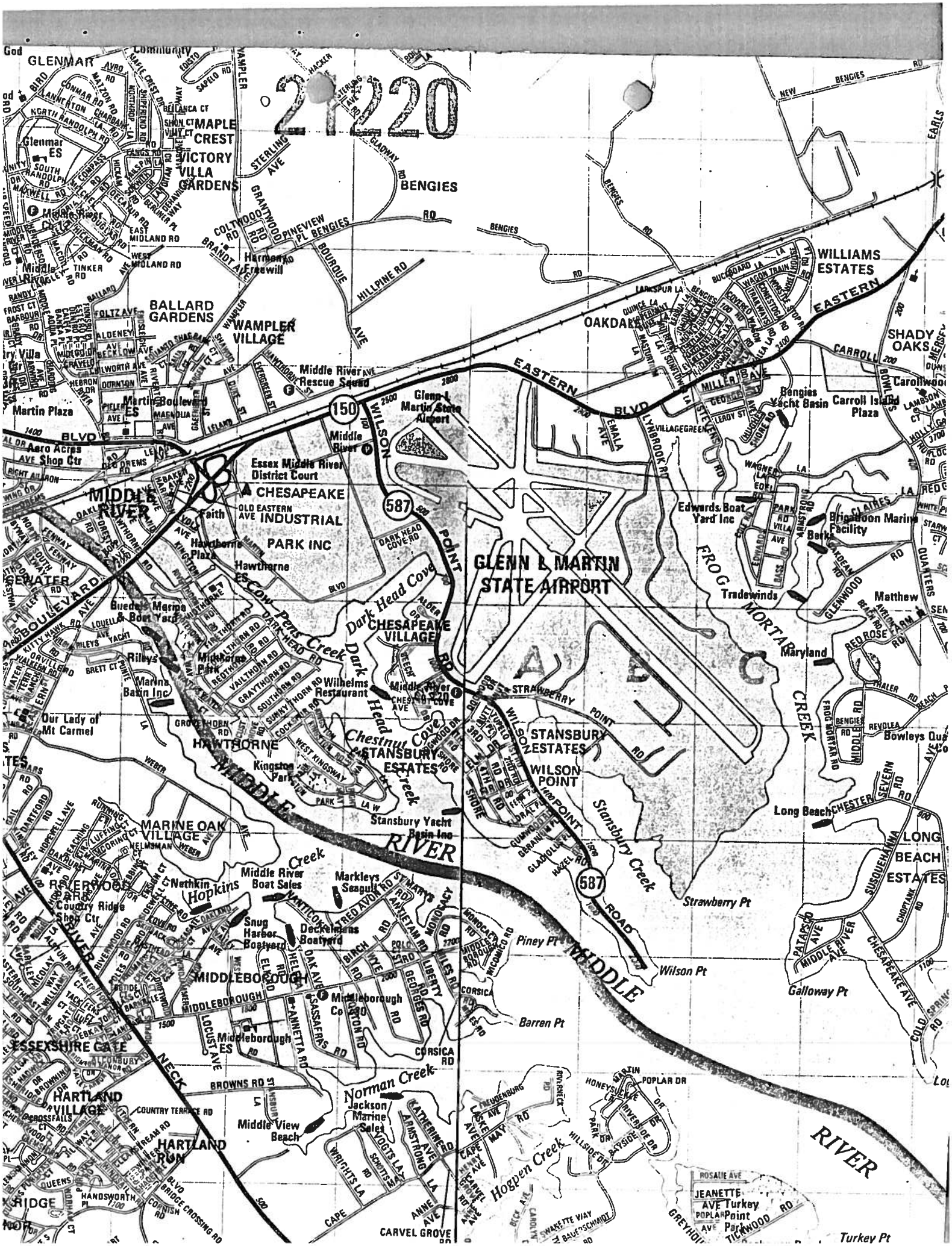
Part II Sequence_____

COMMENTS/DESCRIPTIONS

20 gallons of paint stripper spilled. Paint stripper has been cleaned + contained w/ sorbent. Sorbent is being put in drum.


Approx. dump location
YEOMAN PLANT
ABOVE GRADE JET FUEL STORAGE DIKED. -
ONE OUTFALL W/ABSORB
DAM.
N
STORM DRAIN LOCATION
GLENN L. MARTIN STATE AIRPORT & SURROUNDING AREA
MARYLAND DEPT. OF TRANSPORTATION
STATE AVIATION ADMINISTRATION

2/2/77


21220
GLENMAR
MAPLE CREST
VICTORY VILLA GARDENS
BENGIES
BALLARD GARDENS
WAMPLER VILLAGE
Middle River Rescue Squad
Martin Boulevard
Martin Plaza
Aero Acres Shop Ctr
MIDDLE RIVER
Essex Middle River District Court
CHESAPEAKE INDUSTRIAL PARK INC
Faith
Hawthorne Plaza
Hawthorne ES
Buedel's Marine & Boat Yard
Rileys
Marina Basin Inc
Our Lady of Mt Carmel
HAWTHORNE
Kingston Park
Middle River Park
Cow Pens Creek
Dark Head Cove
CHESAPEAKE VILLAGE
Dark Head Creek
Wilhelms Restaurant
Chestnut Cove
STANSBURY ESTATES
Stansbury Yacht Basin Inc
MARINE OAK VILLAGE
RIVERWOOD PARK
Country Ridge Shop Ctr
Nethkin
Hopkins Creek
Middle River Boat Sales
Markleys Seagull
Snug Harbor Boatyard
Deckelmans Boatyard
MIDDLEBOROUGH
Middleborough Co
Middleborough ES
ESSEXSHIRE GATE
HARTLAND VILLAGE
HARTLAND RUN
Middle View Beach
Norman Creek
Jackson Marine Sales
Hogpen Creek
CARVEL GROVE
Glenn L Martin State Airport
GLENN L MARTIN STATE AIRPORT
WILSON POINT
STANSBURY ESTATES
WILSON POINT
Stansbury Creek
Strawberry Pt
Piney Pt
Wilson Pt
Barren Pt
Galloway Pt
Turkey Pt
Turkey Point Park
OAKDALE
WILLIAMS ESTATES
SHADY OAKS
Carroll Island Plaza
Bengies Yacht Basin
Edwards Boat Yard Inc
Brigadoon Marine Facility
Tradewinds
Matthew
Maryland
FROG MORTAR CREEK
Long Beach
LONG BEACH ESTATES
Bowleys Qua
EASTERN BLVD
WILSON POINT ROAD
MIDDLE RIVER
NECK RIVER
150
587

NUMBER IS TO BE PUNCHED (COLS. 3-0 ON ALL CARDS)

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

COUNTY NUMBER 003

Date Received (WRA use only) DEC 30 1981

DATE WELL COMPLETED 11-19-81

Depth of Well 199 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" BA-81-0352

OWNER Department of the Army
last name first name

STREET OR RFD Balto. District Corps of Engineers TOWN Balto. 21201

SUBDIVISION Lunbrook Rd SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Sand	0	18	
White Clay	18	22	
Sand & wh. Clay	22	26	
White Clay	26	37	
Sand	37	47	
Stone	47	48	
Red Clay	48	71	
Sand & wh. Clay	71	75	
Sand	75	77	
White Clay	77	105	
Gray Clay	105	117	
Red Clay	117	122	
Sd & wh. Clay	122	136	
Red Clay	136	160	
Fine Sand	160	165	
Fine Sand	165	170	
Med. & Fine Sand	170	175	
Sand & wh. Clay	175	179	
Fine Sand	179	184	
Med. & Course			
White Sand	184	199	✓

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) YES (Y) NO (N)

TYPE OF GROUTING MATERIAL

CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS 19 NO. OF POUNDS 950

GALLONS OF WATER 140

DEPTH OF GROUT SEAL (to nearest foot) from 0 ft. (enter 0 if from surface) to 184 ft.

CASING RECORD
casing types - insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top(main)casing (nearest inch)	Total depth of main casing (nearest foot)
S T	6	189

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole - insert appropriate code below

[S T] STEEL [B R] BRASS, BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

C 2 (seq. no.)

EACH SCREEN		DEPTH (nearest ft.)	
1	S T	189	199
2			
3			

SLOT SIZE 1 .018 2 3

DIAMETER OF SCREEN 4 (NEAREST INCH)

GRAVEL PACK from 189 to 199

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX [F]

C 3 (seq no)

PUMPING TEST
HOURS PUMPED (nearest hour) 4

PUMPING RATE (gal. per min. to nearest gal.) 300

METHOD USED TO MEASURE PUMPING RATE 55gal drum

WATER LEVEL (distance from land surface)

BEFORE PUMPING

WHEN PUMPING 155

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES (Y) NO (N)

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: (A, C, J, P, R, S, T, O)) [S]

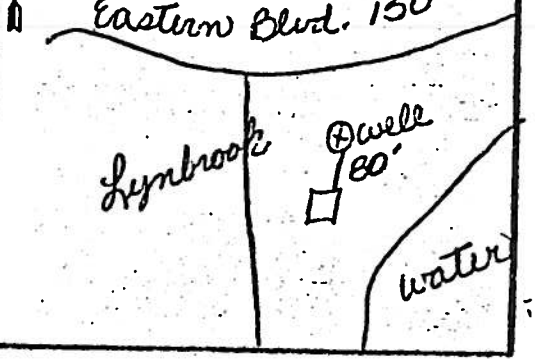
CAPACITY:
GALLONS PER MINUTE (to nearest gallon) 12

PUMP HORSE POWER 1.5

PUMP COLUMN LENGTH (nearest ft) 63

CASING HEIGHT (circle appropriate box and enter casing height) [+] above [—] below LAND SURFACE 2 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE BOX
[A] A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

[E] ELECTRIC LOG OBTAINED

[C] TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLERS IDENT. NO. 5

DRILLERS SIGNATURE Walt J Grant
MUST MATCH SIGNATURE ON APPLICATION

WELL SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

WRA USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.)

[ ] TELESCOPE CASING [ ] LOG INDICATOR W Q OTHER DATA

ORIGINAL

1 1021 WRA USE ONLY
THIS NUMBER IS TO BE PUNCHED COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please print or type

BA-81-0352
fill in this form completely

DATE RECEIVED NOV 3 1981
8 (WRA USE ONLY) 13

OWNER INFORMATION

Department of the Army
LAST NAME OWNER FIRST NAME 34

Balto. District, Corps of Engineers
STREET OR RFD 55

Baltimore, Md. 21201
TOWN 57 STATE 76 ZIP

1 CONTINUED

DRILLER INFORMATION

Walter J. Frank 5
DRILLER'S NAME 77 LICENSE NO. 80

Walter J. Frank 7-31-81
SIGNATURE DATE

2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN) 10
AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY) 2,000

USE FOR WATER (CIRCLE APPROPRIATE BOX)

D HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION)
I INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOV. OTHER (REQUIRES APPROPRIATION PERMIT)
P PUBLIC OR PRIVATE WATER COMPANY (REQUIRES APPROPRIATION PERMIT AND STATE HEALTH DEPARTMENT APPROVAL)
T TEST, OBSERVATION, MONITORING (MAY REQUIRE APPROPRIATION PERMIT)

APPROXIMATE DEPTH OF WELL 120 FEET
APPROXIMATE DIAMETER OF WELL 6 NEAREST INCH

Method of Drilling (circle one)

BORED (OR AUGERED) JETTED JETTED & DRIVEN
AIR ROTARY AIR-PERCUSSION ROTARY (HYDRAULIC) ROTARY
CABLE REVERSE ROTARY DRIVE-POINT
other

REPLACEMENT OR DEEPENED WELLS
(Circle Appropriate Box)

N THIS WELL WILL NOT REPLACE AN EXISTING WELL
Y THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
D THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE)

Not to be filled in by driller (WRA USE ONLY)

APPROP. PERMIT NUMBER BA72GAP0007

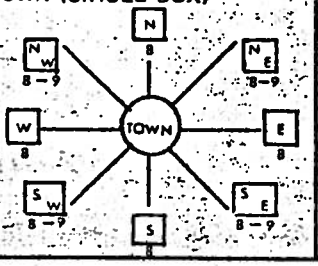
FORCE TE WRITE INITIALS IN BOX CONDITIONS BA-81-0352
A E N S G W Q C L U

B 3 LOCATION OF WELL

COUNTY Baltimore
SUBDIVISION
SECTION LOT
NEAREST TOWN Middle River
MILES FROM TOWN (enter 0 if in town) 0 M I

B 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



Lynbrook Rd.
NEAR WHAT ROAD

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX) NORTH N WEST W E EAST S SOUTH

250 FT
DISTANCE FROM ROAD (CIRCLE APPROPRIATE BOX)

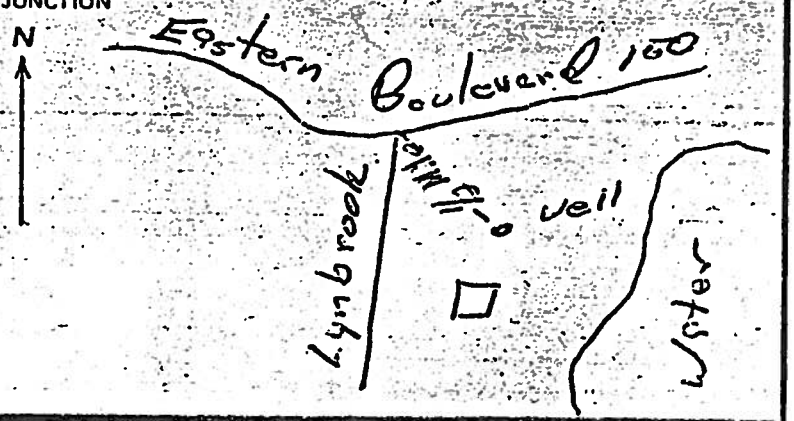
SHOW LOCATION OF WELL WITH AN "X" IN THIS BOX

WRITE THE BOX NUMBER FROM THE MAP HERE

E 960
N 540

000 000

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



B 4

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

BALTIMORE 003
COUNTY NAME COUNTY NO.

EHA SIGNATURE STATE HEALTH CIRCLE BOX S

MO 10 DAY 27 YR 81 CO SIGNATURE DATE

NORTH GRID 5460 EAST 0967 ELEV. (FT.)

5 SPECIAL CONDITIONS 8-63 (WRA USE ONLY)

ORIGINAL

DHMH 3845

MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS - Waste Management & Enforcement Programs

FIELD INVESTIGATION REPORT

WR-QI-36-6

Facility Number: c e - a e q (1–6)

Inv. Date: Yr. Mo. Da. 8 2 0 3 1 7 (8–13)

Time: 1030-1100

Name of facility or area ivestigated:
Md. Air National Guard - Martin Airport
Balto. Co DP-1413

Persons contacted (include title):
Sr. A. Gessner - Civil Engineer dept.

Citizen report: (name & title):

Statement of Findings:
I examined the oil-water separator which collects runway runoff. There was no oil in the separator and it appeared to be well maintained. The separator discharges to a drainage ditch.
SRA Gessner advised me to contact Lt. Col. Shero concerning the discharge permit application. (He was not available today)
Called Col. Shero 3/23 - Advised him to submit D.P. appl. for ANG or jointly with Martin Airport.

Use reverse side of this form if needed ☐ Check if continued

Recommended action items (check appropriate item):
- ○ Issue complaint & order
- ○ Issue complaint
- ○ Hold WRA Hearing
- ○ Require Facility Report
- ○ Send letter describing WRA Findings & requirements
- ○ Additional Investigations Planned Within _____ (State time period)
- ○ Continue Periodic Investigations
- ○ Place File on Inactive List
- ✓ Other (Explain): Contact Lt. Col. Shero

Preliminary Indication of Water Pollution Control Status (Subject to analysis of all evidence collected) ○

* KEY: W/ = With; WD = Waste Discharge; OPS/MAINT. = Operations and Maintenance

Checked By: [signature]

Water Resources Investigator: James D. Curbs

Reason for Investigation (Circle only one)
- 1 Periodic Investigation (15)
- 2 Complaint-Order Action
- 3 Discharge Permit
- 4 Wetlands Permit/License
- 5 Oil Handler's Permit/Oil Terminal License
- 6 Sediment Action
- 7 Waterway obstruction/construction
- 8 Well Permit/construction
- 9 Other (explain) _____

Condition of Waste Producing Processes (Circle only one)
- 1 Facility in Operation, W/WD* (17)
- 2 Facility in Operation, No/WD*
- 3 Facility not in Operation, W/WD*
- 4 Facility not in Operation, No/WD*
- 5 Other (Explain) _____

Key Rev. No. (19–58)

Evidence Collected (Circle only one)
- S Sample or specimen (60)
- X Sample and Graphic
- G Graphic, photo, etc.
- O Other (Explain) _____
- N None

Water Pollution Control Status (Circle only one)
- 1 Facility Satisfactory (62)
- 2 Facility Under construction or development
- 3 Plans/Proposals for improvements underway
- 4 Facility Satisfactory; OPS/MAINT Unsatisfactory
- 5 Facility Unsatisfactory

Investigator's Initials

Card No. 19

MARYLAND
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS - Waste Management & Enforcement Programs

FIELD INVESTIGATION REPORT

WR-QI-36-6/71

Facility Number: c e - m e q (1–6)

Inv. Date: Yr. Mo. Da. 8 / 09 / 16 (8–13)

Time

Name of facility or area ivestigated: Martin Airport S.A.A. R. Cto. Co. 77-DP-1413

Persons contacted (include title): John M. Porter - Manager; Don Meredith - ass't. manager

Citizen report: (name & title): W/J. Hobner

Statement of Findings:

On the east side of the runway we found an open dump covering approx. one acre of ground. Demolition debris, construction debris, rubble, brush, trash and tires have been dumped at the site. Most of the debris probably comes from the ANG or airport operations.

Use reverse side of this form if needed ☐ Check if continued

Recommended action items (check appropriate item):

- ( ) Issue complaint & order
- ( ) Issue complaint
- ( ) Hold WRA Hearing
- ( ) Require Facility Report
- (✓) Send letter describing WRA Findings & requirements
- ( ) Additional Investigations Planned Within _____ (State time period)
- ( ) Continue Periodic Investigations
- ( ) Place File on Inactive List
- ( ) Other (Explain):

Preliminary Indication of Water Pollution Control Status (subject to analysis of all evidence collected) ( )

KEY: W/ = With; WD = Waste Discharge; OPS/MAINT. = Operations and Maintenance

Checked ✓ | Water Resources Investigator: James D. Curtis

Reason for Investigation (Circle only one)

- [1] Periodic Investigation (15)
- [2] Complaint-Order Action
- [3] Discharge Permit
- [4] Wetlands Permit/License
- [5] Oil Handler's Permit/Oil Terminal License
- [6] Sediment Action
- [7] Waterway obstruction/construction
- [8] Well Permit/construction
- [9] Other (explain)

Condition of Waste Producing Processes (Circle only one)

- [1] Facility in Operation, W/WD* (17)
- [2] Facility in Operation, No/WD*
- [3] Facility not in Operation, W/WD*
- [4] Facility not in Operation, No/WD*
- [5] Other (Explain)

Key Remarks (19–58)

Evidence Collected (Circle only one)

- [S] Sample or specimen (60)
- [X] Sample and Graphic
- [G] Graphic, photo, etc.
- [O] Other (Explain)
- [N] None

Water Pollution Control Status (Circle only one)

- [1] Facility Satisfactory (62)
- [2] Facility Under construction or development
- [3] Plans/Proposals for improvements underway
- [4] Facility Satisfactory; OPS/MAINT Unsatisfactory
- [5] Facility Unsatisfactory

Investigator's Initials: JDC (64 65 66)

Card No. 19 (79 80)

G.L. Martin Airport 9/16/81 GDC





STATE OF MARYLAND
DEPT. OF HEALTH AND MENTAL HYGIENE

Date 10/6/81

To Paul Thompson

From Ronald Nelson

- ☐ Please Note & File
- ☐ To be Signed
- ☐ For Your Information
- ☐ Please Comment
- ☐ Please Note & Return
- ☐ Please See Me
- ☐ Please Handle
- ☐ Please answer, Sending me Copy of your letter
- ☐ Please Prepare reply for my Signature

Remarks:

Contact Mr. Truby and try to settle this without an Order.

RE-INSPECT AND REVIEW ENTIRE FACILITY. GET INFO FROM PLS

P

State of Maryland

OFFICE OF THE SECRETARY
DEPARTMENT OF HEALTH AND MENTAL HYGIENE
201 WEST PRESTON STREET • BALTIMORE, MARYLAND 21201 • Area Code 301 • 383- 7328

Charles R. Buck, Jr., Sc.D. Secretary

CERTIFIED MAIL

Mr. T. James Truby, Administrator
State Aviation Administration
Post Office Box 8766
BWI Airport
Baltimore, Maryland 21240

-and-

Mr. John M. Porter, Manager
State Aviation Administration
Glenn L. Martin State Airport
Post Office Box 1
Middle River, Maryland 21220

Dear Sirs:

On September 16, 1981, a representative of the Waste Management Administration examined an open dump area located on the east side of the Glenn L. Martin State Airport adjacent to Frog Mortar Creek. This inspection revealed that demolition debris, construction debris, brush, trash, and tires have been disposed at this open dumping operation.

In addition, a review of the Administration's files indicates that you have not obtained a Refuse Disposal Permit for this site.

Accordingly, the Office of Environmental Programs has issued the enclosed Order.

If you have any questions regarding this matter, please communicate with Mr. Paul G. Thompson, Acting Regional Chief, Waste Management Administration at 301-383-6650.

Sincerely yours,

William M. Eichbaum
Assistant Secretary for
Environmental Programs

WME:lch

Enclosure

cc: Mr. Ronald Nelson
Dr. Donald J. Roop
Mr. Arthur Caple
Mr. William O. Jensen, Jr.
Mr. Douglas John

Lt. Williams

Md.

728.3388 226

Martin Airfield

AGIT GOVERS
office

Atl

STATE OF MARYLAND
DEPT. OF HEALTH AND MENTAL HYGIENE

Date.....

To Paul T

From JK

- ☐ Please Note & File
- ☐ To be Signed
- ☐ For Your Information
- ☐ Please Comment
- ☐ Please Note & Return
- ☐ Please See Me
- ☐ Please Handle
- ☐ Please answer, Sending me Copy of your letter
- ☐ Please Prepare reply for my Signature

Remarks: Current addrs

Walter Chandler ok

Methylene Chloride

Tetrachloroethylene

Benzene

Ethylbenzene

wells = same depth

across Fwy / Morton Ave

& private homes

well – near prop. line of Martin State Airport
– acid pits & abandoned dumps too
– he can't go into state property.

drinking water well → bottled water or post

STATE OF MARYLAND
DEPT. OF HEALTH AND MENTAL HYGIENE

Date.....

To .....

om .....

- ☐ Please Note & File
- ☐ For Your Information
- ☐ Please Note & Return
- ☐ Please Handle
- ☐ To be Signed
- ☐ Please Comment
- ☐ Please See Me
- ☐ Please answer, Sending me Copy of your letter
- ☐ Please Prepare reply for my Signature

Remarks: Test Sgt. Charles Smith

687-6270

x 428

MD Air Nat'l Guard

2701 Eastern Blvd.

Middle River Md.

well – near prop. line & Airport
– acid pits – Martin Mar. Airport
– abandoned dumps too
– he can't go into state property.

STATE OF MARYLAND
DEPT. OF HEALTH AND MENTAL HYGIENE

Date.....

To drinking water well → bottled water or post

From .....

- ☐ Please Note & File
- ☐ For Your Information
- ☐ Please Note & Return
- ☐ Please Handle
- ☐ To be Signed
- ☐ Please Comment
- ☐ Please See Me
- ☐ Please answer, Sending me Copy of your letter
- ☐ Please Prepare reply for my Signature

Remarks: Test Sgt. Charles Smith

687-6270

X 428

MD Air Nat'l Guard

2701 Eastern Blvd.

Middle River Md.

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies { J. BEAZLEY
BILL PARRISH

VIA: PAUL THOMPSON

TO JK From M. GRIFFEN Date 1.25.85

Subject MARYLAND AIR NATIONAL GUARD - 2701 EASTERN BLVD., MIDDLE RIVER

METHYLENE CHLORIDE
TETRACHLOROETHYLENE
BENZENE
ETHYL BENZENE
} ALL 10 ppb OR LESS DISCOVERED IN

DRINKING WATER WELL AT MD. AIR NATIONAL GUARD FACILITY IN BALTIMORE COUNTY (ADJACENT TO GLENN L. MARTIN STATE AIRPORT - 83-DP-1413). ACCORDING TO TECH. SGT. CHARLES SMITH (687-6720 ext. 428):

1. POST HAS BEEN PLACED ON BOTTLED DRINKING WATER
2. WELL IS LOCATED NEAR AIRPORT PROPERTY LINE - HE CAN'T GO ONTO STATE PROPERTY FOR FURTHER INVESTIGATION.
3. ACID PITS AND DUMP SITE (BOTH ABANDONED) ON MARTIN MARIETTA - CHESAPEAKE PARK (81-DP-0098) PROPERTY.
4. PRIVATE WELLS FOR RESIDENCES ACROSS FROG MORTAR CREEK ARE INSTALLED AT THE SAME DEPTH AS THE ONE ON POST.

ALL ABOVE INFORMATION RECEIVED FROM BILL PARRISH (4249) WHO WOULD LIKE TO BE OUR CONTACT PERSON FOR BALTIMORE COUNTY'S HEALTH DEPT. (JOHN HOBNER - 494-3768) FOR THEIR ASSISTANCE IN WELL LOCATING (EXISTING) AND SAMPLING.

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

VIA: PAUL THOMPSON

TO JOHN KOONTZ From M. GRIFFEN Date 1-25-85

Subject MD. AIR NATIONAL GUARD - 2701 EASTERN BLVD.

METHYLENE CHLORIDE
TETRACHLOROETHYLENE
BENZENE
ETHYL BENZENE

} ALL 10 ppb or LESS

DRAFT

IN DRINKING WATER WELL AT MD. AIR NATIONAL GUARD (ADJACENT TO GLENN L. MARTIN STATE AIRPORT) - DP# 83-DP-1413. ACCORDING TO TECH. SGT. CHARLES SMITH (687-6720 ext. 428), (1) POST HAS BEEN PUT ON BOTTLED DRINKING WATER, (2) WELL IS LOCATED NEAR AIRPORT PROPERTY LINE, (3) HE CAN'T GO ONTO STATE PROPERTY, (3) ACID PITS ON MARTIN MARIETTA CHESAPEAKE PARK. DP# 81-DP-0298 PROPTY. (4) ABANDONED DUMP ON SITE, TOO, (5) PRIVATE WELLS FOR RESIDENCES ACROSS FROG MORTAR CREEK = same DEPTH AS WELL ON POST.

ALL OF ABOVE INFO from BILL PARRISH ( ) who would like to contact Balt Co. (Jno. Hobner 494-3768) for assistance in (1) home sampling (2) well locations map(s).

STATE OF MARYLAND
DEPT. OF HEALTH AND MENTAL HYGIENE

Date 1-24-85

To Mike Griffen

From Butch Oye

- ☐ Please Note & File
- ☐ To be Signed
- ☑ For Your Information
- ☐ Please Comment
- ☑ Please Note & Return
- ☐ Please See Me
- ☐ Please Handle
- ☐ Please answer, Sending me Copy of your letter
- ☐ Please Prepare reply for my Signature

Remarks:

WARREN D. HODGES
THE ADJUTANT GENERAL

STATE OF MARYLAND
MILITARY DEPARTMENT
FIFTH REGIMENT ARMORY
BALTIMORE, MARYLAND 21201-2285
TEL 3366

12 December 1984

RECEIVED
DEC 19 19[illegible]
DEPARTMENT OF HEALTH
AND MENTAL HYGIENE

The Honorable Adele Wilzack
Secretary - Department of
Health and Mental Hygiene
5th Floor - 201 W. Preston Street
Baltimore, Maryland 21201

Dear Secretary Wilzack:

The Military Department, State of Maryland, generates various hazardous waste materials at its approximately 35 armories, installations and facilities located throughout the State. While the amount of waste generated is relatively small, because of the geographical spread of our various facilities, we are faced with a significant problem associated with the collection, segregation, transportation, storage and final disposal of such materials.

In view of the State mission of the National Guard, which is to provide for the protection of the lives and property of the residents of the State in the event of an emergency, the Military Department is acutely aware of its responsibilities in this area. As such, we are desirous of developing and implementing a comprehensive program which will assure proper protection of our environment. To do so, we will need the advice, guidance, cooperation and assistance of your department.

My environmental specialist, Lieutenant David Williams, has been in contact with various members of your staff who have informally agreed to help us in this matter.

This letter is for the purpose of formally requesting your personal support as well as the support of your department in this effort.

If you have any questions or desire further information, please contact me at any time.

Respectfully,

Warren D. Hodges

WARREN D. HODGES
Major General (MdO
The Adjutant General

TO: Secretary (X) Deputy Secretary ( ) DHMH ( ) Governor ( )

Due Date 1-3-85

FROM

Major General Warren Hodges

Letter (X) Other: _____ Date: 12-17

Date Received: KOONT 2

12-19-84-4

SUBJECT:

Hazardous waste storage

ACTION TO BE TAKEN ON CORRESPONDENCE TO:

Governor:

( ) Draft Reply for Gov.'s Signature
( ) Reply for Secretary's Signature
( ) Reply for Your Signature
( ) Please Send _____ Additional Copies To OS:CRU

Secretary and Deputy Secretary:

Reply for (X) Secretary's Signature
( ) Deputy Secretary's Signature
( ) Your Signature
( ) Signature of _____
( ) Handle
( ) Please Send _____ Additional Copies to OS:CRU

Referred to:	Date:	Referred to:	Date:	Referred to:	Date:	Referred to:	Date:
BW AS:EP	12-19	Nelson	12/27				

Reply sent (date)	Acknowledged (date)	Follow-up (date)	Correspondence Information Only ( )

If no answer necessary or phone call was made, please explain (use other side if necessary)

OS:CRU FILE DESIGNATION

Correspondence Control
RECORD COPY-DO NOT REMOVE
DHMH 1044

CROSS FILE

1

Art.
TRACK AC
JK
Butch D

Major General Warren D. Hodges
The Adjutant General
State of Maryland
Fifth Regiment Armory
Baltimore, Maryland 21201-2288

Dear General Hodges:

Thank you for your letter of December 12, 1984 regarding Maryland's Military Department's storage and handling of hazardous waste.

I have requested Mr. Arthur N. Caple of the Waste Management Administration's Hazardous Inspection team to maintain contact with Lieutenant Williams and work closely with your Department to assist you in developing and implementing the comprehensive program you mentioned.

Please be assured of my support for your Department in their effort to handle hazardous wastes in a proper manner.

Sincerely,

AW 1/14/85

Adele Wilzack, R.N., M.S.
Secretary

AW:js

cc: Lieutenant David Williams
Mr. William M. Eichbaum
Mr. Ronald Nelson
Mr. John Koontz
Mr. Arthur N. Caple

OS Official file, 5th floor, O'Conor Bldg.
OS Reading file, 5th floor, O'Conor Bldg.
EP:WAS:J.Koontz:js 1-7-85

AIR TECHNICIAN DETACHMENT
MARYLAND AIR NATIONAL GUARD
2701 EASTERN BOULEVARD
BALTIMORE, MARYLAND 21220

REPLY TO ATTN. OF: DEE

26 December 1984

SUBJECT: **Shipment of Hazardous Waste**

TO: Department of Health and Mental Hygiene
Office of Environmental Programs
ATTN: Harold L. Dye Jr.
201 W. Preston Street
Baltimore, Maryland 21201

In response to site complaint SC-0-85-185 and as required by COMAR 10.51.03.04.D I have attached manifest D-0005B for a HW shipment transported on 14 December 1984.

Scott A. Kearby, Capt, MDANG
Assistant Base Engineer

Atch: Manifest D-0005B

cc: DPDO (John Shafer) w/o atch

RECEIVED
DEC 28 1984
ENFORCEMENT DIVISION

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES
Division of Hazardous Waste Management
P. O. Box 2063
Harrisburg, PA 17120

AC
Rick

ER-SWM-61:Rev 5/84

Please print or type. (Form designed for use on elite (12 pitch) typewriter.) Form Approved. OMB No. 2000-0404 Expires 7-31-86

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: MDD 083501023 — Manifest Document No.: B-00058
2. Page 1 of — Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address: Maryland Air National Guard, 2701 Eastern Blvd., Baltimore, Md. 21220 — Attn. Cpt. Kearby
4. Generator's Phone ( ) 301-687 6270

A. State Manifest Document Number: PAB 00412204
B. State Gen. ID:

5. Transporter 1 Company Name: Eldredge Trucking
6. US EPA ID Number: PAD 014146179
C. State Trans. ID: PA-AH 0056

7. Transporter 2 Company Name:
8. US EPA ID Number:
D. Transporter's Phone: 215 459-1017
E. State Trans. ID: PA-AH

9. Designated Facility Name and Site Address: Delaware Container Co., Inc., West 11th Ave & Valley Rd., Coatsville, Pa. 19320
10. US EPA ID Number: PAD 064375478
F. Transporter's Phone ( )
G. State Facility's ID: Not Required
H. Facility's Phone: 215 383-6400

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. Waste Flammable Liquid NOS UN 1993 (Solvents - Strippers - (Paints) Flammable Liquid	29	DM	1545	G	2001
b. Hazardous Waste Solid NOS NA9189 (Spill Residue) ORM-E	1	DM	500	P	2000
c.					
d.					

J. Additional Descriptions for Materials Listed Above (include physical state and hazard code): a. Liquid- 1; b. Solid; c.; d.

K. Handling Codes for Wastes Listed Above: a.; b.; c.; d.

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national governmental regulations, and all applicable State laws/regulations.

Printed/Typed Name: John [illegible] — Signature: [signature] — Date: Month 12 Day 14 Year 84

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name: [illegible] PARKER — Signature: [signature] — Date: Month 12 Day 14 Year 84

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name: — Signature: [illegible] — Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name: — Signature: — Date: Month Day Year

GENERATOR — TRANSPORTER — FACILITY

PAB 00412204

EPA Form 8700-22 (3-84) COPY 6 - Destination State - Mailed by Generator

In case of an emergency or spill immediately call the National Response Center (800) 424-8802 and the PA DER (717) 787-4343

12-6-94

Art,

I think it imperative that this office meets with DPDO and answer questions regarding handling of materials.

Butch

See Me Art

AIR TECHNICIAN DETACHMENT
MARYLAND AIR NATIONAL GUARD
2701 EASTERN BOULEVARD
BALTIMORE, MARYLAND 21220

RECEIVED
DEC 1 5 19
ENFORCEMENT DIVISION

REPLY TO ATTN. OF: DEE

5 December 1984

SUBJECT: **Site Complaint SC-0-85-185**

TO:
MR. Harold L. Dye, Jr.
Department of Health and Mental Hygiene
Office of Environmental Programs
201 W. Preston Street
Baltimore, Maryland 21201

This is an update on our actions in response to subject site complaint.

1. A copy of the site complaint and request for immediate removal of the HW was sent to the Defense Property Disposal Office on 19 November 1984. A copy of the letter was forwarded to your office.

2. DPDO has informed me that the HW pickup will take place between 10-12 December 1984. We have requested written confirmation and a copy of the message is attached.

3. On 4 December 1984 the contractor made a site visit to inspect and sample the HW scheduled for pickup.

If you have any questions please contact me at 687-6270, extension 222.

Scott A. Kearby, Capt, MDANG
Assistant Base Engineer

Atch: 175 TFG/DEE MSG 05 1454Z

cc: MDANG-DI (Lt Williams)
135 TAG/CC w/o atch
175 TFG/CC w/o atch

JOINT MESSAGEFORM

SECURITY CLASSIFICATION: UNCLASSIFIED

PAGE	DTG/RELEASER TIME			PRECEDENCE		CLASS	SPECAT	LMF	CIC	ORIG/MSG IDENT
	DATE-TIME	MONTH	YR	ACT	INFO					
1 OF 1	05 1454Z	DEC	84	PP		UUUU				

BOOK: NO

MESSAGE HANDLING INSTRUCTIONS:

FROM: 175 TFG MARTIN STATE AIRPORT BALTIMORE MD//DEE//

TO: ABERDEEN PROVING GROUND MD//DPDO//

UNCLAS

SUB: PICKUP OF HAZARDOUS WASTES

1. REQUEST YOU ADVISE THIS OFFICE IMMEDIATELY IF HW PICKUP PREVIOUSLY REQUESTED WILL BE DELAYED PAST 15 DEC 84.

2. WE UNDERSTAND DELIVERY ORDER IS DATED 21 NOV 84 AND CONTRACTOR HAS 30 DAYS TO MAKE PICKUP.

3. ANY PICKUP AFTER 15 DEC 84 DOES NOT MEET TIME LIMIT PRESCRIBED BY SITE COMPLAINT SC-0-85-185.

4. COPY OF THIS MESSAGE HAS BEEN SENT TO MARYLAND DEPT OF HEALTH AND MENTAL HYGIENE.

6 5 4 3 2 1 0

DISTR:

- 135 TAG/175 TFG/CC

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE:
SCOTT A. KEARBY, CAPT, MDANG
ASSISTANT BASE ENGINEER

SPECIAL INSTRUCTIONS:

RELEASER

TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE:
JULIUS F. PRIETO, CMSgt, MDANG

SIGNATURE: Julius Prieto

SECURITY CLASSIFICATION: UNCLASSIFIED

DATE TIME GROUP: 05 1454Z

DD FORM 1 MAR 79 173/1 PREVIOUS EDITION IS OBSOLETE ☆U.S. G.P.O. 1980-320-000/5434

STATE OF MARYLAND

DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS
P.O. BOX 13387
201 W. PRESTON STREET
BALTIMORE, MARYLAND 21203
(301) 383-6650

SITE COMPLAINT

NUMBER	DATE
SC-0- 85-217	12-4-84

1. Name of violator: Defense Logistics Agency; Defense Property Disposal Office
   Address: Aberdeen Proving Ground, Maryland 21005
   County: Harford Phone: 301/278-2235
2. Violation Type (with reference to Maryland Code)
   - ☐ Water Pollution Control and Abatement (Health Environmental Article, Sections 9-301 through 9-344)
   - ☑ Controlled Hazardous Substances (Health Environmental Article, Sections 7-201 through 7-268)
   - ☐ Landfills and Sludge Disposal (Health Environmental Article, Section 9-210)
   - ☐ Other .....
3. Specifically: storage of hazardous waste in violation of COMAR 10.51.02.06 B.
4. The existence of the above-mentioned violation(s) may subject you to prosecution and penalty. Accordingly, you are advised that the folllowing corrective actions are necessary to remedy the violation(s).
   Within 30 days, manage all generated CHS wastes in compliance with those requirements as found in COMAR 10.51.02.06.
5. Continuation of the violation(s) or failure to take the corrective action described above may result in the Department seeking legal sanctions against you, including the imposition of civil and/or criminal penalties.
6. "I hereby acknowledge receipt of this Site Complaint by my signature, which is not an admission of guilt."

Person issued to: C. Judd Baughman Title: PROPERTY DISPOSAL OFFICER

Authorized by: William Eichbaum
Assistant Secretary for
Environmental Programs

Issued by: Harold T. Dye, J.
Inspector

Phone: 301/383-6650

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: CHS Storage Date 12/4/84

Facility Name: Defense Logistics Agency/Defense Property Disposal Office/Aberdeen Proving Ground, Md. 21005

Remarks: Representatives: Mr. Gerald Baughman, DPDO
Mr. John Shafer, DPDO
Mr. Mike Griffen, Waste Management Admin.
Mr. Harold L. Oye, Jr., WMA

Purpose of this inspection and meeting came about as a follow-up to an inspection at Maryland Air National Guard at Martin's Airport in Baltimore County on November 16, 1984. During that inspection, reference was made that the DPDO at Aberdeen Proving Ground had accountability for CHS generated at Martin's Airport Md. Air National Guard facility. Communication between this office (WMA) and DPDO led to this day's meeting and inspection.

Initially, the meeting focused on definition of solid waste and Hazardous waste as defined by COMAR 10.51 (Hazardous Waste Regulations) and the re-cyclable or re-use nature of same. DPDO is charged by the U.S. Department of Defense with the responsibility of accounting for material generated by a facility that is considered no longer useful or useable by various operations at the facility and with re-sale or re-use prior to disposal, if a buyer or user can be found. Items include equipment, desks, and hazardous materials (solvents, paints, miscellaneous photographic developers, herbicides). These hazardous materials may have expired shelf lives or by facility regulation, may no longer be used by the particular operation. By definition under COMAR 10.51.02.06, these hazardous materials meet the Special Requirements for Hazardous Waste Which is Used, Re-used, Recycled, or Reclaimed, and Residues from Emptied Drums.

In the case of those materials which are defined by the hazardous waste characteristics of ignitability, corrosivity, reactivity or EP Toxicity, those wastes, if

Observer: _____ Person Interviewed: _____

DHMH 3879

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: _____ Date 12, 4, 84

Facility Name: DPDO, Aberdeen Proving Ground.

Remarks: re-used, recycled or reclaimed, are not subject to regulation under COMAR 10.51.03 - 10.51.05. (See COMAR 10.51.02.06 A. However, ~~the~~ hazardous wastes which are listed in Regulations 10.51.02.14 - .17 are subject to those requirements with respect to transportation or storage as found in COMAR 10.51.02.06 B.

[Note: Before any material is considered a hazardous waste it must be a solid waste. It is this writer's interpretation, with advice of legal counsel from Md. AAG's office, that the materials in DPDO custody are hazardous wastes as seen under COMAR 10.51.02 B(2): "Has served its original intended use and sometimes is discarded" - can be interpreted as served its period of usefulness.

A tour of 4 warehouses on APG, Buildings 3558, 3560, 3506 and 3511, has found a variety of materials. In particular, in building 3560, 6 drums of 1,1,1-Trichloroethane, and ~~of~~ what appears to be ten 55lb bags of a herbicide. Other items include miscellaneous paints, possible corrosives, ignitables. Most items meet the characteristic hazardous waste criteria, i.e. corrosive, ignitable, EP Toxic or reactive. The 1,1,1-TCE is listed, U226. The herbicide is unknown.

As such, the requirements for storage of recyclable materials as found in COMAR 10.51.02.06 B must be met. Site complaint SC-0-85-217 is being issued.

Due to the unique nature of this DPDO activity, this writer feels that a meeting is indicated in order to identify positions with regard to compliance with the hazardous waste regulations in the State of Maryland.

A copy of this report was left with Mr. Baughman.

Observer: Harold Snipes Jr. Person Interviewed: C. Judd Baughman

DHMH 3879

Region Headquarters:

Defense Property Disposal Region - Columbus

3990 E. Broad St.
Columbus, OH 43215

ATTN: Mr. Don Bowles
DPDR-CRH, Hay. Material Branch
614-236-2171

WMM

B. Dye

AIR TECHNICIAN DETACHMENT
MARYLAND AIR NATIONAL GUARD
2701 EASTERN BOULEVARD
BALTIMORE, MARYLAND 21220

REPLY TO ATTN OF: DEE

19 November 1984

SUBJECT: Hazardous Waste Site Complaint

TO: ~~DCE~~ Glenn 19Nov84
Air Commander
DPDO
IN TURN

1. As a result of a site visit to the Maryland Air National Guard Base, Glenn L. Martin State Airport, 16 November 1984, by the State Department of Mental Health and Hygiene the Defense Property Disposal Office and the Maryland Air National Guard have been jointly issued a site complaint for storage of hazardous waste greater than 90 days without the required permit (see attached site complaint SC-0-85-185).

2. On 10 August 1984 the MdANG requested removal of this HW (see attached letter). On 19 October 1984 John Shafer accepted this material in place. As of 19 November 1984, subject HW is still on site.

3. **Request immediate removal of this material.** Please note the "show cure" date on the site complaint is 15 December 1984.

SCOTT A. KEARBY, Capt, MdANG
Assistant Base Engineer

2 Atch:
1. Site Complaint
2. DEE Letter, 10 Aug 84

cc: Department of Mental Health and Hygiene
ANGSC/DEV
MDNG-DI (LT Williams)
State Airport Manager
J. Leonard Wood
175 TFG/CC

RECEIVED
NOV 23 1984
ENFORCEMENT DIVISION

AIR TECHNICIAN DETACHMENT
MARYLAND AIR NATIONAL GUARD
2701 Eastern Boulevard
Baltimore, Maryland 21220

REPLY TO
ATTN OF DEE

10 August 1984

SUBJECT Request for Hazardous Waste Disposal

TO DPDO-XPF
Aberdeen Proving Ground

1. I am enclosing disposal turn-in documents, DD 1348-1, for the items listed below:

Waste	Federal Stock Number	Container	Quantity
Methanol	6810-00-224-8353	1 ea 55 Gal Drum	20 Gal
Trichloroethane	6810-00-664-0387	2 ea 5 Gal Can	10 Gal
PD680	6850-00-281-1968	6 ea 55 Gal Drum	300 Gal
Paint Stripper	8010-01-040-1059	3 ea 55 Gal Drum	150 Gal

2. Request that these items be scheduled for pick-up at the earliest opportunity. In order to maintain our small generator status we must not store HW for longer than 90 days.

SCOTT A. KEARBY, Capt., MdANG
Assistant Base Engineer

Atch: DD 1348-1

cc: Base Supply w/o atch

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

TO T. BATTLE From M. GRIFFEN Date 11.19.84

Subject MARYLAND AIR NATIONAL GUARD
2701 EASTERN BLVD.
MARTIN STATE AIRPORT
BALTIMORE, MD. 21220
(301) 687-6270 ext. 222

Tom; Captain Scott A. Kearby, Asst. Base Engineer, and T-Sgt. Chuck Smith would like to be put on your list for periodic mailings of regulation changes, etc. as well as an up to date copy of COMAR, since our 11.16.84 inspection promoted them from small quantity generator status to generator status.

STATE OF MARYLAND • DEPARTMENT OF HEALTH AND MENTAL HYGIENE

MEMORANDUM

Copies

TO Art Caple From M. Griffey Date 11-19-84

Subject Maryland Air National Guard / Defense Property Disposal Office

2701 Eastern Blvd.
Martin State Airport
Balt. Md. 21220
(301) 687-6270 ext. 222

Art, as a result of the joint inspection of this facility by Butch Dye and myself on Friday, 11-16-84, it appears that if this facility can transfer (albeit on paper) all of its CHS to DPDO-Aberdeen while the material remains at the Air National Guard facility, then this site needs a TSD facility permit for DPDO.

11/19/84

Butch, what happens next as a result of your visit?

Art

STATE OF MARYLAND

DEPARTMENT OF HEALTH AND MENTAL HYGIENE
OFFICE OF ENVIRONMENTAL PROGRAMS
P.O. BOX 13387
201 W. PRESTON STREET
BALTIMORE, MARYLAND 21203
(301) 383-6650

SITE COMPLAINT

NUMBER	DATE
SC-0- 85-185	11-16-84

1. Name of violator: Defense Property Disposal Office/MD Air National Guard
   Address: 2701 Eastern Blvd.; Martin State Airport; Balto., Md. 21220
   County: Baltimore Phone: 301/687-6270 Ext. 222
2. Violation Type (with reference to Maryland Code)
   - ☐ Water Pollution Control and Abatement (Health Environmental Article, Sections 9-301 through 9-344)
   - ☑ Controlled Hazardous Substances (Health Environmental Article, Sections 7-201 through 7-268)
   - ☐ Landfills and Sludge Disposal (Health Environmental Article, Section 9-210)
   - ☐ Other .....
3. Specifically: Storage of hazardous waste greater than 90 days without a Hazardous Waste Storage Permit; violation of generator storage requirements for containers as found in COMAR 10.51.03.06 E.
4. The existence of the above-mentioned violation(s) may subject you to prosecution and penalty. Accordingly, you are advised that the folllowing corrective actions are necessary to remedy the violation(s).
   ① within 30 days, remove all hazardous waste stored greater than 90 days to a facility that is permitted to accept CHS for treatment, storage or disposal. ② Immediately begin storing containers in compliance with COMAR 10.51.03.06E including those requirements as found in COMAR 10.51.05.09, and/or apply for CHS storage permit.
5. Continuation of the violation(s) or failure to take the corrective action described above may result in the Department seeking legal sanctions against you, including the imposition of civil and/or criminal penalties.
6. "I hereby acknowledge receipt of this Site Complaint by my signature, which is not an admission of guilt."

Person issued to: Scott A. Kearney (Scott A. Kearney) Title: Asst. Base Engr.

Authorized by: William Eichbaum
Assistant Secretary for
Environmental Programs

Issued by: Harold F. Wyatt, Jr.
Inspector

Phone: 301/383-6650

DHMH 4158

State of Maryland
Department of Health and Mental Hygiene
Office of Environmental Programs
201 West Preston Street, Baltimore, Maryland 21201

Report of Observations

Type of Inspection/Observations: CHS spill Date 11/16/84

Facility Name: Maryland Air National Guard

Remarks: 2701 Eastern Blvd.
Martin State Airport
Baltimore Md. 21220
687-6290 ext. 222

This writer and Harold L. Dye of Maryland Waste Management Administration met Capt. Scott Kerby and T-SGT. Chuck Smith on site to investigate reported spill of ≈20 gallons paint stripper.

At ≈1000 hrs. on 11.15.84 representatives of the base fire company noticed a leak in the underside seam of the heated bath used to strip/degrease aircraft equipment. Sorbent material was immediately used to arrest flow of spillage. Spilled material and remaining material in vat was placed in two 55 gal. drums and removed to secured drum storage area.

Spilled material was adequately cleaned up and material was confined to macadam parking area which remained impervious to spillage.

Site complaint #SC-0-85-185 issued for storage of hazardous wastes in excess of 90 days and generator storage requirements for containers.

Current and upcoming COMAR regulations discussed and copies will be delivered to this site.

Observer: M. Gaffney, H.L. Dye, Sr. Person Interviewed: Col. Shero, Capt Kerby, T-Sgt. Smith

DHMH 3879

AIR TECHNICIAN DETACHMENT
MARYLAND AIR NATIONAL GUARD
2701 EASTERN BOULEVARD
BALTIMORE, MARYLAND 21220

REPLY TO
ATTN. OF: DEE

16 November 1984

SUBJECT: Spill Incident Report

TO: Maryland State Department of Health and Mental Hygiene
ANGSC/DEV
J. Leonard Wood, Airport Manager
MDNG-DI (Lt Williams)

1. Place: Maryland Air National Guard
Martin State Airport
2701 Eastern Blvd.
Baltimore, MD 21220

2. Date: 15 NOV 84

3. Time: 1000 HRS

4. Amount and Type of Material: Approximately 20 gallons of paint remover, FSN 8010-01-040-1059 (see MSDS attached).

5. Circumstances: The MDANG operates a paint stripping facility to remove paint from wheels and other metal aircraft parts. The facility consists of a stripping vat enclosed in a shed. A seam on the bottom of the paint stripping vat had deteriorated with age and the seam split, leaking the paint stripper onto the pavement.

6. Containment, Removal and Cleanup Operations: (See attached spill incident log.) The spill was completely contained on the pavement and absorbed with SORBOL. The SORBOL spill residue was placed into 55 gallon drums. Personnel performing clean up operations were equipped with respirators, coveralls and rubber gloves. The spill residue will be diposed of as a hazardous waste through the Defense Property Disposal Office, Aberdeen Proving Ground, Maryland.

7. Follow Up Action: The paint stripping vat has been removed from service and will be cleaned of all sludges and residual paint remover and turned into DPDO. Two new stripping vats have been on hand since July, 1984 and the design of a facility to house them is 95% complete with construction planned for Spring, 1985.

8. If additional information is needed, please contact me at (301) 687-6270, ext 222.

SCOTT A. KEARBY, Capt, MdANG
Assistant Base Engineer

2 Atch
1. MSDS
2. Spill Incident Log

cc: 135 TAG/CC
175 TFG/CC
Fire Department
Clinic/SGPB
175 CAMS

N S N	FSCM	NCGR	F P IND	PN IND	* * * HAZARDOUS ITEM BASIC PUBLICATION * * * PART NUMBER/TRADE NAME	ACT CD	DATE	PAGE NR
8010-01-040-1059	61102		G	A	TURCO 6433			1

* * * * GENERAL INFORMATION * * * *

PROPRIETARY NO

MANUFACTURER: TURCO PRODUCTS, INC.

EMERGENCY TELE NO: 213-634-3300

ITEM NAME

UI | UI CONTAINER QTY | TYPE OF CONT | NET UNIT WT | MAG/MILGAUS | EXEMPTION NO

AEROSOL PROPELLANT

RADIOACTIVITY | FORM | TR GP | NRC LIC NUMBER | CHEMICAL NAME | CHEMICAL FAMILY | SPECIFICATION | FORMULA

* * * * * HAZARDOUS COMPONENTS * * * * *

NIOSH NO	CHEMICAL NAME	PCT	T L V
KX3850000	PERCHLOROETHYLENE		
1000089A8	AROMATIC PETROLEUM SOLVENT		
KJ5775000	MONOETHANOLAMINE		
QA5075000	SODIUM MOLYBDATE		

* * * * * * TRANSPORTATION DATA * * * * * *

DOT SHIPPING NAME:

CLASS: LABEL: MODE: ID NO: RQ:

WATER SHIPPING NAME:

CLASS: LABEL: UN NO: UN CLASS: COM GP: DOT: IMCO

TARIFF 6-D SHIPPING:

CLASS: LABEL:

IATA SHIPPING NAME:

CLASS: LABEL: IATA ARTICLE NO:

AFR 71-4 SHIPPING NAME:

CLASS: LABEL: HMAC:

* * * * * * ADDITIONAL DATA * * * * * *

D 6

NSN		ACT CD	DATE	PAGE NR
8010-01-040-1059	* * * * HEALTH AND PHYSICAL PROPERTY DATA * * * *		81324	2

BOILING POINT	VAP DEN/AIR=1/	SOL IN H2O	FLASH POINT	VAP PRESS/MM HG/70 F/	TLV-MIXTURE	STORAGE CODE
>100/>212	>1	MODERATE		20		

APPEARANCE AND ODOR	LEL/PCT/	UEL/PCT/	SP GR	PCT VOLT BY VOL	EVAP RATE PER REFERENCE
2 LAYER THIN AMBER LIQUID;CHLORINATED SOLBENT ODOR			1.28	30	BUTYL ACETATE=1:<1

EFFECTS OF OVEREXPOSURE — NET PROP WT-AMMO — NET LB

INHAL:DIZZY,HEADACHE,INTOXICATION.MILD TO SEVERE SKIN AND EYE IRRITANT

STABLE	CONDITIONS TO AVOID	MATERIALS TO AVOID
YES		STRONG OXIDIZING AGENTS

HAZ POLYMERIZATION OCCUR	CONDITIONS TO AVOID	AUTO IGN TEMP	VISCOSITY	CG AMDO CD
NO				

HAZARDOUS DECOMPOSITION PRODUCTS

TOXIC OXIDES OF CARBON AND CHLORINE(CO,PHOSGENE,ETC.)

* * * * SAFETY STORAGE HANDLING AND FIRE FIGHTING PROCEDURES * * * *

EXTINGUISHING MEDIA

CARBON DIOXIDE,FOAM

SPECIAL FIRE FIGHTING PROCEDURES

USE SELF-CONTAINED RESPIRATORY APPARATUS.

UNUSUAL FIRE / EXPLOSION HAZARDS

THERMAL DECOMPOSITION MAY PRODUCE TOXIC OXIDES OF CARBON AND CHLORINE

PROTECTIVE GLOVES

NEOPRENE

EMERGENCY FIRST AID PROCEDURES

INHAL:MOVE TO FRESH AIR.GIVE OXYGEN IF NEEDED.EYES:FLUSH W/WATER FOR 15 MIN. SKIN:REMOVE CONTAMINATED CLOTHES,WASH W/SOAP AND WATER.INGEST:DO NOT INDUCE VOMIT.DILUTE BY GIVING MILK OR WATER.CALL DR.

TYPE OF RESPIRATORY PROTECTION

APPROPRIATE SELF-CONTAINED BREATHING APPARATUS.

VENTILATION

LOCAL EXHAUST

EYE PROTECTION

GOGGLES-RUBBER FRAMED

OTHER PROTECTIVE EQUIPMENT

NEOPRENE BOOTS AND APRON.

HANDLING / STORAGE PRECAUTIONS

USE CARE IN OPENING DRUMS TO AVOID SPU
RTING OF CONTENTS.

* * * * SPILL AND LEAK PROCEDURES * * * *

SPILL AND LEAK CONTROL

CONTAIN SPILLAGE,VENTILATE AREA.WIPE UP OR ABSORB SPILLABE ONTO ABSORBENT MATERIAL.RECOVER IN DRUMS FOR DISPOSAL.

WASTE ELIMINATION

1. LANDFILL UNDER APPLICABLE FEDERAL,STATE,AND LOCAL REGULATIONS. 2.BURN IN CHEM.FURNACE W/APPROPRIATE FUME SCRUBBING SYSTEM. 3.TRANSFER TO RECLAIMING CENTER FOR SOLVENT RECOVERY.

OTHER PRECAUTIONS

VAPORS FROM THIS PRODUCT ARE HEAVIER THAN AIR AND WILL TRAVEL AL
ONG THE GROUND TO COLLECT IN LOW-LYING AREAS.USE APPROPRIATE PRE
CATIONS.

SUPPLEMENTAL DATA

DRUMS EXPOSED TO EVEN MODERATE HEAT MAY DEVELOP SUFFICIENT INTER
NAL PRESSURE TO RUPTURE.CAN BE ABSORBED THROUGH SKIN IN TOXIC AM
TS.

SPILL INCIDENT LOG

1. 15 NOV 84 1000 — The Fire Department discovered paint remover (NSN 8010-01-040-1059, MFG: TURCO) leaking from the wheel stripping vat near bldg 1050. Members of the Fire Department immediately diked the puddle on the pavement with SORBOL and notified TSGT C. Smith, BioEnviromental Tech. Paint remover was contained on pavement (approx 6" asphalt). Estimated quantity of spill was 20 gallons.

2. 15 NOV 84 1000 — TSGT Smith notified the 175 CAM/FMS supervisors, SMS Swegon and SMS Pennington.

3. 15 NOV 84 1050 — TSGT Smith notified Civil Engineering.

4. 15 NOV 84 1016 — CE personnel dispatched as spill control team.

5. 15 NOV 84 1030 — CE spill team assembled on site, began gathering required equipment.

6. 15 NOV 84 1130 — Capt Kearby notified Debbie Ford, State Department of Health and Mental Hygiene.

7. 15 NOV 84 1132 — Capt Kearby notified MDNG-DI, 5th Regiment Armory (Lt Williams was not in).

8. 15 NOV 84 1219 — Clean up operations complete. All SORBOL spill residue packed into 55 gallon drums.

9. 15 NOV 84 1225 — LtCol Shero notified Command Post/Ops of incident and status.

10. 15 NOV 84 1450 — Capt Kearby received call from Michael Griffen, State Department of Mental Health and Hygiene, asking for further details about the spill incident.

Scott A. Kearby, Capt, MDANG
Assistant Base Engineer

IN THE MATTER OF:

Glenn L. Martin State Airport

SERVE ON:

Mr. T. James Truby, Administrator
State Aviation Administration
Post Office Box 8766
BWI Airport
Baltimore, Maryland 21240

-and-

Mr. John M. Porter, Manager
State Aviation Administration
Glenn L. Martin State Airport
Post Office Box 1
Middle River, Maryland 21220

* SECRETARY OF HEALTH AND MENTAL HYGIENE

* OFFICE OF ENVIRONMENTAL PROGRAMS
201 West Preston Street
Baltimore, Maryland 21201

C-O-82-066

COMPLAINT AND ORDER

Whereas, the State of Maryland, Department of Health and Mental Hygiene, Office of Environmental Programs, pursuant to the powers, duties and responsibilities vested in and imposed upon the Secretary of Health and Mental Hygiene, by the provisions of Article 43, Section 1F, 388, 391 and 394, Annotated Code of Maryland, has conducted an inspection at the Glenn L. Martin State Airport located in Middle River, Baltimore County, and

Whereas, the Office of Environmental Programs pursuant to its inspection has determined that the State Aviation Administration is disposing of solid waste, in an open dump, consisting of demolition debris, wood, brush, trash and construction debris at the above-mentioned property, and

Whereas, the State Aviation Administration has failed to obtain a valid Refuse Disposal Permit from the Office of Environmental Programs for said disposal operation, and

Whereas, the above-cited conditions, caused by the State Aviation Administration constitute a violation of Article 43, Section 394(a) and COMAR 10.17.11.03(B).

Therefore, it is this _____day of _____, 1981, ORDERED by the Assistant Secretary for Environmental Programs

that the State Aviation Administration shall:

1) Cease and desist further refuse disposal activity at the aforementioned site unless authorized by a valid Refuse Disposal Permit;

2) By _____, 1981, remove and properly dispose of all refuse accumulated at the aforementioned site, to a permitted sanitary landfill.

This Order may be appealed in accordance with the Administrative Procedure Act, Article 41, Section 244, et seq., Annotated Code of Maryland, by filing within 10 days of receipt of this Order, a Notice of Intent to Appeal and a Request for Hearing, if desired, with the Chief Hearing Officer, William O. Jensen, Jr., 201 West Preston Street, Baltimore, Maryland 21201. The notice of appeal shall contain any ground upon which you contend that the Order is unlawful, unreasonable or unnecessary for protection of the public health or welfare.

_____
DATED

William M. Eichbaum
Assistant Secretary for
Environmental Programs

Approved as to form and legal sufficiency this 2nd day of October, 1981.

Charles R. Taylor, Jr.
Assistant Attorney General

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Baltimore MD 21230
MDE 410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

October 22, 2010

2003 RGC 5734/
2010 RGC 8019

Mr. Andy Hagan
Northrup Grumman Support Services Group
701 Wilson Point Road, Box 4
Baltimore, MD 21220

Dear Mr. Hagan:

Enclosed is Maryland General Scrap Tire Collection Facility License No. **2010-RGC-08019**, which authorizes the accumulation of **no more than fifty (50)** scrap tires at any one time at 701 Wilson Point Road, Box 4, in Baltimore, Baltimore County, as specified in your application of July 13, 2010.

To operate this facility, and to avoid a violation of this license, please have all scrap tire haulers who remove scrap tires from this facility (current or planned) show you their current Maryland license prior to providing services. Also, you should verify that the site to which your scrap tires are being taken is a facility licensed or approved by the Maryland Department of the Environment (the "Department") by obtaining their license number. In addition, if you are currently hauling your own scrap tires or intend to do so in the future, you must also have a Scrap Tire Hauler License.

Please note that this license is subject to the enclosed terms and conditions. This license may be appealed by filing a written request for a hearing within thirty (30) days of receipt of this license. The request should be addressed to Mr. Horacio Tablada, Director, Land Management Administration, at the Department's address. You will subsequently be contacted regarding a hearing date. All license hearings will be conducted in accordance with the Administrative Procedure Act. If no appeal is received within the specified time period, this will constitute acceptance of the terms and conditions of this license.

For further information, please contact Ms. Linda Gustafson, Scrap Tire Unit at (410) 537-3143.

Sincerely,

Hilary D. Miller

Hilary D. Miller, Program Manager
Technical Services and Operations Program

HDM:LG:lg

Enclosure
cc: Mr. Horacio Tablada
Mr. Brian Coblentz

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Martin O'Malley
Governor

Land Management Administration • Technical Services and Operations Program
1800 Washington Boulevard, Suite 610 • Baltimore, Maryland 21230-1719
410-537-3314 • 800-633-6101 x3314 • www.mde.state.md.us

MDE
Shari T. Wilson
Secretary

General Scrap Tire Collection Facility License
Number: 2010-RGC-08019

ISSUE DATE: October 22, 2010
EXPIRATION DATE: No Expiration Date

LICENSEE: Northrup Grumman Support Services Group

LOCATION: 701 Wilson Point Road, Box 4, Baltimore, MD 21220

AUTHORIZING: The accumulation of **no more than fifty (50)** scrap tires at any one time, and as specified in your application of July 13, 2010.

This license is issued pursuant to the provisions of Title 9 of the Environment Article, Annotated Code of Maryland, and regulations promulgated thereunder, and are subject to the attached terms and conditions, and compliance with all applicable laws and regulations.

Horacio Tablada, Director
Land Management Administration

LICENSE CONDITIONS:

1. The licensee may only accumulate **no more than fifty (50)** scrap tires at any one time at this facility, as specified in this facility's General Scrap Tire Collection Facility License Application. If there are any discrepancies between this license and the application, the terms and conditions of this license will take precedence.

2. Only scrap tire haulers licensed by Maryland Department of the Environment (the "Department") shall be used to transfer scrap tires.

3. Scrap tires shall only be transferred to the primary or secondary scrap tire collection facilities, scrap tire recycling facilities, or other facilities licensed or approved by the Department.

4. The licensee shall not operate this facility in a manner likely to:

   a. Create a nuisance;

   b. Be conducive to insect and rodent infestation;

   c. Cause a discharge of any constituents derived from scrap tires into the air unless otherwise permitted by the Department;

   d. Cause a discharge of any constituents derived from scrap tires into waters of this State unless otherwise permitted by the Department;

   e. Impair the quality of the environment; or

   f. Create other hazards to the public health, safety, or comfort as may be determined by the Department.

5. The following fire protection standards shall be followed:

   a. Combustibles shall not be stored in the area where scrap tires are being collected; and

   b. Potential ignition sources such as cutting, welding, and heating devices, open fires, etc., shall be prohibited in the scrap tire collection area.

6. The licensee shall inform the Department in writing within 30 days following a business name change, change in ownership or form of business organization, or any other change that affects the license.

7. The licensee shall maintain, for a period of three (3) years, records of all scrap tires entering or exiting this facility. The records shall include, at a minimum, the following information:

   a. The total type and quantity of scrap tires, by number or weight, that were received or generated at this facility;

   b. The total type and quantity of scrap tires, by number or weight, that were transferred from this facility;

c. The total type and quantity of scrap tires, by number or weight, that remained at this facility;

d. The name and identification number of each hauler transferring scrap tires from this facility. The type and quantity of scrap tires must be identified (by number or weight) for each transaction, including tires separated and removed for retreading. The destination of the scrap tires transported by each hauler must also be maintained; and

e. The semi-annual reports specified in General Condition 8.

8. The licensee shall submit to the Department a semi-annual report containing the information described in General Condition 7. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period.

9. This licensee shall not be transferred to new owners unless the following conditions are met:

a. A written request for the transfer is submitted to the Department. The request shall indicate the reason for the requested transfer and be signed by the individuals holding and seeking the license;

b. The new owner shall complete a General Scrap Tire Collection Facility License Application. The completed application shall be submitted with the request; and

c. The Department determines that the proposed transfer of the license would not affect present or future compliance with State or federal laws and regulations.

10. If the licensee discovers through any means, including notification by the Department, that noncompliance with a condition of the license has occurred, the licensee shall immediately take all necessary steps to eliminate the condition of noncompliance and to minimize the adverse impact on public health, safety, welfare, or the environment

11. If the licensee discovers that a noncompliance with a condition of the license has affected the public health, safety, welfare, or the environment, the licensee shall immediately notify the Department at (410) 537-3315.

12. If a person who does not possess a Scrap Tire Hauler License, and who is not exempted under Code of Maryland Regulations (COMAR) 26.04.08.04A(2), attempts to deposit scrap tires at the facility covered by this license, the licensee shall refuse to accept the scrap tires offered by the said person, and shall notify the Department within one week of occurrence, the person's name, license plate number and state of issuance for the vehicle used to haul scrap tires. A person is exempted under COMAR 26.04.08.04A(2) if the person transports not more than five (5) scrap tires annually.

13. This license may be suspended or revoked upon a final, unreviewable determination that the licensee lacks, or is in violation of, any federal, State or local approval necessary to conduct the activity authorized by this license.

MDE
MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
(410) 537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. .Philbrick
Acting Secretary

October 27, 2003

Mr. Dan Franco
Northrop Grumman Systems Corporation
701 Wilson Point Road, Box 4
Baltimore MD 21220

Dear Mr. Franco:

Enclosed is the Maryland General Scrap Tire Collection Facility License No. **2003-RGC-05734**, which authorizes the accumulation of **no more than fifty (50)** scrap tires at any one time at 701 Wilson Point Road, Martin State Airport, Hangar 5 in Baltimore County, as specified in your application of September 26, 2003.

To operate this facility, and to avoid violation of this license, please have all scrap tire haulers who remove scrap tires from this facility (current or planned) show you their current Maryland license prior to providing services. Also, you should verify that the site to which your scrap tires are being taken is a facility licensed or approved by the Maryland Department of the Environment (the "Department") by obtaining their license number. In addition, if you are currently hauling your own scrap tires or intend to do so in the future, you must also have a Scrap Tire Hauler License.

Please note that this license is subject to the enclosed terms and conditions. This license may be appealed by filing a written request for a hearing within thirty (30) days of receipt of this license. The request should be addressed to Mr. Jonas A. Jacobson, Director, Waste Management Administration, at the Department's address. You will subsequently be contacted regarding a hearing date. All license hearings will be conducted in accordance with the Administrative Procedure Act. If no appeal is received within the specified time period, this will constitute acceptance of the terms and conditions of this license.

For further information, please contact Mr. Riyaz A. Kazi, Project Manager at (410) 537-3315.

Sincerely,

Edward M. Dexter, Administrator
Solid Waste Program

EMD:RAK:af
Enclosure
cc: Mr. Jonas A. Jacobson

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Robert L. Ehrlich, Jr.
Governor

Waste Management Administration
Solid Waste Program
1800 Washington Boulevard, Suite 605, Baltimore, Maryland 21230-1719

MDE

Kendl P. Philbrick
Acting Secretary

General Scrap Tire Collection Facility License

No. 2003-RGC-05734

ISSUE DATE: October 27, 2003 ***(NO EXPIRATION DATE)***

Issued to: Northrop Grumman Systems Corporation

Authorizing: the accumulation of **no more than fifty (50)** scrap tires at any one time, and as specified in your application of September 26, 2003

At: 701 Wilson Point Road, Martin State Airport, Hangar 5, Baltimore County, MD 21220.

This license is issued pursuant to the provisions of Title 9 of the Environment Article, Annotated Code of Maryland, and regulations promulgated thereunder, and is subject to the attached terms and conditions, and compliance with all applicable laws and regulations

Edward M. Dexter, Administrator
Solid Waste Program

Jonas A. Jacobson, Director
Waste Management Administration

LICENSE CONDITIONS:

1. The licensee may only accumulate **no more than fifty (50)** scrap tires at any one time at this facility, as specified in this facility's General Scrap Tire Collection Facility License Application. If there are any discrepancies between this license and the application, the terms and conditions of this license will take precedence.

2. Only scrap tire haulers licensed by Maryland Department of the Environment (the "Department") shall be used to transfer scrap tires.

3. The licensee shall comply with all applicable State, local government, and federal laws and regulations.

4. Scrap tires shall only be transferred to the primary or secondary scrap tire collection facilities, scrap tire recycling facilities, or other facilities licensed or approved by the Department.

5. If the licensee discovers through any means, including notification by the Department, that noncompliance with a condition of the license has occurred, the licensee shall immediately take all necessary steps to eliminate the condition of noncompliance and to minimize the adverse impact on public health, safety, welfare, or the environment.

6. If the licensee discovers that a noncompliance with a condition of the license has affected the public health, safety, welfare, or the environment, the licensee shall immediately notify the Department at (410) 537-3315.

7. The licensee shall inform the Department in writing within 30 days following a business name change, change in ownership or form of business organization, or any other change that affects the license.

8. If a person who does not possess a Scrap Tire Hauler License, and who is not exempted under Code of Maryland Regulations (COMAR) 26.04.08.04A(2), attempts to deposit scrap tires at the facility covered by this license, the licensee shall refuse to accept the scrap tires offered by the said person, and shall notify the Department within one week of occurrence, the person's name, license plate number and state of issuance for the vehicle used to haul scrap tires. A person is exempted under COMAR 26.04.08.04A(2) if the person transports not more than five (5) scrap tires annually.

9. The licensee shall not operate this facility in a manner likely to:

   a. create a nuisance;

   b. be conducive to insect and rodent infestation;

   c. cause a discharge of any constituents derived from scrap tires into the air unless otherwise permitted by the Department;

   d. cause a discharge of any constituents derived from scrap tires into waters of this State unless otherwise permitted by the Department;

   e. impair the quality of the environment; or

   f. create other hazards to the public health, safety, or comfort as may be determined by the Department.

10. The licensee shall maintain, for a period of three (3) years, records of all scrap tires entering or exiting this facility. The records shall include, at a minimum, the following information:

    a. the total type and quantity of scrap tires, by number or weight, that were received or generated at this facility;

    b. the total type and quantity of scrap tires, by number or weight, that were transferred from this facility;

    c. the total type and quantity of scrap tires, by number or weight, that remained at this facility;

    d. the name and identification number of each hauler transferring scrap tires from this facility. The type and quantity of scrap tires must be identified (by number or weight) for each transaction, including tires separated and removed for retreading. The destination of the scrap tires transported by each hauler must also be maintained; and

    e. the semi-annual reports specified in General Condition 11.

11. The licensee shall submit to the Department a semi-annual report containing the information described in General Condition 10. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period. The reports shall be submitted on copies of the form attached to this license or be in this format and contain the information described in General Condition 10.

12. This license shall not be transferred to new owners unless the following conditions are met:

    a. a written request for the transfer is submitted to the Department. The request shall indicate the reason for the requested transfer and be signed by the individuals holding and seeking the license;

    b. the new owner shall complete a General Scrap Tire Collection Facility License Application. The completed application shall be submitted with the request; and

    c. the Department determines that the proposed transfer of the license would not affect present or future compliance with State or federal laws and regulations.

13. The following fire protection standards shall be followed:

    a. combustibles shall not be stored in the area where scrap tires are being collected; and

    b. potential ignition sources such as cutting, welding, and heating devices, open fires, etc., shall be prohibited in the scrap tire collection area.

14. Nothing in this license authorizes the establishment or the operation of this facility when in violation of any local, State, or federal laws and regulations.

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Land Management Administration • Waste Diversion and Utilization Program

1800 Washington Boulevard • Suite 610 • Baltimore, Maryland 21230-1719

410-537-3314 • 800-633-6101 x3314• 410-537-3321 fax • http://www.mde.state.md.us

Semi-Annual Scrap Tire Collection Facility Report

**Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.* Please print.

RECEIVED
JAN 08 2013
Land Management Administration

(✓) REPORTING PERIOD: ____ January 1 – June 30
✓ July 1 – December 31

FILL IN REPORTING YEAR: 2012

Your Facility Owner's Name: _____ *Your Collection Facility License No.:* 2010 RGC0S019

Your Mailing Address: _____

City: _____ *County:* _____ *State:* _____ *Zip:* _____

Your Facility's Name: Northrop Grumman TS *Contact Person's Name:* MARK FALICA

Your Facility's Location Address: 701 Wilson point rd, Box 4

City: Baltimore *County:* Baltimore city *State:* MD *Zip:* 21220

Telephone No.: (410) 238 - 4316 *Facsimile No.:* (410) 918 - 0322

SECTION 1: Receiving/Generating Report - Incoming Scrap Tire Information

Check (✓) Scrap Tire Generation/Receiving Source: ☑ Your Facility ☐ Customers ☐ Other

If you checked "Other", complete SECTION 3 on the reverse side.

SECTION 2: Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Destination Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
Emanual	2008-RTH-07066	Aircraft	Emanuel Tire Co 1300 moreland Ave Baltimore MD	2010-RTR-00042	44	0.0100
				TOTAL	44	0.0100

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 2

PLEASE ATTACH ADDITIONAL PAGES IF NECESSARY

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Mark F — Signature

MARK FALICA — Print Name

8 Jan 2013 — Date

If you checked "Other" in SECTION 1 on the front page, complete SECTION 3 below:

SECTION 3: Receiving/Generating Report - Incoming Scrap Tire Information				
Scrap Tire Generation/Receiving Source	**Maryland Scrap Tire Hauler's License No. (If applicable)**	**Scrap Tire Type (Passenger, Truck)**	**Scrap Tire Quantity**	**Scrap Tire Weight (Tons)**
		TOTAL		

RECEIVED
JAN 08 2013
Land Management Administration

PLEASE ATTACH ADDITIONAL PAGES IF NECESSARY

INSTRUCTIONS FOR COMPLETING REPORT

SECTION 1:

1. Check the box indicating the source of the scrap tires collected at your facility.
2. If you checked "Your Facility" or "Customers", you do not need to complete SECTION 3.
3. If you checked "Other", you must complete SECTION 3.
4. Proceed to SECTION 2.

SECTION 2:

1. List the name and license number of the scrap tire hauler who removed scrap tires from your facility.
2. List the type of scrap tires removed.
3. List the place of where the hauler took the scrap tires. ***This is very important!*** *Be sure the hauler tells you where your scrap tires are being delivered and the Maryland scrap tire license/approval number of that destination.* If the scrap tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. List by quantity or tons how many scrap tires were removed from your facility.
5. If no scrap tires were hauled from your facility, write **"None"** or **"0"** in the TOTAL Scrap Tire Quantity box.

SECTION 3:

1. List where the scrap tires came from:
   - A. If from haulers, please list the haulers' names and their Maryland Scrap Tire Hauler License numbers in the appropriate boxes.
   - B. If from individuals hauling less than 5 scrap tires, please write **"Private"** in the **Source** column; and **"None"** in the **License Number** boxes. If you receive scrap tires from many individuals, group them as a single entry.
   - C. If the scrap tires are generated from your business, write **"Company"** in the **Source** column, and your license number in the **License Number** column.
2. List the type of scrap tires (i.e. passenger, truck) collected at your facility.
3. List by quantity or tons how many scrap tires were collected at your facility.
4. If no scrap tires were collected during this period, write **"None"** or **"0"** in the TOTAL Scrap Tire Quantity box.

SIGNATURE:

You must sign your name, print your name, and date the report at the bottom of the front page of this report.

FAX COMPLETED REPORT TO:

410-537-3321

OR

MAIL COMPLETED REPORT TO:

MARYLAND DEPARTMENT OF THE ENVIRONMENT
WASTE DIVERSION AND UTILIZATION PROGRAM
Semi-Annual Scrap Tire Report
1800 Washington Boulevard, Suite 610
Baltimore, Maryland 21230-1719

Valerie Norman - Semi-Annual Scrap tire Collection Facility Report

From: "Falica, Mark (TS)" <Mark.Falica@ngc.com>
To: "vnorman@mde.state.md.us" <vnorman@mde.state.md.us>
Date: 1/8/2013 3:21 PM
Subject: Semi-Annual Scrap tire Collection Facility Report
CC: "Falica, Mark (TS)" <Mark.Falica@ngc.com>, "Hagan, Andrew H (TS)" <andre...
Attachments: img-108145030-0001.pdf; img-108145021-0001.pdf

Hi Valerie,

Thank you for your help over the phone.

I would like to cancel the General Scrap Tire Collection facility license No 2009-RGC-07711 as we only have one collection point for both hangars. Please amend 2010-RGC-08019 License to read hangar 2 as this is where we store our tires.

I have attached both tire collection forms. If there is any more information you need from me or I if I need to correct the forms please let me know and I will do so.

Again thank you for your help

Mark

Mark Falica
Environmental Health & Safety Analyst
Northrop Grumman Technical Services
701 Wilson Point Road
Middle River, MD 20220
(410)-238-4316

MEMORANDUM

Waste Diversion & Utilization Program
Scrap Tire Unit

8614

To: Tony Emanuel

From: Valerie Norman ext. 3952

Thru: Abigail Pascual ext. 3334

Subject: Updating Existing Agency Interest (AI)

Date: January 9, 2013

Please update the existing AI for the enclosed ***Scrap Tire Facility:***

Agency Interest (AI#):	9113
Current Master AI Name:	Northrop Grumman Technical Services
Current Facility Address:	701 Wilson Point Rd., Baltimore, MD 21220
Current Mailing Address:	Same as above
New Master AI Name:	Northrop Grumman Technical Services
New Facility Address:	701 Wilson Point Rd., Lower Hanger 2
New Mailing Address:	701 Wilson Point Rd, Box 4 Baltimore, MD 21220
Comments:	

	Related Organization	**Related People**
Name: 10963	Northrop Grumman Technical Services	Mark Falica 80269
Relationship:	Is AI Permittee for Scrap Tire RGC	Is AI Contact for Scrap Tire RGC
Start Date:	01/08/13	01/18/13
Comments: Tony the following contact needs an date: Douglas Klevisha		

If you have any questions, please call me at Extension 3952. Thanks!

FD# 9113

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Land Management Administration • Waste Diversion and Utilization Program
1800 Washington Boulevard • Suite 610 • Baltimore, Maryland 21230-1719
410-537-3314 • 800-633-6101 x3314• 410-537-3321 fax • http://www.mde.state.md.us

Semi-Annual Scrap Tire Collection Facility Report

*Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period. Please print.

RECEIVED
JAN 08 2013
Land Management Administration

(✓) REPORTING PERIOD: ____ January 1 – June 30
✓ July 1 – December 31
FILL IN REPORTING YEAR: 2012

Your Facility Owner's Name: _____ Your Collection Facility License No.: _____
Your Mailing Address: _____
City: _____ County: _____ State: _____ Zip: _____
Your Facility's Name: Northrop Grumman TS Contact Person's Name: MARK FALICA
Your Facility's Location Address: 701 Wilson point rd, Box 4
City: Baltimore County: Baltimore city State: MD Zip: 21220
Telephone No.: (410) 238 - 4316 Facsimile No.: (410) 918 - 0322

SECTION 1: Receiving/Generating Report - Incoming Scrap Tire Information

Check (✓) Scrap Tire Generation/Receiving Source: ☑ Your Facility ☐ Customers ☐ Other

If you checked "Other", complete SECTION 3 on the reverse side.

SECTION 2: Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Destination Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
Emanual	2008-RTH-07066	Aircraft	Emanuel Tire Co 1300 moreland Ave Baltimore MD	2010-RTR-00042	44	0.0100
				TOTAL	44	0.0100

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 2

PLEASE ATTACH ADDITIONAL PAGES IF NECESSARY

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Mark — Signature
MARK FALICA — Print Name
8 Jan 2013 — Date

MEMORANDUM

Waste Diversion & Utilization Program
Scrap Tire Unit

5019



To: Tony Emanuel

From: Valerie Norman ext. 3952

Thru: Abigail Pascual ext. 3334

Subject: Updating Existing Agency Interest (AI)

Date: July 23, 2012

Please update the existing AI for the enclosed ***Scrap Tire Facility:***

Agency Interest (AI#):	12910 & 9113
Current Master AI Name:	
Current Facility Address:	
Current Mailing Address:	
New Master AI Name:	
New Facility Address:	
New Mailing Address:	
Comments: Tony both AI's need to be updated with their new contact person.	

	Related Organization	**Related People**
Name:	Northrop Grumman Technical Services, Inc.	Douglas Klevisha
Relationship:	Is AI Permittee for Scrap Tire RGC	Is AI Contact for Scrap Tire RGC
Start Date:	07/20/12	07/20/12
Comments: Tony both AI's need to be updated with their new contact person.		

If you have any questions, please call me at Extension 3952. Thanks!

Valerie Norman - name change to Northrop Grumman licenses

From: Abigail W. Pascual
To: Valerie Norman
Date: 7/20/2012 1:11 PM
Subject: name change to Northrop Grumman licenses

Hi Val,

Linda Bellmyer (410-238-5601) from Northrop Grumman called today. She said the contact names had changed for 2009-RGC-07711 and 2010-RGC-08019 to "Douglas Klevisha". I made the changes in Tyrus, but not in Tempo. Please make sure Tony makes those changes.

She also asked if they needed both licenses since they were both at the same facility. They are issued to 2 different hangars. She also said the one for "Middle River Integration Center" (2010-RGC-08019) needed a name change because it's not called that anymore. I told her I'd have you call her to go over whether to cancel one license or keep both and to do the name change to the facility name (I think the owner name is fine).

Please give have Tony make the changes and please call Ms. Bellmyer regarding the other issues. Thanks! -- Abby

Abigail W. Pascual, Head
Scrap Tire Unit
Waste Diversion and Utilization Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 610
Baltimore, Maryland 21230-1719
410-537-3334
410-537-3321 (fax)

AJ# 12977
2009RGC07711
701 Wilson Point Rd hangar 3

AJ# 9113
2010RGC08019
701 Wilson Point Rd hangar 5

Contact
Douglas Klevisha

John Reineck is no longer a contact person for Northrop Grumman, Put an end date on 7/20/12.

5721

From: "Myers, Theresa B." <theresa.myers@ngc.com>
To: "Abigail W. Pascual" <apascual@mde.state.md.us>
Date: 11/4/2010 3:04 PM
Subject: RE: EXTERNAL:Re: Relocation of Our Scrap Tire Accumulation Dumpster

Hi Abby:

Thanks for getting back to me so quickly. The letter is on its way to you. Yes, please feel free to contact me if you have any questions or require any additional information.
I really appreciate your help-

Theresa B. Myers
Phone: (410) 993-6860
FAX: (410) 981-2518
Mobile: (443) 271-2359
eMail: theresa.myers@ngc.com

-----Original Message-----
From: Abigail W. Pascual [mailto:apascual@mde.state.md.us]
Sent: Thursday, November 04, 2010 1:15 PM
To: Myers, Theresa B.
Cc: Linda Gustafson; Vanessa Ciaramellano; Valerie Norman
Subject: EXTERNAL:Re: Relocation of Our Scrap Tire Accumulation Dumpster

Hi Theresa,
Please send the letter to my attention at: Maryland Department of the Environment, Technical Services and Operations Program, 1800 Washington Boulevard, Suite 610, Baltimore, MD 21230. When we get the letter, we will pull the file and make the changes. If we have a problem, we will contact you and work with you to resolve the issue. Thank you for contacting me about this issue - I appreciate your cooperation and your efforts to keep MDE up to date on the status of your facility. --Abby

Abigail W. Pascual, Head
Scrap Tire Unit
Technical Services & Operations Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 610
Baltimore, Maryland 21230-1719
410-537-3334
410-537-3321 (fax)

>>> "Myers, Theresa B." <theresa.myers@ngc.com> 11/4/2010 12:06 PM >>>
Hi Abigail:

Northrop Grumman currently has a Maryland General Scrap Tire Collection Facility License No. 2003-RGC-05721. When we got this permit we were accumulating scrap tires in a dumpster located behind our East Building. We have moved the dumpster to a location next to our West Building. The dumpster is still located at the same physical address 7323 Aviation Boulevard, Linthicum, Anne Arundel County, MD 21090. I have prepared a letter to send to MDE regarding the change in location and I want to make sure I send it to the correct contact and address. Can you please

let me know who and where I need to send this letter.

Any help that you can provide will be greatly appreciated.

Thanks and have a great day-

Theresa B. Myers
Phone: (410) 993-6860
FAX: (410) 981-2518
Mobile: (443) 271-2359
eMail: theresa.myers@ngc.com

The information contained in this communication may be confidential, is intended only for the use of the recipient named above, and may be legally privileged. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication, or any of its contents, is strictly prohibited. If you have received this communication in error, please re-send this communication to the sender and delete the original message and any copy of it from your computer system. Thank You

LAND MANAGEMENT ADMINISTRATION
TECHNICAL SERVICES & OPERATIONS PROGRAM
Scrap Tire Section
LETTER TRACKING AND CHAIN OF CUSTODY FORM

MDE

☐ **PRIORITY**

TRACKING NUMBER: 10-LG-039
DATE RECEIVED: 7/13/10 DATE ASSIGNED 10/14/10 **DUE DATE:** 11/14/10
AFFILIATION:

SUBJECT: ☐Letter ☑New Application ☐Renewal Application ☐Scrap Tire License/Approval

APPLICATION NO.: 2010 PG C08019 ***Compliance with HB935:***

ASSIGNED TO: Linda Gustafson TO BE SIGNED BY: HM & HT

PROJECT MANAGER'S FILE:M:\Vol1\USER\

FINAL FILE: N:\Vol1\SWP\

PLEASE FILL OUT ONE LINE EVERY SINGLE TIME THIS FORM CHANGES HANDS

DRAFT	FINAL	SUBMITTED TO	DATE	COMMENT
		Linda Gustafson	10/13/10	10/14/10 to Abby for review
		Linda	10/21/10	for corrections
		Abby	10/21/10	for review
		Hilary	10/21/10	for review HM OK 10/22/10
				ZT
		Letter Dated / / 2010	**Letter Mailed** / / 2010	☐ **Enclosures Checked**

If necessary, please continue on other side

1988

MEMORANDUM

Technical Services & Operations Program
Scrap Tire Unit

Application Review Sheet

Application Type: NEW / RENEWAL / REPLACEMENT **File#:** 2010-RGC / RSC / RTH-08019

Applicants Name: Northrup Grumman Support Services Corp **Phone#:** 410-391-1445

Reviewed By: Linda Gustafson **Review Date:** 10/14/10

1. Application is: **Complete** / **Incomplete** Comptroller Office: **Applicable / Not Applicable**

2. The information provided in the application is as follows:

	YES / NO
a) Registered business in the State of Maryland Status	yes
b) SDAT ID Number: F01564640	yes
c) Workers Compensation Ins.	verified
d) Worker Compliance Certificate Provided if Individual w/no employees	n/a
e) Vehicle information provided	n/a
f) Collection information provided	n/a
g) Scrap Tires disposal information provided	yes
h) Hauler information provided	yes

i) NOTE: Other information to be provided _____

Follow-up / License Status / File action information: License Issue Date: _____

Date	Particulars

[Workers Comp Contact: (410) 864-5297 or (410) 364-5290]

[SDAT Contact: (410) 767-1340]

Maryland Department of Assessments and Taxation

Taxpayer Services Division
301 West Preston Street W Baltimore, MD 21201 (2007 vw2.3)

Taxpayer Services Division

Entity Name: NORTHROP GRUMMAN SUPPORT SERVICES CORP.
Dept ID #: F01564640

General Information Amendments Personal Property Certificate of Status

Principal Office (Current):	9160 GUILFORD RD COLUMBIA, MD 21046
Resident Agent (Current):	THE CORPORATION TRUST INCORPORATED 351 WEST CAMDEN STREET BALTIMORE, MD 21201
Status:	INCORPORATED
Good Standing:	Yes
Business Code:	Ordinary Business - Stock
Date of Formation or Registration:	08/03/1983
State of Formation:	DE
Stock/Nonstock:	Stock
Close/Not Close:	Unknown

Link Definition

General Information	General information about this entity
Amendments	Original and subsequent documents filed
Personal Property	Personal Property Return Filing Information and Property Assessments
Certificate of Status	Get a Certificate of Good Standing for this entity

Maryland Department of Assessments and Taxation

Taxpayer Services Division
301 West Preston Street W Baltimore, MD 21201 (2007 vw2.3)

Taxpayer Services Division

Entity Name: NORTHROP GRUMMAN SUPPORT SERVICES CORP.
Dept ID #: F01564640

General Information Amendments Personal Property Certificate of Status

Mailing Address

NORTHROP GRUMMAN SUPPORT SERVICES CORP.
A
1580 W NURSERY RD
LINTHICUM, MD 21090 2202

Personal Property Filings

Asmt. Year	Filing Date	Extension	Penalty Amount	Penalty Paid Date
2010	06/15/2010	Yes		
2009	06/15/2009	Yes		
2008	06/15/2008	Yes		
2007	06/15/2007	Yes		
2006	06/15/2006	Yes		

Personal Property Assessments Summary

Asmt. Year	Date Assessed	County Base	Town Base	Date Certified
2010				
2009	12/02/2009	30170	0	12/02/2009
2008	03/04/2009	37360	0	03/04/2009
2007	03/07/2008	36170	0	03/07/2008
2006	02/13/2007	24200	0	02/13/2007

Personal Property Assessments Certification Information

Asmt. Year	Location	County	License	Town	Date Certified
2009	Prince George's County	30170			12/02/09
****		30170			
2008	Prince George's County	37360			03/04/09
****		37360			

2007	Anne Arundel County		03/07/08
2007	Prince George's County	36170	03/07/08
****		36170	
2006	Prince George's County	24200	02/13/07
****		24200	

Link Definition

General Information	General information about this entity
Amendments	Original and subsequent documents filed
Personal Property	Personal Property Return Filing Information and Property Assessments
Certificate of Status	Get a Certificate of Good Standing for this entity

RECEIVED
JUL 13 2010
COMPLIANCE DIVISION

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3375 • 800–633-6101 x3375 • http://www.mde.state.md.us

Land Management Administration • Solid Waste Program

PLEASE MAIL THIS FORM TO THE "MARYLAND DEPARTMENT OF THE ENVIRONMENT – CUSTOMER SERVICE CENTER"	
For office use only AI# 9113	For office use only 2010 RGC 08019

MOP 20101525

General Scrap Tire Collection Facility License Application

Authority: Title 9, Environment Article, Annotated Code of Maryland, and Code of Maryland Regulations (COMAR) 26.04.08

"General Scrap Tire Collection Facility" means a scrap tire collection facility where no more than fifty (50) scrap tires are accumulated on site at any one time as defined in COMAR 26.04.08.02B(9).

Existing License No.: 2003 - rgc0 - 5734 **Issued Date:** 10 / 27 / 2003 **Expiration Date:** ___ / ___ / ___

Applicant's Legal Name: Northrup Grumman Support Services Group

Applicant's Status: ☐ Individual ☑ Corporation ☐ Government ☐ Other: _____

Corporation or Government Federal Tax Identification No.: 52-1280448

Maryland State Department of Assessments and Taxation (SDAT) ID No.: 000728933 F01564640
Please note that a business/entity must be registered to do business in Maryland before a permit can be issued. The business or entity's information provided in this application must match the information in the SDAT register.

Proof of workers' compensation coverage is required under § 1-202 of the Environment Article. Please provide one of the following:
(1) A copy of a Certificate of Compliance issued by the Maryland Workers' Compensation Commission; or
(2) Workers' Compensation Insurance Policy/Binder Number: RMWC 60169681

Applicant's Mailing Address: 701 Wilson Point Rd Box 4 **City:** Baltimore **State:** Md **Zip Code:** 21220
Applicant's Telephone No.: (410) 391-1445 **Facsimile No.:** (410) 238-1960
Emergency Contact Name & Title: Andy Hagan, Facility Mn **Telephone No:** (410) 591-9669

Facility/Site Name: Middle River Integration Center
Facility/Site Address: 701 Wilson Point Rd- Hangar 5 **City:** Baltimore **State:** Md **Zip Code:** 21220

County: _____
County Zoning Map No.: _____
State Legislative District: _____
Bay Tributary Watershed Code: _____
Site Acreage: _____

Maryland Grid Coordinates: _____ / _____
Lot/Parcel No.: _____ **Deed/Liber/Folio No.:** _____
Local Council / Election District: _____
Latitude/Longitude (Deg/Min/Sec): ___-___-___ / ___-___-___
Facility Acreage (Estimated): _____

Property Owner's Name: Maryland Aviation Administration
Property Owner's Address: 701 Wilson Point Rd Box 1 **City:** Baltimore **State:** Md **Zip Code:** 21220
Property Owner's Telephone No.: (410) 682-8800

Briefly describe the manner in which scrap tires are being accumulated at your facility.

Reference #- F11913650. This application is being submitted to request transfer of ownership for license # 2003-RGC-05734 from Northrop Grumman Systems Corp. to Northrop Grumman Support Services Corp.

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COMPLIANCE DIVISION

Average quantity of scrap tires projected to be on site at any given time:

Please check one: ☐ *1 to 10* ☐ *11 to 20* ☐ *21 to 30* ☐ *31 to 40* ☑ *41 to 50*

Type and maximum quantity of scrap tires that can be accepted at this facility on a daily basis:

Please specify the quantity:

Passengers Cars/Trucks: _____ ***Trucks:*** _____ ***Others:*** 10

Provide the following information about the scrap tire hauler who will be picking up scrap tires from this facility.

If you haul your own scrap tires, please provide your information:

Scrap Tire Hauler Name: Emanuel Tire Company

Scrap Tire Hauler License No.: 2008 - ***RTH*** - 07066 ***Expiration Date:*** 04 / 13 / 2013

Provide the following information about the scrap tire facility where your scrap tires will be delivered:

Scrap Tire Facility Name: Emanuel Tire Company

Scrap Tire Facility License No.: 2005 - RTR - 00042 ***Expiration Date:*** 06 / 16 / 210

By signing this form, I the applicant or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this application are true to the best of my knowledge, information, and belief. I hereby authorize the representatives of the Department to have access to the site of the proposed facility for inspection and to records relating to this application at any reasonable time. I acknowledge that depending on the type of facility applied for, other permits or approvals may be required.

Signature of Applicant

5/13/10
Date

John Reineck
Applicant's Name (Print)

Director, MRIC
Title

Privacy Act Notice: This Notice is provided pursuant to the Federal Privacy Act of 1974, 5 U.S.C. §552.a. Disclosure of your Social Security Number or Federal Employer Identification Number on this application is mandatory pursuant to the provisions of §1-203 (2003), Environment Article, Annotated Code of Maryland, which requires the Maryland Department of the Environment to verify that an applicant for a license has paid all undisputed taxes and unemployment insurance. Social Security or Federal Employer Identification Numbers will not be used for any purposes other than those described in this Notice.

For questions regarding this application form, please contact the Department at (410) 537-3375

AF #9113

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JUL 13 2010
COMPLIANCE DIVISION

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3375 • 800–633-6101 x3375 • http://www.mde.state.md.us

Land Management Administration • Solid Waste Program

PLEASE MAIL THIS FORM TO THE *"MARYLAND DEPARTMENT OF THE ENVIRONMENT – CUSTOMER SERVICE CENTER"*	
For office use only	*For office use only*

General Scrap Tire Collection Facility License Application

Authority: Title 9, Environment Article, Annotated Code of Maryland, and Code of Maryland Regulations (COMAR) 26.04.08

"General Scrap Tire Collection Facility" means a scrap tire collection facility where no more than fifty (50) scrap tires are accumulated on site at any one time as defined in COMAR 26.04.08.02B(9).

COPY

Existing License No.: 2003 - rgc0 - 5734 ***Issued Date:*** 10 / 27 / 2003 ***Expiration Date:*** ____ / ____ / ____

Applicant's Legal Name: _____

Applicant's Status: ☐ *Individual* ☑ *Corporation* ☐ *Government* ☐ *Other:* _____

Corporation or Government Federal Tax Identification No.: 52-1280448

Maryland State Department of Assessments and Taxation (SDAT) ID No.: 000728933
Please note that a business/entity must be registered to do business in Maryland before a permit can be issued. The business or entity's information provided in this application must match the information in the SDAT register.

Proof of workers' compensation coverage is required under § 1-202 of the Environment Article. Please provide one of the following:
(1) A copy of a Certificate of Compliance issued by the Maryland Workers' Compensation Commission; or
(2) Workers' Compensation Insurance Policy/Binder Number: RMWC 60169681

Applicant's Mailing Address: 701 Wilson Point Rd Box 4 ***City:*** Baltimor ***State:*** Md ***Zip Code:*** 21220
Applicant's Telephone No.: (410) 391-1445 ***Facsimile No.:*** (410) 238-1960
Emergency Contact Name & Title: Andy Hagan, Facility Mn ***Telephone No:*** (410) 591-9669

Facility/Site Name: Middle River Integration Center
Facility/Site Address: 701 Wilson Point Rd- Hangar 5 ***City:*** Baltimor ***State:*** Md ***Zip Code:*** 21220

County: _____
County Zoning Map No.: _____
State Legislative District: _____
Bay Tributary Watershed Code: _____
Site Acreage: _____

Maryland Grid Coordinates: _____ / _____
Lot/Parcel No.: _____ ***Deed/Liber/Folio No.:*** _____
Local Council / Election District: _____
Latitude/Longitude (Deg/Min/Sec): ____-____-____ / ____-____-____
Facility Acreage (Estimated): _____

Property Owner's Name: Maryland Aviation Administration
Property Owner's Address : 701 Wilson Point Rd Box 1 ***City:*** Baltimor ***State :*** Md ***Zip Code:*** 21220
Property Owner's Telephone No.: (410) 682-8800

Briefly describe the manner in which scrap tires are being accumulated at your facility.

Reference #- F11913650. This application is being submitted to request transfer of ownership for license # 2003-RGC-05734 from Northrop Grumman Systems Corp. to Northrop Grumman Support Services Corp.

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JUL 13 2010
COMPLIANCE DIVISION

Average quantity of scrap tires projected to be on site at any given time:

Please check one: ☐ *1 to 10* ☐ *11 to 20* ☐ *21 to 30* ☐ *31 to 40* ☑ *41 to 50*

Type and maximum quantity of scrap tires that can be accepted at this facility on a daily basis:

Please specify the quantity:

Passengers Cars/Trucks: _____ ***Trucks:*** _____ ***Others:*** 10

Provide the following information about the scrap tire hauler who will be picking up scrap tires from this facility.

If you haul your own scrap tires, please provide your information:

Scrap Tire Hauler Name: Emanuel Tire Company

Scrap Tire Hauler License No.: 2008 - ***RTH*** - 07066 ***Expiration Date:*** 04 / 13 / 2013

Provide the following information about the scrap tire facility where your scrap tires will be delivered:

Scrap Tire Facility Name: Emanuel Tire Company

Scrap Tire Facility License No.: 2005 - RTR - 00042 ***Expiration Date:*** 06 / 16 / 210

By signing this form, I the applicant or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this application are true to the best of my knowledge, information, and belief. I hereby authorize the representatives of the Department to have access to the site of the proposed facility for inspection and to records relating to this application at any reasonable time. I acknowledge that depending on the type of facility applied for, other permits or approvals may be required.

Signature of Applicant

5/13/10
Date

John Reineck
Applicant's Name (Print)

Director, MRIC
Title

20584

Privacy Act Notice: This Notice is provided pursuant to the Federal Privacy Act of 1974, 5 U.S.C. §552.a. Disclosure of your Social Security Number or Federal Employer Identification Number on this application is mandatory pursuant to the provisions of §1-203 (2003), Environment Article, Annotated Code of Maryland, which requires the Maryland Department of the Environment to verify that an applicant for a license has paid all undisputed taxes and unemployment insurance. Social Security or Federal Employer Identification Numbers will not be used for any purposes other than those described in this Notice.

For questions regarding this application form, please contact the Department at (410) 537-3375

GRUMMAN

701 Wilson Point Rd
Hangar 5
Baltimore, Md 21220

7001 2510 0005 4524 1111

CERTIFIED MAIL

PLACE STICKER AT TOP OF ENVELOPE TO THE RIGHT OF THE RETURN ADDRESS. FOLD AT DOTTED LINE

UNITED STATES POSTAGE
PITNEY BOWES
02 1M
0004265780
$ 05.54
MAY 27 2009
MAILED FROM ZIP CODE 21017

Mr. Horacio Tablada
Maryland Department of the Environment
Solid Waste Program
1800 Washington Boulevard, Suite 605
Baltimore Md 21230-1719

UNITED STATES POSTAL SERVICE
1000
21230

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PAID
BALTIMORE.MD
21220
MAY 27. '09
AMOUNT
$0.00
00050956-12

21230$1719 C011

5734

WAS Enforcement Penalty Change Authorization Form

This form should be filled out when a penalty amount is decreased or increased from the original amount.

Name of case: **Northrop Grumman California Systems (2003-RGC-05734)**

Case number: **NOV-WAS-09-ST-180**

Program: **Scrap Tires**
Background: (_____)

The assessed penalty amount of $**500** was reduced / increased to $**0** for the following reason.

(one must be X'd)

☐ 1. New factual information obtained after penalty action taken;

☐ 2. New legal information obtained after penalty action taken;

☐ 3. Projected costs of litigation (filing fees, staff time, expert assistance, unavailability of staff to address higher priority issues) exceeds initial penalty amount or deterrence value of penalty sought;

☒ 4. Other reason that does not fall under category 1, 2, or 3, with a brief summary of the reason for the reduction (e.g. SEPs).
Explanation: **Licensee stated that they had sent the report via certified mail to MDE in January 2009, but MDE has no record of receiving it until May 13, 2009. MDE's records indicate that the July-December 2008 report was received in January 2009, instead of the missing July-December 2007 report. MDE sent Reminder Notice, Final Notice, then NOV. Licensee has since instituted a monthly tracking system to prevent submitting late reports in the future.**

If financial hardship is a principle base of penalty reduction, have tax returns been provided? Y ☐ N ☐

Program Approved By: _____ AG Approved By: _____
(Required if reason 3 solely selected and/or assessed penalty was over $5,000)

Approved: _____ Disapproved: _____ Approved Revised Amount: _____

Horacio Tablada authorized the change: _____
Horacio Tablada, Director Waste Management Administration

Date: _____

cc: Program
AG

MEMORANDUM

Maryland Department of the Environment
Waste Management Administration
Project Management Section

To: Horacio Tablada

Thru: Ed Dexter

From: Abby Pascual

Date: June 3, 2009

Subject: Request to cancel $500 NOV penalty

- We issued a $500 NOV on May 8, 2009 to Northrop Grumman California Systems for failing to submit the July-December 2007 semi-annual scrap tire report for scrap tire general collection facility license 2003-RGC-05734.
- We sent a Reminder Notice by regular mail on August 28, 2008.
- We sent a Final Notice by regular mail on December 24, 2008.
- They submitted the missing semi-annual report on May 13, 2009.

Northrop Grumman sent us a letter requesting that we waive the $500 NOV penalty. They claim to have sent the report via certified mail to MDE in January 2009, but MDE has no record of receiving the report until May 13, 2009. Our records indicate that they submitted the July-December 2008 report in January 2009 instead of the missing July-December 2007 report. I have attached the letter to this memo for your review and decision on waiver of the penalty.

Please call me at x3334 if you have any questions. Thank you.

Abby

NORTHROP GRUMMAN

H1 24
Dexter

Northrop Grumman Corporation
701 Wilson Point Road
Hangar 5
Baltimore, Maryland 21220

May 22, 2009

Mr. Horacio Tablada
Maryland Department of the Environment
Solid Waste Program
1800 Washington Boulevard, Suite 605
Baltimore Md 21230-1719

RE: NOV-WAS-09-ST-180

Dear Mr. Tablada:

On May 8th 2009, the Maryland Department of Environment (MDE) issued a Notice of Violation (NOV) to Northrop Grumman Systems Corporation's facility (Northrop Grumman) at 701 Wilson Point Road in Baltimore, Maryland, advising the company that it was in violation of its Scrap Tire License No. 2003RGC05734 and the Code of Maryland Regulations (COMAR) 26.04.08 regarding failure to submit a Semi-Annual Scrap Tire Collection Facility Report for the reporting period of July 1st to December 31st 2007.

Northrop Grumman is disputing this NOV and requests that the NOV be rescinded since the requested report was already submitted to MDE on January 27, 2009, via certified mail. The report was originally signed on January 25, 2008, but was not submitted until January 27, 2009, due to an oversight. To correct this problem and to avoid any future issues, we are now using a monthly tracking system.

In addition, upon receipt of the NOV I contacted MDE and spoke to Bernice Henson about the fact that the report had already been submitted to MDE. Bernice Henson requested that we send the NOV, another copy of the missing scrap tire report and the certified mail receipt for that report to the attention of Valerie Norman for her review. To this date, we have not received a response back from Ms. Norman.

Please let me know if you need additional information related to this matter and our request that the NOV be rescinded. I can be reached at (410) 391-1445, Extension #3445, if you have any questions.

Thank you for your attention to this matter.

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JUN 4 - 2009
SOLID WASTE PROGRAM

Sincerely,

April Jones

April Jones
Environmental, Safety, and Health Specialist
Northrop Grumman Corporation

cc: Ms. Abigail Pascual
Ms. Valerie Norman

Enclosures (2)
Certified Mail # 7001 2510 0005 8524 5111

RECEIVED
MAY 29 2009
WASTE MANAGEMENT ADMINISTRATION

NORTHROP GRUMMAN

5734

RECEIVED
MAY 18 2009
COMPLIANCE/PROJECT MANAGEMENT DIVISION

Facsimile Transmission Header Sheet
CALIFORNIA MICROWAVE SYSTEMS
A Business Unit of Electronic Systems
*****DO NOT TRANSMIT CLASSIFIED MATERIAL BY FACSIMILE*****

DATE			
5/14/09			
TO: NAME	**PHONE NO.**	**LOCATION**	**FAX NO.**
Valeria Norman	410-537-3000	MDE	410-537-3842
FROM: NAME	**PHONE NO.**	**LOCATION**	**FAX NO.**
April Jones	410-391-1445	Martin State Airport	410-918-0322

THE FOLLOWING TRANSMISSION CONTAINS PAGES, INCLUDING THIS HEADER SHEET.

MESSAGE:

Notice of Violation letter with Scrap Tire report and Certified Mail receipt for Scrap Tire License N0. 2003RGC05734.

Contact Name:
April Jones
email: april.jones@ngc.com
410-391-1445

I HEREBY CERTIFY THAT THE CONTENTS OF THIS MESSAGE ARE UNCLASSIFIED AND IN ACCORDANCE WITH SECTOR EXPORT PROCEDURES.

SIGNATURE:

IS THIS AN EXPORT? IF YES, THEN COMPLETE THE FOLLOWING:

CHECK THE APPROPRIATE DECLARATION(S):

1. ☐ Technical data as defined in 22 CFR 120.10 or 15 CFR 779.1 not included. Export not subject to U.S. control; or
2. ☐ Technical data as defined in 22 CFR 120.10 or 15 CFR 779.1 included. Export subject to U.S. Control. Recipient is responsible for compliance with U.S. export laws and regulations. Complete the following statements:
   - Export Authority: License No. or 22 CFR 125.4(b) . Technical Data Export Authorization form is required.
   - Per 22 CFR 123.9(B), these commodities are authorized by the U.S. Government for export only to for use by . They may not be transferred, transshipped on a non-continuous voyage, or otherwise be disposed of in any other country, either in their original form or after being incorporated into other end-terms, without the prior written approval of the U.S. Department of State.
   - Sender hereby certifies that export does not exceed scope of the export authority.

This message is intended for the use of the individual to whom it is addressed and may contain information that is privileged, confidential and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution or copying of this communication is strictly prohibited. If you have received this communication in error, please notify us immediately by telephone, and return the original message to us at the above address via the U.S. Postal Service. Thank you.

NORTHROP GRUMMAN SYSTEMS CORP
C/O STEVE REINKER
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

DEPARTMENT OF THE ENVIRONMENT
Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
• 800-633-6101 x3315 • http://www.mde.state.md.us

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MAY 13 2009
COMPLIANCE AND PROJECT MANAGEMENT DIVISION

Waste Management Administration • Solid Waste Program

Semi-Annual Scrap Tire Collection Facility Report

Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period. Please print.

REPORTING PERIOD: July 1 – December 31, 2007
DUE ON OR BEFORE February 1, 2008

Licensee's Name: Northrop Grumman *Scrap Tire Collection Facility License No.:* 2003-RGC-05734

Licensee's Mailing Address: 701 Wilson Point Rd Box 4

City: Baltimore *County:* Baltimore *State:* MD *Zip:* 21220

Facility's Name: Martin State Airport *Facility's Contact Person Name:* Steve Reinker

Facility's Location Address: 701 Wilson Point Rd. Hangar 5

City: Baltimore *County:* Baltimore *State:* MD *Zip:* 21220

Telephone No.: (410) 391 - 1445 *Facsimile No.:* (410) 391 - 6695

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the scrap tires came from:
   A. If from haulers, please list the hauler's names and their Maryland Scrap Tire Hauler License Numbers in the appropriate boxes.
   B. If from individuals hauling less than 5 scrap tires, please write **Private** in the **Source** column; and **None** in the **License Number** boxes. If you receive scrap tires from many individuals, group them as a single entry.
   C. If the scrap tires are generated from your business, write **Company** in the **Source** column, and your license number in the **License Number** column.
2. List the type of scrap tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of scrap tires or tonnage.
3. If no scrap tires were received during this period, write **None** received across the table.

TABLE 2:

1. List the name and license number of the scrap tire hauler who removed scrap tires from your facility.
2. List the type of scrap tires removed by quantity or tons.
3. List the place of where the hauler took the scrap tires. ***This is very important!*** *Be sure the hauler tells you where your scrap tires are being delivered and the Maryland scrap tire license/approval number of that destination.* If the scrap tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no scrap tires were hauled from your facility, write **No** scrap tires hauled.

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

[signature]	Doug [signature]	1-25-08
Signature	**Print Name**	**Date**

Form Number: MDE/WAS/LIC.007
Date: July 1, 2005
TTY Users: 800-201-7165

Recycled Paper

p.4

May 14 09 08:44a

TABLE-1
Receiving/Generating Report - Incoming Scrap Tire Information

Scrap Tire Generation/Receiving Source	Maryland Scrap Tire Haulers License No. (If applicable)	Type of Scrap Tire (Passenger, Truck)	Scrap Tire Quantity(ies)	Scrap Tire Weight (Tons)
Company	[illegible]	Aircraft	12	
		TOTAL	12	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TABLE-2
Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
No scrap tires hauled						
					TOTAL	

RECEIVED
MAY 13 2009
COMPLIANCE AND PROJECT MANAGEMENT DIVISION

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 21

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

Form Number: MDE/WAS/LIC.007
Date July 1, 2005
TTY Users: 800-201-7165

Recycled Paper

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MAY 13 2009
COMPLIANCE AND PROJECT
MANAGEMENT DIVISION

May 14 09 08:44a

UNITED STATES POSTAL SERVICE

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

Steve Reinker
Northrop Grumman Corp.
701 Wilson Point Road
Box 4
Hangar 5, Martin State Airport
Baltimore, MD 21220

Certified Mail Provides:

- A mailing receipt
- A unique identifier for your mailpiece
- A record of delivery kept by the Postal Service for two years

Important Reminders:

- Certified Mail may ONLY be combined with First-Class Mail® or Priority Mail®.
- Certified Mail is *not* available for any class of international mail.
- NO INSURANCE COVERAGE IS PROVIDED with Certified Mail. For valuables, please consider Insured or Registered Mail.
- For an additional fee, a *Return Receipt* may be requested to provide proof of delivery. To obtain Return Receipt service, please complete and attach a Return Receipt (PS Form 3811) to the article and add applicable postage to cover the fee. Endorse mailpiece "Return Receipt Requested". To receive a fee waiver for a duplicate return receipt, a USPS® postmark on your Certified Mail receipt is required.
- For an additional fee, delivery may be restricted to the addressee or addressee's authorized agent. Advise the clerk or mark the mailpiece with the endorsement *"Restricted Delivery"*.
- If a postmark on the Certified Mail receipt is desired, please present the article at the post office for postmarking. If a postmark on the Certified Mail receipt is not needed, detach and affix label with postage and mail.

IMPORTANT: Save this receipt and present it when making an inquiry.

PS Form 3800, August 2006 *(Reverse)* PSN 7530-02-000-9047

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Maryland Department of the Environment
Solid Wast Program
1800 Washington Blvd. Suite 605
Baltimore, MD 21230-1719

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)* | B. Date of Delivery

C. Signature
X
☐ Agent
☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☐ Certified Mail ☐ Express Mail
☒ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Copy from service label)*
7008 1830 0000 0749 2977

PS Form 3811, July 1999 Domestic Return Receipt 102595-00-M-0952

7008 1830 0000 0749 2977

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com
BALTIMORE MD 21230
OFFICIAL USE

Postage	$1.62
Certified Fee	$2.70
Return Receipt Fee (Endorsement Required)	$2.20
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$5.32

0024
Postmark Here
JAN 27 2009 BALTIMORE MD 21201
01/27/2009

Sent To Maryland MDE
Street, Apt. No.; or PO Box No.
City, State, ZIP+4
USPS

PS Form 3800, August 2006

RECEIVED
MAY 13 2009
COMPLIANCE/ENFORCEMENT
MANAGEMENT DIVISION

May 14 09 08:44a
P.7

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
MDE 410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

NOTICE OF VIOLATION

May 8, 2009

RECEIVED
MAY 13 2009
SUMQUEHANNA/PATUXENT
MANAGEMENT COMMISSION

CERTIFIED MAIL
Return Receipt Requested

NORTHROP GRUMMAN SYSTEMS CORP
C/O STEVE REINKER
701 WILSON POINT RD
BALTIMORE MD 21220

RE: **NOV-WAS-09-ST-180**

Dear Licensee:

A review of the Waste Management Administration's records indicates that NORTHROP GRUMMAN SYSTEMS CORP has failed to submit a semi-annual report summarizing the scrap tire transactions for the time period from **July 1, to December 31, 2007.** This report is required by your scrap tire license No. **2003RGC05734.** Failure to submit the semi-annual report is a violation of your license and the Code of Maryland Regulations (COMAR) 26.04.08 regarding scrap tire management.

Maryland's system of regulating scrap tires was designed to ensure that scrap tires are being recycled to the maximum extent possible, and to prevent their open dumping. With this goal in mind, the regulations require that scrap tires be hauled only by licensed haulers, to licensed or approved collection facilities. The record keeping and reporting requirements for haulers and collection facilities are an essential part of the system. Maintaining written records of legitimate scrap tire transactions reduces the chances that scrap tires will be illegally dumped. Failure to maintain the required records and submit the semi-annual reports undermines this important part of the regulatory system.

This Administration sent you a reminder notice with a report form enclosed, stating that the semi-annual report must be filled out and returned. More recently, the Administration sent you a final notice that your semi-annual report was overdue, and gave you fifteen (15) additional days to submit the report. To date, we have not received it. This Notice of Violation is your third written notice that the semi-annual report must be submitted.

p.2
May 14 09 08:44a

RECEIVED
MAY 18 2009
COMPLIANCE AND PROJECT
MANAGEMENT DIVISION

The Administration is willing to settle this matter in return for a settlement payment of $500.00 and submittal of the missing semi-annual report. If you choose to settle this matter, please send a check for $500.00 payable to the Maryland Clean Water Fund within the next twenty (20) days to:

Maryland Clean Water Fund
Maryland Department of the Environment
P.O. Box 1417
Baltimore, MD 21203-1417

State law allows the Maryland Department of the Environment to seek civil penalties in the amount of $10,000 per violation per day for violations of scrap tire regulations or license requirements. The missing semi-annual report should be sent to:

Maryland Department of the Environment
Solid Waste Program
1800 Washington Boulevard, Suite 605
Baltimore MD 21230-1719

To ensure that your payment is properly credited, please write the reference NOV number on your check, and return a copy of this letter with your payment. If you elect to settle this matter, you will not be admitting any of the allegations stated herein.

If you fail to settle by submitting the required report and the above payment, this matter may be referred to the Office of the Attorney General for further enforcement action. Such enforcement action may include a penalty, an order, and/or the suspension or revocation of your scrap tire license. Any subsequent violations would subject you to additional enforcement action. Therefore, you are advised to maintain compliance with applicable Maryland regulations and licenses. Please direct any questions or comments in this matter to Ms. Abigail Pascual, Head, Project Management Section at (410) 537-3315.

Sincerely,

Horacio Tablada, Director
Waste Management Administration

HT:AP:af

cc: Ms. Abigail Pascual

ST PCA 13760 Object 7588 Suffix 626

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Blvd. - Baltimore, Maryland 21230
410-537-3315 ▪ 800-633-6101x 3315 (within Maryland) ▪ http:/www.mde.state.md.us

SOLID WASTE PROGRAM

GENERAL SCRAP TIRE COLLECTION FACILITY LICENSE APPLICATION

Authority: Environment Article, § 9-228, Annotated Code of Maryland, and Code of Maryland Regulations (COMAR) 26.04.08.

"General Scrap Tire Collection Facility" means a scrap tire collection facility where no more than 50 scrap tires are accumulated on site at any one time as defined in the COMAR 26.04.08.02B(9).

For office use only		
Application Receipt Date:	*I.D. Number:*	*Application Number:*
10/1/03	MOPT 2003 2451	2003 RGL05734

A. APPLICANT INFORMATION

1. **Applicant's Status:** ☐ Federal ☐ State ☐ Local Government (County/City) ☐ Individual ☐ Partnership ☒ Corporation ☐ Other: _____

2. **Applicant's Legal Name:** Northrop Grumman Systems Corporation
   (This is the name of the business/entity to which the license will be issued. It need not be the same as the facility name.)

3. **Registration with the Maryland Department of Assessments and Taxation (SDAT) ID Number:** 05776586
   (Please note that a business/entity must be registered to do business in Maryland before a license can be issued. The business/entity's information provided in this application must match the information in the SDAT register.)

4. **Applicant's Mailing Address:** 701 Wilson Point Road; Box 4

   Baltimore (City) | Baltimore (County) | MD (State) | 21220 (Zip Code)

5. **Applicant's Telephone No.:** (410) 391 - 1445 **Facsimile No.:** (410) 391 - 6695

6. **Emergency Contact Name and Title:** Steve Reinker; Logistics Analyst
   (This person must be reachable at the emergency number given during non-working hours.)

7. **Emergency Telephone Number:** (410) 420 - 9177

B. FACILITY INFORMATION

1. **Facility Name:** Northrop Grumman - California Microwave Systems

2. **Facility's Location Address:** 701 Wilson Point Road; Martin State Airport; Hangar 5

   Baltimore (City) | Baltimore (County) | MD (State) | 21220 (Zip Code)

3. **Facility Telephone Number:** (410) 391 - 1445 **Facsimile No.:** (410) 391 - 6695

4. **Property Owner's Name:** Maryland Aviation Administration

5. **Property Owner's Address:** 701 Wilson Point Road; Box 1

   Baltimore (City) | Baltimore (County) | MD (State) | 21220 (Zip Code)

6. Property Owner's Telephone Number: (410) 682 - 8800

7. Briefly describe the manner in which scrap tires are being accumulated at your facility.

Airplane tire change out. The tires are stored in a hangar equipped with sprinklers.

8. Average quantity of scrap tires projected to be on site at this facility at any given time:

Please check one: ☐ 1 to 10 ☐ 11 to 20 ☒ 21 to 30 ☐ 31 to 40 ☐ 41 to 50

9. Type and maximum quantity of scrap tires that can be accepted at this facility on a daily basis:

Please specify the quantity: ____ Passengers Cars/Light Trucks ____ Trucks ✓ Others

10. Provide the following information about the scrap tire hauler who will be picking up scrap tires from this facility. If you haul your own tires, please provide your information:

i. Scrap Tire Hauler Name: Waste - Tron of Maryland

ii. Scrap Tire Hauler License No.: 2000 - RTH -04670 Expiration Date: 06 / 21 / 2005

11. Provide the following information about the scrap tire facility where your scrap tires will be delivered:

i. Scrap Tire Facility Name: Waste - Tron of Maryland

ii. Scrap Tire Collection Facility License No.: 2000 - ~~RTH -04670~~ RGC-04669 Expiration Date: 06 / 21 / 2005

C. COMPLIANCE WITH THE WORKER'S COMPENSATION ACT

Proof of workers' compensation coverage is required under Section 1-202 of the Environment Article, Annotated Code of Maryland. Please complete the following:

1. Are you a holder of a Certificate of Compliance issued by the Maryland Workers Compensation Commission?
☐ YES ☒ NO
If yes, please submit a copy of this Certificate with this application.

2. If no, please submit the number of a workers compensation insurance policy or binder.

Workers Compensation Insurance Policy Number: RMWC 3323595
Workers Compensation Insurance Binder Number: _____

D. SIGNATURES

By signing this form, I solemnly affirm under the penalties of perjury that the contents of this application are true to the best of my knowledge, information, and belief. I hereby authorize representatives of the Maryland Department of the Environment to have access to the site of the proposed facility for inspection and records relating to this application at any reasonable time. I acknowledge that depending on the specifics of this proposal, other permits may be required.

Dan Franco	Dan Franco	9/26/03
Applicant's Name (Print)	Applicant's Signature	Date

Please complete this application form and mail to:

Maryland Department of the Environment
Waste Management Administration
1800 Washington Blvd., Baltimore, Maryland 21230

Any questions regarding this application should be directed to the Design and Certification Division at (410) 537-3375.

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3315 • 800-633-6101 x3315 • http://www.mde.state.md.us

Waste Management Administration • Solid Waste Program

Semi-Annual Scrap Tire Collection Facility Report

RECEIVED JAN 20 2009 SUMPTER/WOOD PROJECT MANAGEMENT DIVISION

3734

Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.* **Please print.

REPORTING PERIOD: July 1 – December 31, 2008
DUE ON OR BEFORE February 1, 2009

Licensee's Name: Northrop Grumman *Scrap Tire Collection Facility License No.:* 2003-RGC-05734

Licensee's Mailing Address: 701 Wilson Point Rd Box 4

City: Baltimore *County:* Baltimore *State:* MD *Zip:* 21220

Facility's Name: Martin State Aicport *Facility's Contact Person Name:* Steve Reinker

Facility's Location Address: 701 Wilson Point Rd, Hangar 5

City: Baltimore *County:* Baltimore *State:* MD *Zip:* 21220

Telephone No.: (410) 391 - 1445 *Facsimile No.:* (410) 391 - 6695

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the scrap tires came from:
   A. If from haulers, please list the hauler's names and their Maryland Scrap Tire Hauler License Numbers in the appropriate boxes.
   B. If from individuals hauling less than 5 scrap tires, please write **Private** in the **Source** column; and **None** in the **License Number** boxes. If you receive scrap tires from many individuals, group them as a single entry.
   C. If the scrap tires are generated from your business, write **Company** in the **Source** column, and your license number in the **License Number** column.
2. List the type of scrap tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of scrap tires or tonnage.
3. If no scrap tires were received during this period, write **None** received across the table.

TABLE 2:

1. List the name and license number of the scrap tire hauler who removed scrap tires from your facility.
2. List the type of scrap tires removed by quantity or tons.
3. List the place of where the hauler took the scrap tires. ***This is very important!*** *Be sure the hauler tells you where your scrap tires are being delivered and the Maryland scrap tire license/approval number of that destination.* If the scrap tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no scrap tires were hauled from your facility, write **No** scrap tires hauled.

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Signature	Print Name	Date
	Doug Kleuska	1/27/09

Form Number: MDE/WAS/LIC.007
Date: December 1, 2008
TTY Users: 800-201-7165

NORTHROP GRUMMAN SYSTEMS CORP
C/O STEVE REINKER
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

TABLE-1
Receiving/Generating Report - Incoming Scrap Tire Information

Scrap Tire Generation/Receiving Source	Maryland Scrap Tire Haulers License No. (If applicable)	Type of Scrap Tire (Passenger, Truck)	Scrap Tire Quantity(ies)	Scrap Tire Weight (Tons)
Company	2003-RGC-05739	Aircraft	1	
		TOTAL	1	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TABLE-2
Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
No scrap tires hauled						
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 37

SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
Semi-Annual Scrap Tire Report
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

NORTHROP GRUMMAN SYSTEMS CORP
C/O STEVE REINKER
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

DEPARTMENT OF THE ENVIRONMENT

Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
• 800-633-6101 x3315 • http://www.mde.state.md.us

RECEIVED JAN 23 2009 COMPLIANCE AND PROJECT MANAGEMENT DIVISION 5737

Waste Management Administration • Solid Waste Program

Semi-Annual Scrap Tire Collection Facility Report

*Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period. Please print.

REPORTING PERIOD: July 1 – December 31, 2007
DUE ON OR BEFORE February 1, 2008

Licensee's Name: Northrop Grumman Scrap Tire Collection Facility License No.: 2003-RGC-05734

Licensee's Mailing Address: 701 Wilson Point Rd Box 4

City: Baltimore County: Baltimore State: MD Zip: 21220

Facility's Name: Martin State Airport Facility's Contact Person Name: Steve Reinker

Facility's Location Address: 701 Wilson Point Rd. Hangar 5

City: Baltimore County: Baltimore State: MD Zip: 21220

Telephone No.: (410) 391 - 1445 Facsimile No.: (410) 391 - 6695

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the scrap tires came from:
   A. If from haulers, please list the hauler's names and their Maryland Scrap Tire Hauler License Numbers in the appropriate boxes.
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2. List the type of scrap tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of scrap tires or tonnage.
3. If no scrap tires were received during this period, write **None** received across the table.

TABLE 2:

1. List the name and license number of the scrap tire hauler who removed scrap tires from your facility.
2. List the type of scrap tires removed by quantity or tons.
3. List the place of where the hauler took the scrap tires. ***This is very important!*** *Be sure the hauler tells you where your scrap tires are being delivered and the Maryland scrap tire license/approval number of that destination.* If the scrap tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no scrap tires were hauled from your facility, write **No** scrap tires hauled.

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Signature	Print Name	Date
[signature]	Doug Klevisha	1-25-09

TABLE-1
Receiving/Generating Report - Incoming Scrap Tire Information

Scrap Tire Generation/Receiving Source	Maryland Scrap Tire Haulers License No. (If applicable)	Type of Scrap Tire (Passenger, Truck)	Scrap Tire Quantity(ies)	Scrap Tire Weight (Tons)
Company	2003-RGC-05734	Aircraft	12	
		TOTAL	12	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TABLE-2
Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
No scrap tires hauled						
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 21

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

MDE
MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
410-537-3000 • 1-800-633-6101

S734

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

FINAL NOTICE

December 24, 2008

Dear Scrap Tire Licensee:

The Solid Waste Program of the Maryland Department of the Environment (the "Department") **has not received a semi-annual report** for your scrap tire license(s) for the period of **July 1 – December 31, 2007** due on **February 1, 2008**. Your license(s) information is provided on the label in the designated block directly to the right. Please complete the enclosed semi-annual report form for the period specified and submit it to the Department.

NORTHROP GRUMMAN SYSTEMS CORP
C/O STEVE REINKER
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

Please note that Scrap Tire Regulations require licensees' to maintain scrap tire activity records and submit reports to the Department by February 1 and August 1 of each year. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period.

Please be advised, you are currently in violation of your scrap tire license(s). By this notice, the Department is providing you a **last chance** to submit these reports and to be in compliance with this license condition. Failure to submit this information within 15 days of receipt of this notice will result in the Department evaluating further enforcement options to bring your facility into compliance. If you have already sent the report, please *re-submit* a copy of the report along with this letter to the Department so we can clear your record.

Thank you for your cooperation. If you need assistance in completing this form please call Ms. Valerie Norman, Administrative Specialist, at (410) 537-3315.

Sincerely,

Abigail W. Pascual, Head
Project Management Section

AP: AP: bh
Enclosure
cc: Mr. Horacio Tablada

S734

MARYLAND DEPARTMENT OF THE ENVIRONMENT

MDE 1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

REMINDER NOTICE

August 28, 2008

Dear Scrap Tire Licensee:

The Solid Waste Program of the Maryland Department of the Environment (the "Department") **has not received a semi-annual report** for your scrap tire license(s) for the period of **July 1 – December 31, 2007** due on **February 1, 2008**. Your license(s) number(s) are provided on the label in the designated block directly to the right. Please complete the enclosed semi-annual report form for the period specified and submit it to the Department.

NORTHROP GRUMMAN SYSTEMS CORP
C/O STEVE REINKER
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

Please note that Scrap Tire Regulations require licensees' to maintain scrap tire activity records and submit reports to the Department by February 1 and August 1 of each year. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period.

Please be advised, you are currently in violation of your scrap tire license(s). By this notice, the Department is providing you an opportunity to submit this report and come into compliance with this license condition. Failure to submit this information within 15 days of receipt of this notice will result in the Department evaluating further enforcement options to bring your facility into compliance. If you have already submitted the report and this letter was sent to you by mistake, please send a copy of the report along with this letter to the Department so we can clear your record.

Thank you for your cooperation. If you need assistance in completing this form please call Ms. Valerie Norman, Administrative Specialist, at (410) 537-3315.

Sincerely,,

Abigail W. Pascual, Head
Project Management Section

APbh
Enclosure
cc: Mr. Horacio Tablada

5734

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3315 • 800-633-6101 x3315 • http://www.mde.state.md.us

RECEIVED
AUG 27 2008
COMPLIANCE AND PROJECT MANAGEMENT DIVISION

Waste Management Administration • Solid Waste Program

Semi-Annual Scrap Tire Collection Facility Report

*Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period. Please print.

REPORTING PERIOD: January 1 – June 30, 2008
DUE ON OR BEFORE August 1, 2008

Licensee's Name: Northrop Grumman Scrap Tire Collection Facility License No.: 2003-RGC-05734
Licensee's Mailing Address: 701 Wilson Point Rd, Box 4
City: Baltimore County: Baltimore State: MD Zip: 21220
Facility's Name: Martin State Airport Facility's Contact Person Name: Steve Reinker
Facility's Location Address: 701 Wilson Point Rd., Hangar 5
City: Baltimore County: Baltimore State: MD Zip: 21220
Telephone No.: (410) 391 - 1445 Facsimile No.: (410) 391 - 6695

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the scrap tires came from:
   A. If from haulers, please list the hauler's names and their Maryland Scrap Tire Hauler License Numbers in the appropriate boxes.
   B. If from individuals hauling less than 5 scrap tires, please write **Private** in the **Source** column; and **None** in the **License Number** boxes. If you receive scrap tires from many individuals, group them as a single entry.
   C. If the scrap tires are generated from your business, write **Company** in the **Source** column, and your license number in the **License Number** column.
2. List the type of scrap tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of scrap tires or tonnage.
3. If no scrap tires were received during this period, write **None** received across the table.

TABLE 2:

1. List the name and license number of the scrap tire hauler who removed scrap tires from your facility.
2. List the type of scrap tires removed by quantity or tons.
3. List the place of where the hauler took the scrap tires. ***This is very important!*** *Be sure the hauler tells you where your scrap tires are being delivered and the Maryland scrap tire license/approval number of that destination.* If the scrap tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no scrap tires were hauled from your facility, write **No** scrap tires hauled.

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Steven E Reinker — **Signature**
Steven E. Reinker — **Print Name**
7-25-08 — **Date**

NORTHROP GRUMMAN SYSTEMS CORP
C/O STEVE REINKER
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

Recycled Paper

TABLE-1
Receiving/Generating Report - Incoming Scrap Tire Information

Scrap Tire Generation/Receiving Source	Maryland Scrap Tire Haulers License No. (If applicable)	Type of Scrap Tire (Passenger, Truck)	Scrap Tire Quantity(ies)	Scrap Tire Weight (Tons)
Company	208-RGC-05734	Aircraft	15	
		TOTAL	15	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TABLE-2
Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
No scrap tires hauled						
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 36

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

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00-633-6101 x3315 • http://www.mde.state.md.us

Waste Management Administration • Solid Waste Program

Semi-Annual Scrap Tire Collection Facility Report

***Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.** Please print.

REPORTING PERIOD: January 1 – June 30, 2007
DUE ON OR BEFORE August 1, 2007

Licensee's Name: Northrop Grumman **Scrap Tire Collection Facility License No.:** 2003-RGC-05734

Licensee's Mailing Address: 701 Wilson Point Rd Box 4

City: Baltimore **County:** Baltimore **State:** MD **Zip:** 21220

Facility's Name: Martin State Airport **Facility's Contact Person Name:** Steve Reinker

Facility's Location Address: 701 Wilson Point Rd. Hangar 5

City: Baltimore **County:** Baltimore **State:** MD **Zip:** 21220

Telephone No.: (410) 391 - 1445 **Facsimile No.:** (410) 391 - 6695

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

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By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Doug Klenke — **Signature**

Doug Klenke — **Print Name**

7/18-07 — **Date**

RECEIVED
JUL 23 2007
COMPLIANCE, ENFORCEMENT & DATA MANAGEMENT DIVISION

Form Number: MDE/WAS/LIC.007
Date: July 1, 2005
TTY Users: 800-201-7165

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TABLE-1
Receiving/Generating Report - Incoming Scrap Tire Information

Scrap Tire Generation/Receiving Source	Maryland Scrap Tire Haulers License No. (If applicable)	Type of Scrap Tire (Passenger, Truck)	Scrap Tire Quantity(ies)	Scrap Tire Weight (Tons)
Company	2003-RGC-05734	Aircraft	9	
		TOTAL	9	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TABLE-2
Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
Unishippers/ Pitt-Ohio	N/A	Air Craft	Wilkerson Tire Co 206 West Virgina Ave Crewe, VA 23930	N/A	63	
Tires were shipped to Wilkerson for re-treading.						
				TOTAL	63	

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 9

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

5734

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3315 • 800-633-6101 x3315 • http://www.mde.state.md.us

Waste Management Administration • Solid Waste Program

Semi-Annual Scrap Tire Collection Facility Report

***Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.** Please print.

REPORTING PERIOD: July 1 – December 1, 2006
DUE ON OR BEFORE February 1, 2007

Licensee's Name: Northrop Grumman **Scrap Tire Collection Facility License No.:** 2003-RGC-05734

Licensee's Mailing Address: 701 Wilson Point Rd Box 4

City: Baltimore **County:** Baltimore **State:** MD **Zip:** 21220

Facility's Name: Martin State Airport **Facility's Contact Person Name:** Steve Reinker

Facility's Location Address: 701 Wilson Point Rd Hangar 5

City: Baltimore **County:** Baltimore **State:** MD **Zip:** 21220

Telephone No.: (410) 391 - 1445 **Facsimile No.:** (410) 391 - 6695

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RECEIVED
JUL 23 2007
COMPLIANCE ENFORCEMENT & DATA MANAGEMENT DIVISION

[signature] Doug Klevisha 7-18-07

Signature **Print Name** **Date**

Form Number: MDE/WAS/LIC.007
Date: July 1, 2005
TTY Users: 800-201-7165

Recycled Paper

TABLE-1
Receiving/Generating Report - Incoming Scrap Tire Information

Scrap Tire Generation/Receiving Source	Maryland Scrap Tire Haulers License No. (If applicable)	Type of Scrap Tire (Passenger, Truck)	Scrap Tire Quantity(ies)	Scrap Tire Weight (Tons)
None	Received			
		TOTAL		

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TABLE-2
Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
No	Scrap	tires	hauled			
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 63

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Solid Waste Program – 1800 Washington Blvd, Suite 605 - Baltimore, Maryland 21230-1719
410-537-3315 800-633-6101x3315 (within Maryland) http:/www.mde.state.md.us

5734

SOLID WASTE PROGRAM

SEMI-ANNUAL SCRAP TIRE COLLECTION FACILITY REPORT

Please print

* **Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.**

REPORTING PERIOD January1 – June 30, 2006
DUE ON OR BEFORE August 1, 2006

YOUR BUSINESS'S SCRAP TIRE COLLECTION FACILITY LICENSE NUMBER: 2003-RGC-05734

FACILITY NAME: NG-CMS-MSA FACILITY OWNER: Maryland Aviation Admin.

FACILITY MAILING ADDRESS: 701 Wilson Point Rd., Martin State Airport, Hangar 5 Baltimore, MD 21220

FACILITY LOCATION: Same

TELEPHONE: 410-391-1445

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the tires came from.
   A. If from Hauler, list the haulers name and MDE License number in the appropriate boxes.
   B. If from individuals hauling less than 5 tire/year, write a Private in the Source column; and None in the License Number boxes. If you receive tires from many individuals, group them as a single entry.
   C. If the tires are generated from your business, write Company in the Source column, and your license number in the License Number column.
2. List the type of tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of tires or tonnage.
3. If no tires were received during this period, write None Received across the table.

TABLE 2:

1. List the name and MDE License number of the hauler who removed tires from your facility.
2. List the type of tires removed by quantity or tons.
3. List where the hauler took the tires. *This is very important! Be sure the hauler tells you where your tires are being delivered and the MDE license/approval number of that destination.* If the tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no tires were hauled from your facility, write No tires hauled

I certify, to the best of my knowledge, that the semi-annual operational information provided on this form and any attached documents, are accurate and based upon actual records maintained as required by the conditions of the Scrap Tire Facility license. These semi-annual operational records will be made available to the MDE for auditing purposes, if requested.

Signature/Name Director Title 25 July 06 Date

RECEIVED
AUG 03 2006
COMPLIANCE ENFORCEMENT &
DATA MANAGEMENT DIVISION

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

Recycled Paper

RECEIVING/GENERATING REPORT- INCOMING SCRAP TIRE INFORMATION

BLE 1

Tire Generating/Receiving Source	Tire Haulers MDE License No (If applicable)	Tire Type (passenger, truck)	Tire Quantity	Weight (Tons)
Company		Aircraft	11	
		TOTAL	11	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TRANSFER REPORT – OUTGOING SCRAP TIRE INFORMATION

TABLE 2

Name of Hauler	Hauler's MDE License No.	Tire Type	Destination Facility Name/Address	Facilitys License/ Permit No	Tire Quantity	Weight (Tons)
No tires hauled						
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 63

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM/COMPLIANCE PROJECTS & DATA MANAGEMENT
1800 WASHINGTON BLVD, SUITE 605
BALTIMORE, MARYLAND 21230-1719

5734

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3315 • 800-633-6101 x3315 • http://www.mde.state.md.us

Waste Management Administration • Solid Waste Program

Semi-Annual Scrap Tire Collection Facility Report

*Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period. Please print.

REPORTING PERIOD: July 1 – December 31, 2005
DUE ON OR BEFORE February 1, 2006

Licensee's Name: Northrop Grumman Corp Scrap Tire Collection Facility License No.: 2003RGC05734

Licensee's Mailing Address: 701 Wilson Point Rd Box 4

City: Baltimore County: Baltimore State: MD Zip: 21220

Facility's Name: NG - CMS - MSA Facility's Contact Person Name: Steven Reinker

Facility's Location Address: 701 Wilson Point Rd Hangar 5

City: Baltimore County: Baltimore State: MD Zip: 21220

Telephone No.: (410) 391 - 1445 Facsimile No.: (410) 391 - 6695

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the scrap tires came from:
   A. If from haulers, please list the hauler's names and their Maryland Scrap Tire Hauler License Numbers in the appropriate boxes.
   B. If from individuals hauling less than 5 scrap tires, please write **Private** in the **Source** column; and **None** in the **License Number** boxes. If you receive scrap tires from many individuals, group them as a single entry.
   C. If the scrap tires are generated from your business, write **Company** in the **Source** column, and your license number in the **License Number** column.
2. List the type of scrap tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of scrap tires or tonnage.
3. If no scrap tires were received during this period, write **None** received across the table.

TABLE 2:

1. List the name and license number of the scrap tire hauler who removed scrap tires from your facility.
2. List the type of scrap tires removed by quantity or tons.
3. List the place of where the hauler took the scrap tires. ***This is very important!*** *Be sure the hauler tells you where your scrap tires are being delivered and the Maryland scrap tire license/approval number of that destination.* If the scrap tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no scrap tires were hauled from your facility, write **No** scrap tires hauled.

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Dan Franco Dan Franco 23 Jan 06

Signature Print Name Date

RECEIVED
FEB 03 2006
COMPLIANCE ENFORCEMENT & DATA MANAGEMENT DIVISION

Form Number: MDE/WAS/LIC.007
Date: July 1, 2005
TTY Users: 800-201-7165

NORTHROP GRUMMAN SYSTEMS CORP
325
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734

TABLE-1
Receiving/Generating Report - Incoming Scrap Tire Information

Scrap Tire Generation/Receiving Source	Maryland Scrap Tire Haulers License No. (If applicable)	Type of Scrap Tire (Passenger, Truck)	Scrap Tire Quantity(ies)	Scrap Tire Weight (Tons)
Company	2003-RGC-05734	Aircraft	2	
		TOTAL	2	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TABLE-2
Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
	NO scrap tires hauled					
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 52

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

5734

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3315 • 800-633-6101 x3315 • http://www.mde.state.md.us

Waste Management Administration • Solid Waste Program

Semi-Annual Scrap Tire Collection Facility Report

*Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period. Please print.

REPORTING PERIOD: January 1 – June 30, 2005
DUE ON OR BEFORE August 1, 2005

Licensee's Name: Northrop Grumman Corp. Scrap Tire Collection Facility License No.: 2003 RGC 05734

Licensee's Mailing Address: 701 Wilson Point Rd Box 4

City: Baltimore County: Baltimore State: MD Zip: 21220

Facility's Name: NG-CMS-MSA Facility's Contact Person Name: Steven Reinker

Facility's Location Address: 701 Wilson Point Rd Hangar 5

City: Baltimore County: Baltimore State: MD Zip: 21220

Telephone No.: (410) 391 - 1445 Facsimile No.: (410) 391 - 6695

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the scrap tires came from:
   A. If from haulers, please list the hauler's names and their Maryland Scrap Tire Hauler License Numbers in the appropriate boxes.
   B. If from individuals hauling less than 5 scrap tires, please write **Private** in the **Source** column; and **None** in the **License Number** boxes. If you receive scrap tires from many individuals, group them as a single entry.
   C. If the scrap tires are generated from your business, write **Company** in the **Source** column, and your license number in the **License Number** column.
2. List the type of scrap tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of scrap tires or tonnage.
3. If no scrap tires were received during this period, write **None** received across the table.

TABLE 2:

1. List the name and license number of the scrap tire hauler who removed scrap tires from your facility.
2. List the type of scrap tires removed by quantity or tons.
3. List the place of where the hauler took the scrap tires. ***This is very important!*** *Be sure the hauler tells you where your scrap tires are being delivered and the Maryland scrap tire license/approval number of that destination.* If the scrap tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no scrap tires were hauled from your facility, write **No** scrap tires hauled.

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Signature: Dan Franco Print Name: Dan Franco Date: 12 Jan 06

RECEIVED
JAN 18 2006
COMPLIANCE ENFORCEMENT & DATA MANAGEMENT

TABLE-1
Receiving/Generating Report - Incoming Scrap Tire Information

Scrap Tire Generation/Receiving Source	Maryland Scrap Tire Haulers License No. (If applicable)	Type of Scrap Tire (Passenger, Truck)	Scrap Tire Quantity(ies)	Scrap Tire Weight (Tons)
Company	2003-RGC-05734	Aircraft	16	
		TOTAL	16	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TABLE-2
Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
	No scrap tires hauled					
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: 50

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

Form Number: MDE/WAS/LIC.007
Date: July 1, 2005
TTY Users: 800-201-7165

Recycled Paper

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Solid Waste Program – 1800 Washington Blvd, Suite 605 - Baltimore, Maryland 21230-1719
410-537-3315 800-633-6101x3315 (within Maryland) http:/www.mde.state.md.us

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SOLID WASTE PROGRAM

SEMI-ANNUAL SCRAP TIRE COLLECTION FACILITY REPORT

Please print

* **Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.**

REPORTING PERIOD **July 1 – December 31, 2004**
DUE ON OR BEFORE **February 1, 2005**

YOUR BUSINESS'S SCRAP TIRE COLLECTION FACILITY LICENSE NUMBER: 2003-RGC-05734

FACILITY NAME: NG-CMS-MSA FACILITY OWNER: Maryland Aviation Admin.

FACILITY MAILING ADDRESS: 701 Wilson Point Rd, Martin State Airport - HGR 5, Baltimore, MD 21220

FACILITY LOCATION: Same

TELEPHONE: 410-391-1445

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the tires came from.
   A. If from Hauler, list the haulers name and MDE License number in the appropriate boxes.
   B. If from individuals hauling less than 5 tire/year, write a Private in the Source column; and None in the License Number boxes. If you receive tires from many individuals, group them as a single entry.
   C. If the tires are generated from your business, write Company in the Source column, and your license number in the License Number column.
2. List the type of tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of tires or tonnage.
3. If no tires were received during this period, write None Received across the table.

RECEIVED
FEB 02 2005
COMPLIANCE ENFORCEMENT & DATA MANAGEMENT DIVISION

TABLE 2:

1. List the name and MDE License number of the hauler who removed tires from your facility.
2. List the type of tires removed by quantity or tons.
3. List where the hauler took the tires. *This is very important! Be sure the hauler tells you where your tires are being delivered and the MDE license/approval number of that destination.* If the tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no tires were hauled from your facility, write No tires hauled

I certify, to the best of my knowledge, that the semi-annual operational information provided on this form and any attached documents, are accurate and based upon actual records maintained as required by the conditions of the Scrap Tire Facility License. These semi-annual operational records will be made available to the MDE for auditing purposes, if requested.

Signature/Name Director Title Date

NORTHROP GRUMMAN SYSTEMS
CORP 325
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734

RECEIVING/GENERATING REPORT- INCOMING SCRAP TIRE INFORMATION

TABLE 1

Tire Generating/Receiving Source	Tire Haulers MDE License No (If applicable)	Tire Type (passenger, truck)	Tire Quantity	Weight (Tons)
Company	2003-RGC-05734	Aircraft	3	
		TOTAL	3	

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TRANSFER REPORT – OUTGOING SCRAP TIRE INFORMATION

TABLE 2

Name of Hauler	Hauler's MDE License No.	Tire Type	Destination Facility Name/Address	Facilitys License/ Permit No	Tire Quantity	Weight (Tons)
No tires hauled						
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD:

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM/COMPLIANCE PROJECTS & DATA MANAGEMENT
1800 WASHINGTON BLVD, SUITE 605
BALTIMORE, MARYLAND 21230-1719

MARYLAND DEPARTMENT OF THE ENVIRONMENT

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1800 Washington Boulevard - Suite 605 - Baltimore, Maryland 21230-1719
(410) 537-3315 800-633-6101x3315 (within Maryland) http:/www.mde.state.md.us

SOLID WASTE PROGRAM

SEMI-ANNUAL SCRAP TIRE COLLECTION FACILITY REPORT

Please print

*** Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.**

REPORTING PERIOD — January 1 – June 30, 2004
DUE ON OR BEFORE August 1, 2004

YOUR BUSINESS'S SCRAP TIRE COLLECTION FACILITY LICENSE NUMBER: 2003-RGC-05734

FACILITY NAME: NG-CMS-MSA FACILITY OWNER: Maryland Aviation Admin.

FACILITY MAILING ADDRESS: 701 Wilson Point Rd, Martin State Airport, Hangar 5, Baltimore, MD 21220

FACILITY LOCATION: Same

TELEPHONE: 410-391-1445

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the tires came from.
   - A. If from Hauler, list the haulers name and MDE License number in the appropriate boxes.
   - B. If from individuals hauling less than 5 tire/year, write a Private in the Source column; and None in the License Number boxes. If you receive tires from many individuals, group them as a single entry.
   - C. If the tires are generated from your business, write Company in the Source column, and your license number in the License Number column.
2. List the type of tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of tires or tonnage.
3. If no tires were received during this period, write ☐None Received across the table.

TABLE 2:

1. List the name and MDE License number of the hauler who removed tires from your facility.
2. List the type of tires removed by quantity or tons.
3. List where the hauler took the tires. *This is very important! Be sure the hauler tells you where your tires are being delivered and the MDE license/approval number of that destination.* If the tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no tires were hauled from your facility, write No tires hauled

I certify, to the best of my knowledge, that the semi-annual operational information provided on this form and any attached documents, are accurate and based upon actual records maintained as required by the conditions of the Scrap Tire Facility License. These semi-annual operational records will be made available to the MDE for auditing purposes, if requested.

Signature/Name | Director (Title) | 21 Dec 04 (Date)

RECEIVED
DEC 27 2004
COMPLIANCE ENFORCEMENT & DATA MANAGEMENT DIVISION

RECEIVING/GENERATING REPORT- INCOMING SCRAP TIRE INFORMATION

TABLE 1

Tire Generating/Receiving Source	Tire Haulers MDE License No (If applicable)	Tire Type (passenger, truck)	Tire Quantity	Weight (Tons)
Company	2003-RGC-05734	Aircraft	22	1/4
		TOTAL		

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TRANSFER REPORT – OUTGOING SCRAP TIRE INFORMATION

TABLE 2

Name of Hauler	Hauler's MDE License No.	Tire Type	Destination Facility Name/Address	Facilitys License/ Permit No	Tire Quantity	Weight (Tons)
No tires hauled						
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD:

PLEASE SEND COMPLETED REPORT TO:

MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM
1800 Washington Boulevard, Suite 605
Baltimore, Maryland 21230-1719

MARYLAND DEPARTMENT OF THE ENVIRONMENT
Solid Waste Program – 1800 Washington Blvd, Suite 605 - Baltimore, Maryland 21230-1719
410-537-3315 800-633-6101x3315 (within Maryland) http:/www.mde.state.md.us

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SOLID WASTE PROGRAM

SEMI-ANNUAL SCRAP TIRE COLLECTION FACILITY REPORT

Please print

* Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.

REPORTING PERIOD July 1 – December 31, 2003
DUE ON OR BEFORE February 1, 2004

YOUR BUSINESS'S SCRAP TIRE COLLECTION FACILITY LICENSE NUMBER: 2003-RGC-05734

FACILITY NAME: NG-CMS-MSA FACILITY OWNER: Maryland Aviation Admin.

FACILITY MAILING ADDRESS: 701 Wilson Point Road, Martin State Airport, Hangar 5, Baltimore, MD 21220.

FACILITY LOCATION: Same

TELEPHONE: 410-391-1445

INSTRUCTIONS FOR COMPLETING TABLES ON REVERSE SIDE

TABLE 1:

1. List where the tires came from.
   A. If from Hauler, list the haulers name and MDE License number in the appropriate boxes.
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   C. If the tires are generated from your business, write Company in the Source column, and your license number in the License Number column.
2. List the type of tires (i.e. passenger, truck) collected at your facility. This can be reported as quantity of tires or tonnage.
3. If no tires were received during this period, write None Received across the table.

TABLE 2:

1. List the name and MDE License number of the hauler who removed tires from your facility.
2. List the type of tires removed by quantity or tons.
3. List where the hauler took the tires. *This is very important! Be sure the hauler tells you where your tires are being delivered and the MDE license/approval number of that destination.* If the tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. If no tires were hauled from your facility, write No tires hauled

I certify, to the best of my knowledge, that the semi-annual operational information provided on this form and any attached documents, are accurate and based upon actual records maintained as required by the conditions of the Scrap Tire Facility License. These semi-annual operational records will be made available to the MDE for auditing purposes, if requested.

Daniel O Franco Director 19 Jan 04

Signature/Name Title Date

Form Number: MDE/WAS/ LIC.007
Revision Date: May 17, 2001
TTY USERS 800-735-2258

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

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JAN 26 2004
COMPLIANCE ENFORCEMENT & DATA MANAGEMENT DIVISION

Recycled Paper

RECEIVING/GENERATING REPORT- INCOMING SCRAP TIRE INFORMATION

TABLE 1

Tire Generating/Receiving Source	Tire Haulers MDE License No (If applicable)	Tire Type (passenger, truck)	Tire Quantity	Weight (Tons)
Company	2003-RGC-05734	Aircraft	24	1/4
		TOTAL		

PLEASE MAKE ADDITIONAL COPIES IF NECESSARY

TRANSFER REPORT – OUTGOING SCRAP TIRE INFORMATION

TABLE 2

Name of Hauler	Hauler's MDE License No.	Tire Type	Destination Facility Name/Address	Facilitys License/ Permit No	Tire Quantity	Weight (Tons)
No tires hauled						
				TOTAL		

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD:

PLEASE SEND COMPLETED REPORT TO:
MARYLAND DEPARTMENT OF THE ENVIRONMENT
SOLID WASTE PROGRAM/COMPLIANCE PROJECTS & DATA MANAGEMENT
1800 WASHINGTON BLVD, SUITE 605
BALTIMORE, MARYLAND 21230-1719

MEMORANDUM

MDE

Solid Waste Program
Design and Certification Division
NEW / RENEWAL / REPLACEMENT # / /

SCRAP TIRES RECYCLING

To: File #2003- RGC / RSC / RTH -05734 **Applicants Name:**
From: Riyaz A. Kazi 1.
Subject: Application Review 2.
Review Date: 10 -20 - 2003 **Phone Nos.**: 1. 2.

1. Application is: complete / incomplete
2. Comptroller Office: applicable/not applicable/approved/not approved **STAT:**
3. The information provided in the application is as follows:
   - A YES / NO / (na) -Vehicle information provided
   - b. YES / NO / (na) - Collectn. Inform. provided
   - c. (YES) / NO / na -Hauler information provided
   - d. (YES) / NO -Scrap tires disposal information provided Brown Station Rd LF 1998 R 00135
   - e. (YES) / NO -Workers' Comp (WC) Ins. / WC Compliance Cert. Provided
   - f. (YES) / NO. - STAT Registered STATUS:-(Corp.)/Active/Inactive/Other_____
     SDAT ID No: 1. F04330890 2.
   - g. YES / NO / na -Any other required information-(SECTION: ITEM:)

FOLLOW-UP/LICENSE STATUS/FILE ACTION INFORMATION: **License Issue Date:** 10 -24 -2003

Contacted	Particulars
10/22	OK

FILE TRACK: RF → KH → ____ → ____ → ____ → ____ → ____ → ____ → ____ → ____ → ____ → ____ →
(W/ DATE) 10/20/03 10/22/03
[Workers Comp. Contact:(410) 864-5297 {(410) 864-5290 Ms Wingate} [SDAT Contact:(410) 767-1340]

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
MDE 410-537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. Philbrick
Acting Secretary

October 20, 2003

Mr. Dan Franco
Northrop Grumman Systems Corporation
701 Wilson Point Road, Box 4
Baltimore MD 21220

Dear Mr. Franco:

The Maryland Department of the Environment (the "Department") acknowledges the receipt of your new application for a General Scrap Tire Collection Facility License, dated September 26, 2003. The standard application review time for a completed application of this type is 45 to 60 days.

The Department is in the process of reviewing your application and will contact you if additional information is required. The Department will notify you in writing of its decision when the processing of your application is completed.

For document control purposes, the Department has assigned the following number: 05734. Please include this number when writing to us regarding your application. If you have any questions regarding this matter, please feel free to call me at (410) 537-3315.

Sincerely,

Riyaz A. Kazi, Project Manager
Design & Certification Division

RAK:RAK:rak

cc: Mr. Jonas A. Jacobson

Maryland Department of Assessments and Taxation

Taxpayer Services Division
301 West Preston Street Baltimore, Maryland 21201

Taxpayer Services Division

Entity Name: NORTHROP GRUMMAN SYSTEMS CORPORATION
Dept. ID #: F04330890

General Information | **Amendments** | **Personal Property** | **Certificate of Status**

Principal Office (Current):	1840 CENTURY PARK EAST LOS ANGELES, CA 90067
Resident Agent (Current):	THE CORPORATION TRUST INCORPORATED 300 E LOMBARD ST BALTIMORE, MD 21202
Status:	INCORPORATED
Good Standing:	Yes
Business Code:	Ordinary Business - Stock
Date of Formation or Registration:	02/12/1996
State of Formation:	DE
Stock/Nonstock:	Stock
Close/Not Close:	Unknown

Link Definition

General Information	General information about this entity
Amendments	Original and subsequent documents filed
Personal Property	Personal Property Return Filing Information and Personal Property Assessments
Certificate of Status	Get a Certificate of Good Standing for this entity.

5734

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

NOTICE OF VIOLATION

May 8, 2009

CERTIFIED MAIL
Return Receipt Requested

NORTHROP GRUMMAN SYSTEMS CORP

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

ENDER: *COMPLETE THIS SECTION*

Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired. Print your name and address on the reverse so that we can return the card to you. Attach this card to the back of the mailpiece, or on the front if space permits.

Article Addressed to:

NORTHROP GRUMMAN SYSTEMS CORP
C/O STEVE REINKER
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 NOV-WAS-09-ST-180 325

COMPLETE THIS SECTION ON DELIVERY

A. Signature: X — ☐ Agent ☐ Addressee

B. Received by (Printed Name): Michael Hagan — C. Date of Delivery: 05/12/09

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

MAY 12 2009

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

Article Number *(Transfer from service label)* 7002 3150 0000 1140 2697

S Form 3811, August 2001 Domestic Return Receipt 102595-02-M-1540

ndicates that
emi-annual report
l, to December 31, 2007. Failure to submit the
land Regulations

sure that scrap tires are
pen dumping. With this
licensed haulers, to
rting requirements for
intaining written records
will be illegally dumped.
Failure to maintain the required records and submit the semi-annual reports undermines this important part of the regulatory system.

This Administration sent you a reminder notice with a report form enclosed, stating that the semi-annual report must be filled out and returned. More recently, the Administration sent you a final notice that your semi-annual report was overdue, and gave you fifteen (15) additional days to submit the report. To date, we have not received it. This Notice of Violation is your third written notice that the semi-annual report must be submitted.

The Administration is willing to settle this matter in return for a settlement payment of $500.00 and submittal of the missing semi-annual report. If you choose to settle this matter, please send a check for $500.00 payable to the Maryland Clean Water Fund within the next twenty (20) days to:

Maryland Clean Water Fund
Maryland Department of the Environment
P.O. Box 1417
Baltimore MD 21203-1417

State law allows the Maryland Department of the Environment to seek civil penalties in the amount of $10,000 per violation per day for violations of scrap tire regulations or license requirements. The missing semi-annual report should be sent to:

Maryland Department of the Environment
Solid Waste Program
1800 Washington Boulevard, Suite 605
Baltimore MD 21230-1719

To ensure that your payment is properly credited, please write the reference NOV number on your check, and return a copy of this letter with your payment. If you elect to settle this matter, you will not be admitting any of the allegations stated herein.

If you fail to settle by submitting the required report and the above payment, this matter may be referred to the Office of the Attorney General for further enforcement action. Such enforcement action may include a penalty, an order, and/or the suspension or revocation of your scrap tire license. Any subsequent violations would subject you to additional enforcement action. Therefore, you are advised to maintain compliance with applicable Maryland regulations and licenses. Please direct any questions or comments in this matter to Ms. Abigail Pascual, Head, Project Management Section at (410) 537-3315.

Sincerely,

Horacio Tablada, Director
Waste Management Administration

HT:AP:af

cc: Ms. Abigail Pascual

ST PCA 13760 Object 7588 Suffix 626

5734

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
410-537-3000 • 1-800-633-6101

DE

in O'Malley
ernor

ony G. Brown
enant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

NOTICE OF VIOLATION

May 8, 2009

RTIFIED MAIL
urn Receipt Requested

RTHROP GRUMMAN SYSTEMS CORP
STEVE REINKER
WILSON POINT RD
TIMORE MD 21220

NOV-WAS-09-ST-180

Licensee:

A review of the Waste Management Administration's records indicates that THROP GRUMMAN SYSTEMS CORP has failed to submit a semi-annual report narizing the scrap tire transactions for the time period from **July 1, to December 31, 2007.** report is required by your scrap tire license No. **2003RGC05734.** Failure to submit the annual report is a violation of your license and the Code of Maryland Regulations AR) 26.04.08 regarding scrap tire management.

Maryland's system of regulating scrap tires was designed to ensure that scrap tires are recycled to the maximum extent possible, and to prevent their open dumping. With this n mind, the regulations require that scrap tires be hauled only by licensed haulers, to ed or approved collection facilities. The record keeping and reporting requirements for s and collection facilities are an essential part of the system. Maintaining written records itimate scrap tire transactions reduces the chances that scrap tires will be illegally dumped. e to maintain the required records and submit the semi-annual reports undermines this tant part of the regulatory system.

This Administration sent you a reminder notice with a report form enclosed, stating that ni-annual report must be filled out and returned. More recently, the Administration sent inal notice that your semi-annual report was overdue, and gave you fifteen (15) additional submit the report. To date, we have not received it. This Notice of Violation is your ritten notice that the semi-annual report must be submitted.

5734

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Certified Fee JUL 06 2007 Postmark Here
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Total

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

PS Form 3800, June 2002 See Reverse for Instructions

7003 0500 0001 2779 5262

SENDER: COMPLETE THIS SECTION
- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to: NORTHROP GRUMMAN SYSTEMS CORP C/O DAN FRANCO 701 WILSON POINT RD BALTIMORE MD 21220 2003RGC05734 325

2. Article Number (Transfer from service label) 7003 0500 0001 2779 5262

3. Service Type: ☑ Certified Mail ☐ Express Mail ☐ Registered ☐ Return Receipt for Merchandise ☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

COMPLETE THIS SECTION ON DELIVERY
A. Signature X ☐ Agent ☐ Addressee
B. Received by (Printed Name) C. Date of Delivery 7-10-07
D. Is delivery address different from item 1? ☐ Yes If YES, enter delivery address below: ☐ No

PS Form 3811, February 2004 Domestic Return Receipt 2ACPRI-03-Z-0995

...IENT OF THE ENVIRONMENT

...uite 605 • Baltimore MD 21230-1719
...101

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

...ER NOTICE

JUL 06 2007

Department of the Environment (the "Department") **has** ... tire license(s) for the period ... **1, 2007**. Your ...he designated ... closed semi- ...omit it to the ...

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

...quire licensees' ...t reports to the ... year. A report ...ear is due no later than August 1 following the reporting ... December of each year is due no later than February 1

Please be advised, you are currently in violation of your scrap tire license(s). By this notice, the Department is providing you an opportunity to submit this report and come into compliance with this license condition. Failure to submit this information within 15 days of receipt of this notice will result in the Department evaluating further enforcement options to bring your facility into compliance. If you have already submitted the report and this letter was sent to you by mistake, please send a copy of the report along with this letter to the Department so we can clear your record.

Thank you for your cooperation. If you need assistance in completing this form please call Ms. Valerie Norman, Administrative Specialist, at (410) 537-3315.

Sincerely,

Tariq Masood, Head
Office of Reports & Data Management

JRR:TM:af
Enclosure
cc: Mr. Horacio Tablada

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

REMINDER NOTICE

Certified Mail
Return Receipt Requested

JUL 06 2007

Dear Scrap Tire Licensee:

The Solid Waste Program of the Maryland Department of the Environment (the "Department") **has not received a semi-annual report** for your scrap tire license(s) for the period of **July 1 – December 31, 2006** due on **February 1, 2007**. Your license(s) number(s) are provided on the label in the designated block directly to the right. Please complete the enclosed semi-annual report form for the period specified and submit it to the Department.

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

Please note that Scrap Tire Regulations require licensees' to maintain scrap tire activity records and submit reports to the Department by February 1 and August 1 of each year. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period.

Please be advised, you are currently in violation of your scrap tire license(s). By this notice, the Department is providing you an opportunity to submit this report and come into compliance with this license condition. Failure to submit this information within 15 days of receipt of this notice will result in the Department evaluating further enforcement options to bring your facility into compliance. If you have already submitted the report and this letter was sent to you by mistake, please send a copy of the report along with this letter to the Department so we can clear your record.

Thank you for your cooperation. If you need assistance in completing this form please call Ms. Valerie Norman, Administrative Specialist, at (410) 537-3315.

Sincerely,

Tariq Masood, Head
Office of Reports & Data Management

JRR:TM:af
Enclosure
cc: Mr. Horacio Tablada

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Restricted Delivery Fee (Endorsement Required)	
Total P	

1/25/06 Postmark Here

2004RGC05822 / 06/30/2005

Sent To: NORTHROP GRUMMAN SYSTEMS CORP
Street, Ap or PO Bo: 325 C/O DAN FRANCO 701 WILSON POINT RD
City, Stat: BALTIMORE MD 21220

PS Form 3800, June 2002 See Reverse for Instructions

7002 2410 0005 8914 3802

...OF THE ENVIRONMENT
• Baltimore MD 21230-1719

5734

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

January 26, 2006

Dear Scrap Tire Licensee:

The Solid Waste Program of the Maryland Department of the Environment (the "Department") did ...t receive a semi-annual report for your scrap tire license(s) for the period ...st 1 following the reporting ...ue no later than February 1 ...se(s). By this notice, the ...compliance with this license ...otice will result in the ...ompliance. If you have ...ter to the Department so we can clear your record.

SENDER: COMPLETE THIS SECTION
- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:
2004RGC05822 / 06/30/2005
NORTHROP GRUMMAN SYSTEMS CORP
325
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220

COMPLETE THIS SECTION ON DELIVERY
A. Signature X ☐ Agent ☐ Addressee
B. Received by (Printed Name) C. Date of Delivery 01/30/06
D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No
RECEIVED JAN 31 2006
COMPLIANCE ENFORCEMENT & DATA MANAGEMENT DIVISION
3. Service Type ☑ Certified Mail ☐ Express Mail ☐ Registered ☐ Return Receipt for Merchandise ☐ Insured Mail ☐ C.O.D.
4. Restricted Delivery? (Extra Fee) ☐ Yes

2 7002 2410 0005 8914 3802

PS Form 3811, August 2001 Domestic Return Receipt 102595-02-M-1540

GRUMMAN SYSTEMS CORP
...NCO
...POINT RD
MD 21220
...34 / 06/30/2005

Thank you for your cooperation. If you need assistance in completing this form please call Ms. Valerie Norman, Administrative Specialist, at (410) 537-3315.

Sincerely,

Tariq Masood, Head
Compliance Projects & Data Management Section

JRR:TM:af
Enclosure
cc: Mr. Horacio Tablada

Certified Mail may ONLY be combined with First-Class Mail® or Priority Mail®.
Certified Mail is *not* available for any class of International mail.
NO INSURANCE COVERAGE IS PROVIDED with Certified Mail. For valuables, please consider Insured or Registered Mail.

MDE — DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
(410) 537-3000 • 1-800-633-6101

5734

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

FINAL NOTICE

Certified Mail
Return Receipt Requested

January 26, 2006

Dear Scrap Tire Licensee:

The Solid Waste Program of the Maryland Department of the Environment (the "Department") **did not receive a semi-annual report** for your scrap tire license(s) for the period of **January 1 – June 30, 2005** due on **August 1, 2005**. Your license(s) information is provided on the label in the designated block directly to the right. Please complete the enclosed semi-annual report form for the period specified and submit it to the Department.

NORTHROP GRUMMAN SYSTEMS CORP
325
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 / 06/30/2005

Please note that Scrap Tire Regulations require licensees' to maintain scrap tire activity records and submit reports to the Department by February 1 and August 1 of each year. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period.

Please be advised, you are currently in violation of your scrap tire license(s). By this notice, the Department is providing you a **last chance** to submit these reports and to be in compliance with this license condition. Failure to submit this information within 15 days of receipt of this notice will result in the Department evaluating further enforcement options to bring your facility into compliance. If you have already sent the report, please *re-submit* a copy of the report along with this letter to the Department so we can clear your record.

Thank you for your cooperation. If you need assistance in completing this form please call Ms. Valerie Norman, Administrative Specialist, at (410) 537-3315.

Sincerely,

Tariq Masood, Head
Compliance Projects & Data Management Section

JRR:TM:af
Enclosure
cc: Mr. Horacio Tablada

MDE

THE ENVIRONMENT
altimore MD 21230-1719

Robert L. E
Governor

Michael S.
Lt. Governo

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

5734

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11/28/05

Sent To NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
Street, Ap or PO Bo 701 WILSON POINT RD
City, State BALTIMORE MD 21220
2003RGC05734 325

PS Form 3800, June 2002 See Reverse for Instructions

November 28, 2005

Certified M
Return Recei

Dear Scrap Tire Licensee:

The Solid Waste Program of the Maryland Department of the Environment (the "Department") **has not received a semi-annual report** for your scrap tire license(s) for the period **ugust 1, 2005**. Your abel in the designated te the enclosed semi- d and submit it to the

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

ions require licensees' submit reports to the f each year. A report each year is due no later than August 1 following the reporting rough December of each year is due no later than February 1

in violation of your scrap tire license(s). By this notice, the to submit this report and come into compliance with this ormation within 15 days of receipt of this notice will result in ent options to bring your facility into compliance. If you have vas sent to you by mistake, please send a copy of the report ve can clear your record.

you need assistance in completing this form please call list, at (410) 537-3315.

Sincerely,

Tariq Masood, Head
Compliance Projects & Data Management Section

SENDER: COMPLETE THIS SECTION
■ Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
■ Print your name and address on the reverse so that we can return the card to you.
■ Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to: NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

COMPLIANCE ENFORCEMENT & DATA MANAGEMENT DIVISION
RECEIVED DEC 09 2005

COMPLETE THIS SECTION ON DELIVERY
A. Signature X
B. Received by (Printed Name) C. Date of Delivery
D. Is delivery address different from item 1? Yes No
If YES, enter delivery address below:

3. Service Type ☑ Certified Mail ☐ Express Mail ☐ Registered ☐ Return Receipt for Merchandise ☐ Insured Mail ☐ C.O.D.
4. Restricted Delivery? (Extra Fee) ☐ Yes

7002 2410 0005 8913 4756

102595-02-M-1540 Domestic Return Receipt
PS Form 3811, August 2001

JRR:TM:af
Enclosure
cc: Mr. Horacio Tablada

Certified Mail is not available for any class of International mail.
■ NO INSURANCE COVERAGE IS PROVIDED with Certified Mail valuables, please consider Insured or Registered Mail.
■ For an additional fee, a Return Receipt may be requested to obtain Return Receipt (PS Form 3811) or Delivery Confirmation Receipt (PS Form 3806) or Signature Confirmation Receipt (PS Form 3807).

THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
(410) 537-3000 • 1-800-633-6101

5734

ırlich, Jr.

Kendl P. Philbrick
Secretary

teele

Jonas A. Jacobson
Deputy Secretary

REMINDER NOTICE

il
ɔt Requested

November 28, 2005

re Licensee:

ɔlid Waste Program of the Maryland Department of the Environment (the "Department") **has ı semi-annual report** for your scrap tire license(s) for the period – **June 30, 2005** due on **August 1, 2005**. Your ıber(s) are provided on the label in the designated to the right. Please complete the enclosed semi- form for the period specified and submit it to the

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

ıote that Scrap Tire Regulations require licensees' 'ap tire activity records and submit reports to the February 1 and August 1 of each year. A report ɔf January through June of each year is due no later than August 1 following the reporting ɔrt for the period of July through December of each year is due no later than February 1 'porting period.

ɛ advised, you are currently in violation of your scrap tire license(s). By this notice, the roviding you an opportunity to submit this report and come into compliance with this ı. Failure to submit this information within 15 days of receipt of this notice will result in evaluating further enforcement options to bring your facility into compliance. If you have d the report and this letter was sent to you by mistake, please send a copy of the report tter to the Department so we can clear your record.

ı for your cooperation. If you need assistance in completing this form please call ıan, Administrative Specialist, at (410) 537-3315.

Sincerely,

Tariq Masood, Head
Compliance Projects & Data Management Section

Tablada

5734

U.S. Postal Service
CERTIFIED MAIL RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

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Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total	

12/13/04
Postmark Here

2003RSC05626 5054

Sent To: NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
Street, Apt. No., or PO Box: 701 WILSON POINT RD
City, State, ZIP+4: BALTIMORE MD 21220
2003RGC05734 325

7002 0860 0006 7894 3488

PS Form 3811, August 2001 Domestic Return Receipt 102595-02-M-1540

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

2003RSC05626 5054

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) Bryan Rives C. Date of Delivery 12/22/04

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

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DEC 21 2004
COMPLIANCE ENFORCEMENT & DATA MANAGEMENT

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

1ST TM

RTMENT OF THE ENVIRONMENT

rd, Suite 605 • Baltimore MD 21230-1719
33-6101

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

December 15, 2004

HINDER NOTICE

ıment (the "Department") **did**

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ıs due no later than February 1

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the Department evaluating further enforcement options to bring your facility into compliance. If you have already submitted the report and this letter was sent to you by mistake, please send a copy of the report along with this letter to the Department so we can clear your record.

Thank you for your cooperation. If you need assistance in completing this form please call Ms. Valerie Norman, Administrative Specialist, at (410) 537-3315.

Sincerely,

Tariq Masood

Tariq Masood, Head
Compliance Projects & Data Management Section

JRR:TM:af
Enclosure
cc: Mr. Horacio Tablada

quired.
or an additional fee, delivery may be restricted to
ddressee's authorized agent. Advise the clerk or mark the mailpiece with the
ndorsement "Restricted Delivery".
If a postmark on the Certified Mail receipt is desired, please present the arti-
le at the post office for postmarking. If a postmark on the Certified Mail
detach and affix label with postage and mail.

5734

MDE
MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
(410) 537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

Kendl P. Philbrick
Secretary

Jonas A. Jacobson
Deputy Secretary

REMINDER NOTICE

Certified Mail
Return Receipt Requested

December 15, 2004

First-Cla
Postage
USPS
Permit N

rap Tire Licensee:

The Solid Waste Program of the Maryland Department of the Environment (the "Department") **did eive a semi-annual report** for your scrap tire license(s) for the period **uary 1 – June 30, 2004** due on **August 1, 2004**. Your (s) number(s) are provided on the label in the designated directly to the right. Please complete the enclosed semi- report form for the period specified and submit it to the tment.

NORTHROP GRUMMAN SYSTEMS CORP
C/O DAN FRANCO
701 WILSON POINT RD
BALTIMORE MD 21220
2003RGC05734 325

Please note that Scrap Tire Regulations require licensees' intain scrap tire activity records and submit reports to the rtment by February 1 and August 1 of each year. A report he period of January through June of each year is due no later than August 1 following the reporting d. A report for the period of July through December of each year is due no later than February 1 wing the reporting period.

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Thank you for your cooperation. If you need assistance in completing this form please call Ms. Valerie Norman, Administrative Specialist, at (410) 537-3315.

Sincerely,

Tariq Masood, Head
Compliance Projects & Data Management Section

JRR:TM:af
Enclosure
cc: Mr. Horacio Tablada

RECEIVED
DEC 09 2008
COMPLIANCE AND PROJECT MANAGEMENT DIVISION

MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3375 • 800-633-6101 x3375 • http://www.mde.state.md.us

Waste Management Administration • Solid Waste Program

PLEASE MAIL THIS FORM TO THE "MARYLAND DEPARTMENT OF THE ENVIRONMENT – CUSTOMER SERVICE CENTER"

For office use only	*For office use only*
AI# 4324	2008 RTH 07322

MOPT 08 1202

Scrap Tire Hauler License Application

Authority: Title 9, Environment Article, Annotated Code of Maryland, and Code of Maryland Regulations (COMAR) 26.04.08

"Scrap Tire Hauler" means a person who, as part of a commercial business, transport scrap tires in the State to or from a scrap tire facility as defined in COMAR 26.04.08.02B(20).

Application for: ☑ **New License** ☐ **License Renewal**

Existing License No. _____ *- RTH -* _____ *Issued Date* ____/____/_____ *Expiration Date:* ____/____/_____

Applicant's Legal Name: Maryland Aviation Administration

Applicant's Status: ☐ *Individual* ☐ *Corporation* ☑ *Government* ☐ *Other:* _____

Corporation or Government Federal Tax Identification No.: _____

Maryland State Department of Assessments and Taxation (SDAT) ID No.: 30002563

Please note that a business/entity must be registered to do business in Maryland before a permit can be iss
entity's information provided in this application must match the information in the SDAT register.

2008 RTH 07322

Proof of workers' compensation coverage is required under § 1-202 of the Environment Article. Please
(1) A copy of a Certificate of Compliance issued by the Maryland Workers' Compensation Commission
(2) Worker's Compensation Insurance Policy/Binder Number: 901141

Applicant's Mailing Address 701 Wilson Pt. Rd Box 1 *City:* Middle River *State:* MD *Zip Code:* 21220

County: Baltimore *Telephone No.:* (410) 682-8800 *Facsimile No.:* (410) 682-8822

Please identify the geographical area that you intend to serve during the term of the license being requested by attaching a map describing the area that you serve as a scrap tire hauler; or providing a list of zip code areas to be served.

Please complete Attachment No. I, II and III of this application.

Are you interested in being placed on the list of licensed scrap tire haulers who are interested in providing services on a commercial basis? This list would be distributed to businesses that need scrap tire hauling services. ☐ *YES* ☑ *NO*

By signing this form, I the applicant or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this application are true to the best of my knowledge, information, and belief. I hereby authorize the representatives of the Department to have access to the site of the proposed facility for inspection and to records relating to this application at any reasonable time. I acknowledge that depending on the type of facility applied for, other permits or approvals may be required.

Melvin J Hoeffler JR
Signature of Applicant

11/28/08
Date

Melvin J Hoeffler JR
Applicant's Name (Print)

Supervisor Facilities Maintenance
Title

Privacy Act Notice: This Notice is provided pursuant to the Federal Privacy Act of 1974, 5 U.S.C. §552.a. Disclosure of your Social Security Number or Federal Employer Identification Number on this application is mandatory pursuant to the provisions of §1-203 (2003), Environment Article, Annotated Code of Maryland, which requires the Maryland Department of the Environment to verify that an applicant for a license has paid all undisputed taxes and unemployment insurance. Social Security or Federal Employer Identification Numbers will not be used for any purposes other than those described in this Notice.

For questions regarding this application form, please contact the Department at (410) 537-3375

RECEIVED
DEC 09 2008
COMPLIANCE AND PROJECT
MANAGEMENT DIVISION

ATTACHMENT I

VEHICLE INFORMATION

_____- RTH -_____

Please complete this attachment for each vehicle to be utilized under your license for hauling scrap tires.

STATE	VEHICLE IDENTIFICATION NUMBER (VIN)	VEHICLE REGISTRATION PLATE NUMBER	VEHICLE MAKE/YEAR	LEGAL OWNERSHIP	OWNED/RENTAL	APPROVED BY MDE (*)
MD	1HTLDTVN0HH521954	5G01910	Intel/1987	MAA	Owned	
MD	1FTWW30518EA40978	5G24153	Ford/2008	MAA	Owned	
MD	1FTNF21L04EC93268	5G21278	Ford/2004	MAA	Owned	

Please use additional sheets, if necessary.

Form Number: MDE/WAS/LIC.008
Date: July 1, 2005
TTY Users: 1-800-735-2258

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ATTACHMENT II

IDENTIFICATION OF SCRAP TIRE COLLECTION FACILITIES

_____- RTH -_____

Please complete this attachment for each licensed scrap tire collection facility that you will collect scrap tires from. If you only haul scrap tires from your business location, you must obtain a scrap tire collection facility license for your business and include the required information for this facility. If you are picking up or are proposing to pick up scrap tires from residential properties, illegal tire dumps, or any other location, please identify the locations of these sites on a separate sheet.

Facility Name	Scrap Tire Facility License Number	Location Address	City	State	Zip Code	Phone Number
Martin State Airport	Applying for License	701 Wilson Pt. Rd Box 1	Middle River	MD	21220	410-682-8800
	2008-RGC-07321					

Please use additional sheets, if necessary.

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COMPLIANCE AND PROJECT MANAGEMENT DIVISION

ATTACHMENT III

IDENTIFICATION OF SCRAP TIRE DELIVERY FACILITIES

_____- RTH -_____

Please complete this attachment for each scrap tire collection facility that you are or will be delivering scrap tires to.

Facility Name	Scrap Tire Facility License Number	Location Address	City	State	Zip Code	Phone Number
BWI Thurgood Marshall Airport	2008-RSC-07834	7001 Aviation Blvd	BWI Airport	MD	21240	410-859-7025

Please use additional sheets, if necessary.

Form Number: MDE/WAS/LIC.008
Date: July 1, 2005
TTY Users: 1-800-735-2258

Recycled Paper

Locked 2/25/2009

MDE

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

February 5, 2008

Mr. Melvin J. Hoefler
Maryland Aviation Administration
Martin State Airport
701 Wilson Point Road, Box 1
Middle River MD 21220

Dear Mr. Hoefler:

Enclosed is Maryland Scrap Tire Hauler License No. **2008-RTH-07322**, which authorizes the transportation of scrap tires in the State of Maryland to or from scrap tire facilities licensed or approved by the Maryland Department of the Environment (the "Department"), as specified in your application of November 28, 2008.

To avoid violation of this license, please have your clients show you their current Maryland Scrap Tire License prior to providing services. Also, you should verify that the site to which your scrap tires are being taken is a facility licensed or approved by the Department by obtaining their license number. If you collect tires at your own location, you must also have a current Maryland Scrap Tire License.

Please note that this license is subject to the enclosed terms and conditions. This license may be appealed by filing a written request for a hearing within thirty (30) days of receipt of this license. The request should be addressed to Mr. Horacio Tablada, Director, Waste Management Administration, at the Department's address. You will subsequently be contacted regarding a hearing date. All license hearings will be conducted in accordance with the Administrative Procedure Act. If no appeal is received within the specified time period, this constitutes acceptance of the terms and conditions of this license.

For further information, please contact Mr. Kaveh Hosseinzadeh, Head, Solid Waste Facilities Section at (410) 537-3315.

Sincerely,

Edward M. Dexter

Edward M. Dexter, Administrator
Solid Waste Program

EMD:KH:bh
Enclosure
cc: Mr. Horacio Tablada
Mr. Brian Coblentz

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Martin O'Malley
Governor

Waste Management Administration
Solid Waste Program
1800 Washington Boulevard, Suite 605, Baltimore, Maryland 21230-1719

MDE
Shari T. Wilson
Secretary

Scrap Tire Hauler License

No. 2008-RTH-07322

ISSUE DATE: February 5, 2009

EXPIRATION DATE: February 4, 2014
IDENTIFICATION No.: 08H07322

Issued to: Maryland Aviation Administration

At: 701 Wilson Point Road, Box 1, Middle River, Baltimore County, MD 21220.

Authorizing: the transportation of scrap tires in the State of Maryland to or from scrap tire facilities licensed or approved by the Maryland Department of the Environment, and as specified in your application of November 28, 2008.

This license is issued pursuant to the provisions of Title 9 of the Environment Article, Annotated Code of Maryland, and regulations promulgated thereunder, and is subject to the attached terms and conditions, and compliance with all applicable laws and regulations.

Edward M. Dexter, Administrator
Solid Waste Program

Horacio Tablada, Director
Waste Management Administration

LICENSE CONDITIONS:

A. Transportation:

1. The licensee may transport scrap tires only as specified in the licensee's Scrap Tire Hauler License Application and its supporting documentations. If there are any discrepancies between this license and the application, the terms and conditions of this license will take precedence.

2. The licensee may only transport scrap tires to or from scrap tire facilities licensed or approved by the Department and as listed in licensee's Scrap Tire Hauler Application. A licensed or approved scrap tire facility includes an existing site that stores, collects, recycles, incinerates to recover energy, or otherwise processes scrap tires.

3. The licensee may only transport scrap tires from cleanup sites, as designated by the Department to scrap tire facilities licensed or approved by the Department. A licensed or approved scrap tire facility includes an existing site that stores, collects, recycles, incinerates to recover energy, or otherwise processes scrap tires.

4. The licensee may only transport scrap tires from scrap tire facilities licensed or approved by the Department, which include existing sites that store, collect, recycle, incinerate to recover energy, or otherwise processes scrap tires, to out of state licensed or approved scrap tire facilities.

5. The licensee shall not transport scrap tires in a manner likely to:

   a. create a nuisance;

   b. impair the quality of the environment; or

   c. create other hazards to the public health, safety, or comfort as may be determined by the Department.

6. The licensee shall transport scrap tires only in the vehicles identified with an asterisk on the list appended to this license as Attachment I.

B. Landfilling Prohibited:

1. Scrap tires shall not be disposed of in this State's landfills.

2. Scrap tires may be transported to a sanitary landfill after January 1, 1994 if the landfill accepts scrap tires for purposes other than disposal and has received a scrap tire facility license/approval from the Department.

3. Scrap tires shall not be disposed of in an open dump.

C. Hauler Identification:

The licensee shall display the scrap tire hauler identification (ID) number issued by the Department on all vehicles used to transport scrap tires, including rental vehicles. The ID number shall be displayed on the front driver and passenger side doors of each vehicle. Each character of this ID number shall be a minimum of three (3) inches in height and legible at all times.

D. Change of Vehicles:

The licensee shall inform the Department within thirty (30) days of any change in the vehicles used, including rental vehicles, change in license plate number, or ownership of any vehicle identified in the licensee's Scrap Tire Hauler License Application and its accompanied materials. The licensee shall notify the Department in the event that any previously approved vehicle is deleted from the fleet.

E. Record Keeping:

The licensee shall maintain, for a period of three (3) years, records of all scrap tires collected, transported and deposited by the licensee. These records shall document each load of scrap tires that has been collected, transported and deposited during daily operations. The records shall include, at a minimum, the following information:

1. The total type and quantity in number or weight of scrap tires, including processed portions, for each transaction that were transported by the licensee;

2. The identification and location of each person, entity or facility from which the scrap tires were collected. Specify the total type and quantity in number or weight of scrap tires, including processed portions, for each transaction that were collected by the licensee; and

3. The identification and location of each person, entity or facility where the collected scrap tires were deposited. Specify the total type and quantity of scrap tires in number or weight, including processed portions, for each transaction that were deposited by the licensee.

F. Reporting:

The licensee shall submit to the Department a semiannual report. Each report shall summarize the records required by the Record Keeping Condition of this license. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period. Each report shall be submitted on the attached form provided by the Department.

G. Availability of Reports:

Except for information determined to be confidential under Section 10-617(d) of the State Government Article, Annotated Code of Maryland, all documents submitted to the Department pursuant to the record keeping and reporting requirements set forth in this license shall be available for public inspection at the Department's offices.

H. Application for Renewal:

At least ninety (90) days before the expiration date of this license, the licensee shall submit a renewal application for a license or notify the Department of the intent to cease operating by the expiration date of this license. The licensee whose license has expired following submission to the Department of a timely and complete renewal application, may continue to conduct the authorized activity until the Department takes final action on the application if the Department determines that:

1. The licensee is in compliance with the terms and conditions of the expired license; and

2. The Department, through no fault of the person seeking a license, has not taken final action on the application on or before the expiration date of the license.

I. Modification:

1. The Department may modify any term or condition of this license if the modification is needed to reflect changes in local, State or federal laws or regulations applicable to this type of operation. Any modification shall also be made, as appropriate, to other documents, which are part of this license.

2. The Department may modify this license if any violation of a term or condition of this license or any applicable law or regulation has occurred.

3. The Department may modify this license upon receipt of a written request from the licensee stating the reasons for the proposed modification and provides supporting documentation.

4. The Department may modify this license upon receipt of a written request for approval to add additional vehicles, which have not been previously approved for use, provided that such modification is requested within thirty (30) days following commencement of the use of any additional vehicle(s).

5. The Department may modify this license upon receipt of a written request from the licensee for approval to transport scrap tires from additional scrap tire facilities not approved by this license.

J. Transfer of License:

This license may be transferred to new owners if the following conditions are met:

1. Before any change in the ownership, a written request for the transfer of the license shall be submitted to the Department for review and approval. The request for transfer shall state the reason(s) for the requested transfer, and shall be signed by the licensee and the new owner. The request shall also include a completed Scrap Tire License Application signed by the new owner; and

2. The Department determines that the proposed transfer of the license would not affect present or future compliance with local, State, or federal laws and regulations.

K. Suspension or Revocation:

In accordance with Section 9-262 of the Environment Article and Title 10 of the State Government Article, the Department may suspend, revoke, or modify this license, if the Department finds that:

1. The application contained false or inaccurate information;

2. There has been a substantial deviation from:

   a. the documents accepted by the Department as part of this license application;

   b. any requirement established by the Department;

   c. a representative of the Department has been denied entry to any area in which activities regulated by this license are conducted or to any documents required to be maintained by this license;

   d. there is or has been a violation of the terms and conditions of the license or any applicable State law or regulation; or

   e. there is any other good cause.

L. Right of Entry:

The licensee shall allow the Department's authorized representatives, at reasonable times and upon presentation of credentials:

1. To enter any site(s) where records required by this license are maintained;

2. To have access to and copy any and all records required to be maintained by this license;

3. To inspect any equipment or process used in connection with the activities regulated by this license;

4. To inspect any facility, system or vehicle used in connection with the activities regulated by this license; and

5. To obtain photographic documentation, collect samples, or any other information pertinent to the activities regulated by this license.

M. Compliance:

1. The licensee shall comply with the terms and conditions of this license, and with all applicable local, State and federal laws and regulations.

2. If for any reason the licensee cannot comply or is unable to comply with this license or with any applicable local, State, or federal laws and regulations, the licensee shall notify the Department at (410) 537-3315 on the same day or on the next working day, following any noncompliance. Within five (5) working days after this notification, the licensee shall provide the Department with the following information in writing:

   a. description of the noncompliance, including date, time, and type of noncompliance;

   b. cause of the noncompliance;

   c. anticipated time the noncompliance is expected to continue or if such condition has been corrected;

   d. steps taken by the licensee to correct the noncompliance; and

   e. steps to be taken by the licensee to prevent recurrence of the noncompliance.

3. If the licensee discovers through any means, including notification by the Department, that a noncompliance with any condition of the license has occurred, the licensee shall immediately take all necessary steps to eliminate the condition of noncompliance and to minimize the adverse impact on public health, safety, welfare, or the environment.

4. If the licensee discovers that a noncompliance with any condition of the license has affected the public health, safety, welfare, or the environment, the licensee shall immediately notify the Department.

N. Civil and Criminal Liability:

Nothing in this license shall be construed to preclude the institution of any legal action nor relieve the licensee from civil or criminal responsibilities and/or penalties for non-compliance with Title 9 of the Environment Article, Annotated Code of Maryland, or any local, State, federal, or other State laws or regulations.

O. Property Rights:

The issuance of this license does not intend to convey any property rights in either real or personal property, or any exclusive privilege or franchise, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of local, State, or federal laws or regulations.

P. Severability:

If any provision of this license shall be held invalid for any reason, the remaining provisions shall remain in full force and effect, and such invalid provision shall be considered severed and deleted from this license.

Q. Signatory Requirements:

All applications, request for modifications or transfer, renewal requests, reports, or information submitted to the Department shall be signed and verified in accordance with Section 1-201 of the Environment Article, Annotated Code of Maryland, by the licensee or authorized representative of the licensee as being true.

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard • Suite 605 • Baltimore, Maryland 21230-1719
410-537-3375 • 800-633-6101 x3375 • http://www.mde.state.md.us

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COMPLIANCE AND PROJECT MANAGEMENT DIVISION

Waste Management Administration • Solid Waste Program

PLEASE MAIL THIS FORM TO THE "MARYLAND DEPARTMENT OF THE ENVIRONMENT – CUSTOMER SERVICE CENTER"	
For office use only AI # 4324	*For office use only* 2008 RGC 0732 1

MDPT 08 1202

General Scrap Tire Collection Facility License Application

Authority: Title 9, Environment Article, Annotated Code of Maryland, and Code of Maryland Regulations (COMAR) 26.04.08

"General Scrap Tire Collection Facility" means a scrap tire collection facility where no more than fifty (50) scrap tires are accumulated on site at any one time as defined in COMAR 26.04.08.02B(9).

2008 RGC 07321

Existing License No.: _____ - _____ - _____ *Issued Date:* ____/____/_____ *Expiration Date:* ____/____/_____

Applicant's Legal Name: Maryland Aviation Administration

Applicant's Status: ☐ *Individual* ☐ ☐ *Other:* _____

Corporation or Government Federal Tax Id

Maryland State Department of Assessment 563
Please note that a business/entity must be reg *a permit can be issued. The business or*
entity's information provided in this application *register.*

Proof of workers' compensation coverage is required under § 1-202 of the Environment Article. Please provide one of the following:
(1) A copy of a Certificate of Compliance issued by the Maryland Workers' Compensation Commission; or
(2) Workers' Compensation Insurance Policy/Binder Number: 901141

Applicant's Mailing Address: 701 Wilson Pt. Rd. Box 1 *City:* Middle River *State:* MD *Zip Code:* 21220
Applicant's Telephone No.: (410) 682-8800 *Facsimile No.:* (410) 682-8822
Emergency Contact Name & Title: Melvin Hoefler Supervisor, Facilities Maintenance *Telephone No:* (410) 682-8816 fax (410) 682 8813 (office)

Facility/Site Name: Martin State Airport
Facility/Site Address: 701 Wilson Pt. Rd. Box 1 *City:* Middle River *State:* MD *Zip Code:* 21220

County: Baltimore *Maryland Grid Coordinates:* _____ / _____
County Zoning Map No.: _____ *Lot/Parcel No.:* 152 *Deed/Liber/Folio No.:* 5542/897
State Legislative District: 7 *Local Council / Election District:* 15
Bay Tributary Watershed Code: _____ *Latitude/Longitude (Deg/Min/Sec):* 39 - 19 - 27 / 76 - 24 - 59
Site Acreage: 740 *Facility Acreage (Estimated):* 740

Property Owner's Name: State of Maryland-Maryland Aviation Administration
Property Owner's Address : 701 Wilson Pt. Rd. Box 1 *City:* Middle River *State :* MD *Zip Code:* 21220
Property Owner's Telephone No.: (410) 682-8800

Briefly describe the manner in which scrap tires are being accumulated at your facility.

Tires collected from light and heavy duty vehicles.

Average quantity of scrap tires projected to be on site at any given time:

Please check one: ☐ *1 to 10* ☐ *11 to 20* ☑ *21 to 30* ☐ *31 to 40* ☐ *41 to 50*

Type and maximum quantity of scrap tires that can be accepted at this facility on a daily basis:

Please specify the quantity:

Passengers Cars/Trucks: 10 *Trucks:* 10 *Others:* 10

Provide the following information about the scrap tire hauler who will be picking up scrap tires from this facility.

If you haul your own scrap tires, please provide your information:

Scrap Tire Hauler Name: Martin State Airport-Applying for License

Scrap Tire Hauler License No.: 2008 - *RTH* - 07322 *Expiration Date:* N / E / W

Provide the following information about the scrap tire facility where your scrap tires will be delivered:

Scrap Tire Facility Name: BWI Thurgood Marshall Airport

Scrap Tire Facility License No.: ~~2003~~ - ~~RSC~~ - ~~05674~~ 2008 - RSC - 07334 *Expiration Date:* ~~08~~ / ~~25~~ / ~~08~~ Currently applying for new license

By signing this form, I the applicant or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this application are true to the best of my knowledge, information, and belief. I hereby authorize the representatives of the Department to have access to the site of the proposed facility for inspection and to records relating to this application at any reasonable time. I acknowledge that depending on the type of facility applied for, other permits or approvals may be required.

John J Hoefler Jr.
Signature of Applicant

11-26-08
Date

Melvin J Hoefler JR
Applicant's Name (Print)

Supervisor Facilities Maintenance
Title

Privacy Act Notice: This Notice is provided pursuant to the Federal Privacy Act of 1974, 5 U.S.C. §552.a. Disclosure of your Social Security Number or Federal Employer Identification Number on this application is mandatory pursuant to the provisions of §1-203 (2003), Environment Article, Annotated Code of Maryland, which requires the Maryland Department of the Environment to verify that an applicant for a license has paid all undisputed taxes and unemployment insurance. Social Security or Federal Employer Identification Numbers will not be used for any purposes other than those described in this Notice.

For questions regarding this application form, please contact the Department at (410) 537-3375

Maryland Aviation Administration

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

John D. Porcari
Secretary

Timothy L. Campbell, A.A.E.
Executive Director

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DEC 09 2008
COMPLIANCE AND PROJECT MANAGEMENT DIVISION

December 3, 2008

Maryland Department of the Environment
Customer Service Center
1800 Washington Boulevard
Baltimore, MD 21230

To Whom It May Concern:

SUBJECT: Scrap Tire Collection and Hauler Licenses

Please find the enclosed applications for the General Scrap Tire Collection Facility License and Scrap Tire Hauler Licenses for Martin State Airport (MTN). Please be aware that MTN will haul tires to our facility located at Baltimore/Washington International Thurgood Marshall Airport (BWI Marshall). BWI Marshall is currently renewing their Secondary Scrap Tire Collection Facility License.

If you have any questions regarding these applications please contact me at 410-859-7806 or 443-423-9016.

Sincerely,

Barron J. Feit, Environmental Analyst
Division of Environmental Compliance

Enclosures:

cc: Mr. Charles M. Baublitz, Chief, Airport Operations, MTN, Maryland Aviation Administration
Mr. Richard Keller, Manager of Recycling, Maryland Environmental Service
Mr. Edwin K. Maker, Contract Manager, Division of Contract Support, Maryland Aviation Administration
Mr. James L. Poppinga, Manager, Division of Contract Support, Maryland Aviation Administration
Mr. Mark Williams, Manager, Division of Environmental Compliance, Maryland Aviation Administration

Voided 2/25/2009 TM

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
MDE 410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

February 5, 2008

Mr. Melvin J. Hoefler
Maryland Aviation Administration
Martin State Airport
701 Wilson Point Road, Box 1
Middle River MD 21220

Dear Mr. Hoefler:

Enclosed is Maryland General Scrap Tire Collection Facility License No. **2008-RGC-07321**, which authorizes the accumulation of **no more than fifty (50)** scrap tires at any one time at Martin State Airport, 701 Wilson Point Road, Box 1 in Middle River, Baltimore County as specified in your application of November 28, 2008.

To operate this facility, and to avoid a violation of this license, please have all scrap tire haulers who remove scrap tires from this facility (current or planned) show you their current Maryland license prior to providing services. Also, you should verify that the site to which your scrap tires are being taken is a facility licensed or approved by the Maryland Department of the Environment (the "Department") by obtaining their license number. In addition, if you are currently hauling your own scrap tires or intend to do so in the future, you must also have a Scrap Tire Hauler License.

Please note that this license is subject to the enclosed terms and conditions. This license may be appealed by filing a written request for a hearing within thirty (30) days of receipt of this license. The request should be addressed to Mr. Horacio Tablada, Director, Waste Management Administration, at the Department's address. You will subsequently be contacted regarding a hearing date. All license hearings will be conducted in accordance with the Administrative Procedure Act. If no appeal is received within the specified time period, this will constitute acceptance of the terms and conditions of this license.

For further information, please contact Mr. Kaveh Hosseinzadeh, Head, Solid Waste Facility Section at (410) 537-3315.

Sincerely,

Edward M. Dexter, Administrator
Solid Waste Program

EMD:KH:bh
Enclosure
cc: Mr. Horacio Tablada
Mr. Brian Coblentz

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Martin O'Malley
Governor

Waste Management Administration
Solid Waste Program
1800 Washington Boulevard, Suite 605, Baltimore, Maryland 21230-1719

MDE
Shari T. Wilson
Secretary

General Scrap Tire Collection Facility License

No. 2008-RGC-07321

ISSUE DATE: February 5, 2009 ***(NO EXPIRATION DATE)***

Issued to: Maryland Aviation Administration

Authorizing: the accumulation of **no more than fifty (50)** scrap tires at any one time, and as specified in your application of November 28, 2008.

At: Martin State Airport, 701 Wilson Point Road, Box 1, Middle River, Baltimore County, MD 20220.

This license is issued pursuant to the provisions of Title 9 of the Environment Article, Annotated Code of Maryland, and regulations promulgated thereunder, and is subject to the attached terms and conditions, and compliance with all applicable laws and regulations.

Edward M. Dexter, Administrator
Solid Waste Program

Horacio Tablada, Director
Waste Management Administration

LICENSE CONDITIONS:

1. The licensee may only accumulate **no more than fifty (50)** scrap tires at any one time at this facility, as specified in this facility's General Scrap Tire Collection Facility License Application. If there are any discrepancies between this license and the application, the terms and conditions of this license will take precedence.

2. Only scrap tire haulers licensed by Maryland Department of the Environment (the "Department") shall be used to transfer scrap tires.

3. The licensee shall comply with all applicable State, local government, and federal laws and regulations.

4. Scrap tires shall only be transferred to the primary or secondary scrap tire collection facilities, scrap tire recycling facilities, or other facilities licensed or approved by the Department.

5. If the licensee discovers through any means, including notification by the Department, that noncompliance with a condition of the license has occurred, the licensee shall immediately take all necessary steps to eliminate the condition of noncompliance and to minimize the adverse impact on public health, safety, welfare, or the environment.

6. If the licensee discovers that a noncompliance with a condition of the license has affected the public health, safety, welfare, or the environment, the licensee shall immediately notify the Department at (410) 537-3315.

7. The licensee shall inform the Department in writing within 30 days following a business name change, change in ownership or form of business organization, or any other change that affects the license.

8. If a person who does not possess a Scrap Tire Hauler License, and who is not exempted under Code of Maryland Regulations (COMAR) 26.04.08.04A(2), attempts to deposit scrap tires at the facility covered by this license, the licensee shall refuse to accept the scrap tires offered by the said person, and shall notify the Department within one week of occurrence, the person's name, license plate number and state of issuance for the vehicle used to haul scrap tires. A person is exempted under COMAR 26.04.08.04A(2) if the person transports not more than five (5) scrap tires annually.

9. The licensee shall not operate this facility in a manner likely to:

   a. create a nuisance;

   b. be conducive to insect and rodent infestation;

   c. cause a discharge of any constituents derived from scrap tires into the air unless otherwise permitted by the Department;

   d. cause a discharge of any constituents derived from scrap tires into waters of this State unless otherwise permitted by the Department;

   e. impair the quality of the environment; or

   f. create other hazards to the public health, safety, or comfort as may be determined by the Department.

10. The licensee shall maintain, for a period of three (3) years, records of all scrap tires entering or exiting this facility. The records shall include, at a minimum, the following information:

    a. the total type and quantity of scrap tires, by number or weight, that were received or generated at this facility;

    b. the total type and quantity of scrap tires, by number or weight, that were transferred from this facility;

    c. the total type and quantity of scrap tires, by number or weight, that remained at this facility;

    d. the name and identification number of each hauler transferring scrap tires from this facility. The type and quantity of scrap tires must be identified (by number or weight) for each transaction, including tires separated and removed for retreading. The destination of the scrap tires transported by each hauler must also be maintained; and

    e. the semi-annual reports specified in General Condition 11.

11. The licensee shall submit to the Department a semi-annual report containing the information described in General Condition 10. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period. The reports shall be submitted on copies of the form attached to this license or be in this format and contain the information described in General Condition 10.

12. This license shall not be transferred to new owners unless the following conditions are met:

    a. a written request for the transfer is submitted to the Department. The request shall indicate the reason for the requested transfer and be signed by the individuals holding and seeking the license;

    b. the new owner shall complete a General Scrap Tire Collection Facility License Application. The completed application shall be submitted with the request; and

    c. the Department determines that the proposed transfer of the license would not affect present or future compliance with State or federal laws and regulations.

13. The following fire protection standards shall be followed:

    a. combustibles shall not be stored in the area where scrap tires are being collected; and

    b. potential ignition sources such as cutting, welding, and heating devices, open fires, etc., shall be prohibited in the scrap tire collection area.

14. Nothing in this license authorizes the establishment or the operation of this facility when in violation of any local, State, or federal laws and regulations.

MEMORANDUM

Waste Diversion & Utilization Program
Scrap Tire Unit

To: Tony Emanuel

From: Valerie Norman ext. 3952

Thru: Abigail Pascual ext. 3334

Subject: Updating Existing Agency Interest (AI)

Date: July 23, 2012

Please update the existing AI for the enclosed ***Scrap Tire Facility:***

Agency Interest (AI#):	12910 & 9113
Current Master AI Name:	
Current Facility Address:	
Current Mailing Address:	
New Master AI Name:	
New Facility Address:	
New Mailing Address:	
Comments: Tony both AI's need to be updated with their new contact person.	

2009 RGC 07711

	Related Organization	**Related People**
Name:	Northrop Grumman Technical Services, Inc.	Douglas Klevisha
Relationship:	Is AI Permittee for Scrap Tire RGC	Is AI Contact for Scrap Tire RGC
Start Date:	07/20/12	07/20/12
Comments: Tony both AI's need to be updated with their new contact person.		

If you have any questions, please call me at Extension 3952. Thanks!

Valerie Norman - name change to Northrop Grumman licenses

From: Abigail W. Pascual
To: Valerie Norman
Date: 7/20/2012 1:11 PM
Subject: name change to Northrop Grumman licenses

Hi Val,

Linda Bellmyer (410-238-5601) from Northrop Grumman called today. She said the contact names had changed for 2009-RGC-07711 and 2010-RGC-08019 to "Douglas Klevisha". I made the changes in Tyrus, but not in Tempo. Please make sure Tony makes those changes.

She also asked if they needed both licenses since they were both at the same facility. They are issued to 2 different hangars. She also said the one for "Middle River Integration Center" (2010-RGC-08019) needed a name change because it's not called that anymore. I told her I'd have you call her to go over whether to cancel one license or keep both and to do the name change to the facility name (I think the owner name is fine).

Please give have Tony make the changes and please call Ms. Bellmyer regarding the other issues. Thanks! -- Abby

Abigail W. Pascual, Head
Scrap Tire Unit
Waste Diversion and Utilization Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 610
Baltimore, Maryland 21230-1719
410-537-3334
410-537-3321 (fax)

AJ# 12979
2009 RGC 07711
701 Wilson Point Rd hanger 3

AJ# 9113
2010 RGC 08019
701 Wilson Point Rd hanger 5

Contact
Douglas Klevisha

John Reineck is no longer a contact person for Northrop Grumman, Put an end date 07/20/12.

AI#
129179

7711

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Land Management Administration • Waste Diversion and Utilization Program

1800 Washington Boulevard • Suite 610 • Baltimore, Maryland 21230-1719

410-537-3314 • 800-633-6101 x3314• 410-537-3321 fax • http://www.mde.state.md.us

Semi-Annual Scrap Tire Collection Facility Report

**Please Note: It is very important that you submit a semi-annual report even if you did not collect, generate or haul any scrap tires during the reporting period.* Please print.

(✓) REPORTING PERIOD: ____ January 1 – June 30
✓ July 1 – December 31

FILL IN REPORTING YEAR: ✓

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Land Management Administration

Your Facility Owner's Name: _____ *Your Collection Facility License No.:* 2009 20-0771

Your Mailing Address: _____

City: _____ *County:* _____ *State:* _____ *Zip:* _____

Your Facility's Name: Northrop Grumman TS *Contact Person's Name:* MARK FALICA

Your Facility's Location Address: 701 Wilson point rd, Box 4

City: Baltimore *County:* Baltimore city *State:* Maryland *Zip:* 21220

Telephone No.: (410) 238 - 4316 *Facsimile No.:* (410) 918 - 0322

SECTION 1: Receiving/Generating Report - Incoming Scrap Tire Information

Check (✓) Scrap Tire Generation/Receiving Source: ☑ Your Facility ☐ Customers ☐ Other

If you checked "Other", complete SECTION 3 on the reverse side.

SECTION 2: Transfer Report - Outgoing Scrap Tire Information

Scrap Tire Hauler's Name	Scrap Tire Hauler's License No.	Scrap Tire Type	Destination Facility Name/Address	Destination Facility's License/ Permit No.	Scrap Tire Quantity	Weight (Tons)
				TOTAL	Ø	Ø

TOTAL SCRAP TIRES REMAINING AT YOUR FACILITY AFTER THE REPORTING PERIOD: Ø

PLEASE ATTACH ADDITIONAL PAGES IF NECESSARY

By signing this report, I the license holder or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this report are true to the best of my knowledge, information, and belief. I hereby authorize the representative of the Department to have access to the site for inspection and to record information relating to this license at any reasonable time.

Mark F — Signature | MARK FALICA — Print Name | 8 Jan 2013 — Date

Form Number: MDE/WAS/LIC.007
Date: December 20, 2011
TTY Users: 800-201-7165

VN 1/9/13

If you checked "Other" in SECTION 1 on the front page, complete SECTION 3 below:

SECTION 3: Receiving/Generating Report - Incoming Scrap Tire Information				
Scrap Tire Generation/Receiving Source	**Maryland Scrap Tire Hauler's License No. (If applicable)**	**Scrap Tire Type (Passenger, Truck)**	**Scrap Tire Quantity**	**Scrap Tire Weight (Tons)**
		TOTAL		

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PLEASE ATTACH ADDITIONAL PAGES IF NECESSARY

INSTRUCTIONS FOR COMPLETING REPORT

SECTION 1:

1. Check the box indicating the source of the scrap tires collected at your facility.
2. If you checked "Your Facility" or "Customers", you do not need to complete SECTION 3.
3. If you checked "Other", you must complete SECTION 3.
4. Proceed to SECTION 2.

SECTION 2:

1. List the name and license number of the scrap tire hauler who removed scrap tires from your facility.
2. List the type of scrap tires removed.
3. List the place of where the hauler took the scrap tires. ***This is very important!*** *Be sure the hauler tells you where your scrap tires are being delivered and the Maryland scrap tire license/approval number of that destination.* If the scrap tires are being delivered to an out-of-state facility, list the name and address of this facility.
4. List by quantity or tons how many scrap tires were removed from your facility.
5. If no scrap tires were hauled from your facility, write **"None"** or **"0"** in the TOTAL Scrap Tire Quantity box.

SECTION 3:

1. List where the scrap tires came from:
   - A. If from haulers, please list the haulers' names and their Maryland Scrap Tire Hauler License numbers in the appropriate boxes.
   - B. If from individuals hauling less than 5 scrap tires, please write **"Private"** in the **Source** column; and **"None"** in the **License Number** boxes. If you receive scrap tires from many individuals, group them as a single entry.
   - C. If the scrap tires are generated from your business, write **"Company"** in the **Source** column, and your license number in the **License Number** column.
2. List the type of scrap tires (i.e. passenger, truck) collected at your facility.
3. List by quantity or tons how many scrap tires were collected at your facility.
4. If no scrap tires were collected during this period, write **"None"** or **"0"** in the TOTAL Scrap Tire Quantity box.

SIGNATURE:

You must sign your name, print your name, and date the report at the bottom of the front page of this report.

FAX COMPLETED REPORT TO: **OR** **MAIL COMPLETED REPORT TO:**

410-537-3321

MARYLAND DEPARTMENT OF THE ENVIRONMENT
WASTE DIVERSION AND UTILIZATION PROGRAM
Semi-Annual Scrap Tire Report
1800 Washington Boulevard, Suite 610
Baltimore, Maryland 21230-1719

Valerie Norman - Semi-Annual Scrap tire Collection Facility Report

From: "Falica, Mark (TS)" <Mark.Falica@ngc.com>
To: "vnorman@mde.state.md.us" <vnorman@mde.state.md.us>
Date: 1/8/2013 3:21 PM
Subject: Semi-Annual Scrap tire Collection Facility Report
CC: "Falica, Mark (TS)" <Mark.Falica@ngc.com>, "Hagan, Andrew H (TS)" <andre...
Attachments: img-108145030-0001.pdf; img-108145021-0001.pdf

Hi Valerie,

Thank you for your help over the phone.

I would like to cancel the General Scrap Tire Collection facility license No 2009-RGC-07711 as we only have one collection point for both hangars. Please amend 2010-RGC-08019 License to read hangar 2 as this is where we store our tires.

I have attached both tire collection forms. If there is any more information you need from me or I if I need to correct the forms please let me know and I will do so.

Again thank you for your help

Mark

Mark Falica
Environmental Health & Safety Analyst
Northrop Grumman Technical Services
701 Wilson Point Road
Middle River, MD 20220
(410)-238-4316

MARYLAND DEPARTMENT OF THE ENVIRONMENT

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SCRAP TIRE INSPECTION FORM – FACILITY STATUS REPORT

GENERAL INFORMATION

Facility Name: Adams Auto Service Date: 11/7/12 Time In: 1:20 Time Out: 1:30

Location: 212 Tollgate Rd. Bel Air County: Harford

License # 2009-RGC-07219 Telephone Number: (410) 879-9910

The Licensee or Company named above ☑ does ☐ does not exist at the above location.

The current status of the Licensee or Company is:

- ☐ in business at the given location.
- ☐ not known.
- ☐ out of business.
- ☑ does not handle scrap tires.
- ☐ handles scrap tires and has the needed license(s).
- ☐ handles scrap tires without a needed license.
- ☐ Cancel License
- ☐ _____

The present address of the Licensee or Company is:

☐ not known. ☐ not applicable.

☐ as follows: _____

_____

_____

COMMENTS: The car repair business no longer does tire work, no longer generates scrap tires. There are no scrap tires on site. The license needs to be cancelled. I will submit this report, however, the business owner is advised to contact Abby Pascual – Scrap Tire Division – (410) 537-3334/3315 to request the cancelation. You may have to submit a formal letter to the Department asking for license cancelation.

This report was reviewed by _____ on _____ (date).

Any needed changes were made in the TYRUS database by _____ on _____ (date).

INSPECTOR	LICENSEE'S REPRESENTATIVE
NAME Edwardo Class	NAME Robert W. Adams
TITLE Regional Project Manager PHONE (410) 537-3315	TITLE Owner
SIGNATURE [signature]	SIGNATURE [signature]

Form Number MDE/WAS/COM.038
Revision Date 8/15/03
TTY Users 1-800-735-2258

7711

Valerie Norman - name change to Northrop Grumman licenses

From: Abigail W. Pascual
To: Valerie Norman
Date: 7/20/2012 1:11 PM
Subject: name change to Northrop Grumman licenses

Hi Val,
Linda Bellmyer (410-238-5601) from Northrop Grumman called today. She said the contact names had changed for 2009-RGC-07711 and 2010-RGC-08019 to "Douglas Klevisha". I made the changes in Tyrus, but not in Tempo. Please make sure Tony makes those changes.
She also asked if they needed both licenses since they were both at the same facility. They are issued to 2 different hangars. She also said the one for "Middle River Integration Center" (2010-RGC-08019) needed a name change because it's not called that anymore. I told her I'd have you call her to go over whether to cancel one license or keep both and to do the name change to the facility name (I think the owner name is fine).
Please give have Tony make the changes and please call Ms. Bellmyer regarding the other issues. Thanks! -- Abby

Abigail W. Pascual, Head
Scrap Tire Unit
Waste Diversion and Utilization Program
Maryland Department of the Environment
1800 Washington Boulevard, Suite 610
Baltimore, Maryland 21230-1719
410-537-3334
410-537-3321 (fax)

Called 7/23/12 left a message

Hangar 3 2009 RGC 07711
Fac Name Northrop Grumman Technical Service Inc
Owner Name Same as above

Hangar 5 2010 RGC 08019
Fac Name Middle River Integration Cente
Owner Name Northrop Grumman Support Services Group/Middle River

MARYLAND DEPARTMENT OF THE ENVIRONMENT

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410-537-3375 • 800–633-6101 x3375 • http://www.mde.state.md.us

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OCT 2 7 2009
COMPLIANCE ENFORCEMENT

Land Management Administration • Solid Waste Program

PLEASE MAIL THIS FORM TO THE "MARYLAND DEPARTMENT OF THE ENVIRONMENT – CUSTOMER SERVICE CENTER"	
For office use only ATH 129 179	*For office use only* 2009 RACO7711

MDPI 09 1376

General Scrap Tire Collection Facility License Application

Authority: Title 9, Environment Article, Annotated Code of Maryland, and Code of Maryland Regulations (COMAR) 26.04.08

"General Scrap Tire Collection Facility" means a scrap tire collection facility where no more than fifty (50) scrap tires are accumulated on site at any one time as defined in COMAR 26.04.08.02B(9).

Existing License No.: _____ - _____ - _____ *Issued Date:* ____/____/_____ *Expiration Date:* ____/____/_____

Applicant's Legal Name: Northrop Grumman Technical Services Inc

Applicant's Status: ☐ *Individual* ☑ *Corporation* ☐ *Government* ☐ *Other:* _____

Corporation or Government Federal Tax Identification No.: 73-0934115

Maryland State Department of Assessments and Taxation (SDAT) ID No.: F11913605

Please note that a business/entity must be registered to do business in Maryland before a permit can be issued. The business or entity's information provided in this application must match the information in the SDAT register.

Proof of workers' compensation coverage is required under § 1-202 of the Environment Article. Please provide one of the following:
(1) A copy of a Certificate of Compliance issued by the Maryland Workers' Compensation Commission; or
(2) Workers' Compensation Insurance Policy/Binder Number: RMWC 5455908

Applicant's Mailing Address: 701 Wilson Point Rd Box 82 *City:* Baltimor *State:* Md *Zip Code:* 21220

Applicant's Telephone No.: (410) 391-1445 *Facsimile No.:* (410) 918-0322

Emergency Contact Name & Title: Andy Hagan, Facility Mn *Telephone No:* (410) 591-9669

Facility/Site Name: Northrop Grumman Technical Services Inc

Facility/Site Address: 701 Wilson Point Rd *City:* Baltimor *State:* Md *Zip Code:* 21220

County: Baltimore *Maryland Grid Coordinates:* _____ / _____

County Zoning Map No.: _____ *Lot/Parcel No.:* _____ *Deed/Liber/Folio No.:* _____

State Legislative District: _____ *Local Council / Election District:* _____

Bay Tributary Watershed Code: _____ *Latitude/Longitude (Deg/Min/Sec):* ____-____-____ / ____-____-____

Site Acreage: _____ *Facility Acreage (Estimated):* _____

Property Owner's Name: Maryland Aviation Administration

Property Owner's Address : 701 Wilson Point Rd Box 1 *City:* Baltimor *State :* Md *Zip Code:* 21220

Property Owner's Telephone No.: (410) 682-8800 Middle River

Briefly describe the manner in which scrap tires are being accumulated at your facility.

Aircraft tire change out. Tires are stored in the hangar that is equipped with a sprinkler system.

Average quantity of scrap tires projected to be on site at any given time:

Please check one: ☐ *1 to 10* ☐ *11 to 20* ☐ *21 to 30* ☑ *31 to 40* ☐ *41 to 50*

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OCT 21 2009
COMPLIANCE ENFORCEMENT

Type and maximum quantity of scrap tires that can be accepted at this facility on a daily basis:

Please specify the quantity:

Passengers Cars/Trucks: _____ *Trucks:* _____ *Others:* 10

Provide the following information about the scrap tire hauler who will be picking up scrap tires from this facility.

If you haul your own scrap tires, please provide your information:

Scrap Tire Hauler Name: Emanuel Tire Company

Scrap Tire Hauler License No.: 2008 *- RTH -* 07066 *Expiration Date:* 04 / 14 / 2013

Provide the following information about the scrap tire facility where your scrap tires will be delivered:

Scrap Tire Facility Name: Emanual Tire Company

Scrap Tire Facility License No.: 2005 - RTR - 00042 *Expiration Date:* 06 / 16 / 10

By signing this form, I the applicant or duly authorized representative, do solemnly affirm under the penalties of perjury that the contents of this application are true to the best of my knowledge, information, and belief. I hereby authorize the representatives of the Department to have access to the site of the proposed facility for inspection and to records relating to this application at any reasonable time. I acknowledge that depending on the type of facility applied for, other permits or approvals may be required.

Signature of Applicant

10/5/2009
Date

Dan Franco
Applicant's Name (Print)

Director, Middle River Integrati
Title

Privacy Act Notice: This Notice is provided pursuant to the Federal Privacy Act of 1974, 5 U.S.C. §552.a. Disclosure of your Social Security Number or Federal Employer Identification Number on this application is mandatory pursuant to the provisions of §1-203 (2003), Environment Article, Annotated Code of Maryland, which requires the Maryland Department of the Environment to verify that an applicant for a license has paid all undisputed taxes and unemployment insurance. Social Security or Federal Employer Identification Numbers will not be used for any purposes other than those described in this Notice.

For questions regarding this application form, please contact the Department at (410) 537-3375

Locked 4/8/2010

MARYLAND DEPARTMENT OF THE ENVIRONMENT
1800 Washington Boulevard, Suite 605 • Baltimore MD 21230-1719
410-537-3000 • 1-800-633-6101

Martin O'Malley
Governor

Anthony G. Brown
Lieutenant Governor

Shari T. Wilson
Secretary

Robert M. Summers, Ph.D.
Deputy Secretary

November 23, 2009

Mr. Dan Franco
Northrop Grumman Technical Services, Inc.
701 Wilson Point Road, Box 82
Middle River MD 21220

Dear Mr. Franco:

Enclosed is Maryland General Scrap Tire Collection Facility License No. **2009-RGC-07711**, which authorizes the accumulation of **no more than fifty (50)** scrap tires at any one time at 701 Wilson Point Road in Middle River, Baltimore County, as specified in your application of October 5, 2009.

To operate this facility, and to avoid a violation of this license, please have all scrap tire haulers who remove scrap tires from this facility (current or planned) show you their current Maryland license prior to providing services. Also, you should verify that the site to which your scrap tires are being taken is a facility licensed or approved by the Maryland Department of the Environment (the "Department") by obtaining their license number. In addition, if you are currently hauling your own scrap tires or intend to do so in the future, you must also have a Scrap Tire Hauler License.

Please note that this license is subject to the enclosed terms and conditions. This license may be appealed by filing a written request for a hearing within thirty (30) days of receipt of this license. The request should be addressed to Mr. Horacio Tablada, Director, Land Management Administration, at the Department's address. You will subsequently be contacted regarding a hearing date. All license hearings will be conducted in accordance with the Administrative Procedure Act. If no appeal is received within the specified time period, this will constitute acceptance of the terms and conditions of this license.

For further information, please contact Mr. Jeffry Parker, Project Manager at (410) 537-3315.

Sincerely,

Edward M. Dexter, Administrator
Solid Waste Program

EMD:JWP:jp
Enclosure
cc: Mr. Horacio Tablada
Mr. Brian Coblentz

MARYLAND DEPARTMENT OF THE ENVIRONMENT

Martin O'Malley
Governor

Land Management Administration
Solid Waste Program
1800 Washington Boulevard, Suite 605, Baltimore, Maryland 21230-1719

MDE
Shari T. Wilson
Secretary

General Scrap Tire Collection Facility License

No. 2009-RGC-07711

ISSUE DATE: November 23, 2009 ***(NO EXPIRATION DATE)***

Issued to: Northrop Grumman Technical Services, Inc.

Authorizing: the accumulation of **no more than fifty (50)** scrap tires at any one time, and as specified in your application of October 5, 2009

At: 701 Wilson Point Road, Middle River, Baltimore County, MD 21220

This license is issued pursuant to the provisions of Title 9 of the Environment Article, Annotated Code of Maryland, and regulations promulgated thereunder, and is subject to the attached terms and conditions, and compliance with all applicable laws and regulations.

Edward M. Dexter, Administrator
Solid Waste Program

Horacio Tablada, Director
Land Management Administration

LICENSE CONDITIONS:

1. The licensee may only accumulate **no more than fifty (50)** scrap tires at any one time at this facility, as specified in this facility's General Scrap Tire Collection Facility License Application. If there are any discrepancies between this license and the application, the terms and conditions of this license will take precedence.

2. Only scrap tire haulers licensed by Maryland Department of the Environment (the "Department") shall be used to transfer scrap tires.

3. Scrap tires shall only be transferred to the primary or secondary scrap tire collection facilities, scrap tire recycling facilities, or other facilities licensed or approved by the Department.

4. The licensee shall not operate this facility in a manner likely to:

   a. Create a nuisance;

   b. Be conducive to insect and rodent infestation;

   c. Cause a discharge of any constituents derived from scrap tires into the air unless otherwise permitted by the Department;

   d. Cause a discharge of any constituents derived from scrap tires into waters of this State unless otherwise permitted by the Department;

   e. Impair the quality of the environment; or

   f. Create other hazards to the public health, safety, or comfort as may be determined by the Department.

5. The following fire protection standards shall be followed:

   a. Combustibles shall not be stored in the area where scrap tires are being collected; and

   b. Potential ignition sources such as cutting, welding, and heating devices, open fires, etc., shall be prohibited in the scrap tire collection area.

6. The licensee shall inform the Department in writing within 30 days following a business name change, change in ownership or form of business organization, or any other change that affects the license.

7. The licensee shall maintain, for a period of three (3) years, records of all scrap tires entering or exiting this facility. The records shall include, at a minimum, the following information:

   a. The total type and quantity of scrap tires, by number or weight, that were received or generated at this facility;

   b. The total type and quantity of scrap tires, by number or weight, that were transferred from this facility;

c. The total type and quantity of scrap tires, by number or weight, that remained at this facility;

d. The name and identification number of each hauler transferring scrap tires from this facility. The type and quantity of scrap tires must be identified (by number or weight) for each transaction, including tires separated and removed for retreading. The destination of the scrap tires transported by each hauler must also be maintained; and

e. The semi-annual reports specified in General Condition 8.

8. The licensee shall submit to the Department a semi-annual report containing the information described in General Condition 7. A report for the period of January through June of each year is due no later than August 1 following the reporting period. A report for the period of July through December of each year is due no later than February 1 following the reporting period. The reports shall be submitted on copies of the form attached to this license or be in this format and contain the information described in General Condition 7.

9. This licensee shall not be transferred to new owners unless the following conditions are met:

a. A written request for the transfer is submitted to the Department. The request shall indicate the reason for the requested transfer and be signed by the individuals holding and seeking the license;

b. The new owner shall complete a General Scrap Tire Collection Facility License Application. The completed application shall be submitted with the request; and

c. The Department determines that the proposed transfer of the license would not affect present or future compliance with State or federal laws and regulations.

10. If the licensee discovers through any means, including notification by the Department, that noncompliance with a condition of the license has occurred, the licensee shall immediately take all necessary steps to eliminate the condition of noncompliance and to minimize the adverse impact on public health, safety, welfare, or the environment

11. If the licensee discovers that a noncompliance with a condition of the license has affected the public health, safety, welfare, or the environment, the licensee shall immediately notify the Department at (410) 537-3315.

12. If a person who does not possess a Scrap Tire Hauler License, and who is not exempted under Code of Maryland Regulations (COMAR) 26.04.08.04A(2), attempts to deposit scrap tires at the facility covered by this license, the licensee shall refuse to accept the scrap tires offered by the said person, and shall notify the Department within one week of occurrence, the person's name, license plate number and state of issuance for the vehicle used to haul scrap tires. A person is exempted under COMAR 26.04.08.04A(2) if the person transports not more than five (5) scrap tires annually.

13. This license may be suspended or revoked upon a final, unreviewable determination that the licensee lacks, or is in violation of, any federal, State or local approval necessary to conduct the activity authorized by this license.

APPENDIX E—MARYLAND AVIATION ADMINISTRATION RECORDS

CONTRACT NO. MAA-CO-97-019 – MIDFIELD TERMIAL COMPLEX SITE DEVELOPMENT, PHASE 1 AT MTN AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

ADDENDUM NUMBER 1

Midfield Terminal Complex
Site Development, Phase I
at
Martin State Airport

CONTRACT NUMBER: MAA-CO-97-019

April 27, 1998

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
Office of Planning and Engineering
Terminal Building, Lower Level, Pier A
P.O. Box 8766
Baltimore/Washington International Airport, Maryland 21240

Midfield terminal Complex Development, Phase I
at
Martin State Airport

CONTRACT NUMBER: MAA-CO-97-019

ADDENDUM NUMBER 1

PRE-BID MEETING DATE:	April 15, 1998
ADDENDUM DATE:	April 27, 1998
BID DATE:	May 12, 1998

IMPORTANT: Bidders must acknowledge the receipt of this Addendum on the Bid Forms, page BF-18, stating the Addendum Number. Additionally, Bidders must acknowledge purchase of the Standard Provisions by volume and date on page BF-18.

Minutes of Meeting

The meeting agenda was distributed and an attendance list was circulated for signatures. The agenda and individuals/firms in attendance at the pre-bid/site inspection meeting are included as an attachment in this addendum.

I. Introduction

1. The meeting was chaired by Mr. Emory Carrigan of the MAA. Mr. Carrigan welcomed the attendees and gave a brief overview of the project.

II. Administrative

Ms. Suzette Moore of the MAA reviewed administrative items.

1. Sealed bids must be received at the Office of Planning and Engineering of the Maryland Aviation Administration, lower level, Pier A, Baltimore/Washington international Airport, no later than 11:00 am, on May 12, 1998.

2. Plans and specifications for this Project can be purchased at $150.00 per set.

3. The Standard Provisions are a one-time purchase (which can be used in all MAA projects) at a cost of $30.00 per set.

4. The Bid Proposal must include the Bid Guaranty, otherwise it will be rejected. The Bid Guaranty/Bid Bond is a minimum 5% of the bid price for projects over One Hundred Thousand Dollars ($100,000.00).

5. All Bid Forms must be fully executed. The Bid Package must also include the following:

   a. Bid/Proposal Affidavit (Section 2)
   b. MBE Utilization Affidavit (Section 3)
   c. Subcontractor Utilization Affidavit (Section 4)
   d. Bid Proposal and Bid Tabulation Forms (Section 5)

6. All bidders must list both unit price and total price on the Bid Tabulation Forms for all items. Use the revised Bid Tabulation Forms issued in the Addendum.

7. Total Bid Price must be listed in numerical form and words on pages BF-67A through BF-70A.

8. The Minutes of this meeting will be issued as Addendum No. 1. The bidder must fill out Bid Form page BF-18 acknowledging receipt of all Addenda and the Standard Provisions.

9. The MBE goal for this project is 16%. All MBE's must be certified by MDOT at the time of contract award.

III. General Provisions (GP)/Special Provisions (SP)

Ms. Jackie Schonowski of the MAA stated the following:

1. All MAA projects will be constructed in accordance with MAA General and Special Provisions including Interim Standard Provision Addenda for Construction Contracts and specific Technical Provisions.

IV. Project Description

1. Mr. Tee Sombatpium of TAMS Consultants, Inc. informed the attendees that there would be some revisions made to the Plans and Specifications, to be issued as an Addendum to the bid package. Items that will effect the bid price are as follows:

   a. Bid Item 104.1 Maintenance of Traffic (Pages BF-20, BF-31, BF-42, BF-53): has been deleted from this contract.

   b. Bid Item 108.2 Miscellaneous Construction Items Allowance: has fixed allowance prices as follows:

      i. Bid Item 108.2 for Base project (Page BF-21): $175,000.00
      ii. Bid Item 108.2 for Add Alternate 1 (Page BF-32): $85,000.00
      iii. Bid Item 108.2 for Add Alternate 2 (Page BF-43): $85,000.00
      iv. Bid Item 108.2 for Add Alternate 3 (Page BF-54): $170,000.00

   c. Bid Item D-751.5 Storm Drainage Inlet Type 4: Bid Quantity is changed to read as follows:

      i. Bid Item D-751.5 for Base Project (Page BF-29): 1 Each
      ii. Bid Item D-751.5 for Add Alternate 1 (Page BF-40): 0 Each
      iii. Bid Item D-751.5 for Add Alternate 2 (Page BF-51): 0 Each
      iv. Bid Item D-751.5 for Add Alternate 3 (Page BF-62): 0 Each

   d. Bid Item 308.3 Super Silt Fence (Pages BF-21, BF-32, BF-43, BF-54): Unit of quantity is changed to Linear Feet.

2. The following Technical Specification pages are missing in some sets of the Bid Package:

   a. Page 16195-5
   b. Page 16321-1 and Page 16321-2

   These missing pages will be issued in the Addendum.

3. Technical Specification Section 02080 Asbestos Removal has two pages with similar page number (Page 29). Clarification will be provided in the Addendum.

V. Project Schedule/Performance

1. The project duration, excluding winter shut down, is as follows:

Base Project:	230 calendar days from NTP
Base Project+Add Alternate 1:	260 calendar days from NTP
Base Project+Add Alternate 2:	260 calendar days from NTP
Base Project+Add Alternate 3:	275 calendar days from NTP

With the exception of grading and paving, the Contractor will be allowed to continue working through the winter shutdown, if work is not weather sensitive.

VI. Site Inspection

The meeting adjourned after a site visit by attendees.

VII. Questions and Answers

Inquiries were addressed in the meeting as follows:

Q. The general notes on Sheet G-03 state that the haul roads and staging area are to be discussed at the pre-bid meeting. Where are these locations?
A. See Sheet G-03 for haul road and staging area.

Q. The plans state that the contractor is to store all equipment in the staging area. Will the contractors be allowed to store any equipment or materials onsite?
A. If the contractor wants to store anything onsite, it must conform to the applicable FAA circulars and he must obtain permission from MAA.

Q. Plan Sheet C-15 does not clearly show what portion of work is labeled as "Not Included in This Contract". Can this be verified?
A. Any necessary clarifications will be included in the addendum.The scope of work are as follows:

Base Project: Base Project includes demolition work including asbestos removal and building demolition; removal of the existing stockpile; constructing Pond 1; wetland mitigation; constructing access road; installing site utilities (domestic and fire suppression supply, electrical, communication, drainage, sanitation, gas, fiber optic); abandoning the existing sewage treatment plant at the Strawberry Point Ramp and constructing a new line to bring raw sewage to the

Midfield facility; constructing fire protection pumping facility including a 500,000 gallon water tank. Gas, electrical equipment and cable will be installed by Baltimore Gas and Electric Company under direct contract with the winning bidder. Limit of work is shown on the Plans.

Add Alternative 1: Add Alternate 1 work includes constructing Ponds 3A and 3B, including grading and associated drainage structures; constructing Skytech taxiway, apron, parking lot and access road.

Add Alternate 2: Add Alternate 2 work includes constructing Ponds 3A and 3B, including grading and associated drainage structures; constructing Lockheed-Martin taxiway, apron, parking lot and access road.

Add Alternate 3: Combination of Add Alternates 1 and 2.

Q. Can the unit price for one alternate vary with those of another alternative because of the difference in quantity between alternatives?
A. No. However, MAA will look further into how the different alternatives are handled in order to ensure fairness.

Q. When will all the contractors receive the Wetland Mitigation Plans?
A. These plans will be issued as an Addendum prior to bid and will be included in the Base Project.

Q. The specifications state that the MBE lists must be turned in with the Bid. Can contractors provided these lists within 10 days after the bid, as is the norm?
A. Yes. The MBE list is not required until 10 days after the Notice of Recommended Award is issued. However, MAA will accept the list with the Bid if the contractors have them ready.

Q. Will the contractors be required to obtain any permits?
A. MAA will obtain the necessary permits for the work. However, any permits related to a specific construction activity, i.e., oversized haul permit, will be the responsibility of the contractor.

Q. The plans state that waste concrete may be placed in embankment areas. Will this is allowed?
A. No. Waste concrete will not be allowed in embankment areas. This language will be changed in the addendum.

Q. Some specification pages are either missing or out of order in some books. How can the contractors obtain a complete set of specifications?
A. Contractors should notify MAA opf any missing pages. These pages will be included in Addendum(s).

Q. Will it be required to provide stone bedding for all drainage pipe and will this be considered incidental to the pipe?

A. Yes. All drainage pipe must have stone bedding, and it will not be paid for separately. This will be clarified in the Addendum.

Q. Specifications page 101-2, Paragraph "E" -- typo.

A. Will be corrected in the Addendum.

Q. Specification page D-752-3, Section 3.1.C -- typo.

A. Will be corrected in the Addendum.

Q. The note on sheet D-01 does not clearly state what types of hazardous materials are expected to be encountered.

A. Asbestos is the only hazardous materials which are anticipated to be encountered. There may be slight traces of lead paint found in old buildings such as these.

Q. Sheet 22 calls for the pump station to be abandoned. Should this be demolished and removed?

A. The bid documents call for the pump station to be abandoned. MAA will determine if it should be demolished.

Q. Will there be access to the site after today and before the bid opening?

A. Yes. Access will be allowed, but contractors must call the airport manager first to arrange visits.

Q. What is the utility allowance amount?

A. The utility allowance will be established by MAA, and is shown on the revised Bid Forms. Only the successful bidder will then have to contact BG&E for the utility work.

Q. What is the contract duration and sequence of construction?

A. The number of working days, the sequence of construction, and milestones have been established, and they are stated in the Contract Documents.

Q. Will another contractor be building one or both of the new hangars during this contract?

A. Yes, this possibility exists. The Plans do not state specifically which of the hangars, but include a statement about other contractors working within the construction zone.

Q. The plans call for a winter shutdown. Can any work be performed during this time period?

A. The contractor may request to work during the shutdown, and MAA will allow work to be performed provided that the work is not weather-sensitive, in MAA's sole opinion.

Q. Will the cut/fills balance over the site or will the contractor be required to haul embankment from off-site?

A. No, the site will not balance. It is anticipated that there will be excess material which will have to be hauled away, but it is not anticipated that any additional fill will be required from off-site.

REVISIONS ADDITIONS AND DELETIONS TO THE CONTRACT DOCUMENTS

Technical Provisions

PART I GENERAL INFORMATION

Section GI-1.08 Special Construction Requirements

1. Article A. Time Restrictions:

   a. Fourth line: after "...will be granted", delete "or denied".
   b. Last line: revise "...regardless of the closure requested." to read "...regardless of the closure hours requested."

2. Article C. Staging Areas:

   a. First paragraph, 3rd. Line: change "seven days" to "21 days".
   b. First paragraph, last line: after "...originated by", delete "the MAA or".
   c. Fourth paragraph: revised to read "The Contractor shall maintain at all times all of his staging and work areas clean and clear of trash, debris, etc., in accordance with the Safety Requirements During Construction Notes shown on the Contract Drawing Sheet G-03.

3. Article D. Contract Duration: delete last sentence.

4. Article E. Liquidated Damages:

   a. First sentence, 1st. line: after "...work on", delete "or before".
   b. First sentence, 3th. line: change "below." to "above.".

5. Article O. Project Milestones: first line, first sentence: revise to read as follows: " The Contractor shall perform all work in Stages as shown on the Contract Drawings Sheets A-01 through A-07."

PART I TECHNICAL SPECIFICATIONS

Item 100 Demolition and Removal

1. Article 2.1: seventh line: revise "...objectionable materials which cannot be used..." to read "...objectionable materials cannot be used in backfill, and shall be ...".
2. Article 5.2: Pay Item 100-10: change "Larger than 48" Diameter" to "54" Diameter".

Item 101 Clearing and Grubbing

1. Article 2.1.D: delete the first sentence.
2. Article 2.1.E.: third line: change "Item 0000" to "Item 2080".
3. Article 3.2: delete "Type II: Over eighteen (18) inches butt diameter".
4. Article 4.2: last two lines: change Pay Item "P-151.1" to "101.1"; change Pay Item "P-151.2" to "101.2".

Item 1000 Pre-Engineer Metal Building

1. Article 1.1: fourth line: before "fire sprinkler system", add "unit heater".
2. Article 5.1: fifth line: before "fire sprinkler system", add "unit heater".

Section 02080 Asbestos Removal

Replace both duplicate Page 29 with revised Page 29A, attached.

Section 15000 Pumphouse Equipment, Pipe, and Fittings

Article 3.7.A.2: first line: after "personnel", add "for a minimum period of 24 hours".

Section 16195 Labeling and Identification

Insert page 16195-5 - attached (this page was omitted in some technical specification sets)

Item 16321 Pole Mount Transformer

Insert complete section, Pages 16321-1 and 16321-2, attached (this section was omitted in some technical specification sets)

Item 16900 General Instrumentation

Article 1.2.A: third line: after "...alarm panel,", revised to read:"pumphouse fire alarm panel and dfiesel fuel level...".

Item D-751 Manholes, Catch Basins, and Inlet

Article 1.3: after last line, add the following:
"Type IV Inlets and manholes capable of supporting aircraft loads. See drawing Sheet U-17 for details."

Item D-752 Miscellaneous Drainage Structures

Article 3.1.C.: last line: revise to read: "shall be incidental and included in all applicable pay items where dewatering is required."

Item T-905 Topsoiling

Insert page T905-1 and T905-2 (these pages were omitted in some technical specification sets).

PART III SPECIAL PROVISIONS FORMS

Replace Pages SP-10 through SP-13 with revised Pages SP-10A through SP-13A, attached.

PART VI BID FORMS

Replace Pages BF-20 to BF-67 with Pages BF-20A to BF-70A, attached.

Contract Plans

Sheet G-03 : Added General Note No. 16. See attachment G-03A.

Sheet G-04 : Revised Summary of Estimated Quantities Table. See attachment G-04A.

Sheet G-08 : Revised Plan and Notes. See Attachment G-08A. Reduced sized print of this sheet is also attached for clarity.

Sheet G-09 : Revised Plan and Notes. See Attachment G-09A. Reduced sized print of this sheet is also attached for clarity.

Sheet G-10 : Revised Plan and Note. See Attachment G-10A. Reduced sized print of this sheet is also attached for clarity.

Sheet G-11 : Revised Plan and Note. See Attachment G-11A. Reduced sized print of this sheet is also attached for clarity.

Sheet A-02 : Revised Note. See attachment A-02A.

Sheet D-02 : Revised Plan and Note. See Attachments D-02A, and D-02B.

Sheet C-03 : Revised grading plan for Pond 3B. See Attachment C-03A.

Sheet C-07 : Modified for clarity. See the attached reduced size print of Sheet C-07.

Sheet C-11 : Added Pond Classification, and revised Note. See Attachment C-11A.

Sheet C-14 : Added Pond Classification,revised grading Plan and Note. See Attachment C-14A, C-14B, and C-14C.

Sheet C-15 : Modified for clarity. See the attached reduced size print of Sheet C-15.

Sheet C-21 : Shows limit of work. See Attachment C-21A.

Sheet C-22 : Added SMH descriptions. See Attachment C-22A.

Sheet P-05 : Clarified dimension for Typical Access Road Section. See Attachment P-05A.

Sheet U-01 : Added Note. See Attachment U-01A.

Sheet U-03 : Revised Plans for clarity. See Attachment U-03A, and U-03B.

Sheet U-16 : Typographical error corrected. See Attachment U-16A.

Sheet U-17 : Revised Drainage Sructure descriptions. See Attachments U-17A and U-17B.

Sheet U-18A: Added lable for clarity.Plans for clarity. See Attachment U-18A-A.

Sheet E-09 : Revised Detail. See Attachment E-09A.

Sheet R-02 : Revised Sediment Basin Data Table, Ponds and grading contours shown. See the attached reduced size print of Sheet R-02.

Sheet R-03 : Pond and grading contours shown. See the atached reduced size print of Sheet R-03.

Sheet R-04 : Ttypographical errors corrected. See the attached reduced size print of Sheet R-04.

Sheet R-05 : Typographical errors corrected. See the attached reduced size print of Sheet R-05.

Response to written inquiries

Responses to the attached written inquiries from IA Construction Corporation, dated April 16, 1998, are as follows:

1. Other than the designated storage area shown on the Plans, materials and equipment can be stored on site except on the Lockheed-Martin and Skytech building areas. Permission for additional storage area must be requested through the airport manager.

2. New Bid Tabulation Forms are provided in Addendum 1.

3. See revised Sheets G-08 through G-11 for clarification of the scope of work for each alternate. Sheets C-04 and C-16 are NIC. Sheets C-07 and C-15 are revised (see the attached reduced size prints).

4. Time will stop during a winter shut down period, to be issued solely by MAA. However, the Contractor may be allowed to work in this period provided that the work is not weather sensitive, in MAA's sole opinion.

5. MAA has determined that the unit price of the same items must be the same for each alternate.

6. Wetland Mitigation is included in the Base Project. Bid Tabulation Forms incorporating additional items for Wetland Mitigation are included in this Addendum. Plans and specifications will be provided by MAA in Addendum 2.

7. The MBE list is not required until 10 days after the Notice of Recommended Award is issued. MBE's must be certified by MDOT by the contract award time.

8. Permits to br e obtained by Contractors include haul route, dumping, utility crossing State/County Roads, temporary power, communication and sanitary.

9. See revision included in this Addendum.

10. Demolished concrete must be legally disposed of by the Contractor off the airport site.

11. See revised page included in this Addendum.

12. There will be more excavation than embankment for this project. Surplus must be disposed of off sthe airport site by the Contractor. Borrow material is not required.

13. Missing pages T-905-1 and 2 are included in this Addendum.

14. Stone bedding is required for all storm drain pipe, see pipe bedding detail shown on Sheet U-17. Stone bedding is incidental to the linear foot items.

15. See revised page included in this Addendum.

16. The taxiway safety and object free areas are shown on the revised drawing Sheets G-08 through G-11 included in this Addendum.

17. There are no limits on the number of taxiway closures. However, prior to permission for each closure must be granted by the airport manager 48 hours in advance.

18. No other hazardous material was found in the existing buildings.

Responses to the attached written inquiries from Pott & Callahan, Inc. are as follows:

1. See revised drawing Sheets G-08 through G-11, included in this Addendum, for the scope/limit of work for the Base Project and each alternate. For each work area, see R-Series drawings for limit of disturbance.

2. The Contractor should first familiarize himself with each bid alternate shown on Sheets G-08 through G-11, and then follow the rest of the contract drawings to execute the work.

3. The existing stockpile and sediment trap are shown on survey (T-series), demolition (D-series) and civil (C-series) drawings. These works are part of Bid Item P-152.4.

4. No. Excavation quantities exceed embankments. Surplus material spoils must be disposed of off the airport site by the Contractor.

Responses to the attached written inquiries from Ben Field Electric, dated April 23, 1998, are as follows:

1. Padmounted switchgear, distribution transformers, and cabling are to be provided and installed by BG&E to BG&E Standardsrequirements. This work is part of Bid Item 16000.1.

2. Unit heater and ventilation system for the pumphouse are part of Bid Item 1000.1.

3. Item 16900.1 is to include only the autodialer system. The local alarm components are to be included with Item 427.1 - Oil/Water Separator, and Item 1300.9 - Sanitary Sewer Pump Station respectively.

4. The pumphouse fire alarm system is part of Item 16900.1 - General Instrumentation.

5. Yes. The sewage pumping station shall be pre-wired, and shall have overcurrent protection (circuit breaker or fuse) at the point of connection for electric power.

6. Sheet E-06 show which poles are not-in-contract, or to be included in the bid alternates. For Add Alternate 2 (Pole Nos. 6A through 11), the Contractor is to terminate the luminaire wiring (wires from luminaire) at the base of Poles 6A through 11. All other luminaire wiring is to be connected to circuits from Panel P-1 at the fire pumphouse.

7. Use schedule 80 PVC for direct buried conduit.

8. There are four (4) sanitary sewer pump stations for this project. See Sheets C-06, C-21 and C-22.

9. This is a State project on State property. Inspection will be provided by MAA and their Construction management Consultant.

10. The Contractor is responsible for obtaining a 3ϕ, 4-wire 480Y/277V (200 max. Amp.) Electrical services from BG&E in accordance with BG&E requirements. This work is to be included under Item 16000-1. BG&E will provide the meter and meter socket for this type of service.

11. The Contractor is required to coordinate with the telephone company, and provide all necessary incidentals for the Telephone Termination Cabinet.

END OF ADDENDUM NO.1

MARYLAND AVIATION ADMINISTRATION

MEETING ATTENDANCE REGISTER

CONTRACT NO.: MAA-CO-97-019

CONTRACT TITLE: MIDFIELD COMPLEX CONSTRUCTION SITE DEVELOPMENT @ MTN

[ ] PRE-PROPOSAL MEETING
[ ] PRE-CONSTRUCTION MEETING
[X] PRE-BID/SITE INSPECTION MEETING
[ ] BID OPENING

DATE: APRIL 15, 1998

FIRM NAME	PRINTED NAME	SIGNATURE	PHONE NUMBER
MAA	EMORY W. CARRIGAN		410-859-7085
MAA	Suzette Moore	Suzette Moore	410-859-7792
MAA	Jackie Schonowski	Jackie Schonowski	410-859-7031
MAA/OFP	Lee Carrigan	Lee B Carrigan	410-859-7841
Driggs	C. Montjoy		301 499-1900
PBCS	PETER FLORIAN		703 742-5740
PBCS	REMI de SOUZA		410.750.6006
COSSENTINO CENTR.	NORMAN BUTLER		(410) ~~410~~ 574-5800
MAA	BILL TSAI	Bill Tsai	410-859-7662
TAMS Consultants	MIKE EMLET		703-243-8000
K&K Adams	Mark J Slowinski	Mark J Slowinski	410-523-0857
OLD DOMINION DEMO	WAYNE THOMPSON		757-397-5341
T.C. Timmons	Bill Farrell		410-574-3055
JOHN DRIGGS COMPANY	ALAN K. WYATT		301 499 1900
~~LACEY GR~~			
BAKER HEAVY & HIGHWAY	LARRY GREEN		412-269-7323
I-A CONST. CO.	STERLING RUBY		410-335-0391
"	JOHN KELBLE		"

MAA-222
R 12/90

APR 16 '98 08:14AM

MARYLAND AVIATION ADMINISTRATION

MEETING ATTENDANCE REGISTER

CONTRACT NO.: MAA-CO-97-019

CONTRACT TITLE: MIDFIELD COMPLEX CONSTRUCTION SITE DEVELOPMENT @ MTN

[ ] PRE-PROPOSAL MEETING
[ ] PRE-CONSTRUCTION MEETING

[X] PRE-BID/SITE INSPECTION MEETING
[ ] BID OPENING

DATE: APRIL 15, 1998

FIRM NAME	PRINTED NAME	SIGNATURE	PHONE NUMBER
Facchina Construction	Joseph V. Trapani	Joseph V Trapani	410-760-3892
TAMS Consultants	Scott Delgado	Scott Delgado	703-243-8000
TAMS CONSULTANTS	Tee Sombatpium	[illegible]	703-243-8000
Senfield Electric	Leonard Martin	Leonard Martin	410-879-1485
FIVE STAR EXCAVATION	MIKE TRUSLOW	[illegible]	410-785-3845
MAA/MTN	JAKE R WEST JR	[illegible]	410-682-8800

MAA-222
R 12/90

IA Construction Corporation

Address for Mail:
IA Construction, Area 6
PO Box 210
White Marsh, MD 21162
Tel. (410) 335-0391
Fax (410) 335-6242

Address for Shipments:
U.S. 202 - One-Half Mile South of U.S. 1
P.O. Box 8
Concordville, PA 19331

(610) 459-3136
(610) 459-2086
(610) 358-4469

4/16/98

Maryland Aviation Administration
PO Box 8766
BWI Airport, MD 21240-0766
Attention: Suzette Moore

RE: Martin State Airport Midfield Terminal Complex Site Development
MAA-CO-97-019

Dear Suzette,

The following are the questions that we had asked at the pre bid meeting of April 15,1998.

1) Please clarify exactly where we are allowed to store materials and equipment at locations other than the designated staging area.
2) What is acceptable for entry in the bid forms for the items that have a zero bid quantity?
3) Several sheets in the contract plans include work that is not included in this contract. Some of these sheets are not clear as to what is not included. Some examples are C-04, C-07, C-15 and C-16. Please clarify.
4) Page GI-7 of the specifications discusses the contract time and the exclusion of a winter shutdown. Does this mean that even though this is a calendar day project, time will stop for a winter shutdown? Who will determine when this time begins and ends? May any work be performed during this shutdown?
5) The specs require that the same items in different alternates must have the same unit price. The unit price for many items of work may vary greatly depending on the proposed quantity. We request that we be allowed the option to bid same items at different unit prices.
6) Page GI-8 discusses the issuance of wetland mitigation plans. Will these plans be issued prior to the bid opening? Will this work be part of the base bid?
7) Page GI-7 states that the MBE package will be submitted at the time of bid. Is this correct?
8) Item 10 page 10-2 section 10-3 #3.3 states that the contractor is to obtain the required permits for the project. Exactly which permits are we to obtain?
9) Item 101 page 101-2 section 101-2 2.1 E states "Item 0000". Please clarify.
10) Please clarify what we are supposed to do with any demolished concrete on the project. Page 101-1 – 2.1D, page 100-1 – 2.3 and page 206-1 – 2.4 seem to conflict each other on this issue.
11) My specification book includes two different page 29 in section 02080 Asbestos Removal. Please clarify.

IA Construction, Area 6
PO Box 210
White Marsh, MD 21162
Tel. (410) 335-0391
Fax (410) 335-6242

12) Please clarify Item P-152 Excavation and Embankment section 152-2 2.2 B. There is no grading table in the plans. Does the site balance? If not is there an on site disposal area? Should there be a contingent borrow item?
13) My spec book is missing pages T-905-1 and T-905-2.
14) Item D-701 section 701-3 3.2 A. 1. Discusses the use of stone bedding under storm drain pipe. Is stone bedding to be used under all storm drain pipe? Is this work incidental to the linear foot items?
15) Item D-752 section 752-3 3.1 C states "Item xxxxx". Please clarify.
16) The exact location of the taxiway safety area and taxiway object free area during construction is not indicated anywhere on the contract plans. Please clarify.
17) Are there any limits on the number of taxiway closures?
18) A note on sheet D-01 says, "remove asbestos and other hazardous materials from existing buildings". The specifications only the possibility and procedures for asbestos removal. What other hazardous materials can we expect to find on site?

Please contact me if you have any questions.

Sincerely,

John Kelble
Estimator

POTTS & CALLAHAN, INC.
500 WEST 29TH STREET
BALTIMORE, MARYLAND 21211
PHONE: (410) 235-9400 • FAX: (410) 243-0041

DATE: _____

COMPANY: MAA

ATTENTION: MS. SUZETTE MOORE

REFERENCE: MAA-CO-97-019 MIDFIELD TERMINAL COMPLEX

FAX #: 410 859-5440 PHONE #: _____

MESSAGE:

- SHEET G-08 WHAT IS THE LIMIT OF DISTURBANCE FOR THE BASE PROJECT ?
- COULD YOU CLARIFY WHICH SHEETS OF THE CIVIL DRAWINGS ARE TO BE USED FOR THE BASE BID, ALT. 1, ETC.
- THE EXISTING STOCKPILE TO BE REMOVED NOR THE SEDIMENT POND TO BE BACKFILLED IS APPEARING ON THE CIVIL PLANS. DO YOU HAVE A EARTH QUANTITY FOR THESE 2 ITEMS.
- IS THE CLASS I EXCAVATION INTENDED TO BALANCE ?

SIGNED: WILLIAM COOKE FAX #: (410) 243-0041

This FAXOGRAM has a total of 1 pages, including this page. If you do not receive all the pages, please phone us immediately at (410) 235-9400.

_____ PLEASE ACKNOWLEDGE RECEIPT OF THIS FAXOGRAM BY

_____ TELEPHONE _____ RETURN FAX

CORPORATE OFFICE
P.O. Box 256
14 E. Jarrettsville Road
Forest Hill, MD 21050
(410) 879-1485
(410) 893-0882 Fax

ELKRIDGE OFFICE
6615 Santa Barbara Road
Elkridge, MD 21227
(410) 796-0315
(410) 796-0329 Fax

April 23, 1998

Maryland Aviation Administration
P.O. Box 8766
Baltimore/Washington International Airport
Maryland 21240-0766

Attn: Ms. Suzette Moore

Re: Midfield Terminal Complex Site Development, Phase I
MAA-CO-97-019

Gentleman:

The following are several questions regarding the above referenced project:

1 - On drawing E-05, the "Proposed Midfield Power Distribution" riser indicates two S & C Padmounted Switchgears and three transformers, are we to furnish and install the above mentioned material? If so, please provide correct kva sizing and specifications for the medium voltage transformers and indicate what bid items are to be utilized.

2 - On drawing E-10, the Fire Pump heating and ventilation equipment schedule is indicating catalog numbers. Are we to assume that this equipment is part of the "1000.1-Pre-Engineered Metal Building", since the ventilation fan is specified and the unit heater is not specified in that particular specification?

3 - On drawing E-08, the "Proposed Tank High Level Alarm Panels", indicates several alarm panels for the sewage lift stations and oil/sperator tanks, are we to assume that this is part of "16900.1-General Instrumentation" or is this part of the "427.111/Water Separator" and "1300-Sanitary Sewage Pump Station System" since there is a float sensor and control panel dialers in each of these specifications?

4 - On drawing U-14, the Pumphouse Fire Alarm diagram indicates a fire alarm system, where is the bid item for the fire alarm system and what trade is responsible for the furnishing and installation? Is it going to be bid under item "1000.1 - Pre-Engineered Metal Building" or under "16900.1-General Instrumentation"?

5 - The sewage pumping stations have a power connection, are we to assume that all disconnects, starters, level switches, generator and alarms will be prewired by the "1300.9-Sanitary Sewage Pump Station" contractor, and the electrical contractor will come to a one point connection for the alarm and power connections?

6 - On drawing E-06, the "Parking & Access Road Area Lighting Luminaire Schedule", please explain note number one in more detail. There seems to be a confusion on the scope of work for these poles, since some of the poles are not-in-contract.

(continued)

April 23, 1998

Maryland Aviation Administration

Attn: Ms. Suzette Moore

Re: Midfield Terminal Complex Site Development, Phase I
MAA-CO-97-019

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7 - On drawing E-09, the "Direct Buried Conduit Trench Detail", indicates schedule 80 pvc conduit, but in the specifications item "L-110" it indicates schedule 40 pvc conduit. Which one is correct?

8 - In the bid forms, the bid item number "1300.3-Sanitary Sewer Pump Station" indicates a quantity of four pump stations, but on on the drawings there are only three. Please indicate where the extra pumping station is located.

9 - Does this project require pulling an electrical permit from either the local jurisdiction or a independent inspection organization acceptable to MAA?

10 - Who is responsible for the watt-hour meter and CT cabinet at the Pumphouse?

11 - Is there a requirement to supply a plywood backboard and punch-down blocks in the Telephone Termination Cabinet? If so please specify all requirements.

Thank You.
Benfield Electric Co., Inc.

Leonard Martin
Estimator

final payment. Final payment will not be made until this certification is executed.

PART 4 METHOD OF MEASUREMENT

4.1 There will be no direct measurement for payment of the work specified in this Item. Work under this Item will be paid for on a lump sum basis as specified in Section 5.1 below.

PART 5 BASIS OF PAYMENT

5.1 Payment will be made at the contract lump sum price for asbestos removal. This price shall be full compensation for all materials, equipment, labor, and incidentals necessary to complete the item in accordance with the plans and the provisions of this Item.

Payment will be made under:

Item 2080.1 Asbestos Removal -- lump sum

END OF ITEM 2080

where labeling is specified elsewhere. For panelboards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

N. Install labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

O. Underground Electrical Line Identification: During trench backfilling for exterior underground power and telephone conduits, install continuous underground plastic line marker, located directly above conduit at 6 to 8 inches below finished grade. Where multiple power conduits installed in common trench, do not exceed an overall width of 16 inches; install a single line marker.

16195-4 COMPENSATION

4.1 METHOD OF MEASUREMENT

A. Measurement will be made for the work item of this Item by lump sum.

4.2 BASIS OF PAYMENT

A. Payment for the work of this Item will be included as part of the payment item listed below.

B. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

4.3 PAYMENT ITEM

Item 16195.1 Labeling and Identification -- lump sum

END OF ITEM 16195

ITEM 16321 POLE MOUNT TRANSFORMER

16321-1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Items, apply to this and the other electrical items.

B. Requirements of the following Items apply:

1. Basic Electrical Requirements.
2. Basic Electrical Materials and Methods.

1.2 SUMMARY

A. This item includes 60 hertz, oil insulated, self-cooled, pole mount distribution transformers.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Standard Provisions.

B. Product data for each type transformer and component specified.

C. Shop drawings from manufacturers of transformers including dimensioned plans, sections, and elevations. Show tabulations of installed devices, major features, and voltage rating. Include the following:

1. Enclosure type with details.
2. Current ratings.
3. Features, characteristics, ratings, and factory settings of devices and auxiliary components.

D. Qualification data for field-testing organization certificates, signed by the Contractor, certifying that the organization complies with the requirements specified in Quality Assurance below. Include list of completed projects with project names, addresses, and names of Engineer and Owner plus basic organization qualifications data.

E. Report of field tests and observations certified by the testing organization.

1.4 QUALITY ASSURANCE

A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The terms "listed" and "labeled" shall be defined as they are in the National Electrical Code, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Electrical Standard: Components and installation shall comply with ANSI and NEMA material standards and local electric utility installation guidelines.

16321-2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

1. General Electric Co.
2. Cooper Power Systems.
3. Kuhlman Corporation.
4. Howard Industries.

2.2 POLE MOUNT TRANSFORMERS

A. General: ANSI Design, Conventional dual high voltage bushings.

B. Insulation Class:

1. High voltage BIL: 95 kV.
2. Low voltage BIL: 30 kV.

C. Ratings: 13.2kV- 120/240V, single phase, 10kVA.

D. Voltage Taps: Two 2½ percent above and below.

16321-3 EXECUTION

3.1 INSTALLATION

A. Install transformers and associated wiring in accordance with MAA, BG&E, and ANSI C2 - National Electrical Safety Code.

B. Furnish primary lightning arresters, and fused cutouts as required.

C. Furnish equipment grounds in accordance with Specification Item 16450.

16321-4 COMPENSATION

4.1 METHOD OF MEASUREMENT

A. Measurement will be made for the work item of this Item by the unit.

4.2 BASIS OF PAYMENT

A. Payment for the work of this Item will be included as part of the payment item listed below.

B. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

4.3 PAYMENT ITEM

Payment for this work will be made under:

Item 16321.1 Pole Mount Transformers -- Per Each

END OF ITEM 16321

ITEM T-905 TOPSOILING

905-1 DESCRIPTION

1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from stockpiled topsoil resulting from stripping operations performed under Item P-152, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer. This item shall include furnishing and installing erosion control netting on prepared surfaces inside stormwater management basins as shown on the plans.

1.2 The quantity of topsoil work required under this Item shall be limited to the quantity required to cover the surfaces of the proposed stormwater management basins as shown on the plans. The approximate quantity required to accomplish this is shown on the plans. The Contractor shall be responsible for verifying the actual quantity of topsoil required from the grades and sections shown on the plans. Any topsoil remaining after the completion of this work, or topsoil stripped in excess of the quantity required shall, at MAA's option, remain the property of MAA, and the Contractor shall be entitled to no additional compensation under this Item.

905-2 MATERIALS

2.1 TOPSOIL:

Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches or more in diameter), clay lumps or similar objects. Brush and other vegetation which will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sods and herbaceous growth such as grass and weeds are not to be removed but shall be thoroughly broken up and intermixed with the soil during handling operations. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the association of official agricultural chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). there shall be not less than 20% nor more than 80% of the material passing the 200 mesh (0.075 mm) sieve as determined by the wash test in accordance with ASTM C 117. Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

2.2 INSPECTION AND TESTS:

The topsoil shall be inspected to determine if the stripped material meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in 905-2.1.

2.3 EROSION CONTROL NETTING:

Erosion control netting shall be of the type specified on the plans and shall meet the requirements of the 1994 Standards and Specifications for Erosion and Sediment Control, Maryland Department of the Environment.

905-3 CONSTRUCTION METHODS

3.1 GENERAL:

A. Areas to be topsoiled shall be shown on the plans. If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

B. Suitable equipment necessary for proper preparation and treatment of the ground and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the Engineer before the various operations are started.

3.2 PREPARING THE GROUND SURFACE:

A. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other means approved by the Engineer, to a minimum depth of 2 inches (50 mm) to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 inches (50 mm) in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

B. Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and properly compacted condition to prevent, insofar as practical, the formation of low places or pockets where water will stand.

3.3 OBTAINING TOPSOIL:

A. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the Engineer. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed. When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the Engineer. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the Engineer. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoiling purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

B. When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the Engineer. The Contractor shall notify the Engineer sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

3.4 PLACING TOPSOIL:

A. The topsoil shall be evenly spread on the prepared areas to a uniform depth of 2 inches (50 mm) after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

SP-1.05 Submittal Register (SP-8.06)

CONTRACT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I	CONTRACT NUMBER: MAA-CO-97-019
PROJECT LOCATION: MARTIN STATE AIRPORT, MARYLAND	CONTRACTOR:

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL								CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		MAA ACTION		REMARKS
		SHOP DWG	SAMPLE	MFGS DATA	CERTIFICATE	TEST REPORT	SOFTWARE	OTHER AS NOTED	TECH DATA	GUARANTEE	INFORMATION ONLY	MAA APPROVAL	SUBMIT	APPROVAL NEEDED BY	MATERIALS NEEDED BY	DATE	SUBMIT TO MAA	SUBMIT	DATE	
10	Specifications and Standards							X												
100	Demolition							X												Permits
427	Oil/Water separator			X	X				X	X										Miss Utility
813	Roadway Sign	X							X											
1000	Pre-Engineered Metal Building			X					X	X										
1200	Water Tank	X		X	X	X			X	X										
1300	San. Sewage and Water Supply System	X		X	X	X			X	X										
2080	Asbestos Removal				X															
15000	Pumphouse Equip.,Pipe and Fitting	X		X	X	X			X	X										
16100	Raceways, Boxes, and Cabinets			X																
16110	Elect. Ducts, Foundation, MH, & Handhole	X		X					X											
16120	Wire and Cables			X																
16141	Wiring Devices			X	X				X											

CONTRACT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I																					
PROJECT LOCATION: MARTIN STATE AIRPORT, MARYLAND													CONTRACT NUMBER: MAA-CO-97-019								
													CONTRACTOR:								
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL									CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		MAA ACTION		REMARKS
		SHOP DWG	SAMPLE	MFGS DATA	CERTIFICATE	TEST REPORT	SOFTWARE	OTHER AS NOTED	TECH DATA	GUARANTEE	INFORMATION ONLY	MAA APPROVAL	SUBMIT	APPROVAL NEEDED BY	MATERIALS NEEDED BY	DATE	SUBMIT TO MAA	SUBMIT	DATE	
16170	Motor and Circuit Disconnects			X					X											
16195	Labeling and Identification			X																
16470	Power Distribution Equipment			X																
16510	Lighting	X		X					X											
16900	General Instrumentation	X		X					X											
P-152	Excavation and Embankment					X														
P-209	Crushed Aggregate Base course					X			X											
P-304	Cement-Treated Base Course			X		X			X											
P-401	Plant Mix X Pavements			X	X	X			X											
P-603	Bituminous Tack Coat			X	X				X											
P-605	Joint Sealing Filler			X	X				X											
P-610	Portland Cement Concrete				X	X			X											

CONTRACT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I														CONTRACT NUMBER: MAA-CO-97-019								
PROJECT LOCATION: MARTIN STATE AIRPORT, MARYLAND														CONTRACTOR:								
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL									CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		MAA ACTION		REMARKS
		SHOP DWG	SAMPLE	MFGS DATA	CERTIFICATE	TEST REPORT	SOFTWARE	OTHER AS NOTED	TECH DATA	GUARANTEE	INFORMATION ONLY	MAA APPROVAL	SUBMIT	APPROVAL NEEDED BY	MATERIALS NEEDED BY	DATE	SUBMIT TO MAA	SUBMIT	DATE	
P-620	Pavement Marking and Marking Removal			X	X				X											
D-701	Pipe for Storm Drain and Culvert			X	X				X											
D-705	Pavement Underdrain for Airport			X	X				X											
D-751	Manholes, Catch Basins and Inlets			X	X	X			X											
D-752	Miscellaneous Drainage Structures			X	X	X			X											
L-108	Installation of Airport Underground Cable			X																
L-110	Installation of Airport Underground Elec. Duct			X																
L-125	Installation of Airport Lighting System			X					X											
T-901	Seeding		X		X															

CONTRACT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I	CONTRACT NUMBER: MAA-CO-97-019
PROJECT LOCATION: MARTIN STATE AIRPORT, MARYLAND	CONTRACTOR:

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL									CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		MAA ACTION		REMARKS
		SHOP DWG	SAMPLE	MFGS DATA	CERTIFICATE	TEST REPORT	SOFTWARE	OTHER AS NOTED	TECH DATA	GUARANTEE	INFORMATION ONLY	MAA APPROVAL	SUBMIT	APPROVAL NEEDED BY	MATERIALS NEEDED BY	DATE	SUBMIT TO MAA	SUBMIT	DATE	

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	7,230		
100.2	Remove Existing Chain Link Fence	LF	2,340		
100.3	Remove Existing Underdrain Pipe	LF	0	N/A	N/A
100.4	Demolish/Remove Existing Utilities Structures	EA	5		
100.5	Remove Existing Duct Bank	LF	60		
100.6	Remove Existing Conduit and Cable	LF	500		
100.7	Demolish/Remove Existing Buildings	LS	1		
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	1,200		
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	415		
100.10	Remove Existing Pipe 54" Diameter	LF	310		
101.1	Clearing and Grubbing	ACRE	12		
101.2	Clearing Isolated Trees Type I	EA	50		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 175,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	3,735		
308.1	Stabilized Construction Entrance	SY	160		
308.2	Silt Fence	LF	13,000		
308.3	Super Silt Fence	LF	1,000		
308.4	Stone Check Dam	EA	6		
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	4		
308.9	Portable Sediment Tank	LS	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	4		
308.11	Curb Inlet Protection	EA	2		
308.12	Temporary Seeding and Mulching	ACRE	4		
427.1	Oil/Water Separator	EA	0	N/A	N/A
813.1	Roadway signs	SF	24		
1000.1	Pre-Engineered Metal Building	LS	1		
1200.1	Water Tank	LS	1		
1300.1	Water Pipe (4" Diameter)	LF	205		
1300.2	Water Pipe (8" diameter)	LF	3,620		
1300.3	Water Pipe (14" Diameter)	LF	3,825		
1300.4	Fire Hydrant	EA	1		
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	160		
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	685		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	1,160		
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	4,900		
1300.9	Sanitary Sewer Pump Station	EA	4		
1300.10	Sanitary Sewer Manhole	EA	18		
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	3		
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	1		
2080.1	Asbestos Removal	LS	1		
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	1		
16000.1	Utility Cost Allowance	LS	1	Allowance	$275,000
16010.1	Basic Electrical Requirements	LS	1		
16050.1	Basic Electrical Materials and Methods	LS	1		
16100.1	Raceways, Boxes, and Cabinets	LS	1		
16110.1	Electrical Handhole	EA	46		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	14		
16110.3	Pole Foundation in Grassy Area	EA	7		
16110.4	Pole Foundation in Paved Area	EA	0	N/A	N/A
16110.5	4W-6" concrete Encased Duct	LF	1,600		
16110.6	4W-4" Concrete Encased Duct	LF	3,100		
16110.7	4W-3" Concrete Encased Duct	LF	1,500		
16110.8	2W-6" Concrete Encased Duct	LF	1,400		
16110.9	2W-4" Concrete Encased duct	LF	360		
16110.10	2W-3" Concrete Encased Duct	LF	5,500		
16110.11	2W-2" Concrete Encased Duct	LF	2,700		
16110.12	1W-4" Concrete Encased Duct	LF	0	N/A	N/A
16110.13	1W-2" Concrete Encased Duct	LF	1,900		
16110.14	Electrical Equipment Pad	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	1		
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	1		
16170.1	Motor and Circuit Disconnects	LS	1		
16195.1	Labeling and Identification	LS	1		
16321.1	Pole Mount Transformer	EA	2		
16470.1	Power Distribution Equipment	LS	1		
16510.1	Pole Mount Luminaire	EA	13		
16510.2	Exterior Wall Luminaire	EA	1		
16510.3	Interior Fluorescent Lminaire	EA	9		
16510.4	Emergency Lighting Unit	EA	1		
16510.5	Lighted Exit Sign	EA	1		
16510.6	3.5 EPA Light Pole	EA	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	7		
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	50		
P-152.2	Unclassified Excavation	CY	11,250		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	7,500		
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	0	N/A	N/A
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	2,830		
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	0	N/A	N/A
P-304.1	Cement-Treated Base Course (6" Depth)	SY	0	N/A	N/A
P-304.2	Cement-Treated Base Course (8" Depth)	SY	2,630		
P-304.3	Portland Cement	TON	90		
P-401.1	Airfield Bituminous Surface Course	TON	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	365		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	365		
P-603.1	Bituminous Tack Coat	GAL	105		
P-610.1	Concrete Curb	LF	0	N/A	N/A
P-610.2	Concrete Curb and Gutter	LF	1,580		
P-610.3	Concrete Utility Encasement	CY	20		
P-610.4	Portland Cement Concrete Pavement	SY	0	N/A	N/A
P-620.1	Pavement Marking	SF	840		
P-620.2	Pavement Marking Removal	SF	0	N/A	N/A
D-701.1	12-inch RCP Class IV	LF	10		
D-701.2	15-inch RCP Class IV	LF	75		
D-701.3	18-inch RCP Class IV	LF	110		
D-701.4	24-inch RCP Class IV	LF	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	0	N/A	N/A
D-701.6	30-inch RCP Class A-25	LF	0	N/A	N/A
D-701.7	36-inch RCP Class A-25	LF	0	N/A	N/A
D-701.8	42-inch RCP Class A-25	LF	0	N/A	N/A
D-701.9	Concrete for Pipe Cradles	CY	0	N/A	N/A
D-701.10	Seepage Pipe	LF	100		
D-705.1	Geocomposite Underdrain	LF	0	N/A	N/A
D-705.2	4-inch Polyethylene Pipe	LF	0	N/A	N/A
D-705.3	4-inch Perforated Polyethylene Pipe	LF	0	N/A	N/A
D-705.4	6-inch Polyethylene Pipe	LF	0	N/A	N/A
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	0	N\A	N\A
D-751.3	Storm Drainage Inlet Type 2	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	4		
D-751.5	Storm Drainage Inlet Type 4	EA	1		
D-751.6	Adjust Structure to Grade	EA	2		
D-752.1	Sedimentation Chamber	CY	17		
D-752.2	Endwall	CY	55		
D-752.3	Class I Rip-Rap	SY	40		
D-752.4	Grouted Rip-Rap	SY	90		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	0	N/A	N/A
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	0	N/A	N/A
L-108.3	Ground Rod	EA	0	N/A	N/A
L-108.4	Concrete Cable Marker	EA	0	N/A	N/A
L-110.5	2" PVC Sched. 40 conduit	LF	0	N/A	N/A
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	0	N/A	N/A
L-125.3	Two-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.4	Three-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N/A	N/A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	100		
T-905.1	Topsoiling	CY	2,000		
T-905.2	Erosion Control Netting	SY	8,200		
T-908.1	Mulching	ACRE	15		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

WETLAND MITIGATION

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
101.3	Clearing and Grubbing, Wetland Mitigation Area	AC	3.6		
101.4	Clearing Isolated Trees, Type I, Wetland Mitigation Area	EA	3		
108.3	Mobilization/ Demobilization, Wetland Mitigation Area	LS	1		
109.2	Temporary Construction Items, Wetland Mitigation Area	LS	1		
308.13	Class I Rip Rap Spillway Protection, Wetland Mitigation Area	SY	185		
308.14	Stabilized Construction Entrance, Wetland Mitigation Area	SY	150		
308.15	Super Silt Fence, Wetland Mitigation Area	LF	40		
308.16	Temporary Seeding and Mulching, Wetland Mitigation Area	AC	3		
308.17	Turbidity Curtain, Wetland Mitigation Area	LF	625		
705.1	Permanent Seeding and Mulching, Wetland Mitigation Area	SY	8,335		
710.1	Amelanchier canadensis, 5 Gallon	EA	65		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
710.2	Aronia arbutifolia "Brilliantissima", 3 Gallon	EA	30		
710.3	Cephalanthus occidentalis, 3 Gallon	EA	50		
710.4	Ilex glabra, 3 Gallon	EA	35		
710.5	Lindera benzoin, 3 Gallon	EA	25		
710.6	Myrica pensylvanica, 2 Gallon	EA	65		
710.7	Quercus borealis, 2 Inch Caliper	EA	14		
710.8	Rhus aromatica, 2 Gallon	EA	100		
710.9	Viburnum prunifolium, 5 Gallon	EA	60		
710.10	Viburnum dentatum, 3 Gallon	EA	35		
710.11	Shredded Hardwood Mulch, 3 Inch Depth	SY	480		
711.1	Panicum virgatum, 1-3/4 Inch Peat Pot	EA	9,800		
711.2	Peltandra virginica, 1 Quart Pot	EA	4,450		
711.3	Pontederia cordata, 1 Quart Pot	EA	4,450		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
711.4	Scirpus pungens, 1-3/4 Inch Peat Pot	EA	4,450		
711.5	Scirpus robustus, 1 Quart Pot	EA	2,000		
711.6	Scirpus validus, 1 Quart Pot	EA	2,550		
711.7	Goose Exclosure Fence	LF	625		
P-152.5	Stripping, Wetland Mitigation Area	CY	2,895		
P-152.6	Unclassified Excavation, Wetland Mitigation Area	CY	14,200		
T-905.3	Topsoiling, Six Inch Depth, Wetland Mitigation Area	CY	2,895		
Midfield Terminal Complex Site Development, Phase I Total Base Project					

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200		
100.4	Demolish/Remove Existing Utilities Structures	EA	1		
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

CONTRACT NUMBER: MAA-CO-97-019

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	210		
308.1	Stabilized Construction Entrance	SY	70		
308.2	Silt Fence	LF	4,000		
308.3	Super Silt Fence	LF	960		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26		
308.11	Curb Inlet Protection	EA	1		
308.12	Temporary Seeding and Mulching	ACRE	10		
427.1	Oil/Water Separator	EA	1		
813.1	Roadway signs	SF	20		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9	Sanitary Sewer Pump Station	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	0	N\A	N\A
16110.4	Pole Foundation in Paved Area	EA	3		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	0	N\A	N\A
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	800		
16110.14	Electrical Equipment Pad	EA	2		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	6		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	3,000		
P-152.2	Unclassified Excavation	CY	20,250		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	8,000		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	12,700		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	7,900		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	12,450		
P-304.3	Portland Cement	TON	580		
P-401.1	Airfield Bituminous Surface Course	TON	2,010		

CONTRACT NUMBER: MAA-CO-97-019

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	1,270		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	1,270		
P-603.1	Bituminous Tack Coat	GAL	1,000		
P-610.1	Concrete Curb	LF	250		
P-610.2	Concrete Curb and Gutter	LF	1,650		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50		
P-620.1	Pavement Marking	SF	1,680		
P-620.2	Pavement Marking Removal	SF	100		
D-701.1	12-inch RCP Class IV	LF	64		
D-701.2	15-inch RCP Class IV	LF	530		
D-701.3	18-inch RCP Class IV	LF	470		
D-701.4	24-inch RCP Class IV	LF	420		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	620		
D-701.6	30-inch RCP Class A-25	LF	660		
D-701.7	36-inch RCP Class A-25	LF	400		
D-701.8	42-inch RCP Class A-25	LF	0	N\A	N\A
D-701.9	Concrete for Pipe Cradles	CY	3		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	1,270		
D-705.2	4-inch Polyethylene Pipe	LF	500		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	500		
D-705.4	6-inch Polyethylene Pipe	LF	340		
D-751.1	Storm Drainage Manhole	EA	7		
D-751.2	Storm Drainage Inlet Type 1	EA	7		
D-751.3	Storm Drainage Inlet Type 2	EA	6		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	7		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	3		
D-752.1	Sedimentation Chamber	CY	58		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100		
L-108.3	Ground Rod	EA	26		
L-108.4	Concrete Cable Marker	EA	4		
L-110.5	2" PVC Sched. 40 conduit	LF	1,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	13		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	2		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	2		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N\A	N\A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	40		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	15		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 1**					

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200		
100.4	Demolish/Remove Existing Utilities Structures	EA	0	N\A	N\A
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

CONTRACT NUMBER: MAA-CO-97-019

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	420		
308.1	Stabilized Construction Entrance	SY	70		
308.2	Silt Fence	LF	3,400		
308.3	Super Silt Fence	LF	640		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	8		
308.11	Curb Inlet Protection	EA	0	N\A	N\A
308.12	Temporary Seeding and Mulching	ACRE	15		
427.1	Oil/Water Separator	EA	1		
813.1	Roadway signs	SF	15		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9	Sanitary Sewer Pump Station	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6		
16110.4	Pole Foundation in Paved Area	EA	3		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250		
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	700		
16110.14	Electrical Equipment Pad	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	12		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	9		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	7,900		
P-152.2	Unclassified Excavation	CY	15,000		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	8,300		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	12,950		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	8,100		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	12,700		
P-304.3	Portland Cement	TON	590		
P-401.1	Airfield Bituminous Surface Course	TON	1,850		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	760		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	760		
P-603.1	Bituminous Tack Coat	GAL	800		
P-610.1	Concrete Curb	LF	1,610		
P-610.2	Concrete Curb and Gutter	LF	390		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50		
P-620.1	Pavement Marking	SF	2,220		
P-620.2	Pavement Marking Removal	SF	100		
D-701.1	12-inch RCP Class IV	LF	64		
D-701.2	15-inch RCP Class IV	LF	580		
D-701.3	18-inch RCP Class IV	LF	360		
D-701.4	24-inch RCP Class IV	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	290		
D-701.6	30-inch RCP Class A-25	LF	520		
D-701.7	36-inch RCP Class A-25	LF	220		
D-701.8	42-inch RCP Class A-25	LF	173		
D-701.9	Concrete for Pipe Cradles	CY	10		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	1,292		
D-705.2	4-inch Polyethylene Pipe	LF	400		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	400		
D-705.4	6-inch Polyethylene Pipe	LF	175		
D-751.1	Storm Drainage Manhole	EA	6		
D-751.2	Storm Drainage Inlet Type 1	EA	8		
D-751.3	Storm Drainage Inlet Type 2	EA	4		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	2		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	0	N\A	N\A
D-752.1	Sedimentation Chamber	CY	58		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100		
L-108.3	Ground Rod	EA	26		
L-108.4	Concrete Cable Marker	EA	4		
L-110.5	2" PVC Sched. 40 conduit	LF	1,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	8		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	5		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	1		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2		
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	40		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	15		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 2**					

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	400		
100.4	Demolish/Remove Existing Utilities Structures	EA	1		
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	800		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

CONTRACT NUMBER: MAA-CO-97-019

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 170,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	630		
308.1	Stabilized Construction Entrance	SY	140		
308.2	Silt Fence	LF	7,400		
308.3	Super Silt Fence	LF	1,600		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26		
308.11	Curb Inlet Protection	EA	1		
308.12	Temporary Seeding and Mulching	ACRE	25		
427.1	Oil/Water Separator	EA	2		
813.1	Roadway signs	SF	30		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9	Sanitary Sewer Pump Station	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	4		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6		
16110.4	Pole Foundation in Paved Area	EA	6		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250		
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	1,500		
16110.14	Electrical Equipment Pad	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	2		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	18		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	12		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	2		
P-152.1	Stripping	CY	10,900		
P-152.2	Unclassified Excavation	CY	25,000		
P-152.3	Unsuitable Excavation	CY	400		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	16,300		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	25,652		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	16,000		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	25,150		
P-304.3	Portland Cement	TON	1,170		
P-401.1	Airfield Bituminous Surface Course	TON	3,860		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	2,030		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	2,030		
P-603.1	Bituminous Tack Coat	GAL	1,800		
P-610.1	Concrete Curb	LF	1,860		
P-610.2	Concrete Curb and Gutter	LF	2,040		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	100		
P-620.1	Pavement Marking	SF	3,900		
P-620.2	Pavement Marking Removal	SF	200		
D-701.1	12-inch RCP Class IV	LF	64		
D-701.2	15-inch RCP Class IV	LF	652		
D-701.3	18-inch RCP Class IV	LF	665		
D-701.4	24-inch RCP Class IV	LF	418		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	685		
D-701.6	30-inch RCP Class A-25	LF	405		
D-701.7	36-inch RCP Class A-25	LF	941		
D-701.8	42-inch RCP Class A-25	LF	173		
D-701.9	Concrete for Pipe Cradles	CY	10		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	2,562		
D-705.2	4-inch Polyethylene Pipe	LF	900		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	900		
D-705.4	6-inch Polyethylene Pipe	LF	515		
D-751.1	Storm Drainage Manhole	EA	10		
D-751.2	Storm Drainage Inlet Type 1	EA	12		
D-751.3	Storm Drainage Inlet Type 2	EA	10		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	3		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	3		
D-752.1	Sedimentation Chamber	CY	66		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	2,300		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	2,200		
L-108.3	Ground Rod	EA	52		
L-108.4	Concrete Cable Marker	EA	8		
L-110.5	2" PVC Sched. 40 conduit	LF	2,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	21		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	7		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	3		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	2		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2		
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	30		
T-901.2	Wetlands Vegetation	MSF	40		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	30		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 3**					

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

CONTRACT NUMBER MAA-CO-97-019

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 1

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

CONTRACT NUMBER MAA-CO-97-019

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT+ADD ALTERNATE 2

_____
(Written in Numerals)

_____
(Written in Words)

CONTRACTOR: _____

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 3

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

10. EXISTING AIRFIELD LIGHTING SYSTEMS – INTERRUPTION TO EXISTING AIRFIELD LIGHTING SYSTEMS NOT INCLUDED IN THIS PROJECT SHALL NOT BE PERMITTED. ALL AIRFIELD LIGHTING CIRCUITS AFFECTED BY THIS PROJECT SHALL BE TEMPORARILY MAINTAINED BY THE CONTRACTOR DURING OPERATIONAL PERIODS IN ACCORDANCE WITH THE SPECIFICATIONS AND/OR AS DIRECTED BY THE ENGINEER.

11. PORTABLE FLOODLIGHTING – THE CONTRACTOR SHALL PROVIDE PORTABLE FLOODLIGHTING AS REQUIRED FOR CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL PROVIDE SUFFICIENT UNITS SO THAT ALL WORK AREAS ARE ILLUMINATED TO A LEVEL OF FIVE (5) HORIZONTAL FOOT CANDLES. THE LIGHTING LEVEL SHALL BE CALCULATED AND MEASURED IN ACCORDANCE WITH THE CURRENT STANDARD OF THE ILLUMINATION ENGINEERING SOCIETY. COORDINATE THE USE OF FLOODLIGHTING WITH THE CONTROL TOWER TO ENSURE LIGHT DOES NOT COMPROMISE THE CONTROL TOWER'S VISIBILITY, OR CREATE CONFUSION FOR THE PILOTS.

12. THE CONTRACTOR SHALL OBTAIN ALL PERMITS AND LICENSES REQUIRED FOR FOR THE PROJECT'S WORK AT HIS OWN EXPENSE.

13. EXISTING TOPOGRAPHIC FIELD SURVEYS FOR THIS PROJECT AREA WERE PERFORMED BY A. MORTON THOMAS AND ASSOCIATES, INC. IN 1997.

14. THE CONTROLS ON THIS PROJECT ARE TIED TO :
HORIZONTAL: MARYLAND COORDINATE SYSTEM.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM 1929.

15. FOR WETLAND MITIGATION PLANS AND SPECIFICATIONS, SEE WETLAND MITIGATION PLAN AND SPECIFICATION SETS BY URS GREINER, INC. UNDER SEPARATE COVER.

16. FOR LIMIT OF BASE PROJECT, AND EACH ALTERNATE, THE CONTRACTOR IS REQUIRED TO FOLLOW SHEETS G–08 THROUGH G–11, D–01 THROUGH D–06, ALL A–SERIES, AND ALL C–SERIES SHEETS.

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6	100.6	REMOVE EXISTING CONDUIT AND CABLE	LF	500	400	400	800
7	100.7	DEMOLISH/REMOVE EXISTING BUILDINGS	LS	1	0	0	0
8	100.8	REMOVE EXISTING PIPE SMALLER THAN 12" DIAMETER	LF	1,200	0	0	0
9	100.9	REMOVE EXISTING PIPE 12" TO 24" DIAMETER	LF	415	0	0	0
10	100.10	REMOVE EXISTING PIPE 54" DIAMETER	LF	310	0	0	0
11	101.1	CLEARING AND GRUBBING	ACRE	12	0	0	0
12	101.2	CLEARING ISOLATED TREES TYPE I	EA	50	0	0	0
13							
14	108.1	MOBILIZATION/DEMOBILIZATION	LS	1	1	1	1
15	108.2	MISCELLANEOUS CONSTRUCTION ITEMS ALLOWANCE	LS	1	1	1	1
16	109.1	TEMPORARY CONSTRUCTION ITEMS	LS	1	1	1	1
17	206.1	PAVEMENT REMOVAL	SY	3,735	210	420	630
18	308.1	STABILIZED CONSTRUCTION ENTRANCE	SY	160	70	70	140
19	308.2	SILT FENCE	LF	13,000	4,000	3,400	7,400
20	308.3	SUPER SILT FENCE	LF	1,000	960	640	1,600

111	D-705.1	GEOCOMPOSITE UNDERDRAIN	LF	0	1,270	1,292	2,562
112	D-705.2	4-INCH POLYETHYLENE PIPE	LF	0	500	400	900
113	D-705.3	4-INCH PERFORATED POLYETHYLENE PIPE	LF	0	500	400	900
114	D-705.4	6-INCH POLYETHYLENE PIPE	LF	0	340	175	515
115	D-751.1	STORM DRAINAGE MANHOLE	EA	3	7	6	10
116	D-751-2	STORM DRAINAGE INLET TYPE 1	EA	0	7	8	12
117	D-751-3	STORM DRAINAGE INLET TYPE 2	EA	1	6	4	10
118	D-751-4	STORM DRAINAGE INLET TYPE 3	EA	4	1	2	3
119	D-751-5	STORM DRAINAGE INLET TYPE 4	EA	1	0	0	0
120	D-751.6	ADJUST STRUCTURES TO GRADE	EA	2	3	0	3
121	D-752.1	SEDIMENTATION CHAMBER	CY	17	58	58	66
122	D-752.2	ENDWALL	CY	55	115	115	115
123	D-752.3	CLASS I RIP-RAP	SY	40	200	200	200
124	D-752.4	GROUTED RIP-RAP	SY	90	75	75	75

BASE PROJECT

1. SITE CLEARING AND GRUBBING, INCLUDING REMOVAL OF HAZARDOUS MATERIALS, DEMOLITION OF EXISTING BUILDINGS, AND REMOVAL OF THE EXISTING SOIL STOCKPILE.

2. CONSTRUCT PROPOSED ACCESS ROAD.

3. INSTALL UTILITY SERVICES AS FOLLOWS:

   A. WATER (FOR DOMESTIC AND FIRE SUPPRESSION SYSTEMS)
   B. SANITARY SEWER
   C. ELECTRIC.
   D. COMMUNICATIONS.
   E. GAS MAIN.
   F. CABLE TELEVISION.

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4. CONSTRUCT POND 1.

5. CONSTRUCT WATER TANK AND PUMP HOUSE EQUIPMENT FOR FIRE SUPPRESSION SYSTEM.

6. CONSTRUCT STORM DRAINAGE SYSTEM BETWEEN ACCESS ROAD AND POND 1.

7. CONSTRUCT WETLANDS MITIGATION AREA (SEE WETLAND MITIGATION PLANS ATTACHED).

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ADD ALTERNATE 1

1. CONSTRUCT SKYTECH APRON, TAXIWAY L, ACCESS ROAD EXTENSION, PARKING LOT, AND ASSOCIATED ELECTRICAL APPURTENANCES.
2. CONSTRUCT PONDS 3A AND 3B.
3. CONSTRUCT STORM DRAINAGE SYSTEM BETWEEN APRON AND POND 3A. INSTALL OIL/WATER SEPARATOR AND ASSOCIATED STRUCTURES AT SKYTECH APRON ONLY. GRADE REMAINING AREAS 1 AND 2 WITHIN LIMIT OF WORK SHOWN AND INSTALL REMAINING STORM DRAINAGE SYSTEM.
4. CONSTRUCT STORM DRAINAGE SYSTEM FOR SKYTECH PARKING LOT.

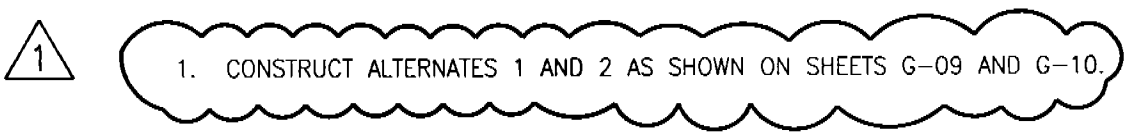


ADD ALTERNATE 2

1. CONSTRUCT LOCKHEED-MARTIN APRON, TAXIWAY J, ACCESS ROAD EXTENSION, PARKING LOT, AND ASSOCIATED ELECTRICAL APPURTENANCES.
2. CONSTRUCT PONDS 3A AND 3B.
3. CONSTRUCT STORM DRAINAGE SYSTEM FOR APRON AND POND 3A. INSTALL OIL/WATER SEPARATOR AND ASSOCIATED STRUCTURES AT LOCKHEED-MARTIN APRON ONLY. GRADE REMAINING AREAS 2 AND 3 WITHIN LIMIT OF WORK SHOWN AND INSTALL REMAINING STORM DRAINAGE SYSTEM.
4. CONSTRUCT STORM DRAINAGE SYSTEM FOR LOCKHEED-MARTIN PARKING LOT.



ADD ALTERNATE 3



STAGE 2 CONSTRUCTION

1. CLEAR/CRUB REMAINDER OF SITE.
2. ESTABLISH PERIMETER EROSION AND SEDIMENT CONTROLS FOR STAGE 2 WORK AREA.
3. EXCAVATE PONDS 3A/3B, STRUCTURES, SET UP AS SEDIMENT BASIN (PER SHEET R-02)
4. VERIFY LOCATIONS OF EXISTING UTILITY, AND LOCATE UTILITIES TO BE REMOVED AND/OR ABANDONED.
5. DEMOLISH AND REMOVE REMAINDER OF ASPHALT AND CONCRETE PAVEMENT ACCESS SITE.
6. REPLACE MANHOLE ON EXISTING 48" TRUNK DRAINAGE LINE (SEE SHEETS D-02 AND C-01) (ADD ALTERNATE 1 ONLY).
7. CONTINUE REMOVAL AND DISPOSAL OF SOIL STOCKPILE.
8. CONSTRUCT SKYTECH PARKING LOT UP TO AND INCLUDING BITUMINOUS BASE COURSE.

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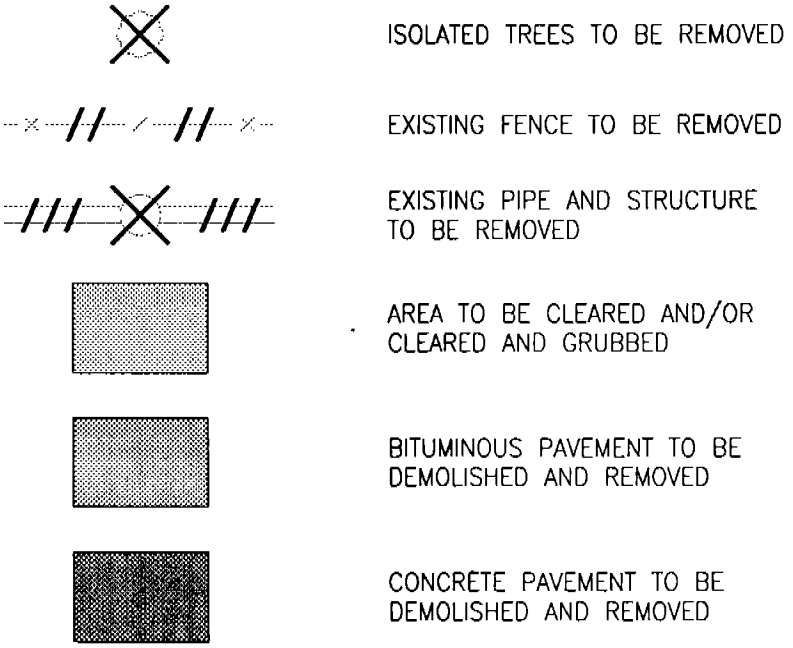
9. SEE SAFETY REQUIREMENT DURING CONSTRUCTION NOTE (B) (2), SHEET G-02, FOR WORK ADJACENT TO ACTIVE TAXIWAY.

DEMOLITION LEGEND



DEMOLITION NOTES

1. THE SIZE AND LOCATION OF THE EXISTING PIPE AND STRUCTURES SHOWN IS APPROXIMATE ONLY. THE CONTRACTOR SHALL LOCATE THE EXISTING PIPE AND STRUCTURES BETWEEN THE INLET AND OUTFALL SHOWN ON SHEET D-04. THESE LOCATIONS SHALL BE MADE KNOWN TO THE ENGINEER BEFORE WORK IN THE VICINITY MAY BEGIN.

2. EXISTING BITUMINOUS SURFACE MAY BE REMOVED BY COLD MILLING OR OTHER MEANS APPROVED BY THE ENGINEER. DEMOLITION OF AIRFIELD PAVEMENTS SHALL BE CLOSELY COORDINATED WITH FINAL PAVING TO FOLLOW.

3. THE EXTENT OF THE EXISTING WATER SYSTEM SHOWN ON SHEET D-02 IS NOT KNOWN. THIS SYSTEM IS ASSUMED TO BE ABANDONED AND WILL BE REMOVED. COSTS FOR PIPE AND STRUCTURE REMOVAL WILL BE PAID FOR ON A UNIT PRICE BASIS AS SPECIFIED IN ITEM 100.

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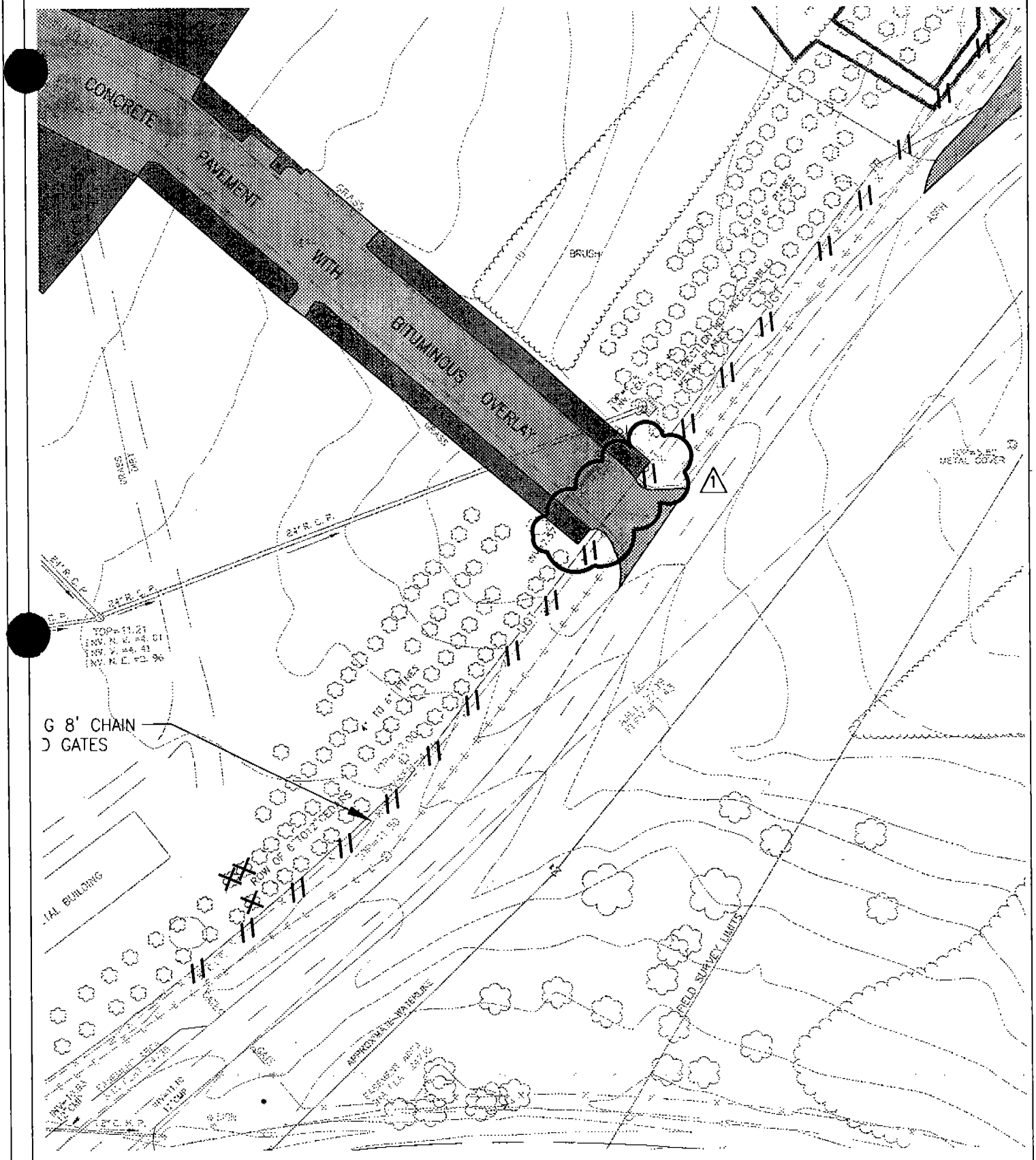
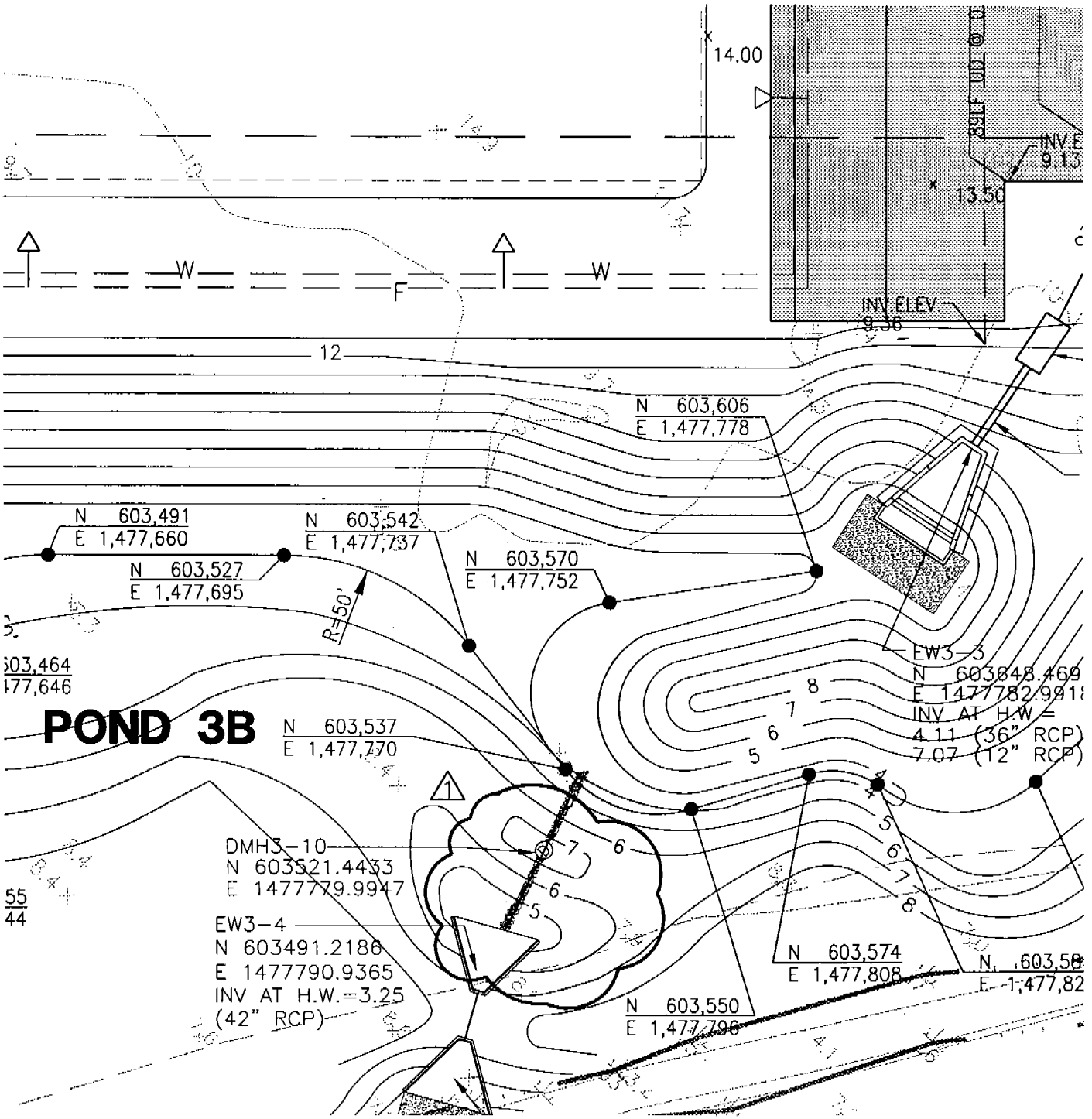
4. EXISTING FACILITIES WITHIN THE LIMITS OF WORK WHICH ARE NOT SPECIFICALLY SHOWN TO BE ALTERED OR REMOVED SHALL REMAIN IN SERVICE AND UNDAMAGED THROUGH THE DURATION OF THE CONTRACT. WHERE THE DISPOSITION OF EXISTING FACILITIES IS UNCLEAR, OR FACILITIES ARE NOT SHOWN ON THESE PLANS ARE ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND OBTAIN DIRECTION BEFORE PROCEEDING WITH WORK AFFECTING THE FACILITIES.



ATTACHMENT D-02B

Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998



Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

ATTACHMENT C-03A

Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998

POND CLASSIFICATION:
SHALLOW MARSH EXTENDED DETENTION

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NOTES:

1. CONTRACTOR SHALL VERIFY THE VERTICAL AND HORIZONTAL LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF WORK. REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO PRECEDING WITH WORK.
2. SEE SHEET C-20 FOR POND SECTION.
3. SEE SHEET V-01 FOR POND PLANTINGS.
4. SEE SHEETS C-17 THROUGH C-19 FOR CONSTRUCTION PHASING.
5. SEE SHEET U-18 THROUGH U-18C FOR SEDIMENT CHAMBER, END WALL AND WING WALL DETAILS.
6. SEE SHEET C-07 FOR COORDINATE INFORMATION FOR DRAIN MANHOLES AND HEADWALLS.
7. EXISTING UNSUITABLE FILL MATERIALS AT POND SIDE SLOPES LOCATIONS MUST BE REMOVED AND REPLACED WITH SUITABLE COMPACTED BACKFILL TO PROVIDE SUITABLE SLOPES.

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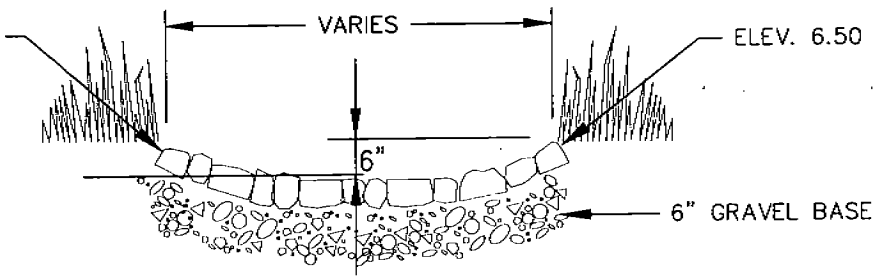


GROUTED STONE SPILLWAY DETAIL

NTS

Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998

ATTACHMENT C-11A

Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

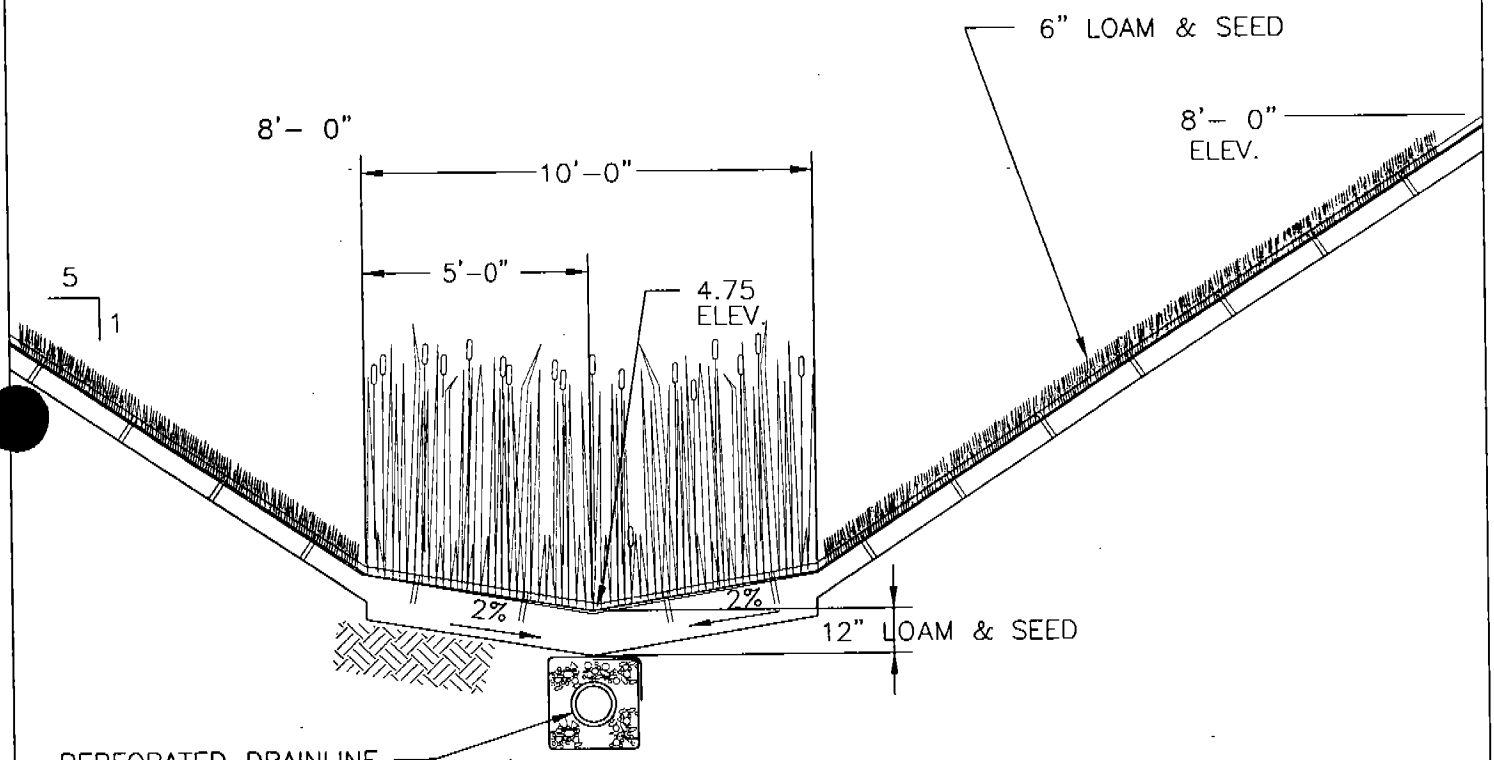
NOTES:

1. SEE SHEET V-02 FOR POND PLANTINGS.
2. SEE SHEETS R-01 THRU R-10 FOR LOCATIONS OF EROSION CONTROL MEASURES.
3. SEE NOTE 5, SHEET C-11.
4. SEE SHEET C-03 FOR COORDINATE INFORMATION FOR DRAIN MANHOLES AND HEADWALLS.
7. EXISTING UNSUITABLE FILL MATERIALS AT POND SIDE SLOPES LOCATIONS MUST BE REMOVED AND REPLACED WITH SUITABLE COMPACTED BACKFILL TO PROVIDE SUITABLE SLOPES.

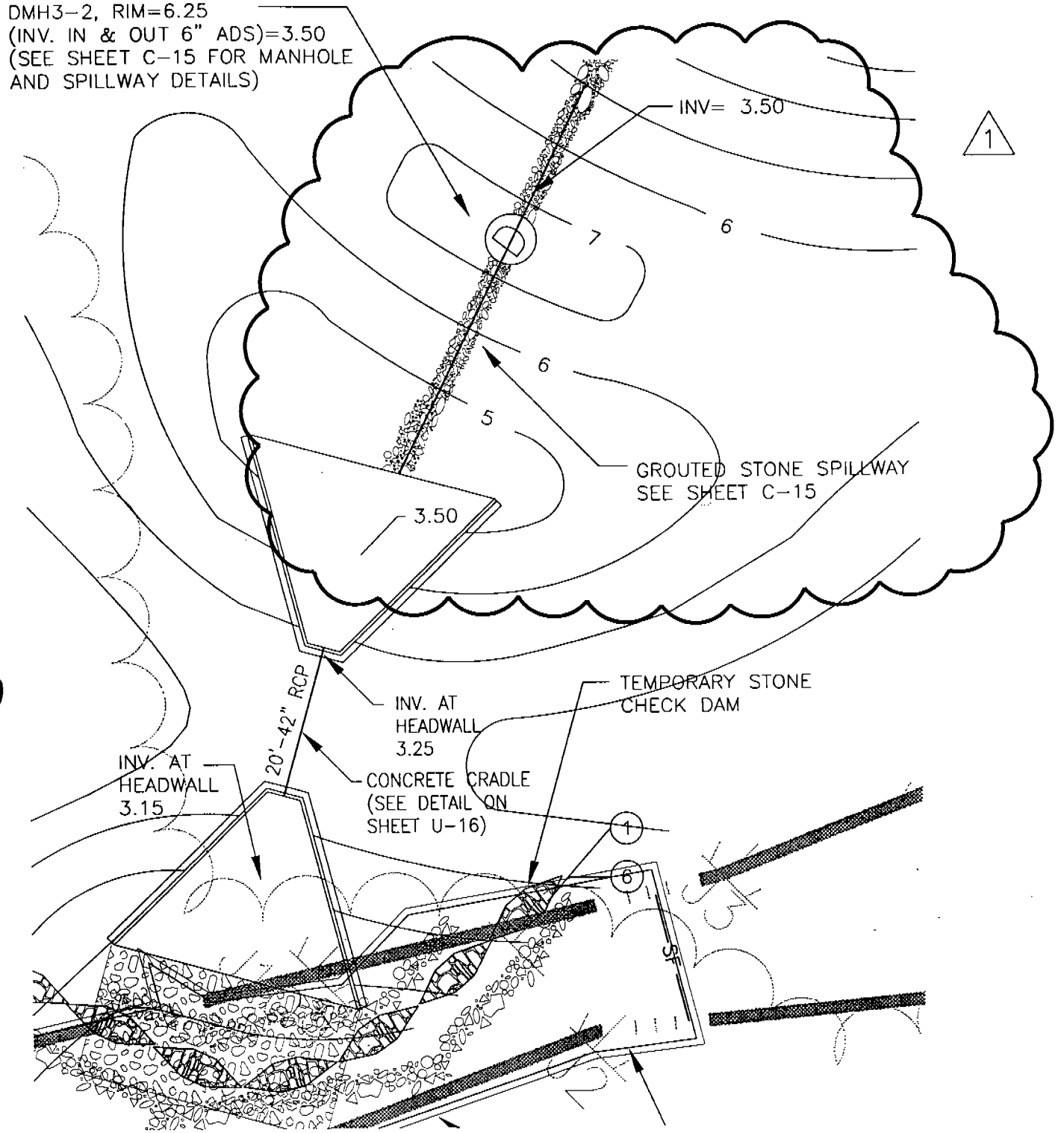
1

1

POND CLASSIFICATION:
SHALLOW MARSH EXTENDED DETENTION



SECTION A–A
DRAINAGE DETAIL
NTS



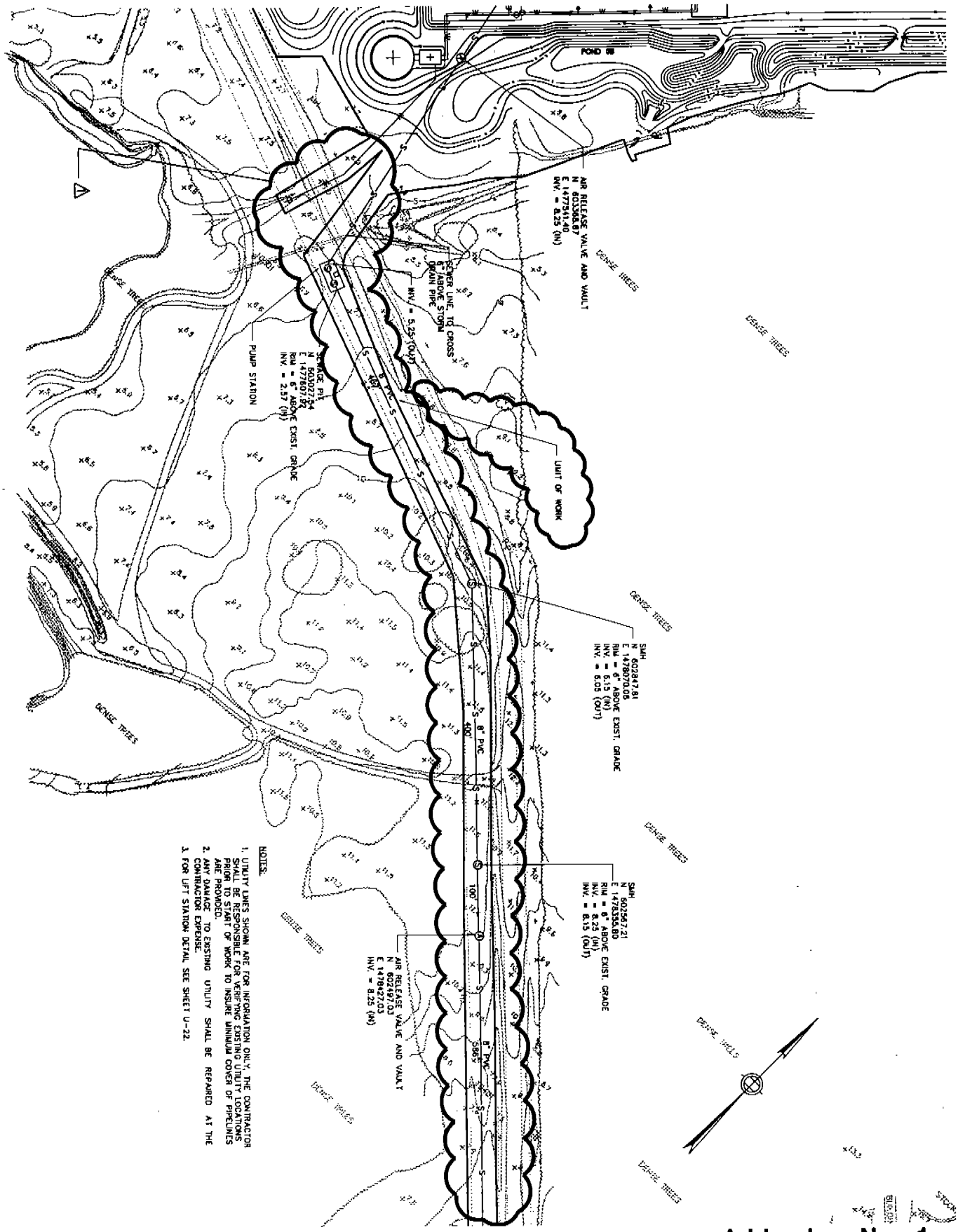
DETAIL A

SCALE 1" = 10'

ATTACHMENT C-14C

Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998

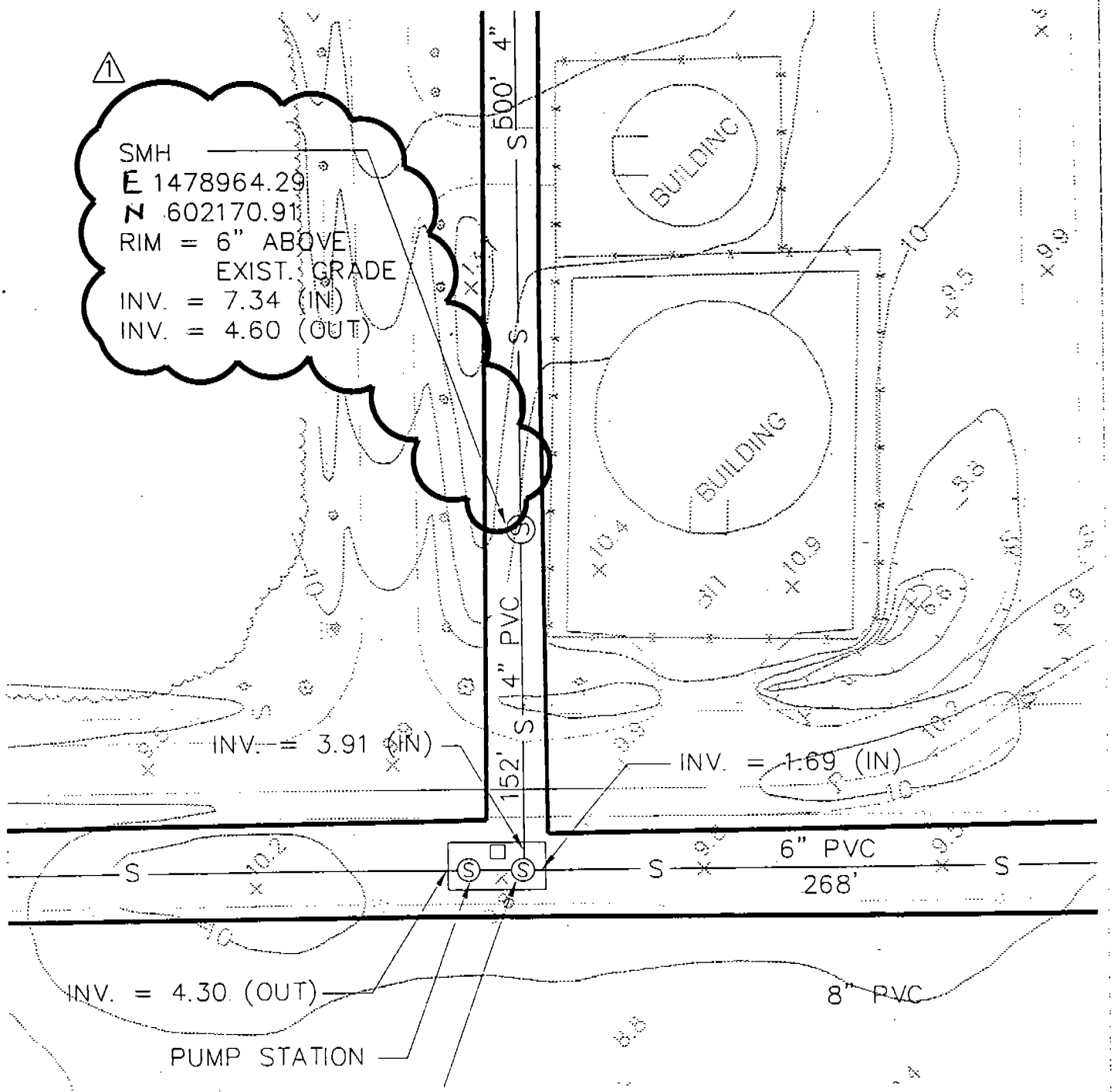
Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I



ATTACHMENT C-21A

Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

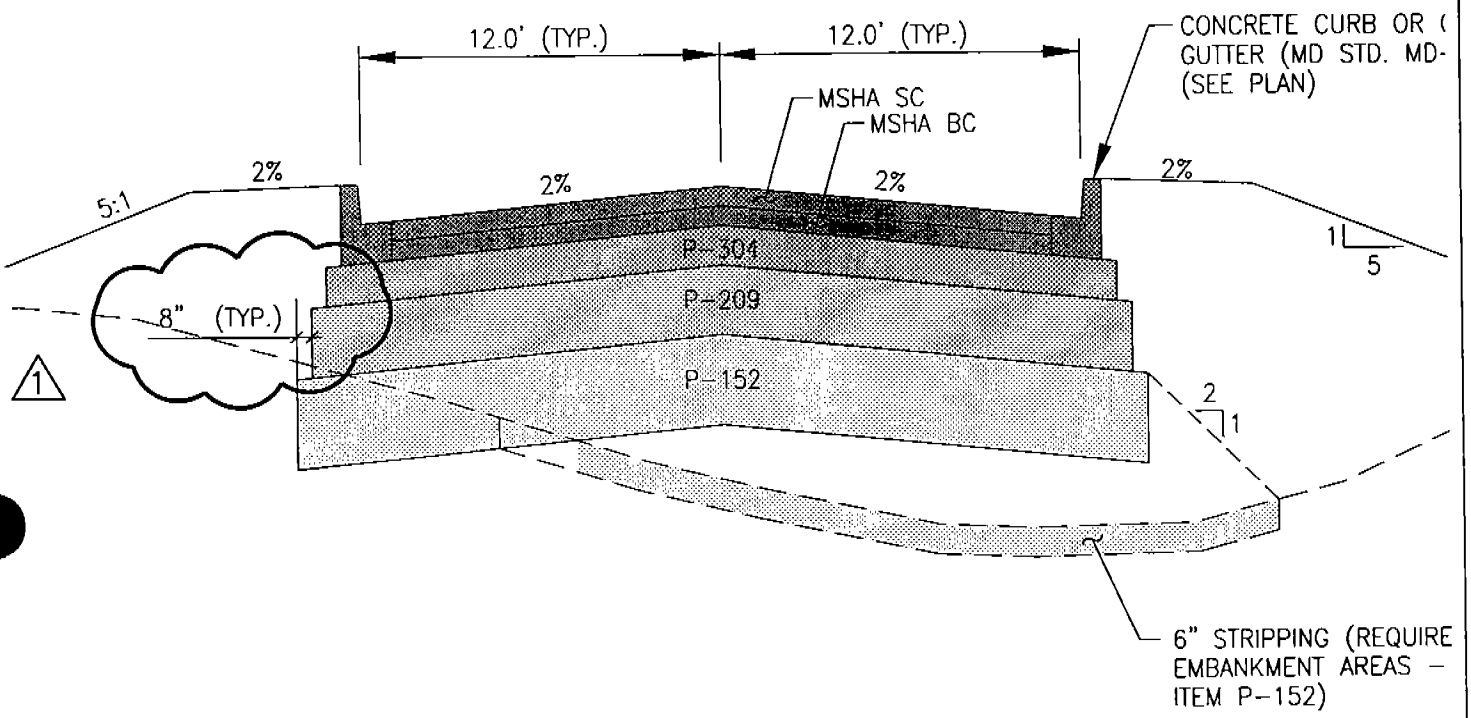
Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998



Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

ATTACHMENT C-22A

Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998



TYPICAL ACCESS ROAD SECTION

NOT TO SCALE

Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

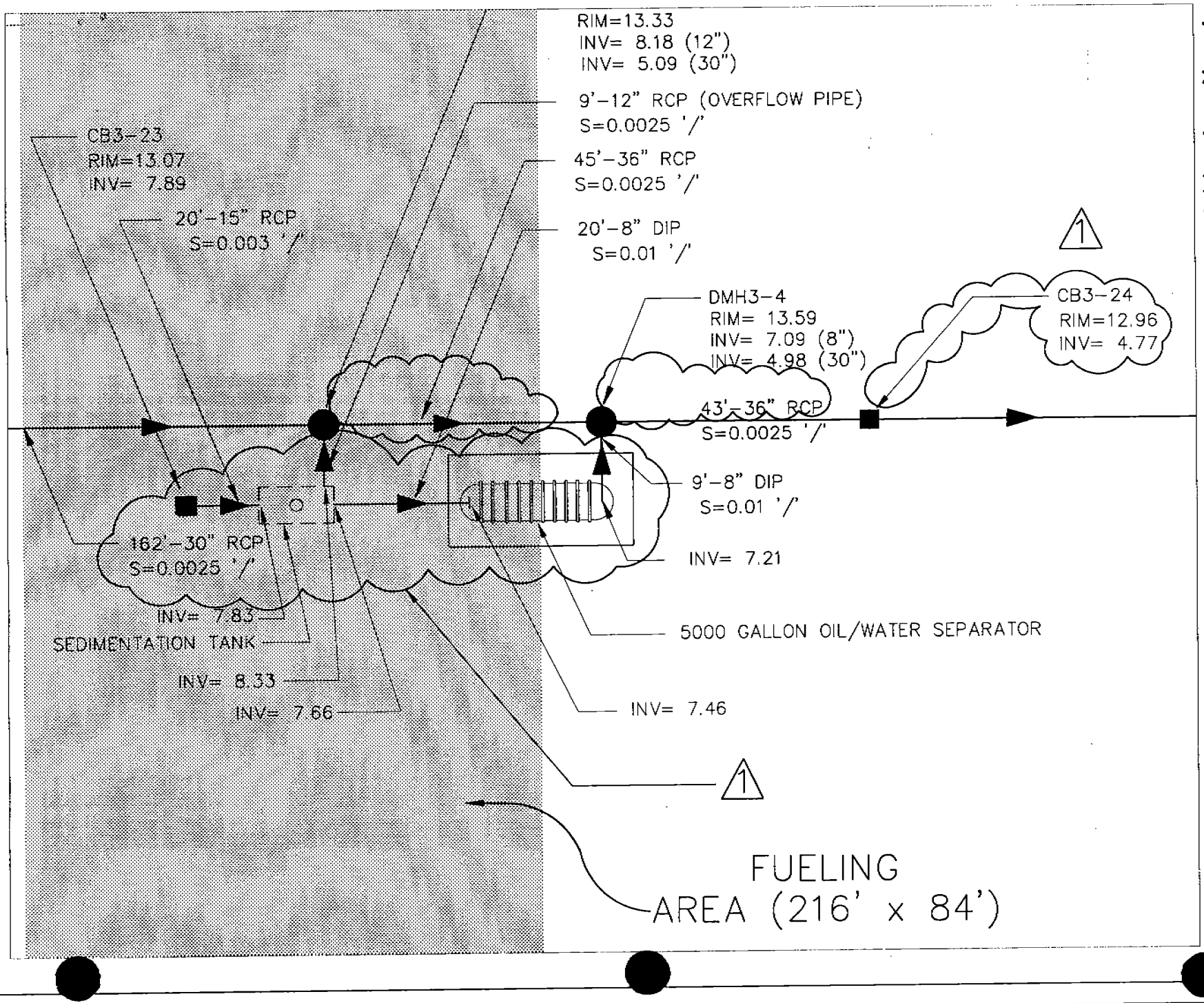
ATTACHMENT P-05A

Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998

1

NOTE:

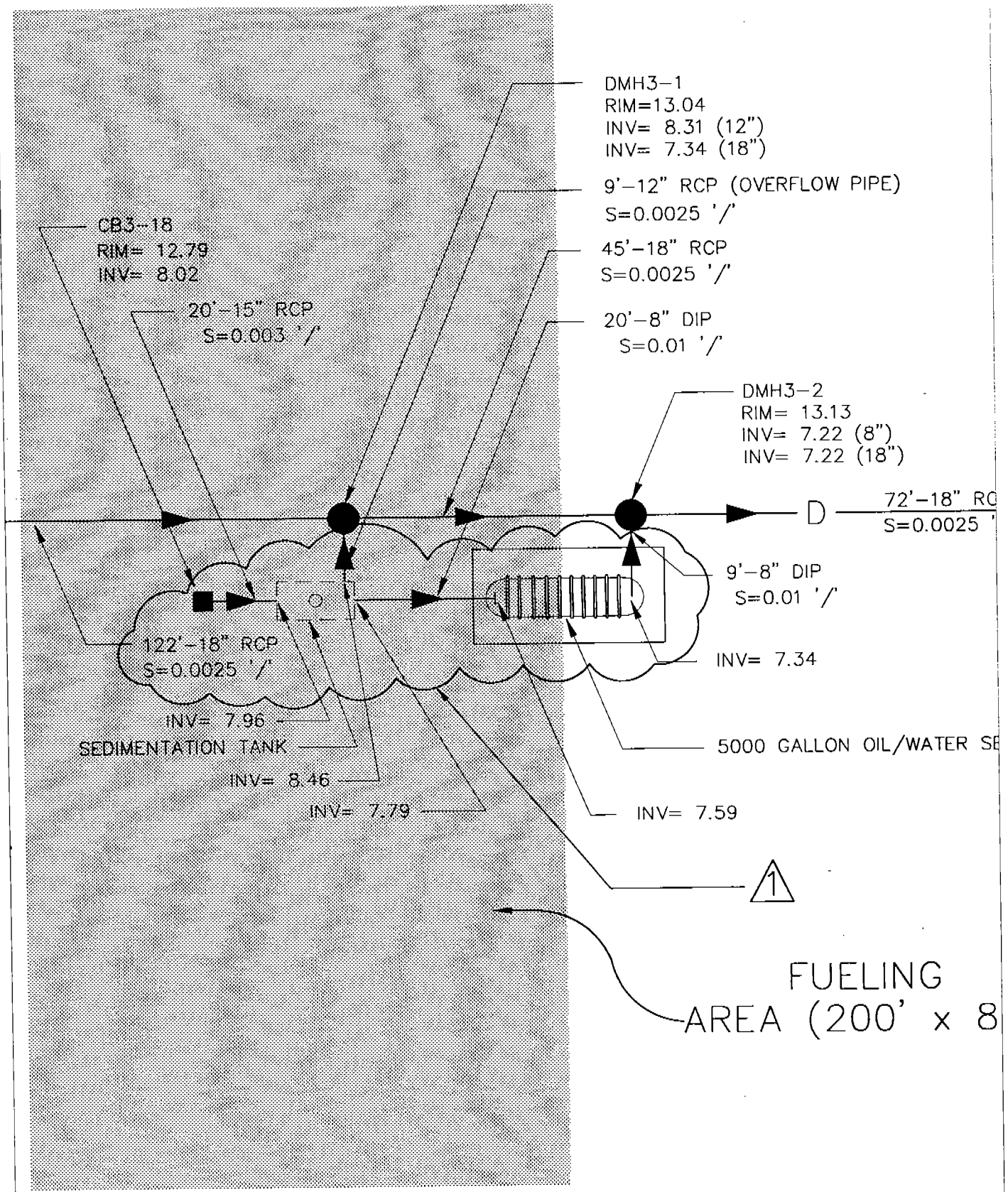
SEE SHEETS C-06 AND C-10 FOR PLANS OF SEWER LINE SHOWN ON THIS SHEET.



Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998

ATTACHMENT U-03A

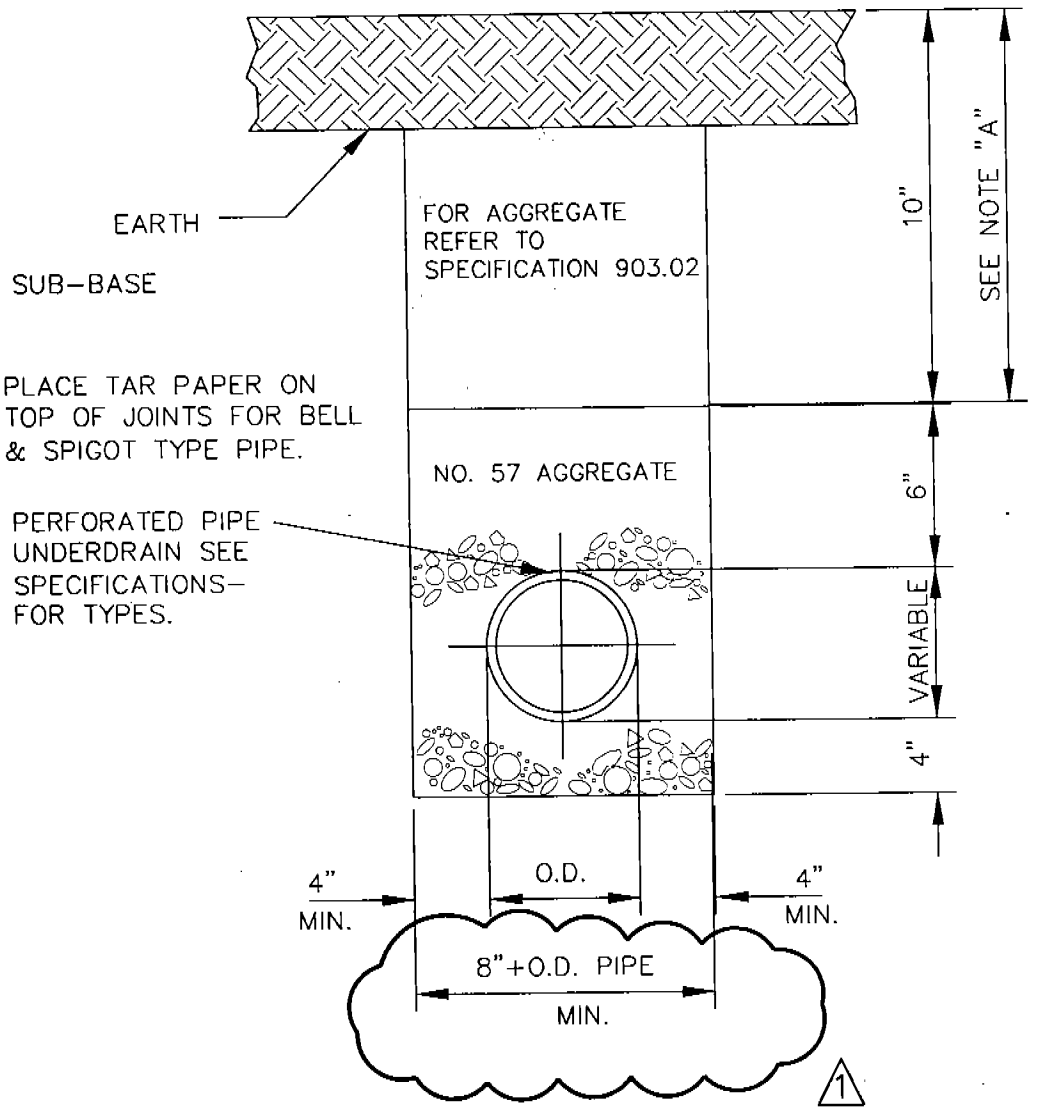
Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I



Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

ATTACHMENT U-03B

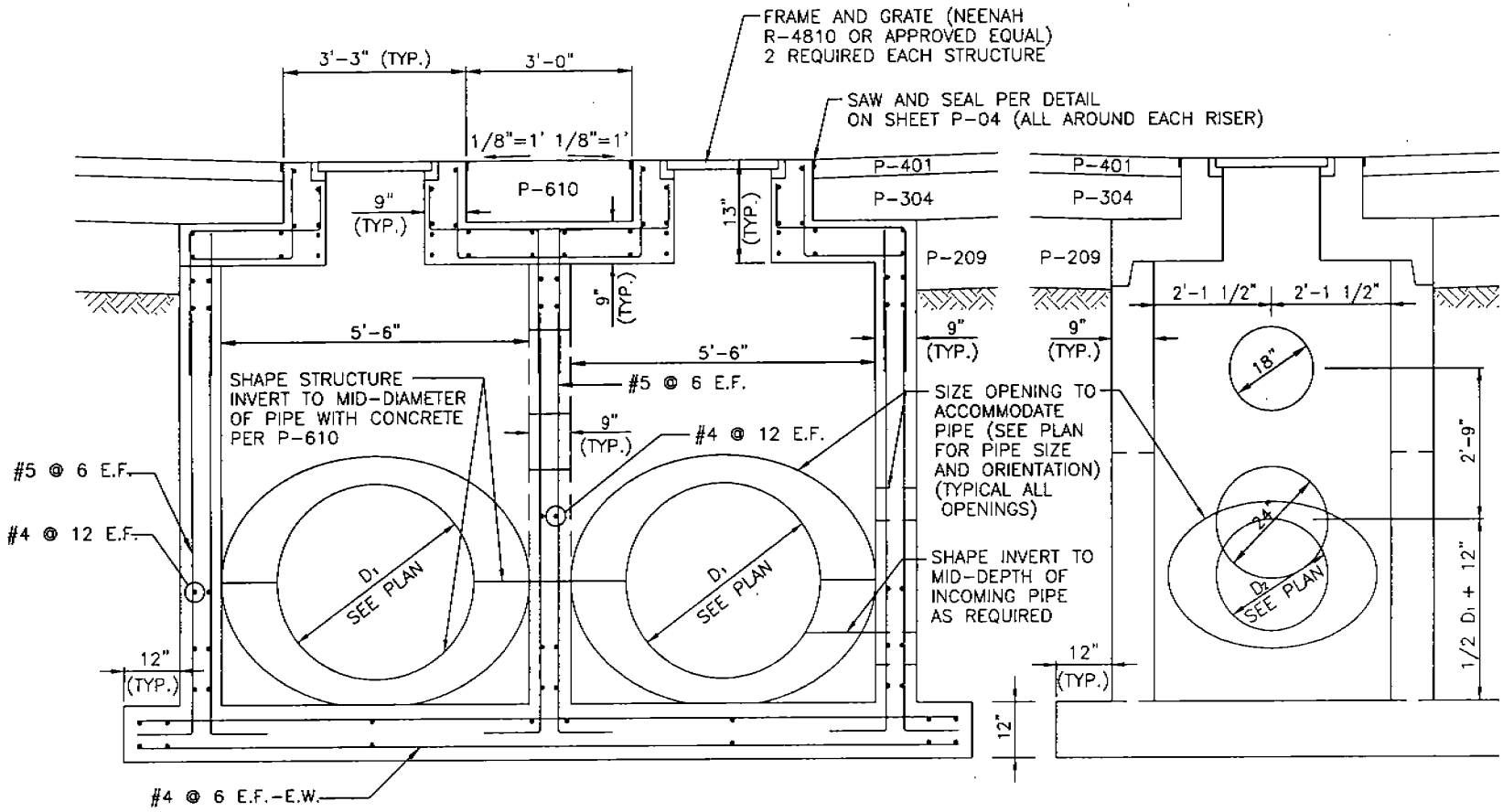
Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998



SUB-SURFACE DRAINAGE DITCH SECTION

NTS

ATTACHMENT U-17A

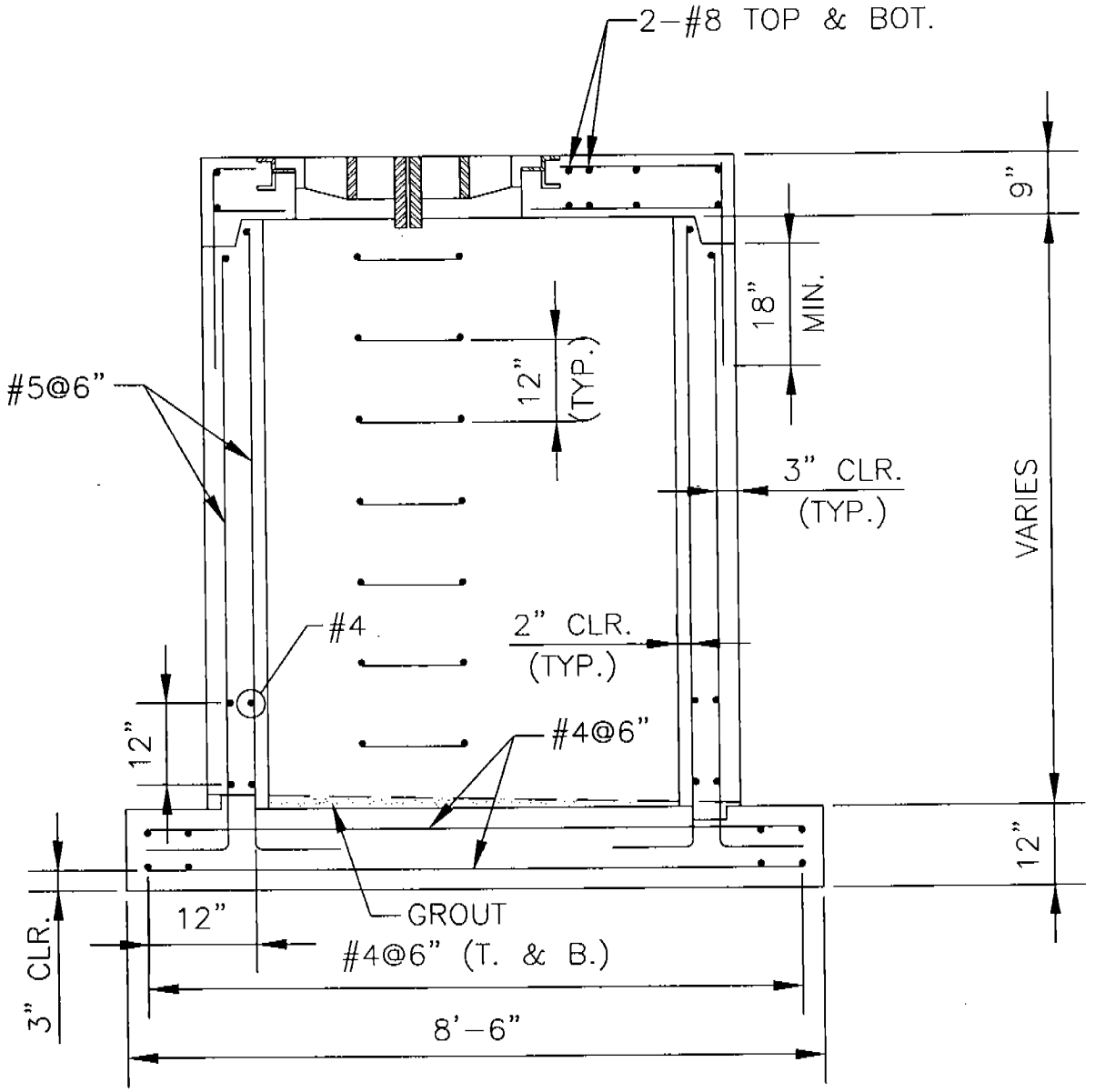


DRAINAGE STRUCTURE TYPE 4 DETAILS

NOT TO SCALE

1

Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I



SECTION A

DRAINAGE STRUCTURE TYPE 1 AND 2 DETAILS

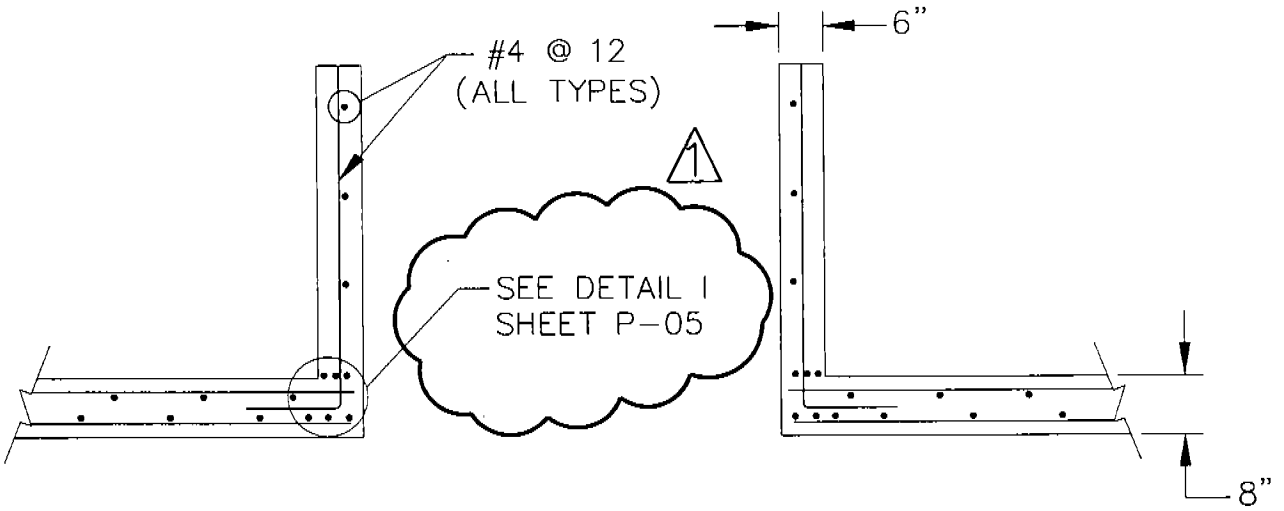
NOT TO SCALE

1

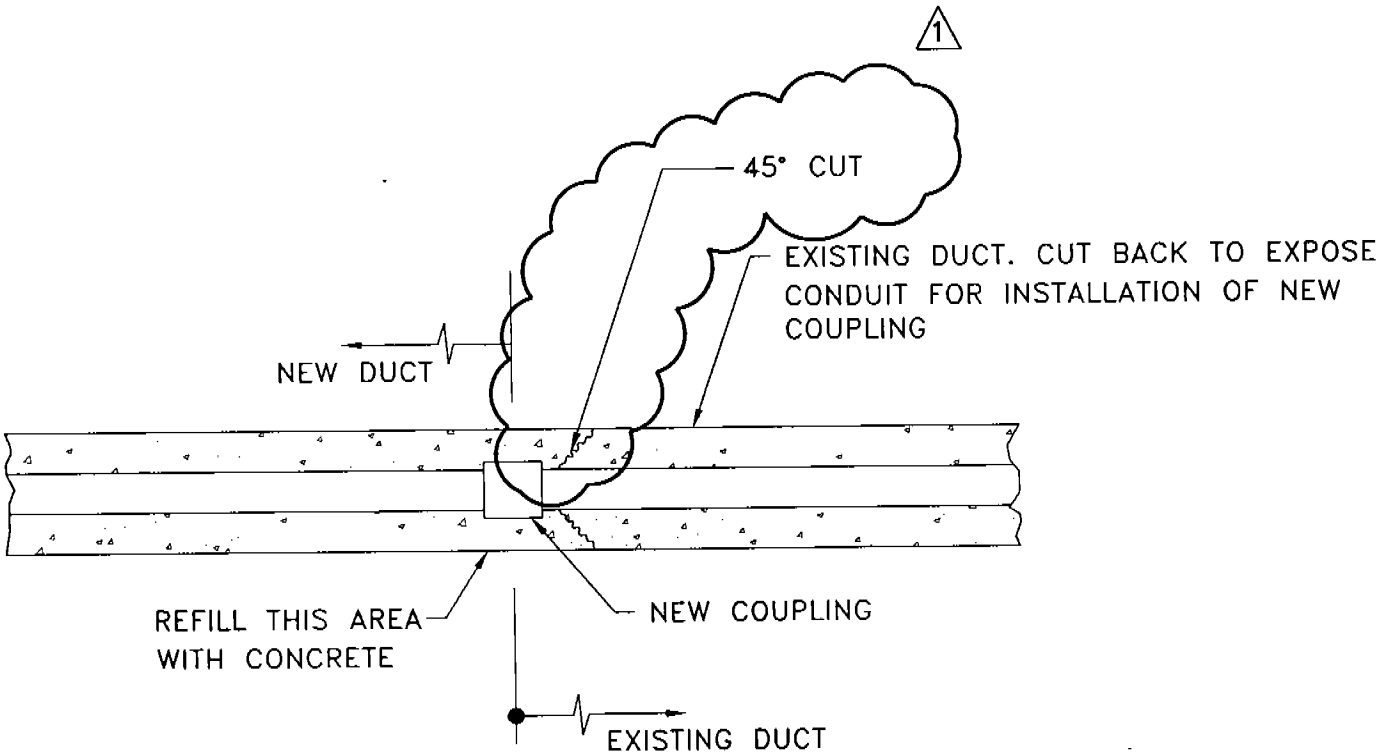
Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

ATTACHMENT U-17B

Addendum No. 1
TAMS Consultants, Inc.
April 27, 1998



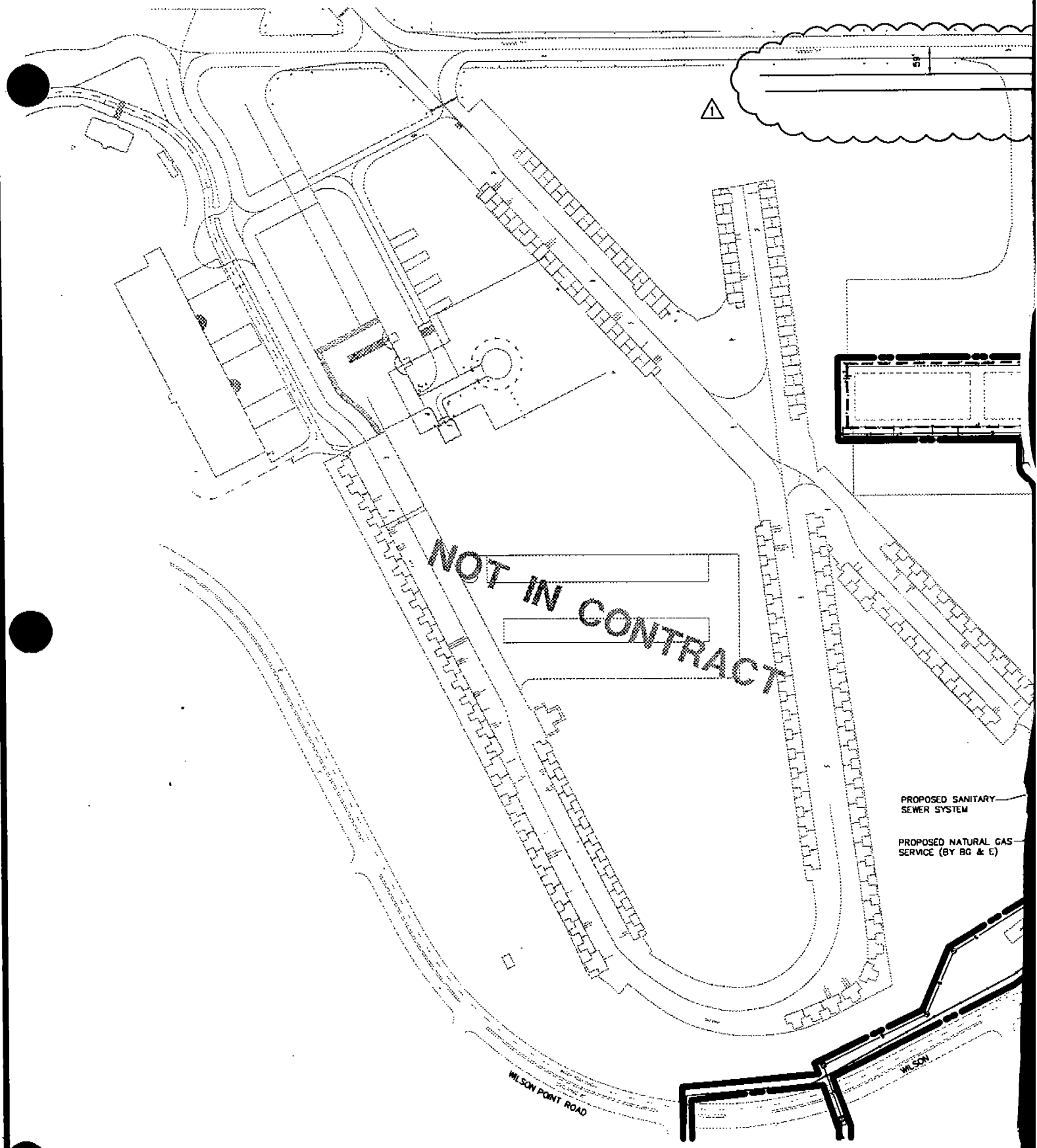
ELEVATION @ MANWAY EXTENSION



DETAIL

CONNECTION OF NEW TO EXISTING ENCASED DUCT

NOT TO SCALE



TAMS

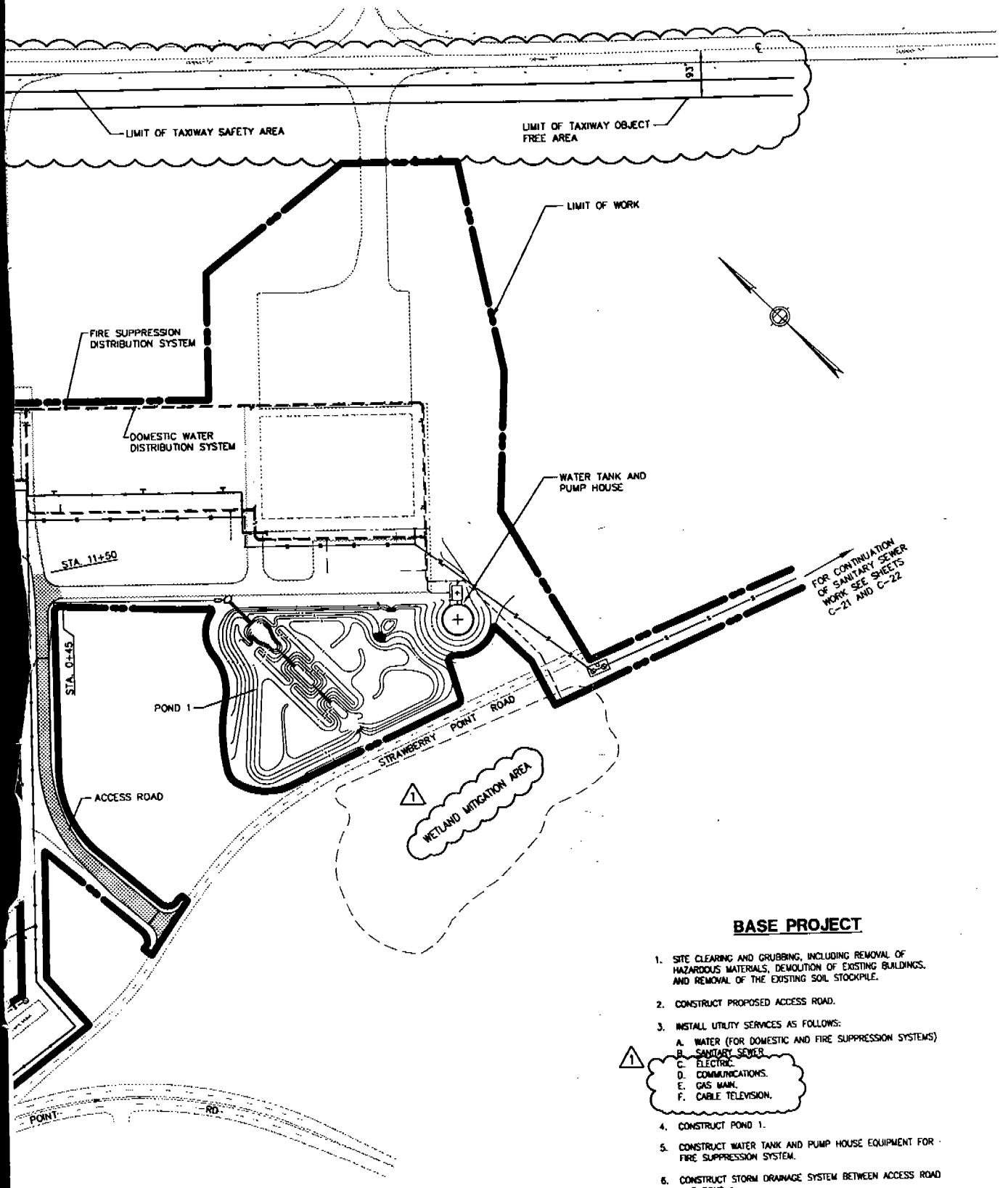
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP/PW
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND
TEKKAPOJ SOMNATPUN
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1, REMOVED COUNTOURS AND POND

MAR
STATE A



BASE PROJECT

1. SITE CLEARING AND GRUBBING, INCLUDING REMOVAL OF HAZARDOUS MATERIALS, DEMOLITION OF EXISTING BUILDINGS, AND REMOVAL OF THE EXISTING SOIL STOCKPILE.
2. CONSTRUCT PROPOSED ACCESS ROAD.
3. INSTALL UTILITY SERVICES AS FOLLOWS:
   - A. WATER (FOR DOMESTIC AND FIRE SUPPRESSION SYSTEMS)
   - B. SANITARY SEWER
   - C. ELECTRIC.
   - D. COMMUNICATIONS.
   - E. GAS MAIN.
   - F. CABLE TELEVISION.

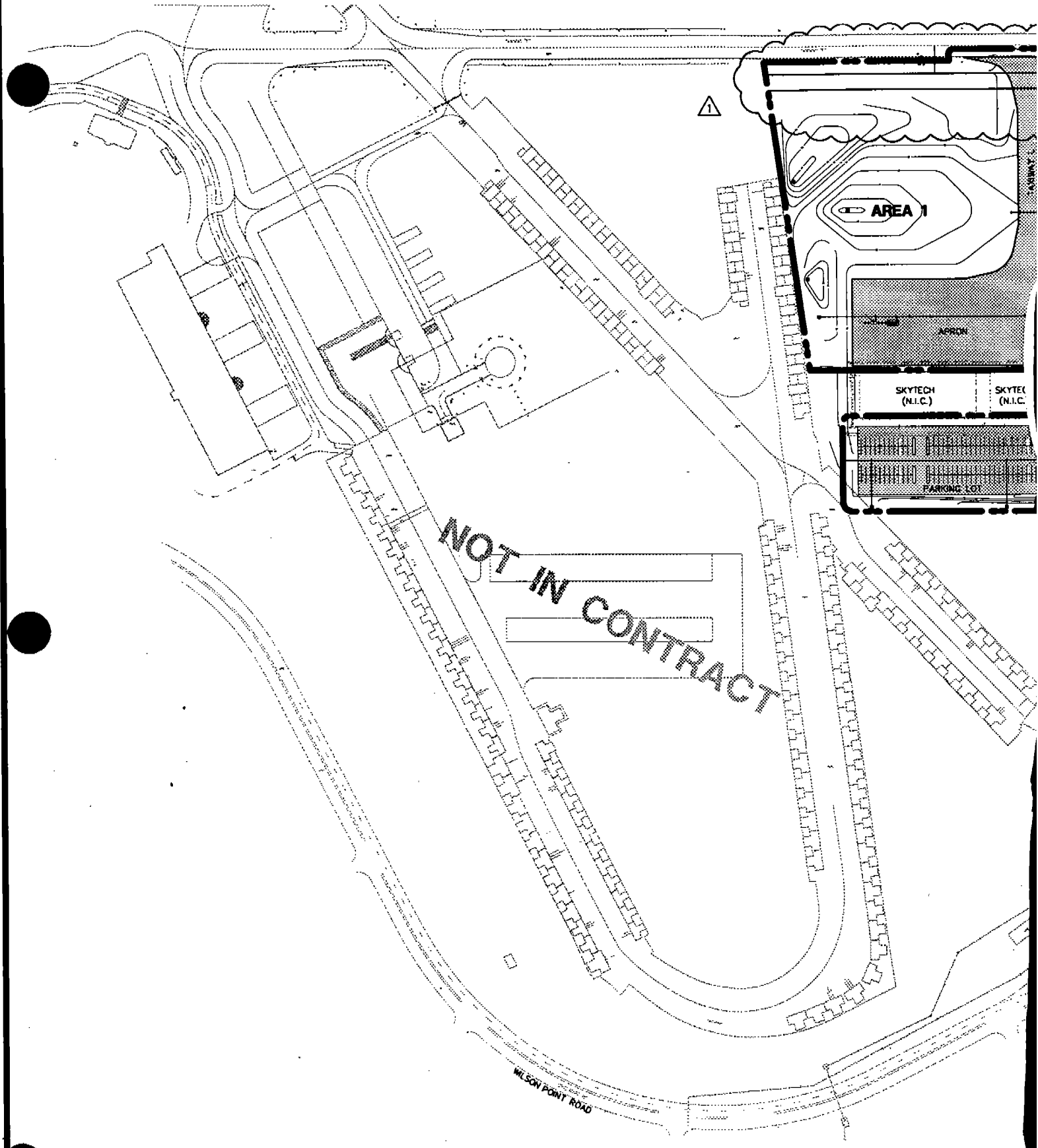
   (1)
4. CONSTRUCT POND 1.
5. CONSTRUCT WATER TANK AND PUMP HOUSE EQUIPMENT FOR FIRE SUPPRESSION SYSTEM.
6. CONSTRUCT STORM DRAINAGE SYSTEM BETWEEN ACCESS ROAD AND POND 1.
7. CONSTRUCT WETLANDS MITIGATION AREA (SEE WETLAND MITIGATION PLANS ATTACHED). (1)

TIN
RPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: BASE PROJECT	SHEET NO.: G-08
SCALE: NO SCALE	DATE: MARCH 31, 1998



TAMS

TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

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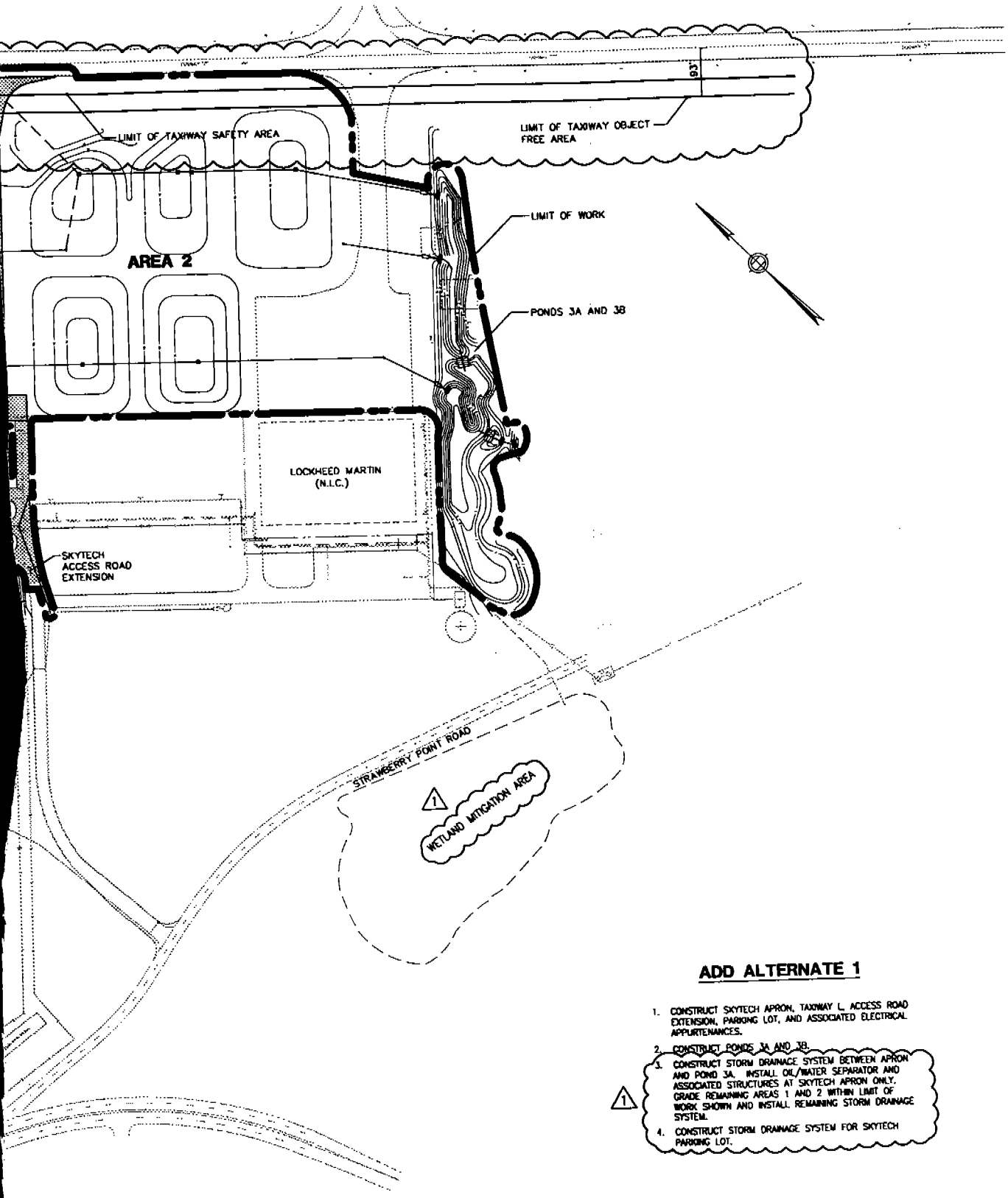
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1

MAR
STATE A



ADD ALTERNATE 1

1. CONSTRUCT SKYTECH APRON, TAXIWAY L, ACCESS ROAD EXTENSION, PARKING LOT, AND ASSOCIATED ELECTRICAL APPURTENANCES.
2. CONSTRUCT PONDS 3A AND 3B.
3. CONSTRUCT STORM DRAINAGE SYSTEM BETWEEN APRON AND POND 3A. INSTALL OIL/WATER SEPARATOR AND ASSOCIATED STRUCTURES AT SKYTECH APRON ONLY. GRADE REMAINING AREAS 1 AND 2 WITHIN LIMIT OF WORK SHOWN AND INSTALL REMAINING STORM DRAINAGE SYSTEM.
4. CONSTRUCT STORM DRAINAGE SYSTEM FOR SKYTECH PARKING LOT.

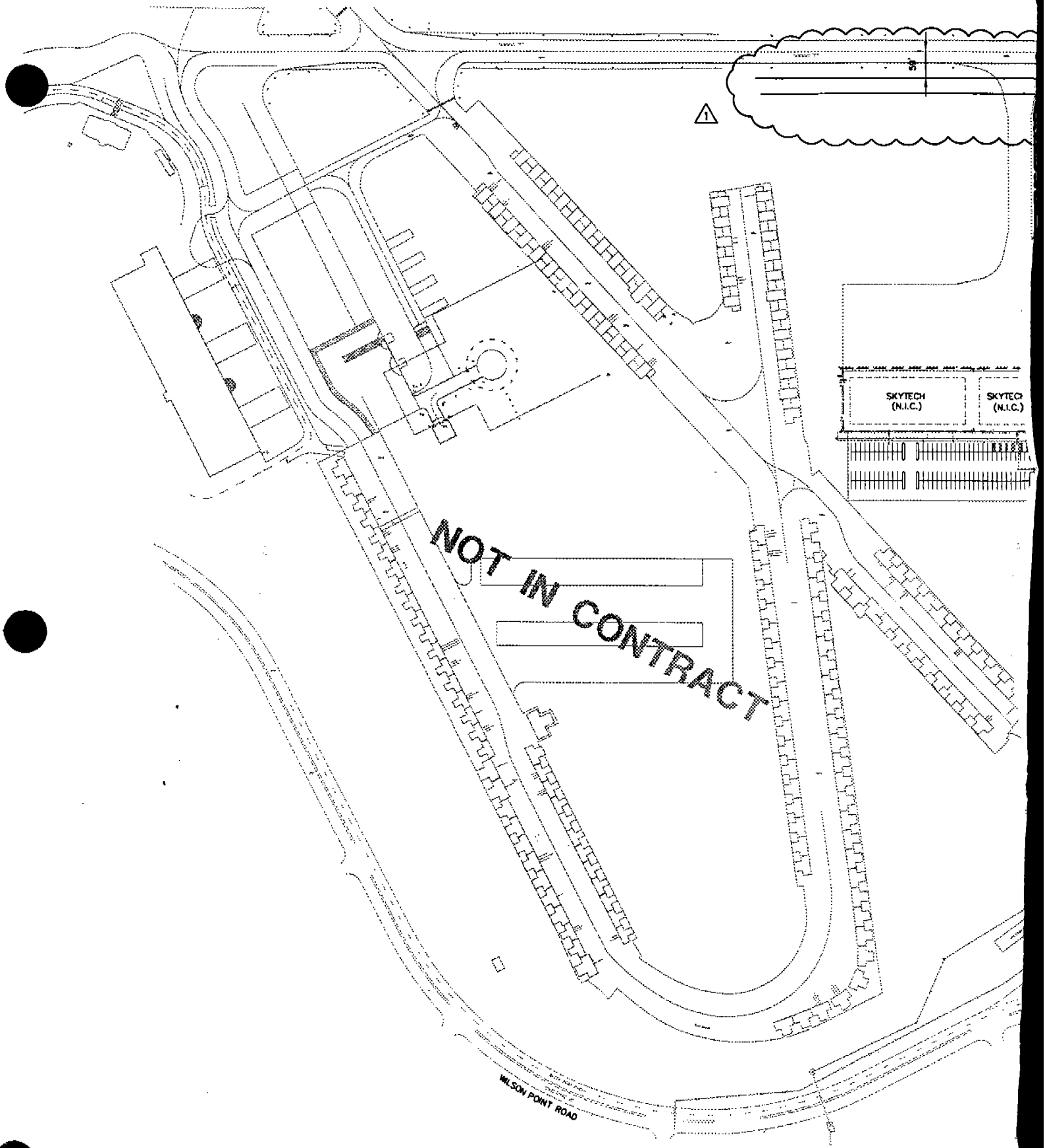
1

RTIN
IRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: ADD ALTERNATE 1	SHEET NO.: G-09
SCALE: NO SCALE	DATE: MARCH 31, 1998



TAMS

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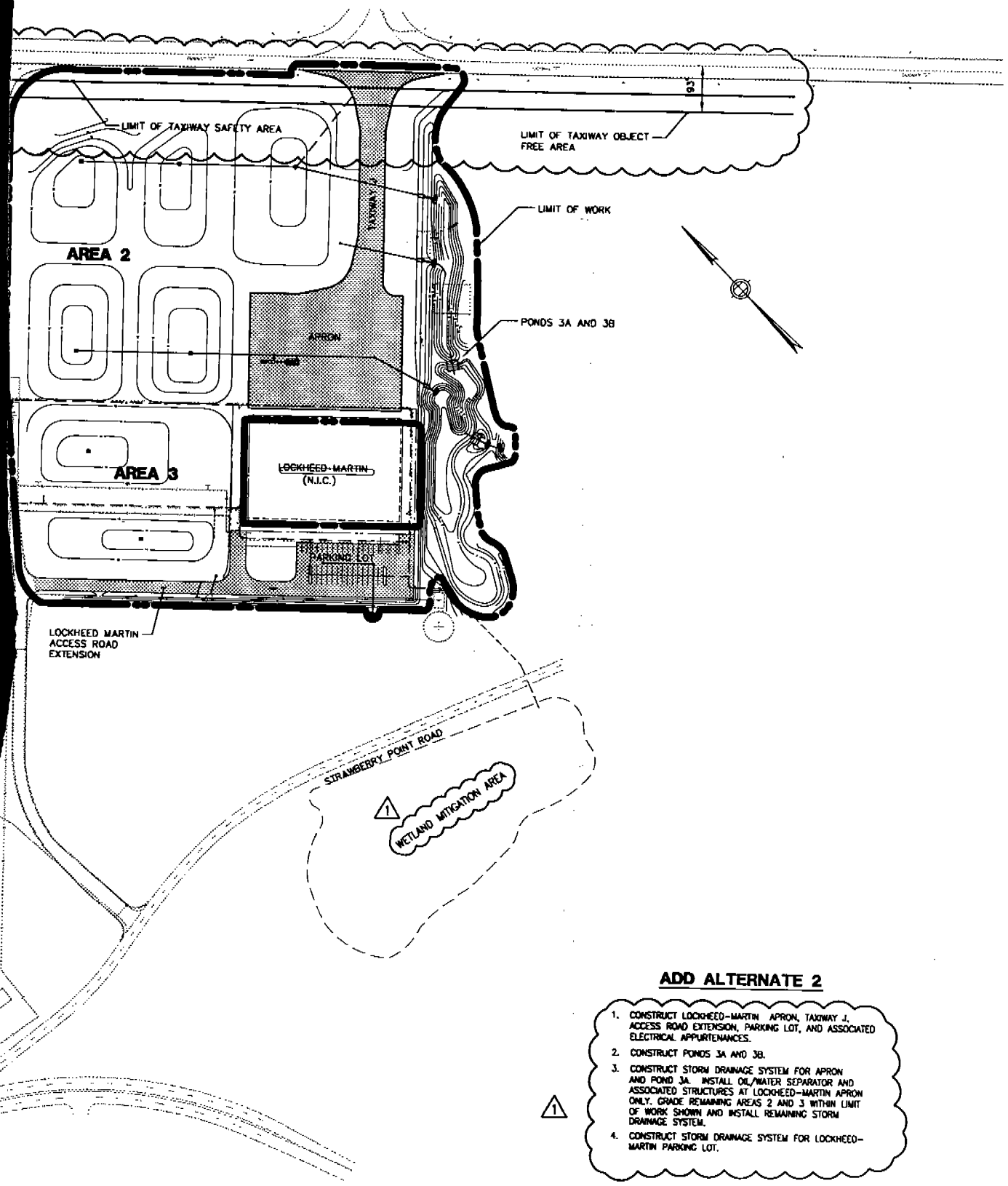
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP/PW
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1, REMOVED COUNTOURS AND POND

MARY
STATE AI



ADD ALTERNATE 2

1. CONSTRUCT LOCKHEED-MARTIN APRON, TAXIWAY J, ACCESS ROAD EXTENSION, PARKING LOT, AND ASSOCIATED ELECTRICAL APPURTENANCES.
2. CONSTRUCT PONDS 3A AND 3B.
3. CONSTRUCT STORM DRAINAGE SYSTEM FOR APRON AND POND 3A. INSTALL OIL/WATER SEPARATOR AND ASSOCIATED STRUCTURES AT LOCKHEED-MARTIN APRON ONLY. GRADE REMAINING AREAS 2 AND 3 WITHIN LIMIT OF WORK SHOWN AND INSTALL REMAINING STORM DRAINAGE SYSTEM.
4. CONSTRUCT STORM DRAINAGE SYSTEM FOR LOCKHEED-MARTIN PARKING LOT.

1

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

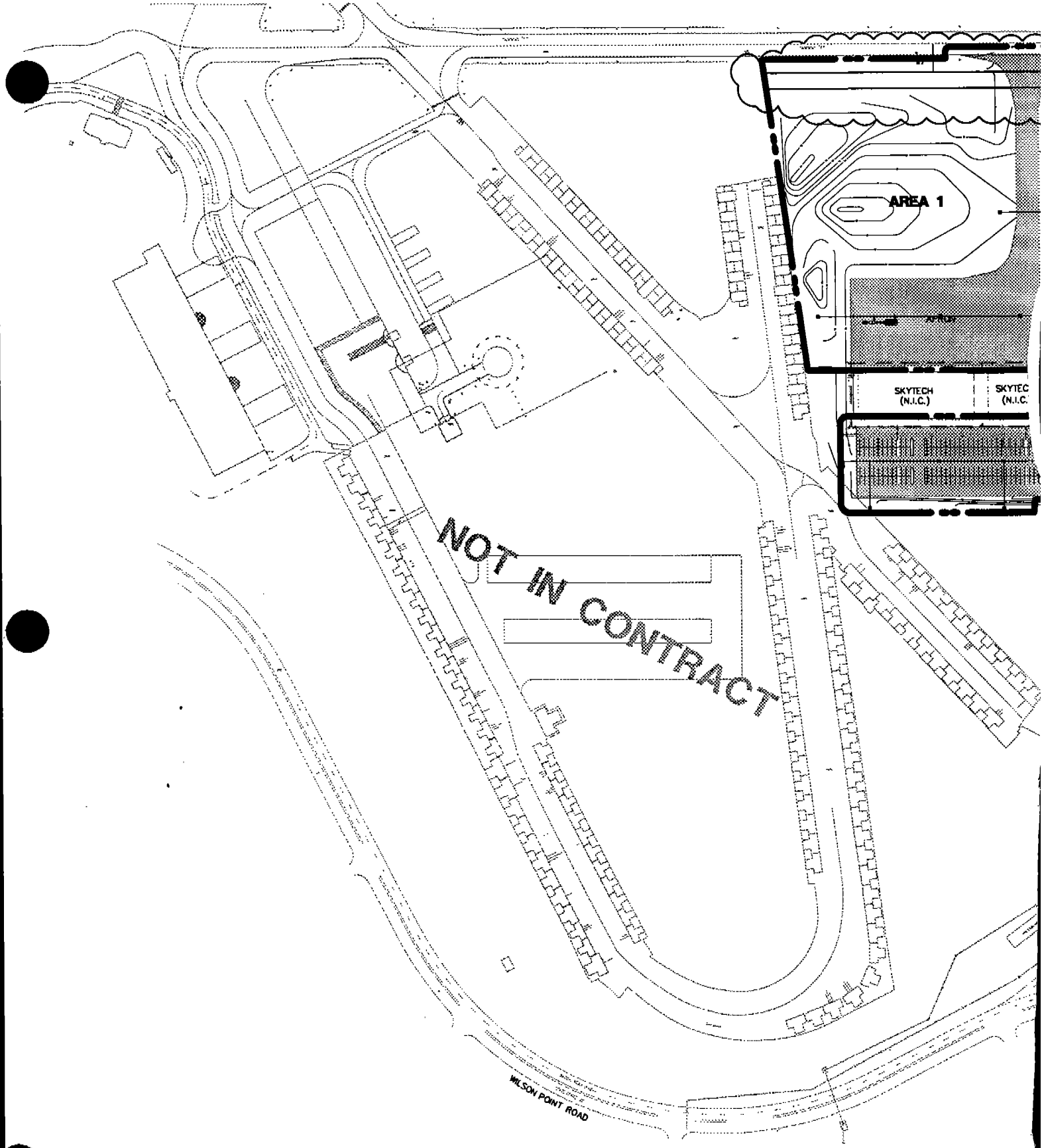
SHEET TITLE
ADD ALTERNATE 2

SCALE: NO SCALE

DATE: MARCH 31, 1998

PROJECT NO.
MAA-CO-97-019

SHEET NO.
G-10



TAMS

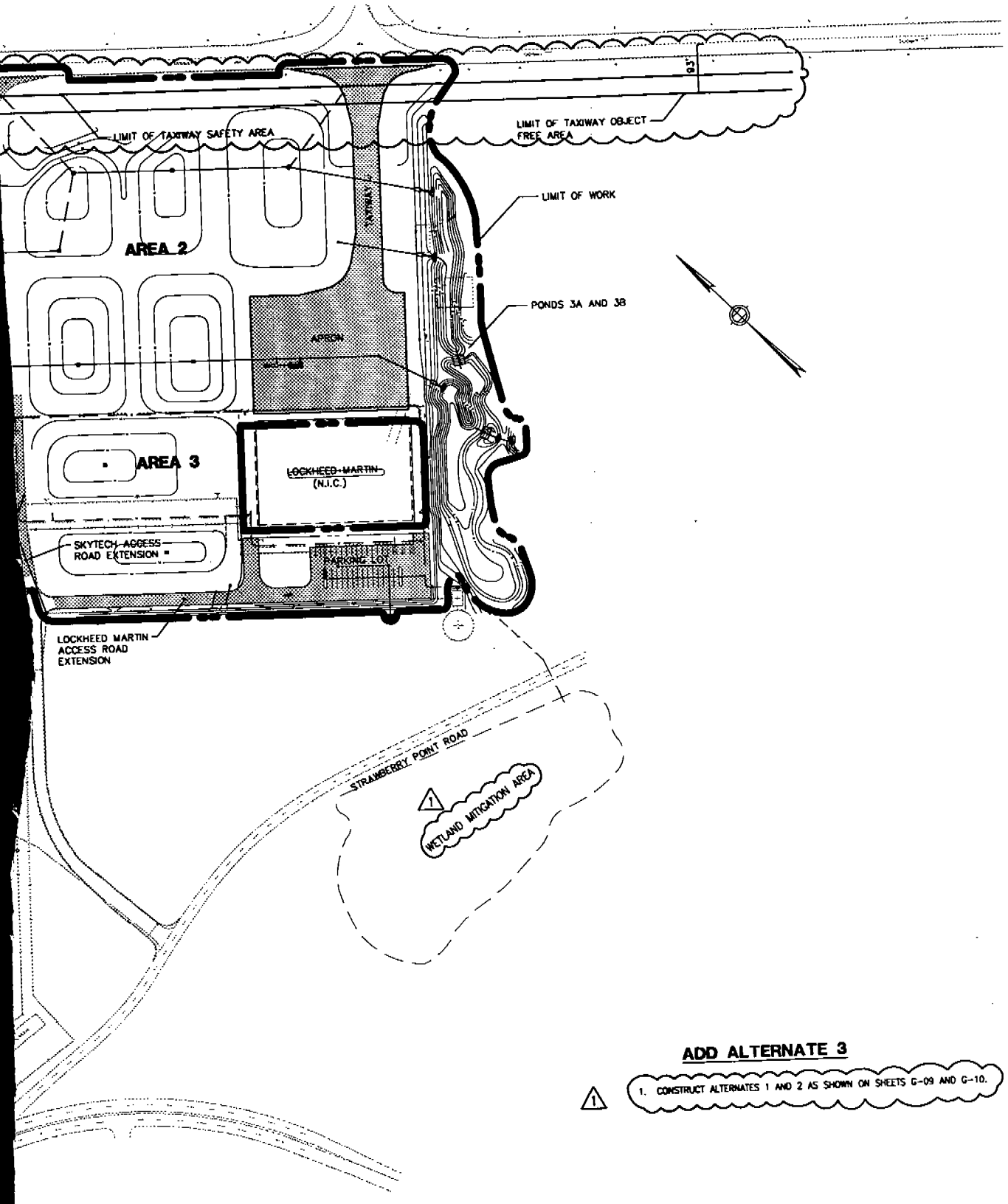
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP/PW
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND
TERRANCE DONAGHUE
LICENSE NO. 12488
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1

MAR
STATE AI



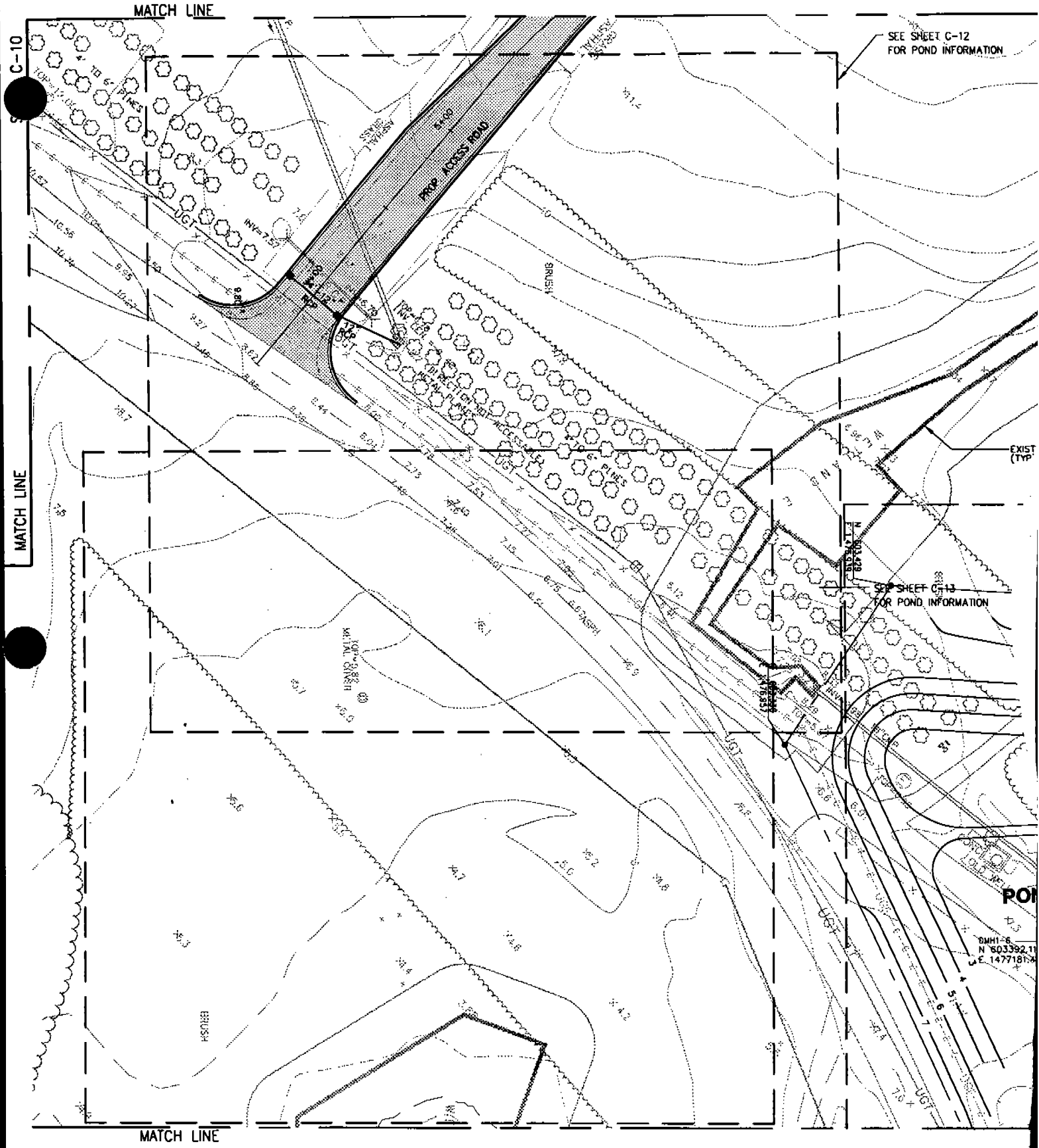
ADD ALTERNATE 3

1. CONSTRUCT ALTERNATES 1 AND 2 AS SHOWN ON SHEETS G-09 AND G-10.

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

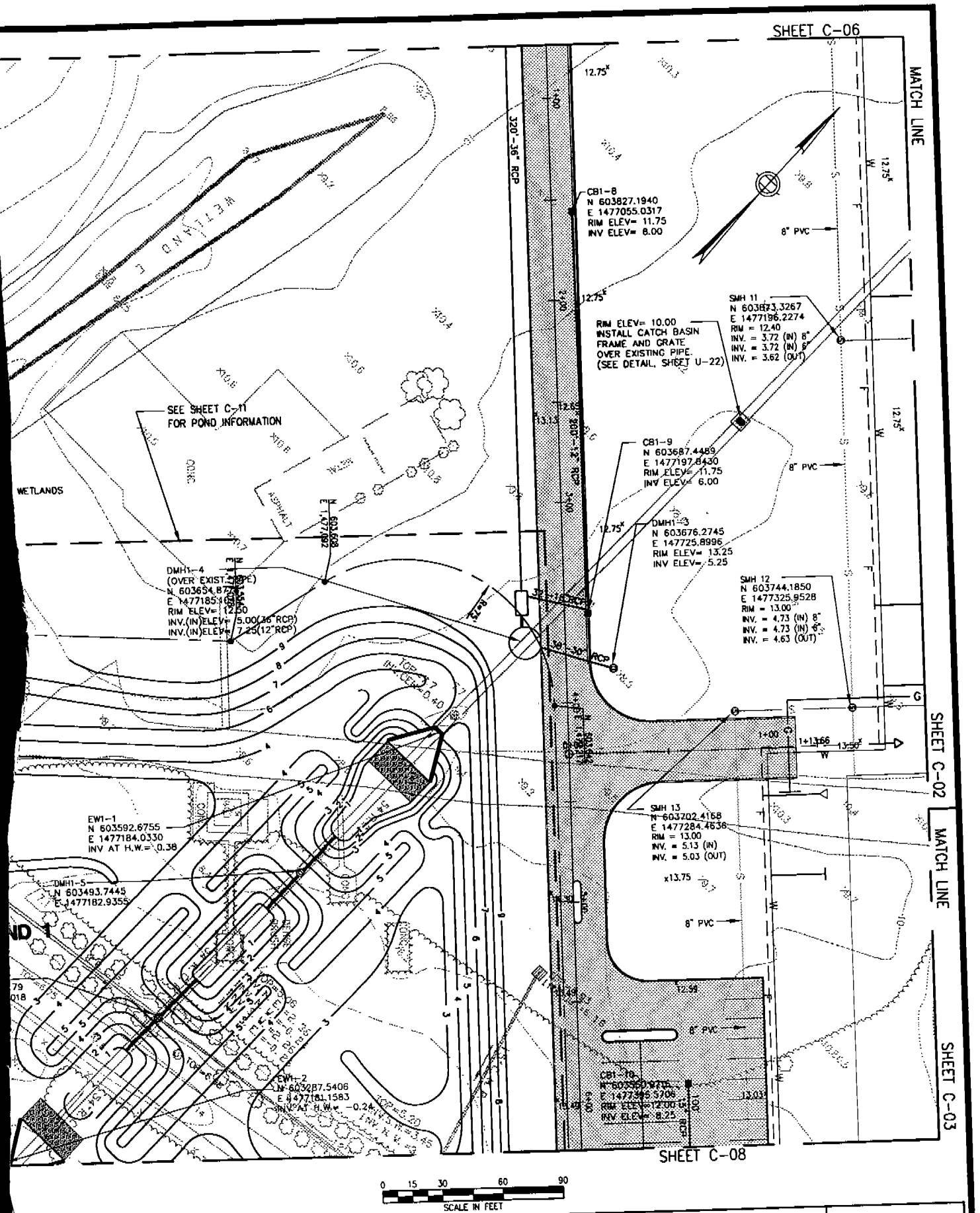
PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
PROJECT NO.	MAA-CO-97-019
SHEET TITLE	ADD ALTERNATE 3
SHEET NO.	G-11
SCALE	NO SCALE
DATE	MARCH 31, 1998



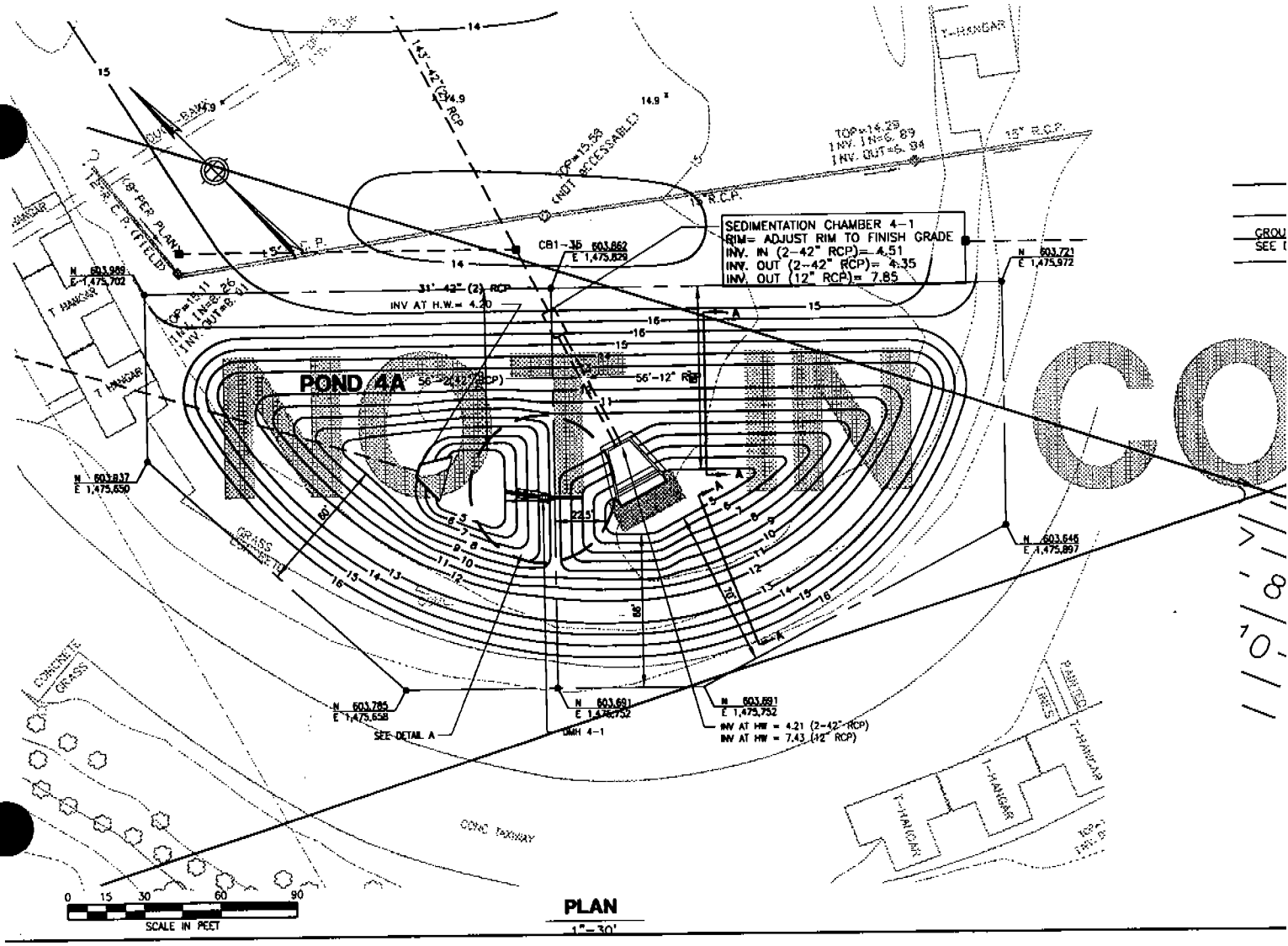
NOTE:
SEE SHEET C-01 FOR NOTES.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED	TDB/GPP	STATE OF MARYLAND TERRANCE DOWNSTREAM LICENSE NO. 12480 REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS
	DRAWN	JJN/FA		1	4/27/98	ADDENDUM 1. MODIFIED FOR CLARITY
	CHECKED	KS/GPP				
	APPROVED	TS				

MAR
STATE A

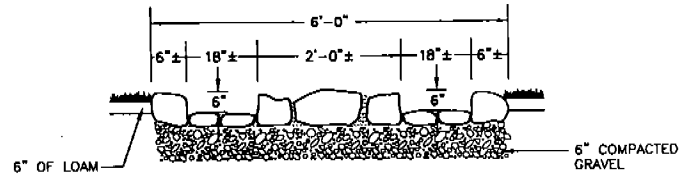


MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING **MARTIN STATE AIRPORT**	PROJECT TITLE **MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I**		PROJECT NO. MAA-CO-97-019
	SHEET TITLE **PAVING, GRADING, DRAINAGE AND UTILITY PLAN VII**		SHEET NO. **C-07**
	SCALE 1" = 30'	DATE MARCH 31, 1998	

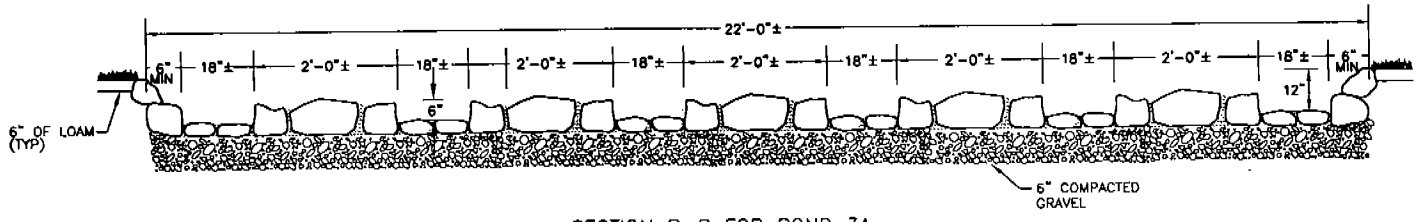


PLAN

1"=30'



SECTION B-B FOR PONDS 1, 2B, & 4A



SECTION B-B FOR POND 3A

NOTE:
SEE SHEET C-01 FOR NOTES.

MANHOLE AND GROUTE

TAMS

TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	TDB
DRAWN	POE
CHECKED	KS
APPROVED	TS

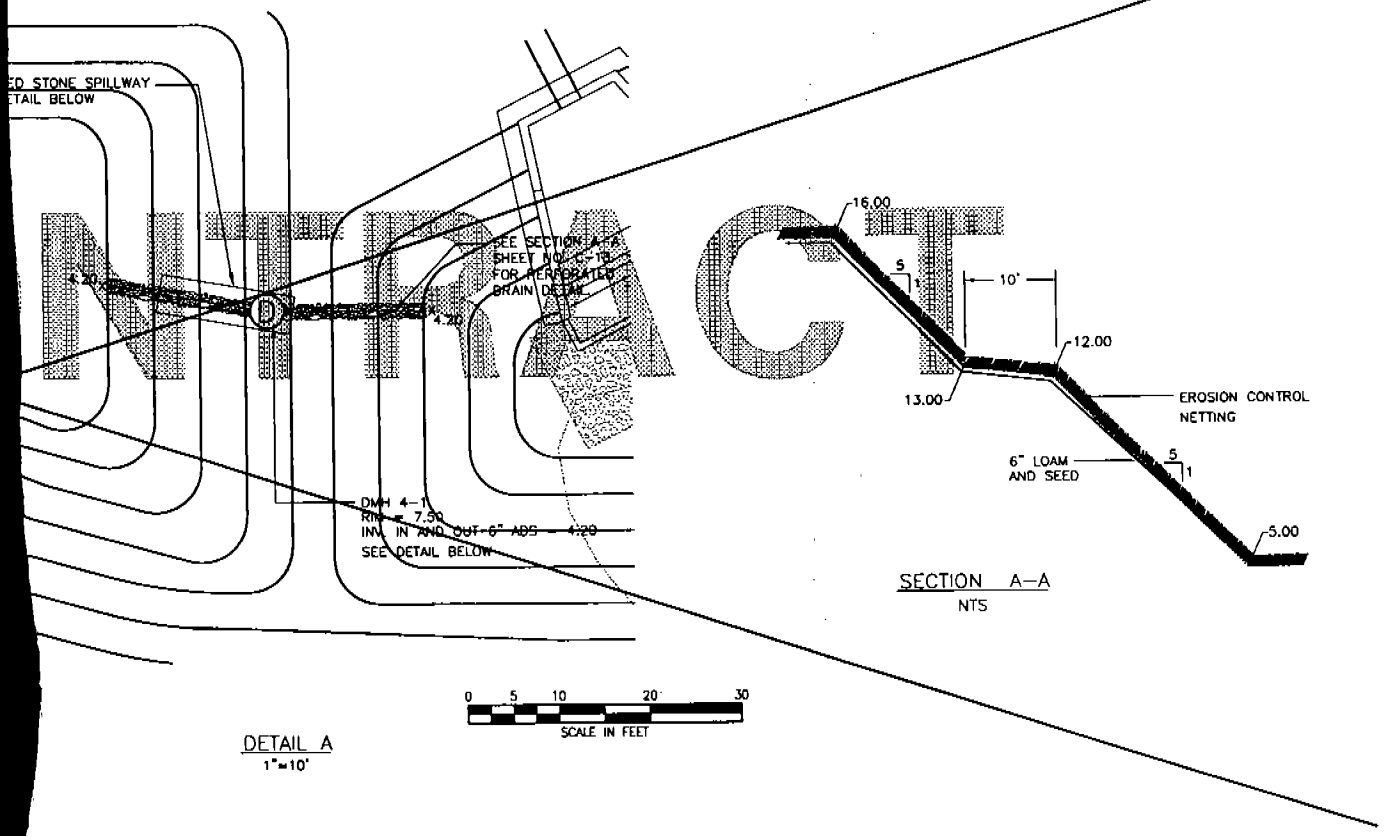
STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1, MODIFIED FOR CLARITY

MAR
STATE A

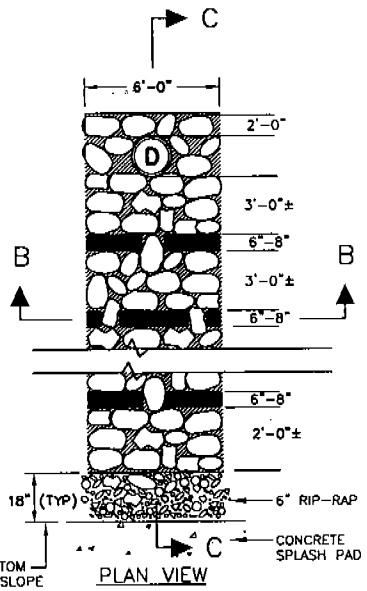
NOTES:

1. SEE SHEET V-03 FOR POND PLANTINGS.
2. SEE SHEETS R-01 THRU R-10 FOR LOCATIONS OF EROSION CONTROL MEASURES.
3. SEE NOTE 5, SHEET C-11.
4. SEE SHEET C-09 FOR COORDINATE INFORMATION FOR DRAIN MANHOLES AND HEADWALLS.

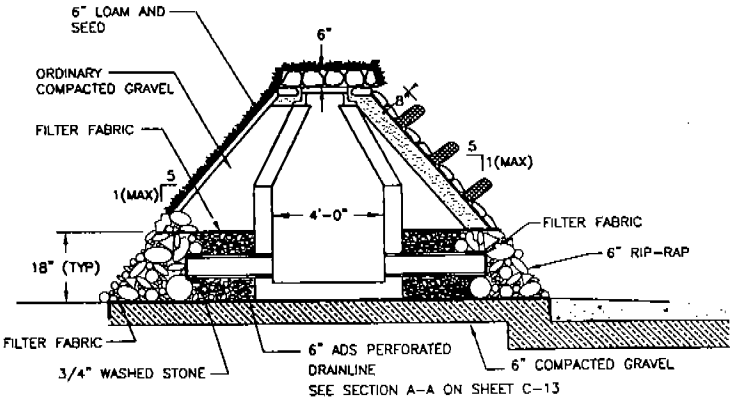


DETAIL A
1"=10'

SECTION A-A
NTS



PLAN VIEW



SECTION C-C

D STONE SPILLWAY DETAIL

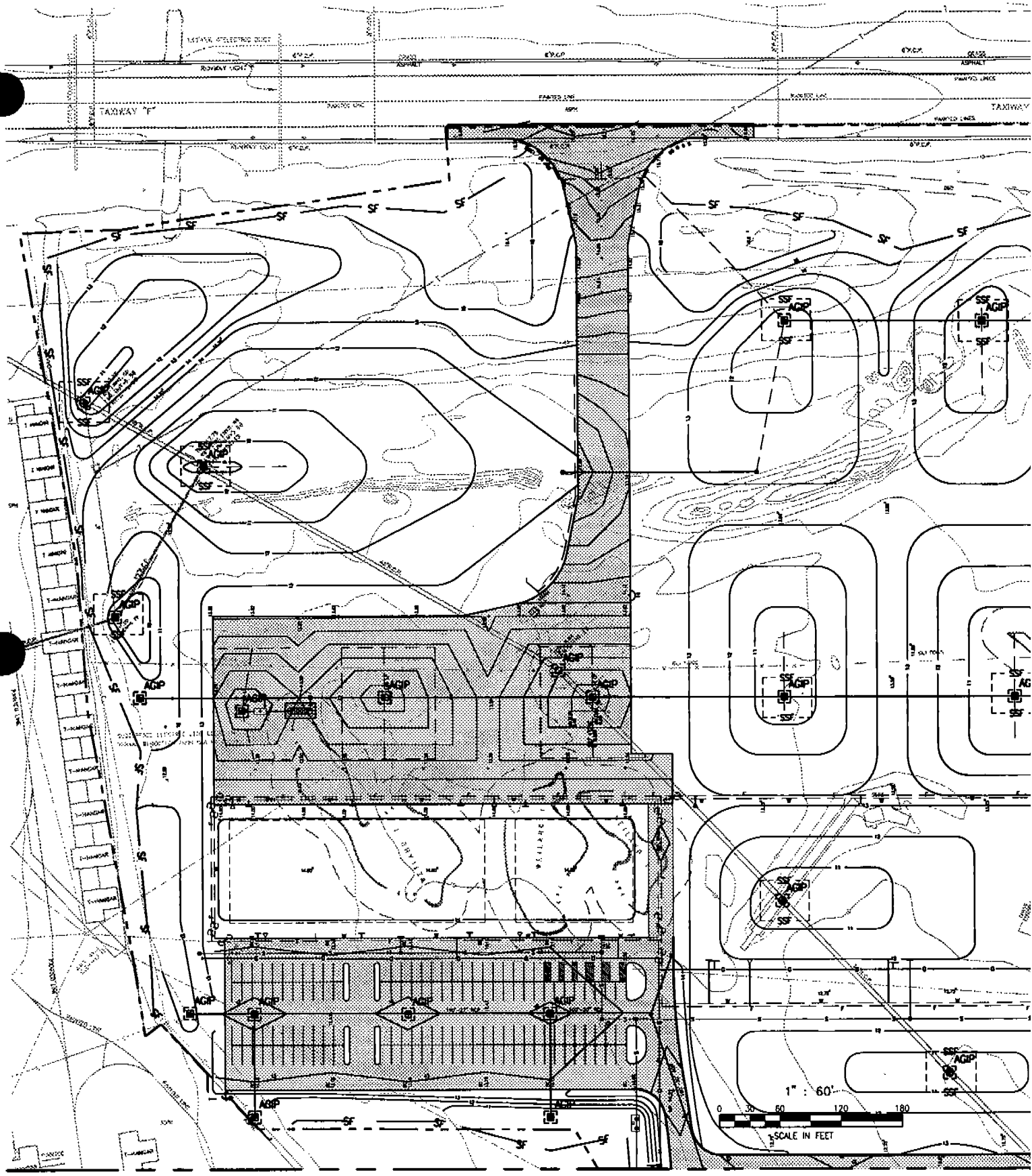
NTS

TIN
PORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: POND 4A ENLARGEMENT & DETAIL PLAN	SHEET NO.: C-15
SCALE: AS NOTED	DATE: MARCH 31, 1998



MATCH LINE

TAMS

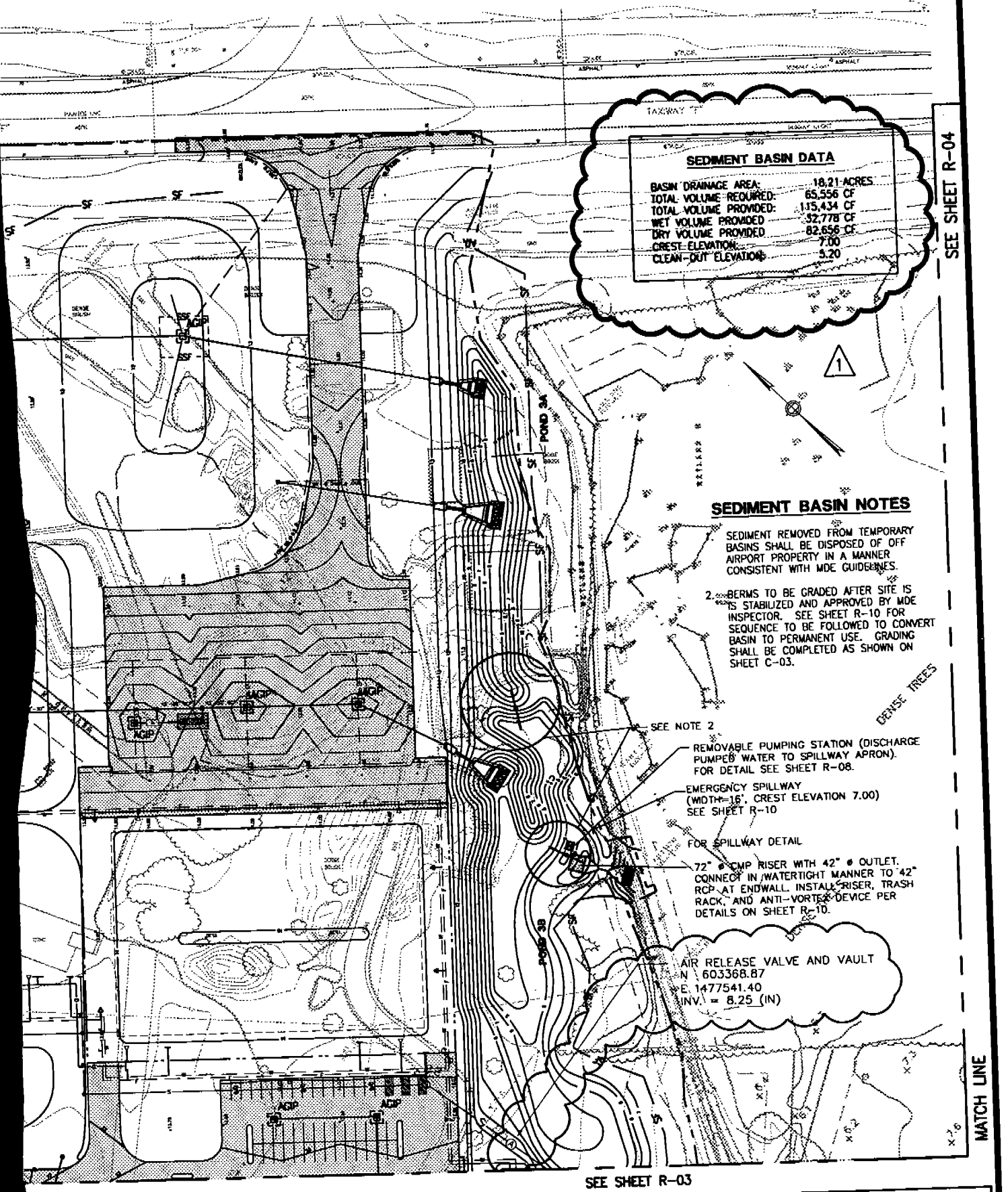
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TSEKAPOJ SOMATYPHON
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1 ADDING PONDS AND GRADING

MAR
STATE AI



MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

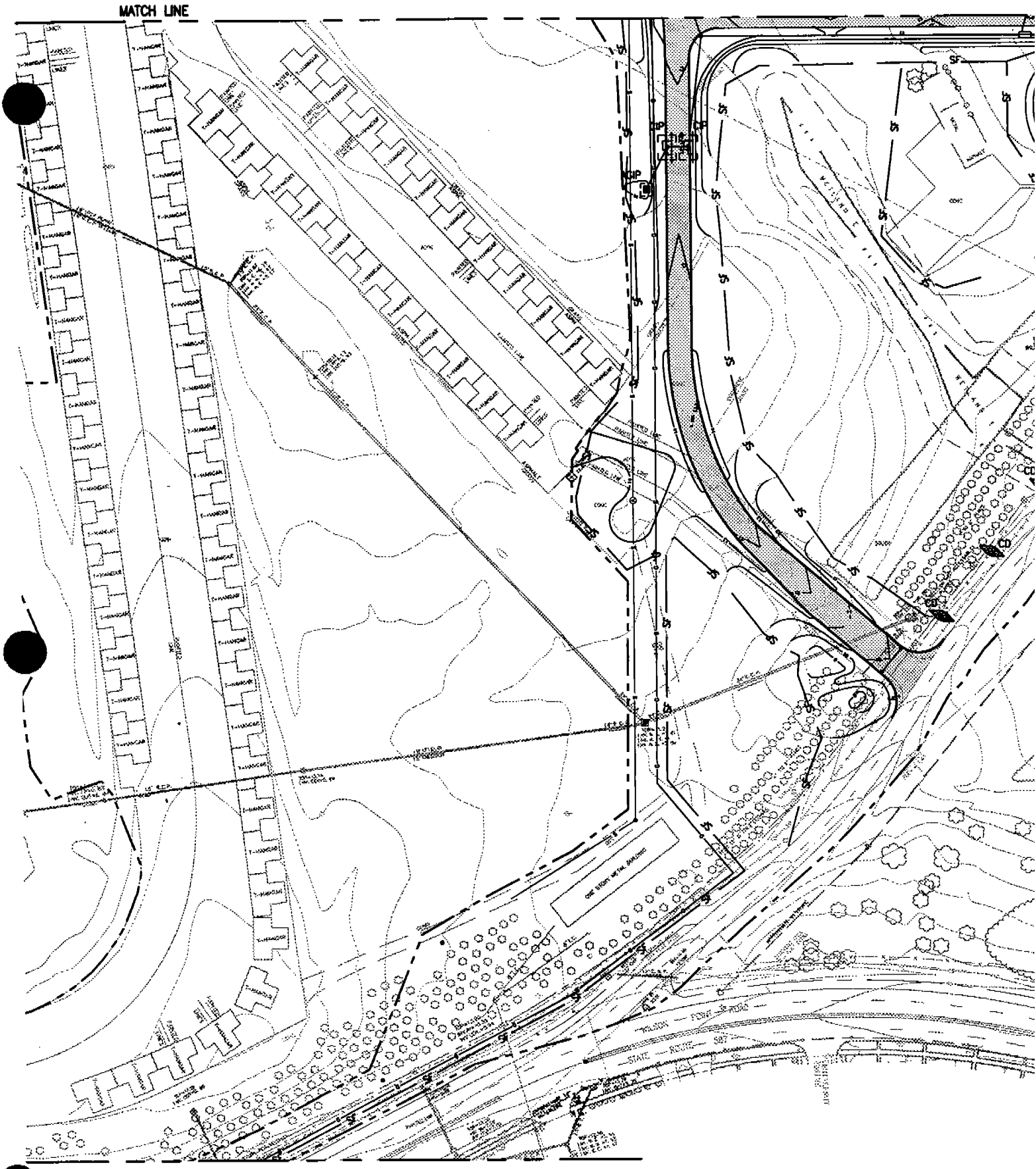
PROJECT NO.: MAA-CO-97-019

SHEET TITLE: EROSION AND SEDIMENT CONTROL PLAN I

SHEET NO.: R-02

SCALE: 1" = 60'

DATE: MARCH 31, 1998



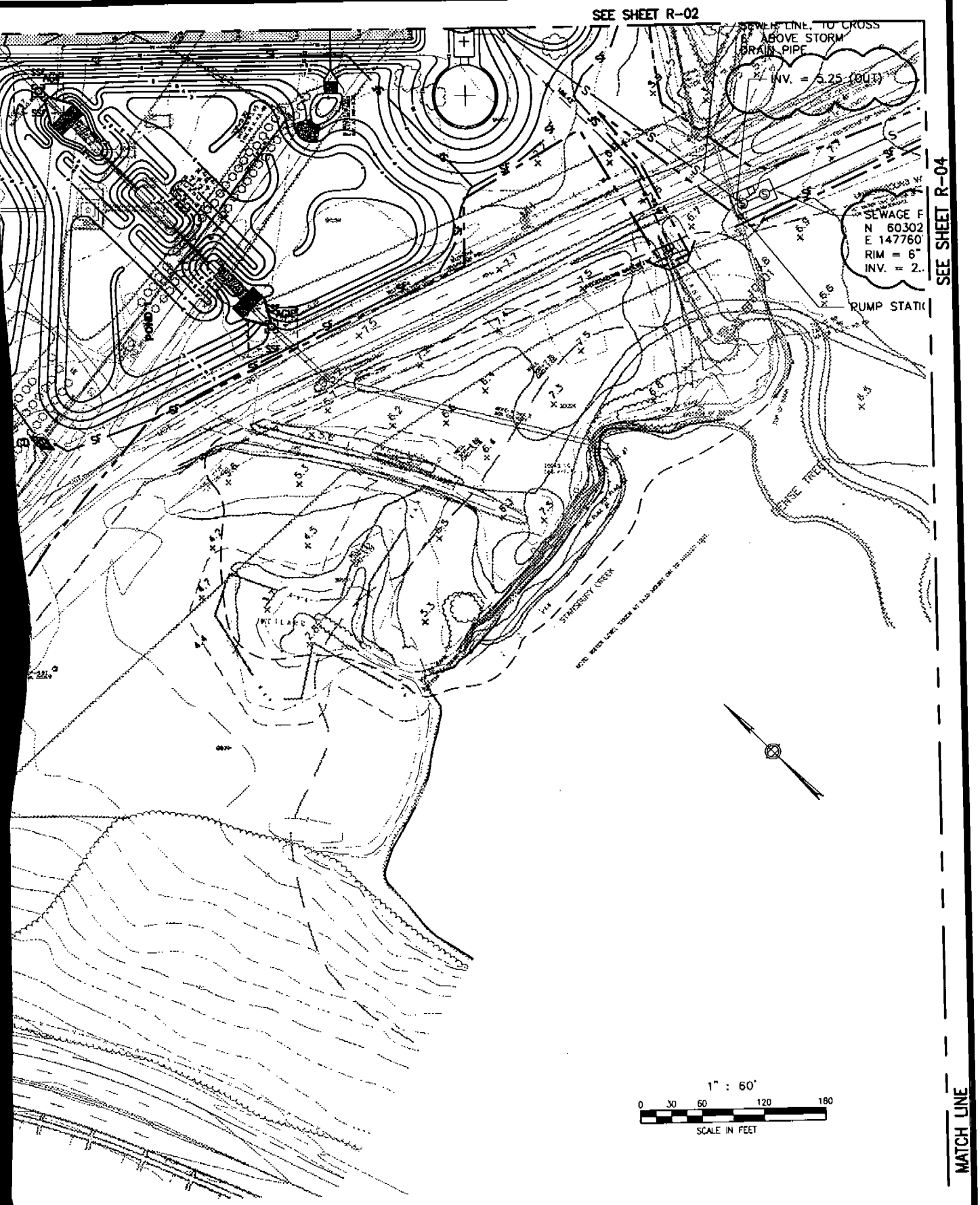
DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1 ADDING PONDS AND GRADING

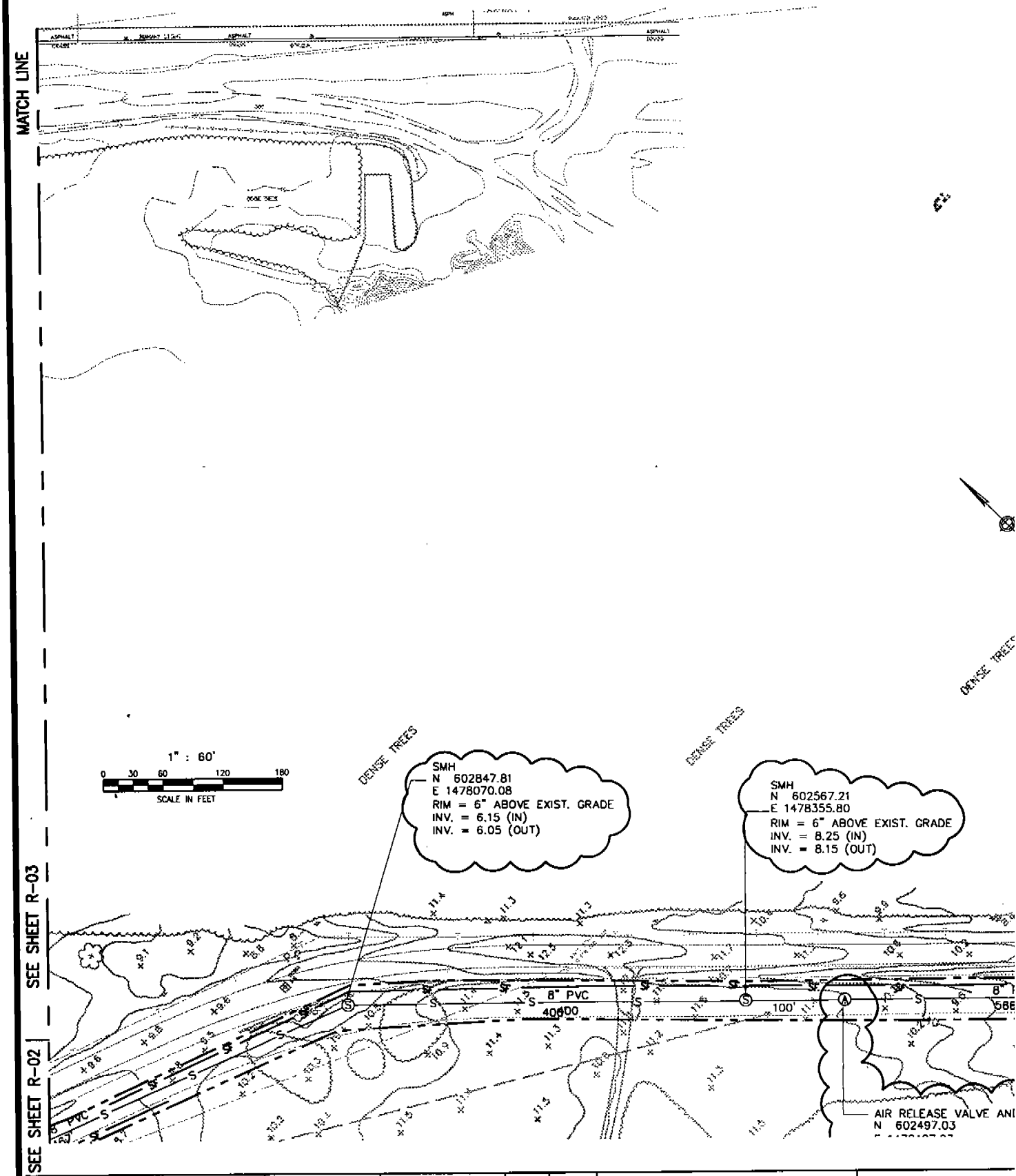
MART
STATE AIR



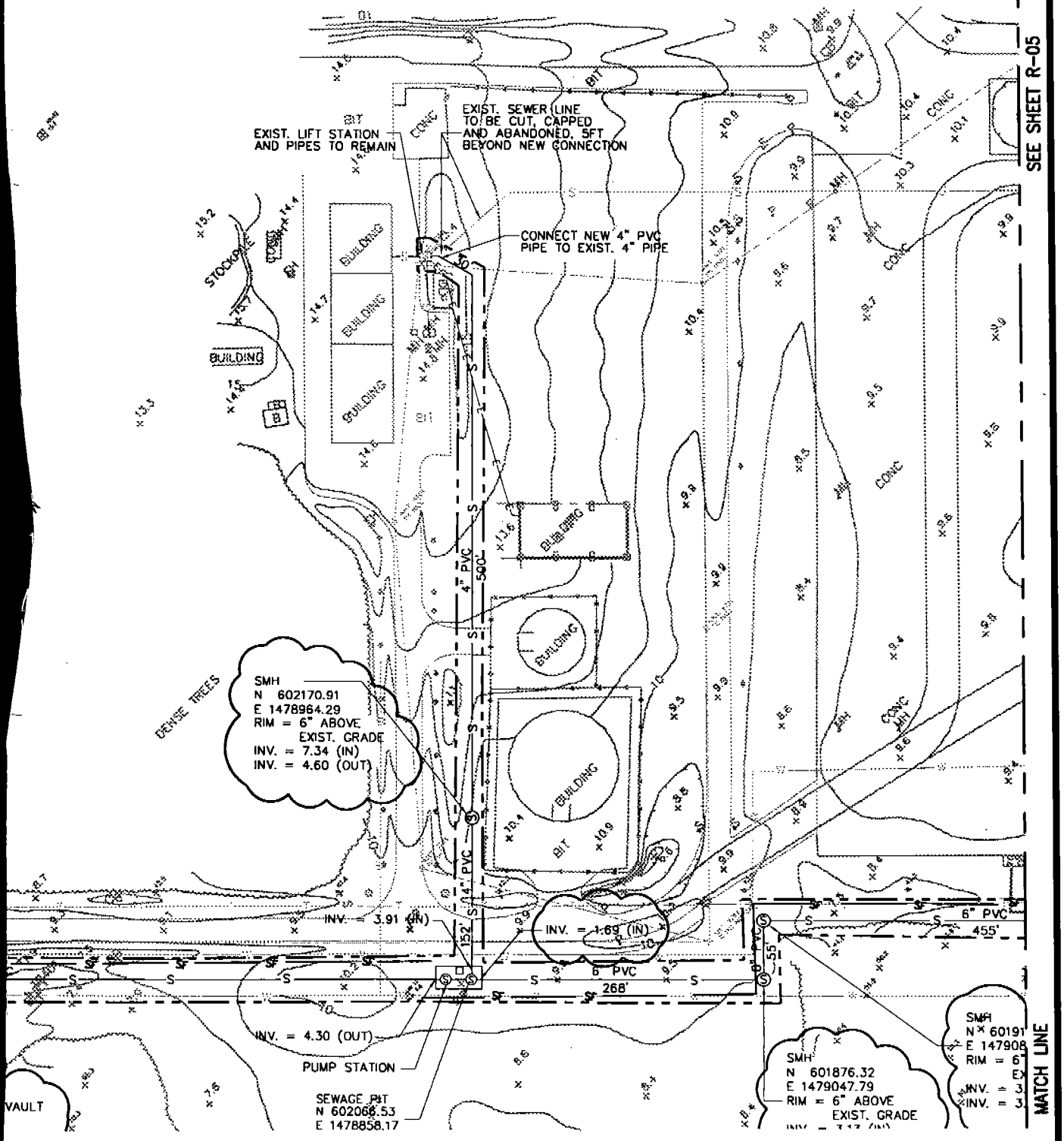
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
PROJECT NO.	MAA-CO-97-019
SHEET TITLE	EROSION AND SEDIMENT CONTROL PLAN II
SHEET NO.	R-03
SCALE	1" = 60'
DATE	MARCH 31, 1998



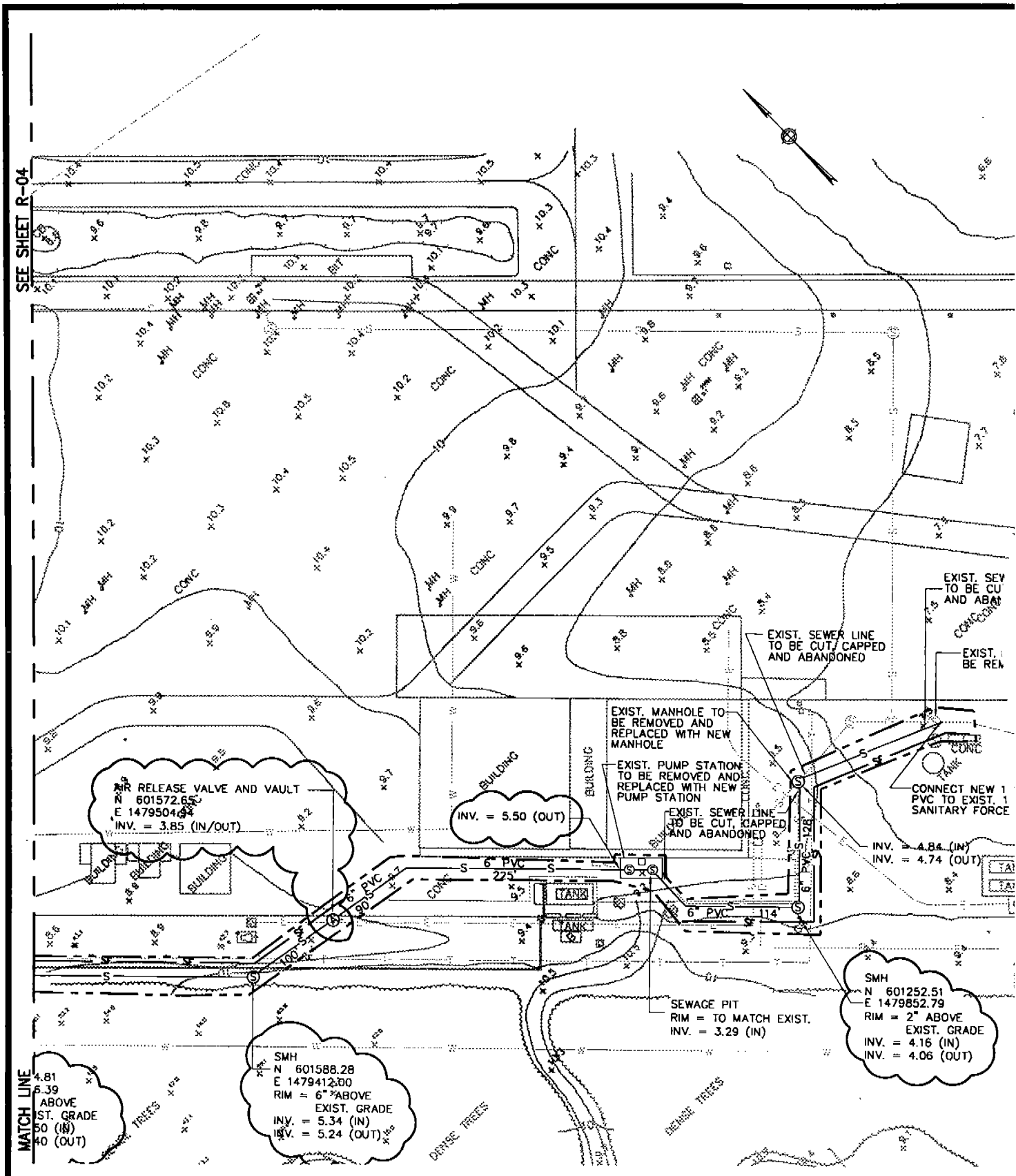
TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED FAA DRAWN FA CHECKED TS APPROVED TS	STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS
			1	4/27/98	ADDENDUM 1



MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
PROJECT NO.	MAA-CO-97-019
SHEET TITLE	EROSION AND SEDIMENT CONTROL PLAN III
SHEET NO.	R-04
SCALE	1" = 60'
DATE	MARCH 31, 1998



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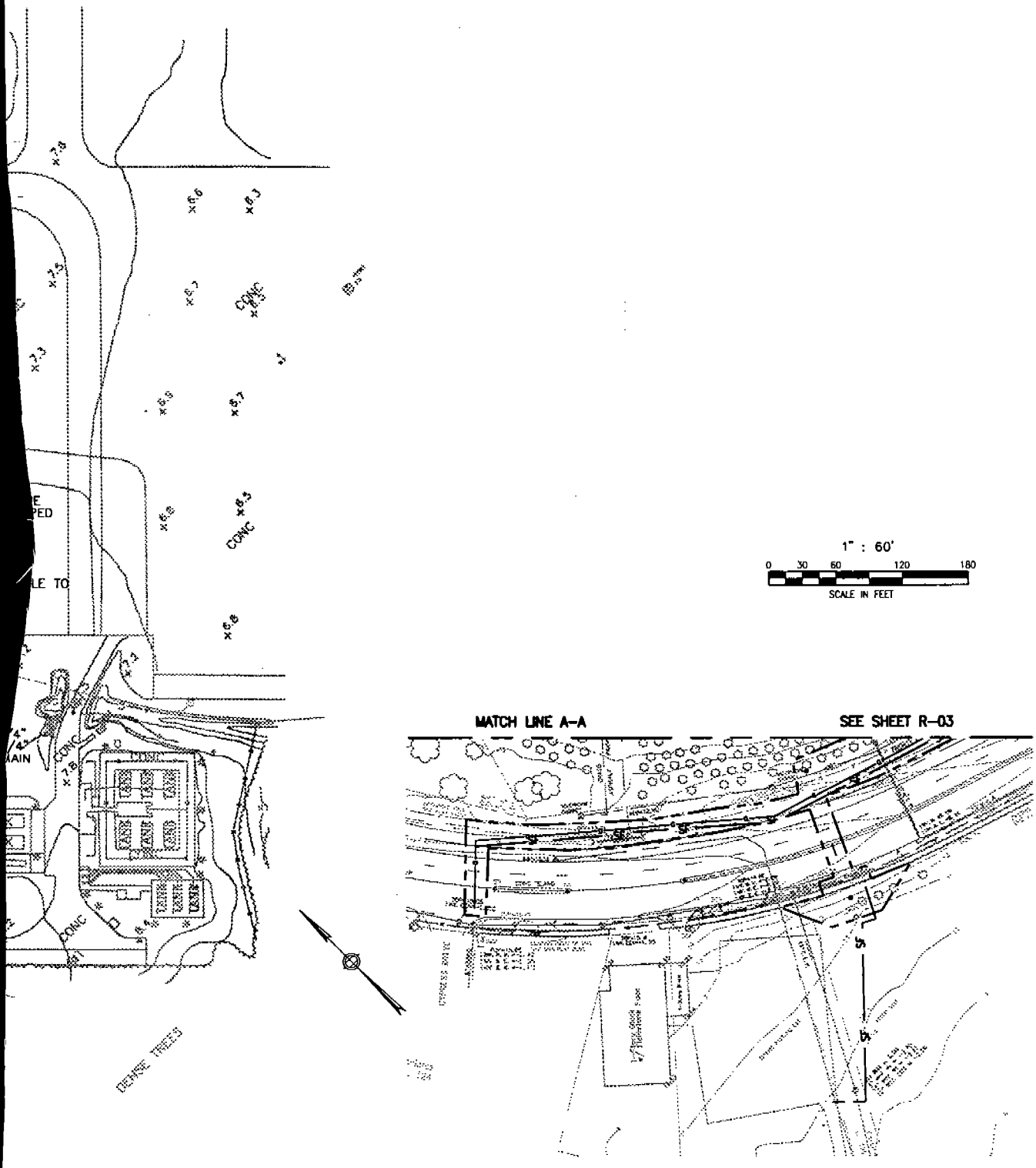

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE 1	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: EROSION AND SEDIMENT CONTROL PLAN IV	SHEET NO.: R-05
SCALE: 1" = 60'	DATE: MARCH 31, 1998

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING
TERMINAL BUILDING, LOWER LEVEL PIER A
P.O. BOX 8766
BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT
MARYLAND 21204-0766

Midfield Terminal Complex
Site Development, Phase I
at
Martin State Airport
Contract No. MAA-CO-~~98-003~~ 97-019

ADDENDUM NUMBER 2

IMPORTANT: Bidders must acknowledge receipt of this Addendum on the Bid Proposal, Section 5, Page BF.18 stating the Addendum Number.

Addendum Date: April 27, 1998

Bid Date: May 12, 1998 at 11:00 a.m. local time

REVISIONS TO TECHNICAL PROVISIONS, CONTRACT PLANS AND BID FORMS

GENERAL

1. Wetland mitigation work is being added to the Contract. The Bid Forms issued as part of Addendum No. 1 include the wetland mitigation items. The Plan Sheets and revisions to Technical provisions are part of this Addendum No. 2.

2. Add the following new drawings to Paragraph G-1.09 List of Drawings:

WM-1	Wetland Mitigation Grading Plan
WM-2	Wetland Mitigation Illustrative Site Sections
WM-3	Wetland Mitigation Soil Borings
WM-4	Wetland Mitigation Erosion and Sediment Control Plan
WM-5	Wetland Mitigation Erosion and Sediment Control Details
WM-6	Wetland Mitigation Erosion and Sediment Control Details
WM-7	Wetland Mitigation Planting Plan

WM-8	Wetland Mitigation Planting Details and Schedules
WM-9	Wetland Mitigation Planting Details
WM-10	Wetland Mitigation Planting Details and Schedules

These new Sheets are attached to this Addendum No. 2

REVISIONS TO TECHNICAL SPECIFICATIONS

1. Add the following to the end of the Table of Contents:

Item 705	Permanent Seeding and Mulching, Wetland Mitigation Area	705-1-705-8
Item 710	Planting Trees and Shrubs	710-1-710-10
Item 711	Planting Wetland Vegetation	711-1-711-5

These new Technical Specifications are attached to this Addendum No. 2.

2. Item 101 Clearing and Grubbing

Add the following under 101-4.2:

"Item 101.3	Clearing and Grubbing, Wetland Mitigation Area -- per acre"
"Item 101.4	Clearing Isolated Trees, Type I, Wetland Mitigation Area -- each"

3. Item 108 Mobilization/Demobilization

Add the following under 108-3.5:

"Item 108.3 Mobilization/ Demobilization, Wetland Mitigation Area -- lump sum"

4. Item 109 Temporary Construction Items

Add the following under 109-5.1:

"Item 109.2 Temporary Construction Items, Wetland Mitigation Area -- lump sum"

5. Item 308 Erosion and Sediment Control

Add the following:

"308-2.3 TURBIDITY CURTAIN.

a. Barriers should be a bright color (yellow or "international" orange are recommended).

b. The curtain fabric must meet the following minimum requirements:

PHYSICAL PROPERTIES OF TURBIDITY CURTAIN FABRIC

Physical Property	Requirement
Thickness, mils	45
Weight/oz./sq. yd.	22
Grab Tensile Strength, lbs.	300
UV Inhibitor	Must be included

c. Seams in the fabric shall be either vulcanized welded or sewn, and shall develop the full strength of the fabric.

d. Flotation devices shall be flexible, buoyant units contained in an individual floatation sleeve or collar attached to the curtain. Buoyancy provided by the floatation units shall be sufficient to support the weight of the curtain and maintain a freeboard of at least 3 inches above the water surface level.

e. Load lines must be fabricated into the bottom of all floating turbidity curtains. Load lines shall be fabricated into the top of the fabric. The top load line shall consist of woven webbing or vinyl-sheathed steel cable and shall have a break strength in excess of 10,000 pounds. The supplemental (bottom) load line shall consist of a chain incorporated into the bottom hem of the curtain of sufficient weight to serve as ballast to hold the curtain in a vertical position. Additional anchorage shall be provided as necessary. The load lines shall have suitable connecting devices which develop the full breaking strength for connecting to load lines in adjacent sections.

f. External anchors shall be bottom anchors.

g. Bottom anchors must be sufficient to hold the curtain in the same position relative to the bottom of the watercourse without interfering with the action of the curtain. The anchor may dig into the bottom (grappling hook, plow or fluke-type) or may be weighted (mushroom type) and should be attached to a floating anchor buoy via an anchor line. The anchor line would then run from the buoy to the top load line of the curtain. These lines must contain enough slack to allow the buoy and curtain to float freely with tidal changes without pulling the buoy or curtain down and must be checked regularly to make sure they do not become entangled with debris. Anchor spacing will vary with

current velocity and potential wind and wave action; manufacturer's recommendations should be followed.

6. Item 308 Erosion and Sediment Control

Add the following:

"308-3.5 TURBIDITY CURTAIN.

a. The Contractor shall set all the curtain anchor points. Care must be taken to ensure that anchor points are of sufficient holding power to retain the curtain under the existing current conditions, prior to putting the furled curtain into the water. Anchor buoys shall be employed on all anchors to prevent the current from submerging the floatation at the anchor points. The Contractor shall provide anchors on both sides of the curtain. When the anchors are secure, the Contractor shall secure the furled curtain to the upstream anchor point and then sequentially attach to each next downstream anchor point until the entire curtain is in position. At this point and before unfurling, the "lay" of the curtain should be assessed and any necessary adjustments made to the anchors. Finally, when the location is ascertained to be as desired, the furling lines should be cut to allow the skirt to drop.

b. The Contractor shall attach anchor lines to the floatation device, not to the bottom of the curtain. The anchoring line attached to the floatation device on the downstream side will provide support for the curtain. Attaching the anchors to the bottom of the curtain could cause premature failure of the curtain due to the stresses imparted on the middle section of the curtain.

c. **Removal.** The Contractor shall exercise care to protect the skirt from damage as the turbidity curtain is removed from the water. The site selected to bring the curtain ashore shall be free of sharp rocks, debris, etc. so as to minimize damage when hauling the curtain over the area. In no case shall the Contractor haul the curtain across areas recently planted with wetland mitigation. If the curtain has a deep skirt, it can be further protected by running a small boat along its length with crew installing furling lines before attempting to remove the curtain from the water.

d. **Maintenance.** The Contractor shall be responsible for maintenance of the filter curtain for the duration of the project in order to ensure the continuous protection of the water course. Should repairs to the geotextile fabric become necessary, the Contractor shall use a repair kit available from the manufacturer. Manufacturer's instructions shall be closely followed to ensure the adequacy of the repair. When the curtain is no longer required as determined by the inspector, the curtain and related components shall be removed in such a manner as to minimize turbidity. Remaining sediment shall be

sufficiently settled before removing the curtain. Sediment may be removed and the original depth (or plan elevation) restored. Any spoils must be taken to upland area and be stabilized.

The Contractor shall set all the curtain anchor points. Care must be taken to ensure that anchor points are of sufficient holding power to retain the curtain under the existing current conditions, prior to putting the furled curtain into the water. Anchor buoys shall be employed on all anchors to prevent the current from submerging the floatation at the anchor points. The Contractor shall provide anchors on both sides of the curtain. When the anchors are secure, the Contractor shall secure the furled curtain to the upstream anchor point and then sequentially attach to each next downstream anchor point until the entire curtain is in position. At this point and before unfurling, the "lay" of the curtain should be assessed and any necessary adjustments made to the anchors. Finally, when the location is ascertained to be as desired, the furling lines should be cut to allow the skirt to drop.

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7. Item 308 Erosion and Sediment Control

Add the following:

"308-4.2 Turbidity curtain will be measured at the contract unit price per linear foot installed in accordance with the plans and specifications of this item and accepted by the Engineer."

8. Item 308 Erosion and Sediment Control

Add the following under 308-5.1:

"Item 308.13 Class I Rip Rap Spillway Protection, Wetland Mitigation Area -- per square yard"

"Item 308.14 Stabilized Construction Entrance, Wetland Mitigation Area -- per square yard"

"Item 308.15 Super Silt Fence, Wetland Mitigation Area -- per linear foot"

"Item 308.16 Temporary Seeding and Mulching, Wetland Mitigation Area -- per acre"

9. Item 308 Erosion and Sediment Control

Add the following:

"308-5.2 Payment for turbidity curtain shall be made at the contract unit price per linear foot of turbidity curtain installed. The price shall be full compensation for furnishing all materials and for all preparation, installation, and removal of the turbidity curtain or completion of the work, and for all labor, equipment, tools, and incidentals necessary to complete the work.

Payment will be made under:

308-5.17 Turbidity Curtain, Wetland Mitigation Area–per linear foot"

10. Item P-152 Excavation and Embankment

Add the following under P-152-4.3:

"Item P-152.5 Stripping, Wetland Mitigation Area -- per cubic yard"

"Item P-152.6 Unclassified Excavation -- per cubic yard"

11. Item T-905 Topsoiling

Add the following under T-905-5.2:

"Item T-905.3 Topsoiling, Six Inch Depth, Wetland Mitigation Area -- per cubic yard"

REVISIONS TO BID FORMS

The Bid Forms issued as part of Addendum No. 1 include the wetland mitigation items and the quantities remain unchanged.

ATTACHMENTS

Plan Sheets

WM-1	Wetland Mitigation Grading Plan
WM-2	Wetland Mitigation Illustrative Site Sections
WM-3	Wetland Mitigation Soil Borings
WM-4	Wetland Mitigation Erosion and Sediment Control Plan
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Technical Specifications

Item 705	Seeding and Mulching	705-1 - 705-8
Item 710	Planting Trees and Shrubs	710-1- 710-10
Item 711	Planting Wetland Vegetation	711-1 - 711-5

END OF ADDENDUM NO. 2

ITEM 705 PERMANENT SEEDING AND MULCHING, WETLAND MITIGATION AREA

DESCRIPTION

705-1.1 This item shall consist of soil preparation, seeding, fertilizing, mulching, and liming the areas as shown on the plans or as directed by the Engineer in accordance with these Specifications and Section 705 of the MSHA Standard Specifications.

MATERIALS

705-2.1 SEEDS.

a. Wetland Seed Mix. The kinds of seed furnished shall be in accordance with Section 920.04 of the MSHA Standard Specifications. Seed must comply with the Maryland Seed Law, Agricultural Article of the Annotated Code of Maryland.

b. Seed shall be furnished in standard containers with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked. The Contractor shall furnish the Engineer duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for the seed furnished.

c. The percentage of weight of pure seed present shall be the freedom of such agriculture seeds from inert matter and from other seeds distinguishable by their appearance.

d. The percentage of germination shown for agriculture seed shall be actual sprouts and shall not include hard seeds unless specifically permitted.

e. Seed for wetland mitigation area (Wetland Seed Mix) shall meet the following requirements:

	Purity Not Less Than Percent	Minimum Percent Germination Including Hard Seed	Percent of Mix
Redtop (*Agrostis alba*)	92	80	40
Switchgrass (*Panicum virgatum*)	90	80	60
Total	–	--	100

705-2.2 MULCHING MATERIAL. Acceptable mulch shall be the materials listed below or any approved locally available material that is similar to those specified. Mulch materials, which contain matured seed of species which would volunteer and be detrimental to the proposed overseeding, or to surrounding farm land, will not be acceptable. Straw or other mulch material which is fresh and/or excessively brittle, or which is in such an advanced stage of decomposition as to smother or retard the planted grass, will not be acceptable.

a. Straw. Straw shall be the threshed plant residue of oats, wheat, barley, rye, or rice from which grain has been removed.

b. Manufactured Mulch. Cellulose-fiber or wood-pulp mulch shall be products commercially available for use in spray applications.

Within two weeks prior to the installation of the mulch, the Engineer shall be notified of sources and quantities of mulch materials available and the Contractor shall furnish him with representative samples of the materials to be used. These samples may be used as standards with the approval of the Engineer and any materials brought on the site which do not meet these standards shall be rejected.

705-2.3 LIME. Lime shall be ground limestone containing not less than 85 percent of total carbonates and shall be ground to such fineness that 90 percent will pass through a No. 20 mesh sieve and 50 percent will pass through a No. 100 mesh sieve. Coarser material will be acceptable, providing the rates of application are increased to provide not less than the minimum quantities specified on the basis of the two sieve requirements above. Dolomitic lime or a high magnesium lime shall contain at least 10 percent of magnesium oxide. Lime shall be applied at the rate of 3,500 pounds per acre or other amount as recommended by soil testing by an approved agricultural testing laboratory.

705-2.4 FERTILIZER. Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-

soluble potash. They shall be applied at the rate and to the depth specified herein, and shall meet the specified requirements of all State and Federal regulations and to the standards of the Association of Official Agricultural Chemists. Commercial fertilizer shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers. Fertilizers failing to meet the specified analysis may be used as determined by the Engineer providing sufficient materials are applied to comply with the specified nutrients per unit of measure without additional cost to the Owner.

The fertilizers may be supplied in one of the following forms:

a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;

b. A finely-ground fertilizer soluble in water, suitable for application by power sprayers, or

c. A granular or pellet form suitable for application by blower equipment.

Fertilizers shall be 10-10-10 commercial fertilizer and spread at the rate recommended by an approved agricultural testing laboratory, or lacking such tests, fertilizer shall be applied at the rate of 400 pounds per acre.

705-2.5 SEEDING SEASONS. No seeding shall be done on frozen ground or when the temperature is 32 degrees F (0 degrees C) or lower. If the time required for completing any of the operations necessary under this item, within the specified planting season or any authorized extensions thereof, extends beyond the Contract period, then such time will be charged against the Contract time; and liquidated damages will be enforced with respect to this portion of work. Seeding seasons shall be as follows:

a. Regular Seeding Season - March 1 to May 15 and August 1 to October 20, inclusive.

b. Summer Seeding Season - May 16 to July 31, inclusive.

c. Late Fall Seeding Season - October 21 to November 20, inclusive.

CONSTRUCTION METHODS

705-3.1 GENERAL. Lime and fertilizer shall be applied to all areas receiving seed. Seed shall be applied to all graded or disturbed areas unless otherwise indicated on the plans or specifications.

705-3.2 ADVANCE PREPARATION AND CLEANUP. After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches in any diameter, sticks, stumps, and other debris which might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 4 inches as a result of grading operations and, if immediately prior to seeding, the top 3 inches of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and shaped to the required grade. For slope areas steeper than 3:1 (three horizontal to one vertical) the subsoil shall be loose to a depth of 1-inch.

After tillage, the lime and fertilizer shall be applied within 48 hours thereafter. The seeding mixture shall be applied within 48 hours after application of lime and fertilizer. Immediately after seeding, the areas shall again be lightly tilled with the disk harrow to a controlled depth of approximately 1 inch. The light tillage operation shall be followed by one pass with a cultipacker to firm the seeded areas.

705-3.3 SEEDING RATES. Seeding rates for Wetland Seed Mix shall be as follows:

Material	Lb. Per 1,000 Ft.^{2} (Kg/100m^2)	Lb. Per Acre (Kg/ha)
Redtop (*Agrostis alba*)	.05 (.02)	2.20 (2.05)
Switchgrass (*Panicum virgatum*)	.23 (.09)	10.0 (9.33)
Wet Seed Mix Total	.28 (.11)	12.20 (11.38)

705-3.4 DRY APPLICATION METHOD.

a. Liming. Lime shall be applied separately and prior to the application of any fertilizer or seed and only on seedbeds which have previously been prepared as described above. The lime shall then be worked into the top 3 inches of soil after which the seedbed shall again be properly graded and dressed to a smooth finish.

b. Fertilizing. Following advance preparations and cleanup, and liming if required, fertilizer shall be uniformly spread at the rate which will provide not less than the minimum quantity stated in Section 705-2.4.

c. Seeding. Grass seed shall be sown at the rate specified herein immediately after fertilizing, and the fertilizer and seed shall be lightly raked to a depth of 1 inch for newly graded and disturbed areas. When seeding is required at other than the inclusive dates March 1 to May 15 and August 1 to October 20, a suitable cover crop approved by the Engineer shall be sown in addition to the specified seed mixture by the same methods required for grass seeding.

d. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted by means of a cultipacker or an approved lawnroller, weighing 50 to 200 pounds per foot of width.

705-3.5 WET APPLICATION METHOD.

a. General. The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in Paragraphs 2.1 through 2.3.

b. Spraying Equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

c. The unit shall also be equipped with a pressure pump capable of delivering 100 gallons per minute at a pressure of 100 pounds per square inch. The pump shall be mounted in a line which will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8-inch solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

d. The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture be supplied so that mixtures may be properly sprayed over distance varying from 20 feet to 100 feet. One shall be a close-range ribbon nozzle,

one a medium-range ribbon nozzle, and one a long-range jet nozzle. For ease of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

e. In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet in length shall be provided to which the nozzles may be connected.

f. **Mixtures.** Lime shall be applied separately in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds of lime shall be added to and mixed with each 100 gallons of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds of these combined solids shall be added to and mixed with each 100 gallons of water.

g. All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. Brackish water shall not be used at any time. The Contractor shall identify to the Engineer all sources of water at least two weeks prior to use. The Engineer may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source which is disapproved by the Engineer following such tests.

h. All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two hours from the time they were mixed or they shall be wasted and disposed of at locations acceptable to the Engineer.

i. **Spraying.** Lime shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches, after which the seedbed shall again be properly graded and dressed to a smooth finish.

j. Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray which shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

k. Particular care shall be exercised to insure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area. Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

l. On surfaces which are to be mulched as indicated by the plans or designated by the Engineer, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

705-3.6 MAINTENANCE OF SEEDED AREAS. The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the Engineer. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

It will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the Engineer. If at the time when the contract has been otherwise completed it is not possible to make an adequate determination of the color, density, and uniformity of such stand of grass, payment for the unaccepted portions of the areas seeded out of season will be withheld until such time as these requirements have been met.

705-3.7 MULCHING. Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding. The spreading of the mulch may be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

Mulch material shall be furnished, hauled, and evenly applied on the areas shown on the plans or designated by the Engineer. Straw or hay shall be spread over the surface to a uniform thickness at the rate of 2 to 3 tons per acre to provide a loose depth of not less than 1-1/2 inches nor more than 3 inches. Cellulose-fiber or wood-pulp mulch shall be applied at the rate of 1,500 pounds (dry weight) per acre. Mulch may be blown on the slopes and the use of cutters in the equipment for this purpose will be permitted to the extent that at least 95 percent of the mulch in place on the slope shall be 6 inches or more in length. When mulches applied by the blowing method are cut, the loose depth in place shall be not less than 1 inch nor more than 2 inches.

705-3.8 SECURING MULCH. The mulch shall be held in place by light discing, a very thin covering of topsoil, small brush, pins, stakes, wire mesh, or other adhesive material approved by the Engineer. Where mulches have been secured by adhesive material, it will not be permissible to walk on the slopes after the binder has been applied. The Contractor is warned that in the application of adhesive material he must take every precaution to guard against damaging or disfiguring structures or property on or adjacent to the areas worked and that he will be held responsible for any such damage resulting from his operations.

If the "Peg and String" method is used, the mulch shall be secured by the use of stakes or wire pins driven into the ground on 5-foot centers or less. Binder twine shall be strung between adjacent stakes

in straight lines and crisscrossed diagonally over the mulch, after which the stakes shall be firmly driven nearly flush to the ground to draw the twine down tight onto the mulch.

705-3.9 CARE AND REPAIR OF MULCH. The Contractor shall care for the mulched areas until final acceptance of the project. Such care shall consist of providing protection against traffic or other use by placing warning signs, as approved by the Engineer, and erecting any barricades that may be shown on the plans before or immediately after mulching has been completed on the designated areas.

The Contractor shall be required to repair or replace any mulching that is defective or becomes damaged until the project is finally accepted. When, in the judgment of the Engineer, such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement shall be borne by the Contractor.

METHOD OF MEASUREMENT

705-4.1 The quantity of seeding and mulching to be paid shall be measured by the number of square yards, measured on the ground surface, completed and accepted.

BASIS OF PAYMENT

705-5.1 The quantity for Seeding and Mulching Wetland Seed Mix on the Proposal Form, will be paid for at the unit price bid per square yard, which price and payment shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

Item 705.1 Permanent Seeding and Mulching, Wetland Mitigation Area--per square yard

END OF ITEM 705

ITEM 710 PLANTING TREES AND SHRUBS

DESCRIPTION

710-1.1 This work shall consist of furnishing, planting, and fertilizing of trees and shrubs, and all planting operations necessary to complete the work as specified, as shown on the plans and/or as directed by the Engineer.

710-1.2 QUALITY ASSURANCE.

a. Installer Qualifications. The Contractor shall engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and who has a record of successful tree and shrub establishment.

b. The Contractor shall provide quantity, size, genus, species, and variety of trees and shrubs indicated on the plans and in these Specifications, complying with applicable requirements of ANSI Z60.1 "American Standard for Nursery Stock" and Section 920 of the MSHA Standard Specifications for Construction and Materials.

c. Topsoil Analysis. The Contractor shall furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay, and sand), deleterious material, pH, and mineral and plant-nutrient content of topsoil.

(1) Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce a satisfactory topsoil.

d. Measurements. The Contractor shall measure trees and shrubs according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches above ground for trees up to 4-inch caliper size, and 12 inches above ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

e. Observation. Engineer may observe trees and shrubs either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size and quality. Engineer retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. The Contractor shall immediately remove all rejected trees or shrubs from the site.

710-1.3 DELIVERY, STORAGE, AND HANDLING. The Contractor shall deliver freshly dug trees and shrubs. Do not prune before delivery, except as approved by Engineer. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy natural shape. Provide protective covering during delivery. Do not drop trees and shrubs during delivery.

Handle balled and burlapped stock by the root ball.

Deliver trees and shrubs after preparations for planting have been completed and install immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist.

a. Do not remove container-grown stock from containers before time of planting.

b. Water root systems of trees and shrubs stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

710-1.4 PLANTING SCHEDULE. The Contractor shall coordinate planting of trees and shrubs in accordance with Schedule for Planting from Section 710.01.01 of the MSHA Standard Specifications.

	Deciduous Material			Evergreen Material		
Season	Balled and Burlapped and Bare Root	Container Grown	Seedling Stock	Balled and Burlapped	Container Grown	Seedling Stock
Spring	3/1 to 4/30	3/1 to 6/15	3/15 to 4/15	3/15 to 4/30	3/15 to 6/15	3/15 to 4/15
Fall	10/15 to 12/15	8/15 to 12/15	—	9/1 to 11/15	8/15 to 11/15	10/1 to 10/31

No container grown plant material shall be planted if not acclimated to the current weather conditions. No planting will be allowed out of season without written permission of the Engineer.

710-1.5 WARRANTY.

a. General Warranty. The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

b. Special Warranty. The Contractor shall warrant living trees and shrubs for a period of one year after date of Substantial Completion, against defects including death and unsatisfactory growth, as specified under Section 710.03.06 of the MSHA Standard Specifications.

c. The Contractor shall remove and replace dead trees and shrubs immediately unless required to plant in the succeeding planting season.

d. The Contractor shall remove and replace trees and shrubs that are more than 25 percent dead or in an unhealthy condition at the end of the warranty period.

710-1.6 MAINTENANCE. The Contractor shall maintain trees and shrubs by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, tightening and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings in strict accordance with Section 710.03.06(b) of the MSHA Standard Specifications. Spray as required to keep trees and shrubs free of insects and disease.

MATERIALS

710-2.1 TREE AND SHRUB MATERIAL.

a. General. Unless otherwise indicated, the Contractor shall furnish nursery-grown trees and shrubs conforming to ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

b. Grade. The Contractor shall provide trees and shrubs of sizes and grades conforming to ANSI Z60.1 for type of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Engineer, with a proportionate increase in size of roots or balls.

c. The Contractor shall label at least 1 tree and 1 shrub of each variety and caliper with a securely attached, waterproof tag bearing legible designation of botanical and common name.

710-2.2 SHADE AND FLOWERING TREES.

a. Shade Trees. Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, conforming to ANSI Z60.1 and Section 920.07 of the MSHA Standard Specifications for type of trees required.

b. Small Trees. Small upright or spreading type, branched or pruned naturally according to species and type, and with relationship of caliper, height, and branching recommended by

ANSI Z60.1, and conforming to Section 920.07 of the MSHA Standard Specifications. Stem form shall be single stemmed.

c. The Contractor shall provide balled and burlapped trees in accordance with Section 920.07 of the MSHA Standard Specifications.

(1) Container-grown trees will be acceptable in lieu of balled and burlapped trees subject to meeting ANSI Z60.1 limitations for container stock.

710-2.3 DECIDUOUS SHRUBS.

a. **Form and Size.** Deciduous shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

b. The Contractor shall provide balled and burlapped deciduous shrubs in accordance with Section 920.07 of the MSHA Standard Specifications.

(1) Container-grown deciduous shrubs will be acceptable in lieu of balled and burlapped deciduous shrubs subject to meeting ANSI Z60.1 limitations for container stock.

710-2.4 TOPSOIL. Topsoil used in the planting soil mix shall be as specified in Section 920.01 of the MSHA Standard Specifications and as follows: ASTM D 5268, fertile, friable, naturally loamy, pH range of 5.5 to 7.6, 4 percent organic material minimum, free of stones 2 inches (50 mm) or larger in any dimension, and other extraneous materials harmful to plant growth.

710-2.5 SOIL AMENDMENTS.

a. **Lime.** Lime shall be as specified in Section 920.02 of the MSHA Standard Specifications and as follows: ASTM C 602, Class T, agricultural limestone containing a minimum 85 percent calcium carbonate equivalent, with a minimum 99 percent passing a No. 8 sieve and a minimum 75 percent passing a No. 60 sieve.

(1) Provide lime in the form of dolomitic limestone.

b. **Peat Humus.** Peat humus shall be as specified in Section 920.08.02 of the MSHA Standard Specifications and as follows: finely divided or granular texture, with a pH range of 6 to 7.5, composed of partially decomposed moss peat (other than sphagnum), peat humus, or reed-sedge peat.

c. **Manure.** Manure shall be as specified in Section 920.08.04 of the MSHA Standard Specifications, and as follows: well-rotted, unleached stable or cattle manure containing not more

than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

d. Herbicides. Herbicides shall be as specified in Section 920.08.07 of the MSHA Standard Specifications. Herbicides shall be EPA registered and approved for use in wetlands and shall be of the type recommended by the manufacturer for control of the pest species in question.

e. Insecticides. Insecticides shall be as specified in Section 920.08.06 of the MSHA Standard Specifications.

f. Water. Water shall be as specified in Section 920.08.01 of the MSHA Standard Specifications, and as follows: potable.

710-2.6 FERTILIZER. Commercial fertilizer shall be as specified in Section 920.03 of the MSHA Standard Specifications and as follows: commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea-form, phosphorous, and potassium in the following composition:

a. Composition. Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

710-2.7 MULCHES. Organic mulch shall be as specified in Section 920.05 of the MSHA Standard Specifications and as follows: free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

a. Type. Shredded hardwood.

b. Type. Ground or shredded bark.

c. Type. Wood and bark chips.

710-2.8 STAKES AND GUYS.

a. Upright and Guy Stakes. Upright and guy stakes shall be as specified in Section 920.08.09 of the MSHA Standard Specifications and as follows: rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects, 2 by 2 inches by length indicated, pointed at one end.

b. Guy Wire. Guy wire shall be as specified in Section 920.08.11 of the MSHA Standard Specifications and as follows: ASTM A 641, Class 1, galvanized-steel wire, 2-strand, twisted, 0.106 inch in diameter.

c. **Hose Chafing Guard.** Hose chafing guard shall be as specified in Section 920.08.14 of the MSHA Standard Specifications and as follows: reinforced rubber or plastic hose at least 5/8 inch in diameter, black, cut to lengths required to protect tree trunks from damage.

d. **Flags.** Standard surveyor's plastic flagging tape, white, 6 inches long.

710-2.9 MISCELLANEOUS MATERIALS.

a. **Antidesiccant.** Antidesiccant shall be as specified in Section 920.08.19 of the MSHA Standard Specifications and as follows: water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's instructions.

b. **Trunk-Wrap Tape.** Trunk-wrap tape shall be as specified in Section 920.08.17 of the MSHA Standard Specifications (clean new burlap) or as follows: two layers of crinkled paper cemented together with bituminous material, 4-inch wide minimum, with stretch factor of 33 percent.

CONSTRUCTION METHODS

710-3.1 EXAMINATION. The Contractor shall examine areas to receive trees and shrubs for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

710-3.2 PREPARATION. The Contractor shall lay out individual tree and shrub locations and areas for multiple plantings in accordance with Section 710.03.02(a) of the MSHA Standard Specifications and as follows: stake locations, outline areas, adjust locations when requested, and obtain Engineer's acceptance of layout before planting. Make minor adjustments as may be required.

The Contractor shall prepare planting beds in accordance with Section 710.03.02(b) of the MSHA Standard Specifications.

710-3.3 PLANTING SOIL PREPARATION. The Contractor shall prepare planting soil in accordance with Section 710.03.02(c) of the MSHA Standard Specifications. Planting soil, planting soil mix, and soil mix backfill for planting are terms which are synonymous with one another, and may be used interchangeably.

Before mixing, clean topsoil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

Mix soil amendments and fertilizers with topsoil at rates indicated in the soil report. Delay mixing fertilizer if planting does not follow placing of planting soil within a few days.

710-3.4 EXCAVATION.

a. Pits and Trenches. The Contractor shall prepare pits and trenches in accordance with Section 710.03.02(d) of the MSHA Standard Specifications and as follows: excavate with vertical sides and with bottom of excavation slightly raised at center to assist drainage. Loosen hard subsoil in bottom of excavation.

b. Dispose of subsoil removed from landscape excavations. Do not mix with planting soil or use as backfill.

c. Obstructions. Notify Engineer if unexpected obstructions detrimental to trees or shrubs are encountered in excavations.

(1) Hardpan Layer. Drill 6-inch diameter holes into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

d. Drainage. Notify Engineer if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

710-3.5 PLANTING TREES AND SHRUBS. The Contractor shall perform all planting in accordance with Section 710.03.03 of the MSHA Standard Specifications. Set balled and burlapped stock plumb and in center of pit or trench with top of ball in relation to adjacent finish grades as indicated on the planting details.

a. Place stock on setting layer of compacted planting soil.

b. Remove burlap and wire baskets from tops of balls and partially from sides, but do not remove from under balls. Remove pallets, if any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.

c. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

Set container-grown stock plumb and in center of pit or trench with top of ball in relation to adjacent finish grades as indicated on the planting details.

a. Carefully remove containers so as not to damage root balls.

b. Place stock on setting layer of compacted planting soil.

c. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately 1/2 backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

Dish and tamp top of backfill to form a 3-inch high mound around the rim of the pit. Do not cover top of root ball with backfill.

710-3.6 PRUNING. The Contractor shall prune, thin, and shape trees and shrubs according to standard horticultural practice and as specified in Section 710.03.03(d) of the MSHA Standard Specifications. Prune trees to retain required height and spread. Unless otherwise directed by Engineer, do not cut tree leaders; remove only injured or dead branches from flowering trees. Prune shrubs to retain natural character. Shrub sizes indicated are size after pruning.

710-3.7 GUYING AND STAKING.

a. **Upright Staking and Guying.** Upright staking and guying shall not be required for trees and shrubs which are less than 5 feet in height. All other trees shall be staked and guyed as specified in Section 710.03.03(b) of the MSHA Standard Specifications and as follows. Use a minimum of 2 stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating balls or root masses. Support trees with 2 strands of guy wire encased in hose sections at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree. Use number of stakes as follows:

(1) Two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper. Use 3 stakes for trees less than 14 feet high and up to 4-inch caliper. Space stakes equally around trees.

(2) Attach flags to each guy wire, 30 inches above finish grade.

710-3.8 MULCHING. The Contractor shall mulch backfilled surfaces of pits, trenches, and other areas indicated in accordance with Section 710.03.03(c) of the MSHA Standard Specifications.

a. **Organic Mulch.** Apply the following average thickness of organic mulch and finish level with adjacent finish grades. Do not place mulch against trunks or stems.

(1) **Thickness:** 3 inches.

710-3.9 CLEANUP AND PROTECTION. During tree and shrub work, keep pavements clean and work area in an orderly condition. Protect trees and shrubs from damage due to landscape operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

710-3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS. The Contractor shall remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of it off the Owner's property.

METHOD OF MEASUREMENT

710-4.1 Trees and shrubs shall be measured at the contract unit price per each item, in accordance with Section 710.04.01 of the MSHA Standard Specifications.

710-4.2 All Shredded Hardwood Bark Mulch at all individual planting pits will be measured by the square yard. The measurement will be computed on the surface area of the specified thickness.

BASIS OF PAYMENT

710-5.1 Planting trees and shrubs will be paid for at the contract unit price for each plant. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work as specified and to the satisfaction of the Engineer.

710-5.2 All Shredded Hardwood Mulch at individual plant pits will be paid for at the contract unit price bid per square yard of material placed and accepted. The payment will be full compensation for all material, labor, equipment, tools, and incidentals necessary to complete the work as specified and to the satisfaction of the Engineer.

Payment will be made under:

Item 710.1 *Amelanchier canadensis*, 5 Gallon--per each

Item 710.2 *Aronia arbutifolia* "Brilliantissima," 3 Gallon--per each

Item 710.3 *Cephalanthus occidentalis*, 3 Gallon--per each

Item 710.4 *Ilex glabra*, 3 Gallon--per each

Item 710.5 *Lindera benzoin*, 3 Gallon--per each

Item 710.6 *Myrica pensylanica*, 2 Gallon--per each

Item 710.7 *Quercus borealis*, 2-Inch Caliper--per each

Item 710.8 *Rhus aromatica*, 2 Gallon--per each

Item 710.9 *Viburnum prunifolium*, 5 Gallon--per each

Item 710.10 *Viburnum dentatum*, 3 Gallon--per each

Item 710.11 Shredded Hardwood Mulch, 3-Inch Depth--per square yard

END OF ITEM 710

ITEM 711 PLANTING WETLAND VEGETATION

DESCRIPTION

711-1.1 This work shall consist of furnishing, planting, and fertilization of emergent wetland plants and grasses, as shown on the plans and/or as directed by the Engineer, and all planting operations necessary to complete the work as specified.

711-1.2 QUALITY ASSURANCE.

a. **Installer Qualifications.** The Contractor shall engage an experienced Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and who has a record of successful wetland vegetation establishment.

b. **Observation.** Engineer may observe wetland vegetation either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size and quality. Engineer retains right to observe wetland vegetation further for size and condition of root systems, insects, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. The Contractor shall immediately remove all rejected wetland vegetation from the site.

711-1.3 WARRANTY.

a. **General Warranty.** The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

b. **Special Warranty.** The Contractor shall warrant living wetland vegetation for a period of one year after date of Substantial Completion, against defects including death and unsatisfactory growth, as specified under Section 710.03.06 of the MSHA Standard Specifications.

c. The Contractor shall remove and replace wetland vegetation that are in an unhealthy condition at the end of the warranty period.

711-1.4 MAINTENANCE. The Contractor shall maintain wetland vegetation by watering, weeding, and fertilizing, as required to establish healthy, viable plantings in strict accordance with Section 710.03.06(b) of the MSHA Standard Specifications. Spray as required to keep wetland vegetation free of insects and disease. Remove all competing Common Reed (*Phragmites*) and Cattail (*Typha*) plants which sprout in the wetland mitigation area in strict accordance with Section 710.03.06(b)(2) "Weed Control" of the MSHA Standard Specifications, and these Specifications.

MATERIALS

711-2.1 WETLAND PLANTS. Wetland plants, as shown on the plans shall conform to Section 920.07 of the MSHA Standard Specifications with the following additions:

a. Some of the plant species required are normally unavailable from standard landscape nursery sources. The Contractor shall make arrangements with competent wetlands restoration specialists or wetland nurseries to insure a supply of the required material. Substitutions of plant species shall not be allowed.

b. The Contractor and/or his subcontractor should be aware of the site design conditions and should take all prudent steps to insure that the plant material specified on the plans is acclimated to wetland conditions prior to delivery to the job site. ALL PLANT MATERIAL TO BE INSTALLED IN THE LOW MARSH ZONE (*PELTANDRA, PONTEDERIA*, AND *SCIRPUS*) SHALL HAVE BEEN ACCLIMATED IN THE NURSERY IN BRACKISH WATER CONDITIONS OF 2 TO 3 PARTS PER THOUSAND SALT FOR A MINIMUM OF ONE WEEK PRIOR TO DELIVERY TO THE SITE.

c. The emergent plant material specified on the plans shall have been propagated, germinated, or otherwise developed from field collected specimens growing in the mid-Atlantic region.

711-2.2 FERTILIZER.

a. Emergent wetland plants (including *Peltandra, Pontederia*, and *Scirpus*).

(1) Plant fertilizer shall be a commercially-available granular product, coated with a plastic resin film for three to four month slow release, with a nutrient analysis of 19-6-12.

b. Shoreline wetland plants (including *Panicum*).

(1) Plant fertilizer shall be a commercially-available granular product, coated with a plastic resin film for six to nine month slow release, with a nutrient analysis of 18-6-12.

CONSTRUCTION METHODS

711-3.1 GENERAL. The sites of the constructed shallow marshes shall be inspected, planted, and fertilized in conformance with Section 711.03 of the MSHA Standard Specifications with the following additions:

a. **Site Inspection.** The Engineer shall inspect the planting area to insure the proper elevation and grade for successful plant establishment. If the grades and elevations are not acceptable, it will be the responsibility of the Contractor or subcontractor performing the grading operation to prepare the planting area in accordance with the plans and to the satisfaction of the Engineer.

b. **Planting Season.** The planting season extends from April 1 to September 30. The Contractor shall perform all plantings during the planting season. Requests for planting out-of-season will not be considered and planting out-of-season will not be allowed.

c. **Plant Material.**

(1) Rootstock of wetland plant material shall be kept moist during transport from the source to the job site and until planted.

(2) Emergent wetland bulbs, tubers, and peat potted grasses, rushes and sedges shall be planted in existing soil with each planting pit excavated to a size sufficient to contain the entire rootstock without cramping.

Fertilizer for emergent wetland bulbs, tubers, and peat potted grasses, rushes, and sedges shall be 1 oz. per plant or peat pot.

Bareroot or container stock shall be positioned in the planting hole. Backfill halfway up the root ball. Place fertilizer beside the root ball approximately 1-inch from the root tips. Do not place fertilizer in the bottom of the hole. Complete backfill, tamp, and water.

Mulching and bed edging are not required.

Care and replacement of planting shall be per Sections 711.03.05 and 710.03.06 of the MSHA Standard Specifications with the following additions:

a. Monthly site visits (a total of six) shall be conducted between April 1 and September 30, following plant installation. During the monthly maintenance inspections, the Contractor shall:

(1) Replant all transplants that have died or are otherwise missing.

(2) Remove all litter and debris deposits that may impede a successful establishment.

(3) Control infestations of *Phragmites communis (australis)* (Common Reed) and *Typha angustifolia* (Narrowleaf cattail) through drip application or sponge application of a

glyphosate herbicide approved for use in wetlands in September following initial installation and again in the following September, at the end of the contract period.

METHOD OF MEASUREMENT

711-4.1 Wetland plant material shall be measured at the contract unit price per each item in accordance with Section 711.04.01 of the MSHA Standard Specifications.

711-4.2 Goose enclosure fence shall be measured at the contract unit price per linear foot of fence installed in accordance with the drawings and specifications and to the satisfaction of the Engineer.

711-4.3 Monthly site visits, litter and debris removal, and herbicide control of invasive plants shall not be measured, but shall be incidental to the cost of installing the wetland vegetation.

BASIS OF PAYMENT

711-5.1 Payment for planting wetland vegetation shall be made at the contract unit price for each plant. Fertilizer and all other soil amendments shall be incidental to the cost of the plant material. The price will include complete installation including all materials, tools, labor, and other items necessary to complete the work as specified and to the satisfaction of the Engineer.

711-5.2 Payment for goose enclosure fence shall be made at the contract unit price per linear foot of fence. This price shall be full compensation for furnishing all materials and for all preparation, erection, and installation, and for all labor, equipment, tools, and incidentals necessary to complete the work.

711-5.3 Payment for monthly site visits, litter and debris removal, and herbicide control of invasive plants shall not be made separately but shall be incidental to the cost of the wetland plantings.

Payment will be made under:

Item 711.1 *Panicum virgatum*, 1¾-Inch Peat Pot--per each

Item 711.2 *Peltandra virginica*, 1 Quart Pot--per each

Item 711.3 *Pontederia cordata*, 1 Quart Pot--per each

Item 711.4 *Scirpus pungens*, 1¾-Inch Peat Pot--per each

Item 711.5 *Scirpus robustus*, 1 Quart Pot--per each

Item 711.6 *Scirpus 3validus*, 1 Quart Pot--per each

Item 711.7 Goose Enclosure Fence--per linear foot

END OF ITEM 711

ADDENDUM NO. 3

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

ADDENDUM TO PLANS AND SPECIFICATIONS

CONTRACT NO. MAA-CO-97-019
MIDFIELD COMPLEX CONSTRUCTION SITE DEVELOPMENT
AT MARTIN STATE AIRPORT

ACKNOWLEDGEMENT OF RECEIPT

The undersigned acknowledges that Addendum No. 3 to Maryland Aviation Administration Plans and Specifications for Contract No. MAA-CO-97-019 has been received by the undersigned and will be incorporated in all copies of said Plans and Specifications in the possession of the undersigned.

It is understood that all proposals submitted in response to MAA-CO-97-019 will be presumed to be based upon full knowledge of the contents of Addendum No. 3.

_____
(Company Name)

By:_____
(Signature-Authorized Official)

_____
(Title)

_____
(Date)

IMPORTANT

NOTE: PLEASE SIGN AND DATE THE "ACKNOWLEDGEMENT OF RECEIPT" AND RETURN VIA FACSIMILE (410-859-5440) IMMEDIATELY.

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING & ENGINEERING
TERMINAL BUILDING, LOWER LEVEL, PIER A
P. O. BOX 8766
BALTIMORE/WASHINGTON INTERNATIONAL AIRPORT MD 21240

Midfield Complex Construction Site Development at Martin State Airport

Contract No. MAA-CO-97-019

ADDENDUM NO. 3

IMPORTANT: Bidders must acknowledge receipt of this Addendum on the Bid Proposal, Section 5, Page BF.18, stating the Addendum Number.

REVISED BID DUE DATE: THURSDAY, MAY 28, 1998, 2:00 P.M.

REVISIONS, ADDITIONS AND DELETIONS TO CONTRACT DOCUMENTS:

1. Clarification: Addendum No. 2 (Wetlands Mitigation) was issued with incorrect contract number on face sheet and plan sheets. Correct contract number is as shown above.

2. Part V, Interim Standard Provisions: Add Section **SP-5.06, Authority of the Procurement Officer:**

SP-5.06 Authority of the Procurement Office

A. Project Manager and Superintendent

The Contractor shall submit for the approval of the Procurement Officer the name and qualifications of the individuals intended to function as the Project Manager and the Superintendent. In the event the Procurement Officer does not approve of an individual offered by the Contractor, the Contractor shall offer a suitable substitute. At any time during the course of the work, if in the judgment of the Procurement Officer, the Project Manager and/or the Superintendent are deemed unacceptable, upon written notification from the Procurement Officer, the Contractor shall promptly offer a replacement for the Procurement Officer's approval. Any cost arising from the action of the Procurement Officer relative to **SP-5.06.A.** shall be borne entirely by the Contractor.

	AS BID				AS BUILT
	BASE PROJECT	ADD ALT. 1	ADD ALT. 2	ADD ALT. 3	TOTAL
	1	0	0	0	
	1	0	0	0	
	2	0	0	0	
	1	0	0	0	
	7	6	12	18	
	1	0	0	0	
	9	0	0	0	
	2	0	0	0	
	1	0	0	0	
	0	3	9	12	
	7	0	0	0	
	1	1	1	2	
	50	3,000	7,900	10,900	
	11,250	31,700	16,300	25,000	
	200	200	200	400	
	7,500	0	0	0	
	0	8,000	8,300	16,300	
	2,830	0	0	0	
	0	12,700	12,950	25,652	
	0	7,900	8,100	16,000	
	2,630	12,450	12,700	25,150	
	90	580	590	1,170	
	0	2,010	1,850	3,860	
	365	1,270	760	2,030	
	365	1,270	760	2,030	
	105	1,000	800	1,800	
	0	250	1,610	1,860	
	1,580	1,650	390	2,040	
	20	0	0	0	
	0	50	50	100	
	840	1,680	2,220	3,900	
	0	100	100	200	
	70	187	245	396	
	0	254	354	374	
	110	570	360	698	
	0	420	0	418	
	0	478	477	478	
	61	367	275	405	
	326	941	651	941	
	0	186	186	188	
	0	3	10	10	
	80	80	80	80	
	0	1,308	1,331	2,639	
	0	500	483	979	
	0	48	390	438	
	0	340	175	523	
	3	3	3	4	
	0	16	9	19	
	1	6	11	12	
	4	1	0	1	
	1	0	0	0	
	0	3	0	3	
	17	58	58	66	
	55	115	115	115	
	40	200	200	200	
	90	75	75	75	
	0	1,150	1,150	2,300	
	0	1,100	1,100	2,200	
	0	26	26	52	
	0	4	4	8	
	0	1,000	1,000	2,000	
	0	13	8	21	
	0	2	5	7	
	0	2	1	3	
	0	1	1	2	
	0	0	2	2	
	0	0	0	0	
	15	15	15	30	
	100	60	60	60	

SEQ.	CONTRACT ITEM NO.	DESCRIPTION	UNIT	AS BID				AS BUILT
				BASE PROJECT	ADD ALT. 1	ADD ALT. 2	ADD ALT. 3	TOTAL
138	T-905.1	TOPSOILING	CY	2,000	750	750	750	
139	T-905.2	EROSION CONTROL NETTING	SY	8200	5100	5100	5100	
140	T-908.1	MULCHING	ACRE	15	15	15	30	

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

PROJECT NO.
MAA-CO-97-019

SHEET TITLE
SUMMARY OF ESTIMATED QUANTITIES

SCALE
NO SCALE

DATE
MARCH 31, 1998

SHEET NO.
G-04

SEQ.	CONTRACT ITEM NO.	DESCRIPTION	UNIT	AS BID				AS BUILT
				BASE PROJECT	ADD ALT. 1	ADD ALT. 2	ADD ALT. 3	TOTAL
1	100.1	DEMOLISH/REMOVE EXISTING CONCRETE SLAB	SY	7,230	0	0	0	
2	100.2	REMOVE EXISTING CHAIN LINK FENCE	LF	2,340	0	0	0	
3	100.3	REMOVE EXISTING UNDERDRAIN PIPE	LF	0	200	200	400	
4	100.4	DEMOLISH/REMOVE EXISTING UTILITIES STRUCTURES	EA	5	1	0	1	
5	100.5	REMOVE EXISTING DUCT BANK	LF	60	0	0	0	
6	100.6	REMOVE EXISTING CONDUIT AND CABLE	LF	500	400	400	800	
7	100.7	DEMOLISH/REMOVE EXISTING BUILDINGS	LS	1	0	0	0	
8	100.8	REMOVE EXISTING PIPE SMALLER THAN 12" DIAMETER	LF	1,200	0	0	0	
9	100.9	REMOVE EXISTING PIPE 12" TO 24" DIAMETER	LF	415	0	0	0	
10	100.10	REMOVE EXISTING PIPE 54" DIAMETER	LF	310	0	0	0	
11	101.1	CLEARING AND GRUBBING	ACRE	12	0	0	0	
12	101.2	CLEARING ISOLATED TREES TYPE I	EA	50	0	0	0	
13								
14	108.1	MOBILIZATION/DEMOBILIZATION	LS	1	1	1	1	
15	108.2	MISCELLANEOUS CONSTRUCTION ITEMS ALLOWANCE	LS	1	1	1	1	
16	109.1	TEMPORARY CONSTRUCTION ITEMS	LS	1	1	1	1	
17	206.1	PAVEMENT REMOVAL	SY	3,735	210	420	630	
18	308.1	STABILIZED CONSTRUCTION ENTRANCE	SY	160	70	70	140	
19	308.2	SILT FENCE	LF	13,000	4,000	3,400	7,400	
20	308.3	SUPER SILT FENCE	LF	1,000	960	640	1,600	
21	308.4	STONE CHECK DAM	EA	6	0	0	0	
22	308.5	REMOVABLE PUMPING STATION	EA	1	1	1	1	
23	308.6	SEDIMENT BASIN RISER DISCHARGE STRUCTURE	LS	1	1	1	1	
24	308.7	CLASS I RIP RAP SPILLWAY PROTECTION	SY	50	50	50	50	
25	308.8	SUMP PIT	EA	4	6	6	6	
26	308.9	PORTABLE SEDIMENT TANK	LS	1	0	0	0	
27	308.10	AT-GRADE INLET PROTECTION	EA	4	26	8	26	
28	308.11	CURB INLET PROTECTION	EA	2	1	0	1	
29	308.12	TEMPORARY SEEDING AND MULCHING	ACRE	4	12	16	25	
30	427.1	OIL/WATER SEPARATOR	EA	0	1	1	2	
31	813.1	ROADWAY SIGNS	SF	24	20	15	30	
32	1000.1	PRE-ENGINEERED METAL BUILDING	LS	1	0	0	0	
33	1200.1	WATER TANK	LS	1	0	0	0	
34	1300.1	WATER PIPE (4" DIAMETER)	LF	205	0	0	0	
35	1300.2	WATER PIPE (8" DIAMETER)	LF	3,620	0	0	0	
36	1300.3	WATER PIPE (14" DIAMETER)	LF	3,825	0	0	0	
37	1300.4	FIRE HYDRANT	EA	1	0	0	0	
38	1300.5	SANITARY SEWER PIPE (1-1/4" DIAMETER)	LF	160	0	0	0	
39	1300.6	SANITARY SEWER PIPE (4" DIAMETER)	LF	2,075	0	0	0	
40	1300.7	SANITARY SEWER PIPE (6" DIAMETER)	LF	695	0	0	0	
41	1300.8	SANITARY SEWER PIPE (8" DIAMETER)	LF	3,975	0	0	0	
42	1300.9.1	SANITARY SEWER PUMP STATION (100 GPM)	EA	1	0	0	0	
42A	1300.9.2	SANITARY SEWER PUMP STATION (130 GPM)	EA	2	0	0	0	
42B	1300.9.3	SANITARY SEWER PUMP STATION (225 GPM)	EA	1	0	0	0	
43	1300.10	SANITARY SEWER MANHOLE	EA	17	0	0	0	
44	1300.11	SANITARY SEWER AIR RELEASE VALVE AND VAULT	EA	4	0	0	0	
45	1300.12	WILSON POINT ROAD SANITARY SEWER CROSSING	LS	1	0	0	0	
46	2080.1	ASBESTOS REMOVAL	LS	1	0	0	0	
47	15000.1	PUMPHOUSE EQUIPMENT, PIPE, AND FITTINGS	LS	1	0	0	0	
48	16000.1	UTILITY COST ALLOWANCE	LS	1	0	0	0	
49	16010.1	BASIC ELECTRICAL REQUIREMENTS	LS	1	0	0	0	
50	16050.1	BASIC ELECTRICAL MATERIALS AND METHODS	LS	1	0	0	0	
51	16100.1	RACEWAYS, BOXES, AND CABINETS	LS	1	0	0	0	
52	16110.1	ELECTRICAL HANDHOLE	LS	1	0	0	0	
53	16110.2	ELECTRICAL MANHOLE	EA	46	3	5	8	
54	16110.3	POLE FOUNDATION IN GRASSY AREA	EA	14	0	0	0	
55	16110.4	POLE FOUNDATION IN PAVED AREA	EA	7	0	5	5	
56	16110.5	4W-6" CONCRETE ENCASED DUCT	EA	0	3	3	6	
57	16110.6	4W-4" CONCRETE ENCASED DUCT	LF	1,600	0	0	0	
58	16110.7	4W-3" CONCRETE ENCASED DUCT	LF	3,100	175	175	350	
59	16110.8	2W-6" CONCRETE ENCASED DUCT	LF	1,500	0	0	0	
60	16110.9	2W-4" CONCRETE ENCASED DUCT	LF	1,400	0	0	0	
61	16110.10	2W-3" CONCRETE ENCASED DUCT	LF	360	0	0	0	
62	16110.11	2W-2" CONCRETE ENCASED DUCT	LF	5,500	0	0	0	
63	16110.12	1W-4" CONCRETE ENCASED DUCT	LF	2,700	0	250	250	
64	16110.13	1W-2" CONCRETE ENCASED DUCT	LF	0	0	0	0	
65	16110.14	ELECTRICAL EQUIPMENT PAD	LF	1,900	800	700	1500	
66	16110.15	ELECTRICAL VAULT	EA	1	2	1	3	
67	16120.1	WIRES AND CABLES	EA	1	0	0	0	
68	16141.1	WIRING DEVICES	LS	1	1	1	2	
69	16170.1	MOTOR AND CIRCUIT DISCONNECTS	LS	1	0	0	0	
70	16195.1	LABELING AND IDENTIFICATION	LS	1	0	0	0	
71	16321.1	POLE MOUNT TRANSFORMER	LS	1	0	0	0	
72	16470.1	POWER DISTRIBUTION EQUIPMENT	LS	1	0	0	0	
73	16510.1	POLE MOUNT LUMINAIRE	LS	1	0	0	0	
74	16510.2	EXTERIOR WALL LUMINAIRE	EA	46	3	5	8	
75	16510.3	INTERIOR FLUORESCENT LUMINAIRE	EA	14	0	0	0	
76	16510.4	EMERGENCY LIGHTING UNIT	EA	7	0	5	5	
77	16510.5	LIGHTED EXIT SIGN	EA	0	3	3	6	
78	16510.6	3.5 EPA LIGHT POLE	LF	1,600	0	0	0	
79	16510.7	10 EPA LIGHT POLE	LF	3,100	175	175	350	
80	16900.1	GENERAL INSTRUMENTATION	LF	1,500	0	0	0	
81	P-152.1	STRIPPING	LF	1,400	0	0	0	
82	P-152.2	UNCLASSIFIED EXCAVATION	LF	360	0	0	0	
83	P-152.3	UNSUITABLE EXCAVATION	LF	5,500	0	0	0	
84	P-152.4	REMOVE EXISTING SOIL STOCKPILE	LF	2,700	0	250	250	
85	P-209.1	CRUSHED AGGREGATE BASE COURSE (12" DEPTH)	LF	0	0	0	0	
86	P-209.2	CRUSHED AGGREGATE BASE COURSE (14" DEPTH)	LF	1,900	800	700	1500	
87	P-209.3	CRUSHED AGGREGATE BASE COURSE (15" DEPTH)	EA	1	2	1	3	
88	P-304.1	CEMENT-TREATED BASE COURSE (6" DEPTH)	EA	1	0	0	0	
89	P-304.2	CEMENT-TREATED BASE COURSE (8" DEPTH)	LS	1	1	1	2	
90	P-304.3	PORTLAND CEMENT	LS	1	0	0	0	
91	P-401.1	AIRFIELD BITUMINOUS SURFACE COURSE						
92	P-401.2	MSHA HOT MIX ASPHALT SURFACE COURSE (SC)						
93	P-401.3	MSHA HOT MIX ASPHALT BASE COURSE (BC)						
94	P-603.1	BITUMINOUS TACK COAT						
95	P-610.1	CONCRETE CURB						
96	P-610.2	CONCRETE CURB AND GUTTER						
97	P-610.3	CONCRETE UTILITY ENCASEMENT						
98	P-610.4	PORTLAND CEMENT CONCRETE PAVEMENT						
99	P-620.1	PAVEMENT MARKING						
100	P-620.2	PAVEMENT MARKING REMOVAL						
101	D-701.1	12-INCH RCP CLASS IV						
102	D-701.2	15-INCH RCP CLASS IV						
103	D-701.3	18-INCH RCP CLASS IV						
104	D-701.4	24-INCH RCP CLASS IV						
105	D-701.5	27-INCH RCP CLASS A-25						
106	D-701.6	30-INCH RCP CLASS A-25						
107	D-701.7	36-INCH RCP CLASS A-25						
108	D-701.8	42-INCH RCP CLASS A-25						
109	D-701.9	CONCRETE FOR PIPE CRADLES						
110	D-701.10	SEEPAGE PIPE						
111	D-705.1	GEOCOMPOSITE UNDERDRAIN						
112	D-705.2	4-INCH POLYETHYLENE PIPE						
113	D-705.3	4-INCH PERFORATED POLYETHYLENE PIPE						
114	D-705.4	6-INCH POLYETHYLENE PIPE						
115	D-751.1	STORM DRAINAGE MANHOLE						
116	D-751-2	STORM DRAINAGE INLET TYPE 1						
117	D-751-3	STORM DRAINAGE INLET TYPE 2						
118	D-751-4	STORM DRAINAGE INLET TYPE 3						
119	D-751-5	STORM DRAINAGE INLET TYPE 4						
120	D-751.6	ADJUST STRUCTURES TO GRADE						
121	D-752.1	SEDIMENTATION CHAMBER						
122	D-752.2	ENDWALL						
123	D-752.3	CLASS I RIP-RAP						
124	D-752.4	GROUTED RIP-RAP						
125	L-108.1	NO. 8 AWG 5 KV UNDERGROUND CABLE INSTALLED IN DUCT OR CONDUIT						
126	L-108.2	NO. 8 AWG BARE COUNTERPOISE WIRE INSTALLED IN TRENCH						
127	L-108.3	GROUND ROD						
128	L-108.4	CONCRETE CABLE MARKER						
129	L-110-5	2" PVC SCHED. 80 CONDUIT						
130	L-125.1	MEDIUM INTENSITY TAXIWAY LIGHT BASE MOUNTED						
131	L-125.2	RELOCATE EXISTING TAXIWAY EDGE LIGHT						
132	L-125.3	TWO-PANEL TAXIWAY GUIDANCE SIGN						
133	L-125.4	THREE-PANEL TAXIWAY GUIDANCE SIGN						
134	L-125.5	MODIFY EXISTING TAXIWAY GUIDANCE SIGN						
135	L-125.6	REPLACE EXISTING TAXIWAY GUIDANCE SIGN PANEL						
136	T-901.1	PERMANENT SEEDING						
137	T-901.2	WETLANDS VEGETATION						

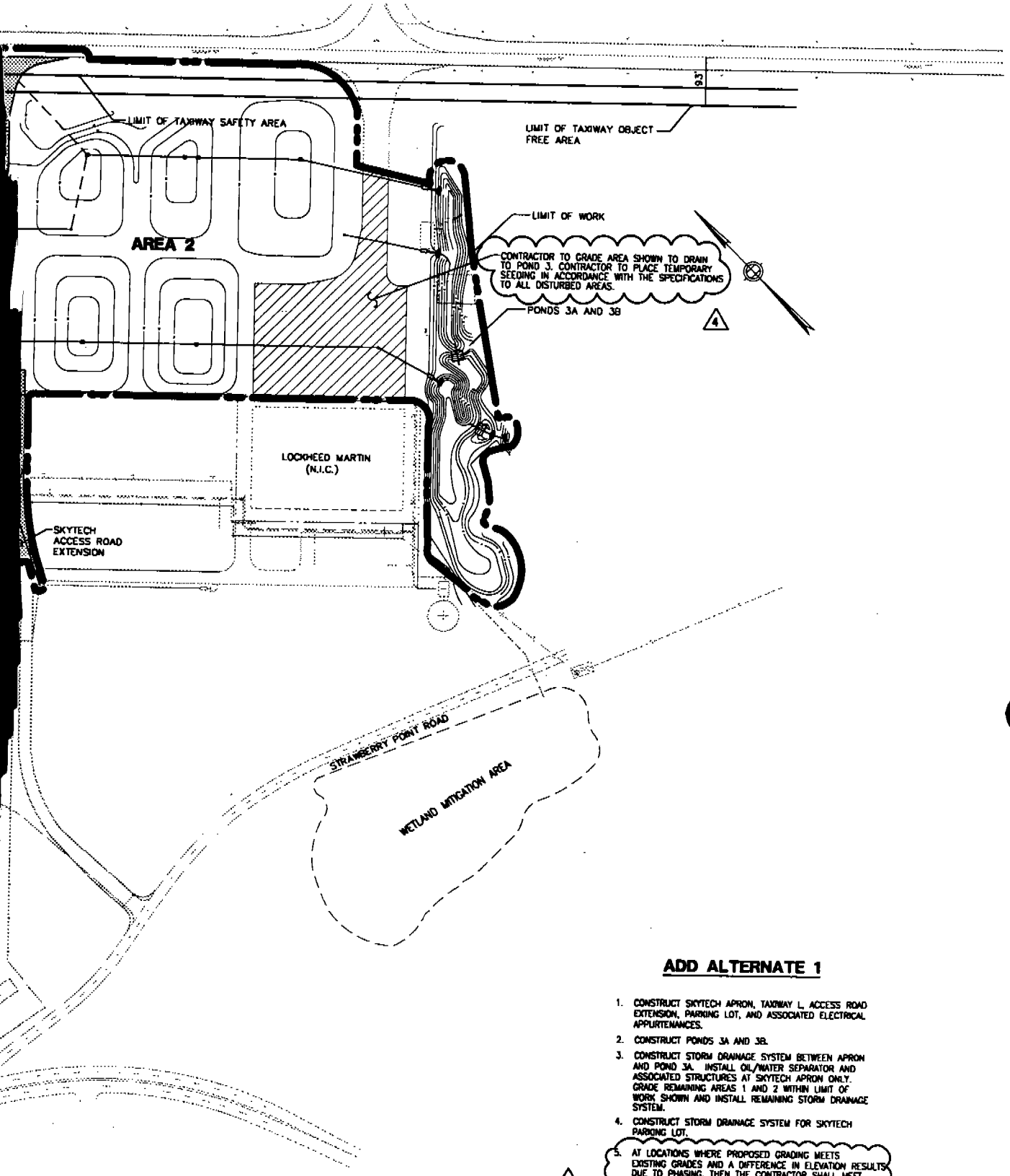
TAMS

TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1
2	5/14/98	ADDENDUM 4



ADD ALTERNATE 1

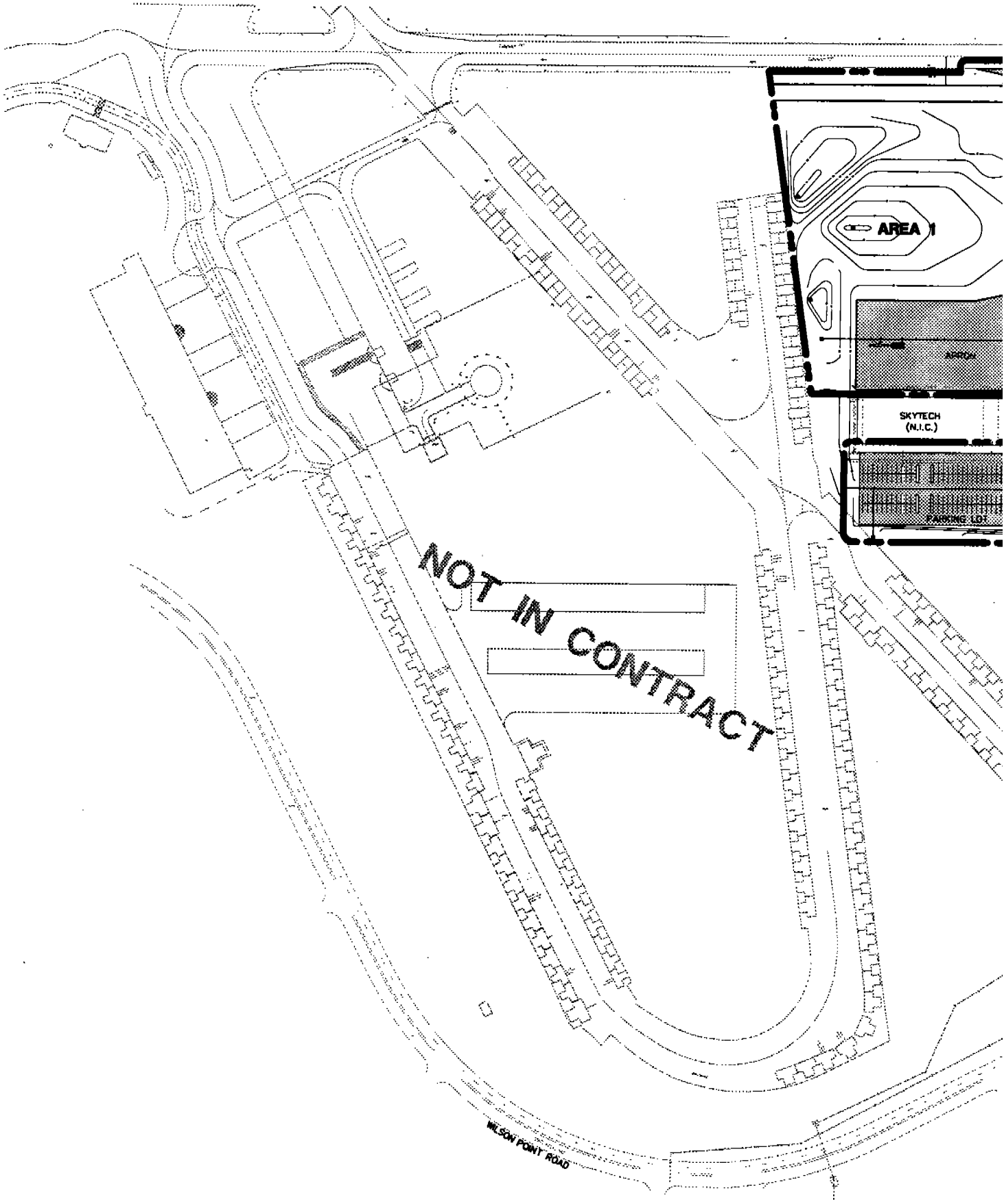
1. CONSTRUCT SKYTECH APRON, TAXIWAY L, ACCESS ROAD EXTENSION, PARKING LOT, AND ASSOCIATED ELECTRICAL APPURTENANCES.
2. CONSTRUCT PONDS 3A AND 3B.
3. CONSTRUCT STORM DRAINAGE SYSTEM BETWEEN APRON AND POND 3A. INSTALL OIL/WATER SEPARATOR AND ASSOCIATED STRUCTURES AT SKYTECH APRON ONLY. GRADE REMAINING AREAS 1 AND 2 WITHIN LIMIT OF WORK SHOWN AND INSTALL REMAINING STORM DRAINAGE SYSTEM.
4. CONSTRUCT STORM DRAINAGE SYSTEM FOR SKYTECH PARKING LOT.
5. AT LOCATIONS WHERE PROPOSED GRADING MEETS EXISTING GRADES AND A DIFFERENCE IN ELEVATION RESULTS DUE TO PHASING, THEN THE CONTRACTOR SHALL MEET THE EXISTING GRADE WITH A 2:1 SLOPE (MAX.)

4

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
PROJECT NO.	MAA-CO-97-019
SHEET TITLE	ADD ALTERNATE 1
SHEET NO.	G-09
SCALE	NO SCALE
DATE	MARCH 31, 1998



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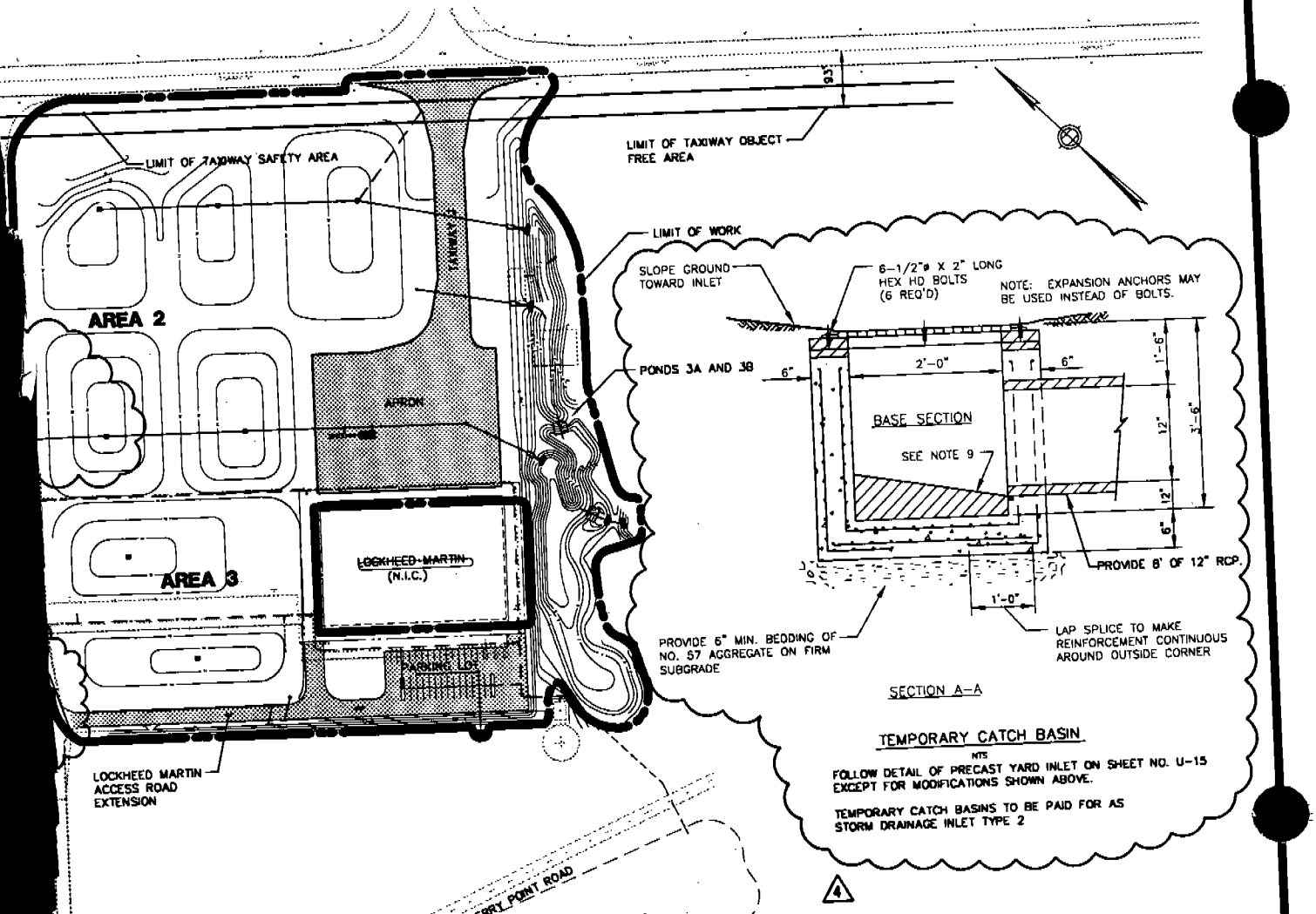
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1
4	5/14/98	ADDENDUM 4

MA
STATE



SECTION A-A

TEMPORARY CATCH BASIN

NTS

FOLLOW DETAIL OF PRECAST YARD INLET ON SHEET NO. U-15 EXCEPT FOR MODIFICATIONS SHOWN ABOVE.

TEMPORARY CATCH BASINS TO BE PAID FOR AS STORM DRAINAGE INLET TYPE 2

4

ADD ALTERNATE 2

1. CONSTRUCT LOCKHEED-MARTIN APRON, TAXIWAY J, ACCESS ROAD EXTENSION, PARKING LOT, AND ASSOCIATED ELECTRICAL APPURTENANCES.
2. CONSTRUCT PONDS 3A AND 3B.
3. CONSTRUCT STORM DRAINAGE SYSTEM FOR APRON AND POND 3A. INSTALL OIL/WATER SEPARATOR AND ASSOCIATED STRUCTURES AT LOCKHEED-MARTIN APRON ONLY. GRADE REMAINING AREAS 2 AND 3 WITHIN LIMIT OF WORK SHOWN AND INSTALL REMAINING STORM DRAINAGE SYSTEM.
4. CONSTRUCT STORM DRAINAGE SYSTEM FOR LOCKHEED-MARTIN PARKING LOT.
5. AT LOCATIONS WHERE PROPOSED GRADING MEETS EXISTING GRADE AND A DIFFERENCE IN ELEVATION RESULTS DUE TO PHASING, THEN THE CONTRACTOR SHALL MEET THE EXISTING GRADE WITH A 2:1 SLOPE (MAX.).

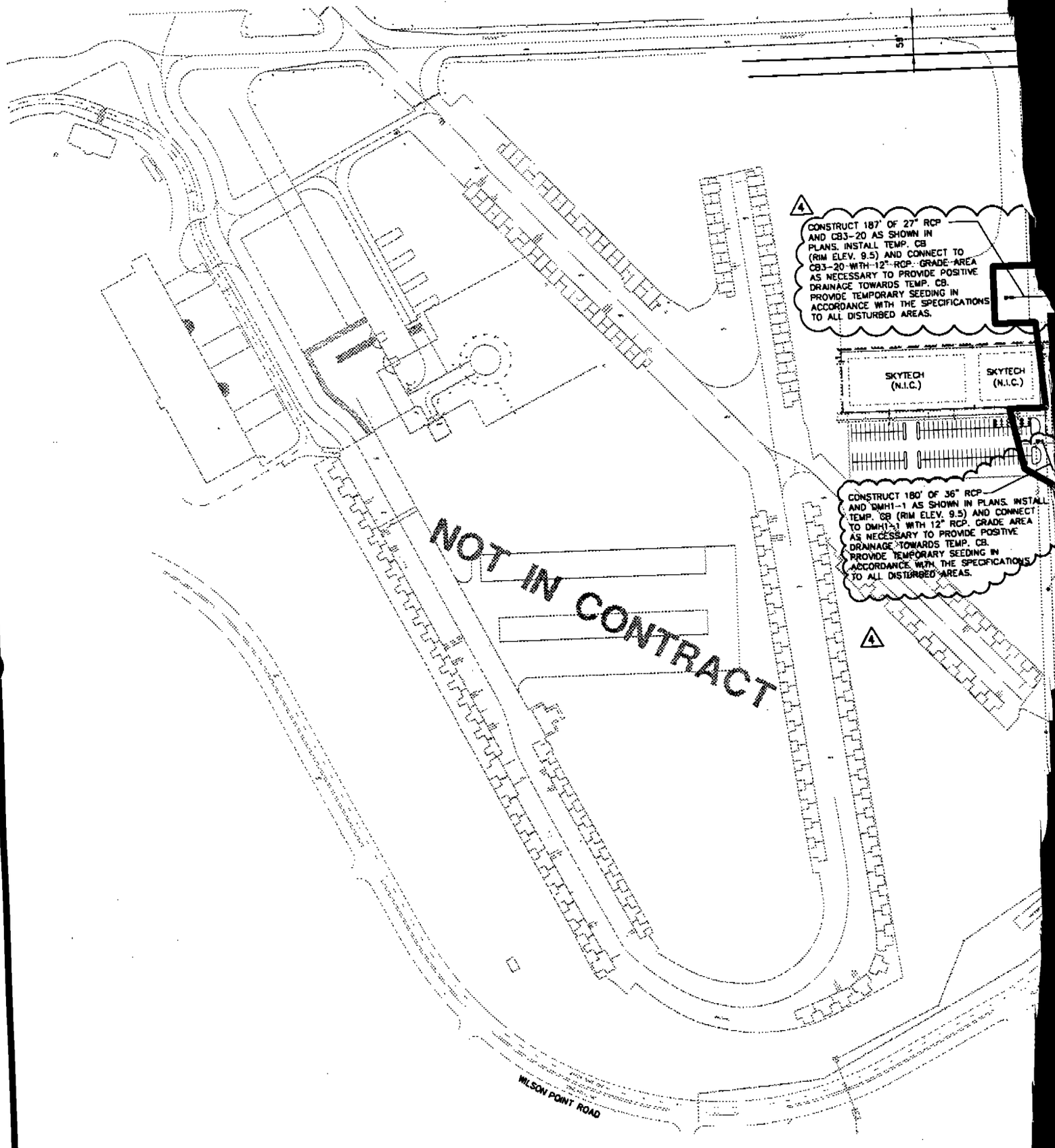
4

RTIN AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: ADD ALTERNATE 2	SHEET NO.: G-10
SCALE: NO SCALE	DATE: MARCH 31, 1998



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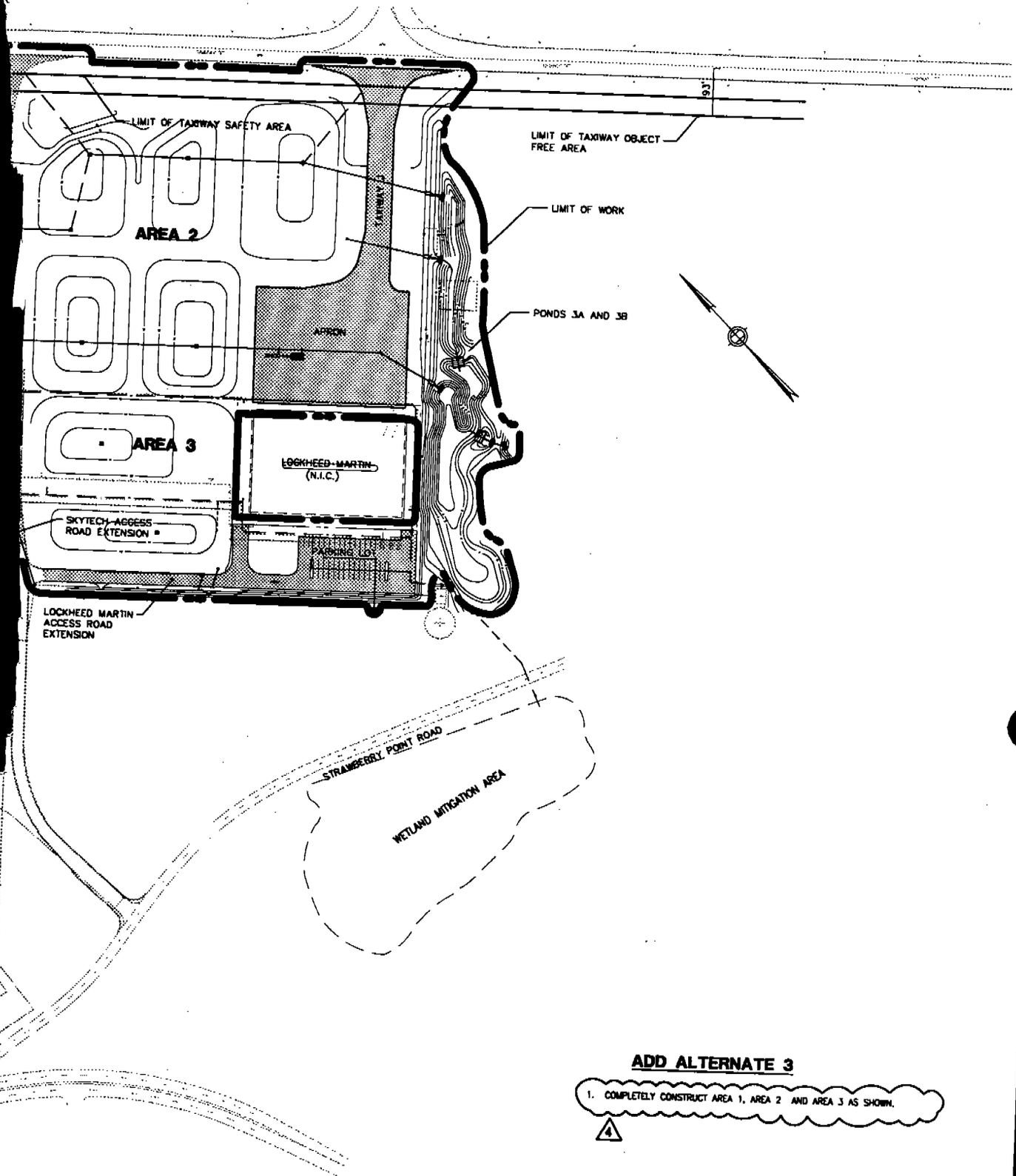
DRAWN	GPP/PW
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1, REMOVED COUNTOURS AND POND
4	5/14/98	ADDENDUM 4

STATE



ADD ALTERNATE 3

1. COMPLETELY CONSTRUCT AREA 1, AREA 2 AND AREA 3 AS SHOWN.

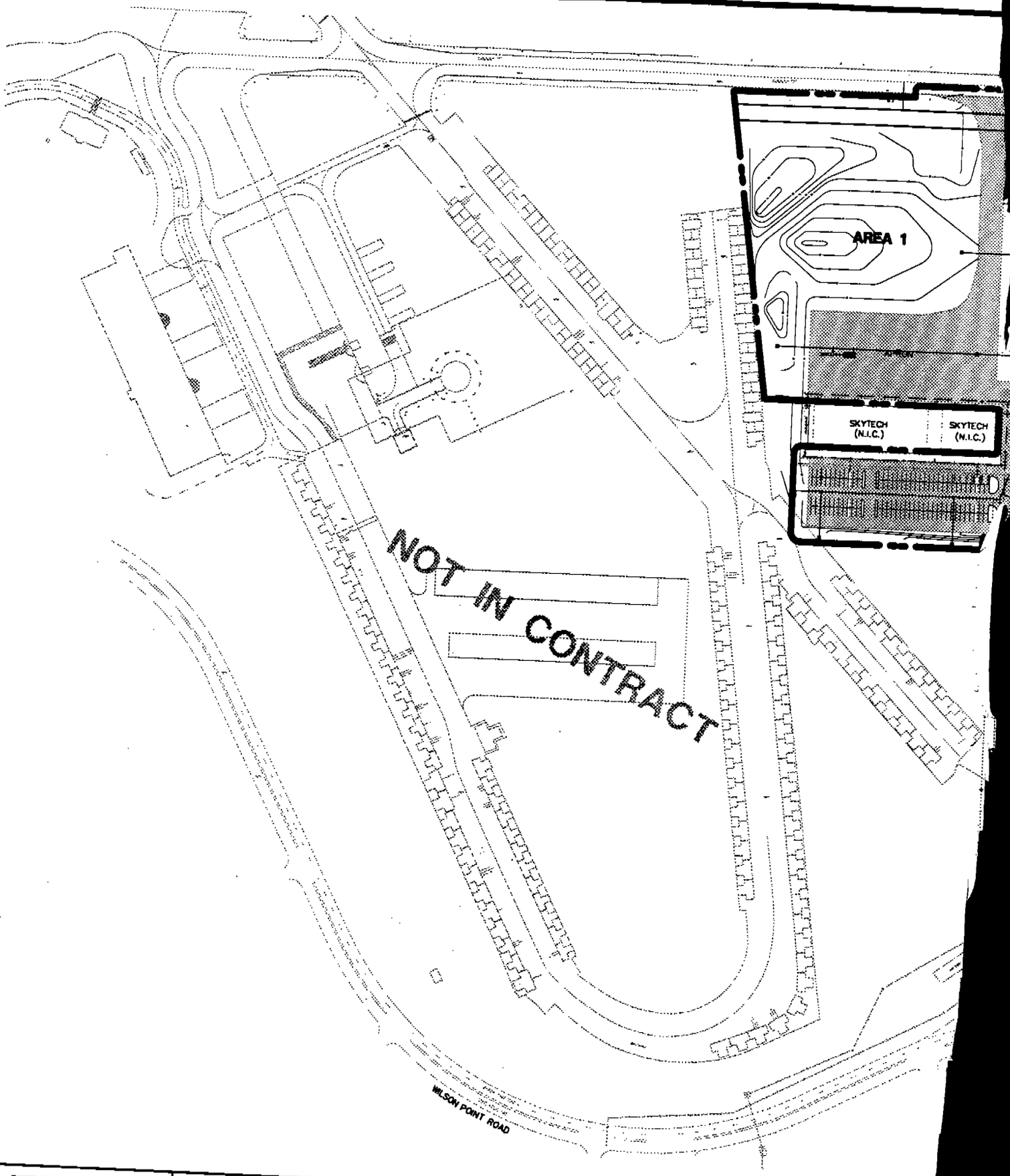
4

RTIN AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE	ADD ALTERNATE 3
SCALE	NO SCALE
DATE	MARCH 31, 1998
PROJECT NO.	MAA-CO-97-019
SHEET NO.	G-11



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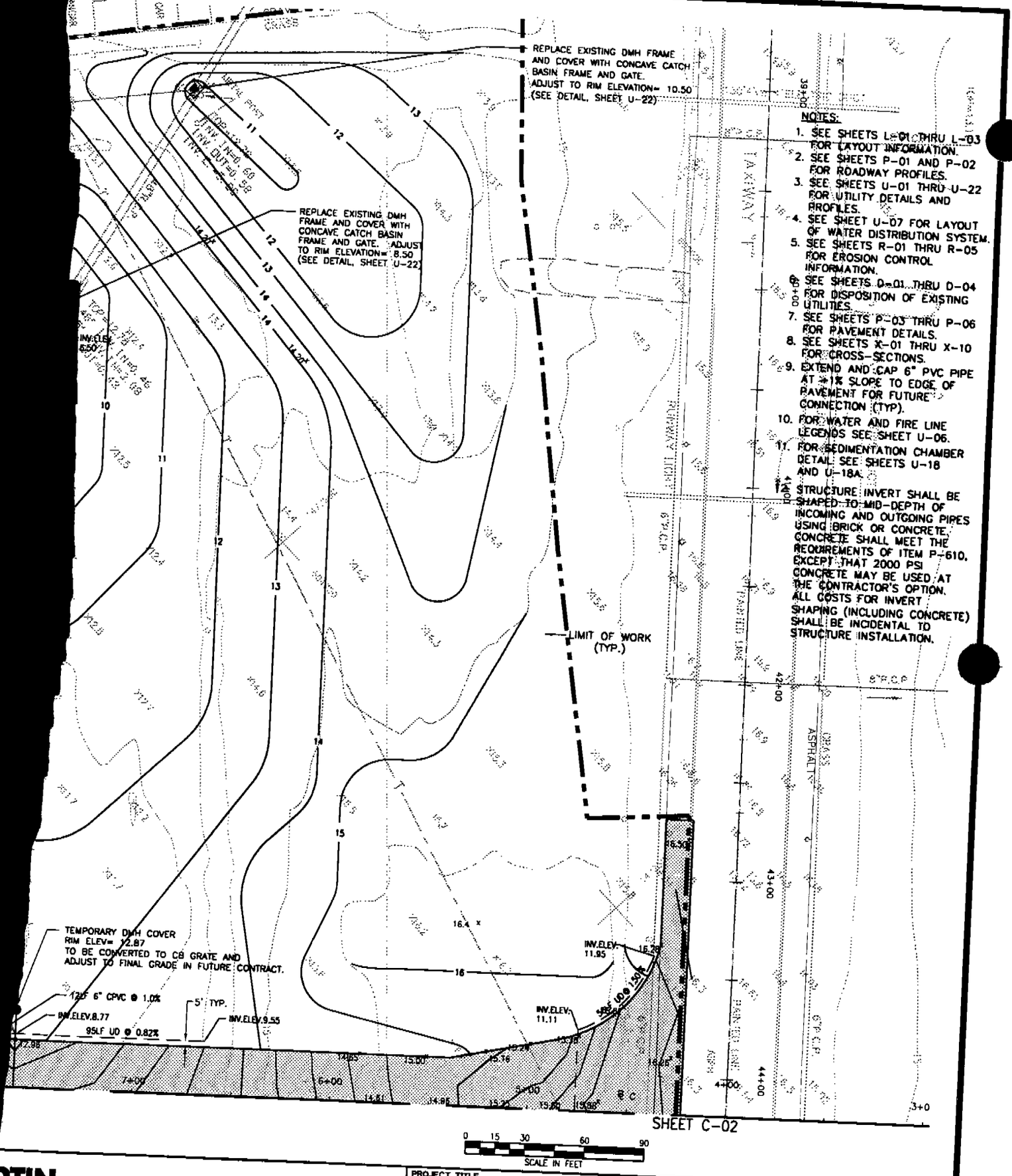
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	4/27/98	ADDENDUM 1
4	5/14/98	ADDENDUM 4

MA
STATE



NOTES:

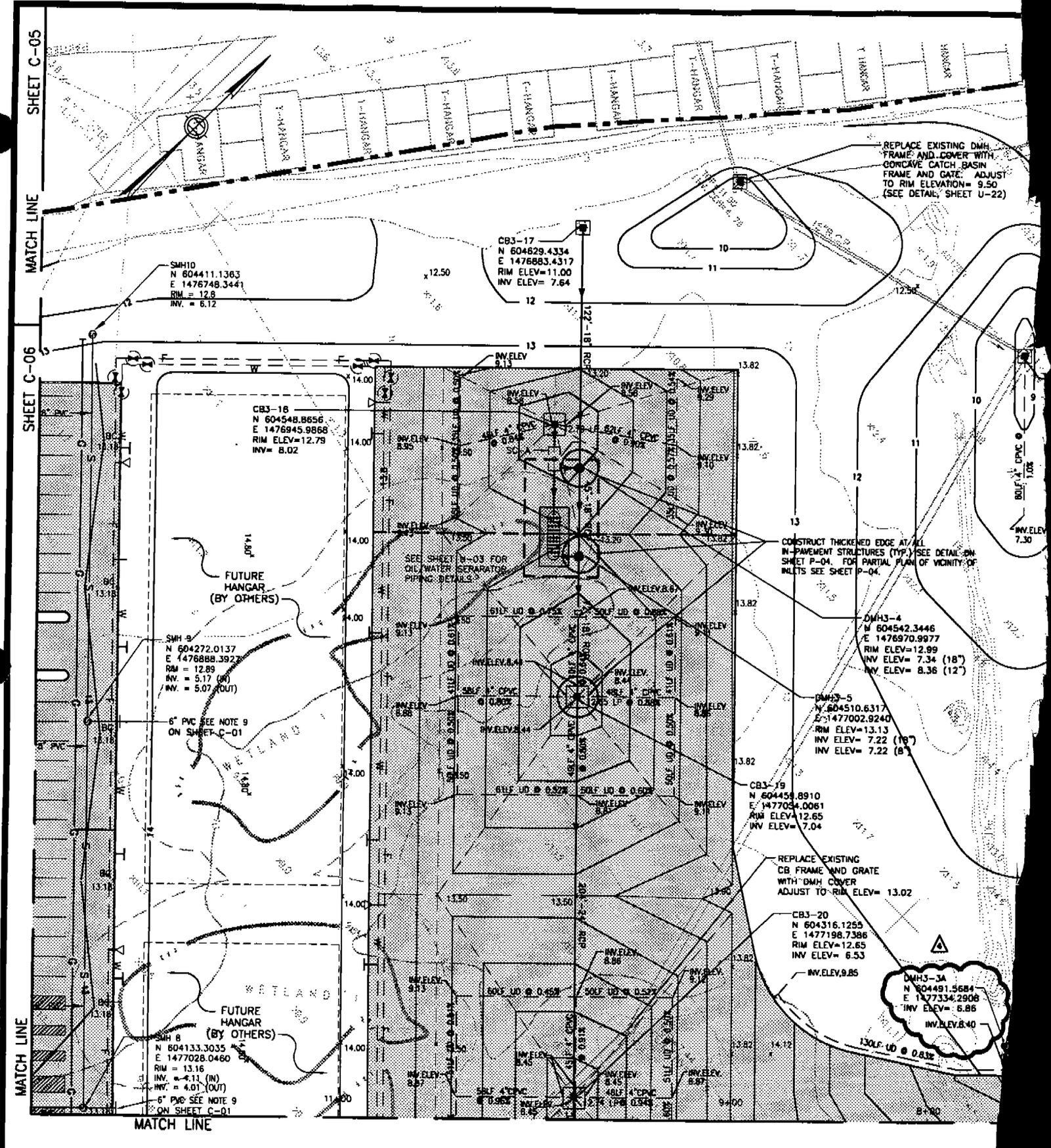
1. SEE SHEETS L-01 THRU L-03 FOR LAYOUT INFORMATION.
2. SEE SHEETS P-01 AND P-02 FOR ROADWAY PROFILES.
3. SEE SHEETS U-01 THRU U-22 FOR UTILITY DETAILS AND PROFILES.
4. SEE SHEET U-07 FOR LAYOUT OF WATER DISTRIBUTION SYSTEM.
5. SEE SHEETS R-01 THRU R-05 FOR EROSION CONTROL INFORMATION.
6. SEE SHEETS D-01 THRU D-04 FOR DISPOSITION OF EXISTING UTILITIES.
7. SEE SHEETS P-03 THRU P-06 FOR PAVEMENT DETAILS.
8. SEE SHEETS X-01 THRU X-10 FOR CROSS-SECTIONS.
9. EXTEND AND CAP 6" PVC PIPE AT +1% SLOPE TO EDGE OF PAVEMENT FOR FUTURE CONNECTION (TYP).
10. FOR WATER AND FIRE LINE LEGENDS SEE SHEET U-06.
11. FOR SEDIMENTATION CHAMBER DETAIL SEE SHEETS U-18 AND U-18A.
12. STRUCTURE INVERT SHALL BE SHAPED TO MID-DEPTH OF INCOMING AND OUTGOING PIPES USING BRICK OR CONCRETE. CONCRETE SHALL MEET THE REQUIREMENTS OF ITEM P-610, EXCEPT THAT 2000 PSI CONCRETE MAY BE USED AT THE CONTRACTOR'S OPTION. ALL COSTS FOR INVERT SHAPING (INCLUDING CONCRETE) SHALL BE INCIDENTAL TO STRUCTURE INSTALLATION.

RTIN AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: PAVING, GRADING, DRAINAGE, AND UTILITY PLAN I	SHEET NO.: C-01
SCALE: 1" = 30'	DATE: MARCH 31, 1998



DESIGNED	TDB/GPP
DRAWN	JJN/PW
CHECKED	KS/GPP
APPROVED	TS

REV.	DATE	REMARKS
1	5/14/98	ADDENDUM 4, ADD DMH NUMBERING

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

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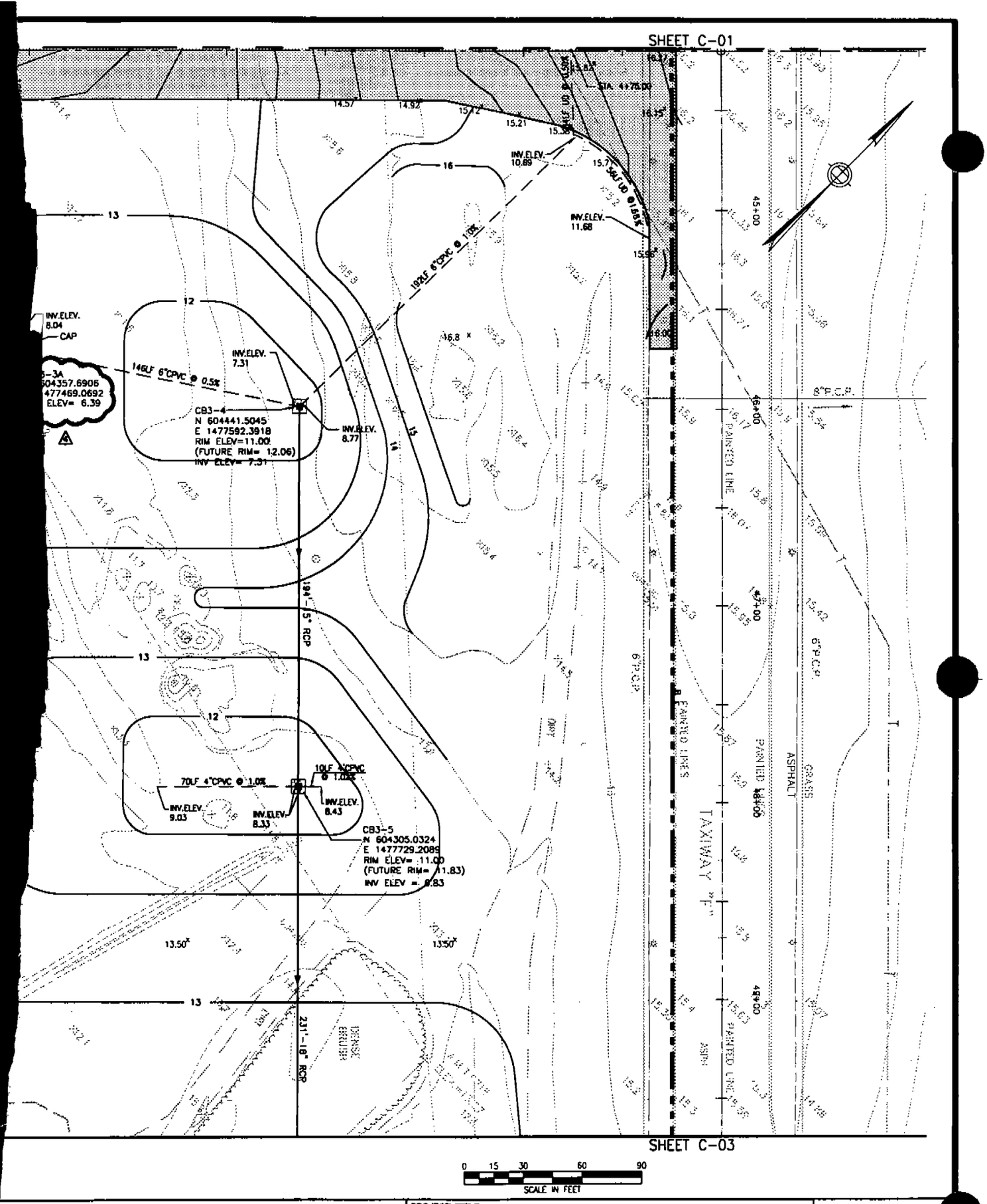


MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

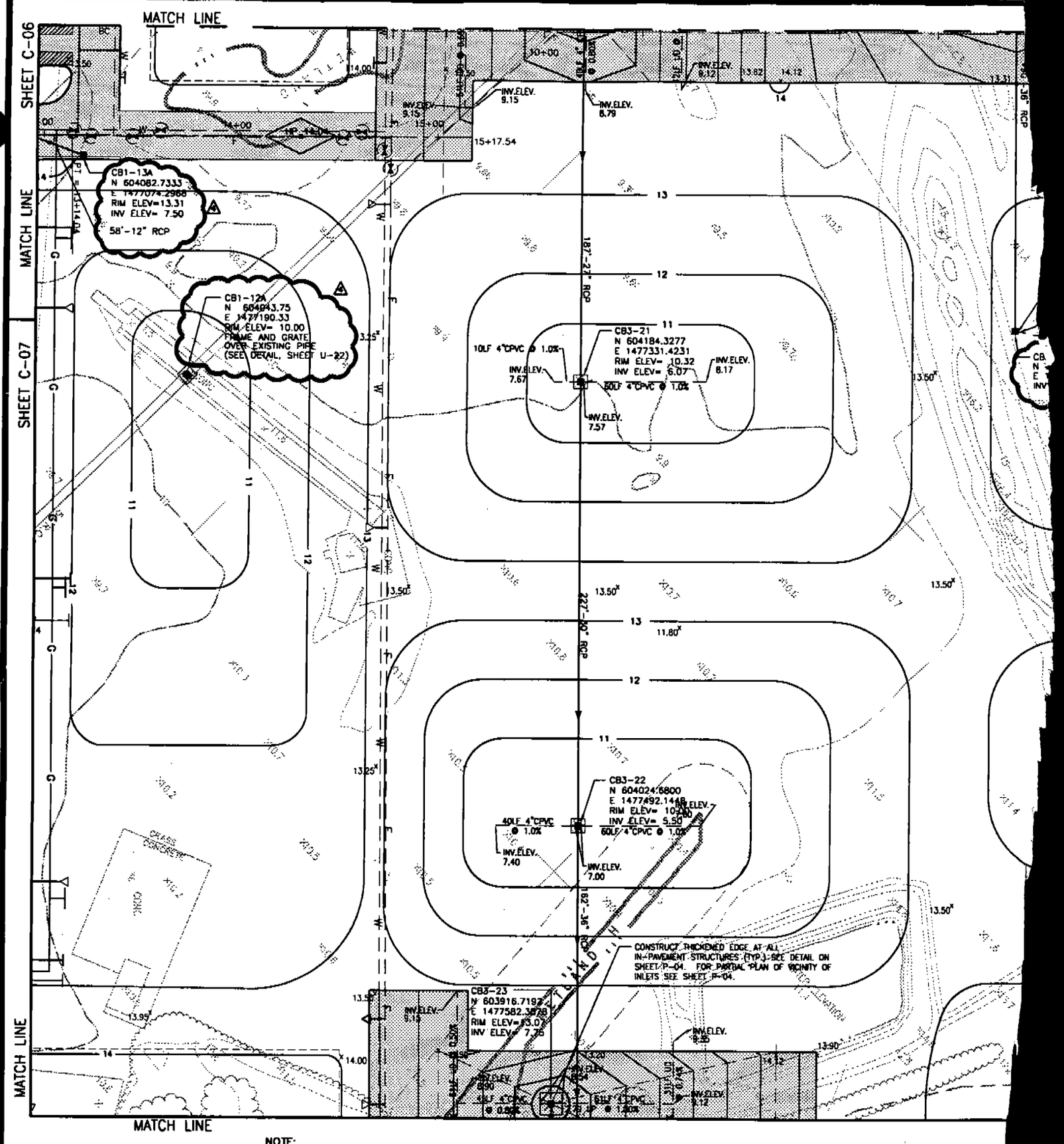
PROJECT NO.
MAA-CO-97-019

SHEET TITLE
PAVING, GRADING, DRAINAGE, AND UTILITY PLAN II

SHEET NO.
C-02

SCALE
1" = 30'

DATE
MARCH 31, 1998



NOTE:
SEE SHEET C-01 FOR NOTES.

DESIGNED	TDB/GPP
DRAWN	JJN/PW
CHECKED	KS/GPP
APPROVED	TS

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REV.	DATE	REMARKS
1	5/14/98	ADDENDUM 4, ADD DMH AND CB NUMBERING

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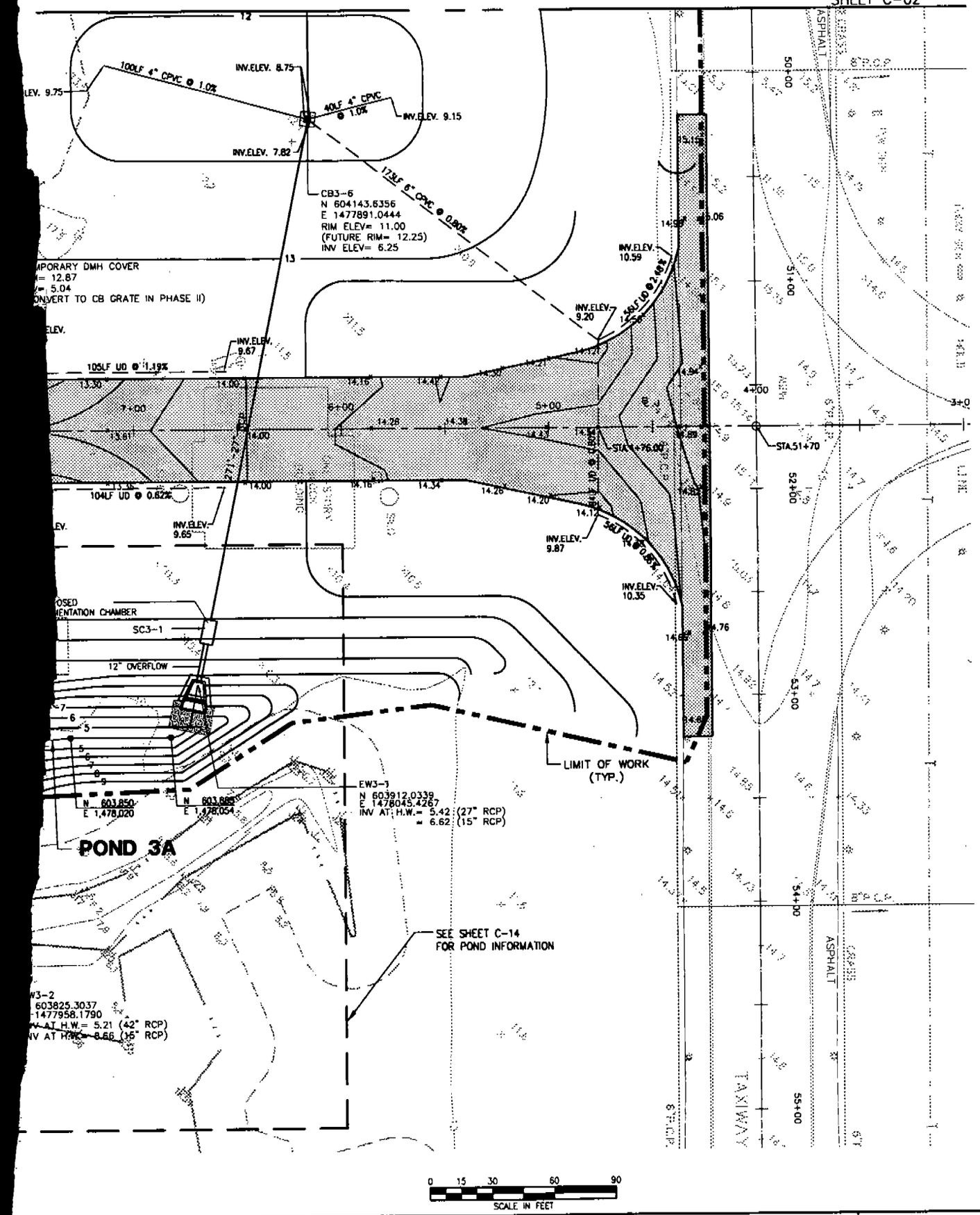
STATE



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SCALE IN FEET

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DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

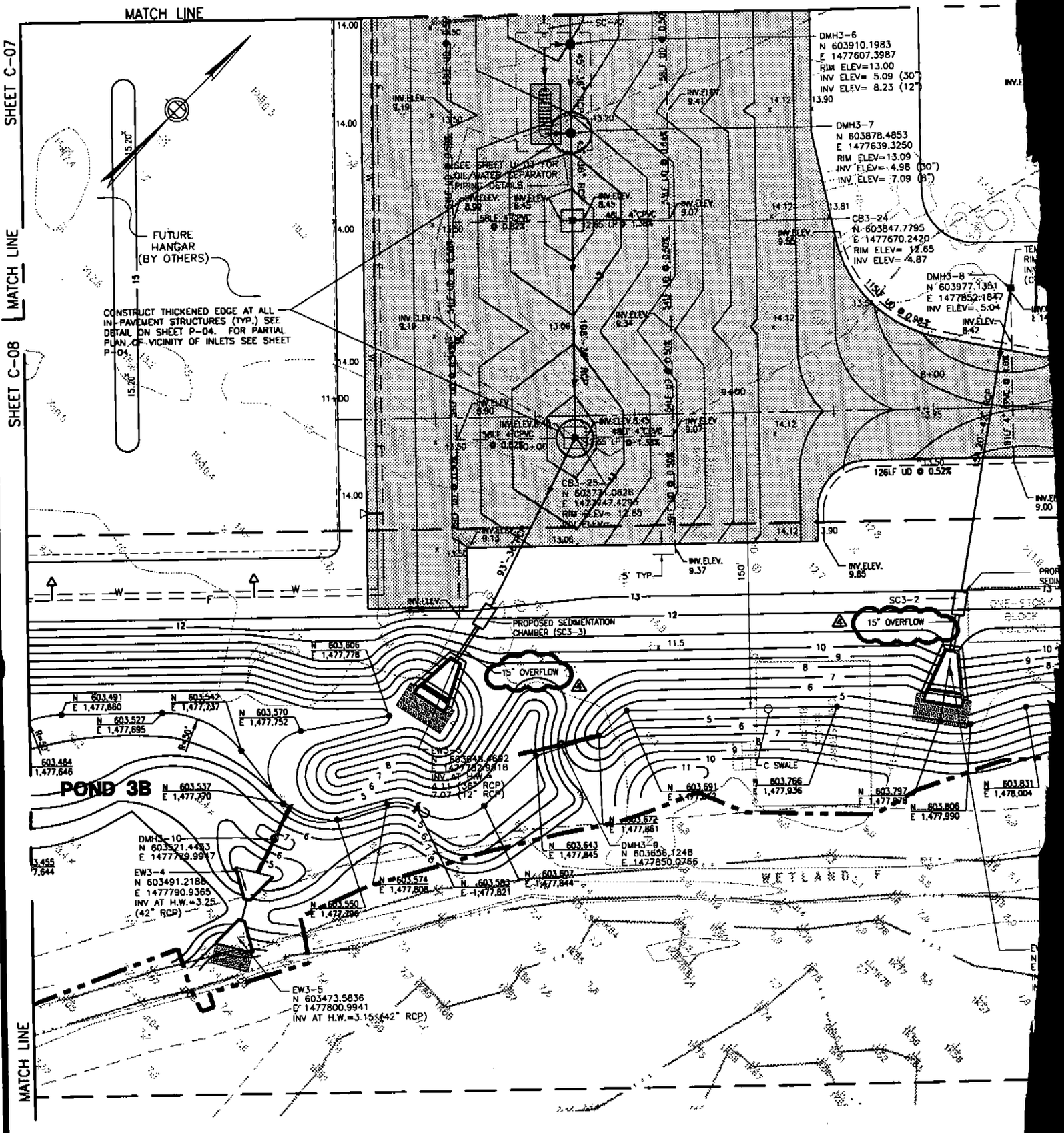
PROJECT NO.
MAA-CO-97-019

SHEET TITLE
PAVING, GRADING, DRAINAGE AND UTILITY PLAN III

SHEET NO.
C-03

SCALE
1" = 30'

DATE
MARCH 31, 1998



NOTE:
SEE SHEET C-01 FOR NOTES.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 800 Arlington, VA 22201	DESIGNED	TDB/GPP	STATE OF MARYLAND TECHNICAL INFORMATION LICENSE NO. 13400 REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS
	DRAWN	JJN/FA		4	5/14/98	ADDENDUM 4, REVISED PIPE SIZE
	CHECKED	KS/GPP				
	APPROVED	TS				

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MARYLAND AVIATION ADMINISTRATION
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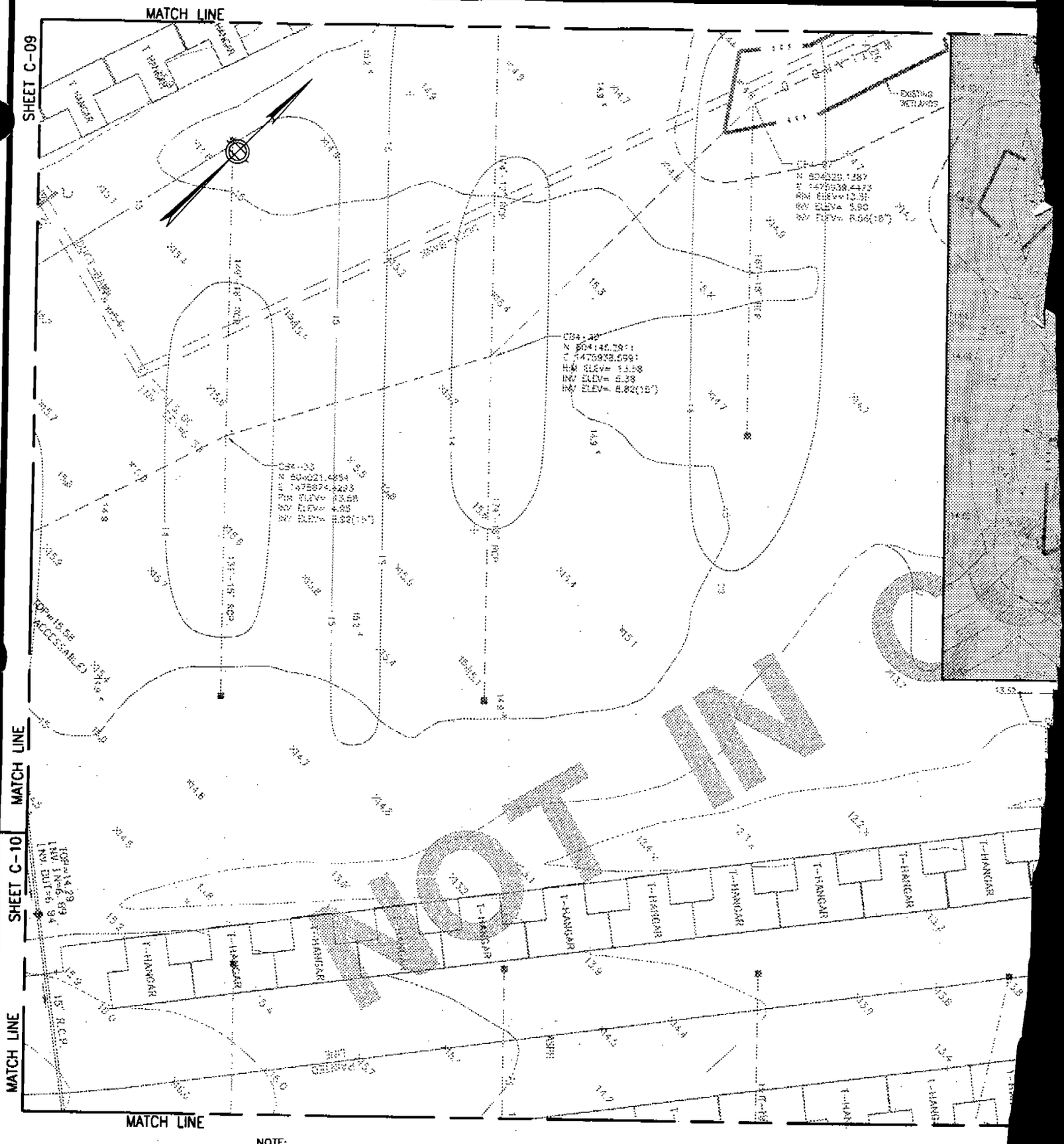
MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE	PAVING, GRADING, DRAINAGE AND UTILITY PLAN V
SCALE	1"= 30'
DATE	MARCH 31, 1998
PROJECT NO.	MAA-CO-97-019
SHEET NO.	C-05



NOTE:
SEE SHEET C-01 FOR NOTES.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED	TDB/GPP	STATE OF MARYLAND TEDDIAN BOUNDATION LICENSE NO. 12400 REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS
	DRAWN	JJN/FA		4	5/14/98	ADDENDUM 4, CLARIFY STORM DRAIN STRUCTURE
	CHECKED	KS/GPP				
	APPROVED	TS				

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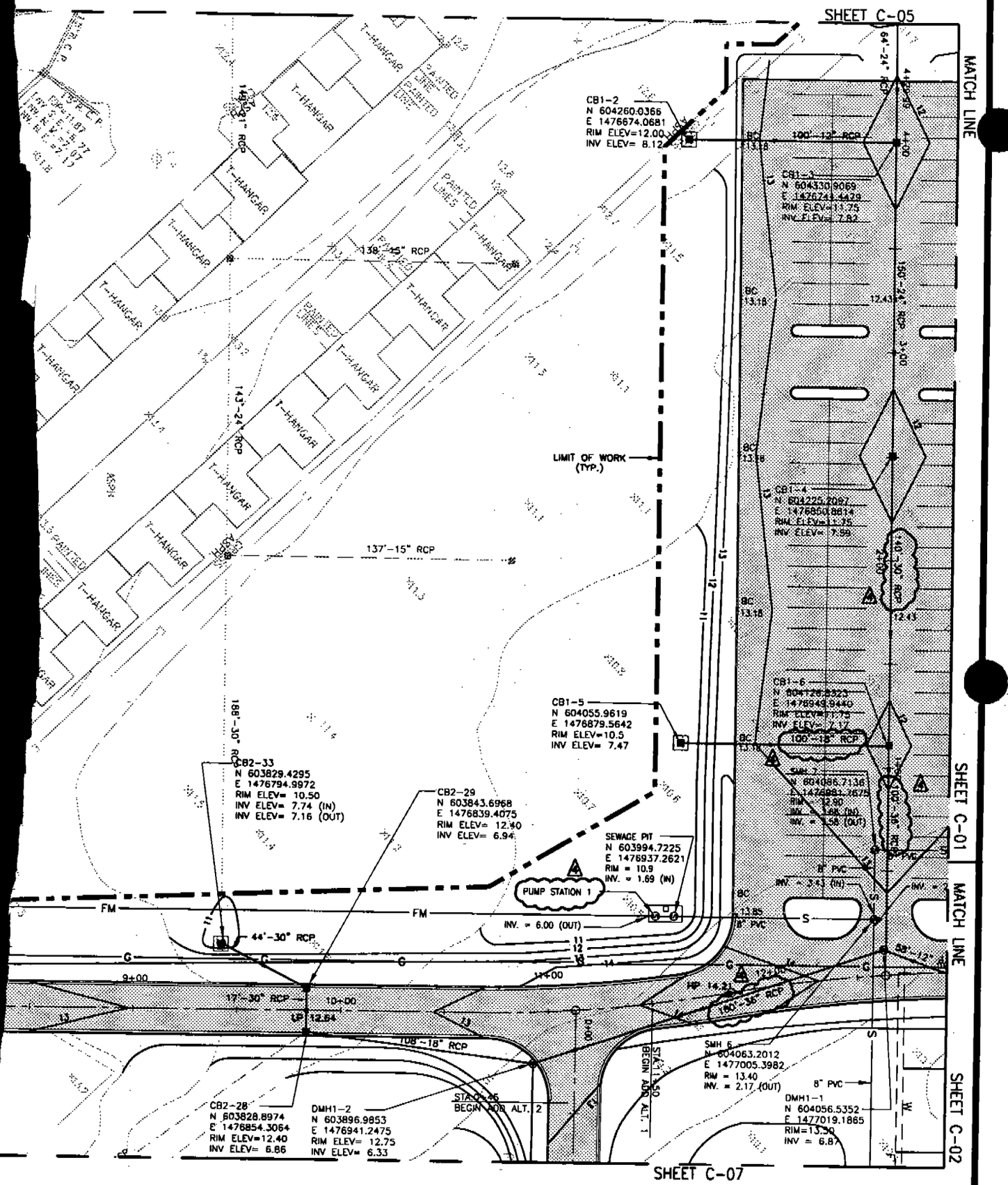


MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

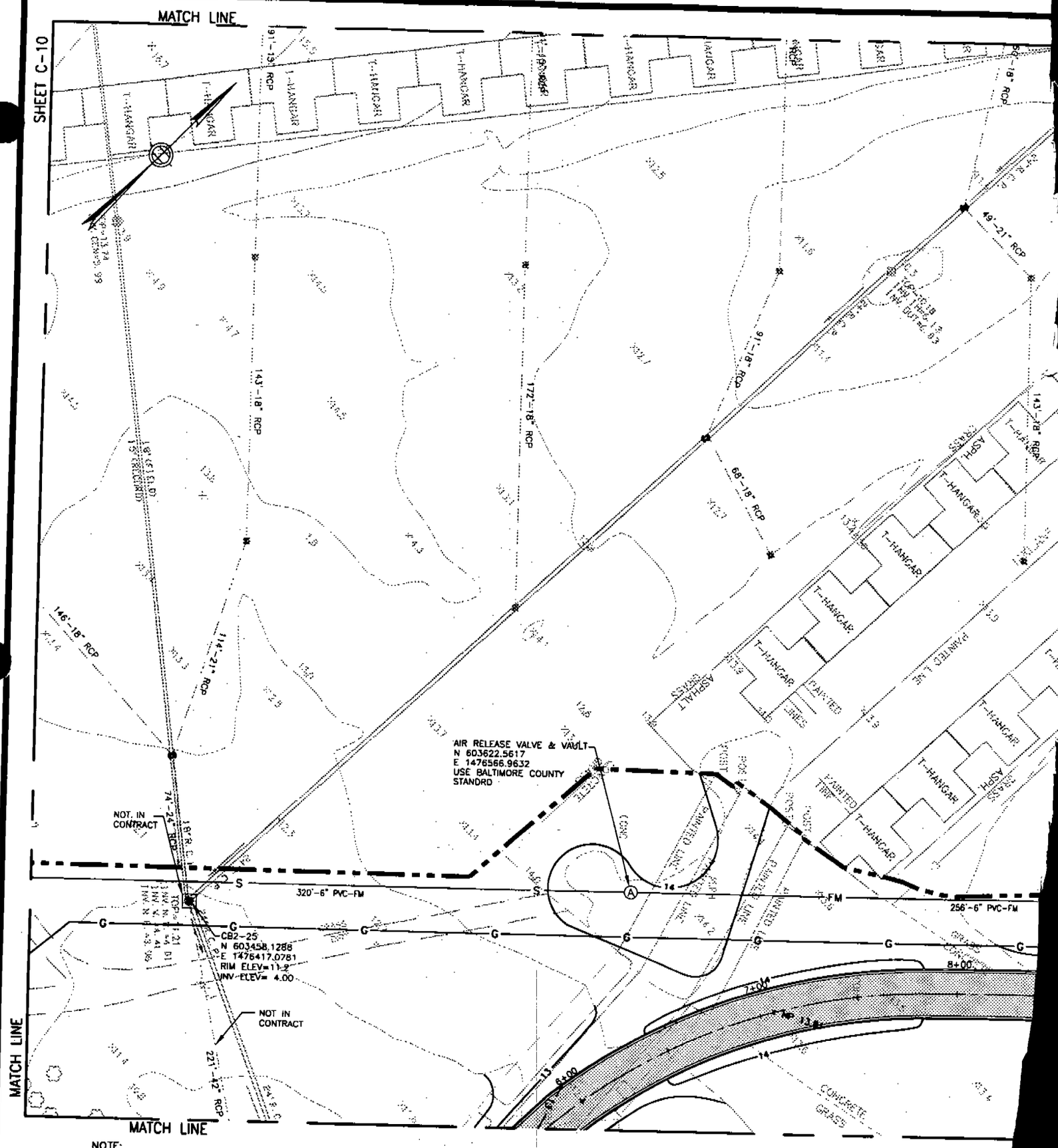
SHEET TITLE
PAVING, GRADING, DRAINAGE AND UTILITY PLAN VI

SCALE
1" = 30'

DATE
MARCH 31, 1998

PROJECT NO.
MAA-CO-97-019

SHEET NO.
C-06



NOTE:
SEE SHEET C-01 FOR NOTES.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED TDB/GPP DRAWN JJN/FA CHECKED KS/CPP APPROVED TS	STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS
			4	5/14/98	ADDENDUM 4, CLARIFY DIMENSIONS

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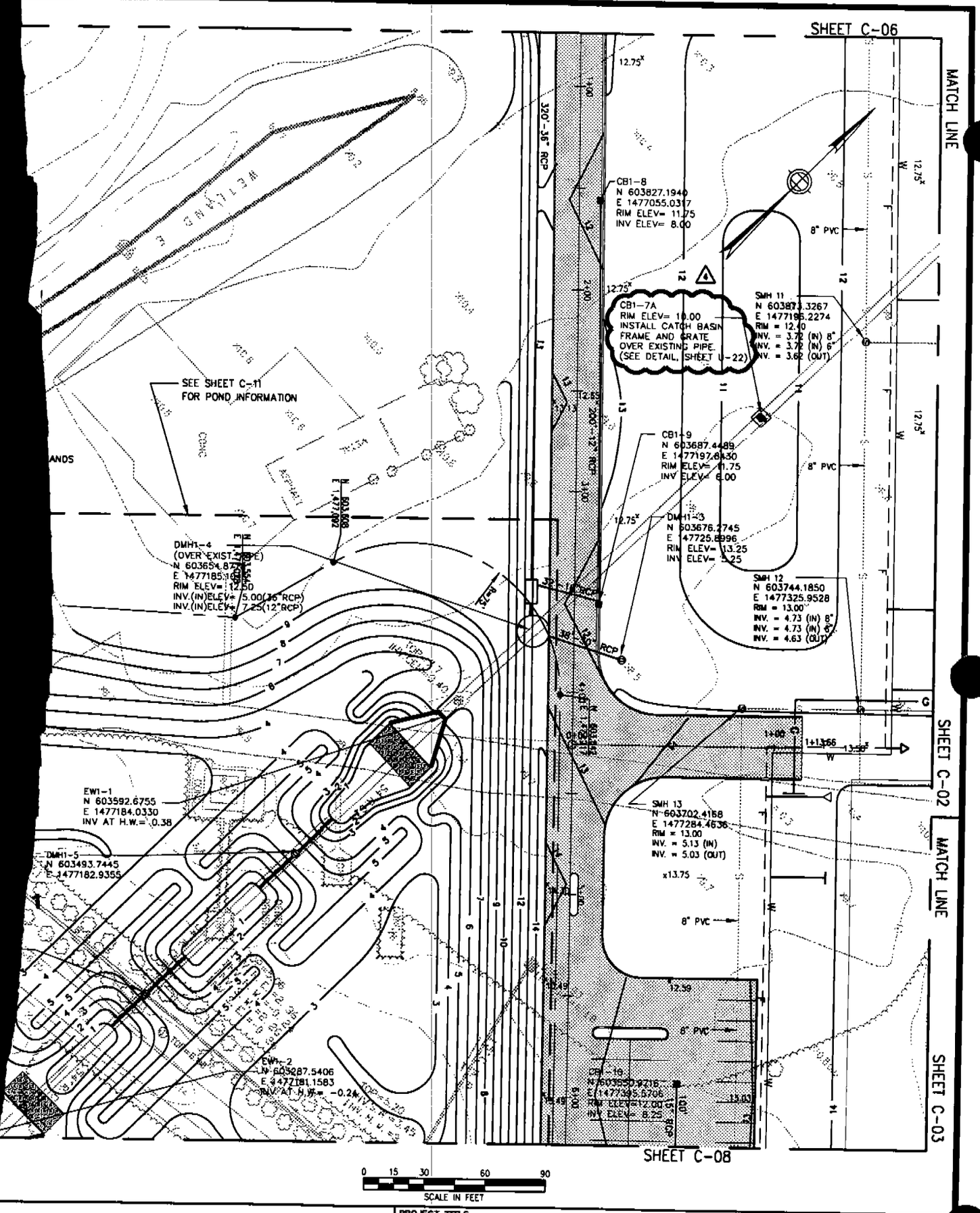
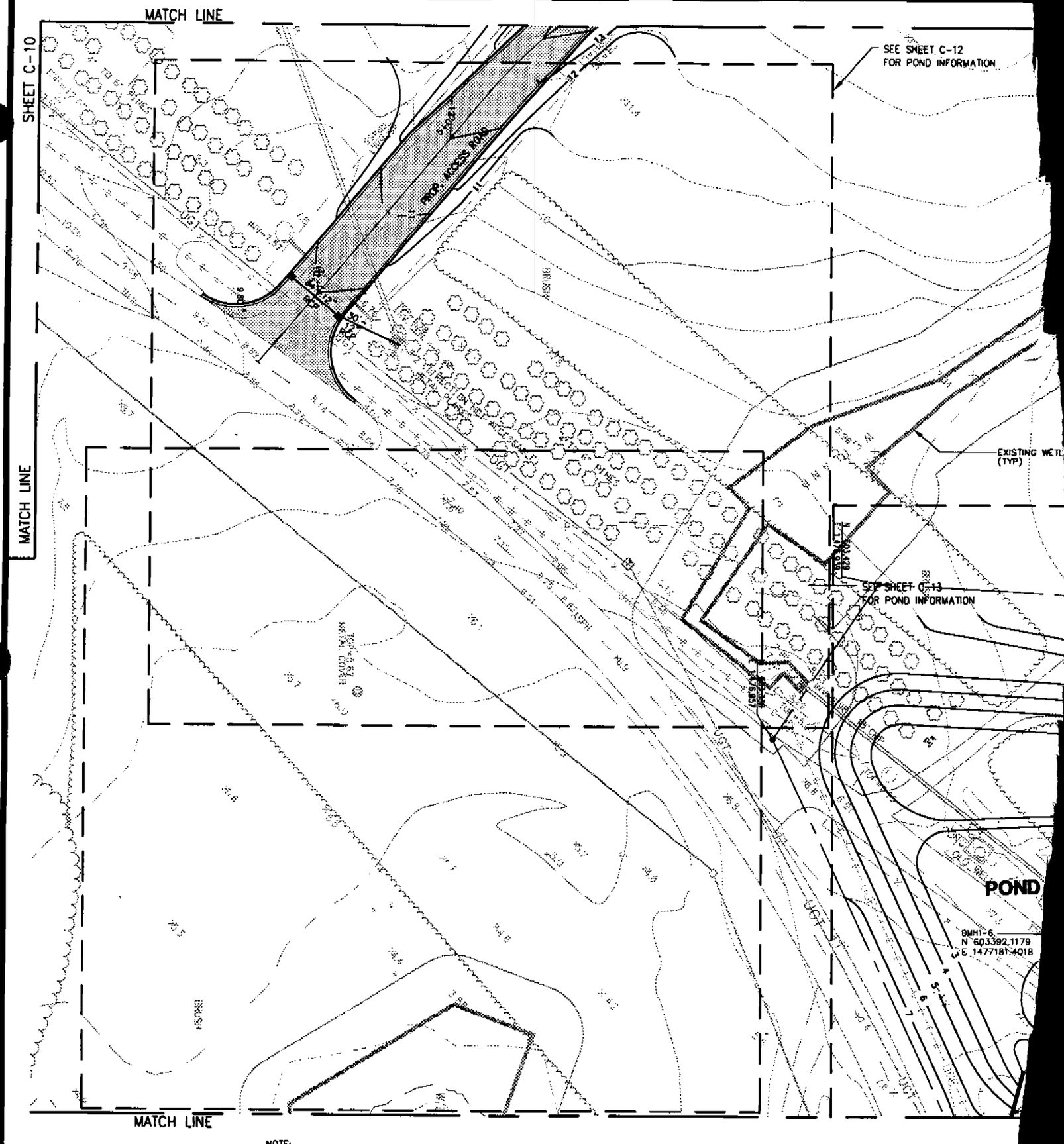


MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: PAVING, GRADING, DRAINAGE AND UTILITY PLAN VII	SHEET NO.: C-07
SCALE: 1" = 30'	DATE: MARCH 31, 1998



NOTE:
SEE SHEET C-01 FOR NOTES.

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CHECKED	KS/GPP
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	5/14/98	ADDENDUM 4, ADD CB NUMBERING

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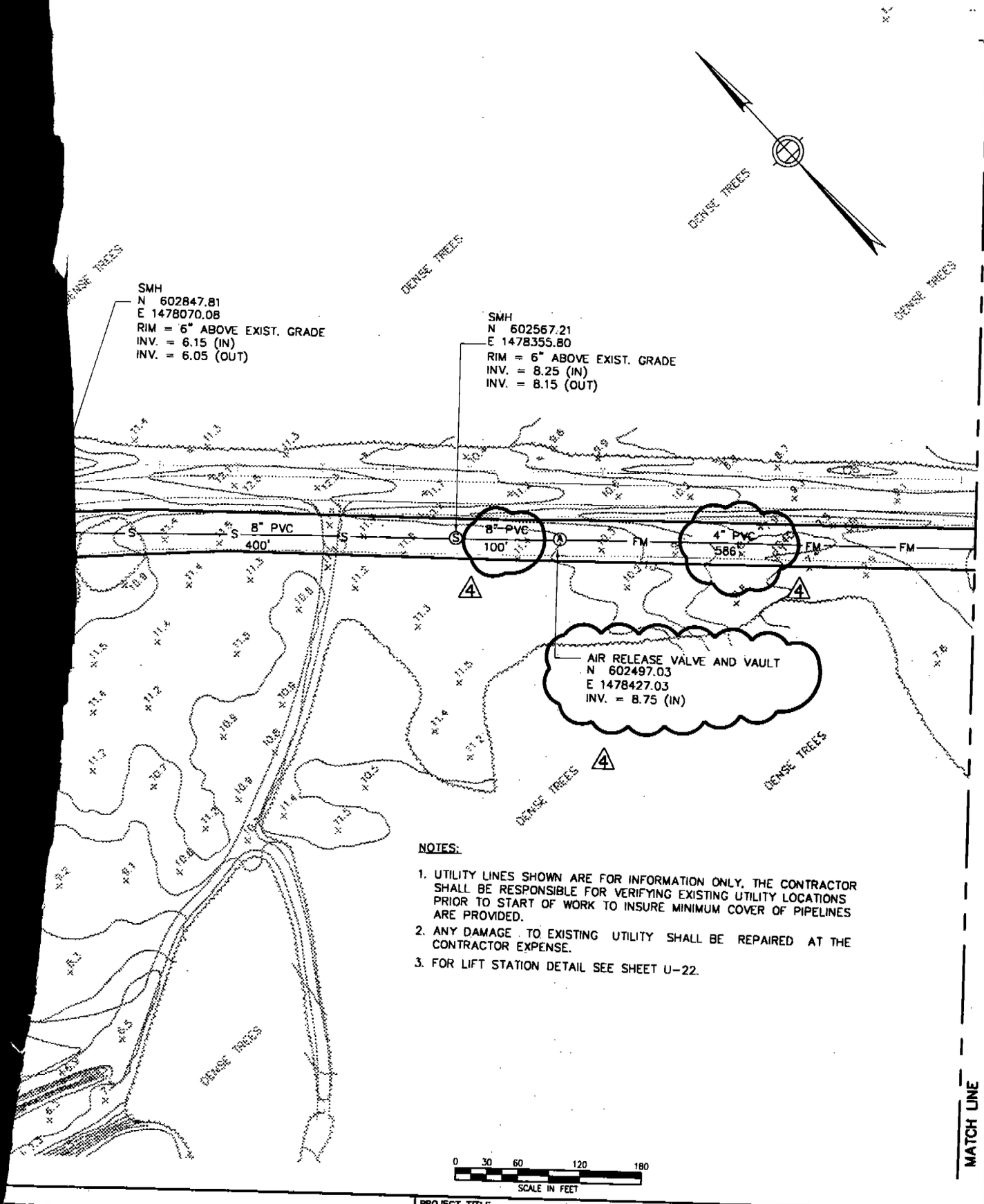
STATE A



NOTES:

1. UTILITY LINES SHOWN ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXISTING UTILITY LOCATIONS PRIOR TO START OF WORK TO INSURE MINIMUM COVER OF PIPELINES ARE PROVIDED.
2. ANY DAMAGE TO EXISTING UTILITY SHALL BE REPAIRED AT THE CONTRACTOR EXPENSE.
3. FOR LIFT STATION DETAIL SEE SHEET U-22.

TIN
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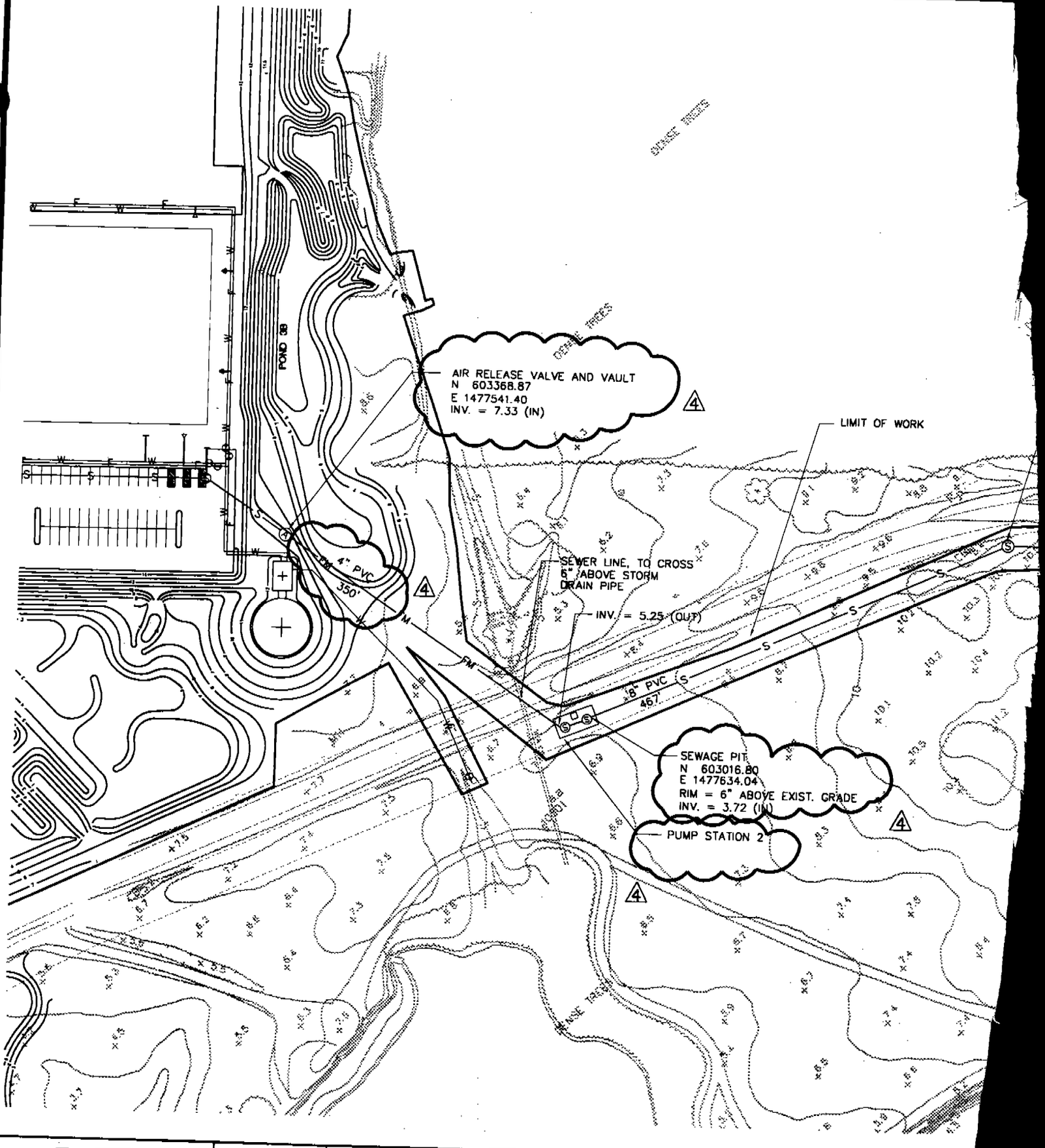
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: STRAWBERRY POINT ROAD SEWER LINE PLAN I	SHEET NO.: C-21
SCALE: 1" = 60'	DATE: MARCH 31, 1998



TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED FA DRAWN FA CHECKED TS APPROVED TS	STATE OF MARYLAND REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS
			4	5/14/98	ADDENDUM 4, REVISED PIPE SIZE INVERT AND PUMP ID.

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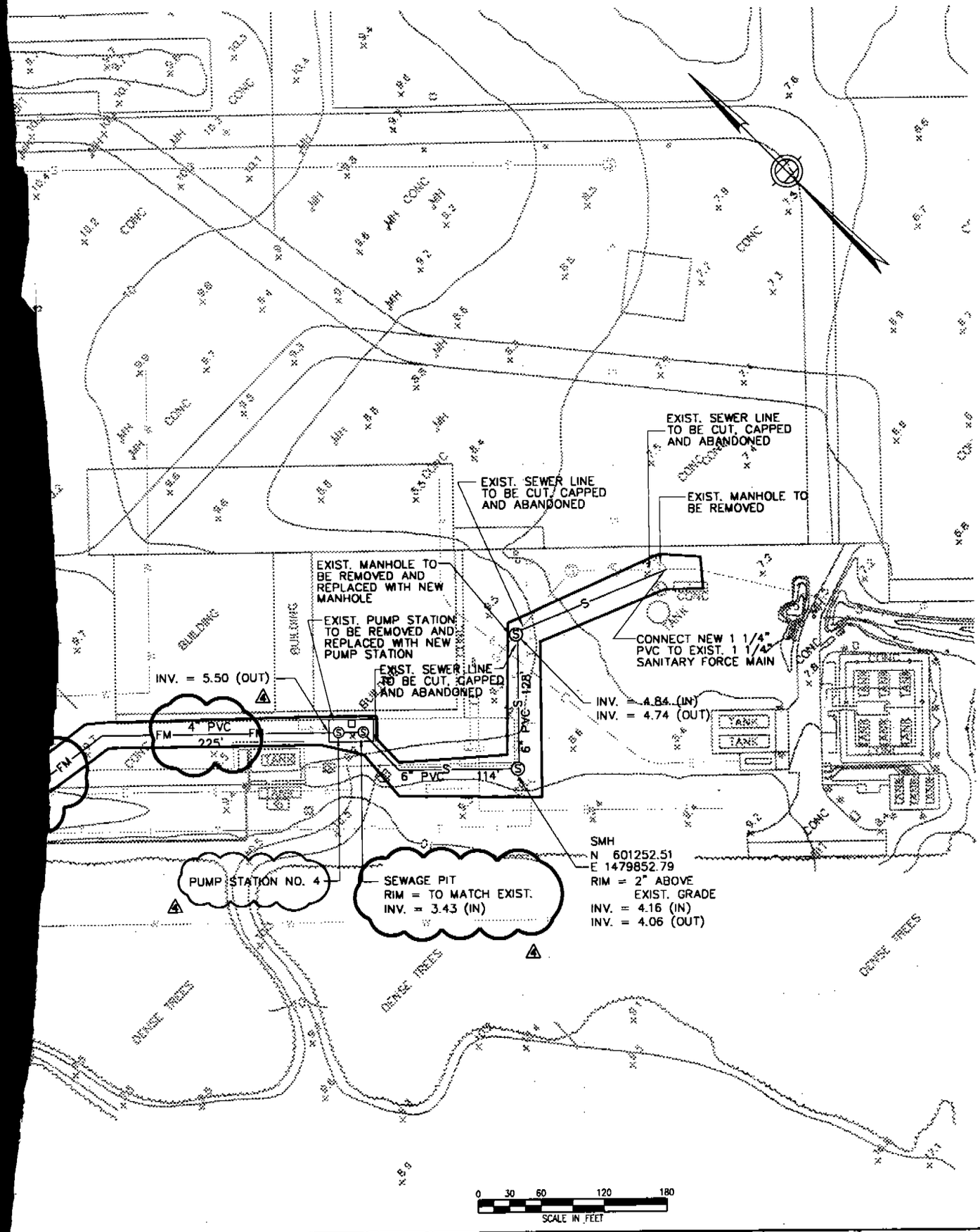
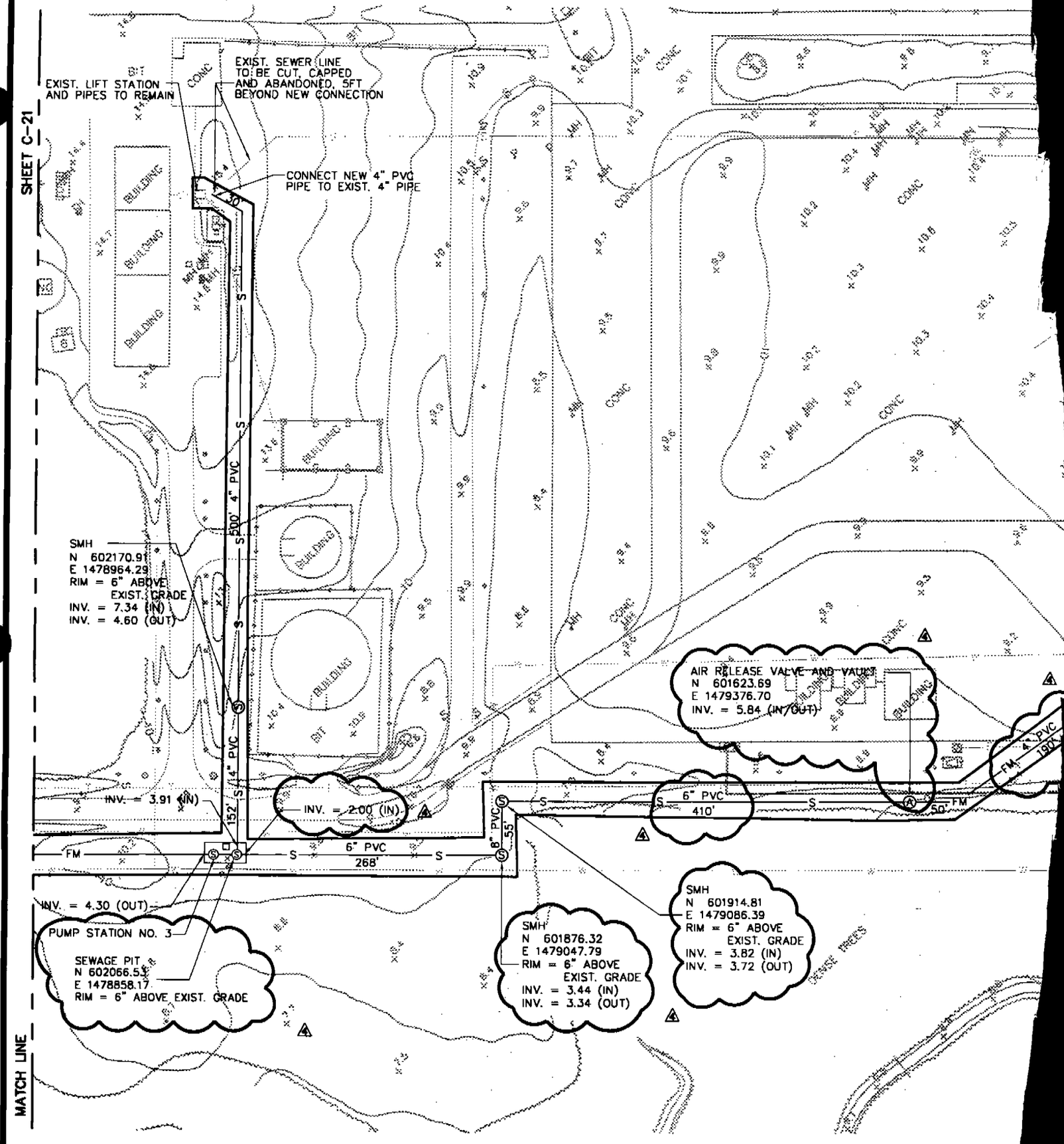


MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
PROJECT NO.	MAA-CO-97-019
SHEET TITLE	STRAWBERRY POINT ROAD SEWER LINE PLAN II
SHEET NO.	C-22
SCALE	1" = 60'
DATE	MARCH 31, 1998



TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201			REV.	DATE	REMARKS
TAMS	DESIGNED	FA	3	4/27/98	ADDENDUM 1
	DRAWN	FA	4	5/14/98	ADDENDUM 4, REVISED PIPE SIZE, INVERT AND PUMP ID.
	CHECKED	TS			
	APPROVED	TS			

STATE OF MARYLAND — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

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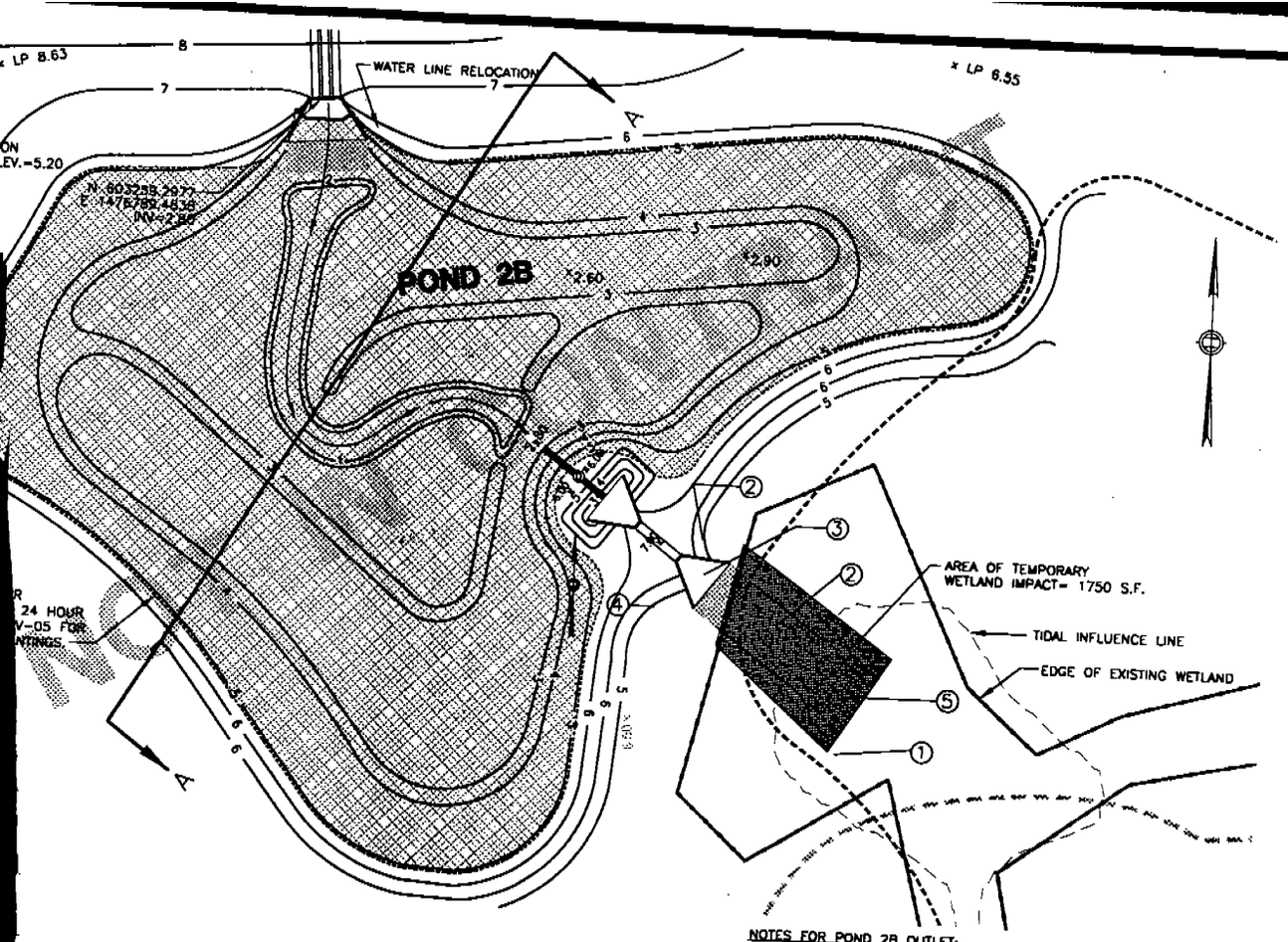


POND 2B

1"=30'

NOTES FOR POND 2B OUTLET:

① INSTALL EROSION CONTROL AS SHOWN ON SHEET R-04.

② EXCAVATE AND REGRADE OUTLET AREA AND PLACE PROPOSED HEADWALL.

③ INSTALL PROPOSED RIP-RAP AS SHOWN.

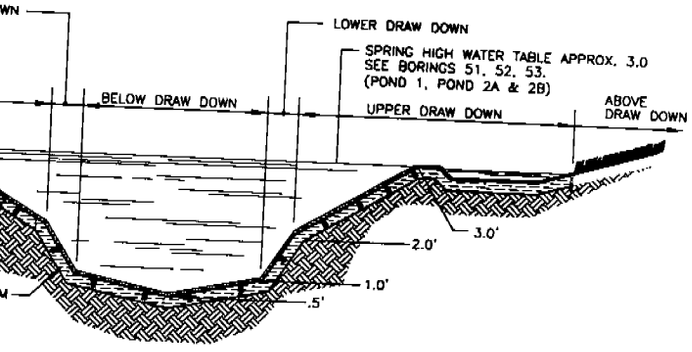
④ INSTALL TEMPORARY STRAW BALE CHECK DAM.

⑤ PLACE EROSION CONTROL NETTING ON 6" OF LOAM, SEED ALL DISTURBED AREAS. ALLOW NATURAL WETLAND VEGETATION TO RE-ESTABLISH IN DISTURBED AREA. MAINTAIN STRAW BALE CHECK DAM TO KEEP ADJACENT WETLAND FREE OF SILT. IF NATURAL VEGETATION DOES NOT RE-ESTABLISH WITHIN 24 MONTHS, SUPPLEMENT DISTURBED AREA WITH SIMILAR VEGETATION.

VATIONS

57
80
ERGED

ELEVATION:
3.80 POND 1



SECTION A-A

1 AND 2B SUBJECT TO SALT WATER INTRUSION

NOTES (PONDS 1 & 2B)

1. SEE SHEET V-04 FOR PLANT SPACING, LOCATION AND METHOD.
2. SEE SHEET V-05 FOR PLANT SELECTION AND DETAILS. ANY PROPOSED SUBSTITUTION OF WETLAND SPECIES FROM THE DESCRIBED LIST MUST BE APPROVED BY THE ENGINEER.
3. ALL EXCAVATION, GRADING, LOAM AND SEEDING SHALL BE DONE BETWEEN JUNE 15 AND SEPTEMBER 30. WETLAND PLANTS SHALL BE PLANTED BETWEEN SEPTEMBER 30 AND OCTOBER 15.
4. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING FINAL LOCATION OF PIPES AND GRADING FOR ALL PONDS.
5. THE CONTRACTOR SHALL MAINTAIN PONDS FREE FROM EROSION AND SILT UNTIL VEGETATION HAS STABILIZED ALL DISTURBED AREAS.
6. ALL OTHER AREAS ABUTTING THE PROPOSED PONDS SHALL BE LOAMED AND SEEDED. (SEE SHEET R-06 FOR DETAILS)
7. PONDS 1, 2A, 2B, 3A AND 3B ARE DESIGNED FOR WATER QUALITY CONTROL. THEY ARE NOT DESIGNED TO MITIGATE THE INCREASE IN RUNOFF DUE TO THE PROPOSED CONSTRUCTION. PONDS 4A AND 4B ARE DESIGNED TO MITIGATE THE INCREASE IN RUNOFF FOR THE 2, 10 AND 100 YEAR STORM EVENTS AS WELL AS WATER QUALITY.

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

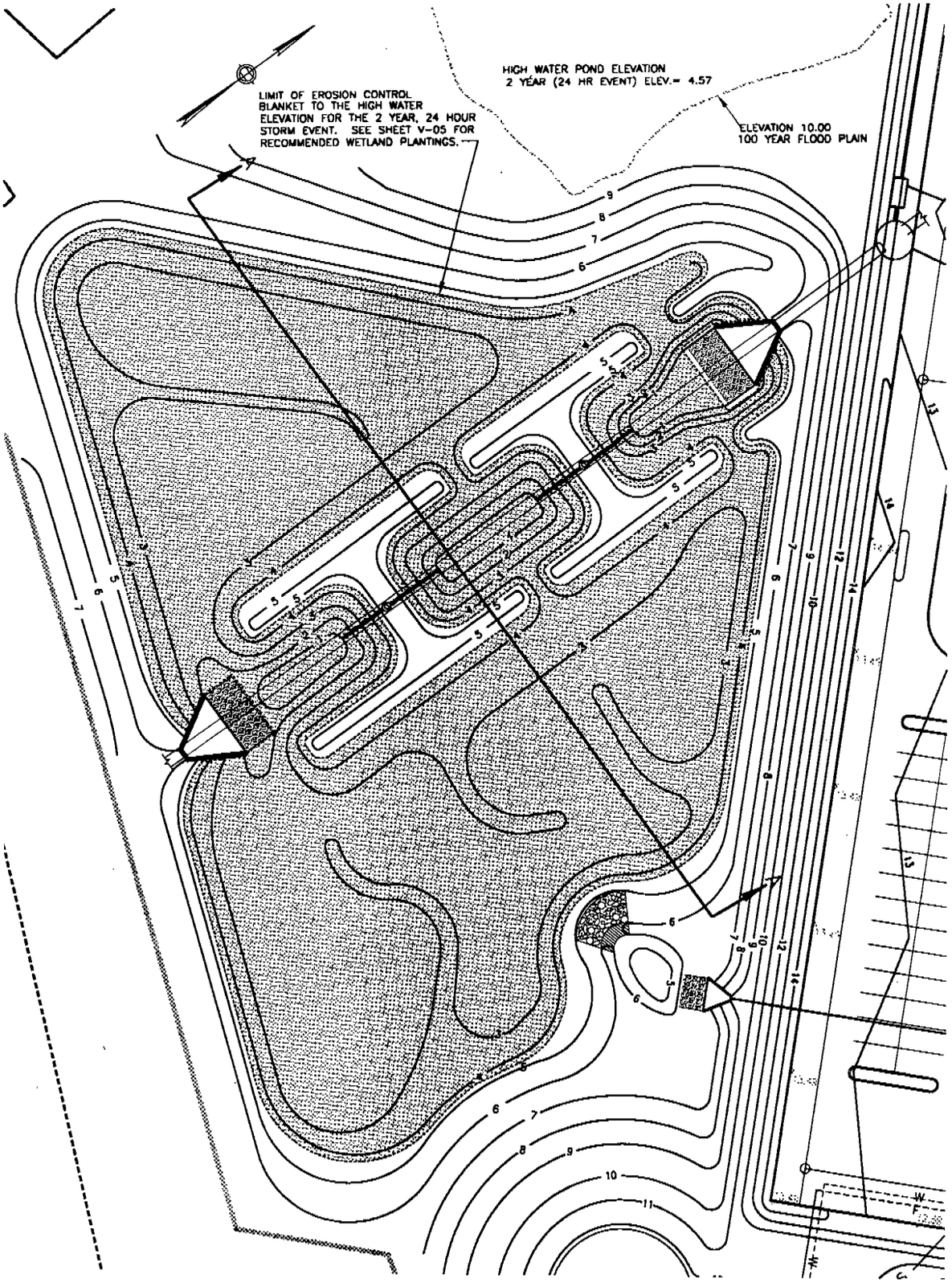
SHEET TITLE: POND VEGETATION ENLARGEMENTS PLAN I

SCALE: AS NOTED

DATE: MARCH 31, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: V-01



POND 1

1"=30'

HIGH WATER POND ELEV
2 YEAR (24 HR EVENT)
CREST HIEGHT 6.50

LIMIT OF EROSION
BLANKET TO THE H
ELEVATION FOR TH
STORM EVENT. SI
RECOMMENDED WE

WATER SURF
(P

2-YEAR ST
1-YEAR ST
OUTLET ASSU

LOWER

ABOVE
DRAW DOWN
UPPER DRAW

EROSION CONTROL NETTI

ELEVATION
ALSO POND 2

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Arlington, VA 22201

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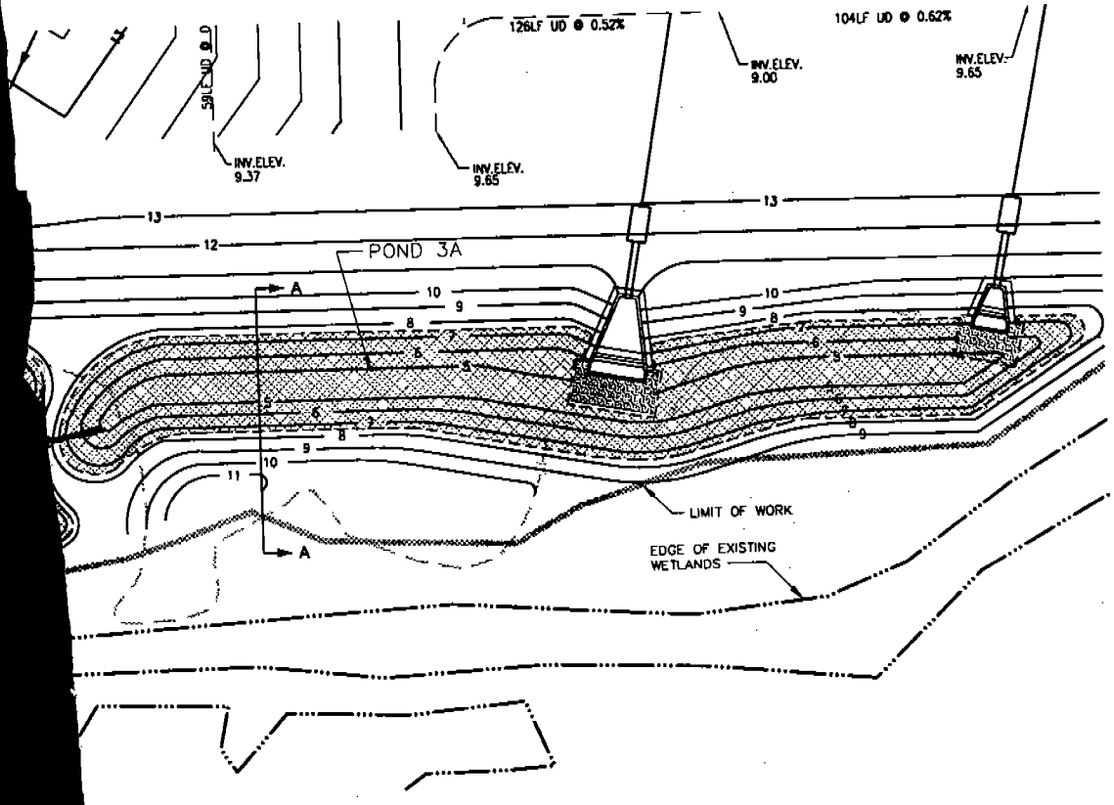
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
4	5/14/98	ADDENDUM 4, CLARIFY NETTING AREA

MAR
STATE A

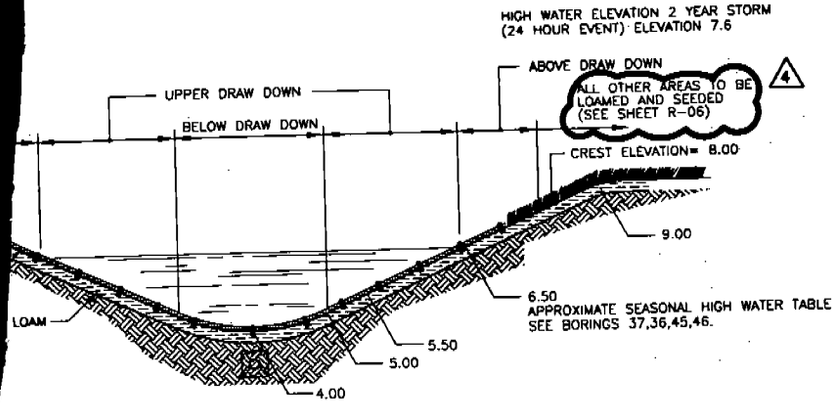


3B

WATER SURFACE ELEVATIONS (PONDS 3A/3B)

	3A	3B
2-YEAR STORM	7.6	7.5
1-YEAR STORM	7.6	7.4

NO TIDAL INFLUENCE ON OUTLET



SECTION A-A
FRESH WATER POND 3A

NOT TO SCALE

NOTES

1. PONDS 3A AND 3B WILL ACT AS TEMPORARY SEDIMENTATION PONDS AS REQUIRED DURING CONSTRUCTIN. PRIOR TO PLACEMENT OF FINAL LOAM AND NETTING, ALL SILT SHALL BE CLEANED AND REMOVED.
2. SEE SHEET V-04 FOR PLANT SPACING, LOCATION AND METHOD.
3. SEE SHEET V-05 FOR PLANT SELECTION AND DETAILS. ANY PROPOSED SUBSTITUTION OF WETLAND SPECIES FROM THE DESCRIBED LIST MUST BE APPROVED BY THE ENGINEER.
4. ALL OTHER AREAS ABUTTING THE PROPOSED PONDS SHALL BE LOAMED AND SEEDED. (SEE SHEET R-06 FOR DETAILS)
5. ALL EXCAVATION, GRADING, LOAM AND SEEDING SHALL BE DONE BETWEEN JUNE 15 AND SEPTEMBER 30. WETLAND PLANTS SHALL BE PLANTED BETWEEN SEPTEMBER 30 AND OCTOBER 15.
6. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING FINAL LOCATION OF PIPES AND GRADING FOR ALL BMP PONDS.
7. THE CONTRACTOR SHALL MAINTAIN PONDS FREE FROM EROSION AND SILT UNTIL VEGETATION HAS STABILIZED ALL DISTURBED AREAS.
8. PONDS 1, 2A, 2B, 3A AND 3B ARE DESIGNED FOR WATER QUALITY CONTROL. THEY ARE NOT DESIGNED TO MITIGATE THE INCREASE IN RUNOFF DUE TO THE PROPOSED CONSTRUCTION. PONDS 4A AND 4B ARE DESIGNED TO MITIGATE THE INCREASE IN RUNOFF FOR THE 2, 10 AND 100 YEAR STORM AS WELL AS WATER QUALITY.

TIN
RPORT

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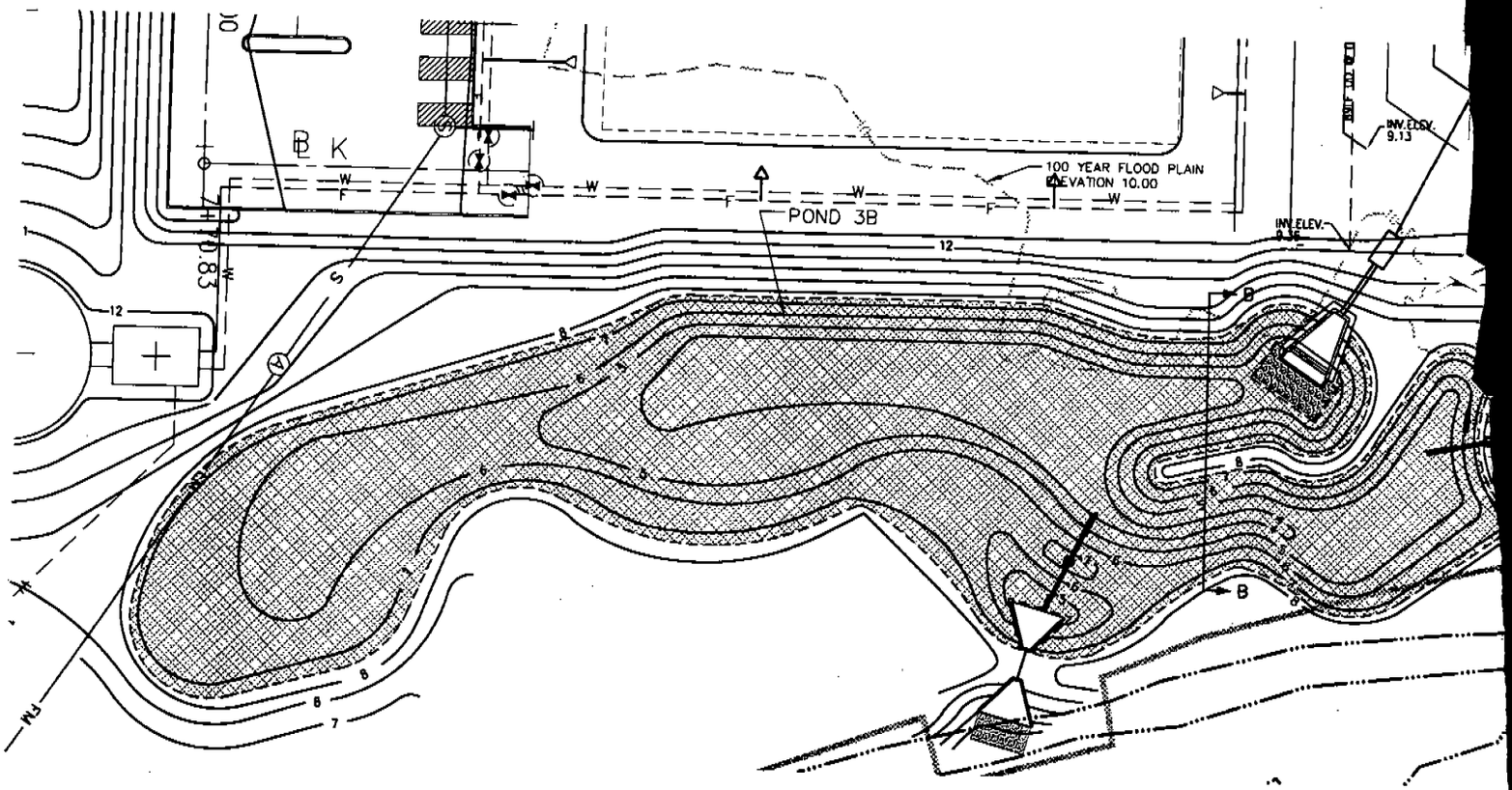
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: POND VEGETATION ENLARGEMENTS PLAN II	SHEET NO.: V-02
SCALE: AS NOTED	DATE: MARCH 31, 1998

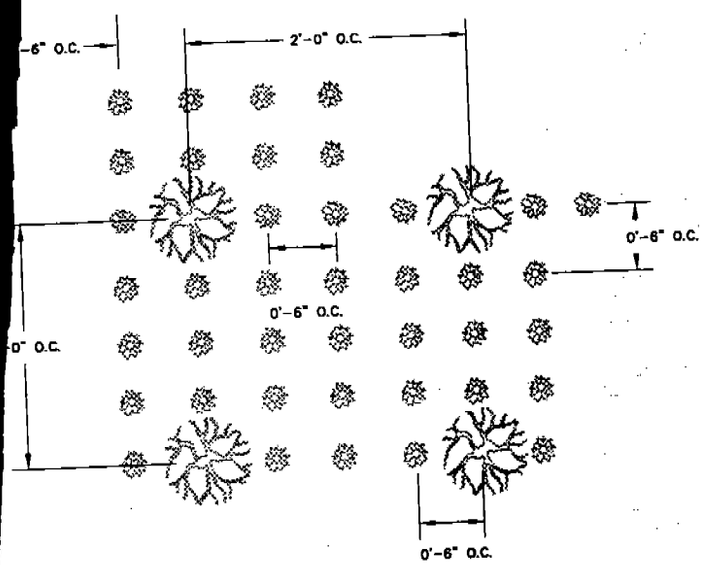

POND 3B
100 YEAR FLOOD PLAIN ELEVATION 10.00
INV.ELEV. 9.13
INV.ELEV. 8.36
B
B
12
12
8
7
6
5
4
3
2
1
9
8
8
7
6
5
4
3
2
1
9
8
8
7
6
5
4
3
2
1
9
8

SALTWATER INTRUSION

SCIENTIFIC NAME	PLANTING SPECIFICATIONS	APPROXIMATE SF
AGROSTIS ALBA (A. STOLONIFERA) PANICUM VIRGATUM SCIRPUS PUNGENS (S. AMERICANUS)	PURE LIVE SEED 5 LBS/AC 0.5 FT OC 2 FT OC	5,760 SF
ACORUS CALAMUS AGROSTIS ALBA (A. STOLONIFERA) ELEOCHARIS PALUSTRIS SCIRPUS AMERICANUS (S. OLNEYI) SCIRPUS PUNGENS (S. AMERICANUS) TYPHA ANGUSTIFOLIA	1 FT OC PURE LIVE SEED 5 LBS/AC 1 FT OC 2 FT OC 2 FT OC 2 FT OC	82,690 SF
ACORUS CALAMUS ELEOCHARIS PALUSTRIS SCIRPUS AMERICANUS (S. OLNEYI) SCIRPUS PUNGENS (S. AMERICANUS) TYPHA ANGUSTIFOLIA	1 FT OC 1 FT OC 2 FT OC 2 FT OC 2 FT OC	3,990 SF
ACORUS CALAMUS SCIRPUS AMERICANUS (S. OLNEYI) SCIRPUS PUNGENS (S. AMERICANUS) TYPHA ANGUSTIFOLIA	1 FT OC 2 FT OC 2 FT OC 2 FT OC	1,780 SF
SPARTINA AMERICANA	2 FT OC	

A

Y HAND USING A DIBBLE, PLANTING SPADE, OR OTHER METHOD APPROVED
BLE OR SPADE SHALL BE USED TO CREATE A SHALLOW HOLE IN
NTING. THE HOLE SHALL BE OF SUFFICIENT DEPTH AND WIDTH TO ALLOW
WITHOUT BREAKAGE OR OTHER DAMAGE. THE PLANTS SHALL BE
BASES ARE AT THE SOIL SURFACE. AFTER PLACEMENT OF THE PLANT IN
BE CAREFULLY CLOSED AROUND THE PLANT ROOT BY GENTLY APPLYING
THE HOLE WITH ONE'S FOOT OR OTHER METHOD APPROVED BE THE
VE BEEN JUDGED BY THE ENGINEER TO BE DAMAGED BY MISHANDLING
SS SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.



GROUND COVER SPACING DETAIL
MIXED PLANTINGS: 2'-0" ON CENTER WITH 6" ON CENTER
NTS

ALL PONDS

AFTER COMPLETION OF EXCAVATION, MONITOR AREAL EXTENT OF INUNDATION AND STANDING WATER LEVELS IN POND THREE TIMES, AT THE BEGINNING, MID-POINT AND END OF A TWO-WEEK PERIOD. SIMULTANEOUSLY MONITOR DEPTH TO WATER TABLE IN ADJACENT WELLS, AT SAME FREQUENCY AND ON SAME DATES. THE ENGINEER WILL CORRELATE STANDING WATER ELEVATIONS TO DEPTH TO WATER TABLE AND, BASED ON PREVIOUS WELL MONITORING RECORD, WILL ESTIMATE SEASONAL HIGH WATER (SHW) AND SEASONAL LOW WATER (SLW) ELEVATIONS.

IMMEDIATELY PRIOR TO PLANTING, INUNDATE POND TO ESTIMATED SHW ELEVATION, HOLDING THE STANDING WATER LEVEL AT THE SHW ELEVATION FOR 48 HOURS AND SUBSEQUENTLY DEWATERING.

PONDS READY FOR PLANTING DURING EARLY SPRING 1998

EARLY SPRING 1998 –

WITHIN 24 HOURS OF DEWATERING THE POND, BEGIN PLANTING THE POND TO THE SELECTED VEGETATION SPECIES.

KEEP THE POND DEWATERED UNTIL THE VEGETATION PLANTED ON THE BOTTOM OF THE POND REACHES HEIGHTS RANGING BETWEEN ONE AND TWO AND ONE-HALF FEET TALL; AT WHICH TIME, ALLOW POND WATER TO REACH NORMAL LEVELS.

THE ENGINEER WILL PERIODICALLY INSPECT THE POND AFTER PLANTING TO RECOMMEND AS APPROPRIATE, REVISIONS TO THE INUNDATION AND DEWATERING PROGRAM.

EARLY SPRING 1999 –

PRIOR TO MAINTENANCE PLANTING, MONITOR AREAL EXTENT OF INUNDATION AND STANDING WATER LEVELS IN POND ONCE A WEEK FOR FOUR WEEKS. SIMULTANEOUSLY MONITOR DEPTH TO WATER TABLE IN ADJACENT WELLS, AT SAME FREQUENCY AND ON SAME DATES. THE ENGINEER WILL CORRELATE STANDING WATER ELEVATIONS TO DEPTH TO WATER TABLE. BASED ON PREVIOUS WELL MONITORING RECORD AND SUCCESS OF PRIOR PLANTINGS, AS APPROPRIATE, THE ENGINEER WILL MODIFY ESTIMATE OF SEASONAL HIGH WATER (SHW) AND SEASONAL LOW WATER (SLW) ELEVATIONS AND WILL PREPARE A MAINTENANCE PLANTING PLAN.

IMMEDIATELY PRIOR TO PLANTING, INUNDATE POND TO ESTIMATED SHW ELEVATION, HOLDING THE STANDING WATER LEVEL AT THE SHW ELEVATION FOR 48 HOURS AND SUBSEQUENTLY DEWATERING.

WITHIN 24 HOURS OF DEWATERING THE POND, BEGIN PLANTING THE POND TO THE SELECTED VEGETATION SPECIES.

KEEP THE POND DEWATERED UNTIL THE VEGETATION PLANTED ON THE BOTTOM OF THE POND REACHES HEIGHTS RANGING BETWEEN ONE AND TWO AND ONE-HALF FEET TALL; AT WHICH TIME, ALLOW POND WATER TO REACH NORMAL LEVELS.

THE ENGINEER WILL PERIODICALLY INSPECT THE POND AFTER PLANTING TO RECOMMEND AS APPROPRIATE, REVISIONS TO THE INUNDATION AND DEWATERING PROGRAM.

PONDS NOT READY FOR PLANTING DURING EARLY SPRING 1998

LATE SPRING, SUMMER OR FALL 1998 –

WITHIN 24 HOURS OF DEWATERING THE POND, SEED ALL POND AREAS 18 INCHES ABOVE THE SHW ELEVATION TO THE POND BOTTOM, INCLUSIVE, TO REDTOP (AGROSTIS ALBA).

EARLY SPRING 1999 –

PRIOR TO PLANTING, MONITOR AREAL EXTENT OF INUNDATION AND STANDING WATER LEVELS IN POND ONCE A WEEK FOR FOUR WEEKS. SIMULTANEOUSLY MONITOR DEPTH TO WATER TABLE IN ADJACENT WELLS, AT SAME FREQUENCY AND ON SAME DATES. THE ENGINEER WILL CORRELATE STANDING WATER ELEVATIONS TO DEPTH TO WATER TABLE. BASED ON PREVIOUS WELL MONITORING RECORD, AS APPROPRIATE, THE ENGINEER WILL MODIFY ESTIMATE OF SEASONAL HIGH WATER (SHW) AND SEASONAL LOW WATER (SLW) ELEVATIONS AND WILL REVISE THE PLANTING PLAN.

IMMEDIATELY PRIOR TO PLANTING, INUNDATE POND TO ESTIMATED SHW ELEVATION, HOLDING THE STANDING WATER LEVEL AT THE SHW ELEVATION FOR 48 HOURS AND SUBSEQUENTLY DEWATERING.

WITHIN 24 HOURS OF DEWATERING THE POND, BEGIN PLANTING THE POND TO THE SELECTED VEGETATION SPECIES.

KEEP THE POND DEWATERED UNTIL THE VEGETATION PLANTED ON THE BOTTOM OF THE POND REACHES HEIGHTS RANGING BETWEEN ONE AND TWO AND ONE-HALF FEET TALL; AT WHICH TIME, ALLOW POND WATER TO REACH NORMAL LEVELS.

THE ENGINEER WILL PERIODICALLY INSPECT THE POND AFTER PLANTING TO RECOMMEND AS APPROPRIATE, REVISIONS TO THE INUNDATION AND DEWATERING PROGRAM.

NOTES:

1. FOR PLANTING LOCATIONS SEE SHEETS V-01 TO V-03.
2. FOR POND DETAILS SEE SHEETS C-11 TO C-16.

TIN
IRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

PROJECT NO.: MAA-CO-97-019

SHEET TITLE: POND VEGETATION NOTES AND DETAILS I

SHEET NO.: V-04

SCALE: AS NOTED

DATE: MARCH 31, 1998

CANDIDATE PLANT SPECIES – FRESHWATER PONDS

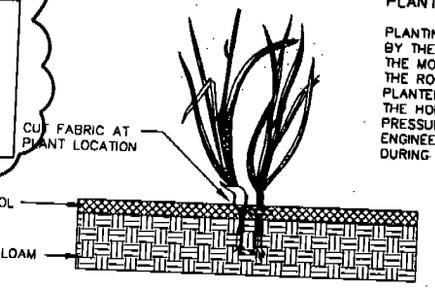
ZONE	COMMON NAME	SCIENTIFIC NAME	PLANTING SPECIFICATIONS	APPROXIMATE SF
ABOVE DRAW DOWN UPPER LIMIT: 18 INCHES ABOVE SEASONAL HIGH WATER (SHW) ELEVATION LOWER LIMIT: SHW ELEVATION	HERBACEOUS EMERGENT			
	REDTOP CHUFA WOOL GRASS	AGROSTIS ALBA (A. STOLONIFERA) CYPERUS ESCULENTUS SCIRPUS CYPERINUS	PURE LIVE SEED 5 LBS/AC TUBERS 50 LBS/AC 1 FT OC	18,820 SF
UPPER DRAW DOWN UPPER LIMIT: SHW ELEVATION LOWER LIMIT: MID-POINT BETWEEN SHW AND SEASONAL LOW WATER (SLW) ELEVATIONS	HERBACEOUS EMERGENT			
	REDTOP PORCUPINE SEDGE CHUFA MARSH SPIKE RUSH COMMON THREE SQUARE BROAD-LEAVED CATTAIL	AGROSTIS ALBA (A. STOLONIFERA) CAREX HYSTRICINA CYPERUS ESCULENTUS ELEOCHARIS PALUSTRIS SCIRPUS PUNGENS (S. AMERICANUS) TYPHA LATIFOLIA	PURE LIVE SEED 5 LBS/AC 1 FT OC TUBERS 50 LBS/AC 1 FT OC 2 FT OC 2 FT OC	13,190 SF
	FLOATING-STEMMED AQUATIC			
	RICE CUTGRASS	LEERSIA ORYZOIDES	1 FT OC	
LOWER DRAW DOWN UPPER LIMIT: MID-POINT BETWEEN SHW AND SLW ELEVATIONS LOWER LIMIT: SLW ELEVATION	HERBACEOUS EMERGENT			
	PORCUPINE SEDGE CHUFA MARSH SPIKE RUSH COMMON THREE SQUARE BROAD-LEAVED CATTAIL	CAREX HYSTRICINA CYPERUS ESCULENTUS ELEOCHARIS PALUSTRIS SCIRPUS PUNGENS (S. AMERICANUS) TYPHA LATIFOLIA	2 FT OC TUBERS 50 LBS/AC 1 FT OC 2 FT OC 2 FT OC	7,335 SF
	FLOATING-STEMMED AQUATIC			
	RICE CUTGRASS	LEERSIA ORYZOIDES	1 FT OC	
BELOW DRAW DOWN – UPPER UPPER LIMIT: SLW ELEVATION LOWER LIMIT: 1 FT BELOW SLW	HERBACEOUS EMERGENT			
	LAKE SEDGE DUCK POTATO SOFT STEM BULRUSH BROAD-LEAVED CATTAIL	CAREX LACUSTRIS SAGITTARIA LATIFOLIA SCIRPUS VALIDUS TYPHA LATIFOLIA	2 FT OC 2 FT OC 2 FT OC 2 FT OC	8,290 SF
	FLOATING-LEAVED AQUATIC			
	SPATTERDOCK	NUPHAR LUTEUM (N. ADVENA)	0.5 FT OC	
BELOW DRAW DOWN – LOWER UPPER LIMIT: 1 FT BELOW SLW LOWER LIMIT: POND BOTTOM	HERBACEOUS EMERGENT			
	LAKE SEDGE DUCK POTATO	CAREX LACUSTRIS SAGITTARIA LATIFOLIA	2 FT OC 2 FT OC	8,290 SF
	FLOATING-LEAVED AQUATIC			
	SPATTERDOCK	NUPHAR LUTEUM (N. ADVENA)	0.5 FT OC	
	SUBMERGED AQUATIC			
	LONG-LEAVED POND PLANT	POTAMOGETON NODOSUS (P. AMERICANUS)	2 FT OC	

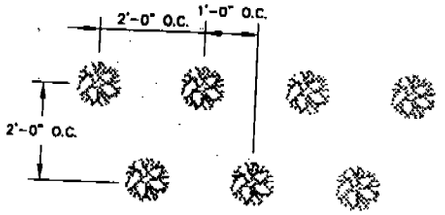
CANDIDATE PLANT SPECIES – PONDS SUBJECT TO

ZONE	COMMON NAME
ABOVE DRAW DOWN UPPER LIMIT: 18 INCHES ABOVE SEASONAL HIGH WATER (SHW) ELEVATION LOWER LIMIT: SHW ELEVATION	HERBACEOUS EMERGENT
	REDTOP SWITCHGRASS COMMON THREE SQUARE
UPPER DRAW DOWN UPPER LIMIT: SHW ELEVATION LOWER LIMIT: MID-POINT BETWEEN SHW AND SEASONAL LOW WATER (SLW) ELEVATIONS	HERBACEOUS EMERGENT
	SWEET FLAG REDTOP MARSH SPIKE RUSH OLNEY'S BULRUSH COMMON THREE SQUARE NARROW-LEAVED CATTAIL
LOWER DRAW DOWN UPPER LIMIT: MID-POINT BETWEEN SHW AND SLW ELEVATIONS LOWER LIMIT: SLW ELEVATION	HERBACEOUS EMERGENT
	SWEET FLAG MARSH SPIKE RUSH OLNEY'S BULRUSH COMMON THREE SQUARE NARROW-LEAVED CATTAIL
BELOW DRAW DOWN UPPER LIMIT: SLW ELEVATION LOWER LIMIT: POND BOTTOM	HERBACEOUS EMERGENT
	SWEET FLAG OLNEY'S BULRUSH COMMON THREE SQUARE NARROW-LEAVED CATTAIL
	SUBMERGED AQUATIC
	WILD CELERY

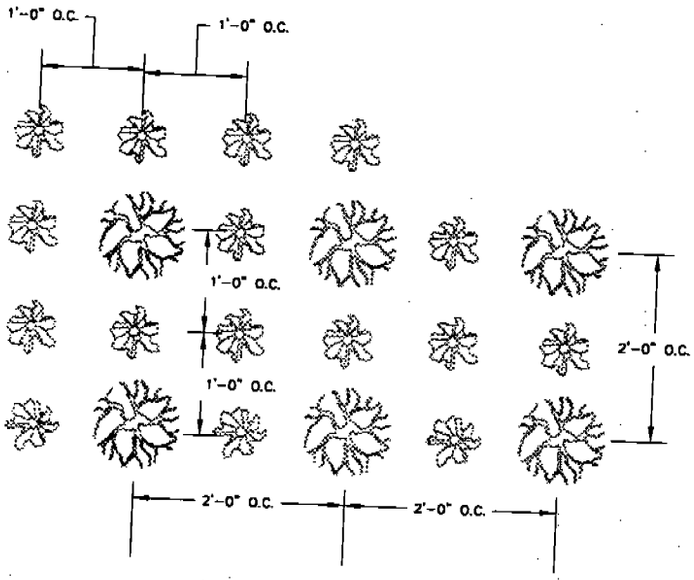
PLANTING METHOD

PLANTING SHALL BE DONE B
BY THE ENGINEER. THE DIBB
THE MOIST TOPSOIL FOR PLA
THE ROOT TO BE INSERTED V
PLANTED SO THAT THE LEAF
THE HOLE, THE HOLE SHALL
PRESSURE TO THE EDGE OF
ENGINEER. PLANTS WHICH HA
DURING THE PLANTING PROCE





GROUND COVER SPACING DETAIL
2'-0" ON CENTER ONLY
NTS



GROUND COVER SPACING DETAIL
MIXED PLANTINGS: 2'-0" ON CENTER WITH 1'-0" ON CENTER
NTS

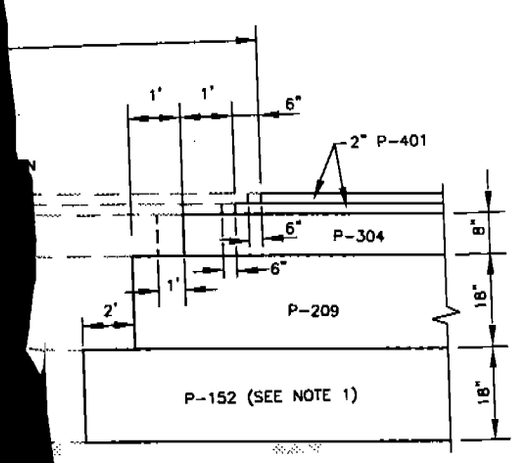
TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 800
Arlington, VA 22201

DESIGNED	TDB
DRAWN	OCO
CHECKED	KS
APPROVED	TS

STATE OF MARYLAND – TERRENCE BOULDIN – LICENSE NO. 12420 – REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
4	5/14/98	ADDENDUM 4, ADD APPROX. PLANTS AREA

MAR
STATE A



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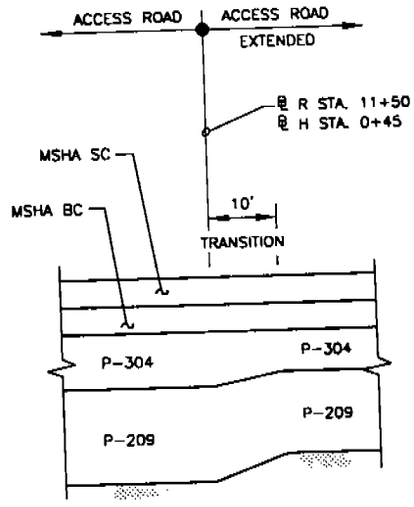
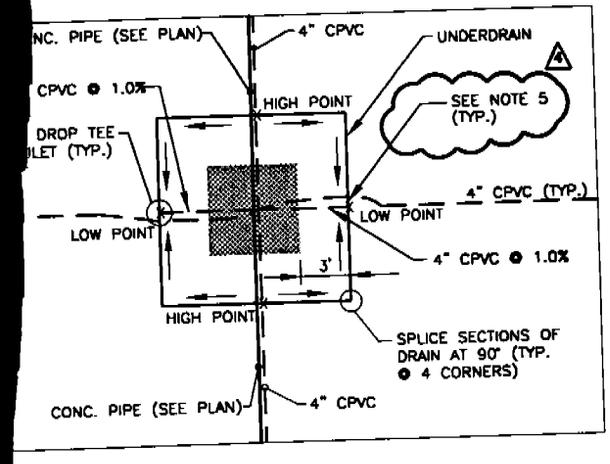


ACCESS ROAD PAVEMENT TRANSITION

NOT TO SCALE



PARTIAL PLAN UNDERDRAIN @ INLETS

SCALE: 1"=5'

NOTES :

1. COMPACTION REQUIREMENTS FOR SUBGRADE SOILS VARY. REFER TO ITEM P-152.
2. LOCATIONS SHOWN MAY BE REVISED AT THE ENGINEER'S DISCRETION WHERE DAMAGE TO PREVIOUSLY PLACED PAVEMENT COURSES IS EVIDENT. IN NO CASE WILL ADJOINING PAVEMENT COURSES BE PLACED AGAINST DAMAGED COURSES WITHOUT THE APPROVAL OF THE ENGINEER. SHOULD DAMAGE OR WEAKENING OF THE SUBGRADE BE EVIDENT, FROM WHATEVER CAUSE, THE PAVEMENT STRUCTURE SHALL BE REMOVED, THE SUBGRADE REWORKED AND COMPACTED IN ACCORDANCE WITH ITEM P-152, AND THE PAVEMENT COURSES REPLACED TO THE LIMITS REQUIRED BY THE ENGINEER.
3. USE THICKNESS DETERMINED BY 1.25 T_2 RAISED TO THE NEXT FULL INCH. E.G. T_2=7" : 1.25 T_2=1.25(7) = 8.75", USE 9".
4. SAW PREVIOUSLY PLACED PAVEMENT COURSES AT THE LOCATIONS SHOWN, EXPOSING NEAT VERTICAL FACES. IN UNDAMAGED MATERIAL, PAINT EXPOSED FACES OF ASPHALT WITH TACK COAT AT 0.15 GAL/SY, AND MOISTEN EXPOSED FACES OF P-304 AND P-209 WITH WATER BEFORE PLACING ADJACENT COURSES.
5. 4" CPVC LINES (FOUR SIDES) TO CROSS UNDER THE UNDERDRAIN LINE.

4

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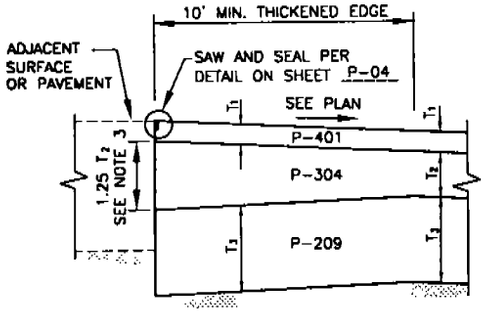
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

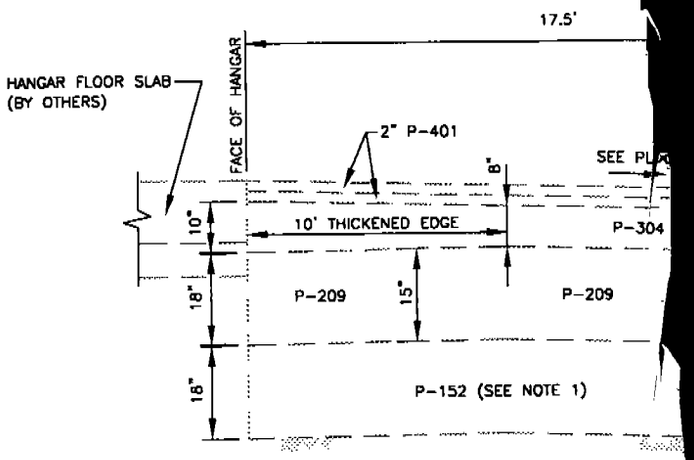
MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: PAVEMENT DETAILS II	SHEET NO.: P-04
SCALE: NO SCALE	DATE: MARCH 31, 1998



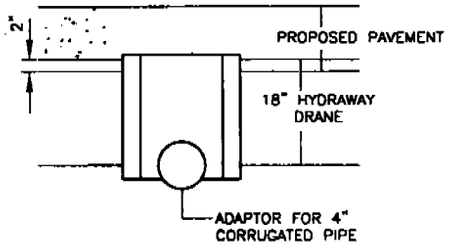
TYPICAL THICKENED EDGE

NOT TO SCALE



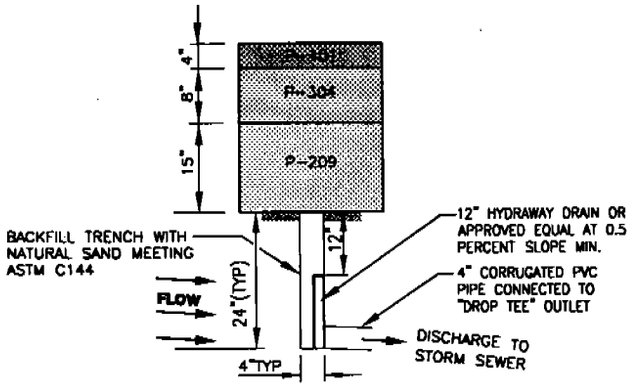
APRON PAVING AT FACE

NOT TO SCALE



DROP TEE OUTLET DETAIL

NOT TO SCALE



UNDERDRAIN INSTALLATION

NOT TO SCALE

TAMS

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ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP/FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
4	5/14/98	ADDENDUM 4, ADD NOTE

MAR
STATE A

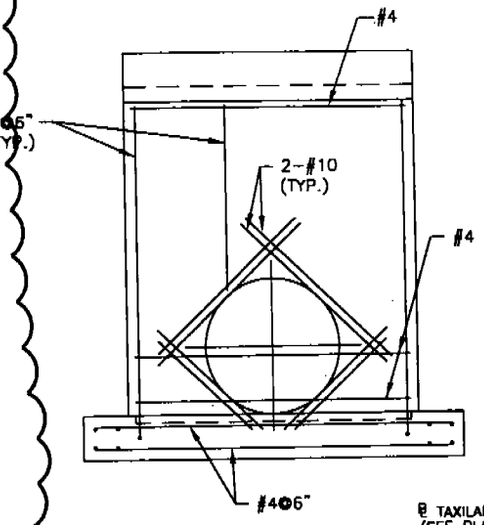
BOT.

Y BE REQ'D.
NG LOGS FOR
UNDWATER

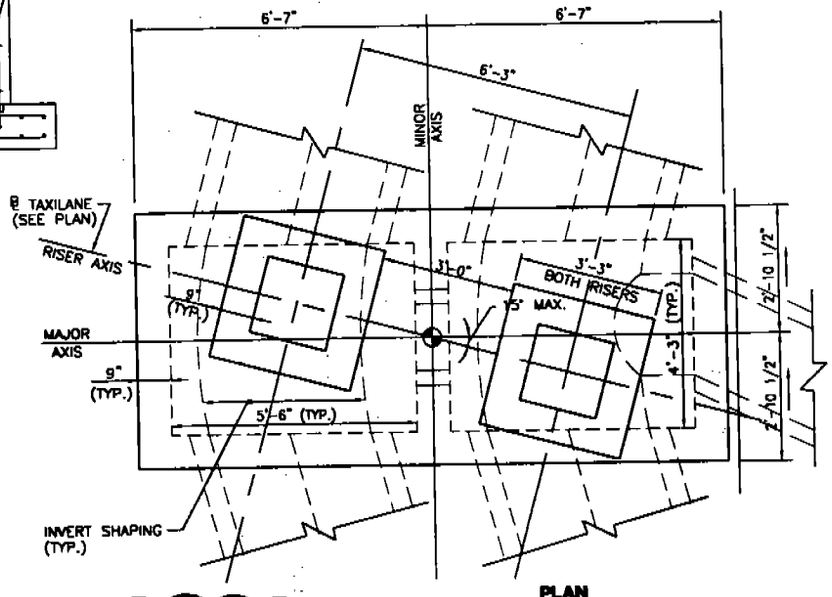
S REQ'D.
AT PIPE

NOTES:

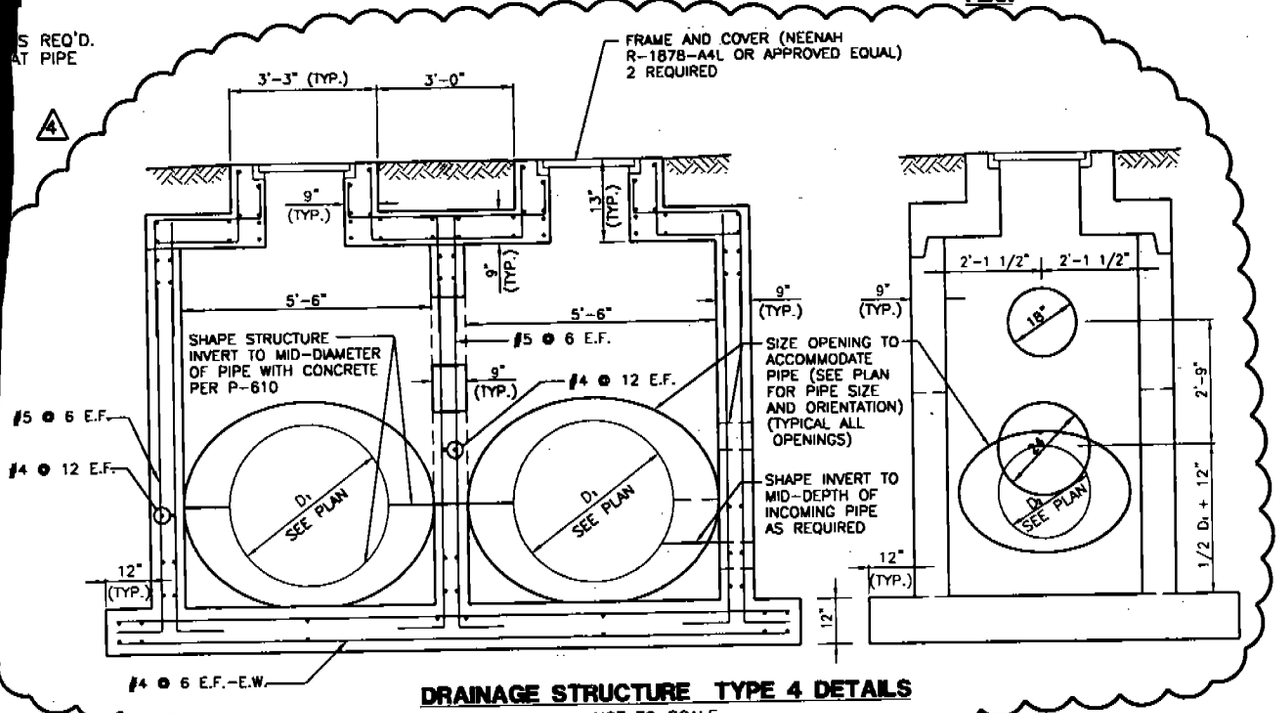
1. PIPE INSTALLED UNDER THIS CONTRACT WILL BE INSTALLED AS SHOWN IN DETAIL (A) THIS SHEET, EXCEPT AS NOTED ON THE PLANS.
2. TEMPORARY SHEETING, SHORING, DEWATERING, AND OTHER METHODS OF PREVENTING OR PROTECTING AGAINST CAVE IN OR OTHER HAZARDS SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY AND SHALL BE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL LAWS.
3. DEWATERING SHALL BE MAINTAINED THROUGH THE INSTALLATION OF THE DRAINAGE SYSTEM AS REQUIRED.
4. PIPE UP TO AND INCLUDING 24" DIAMETER SHALL BE C-WALL CLASS IV PIPE MEETING THE REQUIREMENTS OF ASTM C 76. PIPE 27" IN DIAMETER AND LARGER SHALL BE THIKEST-WALL CLASS B-25 PIPE MEETING THE REQUIREMENTS OF ASTM C 361.



SECTION B



PLAN



DRAINAGE STRUCTURE TYPE 4 DETAILS

NOT TO SCALE

TIN
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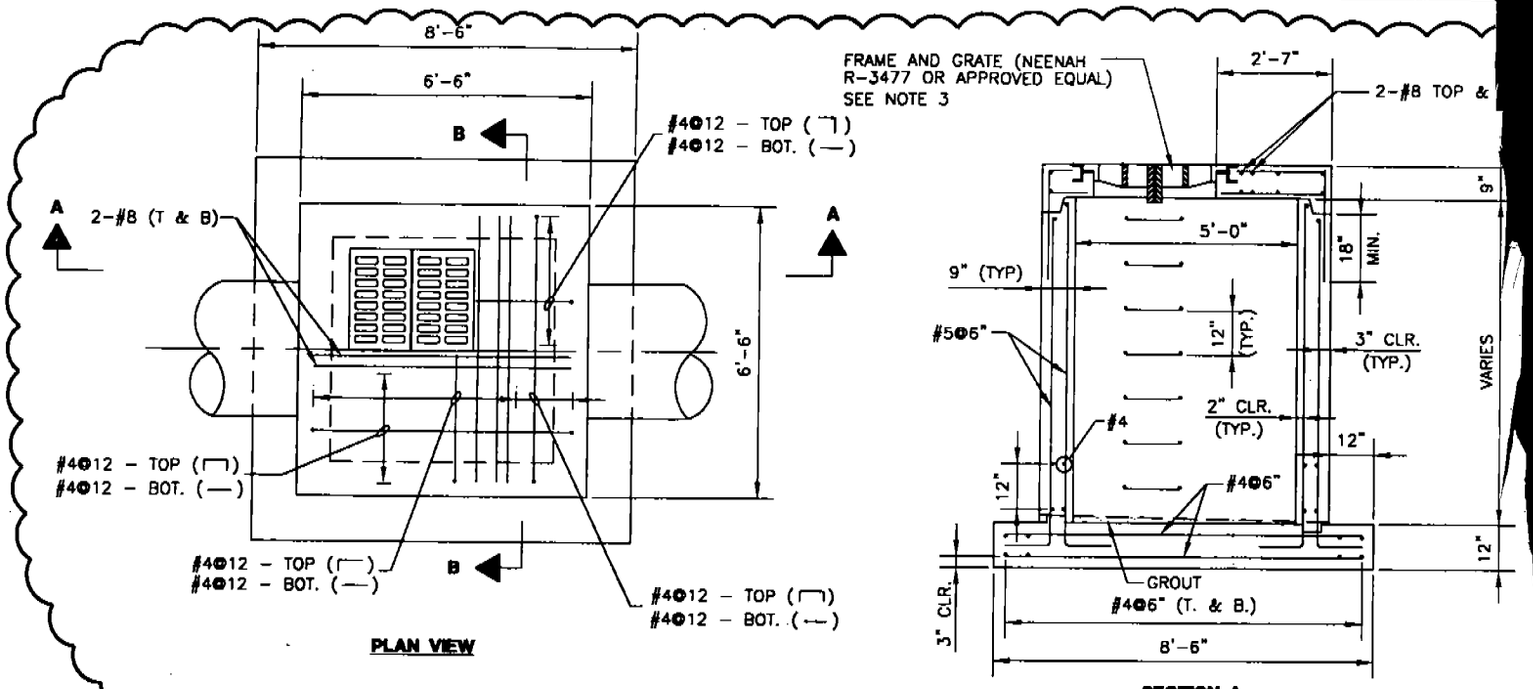
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

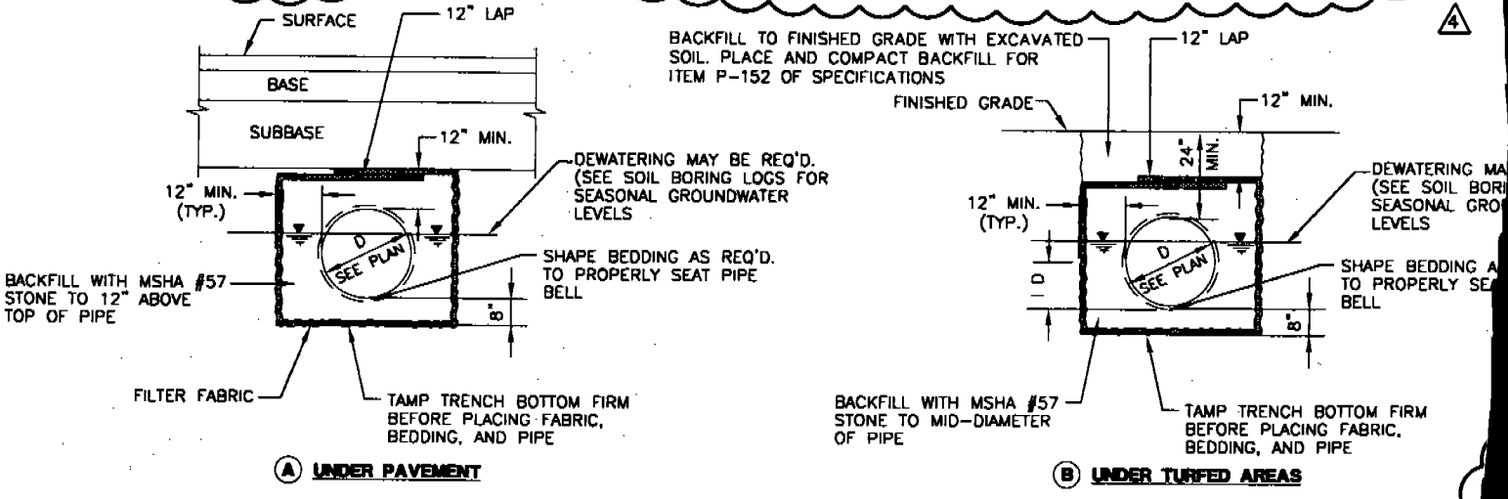
MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
PROJECT NO.	MAA-CO-97-019
SHEET TITLE	DRAINAGE DETAILS III
SHEET NO.	U-17
SCALE	NONE
DATE	MARCH 31, 1998



DRAINAGE STRUCTURE TYPE 1 AND AIRSIDE MANHOLE

NOT TO SCALE



TYPICAL STORMDRAIN PIPE BEDDING DETAILS

NOT TO SCALE

NOTES:

1. CONCRETE SHALL MEET THE REQUIREMENTS OF ITEM P-610. CONCRETE USED FOR INVERT SHAPING ONLY MAY BE 3000 PSI AT CONTRACTOR'S OPTION.
2. STRUCTURE LOCATIONS AND APPROXIMATE ORIENTATIONS ARE SHOWN ON SHEETS C-04 AND C-05. STRUCTURES SHALL BE ORIENTED TO MINIMIZE THE ANGLES BETWEEN THE STRUCTURE AND INCOMING PIPE. THE MAXIMUM SKEW BETWEEN THE RISER AXIS AND MAJOR AXIS SHALL BE 15°.
3. FOR MH OPENING, SIZE SHALL BE 24" x 24". MH FRAME AND COVER (NEENAH R-6662-HR OR APPROVED EQUAL). 4
4. PROVIDE OPENINGS OR KNOCK-OUT PANELS FOR FUTURE PIPE AS SHOWN ON PLANS.

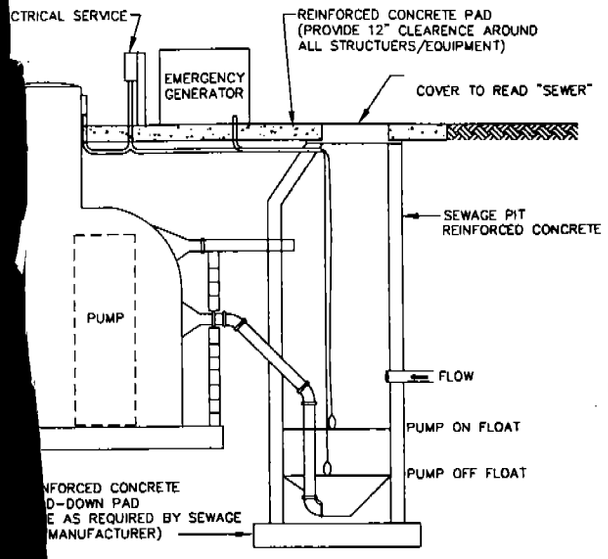
TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 800
Arlington, VA 22201

DESIGNED	TS
DRAWN	JPO
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
4	5/14/98	ADDENDUM 4, REVISED DETAILS AND NOTE

MAR
STATE A



4

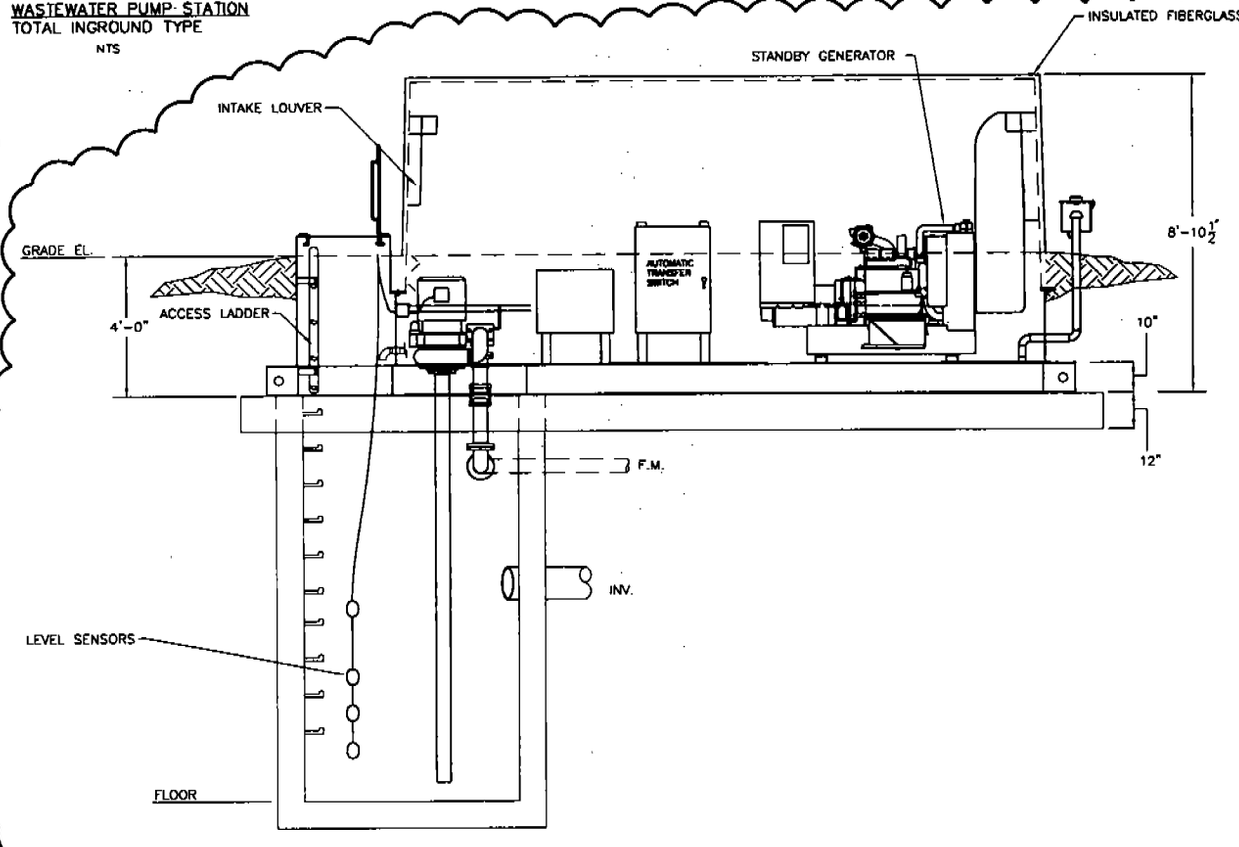
PUMP STATIONS (P.S.) OPERATING REQUIREMENTS:

	* P.S. #4	P.S. #3	P.S. #2	P.S. #1
Electrical Requirements:				
Voltage	120/240	120/240	120/240	120/240
Phase	1	1	1	1
Amperage	80	40	40	40
Pumping Equipment				
Design Flow (GPM)	100	130	130	225
Design Head (FT)	20	23	17	17
Horsepower	1.5	2.0	2.0	3.0
Voltage	1/120/240	1/120/240	1/120/240	1/120/240
Discharge Size (IN)	4"	4"	4"	6"

Standby Power Equipment	P.S. #4	P.S. #3	P.S. #2	P.S. #1
KW	25	20	20	20
BHP	42	42	42	42
Rating (Amps)	80	80	80	80

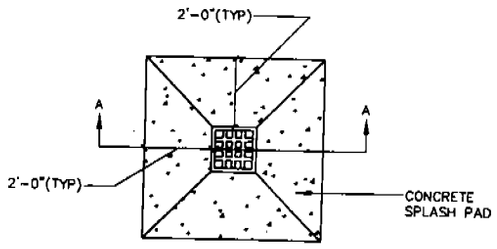
* P.S. # 4 SHALL BE TOTAL INGROUND

WASTEWATER PUMP STATION
TOTAL INGROUND TYPE
NTS

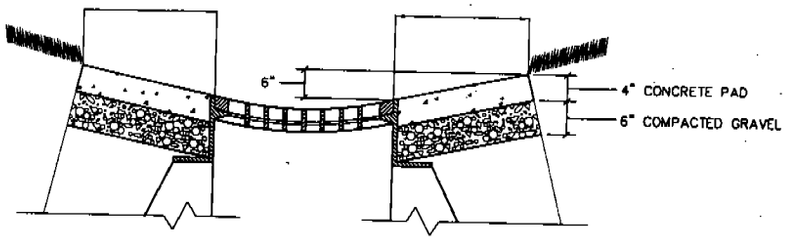


WASTEWATER PUMP STATION
PARTIAL INGROUND TYPE
NTS

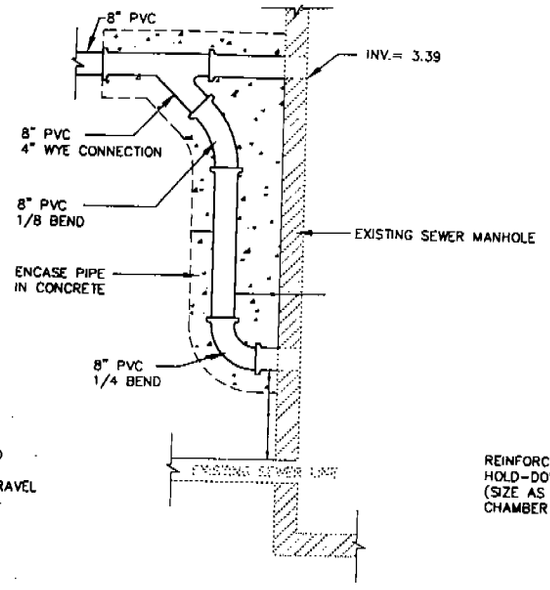
MARTIN AIRPORT	MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING **MARTIN STATE AIRPORT**	PROJECT TITLE: **MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I**	PROJECT NO.: **MAA-CO-97-019**
		SHEET TITLE: **UTILITY DETAILS III**	SHEET NO.: **U-22**
		SCALE: **NOT TO SCALE** / DATE: **MARCH 31, 1998**	



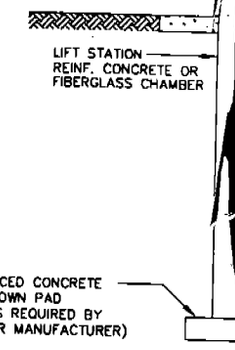
PLAN
NTS



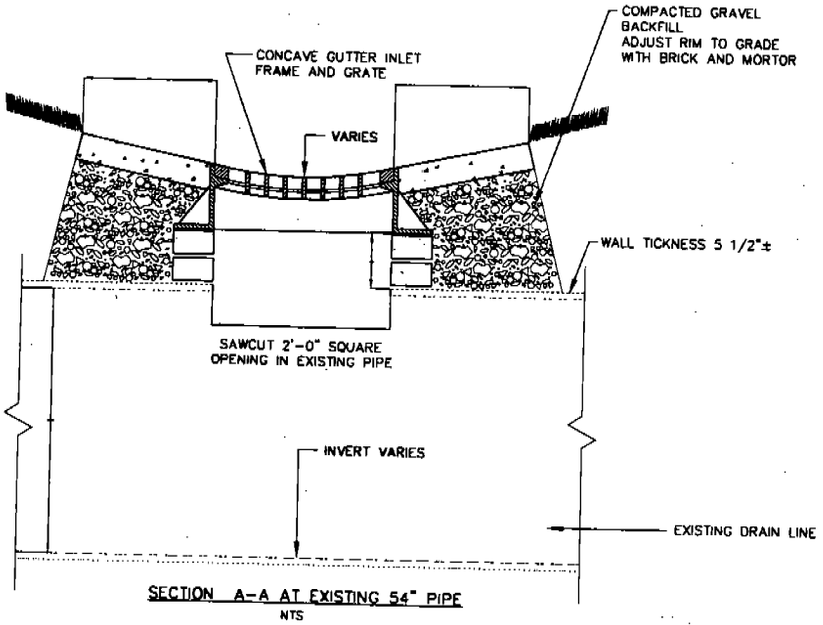
SECTION A-A AT CATCH BASIN
NTS



CONNECTION TO EXISTING SEWER MANHOLE
NTS



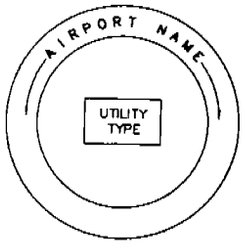
CAST IRON FRAME AND COVER



SECTION A-A AT EXISTING 54" PIPE
NTS

ALL NEW REPLACEMENT AIRPORT MANHOLE/HANDHOLE COVERS/LIDS SHALL INCLUDE THE NAME "MARTIN STATE AIRPORT" AND THE TYPE OF THE UTILITY-

"ELECTRIC"
"STORMWATER"
"SANITARY SEWER"
"GAS"
"TELEPHONE"
"FIRE"
"WATER"
"OIL-WATER SEPARATOR"
"SEDIMENT CHAMBER"



LETTERING SHALL BE HELVITICA MEDIUM, CAPITALIZED AND 1 1/8 INCHES IN HEIGHT.

STANDARD UTILITY COVER DETAIL
N.T.S.

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	TDB
DRAWN	OCO
CHECKED	TDB
APPROVED	MB

STATE OF MARYLAND — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
4	5/14/98	ADDENDUM 4

MAR
STATE A

ADDENDUM NO. 4

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

ADDENDUM TO PLANS AND SPECIFICATIONS

CONTRACT NO. MAA-CO-97-019
MIDFIELD COMPLEX CONSTRUCTION SITE DEVELOPMENT
AT MARTIN STATE AIRPORT

ACKNOWLEDGMENT OF RECEIPT

The undersigned acknowledges that Addendum No. 4 to Maryland Aviation Administration Plans and Specifications for Contract No. MAA-CO-97-019 has been received by the undersigned and will be incorporated in all copies of said Plans and Specifications in the possession of the undersigned.

It is understood that all proposals submitted in response to MAA-CO-97-019 will be presumed to be based upon full knowledge of the contents of Addendum No. 3.

_____
(Company Name)

By: _____
(Signature-Authorized Official)

_____
(Title)

_____
(Date)

IMPORTANT

NOTE: PLEASE SIGN AND DATE THE "ACKNOWLEDGMENT OF RECEIPT" AND RETURN VIA FACSIMILE (410-859-5440) IMMEDIATELY.

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

ADDENDUM NUMBER 4

Midfield Terminal Complex
Site Development, Phase I
at
Martin State Airport

CONTRACT NUMBER: MAA-CO-97-019

May 14, 1998

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
Office of Planning and Engineering
Terminal Building, Lower Level, Pier A
P.O. Box 8766
Baltimore/Washington International Airport, Maryland 21240

Midfield terminal Complex Development, Phase I
at
Martin State Airport

Contract Number MAA-CO-97-019

ADDENDUM NO. 4

IMPORTANT: Bidders must acknowledge the receipt of this Addendum on the Bid Forms, page BF-18, stating the Addendum Number. Additionally, Bidders must acknowledge purchase of the Standard Provisions by volume and date on page BF-18.

BID DUE DATE: MAY 28, 1998
2 P.M.

REVISIONS ADDITIONS AND DELETIONS TO THE CONTRACT DOCUMENTS

Technical Provisions

PART I GENERAL INFORMATION

Section GI-1.02 Notice to Contractors: *After the first paragraph, add the following:*

"THE MARYLAND AVIATION ADMINISTRATION RESERVES THE RIGHT TO REJECT ANY AND ALL BIDS IF IN ITS JUDGEMENT THE INTEREST OF THE ADMINISTRATION MAY SO REQUIRE."

Section GI-1.06 Critical Path Schedule: Revised to read as follows:

"Critical Path Method (CPM) Schedule is required for this project. The Contractor shall develop and submit the CPM Schedule in accordance with the requirements specified in the Special Provisions, Section SP-8.03."

Section GI-1.08 Special Construction Requirements

Article G Basis of Award: second sentence: after "Same items", add ", except earthwork Items P-152.2 and P-152.3,".

PART I TECHNICAL SPECIFICATIONS

Section 1300 Sanitary Sewage and Water Supply System

A. Article 2.3 Sanitary Sewage Lift Station:

1. First line: after "..dry pit design", add "and shall be either total inground or partial inground type design."

2. Eleventh line: change "a flow rate of 130 gallons per minute," to read "a flow rate as follows: Sewer Pump Station No. 1 - 225 GPM, Sewer Pump Station Nos. 2 and 3 - 130 GPM, Sewer Pump Station No. 4 - 100 GPM,".

3. Next to the last line: after "Mansfield, Ohio", add "or Precision System Twin Pac by AMES, Inc. Columbia, Maryland, or approved equal."

B. Article 6.3 : add the following Pay Items:

"Item 1300.9.1 Sanitary Sewer Pump Station (100 GPM)--- each
Item 1300.9.2 Sanitary Sewer Pump Station (130 GPM)--- each
Item 1300.9.3 Sanitary Sewer Pump Station (225 GPM)--- each"

Section 16120 Wires and Cables: Article 2.3.A.: first line: change "twelve (24) fiber" to "twenty (24) fiber".

Item 16321 Pole Mount Transformer: Article 3.1.B. add the following: "Primary lightning arresters and fused cutouts shall be equivalent to Cooper Power Systems Type AZL/STF, rated 15 kv, 50 Amperes Continuous, 1200 Amps interrupting minimum."

Item D-751 Manholes, Catch Basins, and Inlets

Article 1.3:

Manhole: After the last line, add the following: "This item include the following structures DMH3-9, DMH3-10, DMH1-1, DMH1-2, DMH1-3, DMH1-5, and DMH1-6. Manhole structure shall be as shown on the Plans, Sheet U-15."

Type I: After the last line, add the following: "This item includes the following structures: DMH3-3A, DMH3-4 through DMH3-8, CB3-3A, CB3-4, CB3-5, CB3-6, and CB3-17 through CB3-25. Type I drainage structure shall be as shown on the Plans Sheet U-17."

Type II: After the last line, add the Following: "This item includes the following structures: CB1-1 through CB1-6, CB1-7A, CB1-8 through CB1-11, CB1-12A, and CB2-33. Type II drainage structure shall be as shown on the Plans Sheet 17."

Type III: After the last line, add the following: "Curb inlets shall be Maryland Department of Transportation Curb Inlet Standard Nos. 374.51 or 374.61 with 5' trough opening.

Item L-110 Installation of Airport Underground Electrical Duct

Article 5.1: six line: change "Sched. 40 Conduit" to "Sched. 80 Conduit".

PART VI BID FORMS

Bid Tabulation Forms

A new set of Bid Tabulation Forms is issued. The attached Bid Tabulation Forms, Page BF-20B to Page BF-70B supersedes the existing form.

CONTRACT PLANS

Sheet G-04 : Revised Summary of Estimated Quantities Table. See the attached reduced size print of Sheet G-04.

Sheet G-09 : Revised Plan and Notes. See the attached reduced size print of Sheet G-09.

Sheet G-10 : Revised Plan and Note, detail added. See the attached reduced size print of Sheet G-10

Sheet G-11 : Revised Plan and Note. See the attached reduced size print of Sheet G-11.

Sheet C-01 : Added manhole description. See the attached reduced size print of Sheet C-01.

Sheet C-02 : Added drainage structure descriptions. See the attached reduced size print of Sheet C-02.

Sheet C-03 : Revised pipe sizes. See the attached reduced size print of Sheet C-03.

Sheet C-05 : Clarified limit of work. See the attached reduced size print of Sheet C-05.

Sheet C-06 : Clarify pipe dimensions. See the attached reduced size print of Sheet C-06.

Sheet C-07 : Added drainage structure descriptions. See the attached reduced size print of Sheet C-07.

Sheet C-21 : Revised pipe sizes, invert and pump identifications. See the attached reduced size print of Sheet C-21.

Sheet C-22 : Revised pipe sizes, invert and pump identifications. See the attached reduced size print of Sheet C-22.

Sheet V-01 : Clarified netting area. See the attached reduced size print of Sheet V-01.

Sheet V-02 : Misc. revisions. See the attached reduced size print of Sheet V-02.

Sheet V-04 : Added planting SF quantities. See the attached reduced size print of Sheet V-04.

Sheet P-04 : Added note. See the attached reduced size print of Sheet P-04.

Sheet U-17 : Revised details and note. See the attached reduced size print of Sheet U-17.

Sheet U-22 : Added detail and pump information. See the attached reduced size print of Sheet U-22.

Sheet E-01 : Revised Legend. See Attachment E-01B.

Sheet E-04 : Clarified Handholes and elect. duct. See Attachment E-04B.

Sheet E-06 : Revised Light Pole Plan. See Attachment E-06B.

Response to written inquiries

Responses to the attached written inquiries from CNR Lighting, dated April 29, 1998, are as follows:

1. As indicated in the Technical Specification Section L-125.2.1.A., manufacturers for airport lighting equipment and materials shall have prior approval of the FAA, and shall be as listed in Advisory Circular (AC) 150/5345-1U. FAA Advisory Circular can be examined on the Internet at the following address:

   "WWW.FAA.GOV/ARP/ARPHOME.HTM".

   The existing taxiway edge lights and retroreflective guidance signs at Martin State Airport are manufactured ADB-ALNACO, Inc.

2. See the above.

Responses to the attached written inquiries from FACCHINA Construction Company, Inc., dated May 4, 1998 (Letter No. 1), are as follows:

1. There is a 12' run of 42" RCP between EW3-4 and EW3-5 in all Add Alternates. For revised quantities of RCP's, CB's and DMH's, see revised pages of the Bid Tabulation Form, included in this Addendum.

2. The number immediately after "CB" and "DMH" depicts the designated pond where the storm water is drained into. The required type of each drainage structure is clarified in the revised Section D-751.1.3, included in this Addendum.

Responses to the attached written inquiries from FACCHINA Construction Company, Inc., dated May 4, 1998 (Letter No.2), are as follows:

1. The storm drainage pipes from CB2-33 to CB2-29 to CB2-28 are 30" RCP, and pipe between CB2-28 and DMH1-2 is 18" RCP as shown on the Plans. It should be noted that since Pond 2 will not be constructed in this contract, the 18" pipe between CB2-28 and DMH1-2 is provided at this location to temporarily drain the storm water to Pond 1 in stead of Pond 2 as the original design was intended. Once Pond 2 is constructed (in the next contract), this 18" pipe will be abandoned, and a 30" RCP will be installed between CB2-28 and Pond 2.

2. The 42" RCP across the Access Road at Station 4+50 will not be constructed in this contract. See Addendum 1 for clarification.

3. There will be approximately 54 LF of 30" RCP at the Access Road Station 9+80. For the required quantity of this pipe, see the revised pages of the Bid Tabulation Form, included in this Addendum.

4. Sediment Chamber 1-1 has a 12" overflow and a 30" outlet pipes as shown on the Plans. Revised quantities for these items are incorporated on the revised pages of the Bid Tabulation Form, included in this Addendum.

Responses to the attached written inquiries from FACCHINA Construction Company, Inc., dated May 4, 1998 (Letter No. 3), are as follows:

1. Clarification for all storm drain inlet types is included in this Addendum. Inlet Type 3 is a MDOT Curb Inlet Standards 374.51 or 374.61, 5' trough opening.

2. Clarification for Inlet Types 1 and 2 details is included in this Addendum. See Technical Provisions Item D-751.

3. Add Alternate 1 will include grading for Lockheed-Martin Taxiway and Apron areas. Revised scope of work and quantities are included in this Addendum.

4. Filter fabric is required for all storm drain pipe as shown on the Plans.

Responses to the attached written inquiries from FACCHINA Construction Company, Inc., dated May 5, 1998 (Letter No. 1), are as follows:

1. Clarification for all storm drain structures is included in this Addendum. The inquired catch basin is a MDOT Curb Inlet Standards 374.51 or 374.61.

2. The 320' - 36" RCP from DMH1-2 to SC1-1 is included in the Base Project. The required quantity is included in this Addendum.

3. Clarification for all storm drain structures is included in this Addendum.

4. Filter fabric is required for all storm drain pipe as shown on the Plans.

Responses to the attached written inquiries from FACCHINA Construction Company, Inc., dated May 5, 1998 (Letter No. 2), are as follows:

1. Connection of the 14" pump house supply main to the existing 12" water main requires a wet tap.

Responses to the attached written inquiries from FACCHINA Construction Company, Inc., dated May 5, 1998 (Letter No. 3), are as follows:

1. The sanitary force main from the pump station and SMH 14 is a 4" PVC.

Responses to the attached written inquiries from Benfield Electric Company, Inc., dated May 5, 1998, are as follows:

1. The existing sewage pump station is not required to be connected to the autodialer system. Replaced equipment at this location is to be reconnected to the existing power source.

2. The power source for the oil/water high level alarm panel(s) is to come from 120 volt panelboard circuit(s) originating in the proposed hanger/office complexes. In addition, the alarm panels are to be mounted on the exterior building wall of these complexes. The contractor will have to provide a temporary support (4"x 4 x 8' lumber) for the alarm panel(s) until the building(s) are constructed. In addition, he will have to coordinate with the building contractor to complete installation of the alarm panel(s). The drawings do show a conduit originating from handhole(s) adjacent the oil/water separators and terminating at 15 feet from the building edge. This conduit is for routing signal wires from the oil/water separator to the building wall.

3. Seeding is part of T-901.1 Permanent Seeding.

4. The fire pump house will house two fuel day tanks for the fire pump generators. Each of these day tanks is to be provided with fuel gauges with electrical analog outputs (4-20mA) wired back to the autodialer with 2-conductor shielded cable, #22 AWG copper conductors, color coded, 100% foil shield with drain wire. Conductors are to be installed in conduit from fuel gauge to autodialer.

5. Airside manholes are mislabeled. They should be identified as airside handholes. These handholes are detailed on drawing sheet E-09. These handholes and 4-way duct bank are to be paid under Item 16110.1- Electrical Handhole, and Item 16110.6 - 4 Way Ductbank respectively.

6. These pads are for the utility padmount transformers XFR-1 and XFR-2. The contractor should coordinate with BG&E for details.

Responses to the attached written inquiries from IA Construction Corporation, dated May 5, 1998, are as follows:

1. For the earthwork item only (Items P-152.2 and P-152.3), contractors will be allowed to quote different prices for different alternates.

2. Prices for Lump Sum items including Mobilization/Demobilization and Temporary Construction Items should be different for different alternates.

Responses to the attached written inquiries from Black River Supply, Inc., dated May 5, 1998, are as follows:

1. See responses to FACCHINA Construction Company's inquiries including in this Addendum.

2. Same as the above.

3. Same as the above.

4. There is no pipe profiles. Contractors are to follow pipe inverts shown on the Plans.

5. All pipe inverts are listed on the Plans.

Responses to the attached written inquiries from FACCHINA Construction Company, Inc., dated May 6, 1998, are as follows:

1. DMH1-4 shown on Sheet C-07 is a Type 4 Storm drainage structure to be constructed in the base project. Detail for this structure is included in Addendum 1. See also this Addendum for addition clarifications.

Responses to the attached written inquiries from RHOTEN & SONS, Inc., dated May 6, 1998, are as follows:

Contrary to the wetland, Ponds 1, 3A and 3B are extended detention ponds where water level will be fluctuated or even dry most of the time. Pond planting will have to be done after the water level has been determined in field. Contractors are allowed options to select anyone of species listed on Sheet V-04. For estimated SF for each plant type required for ponds, see revised Sheet V-04 included in this Addendum.

Responses to the attached written inquiries from MODERN Electric of Maryland, Ltd., (Letter No. 1), dated May 7, 1998, are as follows:

1. Fire Alarm System specifications are shown on Sheet U-14.

2. Sewage pump station #4 is to be reconnected to the existing station electrical source.

3. The contractor should coordinate with BG&E and furnish a 480/277v, 200 Amp Electric Service. If BG&E does not require a CT cabinet then the contractor does not have to supply one.

4. The contractor should furnish the telephone termination cabinet, cabinet foundation with associated duct work and cabinet grounding components.

5. Contractor should coordinate with BG&E and furnish cable racks and/or rack supports according to BG&E requirements.

6. Yes. The local alarm panels are to be included under Item 1300.9 - Sanitary Sewer Pump Station.

7. Primary lightning arresters and fused cutouts are to be equivalent to Cooper Power Systems Type AZL/STF, rated 15 kv, 50 Amperes Continuous, 1200 Amps interrupting minimum.

8. Sewage pump station 4 does not need telephone autodialer. However, pump station 4 requires only a local alarm panel.

9. 2#8 5 kv L-824 cables is the correct designation. Revised drawing Sheets E-01 and E-04 are included in this Addendum.

Responses to the attached written inquiries from MODERN Electric of Maryland, Ltd., (Letter No. 2), dated May 7, 1998, are as follows:

1. Cable racks and manhole cover frame are to be grounded with #6 bare copper stranded wire.

2. Quantity of two is correct for bid item 16510-4. Revised corresponding page of the Bid tabulation Form is included in this Addendum.

3. Exothermic weld of ground wire to ground rod should be used where identified on contract drawings. Mechanical ground clamp is acceptable where shown on the contract drawings.

4. Yes. Counterpoise wire only gets installed over ducts that contain L-824 cable.

5. Round tapered pole is correct. Revised pole foundation detail for grass area is included in this Addendum.

Responses to the attached written inquiries from John Driggs Company, Inc., dated May 7, 1998, are as follows:

1. P-152 is a prepared subgrade for the pavement section. For compaction requirements, see Technical Specification Section P-152.2.2.C.5.

2. Unless the Contractor can demonstrate that the existing subgrade soil is suitable and well compacted, he is required to undercut the existing soil and backfill with P-152 material.

3. P-152 material is any non-organic, compactable material found on the site. The suitability of P-152 material shall be approved by the Engineer.

Responses to the attached written inquiries from MODERN Electric of Maryland, Ltd., dated May 8, 1998, are as follows:

1. Item 16170.1 identifies safety disconnect switches which may be located at the point of connection of electric service to sewage pump stations 1, 2, 3 & 4.

2. The base project requires seven luminaires to be installed. Luminaire quantities on drawing sheet G-04 shown for the base project should be changed from 13 to 7 pole mount luminaires.

3. The power source for the oil/water high level alarm panel(s) is to come from 120 volt panelboard circuit(s) originating in the proposed hanger/office complexes. In addition, the alarm panels are to be mounted on the exterior building wall of these complexes. The contractor will have to provide a temporary support (4"x 4 x 8' lumber) for the alarm panel(s) until the building(s) are constructed. In addition, he will have to coordinate with the building contractor to complete installation of the alarm panel(s). The drawings do show a conduit originating from handhole(s) adjacent the oil/water separators and terminating at 15 feet from the building edge. This conduit is for routing signal wires from the oil/water separator to the building wall.

4. See answer above.

5. The fire pump house will house two fuel day tanks for the fire pump generators. Each of these day tanks is to be provided with fuel gauges with electrical analog outputs (4-20mA) wire back to the autodialer with 2-conductor shielded cable, #22 AWG copper conductors, color coded, 100% foil shield with drain wire. Conductors are to be installed in conduit from fuel gauge to autodialer.

6. Schedule 80 PVC conduit is correct. Revised Bid Item L-110.5 is included in this Addendum.

7. These pads are for the utility padmount transformers XFR-1 and XFR-2. The contractor should coordinate with BG&E for details.

8. Three panel signs are provided in case of the required sign legend do not fit in two modules. If three module signs are not required, this item will not be used.

Responses to the attached written inquiries from Johnson Controls, dated May 8, 1998, are as follows:

1. The fiber optic cable should be a twenty-four fiber cable. Revised specifications for Item 16120 is included in this Addendum.

2. Correct. It is not required to install the fiber optic cable within an innerduct in the underground duct bank.

Responses to the attached written inquiries from Concrete Transport Inc., dated May 11, 1998, are as follows:

See the Technical Specification Section P-610.3.2.A for structural and pavement concrete mix.

END OF ADDENDUM NO.4

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	7,230		
100.2	Remove Existing Chain Link Fence	LF	2,340		
100.3	Remove Existing Underdrain Pipe	LF	0	N/A	N/A
100.4	Demolish/Remove Existing Utilities Structures	EA	5		
100.5	Remove Existing Duct Bank	LF	60		
100.6	Remove Existing Conduit and Cable	LF	500		
100.7	Demolish/Remove Existing Buildings	LS	1		
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	1,200		
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	415		
100.10	Remove Existing Pipe 54" Diameter	LF	310		
101.1	Clearing and Grubbing	ACRE	12		
101.2	Clearing Isolated Trees Type I	EA	50		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 175,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	3,735		
308.1	Stabilized Construction Entrance	SY	160		
308.2	Silt Fence	LF	13,000		
308.3	Super Silt Fence	LF	1,000		
308.4	Stone Check Dam	EA	6		
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	4		
308.9	Portable Sediment Tank	LS	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	4		
308.11	Curb Inlet Protection	EA	2		
308.12	Temporary Seeding and Mulching	ACRE	4		
427.1	Oil/Water Separator	EA	0	N/A	N/A
813.1	Roadway signs	SF	24		
1000.1	Pre-Engineered Metal Building	LS	1		
1200.1	Water Tank	LS	1		
1300.1	Water Pipe (4" Diameter)	LF	205		
1300.2	Water Pipe (8" diameter)	LF	3,620		
1300.3	Water Pipe (14" Diameter)	LF	3,825		
1300.4	Fire Hydrant	EA	1		
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	160		
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	2075		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	695		
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	3975		
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	1		
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	2		
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	1		
1300.10	Sanitary Sewer Manhole	EA	17		
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	4		
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	1		
2080.1	Asbestos Removal	LS	1		
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	1		
16000.1	Utility Cost Allowance	LS	1	Allowance	$275,000
16010.1	Basic Electrical Requirements	LS	1		
16050.1	Basic Electrical Materials and Methods	LS	1		
16100.1	Raceways, Boxes, and Cabinets	LS	1		
16110.1	Electrical Handhole	EA	46		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	14		
16110.3	Pole Foundation in Grassy Area	EA	7		
16110.4	Pole Foundation in Paved Area	EA	0	N/A	N/A
16110.5	4W-6" concrete Encased Duct	LF	1,600		
16110.6	4W-4" Concrete Encased Duct	LF	3,100		
16110.7	4W-3" Concrete Encased Duct	LF	1,500		
16110.8	2W-6" Concrete Encased Duct	LF	1,400		
16110.9	2W-4" Concrete Encased duct	LF	360		
16110.10	2W-3" Concrete Encased Duct	LF	5,500		
16110.11	2W-2" Concrete Encased Duct	LF	2,700		
16110.12	1W-4" Concrete Encased Duct	LF	0	N/A	N/A
16110.13	1W-2" Concrete Encased Duct	LF	1,900		
16110.14	Electrical Equipment Pad	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	1		
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	1		
16170.1	Motor and Circuit Disconnects	LS	1		
16195.1	Labeling and Identification	LS	1		
16321.1	Pole Mount Transformer	EA	2		
16470.1	Power Distribution Equipment	LS	1		
16510.1	Pole Mount Luminaire	EA	7		
16510.2	Exterior Wall Luminaire	EA	1		
16510.3	Interior Fluorescent Lminaire	EA	9		
16510.4	Emergency Lighting Unit	EA	2		
16510.5	Lighted Exit Sign	EA	1		
16510.6	3.5 EPA Light Pole	EA	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	7		
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	50		
P-152.2	Unclassified Excavation	CY	11,250		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	7,500		
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	0	N/A	N/A
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	2,830		
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	0	N/A	N/A
P-304.1	Cement-Treated Base Course (6" Depth)	SY	0	N/A	N/A
P-304.2	Cement-Treated Base Course (8" Depth)	SY	2,630		
P-304.3	Portland Cement	TON	90		
P-401.1	Airfield Bituminous Surface Course	TON	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	365		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	365		
P-603.1	Bituminous Tack Coat	GAL	105		
P-610.1	Concrete Curb	LF	0	N/A	N/A
P-610.2	Concrete Curb and Gutter	LF	1,580		
P-610.3	Concrete Utility Encasement	CY	20		
P-610.4	Portland Cement Concrete Pavement	SY	0	N/A	N/A
P-620.1	Pavement Marking	SF	840		
P-620.2	Pavement Marking Removal	SF	0	N/A	N/A
D-701.1	12-inch RCP Class IV	LF	70	N/A	N/A
D-701.2	15-inch RCP Class IV	LF	0		
D-701.3	18-inch RCP Class IV	LF	110		
D-701.4	24-inch RCP Class IV	LF	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	0	N/A	N/A
D-701.6	30-inch RCP Class A-25	LF	61	N/A	N/A
D-701.7	36-inch RCP Class A-25	LF	326	N/A	N/A
D-701.8	42-inch RCP Class A-25	LF	0	N/A	N/A
D-701.9	Concrete for Pipe Cradles	CY	0	N/A	N/A
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	0	N/A	N/A
D-705.2	4-inch Polyethylene Pipe	LF	0	N/A	N/A
D-705.3	4-inch Perforated Polyethylene Pipe	LF	0	N/A	N/A
D-705.4	6-inch Polyethylene Pipe	LF	0	N/A	N/A
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	0	N\A	N\A
D-751.3	Storm Drainage Inlet Type 2	EA	1		

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BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	4		
D-751.5	Storm Drainage Inlet Type 4	EA	1		
D-751.6	Adjust Structure to Grade	EA	0	N/A	N/A
D-752.1	Sedimentation Chamber	CY	17		
D-752.2	Endwall	CY	55		
D-752.3	Class I Rip-Rap	SY	40		
D-752.4	Grouted Rip-Rap	SY	90		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	0	N/A	N/A
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	0	N/A	N/A
L-108.3	Ground Rod	EA	0	N/A	N/A
L-108.4	Concrete Cable Marker	EA	0	N/A	N/A
L-110.5	2" PVC Sched. 80 conduit	LF	0	N/A	N/A
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	0	N/A	N/A
L-125.3	Two-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.4	Three-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N/A	N/A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	100		
T-905.1	Topsoiling	CY	2,000		
T-905.2	Erosion Control Netting	SY	8,200		
T-908.1	Mulching	ACRE	15		

BID TABULATION FORMS - BASE PROJECT

WETLAND MITIGATION

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
101.3	Clearing and Grubbing, Wetland Mitigation Area	AC	3.6		
101.4	Clearing Isolated Trees, Type I, Wetland Mitigation Area	EA	3		
108.3	Mobilization/ Demobilization, Wetland Mitigation Area	LS	1		
109.2	Temporary Construction Items, Wetland Mitigation Area	LS	1		
308.13	Class I Rip Rap Spillway Protection, Wetland Mitigation Area	SY	185		
308.14	Stabilized Construction Entrance, Wetland Mitigation Area	SY	150		
308.15	Super Silt Fence, Wetland Mitigation Area	LF	40		
308.16	Temporary Seeding and Mulching, Wetland Mitigation Area	AC	3		
308.17	Turbidity Curtain, Wetland Mitigation Area	LF	625		
705.1	Permanent Seeding and Mulching, Wetland Mitigation Area	SY	8,335		
710.1	Amelanchier canadensis, 5 Gallon	EA	65		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
710.2	Aronia arbutifolia "Brilliantissima", 3 Gallon	EA	30		
710.3	Cephalanthus occidentalis, 3 Gallon	EA	50		
710.4	Ilex glabra, 3 Gallon	EA	35		
710.5	Lindera benzoin, 3 Gallon	EA	25		
710.6	Myrica pensylvanica, 2 Gallon	EA	65		
710.7	Quercus borealis, 2 Inch Caliper	EA	14		
710.8	Rhus aromatica, 2 Gallon	EA	100		
710.9	Viburnum prunifolium, 5 Gallon	EA	60		
710.10	Viburnum dentatum, 3 Gallon	EA	35		
710.11	Shredded Hardwood Mulch, 3 Inch Depth	SY	480		
711.1	Panicum virgatum, 1-3/4 Inch Peat Pot	EA	9,800		
711.2	Peltandra virginica, 1 Quart Pot	EA	4,450		
711.3	Pontederia cordata, 1 Quart Pot	EA	4,450		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
711.4	Scirpus pungens, 1-3/4 Inch Peat Pot	EA	4,450		
711.5	Scirpus robustus, 1 Quart Pot	EA	2,000		
711.6	Scirpus validus, 1 Quart Pot	EA	2,550		
711.7	Goose Exclosure Fence	LF	625		
P-152.5	Stripping, Wetland Mitigation Area	CY	2,895		
P-152.6	Unclassified Excavation, Wetland Mitigation Area	CY	14,200		
T-905.3	Topsoiling, Six Inch Depth, Wetland Mitigation Area	CY	2,895		
Midfield Terminal Complex Site Development, Phase I **Total Base Project**					

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200		
100.4	Demolish/Remove Existing Utilities Structures	EA	1		
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

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BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	210		
308.1	Stabilized Construction Entrance	SY	70		
308.2	Silt Fence	LF	4,000		
308.3	Super Silt Fence	LF	960		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26		
308.11	Curb Inlet Protection	EA	1		
308.12	Temporary Seeding and Mulching	ACRE	12		
427.1	Oil/Water Separator	EA	1		
813.1	Roadway signs	SF	20		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	0	N\A	N\A
16110.4	Pole Foundation in Paved Area	EA	3		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	175	N\A	N\A
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	0	N\A	N\A
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	800		
16110.14	Electrical Equipment Pad	EA	2		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	6		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	3,000		
P-152.2	Unclassified Excavation	CY	31,700		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	8,000		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	12,700		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	7,900		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	12,450		
P-304.3	Portland Cement	TON	580		
P-401.1	Airfield Bituminous Surface Course	TON	2,010		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	1,270		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	1,270		
P-603.1	Bituminous Tack Coat	GAL	1,000		
P-610.1	Concrete Curb	LF	250		
P-610.2	Concrete Curb and Gutter	LF	1,650		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50		
P-620.1	Pavement Marking	SF	1,680		
P-620.2	Pavement Marking Removal	SF	100		
D-701.1	12-inch RCP Class IV	LF	187		
D-701.2	15-inch RCP Class IV	LF	254		
D-701.3	18-inch RCP Class IV	LF	570		
D-701.4	24-inch RCP Class IV	LF	420		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

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BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	475		
D-701.6	30-inch RCP Class A-25	LF	367		
D-701.7	36-inch RCP Class A-25	LF	941		
D-701.8	42-inch RCP Class A-25	LF	186	N\A	N\A
D-701.9	Concrete for Pipe Cradles	CY	3		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	1,308		
D-705.2	4-inch Polyethylene Pipe	LF	500		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	48		
D-705.4	6-inch Polyethylene Pipe	LF	340		
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	16		
D-751.3	Storm Drainage Inlet Type 2	EA	6		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	1		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	3		
D-752.1	Sedimentation Chamber	CY	58		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100		
L-108.3	Ground Rod	EA	26		
L-108.4	Concrete Cable Marker	EA	4		
L-110.5	2" PVC Sched. 80 conduit	LF	1,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	13		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	2		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	2		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N\A	N\A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	15		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 1**					

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200		
100.4	Demolish/Remove Existing Utilities Structures	EA	0	N\A	N\A
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	420		
308.1	Stabilized Construction Entrance	SY	70		
308.2	Silt Fence	LF	3,400		
308.3	Super Silt Fence	LF	640		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	8		
308.11	Curb Inlet Protection	EA	0	N\A	N\A
308.12	Temporary Seeding and Mulching	ACRE	16		
427.1	Oil/Water Separator	EA	1		
813.1	Roadway signs	SF	15		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	5		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6		
16110.4	Pole Foundation in Paved Area	EA	3		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	175	N\A	N\A
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250		
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	700		
16110.14	Electrical Equipment Pad	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	12		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	9		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	7,900		
P-152.2	Unclassified Excavation	CY	16,300		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	8,300		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	12,950		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	8,100		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	12,700		
P-304.3	Portland Cement	TON	590		
P-401.1	Airfield Bituminous Surface Course	TON	1,850		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	760		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	760		
P-603.1	Bituminous Tack Coat	GAL	800		
P-610.1	Concrete Curb	LF	1,610		
P-610.2	Concrete Curb and Gutter	LF	390		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50		
P-620.1	Pavement Marking	SF	2,220		
P-620.2	Pavement Marking Removal	SF	100		
D-701.1	12-inch RCP Class IV	LF	245		
D-701.2	15-inch RCP Class IV	LF	354		
D-701.3	18-inch RCP Class IV	LF	360		
D-701.4	24-inch RCP Class IV	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	477		
D-701.6	30-inch RCP Class A-25	LF	275		
D-701.7	36-inch RCP Class A-25	LF	651		
D-701.8	42-inch RCP Class A-25	LF	186		
D-701.9	Concrete for Pipe Cradles	CY	10		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	1,331		
D-705.2	4-inch Polyethylene Pipe	LF	483		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	390		
D-705.4	6-inch Polyethylene Pipe	LF	175		
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	9		
D-751.3	Storm Drainage Inlet Type 2	EA	11		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	2		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	0	N\A	N\A
D-752.1	Sedimentation Chamber	CY	58		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100		
L-108.3	Ground Rod	EA	26		
L-108.4	Concrete Cable Marker	EA	4		
L-110.5	2" PVC Sched. 80 conduit	LF	1,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	8		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	5		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	1		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2		
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	15		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 2**					

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	400		
100.4	Demolish/Remove Existing Utilities Structures	EA	1		
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	800		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 170,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	630		
308.1	Stabilized Construction Entrance	SY	140		
308.2	Silt Fence	LF	7,400		
308.3	Super Silt Fence	LF	1,600		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26		
308.11	Curb Inlet Protection	EA	1		
308.12	Temporary Seeding and Mulching	ACRE	25		
427.1	Oil/Water Separator	EA	2		
813.1	Roadway signs	SF	30		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	8		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6		
16110.4	Pole Foundation in Paved Area	EA	6		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	350	N\A	N\A
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250		
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	1,500		
16110.14	Electrical Equipment Pad	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	2		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	18		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	12		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	2		
P-152.1	Stripping	CY	10,900		
P-152.2	Unclassified Excavation	CY	25,000		
P-152.3	Unsuitable Excavation	CY	400		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	16,300		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	25,652		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	16,000		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	25,150		
P-304.3	Portland Cement	TON	1,170		
P-401.1	Airfield Bituminous Surface Course	TON	3,860		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	2,030		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	2,030		
P-603.1	Bituminous Tack Coat	GAL	1,800		
P-610.1	Concrete Curb	LF	1,860		
P-610.2	Concrete Curb and Gutter	LF	2,040		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	100		
P-620.1	Pavement Marking	SF	3,900		
P-620.2	Pavement Marking Removal	SF	200		
D-701.1	12-inch RCP Class IV	LF	396		
D-701.2	15-inch RCP Class IV	LF	374		
D-701.3	18-inch RCP Class IV	LF	698		
D-701.4	24-inch RCP Class IV	LF	418		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	478		
D-701.6	30-inch RCP Class A-25	LF	405		
D-701.7	36-inch RCP Class A-25	LF	941		
D-701.8	42-inch RCP Class A-25	LF	186		
D-701.9	Concrete for Pipe Cradles	CY	10		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	2,639		
D-705.2	4-inch Polyethylene Pipe	LF	979		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	438		
D-705.4	6-inch Polyethylene Pipe	LF	523		
D-751.1	Storm Drainage Manhole	EA	4		
D-751.2	Storm Drainage Inlet Type 1	EA	19		
D-751.3	Storm Drainage Inlet Type 2	EA	12		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	1		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	3		
D-752.1	Sedimentation Chamber	CY	66		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	2,300		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	2,200		
L-108.3	Ground Rod	EA	52		
L-108.4	Concrete Cable Marker	EA	8		
L-110.5	2" PVC Sched. 80 conduit	LF	2,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	21		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	7		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	3		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	2		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2		
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	30		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	30		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 3**					

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 1

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 2

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 3

_____

(Written in Numerals)

_____

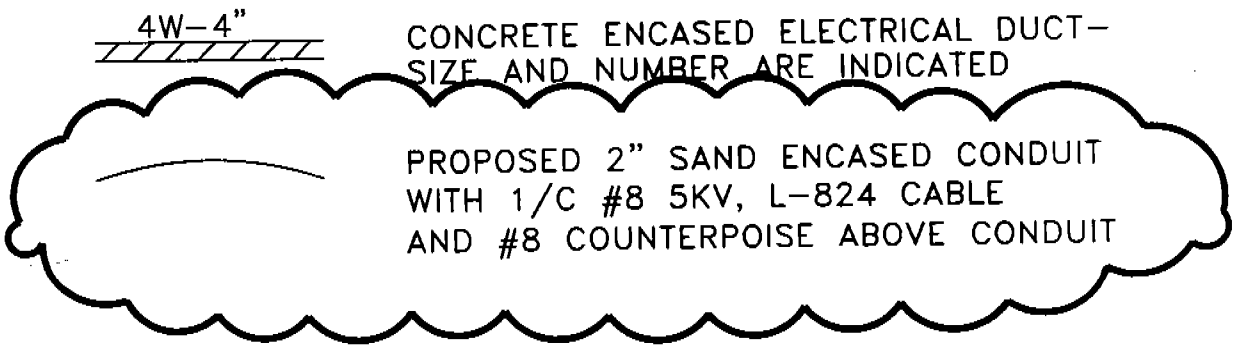
(Written in Words)

CONTRACTOR: _____

4

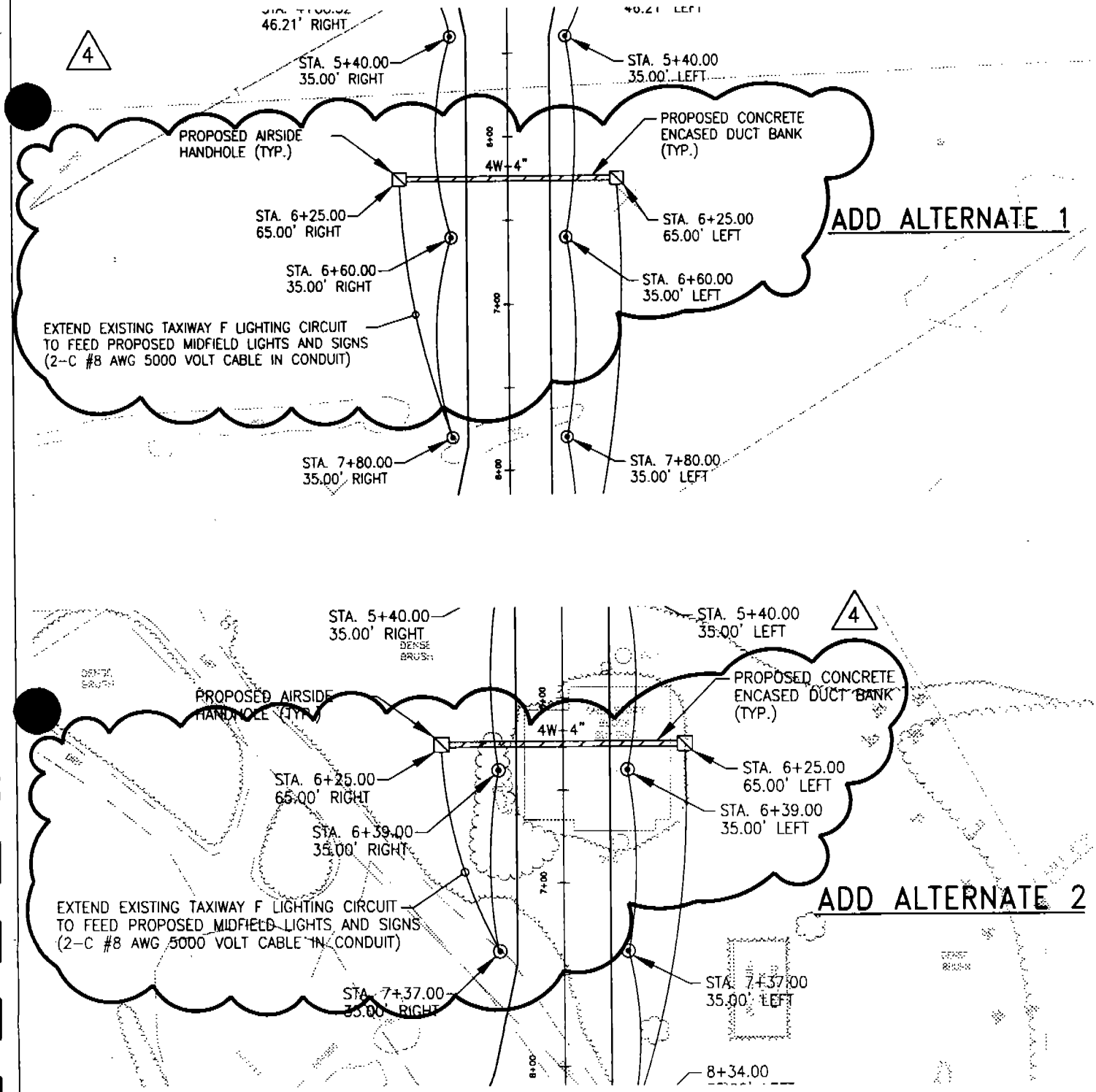
4W–4" CONCRETE ENCASED ELECTRICAL DUCT–SIZE AND NUMBER ARE INDICATED

PROPOSED 2" SAND ENCASED CONDUIT WITH 1/C #8 5KV, L–824 CABLE AND #8 COUNTERPOISE ABOVE CONDUIT



kW KILOWATT

FAA FEDERAL AVIATION ADMINISTRATION

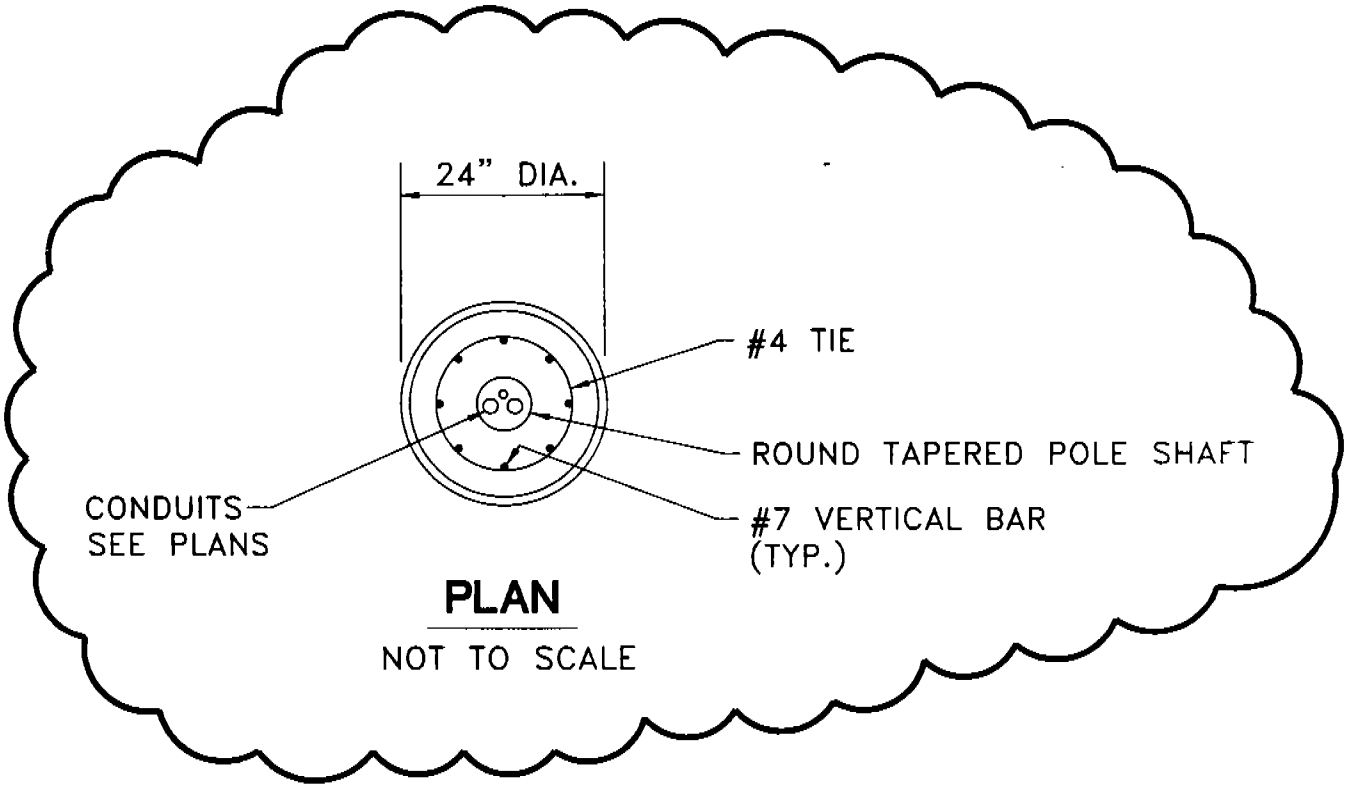


Contract No.: MAA-CO-97-019
Contract Title: Midfield Terminal Complex
Site Development, Phase I

ATTACHMENT E-04B

Addendum No. 4
TAMS Consultants, Inc.
May 14, 1998

4



PLAN

NOT TO SCALE

CNR LIGHTING
4316 WASHINGTON BLVD.
BALTIMORE, MD 21227
PHONE 410-242-4172 FAX 410-644-8827

C.N. ROBINSON LIGHTING SUPPLY CO.

FAX TRANSMITTAL

TO: Martin State Airport DATE: 4/29/98

C/O: PAGES: 1

ATTN: Suzette Moore FROM: Bob Rogerson

RE: Medfield Terminal Complex Site Development, Phase I

Please advise the Manufacturer used on site now for the following items.

1) Taxiway Edge Light
2) Lighted Retroreflective Taxiway Guidance Sign

Thanks!

PHONE: 410-242-4172
FAX: 410-644-8827

FACCHINA

CONSTRUCTION COMPANY, INC.

P.O. Box 186, 9320 W&W Industrial Road, La Plata, MD 20646
(301) 753-3369 FAX (301) 753-3784

May 4, 1998

LETTER NO. 1

Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation
FAX: 410-859-5440

Reference: Midfield Terminal Complex
Site Development, Phase I
Contract No. MAA-CO-97-019

Attention: **Ms. Suzette Moore**

Facchina Construction would like to submit for your review the following questions and concerns in reference to the above mentioned project:

1. The Alternate 1 includes the storm drainage for Pond 3A & 3B. Between EW3-4 and EW3-5 there is a 20' run of 42" RCP. There is zero LF in the Bid Form for the Alternate.1?

2. Does the 1 in the Catch Basin numbering (i.e. CB1-6) indicate that the basin is a Drainage Structure Type 1? If not, how can we determine what type of structure is called for on the plans since there is no drainage structure schedule?

Facchina Construction Company, Inc.
Brian Moore

FACCHINA

CONSTRUCTION COMPANY, INC.

P.O. Box 186, 9320 W&W Industrial Road, La Plata, MD 20646
(301) 753-3369 FAX (301) 753-3784

May 4, 1998

LETTER NO. 2

Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation
FAX: 410-859-5440

Reference: Midfield Terminal Complex
Site Development, Phase I
Contract No. MAA-CO-97-019

Attention: **Ms. Suzette Moore**

Facchina Construction would like to submit for your review the following questions and concerns in reference to the above mentioned project:

1. Shouldn't the storm drainage pipe between CB2-33 and CB2-29 be 30" RCP not 18" RCP?

2. The Base Project includes the storm drainage up to station 11+50 of the Access Road. At station 4+05 a 80' run of 42" RCP crosses the Access Road. There is zero LF in the Bid Form for the Base Project?

3. The Base Project includes the storm drainage up to station 11+50 of the Access Road. At station 9+80 there is 74' of 30" RCP on the Access Road. There is zero LF in the Bid Form for the Base Project?

4. On plan sheet U-18, Sediment Chamber 1-1 has a 36" RCP outlet pipe and is part of the Base Project. There is zero LF for 30" RCP in the Bid Form for the Base Project?

Facchina Construction Company, Inc.
Brian Moore

FACCHINA

CONSTRUCTION COMPANY, INC.

P.O. Box 186, 9320 W&W Industrial Road, La Plata, MD 20646
(301) 753-3369 FAX (301) 753-3784

May 4, 1998

LETTER NO. 3

Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation
FAX: 410-859-5440

Reference: Midfield Terminal Complex
Site Development, Phase I
Contract No. MAA-CO-97-019

Attention: **Ms. Suzette Moore**

Facchina Construction would like to submit for your review the following questions and concerns in reference to the above mentioned project:

1. Where are the details for a Storm Drainage Inlet Type 3?

2. The details for Storm Drainage Inlet Type 1 & 2 are not drawn to scale, what are the dimensions for these structures (wall thickness, inside width & length)? What type of frame & grate will be required?

3. For Alternate No.1 construction of Taxiway J and the Lockheed Martin Apron are not included, what will be the grading requirements in these areas?

4. Detail A & B on plan sheet U-17 shows filter fabric around all storm drainage pipe. The pipe is not working as a underdrain, why do you want the filter fabric? Will the filter fabric be required on all storm drainage pipe as stated (this would be a waste of money)?

Facchina Construction Company, Inc.
Brian Moore

FACCHINA

CONSTRUCTION COMPANY, INC.

P.O. Box 186, 9320 W&W Industrial Road, La Plata, MD 20646
(301) 753-3369 FAX (301) 753-3784

LETTER # 1

May 5, 1998

Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation
FAX: 410-859-5440

Reference: Midfield Terminal Complex
Site Development, Phase I
Contract No. MAA-CO-97-019

Attention: **Ms. Suzette Moore**

Facchina Construction would like to submit for your review the following questions and concerns in reference to the above mentioned project:

1. The catch basin shown on the upper left hand corner of plan sheet C-02 (RIM ELEV = 13.31) does not have a reference to its type (i.e. Drainage Structure Type1). What type of structure is it?

2. Should the 320' – 36" RCP from DMH1-2 to SC1-1 be included in the Base Project? If it should, there is zero LF in the Bid Form for the Base Project.

3. The plans do not have a storm drainage schedule, how can we determine what type structure each catch basin is (i.e. Storm Drainage Structure Type 1 or 2 or 3 or 4)?

Facchina Construction Company, Inc.
Brian Moore

FACCHINA

CONSTRUCTION COMPANY, INC.

P.O. Box 186, 9320 W&W Industrial Road, La Plata, MD 20646
(301) 753-3369 FAX (301) 753-3784

May 5, 1998

LETTER NO. 2

Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation
FAX: 410-859-5440

Reference: Midfield Terminal Complex
Site Development, Phase I
Contract No. MAA-CO-97-019

Attention: **Ms. Suzette Moore**

Facchina Construction would like to submit for your review the following questions and concerns in reference to the above mentioned project:

1. Will the connection of the 14" Water Pump House Supply Main to the existing 12" Water Main require a wet tap, or can the existing water main be shut down temporarily?

Facchina Construction Company, Inc.
Brian Moore

FACCHINA

CONSTRUCTION COMPANY, INC.

P.O. Box 186, 9320 W&W Industrial Road, La Plata, MD 20646
(301) 753-3369 FAX (301) 753-3784

LETTER #3

May 5, 1998

Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation
FAX: 410-859-5440

Reference: Midfield Terminal Complex
Site Development, Phase I
Contract No. MAA-CO-97-019

Attention: **Ms. Suzette Moore**

Facchina Construction would like to submit for your review the following questions and concerns in reference to the above mentioned project:

1. What size pipe should be used for the sanitary force main from the pump station on plan sheet C-21 and SMH14?

Facchina Construction Company, Inc.
Brian Moore

CORPORATE OFFICE
P.O. Box 256
14 E. Jarrettsville Road
Forest Hill, MD 21050
(410) 879-1485
(410) 893-0882 Fax

ELKRIDGE OFFICE
6615 Santa Barbara Road
Elkridge, MD 21227
(410) 796-0315
(410) 796-0329 Fax

May 5, 1998

Maryland Aviation Administration
P.O. Box 8766
Baltimore/Washington International Airport
Maryland 21240-0766

Attn: Ms. Suzette Moore

Re: Midfield Terminal Complex Site Development, Phase I
MAA-CO-97-019

Gentlemen:

The following are several questions regarding the above referenced project:

1 - On drawing C-22, the existing pump station isn't indicated on the electrical drawings for high alarm status and a power feed for the pumps. Does this sewage pump station require the same requirements as the other three stations? If so, please indicate where and how the power is originating and how the alarm wire is getting from the Fire Pumphouse to the existing pump station.

2 - On drawing E-08, the "High Level Alarm Panels" detail indicates a power feed for the high alarm panels for the oil/water separator tanks; but the drawings don't indicate a power source for the alarm panel. Please provide a source and a raceway/ductbbank to use to get back to the power source.

3 - Under all bid items involving ductbanks and direct buried conduit, is seeding/sodding incidental to these bid items or is it part of bid item "T-901.1 Permanent Seeding".

4 - On drawing E-08, the "Proposed Telephone Autodialer System" detail indicates two fuel level analog inputs, please indicate where the level device is and how the wiring is connected back to the dialer. Also, specify type of cable to be used.

5 - On drawing E-04, both Alternate #1 and Alternate #2 show two manholes on each alternate, but there is no bid item under the two alternates that address the manholes. Also, the 4W-4" ductbank is not addressed under the bid items, this ductbank runs between the two manholes on both alternates.

6 - The bid items for the "Electrical Equipment Pad" for the base bid and the alternates are not detailed. Please provide a detail for the particular equipment pad and show where they all are located.

Thank You,
Benfield Electric Co., Inc.

Leonard Martin
Estimator

IA Construction Corporation

Address Reply To
IA Construction, Area 6
PO Box 210
White Marsh, MD 21162
Tel. (410) 335-0391
Fax (410) 335-6242

Executive Offices
U.S. 202 - One-Half Mile South of U.S. 1
P.O. Box 8
Concordville, PA 19331

Telephone (610) 459-3136
Fax Nos. (610) 459-2086
(610) 358-4469

5/5/98

Maryland Aviation Administration
PO Box 8766
BWI Airport, MD 21240-0766
Attention: Suzette Moore

RE: Martin State Airport Midfield Terminal Complex Site Development
MAA-CO-97-019

Dear Suzette,

We have the following questions on the above referenced project.

1) A takeoff of the earthwork quantities reveals a great variance in the quantity of material to be trucked off site depending on which alternates are awarded. We request that we be able to price the excavation items accordingly, and not have to quote similar excavation items in different alternates at the same unit price.
2) Similarly, it would be unreasonable to quote the Mobilization/Demobilization and Temporary Construction items at the same price for different alternates. Are these items excluded from the requirement to quote similar items at the same price for different alternates?
3) Attached are questions from Back River Supply.

Please contact me if you have any questions.

Sincerely,

John Kelble
Estimator

BACK RIVER SUPPLY, INC.
MANUFACTURERS OF PRECAST CONCRETE PRODUCTS
P.O. BOX 329 * GLYNDON, MD 21071
PHONE (410) 833-3384 FAX (410) 833-4116

May 5, 1998

I A Construction
Attn: John Kelble

Re: Martins State Airport
Mid Field Terminal Complex

Dear Mr. Kelble:

The following questions are required to price the inlets for this project.

1. There are no details for a type III inlets.
2. The details of the type I and type III inlets do not show the wall thickness or the inside dimensions.
3. Does "CR3-1" indicate that this inlet is a type III inlet?
4. Are there pipe profiles?
5. Not all inverts for pipes are not given, for heights use lowest given?

If you have any questions please feel free to call me at your convenience.

Sincerely,

Back River Supply, Inc.

Dominic A. Geckle
President

FACCHINA

CONSTRUCTION COMPANY, INC.

P.O. Box 186, 9320 W&W Industrial Road, La Plata, MD 20646
(301) 753-3369 FAX (301) 753-3784

May 6, 1998

Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation
FAX: 410-859-5440

Reference: Midfield Terminal Complex
Site Development, Phase I
Contract No. MAA-CO-97-019

Attention: **Ms. Suzette Moore**

Facchina Construction would like to submit for your review the following questions and concerns in reference to the above mentioned project:

1. In the Bid Form the Base Project has one Storm Drainage Inlet Type 4 (item no. D-751.5). I can't find a Type 4 Inlet on the plans. If the inlet doesn't exist, shouldn't the item be deleted from the Bid Form?

Facchina Construction Company, Inc.
Brian Moore

P. Flanigan & Sons, Inc
Attn: Kevin Mullens

RHOTEN
& SONS, INC.

May 6, 1998

Project Title: Midfield Terminal Complex
Site Development, Phase I
Martin State Airport
Contract No. MAA-Co ~~98-009~~ 97-019

Gentlemen:

Please fax this request for Clarification.

Bid Item's T-901.2 Wetland Vegetation for Ponds 1, 3A, & 3B is only noted in the Seeding Specification Item T-901 Seeding, with basis of payment to be made under 901-5, at a unit price per thousand square feet.

Addendum No 2 Has a new specification Item 711 Planting Wetland Vegetation with Basis of payment paid by the each, for each Plant Species to by used. And Drawings WM-1 thru WM-10 done by Urs Greiner for the Pond by Stanbury Creek. This is very good information from which we can Establish Prices from to bid.

Bid Item's T-901.2 Wetland Vegetation for Ponds 1, 3A, & 3B are almost impossible to develop Bid Prices, for when Bidding the item Per Thousand Square Feet.

The Plant Species and Quantities are determined by water levels, which will not be known, until the Job is in progress, and maybe not then.

This will affect the quantity and species Per Thousand Square Feet, and will be different for each Pond, making it impossible to Bid, the same unit prices for the Base Bid and Alternates.

Why can't Bid Item's T-901.2 be Bid under the correct Specification Section Per Addendum No 2 Item 711 Planting Wetland Vegetation and Bid Per Each For Pond 1, 3A, & 3B in the Base Bid and Alternates, similar to Item's 711.1 thru 711.7 established in Addendum No 2. This is the only proper way to Bid this given, the lack of information we are afforded, to Bid Item's
T-901.2.

MODERN ELECTRIC
OF MARYLAND, LTD.

LETTER NO. 1

May 7, 1998

Suzette Moore
Maryland Aviation Administration
Pier A, Lower Level
Terminal Building
P.O. Box 8766
Baltimore, MD 21240

RE: INV#: MAA-CO-97-019

Dear Ms. Moore:

In reviewing the plans and specifications for the above referenced project, I have the following questions which require your responses:

1. In addendum no. 1, page 13, question 4 requires the fire alarm system to be part of item 16900.1 - General Instrumentation. Where can we find the specifications for the fire alarm system?

2. Electrical drawings E-02 and E-03 indicate 3 pumping stations and the electrical requirements. Please provide detailed information how the fourth pumping station is to be electrically connected.

3. The addendum No. 1, page 13, question 10 indicates a 200 AMP service to be provided by BGE. The drawings indicate a CT cabinet to be installed. BGE does not furnish a CT cabinet and does not require a CT cabinet for a 200 AMP service. So, is the contractor to install one because it is shown on the plans?

4. The addendum No. 1, page 13, question 11 requires the contractor to furnish all incidentals for the telephone termination cabinet. The telephone company will not give any information as to what incidentals need to be provided until they know more about the project. How can we formulate our pricing without such information?

5. On drawing E-07, the proposed precast electric manhole requires cable racks. Please provide a specification for this item.

7501 RESOURCE COURT
BALTIMORE, MARYLAND 21226
(410) 437-5400 FAX (410) 437-5401

6. Drawings E-02 and E-03 indicate the local alarm panel to be in NEMA 4X enclosure. Is the sewage pump station supplier to provide this enclosure?

7. Spec. section 16321 3.1B states "Furnish primary lighting arresters; and fuse cutouts as required." As required by whom? Please furnish specs. for arresters and cutouts.

8. Drawing E-08 proposed telephone autodialer has information of trouble alarms for sewage pump station Nos. 1-3. Addendum No. 1 indicated a fourth pump station. Are any trouble alarms to be connected to the autodialer from the fourth sewage pump station?

9. Drawing E-09 detail "Typical Taxiway Edge Light" indicated 2 #8 5KV L-824 cables in conduit. Drawing E-04 indicates 1 - #8 5KV cable in a series loop installation. Please clarify.

Please provide responses to the above questions at your earliest convenience. If you have any questions or concerns, please feel free to contact me.

Sincerely,

David R. Ashburn

David R. Ashburn
President

MODERN ELECTRIC OF MARYLAND, LTD.

May 7, 1998

LETTER NO. 2

Suzette Moore
Maryland Aviation Administration
Pier A, Lower Level, Terminal Building
P.O. Box 8766
Baltimore, MD 21240

RE: INV#: MAA-CO-97-019

Dear Ms. Moore:

In reviewing the plans and specifications for the above referenced project, I have encountered the following points which require clarification:

1. Drawing E-07, Proposed Electric Manhole, indicates a ¾ x 10' ground rod to be installed with an exothermic weld for ground wire, but it does not indicate a ground wire. What gets grounded?

2. Bid item 16510.4 indicates Quantity 1, drawing E-10 indicates Quantity 2. Please clarify.

3. Drawing E-07 indicates exothermic weld to the ground rods. Spec. 16450 2.1C indicates a mechanical clamp. Please clarify.

4. On drawing E-09 the #8 bare copper counterpoise cable is indicated in typical 4 - way duct. On drawing E-07 there is no counterpoise indicated in the trench details. Does the counterpoise only get installed in the ducts that contain the L-824 cable? Spec. 16450 3.1 C.3. indicates underground ducts.

5. Drawing E-06 typical pole-mount luminaire detail indicates a round-tapered pole, the typical pole foundation for grass areas detail indicates a square pole shaft. Please clarify if you want round or square.

Please provide responses to the above questions at your earliest convenience. If you have any questions or concerns, please feel free to contact me.

Sincerely,

David R. Ashburn (EH)

David R. Ashburn
President

7501 RESOURCE COURT
BALTIMORE, MARYLAND 21226

(410) 437-5400 FAX (410) 437-5401

MEMO

JOHN DRIGGS COMPANY, INC.
8723 Ashwood Drive
Capitol Heights, MD 20743-3735
(301)350-4000

May 7, 1998

SENT BY FACSIMILE (410) 859-5440

TO: Maryland Aviation Administration **SUBJECT:** Solicitation MAA-CO-97-019

Attn: Ms. Suzette Moore **JOB:** Martin State Airport

Ms. Moore:

In reference to the above referenced solicitation, JDCI has questions regarding the pavement details. The typical pavement sections, as shown on Drawing P-03 of the project plans, indicate a base of P-152; we are unclear as to the nature of this material and have the following questions:

1. Where is sub-grade in relation to the section (above or below section P-152)?
2. If the P-152 section is below sub-grade, is the proposed sub-grade under-cut and then backfilled with the P-152 material?
3. What type of material is required for the P-152 section?

Your attention into this matter is greatly appreciated; please respond to Saeed Milani-Nia via fax at (301) 499-4215.

SM/DP/dp
c:\estimates\mas

SIGNED: Saeed

Saeed Milani-Nia
Vice-President

05/07/98 THU 11:08 FAX 3014994215 JDCI

MODERN ELECTRIC OF MARYLAND, LTD.

May 8, 1998

Suzette Moore
Maryland Aviation Administration
Pier A, Lower Level, Terminal Building
P.O. Box 8766
Baltimore, MD 21240

RE: INV#: MAA-CO-97-019

Dear Ms. Moore:

In reviewing the plans and specifications for the above referenced project, I have encountered the following points which require clarification:

1. Bid schedule 16170.1 Motor and Circuit Disconnect - LS and spec. section 16170 is for Motor and Circuit Disconnects. Please indicate where on the plans this item is required.

2. Bid schedule 16510.1 Pole Mount Luminaire has a quantity of 13 each. The drawing E-06 only requires 7 luminaire for poles under the base bid. Where are the remaining 6 luminaires to be installed?

3. Where do the Oil/Water separator get their electrical power? None shown on electrical drawings.

4. Where do the tank high level alarm panels for the Oil/Water separator tanks get installed?

5. Where do the two fuel level analog imputs originate that connect to the auto dialer in the fire pump house?

6. Bid schedule L-110.5 indicates 2" conduit sched. 40, drawing E-09 indicates sched. 80 PVC conduit. Please clarify.

7. Bid schedule 16110.14 indicates 2 electrical equipment pads. Are these pads for the taxiway guidance signs? If so, there are 3 new guidance signs. If not, what are they for?

7501 RESOURCE COURT
BALTIMORE, MARYLAND 21226
(410) 437-5400 FAX (410) 437-5401

8. Bid schedule L-125.4 in ALT. #1 and 2 indicates a three panel sign. The guidance sign schedule on drawing E-04 only indicates 2 module signs. Please clarify.

Please provide responses to the above questions at your earliest convenience. If you have any questions or concerns, please feel free to contact me.

Sincerely,

David R. Ashburn (AH)

David R. Ashburn
President

JOHNSON CONTROLS
NETWORK INTEGRATION SERVICES
9051 Red Branch Road, Columbia, MD 21045

Date: 05/08/98
Number of pages including cover sheet: 1

FAX

To:
Ms. Suzette Moore
Maryland Aviation Administration

Phone: 410-859-7792
Fax phone: 410-850-4729
CC:

From:
Bruce C. Harry, RCDD/LAN Specialist

Phone: 410-997-8884
Fax phone: 410-997-5911

REMARKS: ☐ Urgent ☒ For your review ☐ Reply ASAP ☒ Please comment

WE HAVE THE FOLLOWING QUESTIONS IN REFERENCE TO THE BID FOR CONTRACT NO. MAA-CO-97-019.

1. THE BID SPECIFICATIONS STATE THAT A TWELVE (24) STRAND FIBER CABLE IS TO BE INSTALLED BETWEEN HANDHOLE # 216 AND HANDHOLE #236. HOW MANY STRANDS SHOULD THIS CABLE CONTAIN, 12 OR 24?
2. THE BID SPECIFICATION DOES NOT STATE THAT THE FIBER OPTIC CABLE HAS TO BE INSTALLED IN INNERDUCT WITHIN THE UNDERGROUND CONDUITS. IS THIS CORRECT OR DO YOU IN FACT WANT THE CABLE INSTALLED WITHIN INNERDUCT?

THANK YOU IN ADVANCE FOR YOUR RESPONSE.

Bruce C. Harry

BRUCE C. HARRY
SR. SYSTEMS ENGINEER

CONCRETE TRANSPORT INC.

FACSIMILE TRANSMITTAL SHEET

TO: Suzette Moore

FROM: Jerry Kossol

COMPANY: Concrete Transport

DATE: 5/11/98

FAX NUMBER: 410-355-8360

TOTAL NO. OF PAGES INCLUDING COVER:

PHONE NUMBER: 410-355-3555

SENDER'S REFERENCE NUMBER:

RE:

YOUR REFERENCE NUMBER:

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☑ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Dear Sirs,

In Reference To Martin State Air Port/Midfield Compl

Please Carify Concrete Mixes For Bid Purpose.

200 FRANKFURST AVENUE, BALTIMORE, MD 21225, TEL. (410)355-3555, FAX 355-8360

8723 Ashwood Drive
Capitol Heights
Maryland 20743

John Driggs Company, Inc.

(301) 350-4000
FAX (301) 499-4215

FACSIMILE TRANSMITTAL SHEET

TO: TEE SOMBATIUM - TAMS

TRANSMITTED TO:

COMPANY NAME: MARYLAND AVIATION ADMINISTRATION

PERSON: JACKIE / SUZETTE MOORE

FAX NUMBER RECEIVING FAX: (410) 859-5470

TRANSMITTED FROM:

PERSON SENDING FAX: STEVE REES

FAX NUMBER SENDING FAX: (301) 499-~~0448~~ 0450

PHONE NUMBER FOR CONTACT PERSON: (301) 499-1950 EXT. 5328

DATE SENDING: 5/12/98 TIME SENDING: 1:50

NUMBER OF PAGES TRANSMITTED (INCLUDING COVER SHEET): 1

MESSAGE: RE: MARTIN STATE AIRPORT MIDFIELD COMPLEX.
PLEASE INCLUDE IN ADDENDUM #4 SPECIFICATION SECTIONS ~~[illegible]~~
901- WETLANDS VEGETATION
908 - MULCHING
PLEASE PROVIDE DESCRIPTION OF THE GOOSE EXCLOSURE FENCE - BID ITEM 711.
THANK-YOU

PLEASE NOTIFY THE PERSON ABOVE IF THE PROPER NUMBER OF SHEETS DID NOT TRANSMIT OR IF THE COPIES ARE UNCLEAR. THANK YOU.

RECEIVED
MAY 12 1998
[illegible] INC.
ARLINGTON, VA

ADDENDUM NO. 5

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

ADDENDUM TO PLANS AND SPECIFICATIONS

CONTRACT NO. MAA-CO-97-019
MIDFIELD COMPLEX CONSTRUCTION SITE DEVELOPMENT
AT MARTIN STATE AIRPORT

ACKNOWLEDGMENT OF RECEIPT

The undersigned acknowledges that Addendum No. 5 to Maryland Aviation Administration Plans and Specifications for Contract No. MAA-CO-97-019 has been received by the undersigned and will be incorporated in all copies of said Plans and Specifications in the possession of the undersigned.

It is understood that all proposals submitted in response to MAA-CO-97-019 will be presumed to be based upon full knowledge of the contents of Addendum No. 5.

_____
(Company Name)

By: _____
(Signature-Authorized Official)

_____
(Title)

_____
(Date)

IMPORTANT

NOTE: PLEASE SIGN AND DATE THE "ACKNOWLEDGMENT OF RECEIPT" AND RETURN VIA FACSIMILE (410-859-5440) IMMEDIATELY.

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

ADDENDUM NUMBER 5

Midfield Terminal Complex
Site Development, Phase I
at
Martin State Airport

CONTRACT NUMBER: MAA-CO-97-019

May 20, 1998

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
Office of Planning and Engineering
Terminal Building, Lower Level, Pier A
P.O. Box 8766
Baltimore/Washington International Airport, Maryland 21240

Midfield terminal Complex Development, Phase I
at
Martin State Airport

Contract Number MAA-CO-97-019

ADDENDUM NO. 5

PRE-BID MEETING DATE:	April 15, 1998
ADDENDUM DATE:	May 20, 1998
BID DATE:	May 28, 1998

IMPORTANT: Bidders must acknowledge the receipt of this Addendum on the Bid Forms, page BF-18, stating the Addendum Number. Additionally, Bidders must acknowledge purchase of the Standard Provisions by volume and date on page BF-18.

REVISIONS ADDITIONS AND DELETIONS TO THE CONTRACT DOCUMENTS

Technical Provisions

PART I TECHNICAL SPECIFICATIONS

Section 16120 Wires and Cables: Article 2.3.A.: first line: change "twenty (24) fiber" to "twenty-four (24) fiber".

PART IV WAGE RATES

Replace the existing Wage Rates section (3 pages) with the attached Addendum No. 5 Wage Rates section.

PART VI BID FORMS

Bid Tabulation Forms

A new set of Bid Tabulation Forms is issued. The attached Bid Tabulation Forms, Page BF-20C to Page BF-70C supersedes the existing form.

Response to written inquiries

Responses to the attached written inquiries from Cherry Hill Construction, Inc. (Letter No. 1) are as follows:

1. Water system for the Midfield Complex does not require any connection permit since the main supply will be tapped to the Airport private main. Permit for sanitary sewer connection to the County manhole, located on the South side of Wilson point Road will be provided to the Contractor.

Responses to the attached written inquiries from Cherry Hill Construction, Inc., dated May 16, 1998 (Letter No. 2) are as follows:

1. Casing pipe shall be a-12" dia.(min.) smooth-wall steel pip capable of withstanding the load superimposed by the jacking apparatus. See Article 1300.3.7 for Pipe Jacking specifications.

2. Grout shall be a non-shrink, high early strength cement grout with a 7 day compressive strength of at least 4,000 psi when tested in accordance with ASTM C109.

Responses to the attached written inquiries from PAVEX Incorporated, dated May 15, 1998, are as follows:

1. For this project the Engineer will perform the general construction inspections, including concrete and asphalt testing. Other tests and equipment demonstrations, as specified in the specifications, will be the Contractor's responsibilities.

Responses to the attached written inquiries from FACCHINA Construction Company, Inc., dated May 19, 1998, are as follows:

1. Yes. Precast Yard Inlet detail on Sheet U-15 is used for Item D-751.2 Storm drainage Inlet Type 2. This structural detail is also applicable for Type 2 Inlet in pavement area. For Type 2 Inlet in pavement area, slope ground shown in the detail should be replaced with sloped pavement.

2. CB1-8 and CB1-9 are intended to be Type 2 structures because the access road to Lockheed-Martin hangar will be a part of the main parking lot for the Midfield complex in the final development.

3. Drainage Structure Type 4 detail shown on Sheet U-17 was designed to be a double chamber structure to minimize wall thickness and reinforced steel. This detail will be modified to simplify the construction once the contract is awarded.

END OF ADDENDUM NO.5

STATE OF MARYLAND
DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. EUTAW STREET, ROOM 607
BALTIMORE, MARYLAND 21202-2272
(410) 767-2342

The wage rates to be paid laborers and mechanics on the contract described below is announced by order of the Commissioner of Labor and Industry.

It is mandatory upon the successful bidder and any subcontractor under him, to pay not less than the specific rates to all workers employed by them in execution of this contract. Reference: Annotated Code of Maryland State Finance and Procurement, Section 17-201 thru 17-226 inclusive.

These rates were taken from the locality determination dated January 5, 1998 for Baltimore County, issued pursuant to the Commissioner's authority under State Finance and Procurement Article Section 17-209, Annotated Code of Maryland.

Suzette Moore, Manager, Contract Administration — May 12, 1998
(Name and Title of Requesting Officer) — (Date of Issue)

Maryland Aviation Administration, P.O.Box 8766, BWI Airport, Md 21240
(Department, Agency or Bureau) (Address)

Baltimore County: Martin State Airport-Midfield Terminal Complex Site Development-Phase I
(Location and Description of work)

Project No.: MAA-CO-97-019

CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFIT PAYMENTS
ASBESTOS/INSULATION WORKER	$21.00	$6.21
CARPENTER	$16.72	$5.80
CEMENT MASON-FINISHER	$19.18	$3.19
ELECTRICIAN	$22.40	$8.46
ELEVATOR MECHANIC	$22.67	$8.385
IRONWORKER	$21.14	$8.27
CHAIN LINK FENCE ERECTOR	$17.69	$7.30

Baltimore County: Martin State Airport-Midfield Terminal Complex Site Development-Phase I-Project No.: MAA-CO-97-019

CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFIT PAYMENTS
GLAZIER	$21.14	$8.27
LABORER:		
COMMON OR UNSKILLED	$10.75	$1.625
MASON TENDER	$ 9.98	
PIPELAYER	$13.00	$0.99
ASPHALT RAKER	$11.40	$2.69
AIR TOOL OPERATOR	$ 9.82	$2.88
CONCRETE SURFACER	$12.55	$2.56
ASBESTOS OR LEAD ABATEMENT	$10.75	$1.625
HAZARDOUS MATERIAL HANDLER	$10.75	$1.625
PLUMBER	$22.43	$7.63
SHEETMETAL WORKER	$19.37	$6.52
SPRINKLERFITTER	$21.14	$7.08
STEAMFITTER/PIPEFITTER	$22.43	$7.63
TRUCK DRIVER:		
DUMP TRUCK	$13.66	$4.60 +a+b
FLAT BED	$13.66	$4.60 +a+b
PICK-UP	$13.66	$4.60 +a+b
TRAILER	$13.94	$4.60 +a+b
WATER, FUEL TRUCK	$13.66	$4.60 +a+b
POWER EQUIPMENT OPERATORS:		
BACKHOE	$15.89	$5.35 +a
BOBCAT	$14.21	$3.51
BULLDOZER	$15.97	$5.35 +a
CRANE	$16.84	$5.35 +a
EXCAVATOR	$16.84	$5.35 +a
FORKLIFT	$13.11	$2.015
GRADALL	$16.84	$5.35 +a
GRADER	$16.84	$5.35 +a
LOADER	$16.84	$5.35 +a
MECHANIC	$17.01	$6.60 +a
OILER	$12.76	$5.35 +a
PAVER	$15.97	$5.35 +a
ROLLER	$15.97	$5.35 +a
SCRAPER/PAN	$16.84	$5.35 +a
TRACTOR W/ATTACHMENTS	$16.84	$5.35 +a

a PAID HOLIDAYS: New Years Day, Memorial Day, July 4th, Labor Day, Veteran's Day, Thanksgiving day, & Christmas Day.

b PAID VACATIONS: Employees with 1 year service-1 week paid vacation;
2 years service-2 weeks paid vacation
10 years service-3 weeks paid vacation

WELDER, RIGGER, CAULKER - Receive rate prescribed for craft performing operation to which welding, rigging, or caulking is incidental.

PREVAILING WAGE
INSTRUCTIONS FOR THE CONTRACTOR

The contractor shall submit two complete copies of his payroll records and the payroll records of each of his subcontractors-one copy to the Contracting Officer and one to the Commissioner of Labor & Industry, 1100 N. Eutaw Stree, Room 607, 6th Floor, Baltimore, Maryland 21201, where they will be available for inspection during business hours. These payroll records **MUST BE SUBMITTED WITHIN 14 CALENDAR DAYS AFTER THE END OF EACH PAYROLL PERIOD** and shall contain the following information: Name, address & **TELEPHONE NUMBER**; location and project number of the job; Employees name, address, social security number, exact and specific work classification, hours-straight time and overtime-worked each day, total hours-straight time and overtime-worked rate of pay and gross wages earned. Employee's address may be dropped after it has been reported one time. Payrolls shall be submitted on U.S. Department of Labor Wage and Hour Public Contracts Division Payroll Form WH-347 or its equivalent and contain only information relevant to the job and be serially numbered starting with payroll number one.

The contractor shall be responsible for submission of all subcontractors' payroll records covering work performed directly at the work site. Each copy of the payroll records shall be accompanied by a statement signed by the contractor or the subcontractor, indicating that the wage rates contained therein are not less than those established by the Commissioner as set forth in the contract, that the classification set forth for each worker or apprentice conforms with the work performed, and that the contractor or subcontractor, as the case may be, has complied with the provisions of the law.

A contractor or subcontractor may make **deductions** that are (1) required by law; (2) required by a collective bargaining agreement between a bona fide labor organization and the contractor or subcontractor; or (3) contained in **WRITTEN AGREEMENT** between an employee and an employer undertaken at the beginning of employment, if the agreement is submitted by the employer to the **PUBLIC BODY** awarding the public work and is approved by the public body as fair and reasonable.

If the contractor is delinquent in submitting payroll records, processing of partial payment estimates may be held in abeyance pending receipt of the records. In addition, if the contractor is delinquent in submitting the payroll records, the contractor shall be liable to the Contracting Public Body for liquidated damages. The liquidated damages shall constitute the sum of $10.00 for each calendar day that the records are late.

Only apprentices registered with the Maryland State Apprenticeship and Training Council shall be employed on Prevailing Wage projects. Apprentices shall be paid a percentage of the determined journeyperson's wage rate for the specific craft.

OVERTIME rates shall be paid by the general contractors and subcontractors under its contracts and agreements with their employees which in no event shall be less than time and one-half the prevailing hourly rate of wages for all hours worked **IN EXCESS OF EIGHT (8) HOURS IN ANY ONE CALENDAR DAY** and work performed on Sundays and legal holidays.

Contractors and subcontractors employing a classification of worker for which a wage rate was not issued, shall notify the Commissioner of Labor & Industry, Prevailing Wage Section, for the purpose of obtaining the wage rate for said classification **PRIOR TO BEING EMPLOYED** on this project.

pw-6 Updated: 10-17-97

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	7,230		
100.2	Remove Existing Chain Link Fence	LF	2,340		
100.3	Remove Existing Underdrain Pipe	LF	0	N/A	N/A
100.4	Demolish/Remove Existing Utilities Structures	EA	5		
100.5	Remove Existing Duct Bank	LF	60		
100.6	Remove Existing Conduit and Cable	LF	500		
100.7	Demolish/Remove Existing Buildings	LS	1		
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	1,200		
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	415		
100.10	Remove Existing Pipe 54" Diameter	LF	310		
101.1	Clearing and Grubbing	ACRE	12		
101.2	Clearing Isolated Trees Type I	EA	50		

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 175,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	3,735		
308.1	Stabilized Construction Entrance	SY	160		
308.2	Silt Fence	LF	13,000		
308.3	Super Silt Fence	LF	1,000		
308.4	Stone Check Dam	EA	6		
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	4		
308.9	Portable Sediment Tank	LS	1		

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	4		
308.11	Curb Inlet Protection	EA	2		
308.12	Temporary Seeding and Mulching	ACRE	4		
427.1	Oil/Water Separator	EA	0	N/A	N/A
813.1	Roadway signs	SF	24		
1000.1	Pre-Engineered Metal Building	LS	1		
1200.1	Water Tank	LS	1		
1300.1	Water Pipe (4" Diameter)	LF	205		
1300.2	Water Pipe (8" diameter)	LF	3,620		
1300.3	Water Pipe (14" Diameter)	LF	3,825		
1300.4	Fire Hydrant	EA	1		
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	160		
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	2075		

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	695		
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	3975		
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	1		
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	2		
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	1		
1300.10	Sanitary Sewer Manhole	EA	17		
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	4		
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	1		
2080.1	Asbestos Removal	LS	1		
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	1		
16000.1	Utility Cost Allowance	LS	1	Allowance	$275,000
16010.1	Basic Electrical Requirements	LS	1		
16050.1	Basic Electrical Materials and Methods	LS	1		
16100.1	Raceways, Boxes, and Cabinets	LS	1		
16110.1	Electrical Handhole	EA	46		

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	14		
16110.3	Pole Foundation in Grassy Area	EA	7		
16110.4	Pole Foundation in Paved Area	EA	0	N/A	N/A
16110.5	4W-6" concrete Encased Duct	LF	1,600		
16110.6	4W-4" Concrete Encased Duct	LF	3,100		
16110.7	4W-3" Concrete Encased Duct	LF	1,500		
16110.8	2W-6" Concrete Encased Duct	LF	1,400		
16110.9	2W-4" Concrete Encased duct	LF	360		
16110.10	2W-3" Concrete Encased Duct	LF	5,500		
16110.11	2W-2" Concrete Encased Duct	LF	2,700		
16110.12	1W-4" Concrete Encased Duct	LF	0	N/A	N/A
16110.13	1W-2" Concrete Encased Duct	LF	1,900		
16110.14	Electrical Equipment Pad	EA	1		

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	1		
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	1		
16170.1	Motor and Circuit Disconnects	LS	1		
16195.1	Labeling and Identification	LS	1		
16321.1	Pole Mount Transformer	EA	2		
16470.1	Power Distribution Equipment	LS	1		
16510.1	Pole Mount Luminaire	EA	7		
16510.2	Exterior Wall Luminaire	EA	1		
16510.3	Interior Fluorescent Lminaire	EA	9		
16510.4	Emergency Lighting Unit	EA	2		
16510.5	Lighted Exit Sign	EA	1		
16510.6	3.5 EPA Light Pole	EA	0	N/A	N/A

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	7		
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	50		
P-152.2	Unclassified Excavation	CY	11,250		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	7,500		
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	0	N/A	N/A
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	2,830		
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	0	N/A	N/A
P-304.1	Cement-Treated Base Course (6" Depth)	SY	0	N/A	N/A
P-304.2	Cement-Treated Base Course (8" Depth)	SY	2,630		
P-304.3	Portland Cement	TON	90		
P-401.1	Airfield Bituminous Surface Course	TON	0	N/A	N/A

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	365		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	365		
P-603.1	Bituminous Tack Coat	GAL	105		
P-610.1	Concrete Curb	LF	0	N/A	N/A
P-610.2	Concrete Curb and Gutter	LF	1,580		
P-610.3	Concrete Utility Encasement	CY	20		
P-610.4	Portland Cement Concrete Pavement	SY	0	N/A	N/A
P-620.1	Pavement Marking	SF	840		
P-620.2	Pavement Marking Removal	SF	0	N/A	N/A
D-701.1	12-inch RCP Class IV	LF	70		
D-701.2	15-inch RCP Class IV	LF	0	N/A	N/A
D-701.3	18-inch RCP Class IV	LF	110		
D-701.4	24-inch RCP Class IV	LF	0	N/A	N/A

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	0	N/A	N/A
D-701.6	30-inch RCP Class A-25	LF	61		
D-701.7	36-inch RCP Class A-25	LF	326		
D-701.8	42-inch RCP Class A-25	LF	0	N/A	N/A
D-701.9	Concrete for Pipe Cradles	CY	0	N/A	N/A
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	0	N/A	N/A
D-705.2	4-inch Polyethylene Pipe	LF	0	N/A	N/A
D-705.3	4-inch Perforated Polyethylene Pipe	LF	0	N/A	N/A
D-705.4	6-inch Polyethylene Pipe	LF	0	N/A	N/A
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	0	N\A	N\A
D-751.3	Storm Drainage Inlet Type 2	EA	1		

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	4		
D-751.5	Storm Drainage Inlet Type 4	EA	1		
D-751.6	Adjust Structure to Grade	EA	0	N/A	N/A
D-752.1	Sedimentation Chamber	CY	17		
D-752.2	Endwall	CY	55		
D-752.3	Class I Rip-Rap	SY	40		
D-752.4	Grouted Rip-Rap	SY	90		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	0	N/A	N/A
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	0	N/A	N/A
L-108.3	Ground Rod	EA	0	N/A	N/A
L-108.4	Concrete Cable Marker	EA	0	N/A	N/A
L-110.5	2" PVC Sched. 80 conduit	LF	0	N/A	N/A
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	0	N/A	N/A

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	0	N/A	N/A
L-125.3	Two-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.4	Three-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N/A	N/A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	100		
T-905.1	Topsoiling	CY	2,000		
T-905.2	Erosion Control Netting	SY	8,200		
T-908.1	Mulching	ACRE	15		

BID TABULATION FORMS - BASE PROJECT

WETLAND MITIGATION

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
101.3	Clearing and Grubbing, Wetland Mitigation Area	AC	3.6		
101.4	Clearing Isolated Trees, Type I, Wetland Mitigation Area	EA	3		
108.3	Mobilization/ Demobilization, Wetland Mitigation Area	LS	1		
109.2	Temporary Construction Items, Wetland Mitigation Area	LS	1		
308.13	Class I Rip Rap Spillway Protection, Wetland Mitigation Area	SY	185		
308.14	Stabilized Construction Entrance, Wetland Mitigation Area	SY	150		
308.15	Super Silt Fence, Wetland Mitigation Area	LF	40		
308.16	Temporary Seeding and Mulching, Wetland Mitigation Area	AC	3		
308.17	Turbidity Curtain, Wetland Mitigation Area	LF	625		
705.1	Permanent Seeding and Mulching, Wetland Mitigation Area	SY	8,335		
710.1	Amelanchier canadensis, 5 Gallon	EA	65		

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
710.2	Aronia arbutifolia "Brilliantissima", 3 Gallon	EA	30		
710.3	Cephalanthus occidentalis, 3 Gallon	EA	50		
710.4	Ilex glabra, 3 Gallon	EA	35		
710.5	Lindera benzoin, 3 Gallon	EA	25		
710.6	Myrica pensylvanica, 2 Gallon	EA	65		
710.7	Quercus borealis, 2 Inch Caliper	EA	14		
710.8	Rhus aromatica, 2 Gallon	EA	100		
710.9	Viburnum prunifolium, 5 Gallon	EA	60		
710.10	Viburnum dentatum, 3 Gallon	EA	35		
710.11	Shredded Hardwood Mulch, 3 Inch Depth	SY	480		
711.1	Panicum virgatum, 1-3/4 Inch Peat Pot	EA	9,800		
711.2	Peltandra virginica, 1 Quart Pot	EA	4,450		
711.3	Pontederia cordata, 1 Quart Pot	EA	4,450		

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
711.4	Scirpus pungens, 1-3/4 Inch Peat Pot	EA	4,450		
711.5	Scirpus robustus, 1 Quart Pot	EA	2,000		
711.6	Scirpus validus, 1 Quart Pot	EA	2,550		
711.7	Goose Exclosure Fence	LF	625		
P-152.5	Stripping, Wetland Mitigation Area	CY	2,895		
P-152.6	Unclassified Excavation, Wetland Mitigation Area	CY	14,200		
T-905.3	Topsoiling, Six Inch Depth, Wetland Mitigation Area	CY	2,895		
Midfield Terminal Complex Site Development, Phase I Total Base Project					

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200		
100.4	Demolish/Remove Existing Utilities Structures	EA	1		
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	210		
308.1	Stabilized Construction Entrance	SY	70		
308.2	Silt Fence	LF	4,000		
308.3	Super Silt Fence	LF	960		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26		
308.11	Curb Inlet Protection	EA	1		
308.12	Temporary Seeding and Mulching	ACRE	12		
427.1	Oil/Water Separator	EA	1		
813.1	Roadway signs	SF	20		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	3		

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	0	N\A	N\A
16110.4	Pole Foundation in Paved Area	EA	3		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	175	N\A	N\A
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	0	N\A	N\A
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	800		
16110.14	Electrical Equipment Pad	EA	2		

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	6		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	3		

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	3,000		
P-152.2	Unclassified Excavation	CY	31,700		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	8,000		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	12,700		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	7,900		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	12,450		
P-304.3	Portland Cement	TON	580		
P-401.1	Airfield Bituminous Surface Course	TON	2,010		

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	1,270		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	1,270		
P-603.1	Bituminous Tack Coat	GAL	1,000		
P-610.1	Concrete Curb	LF	250		
P-610.2	Concrete Curb and Gutter	LF	1,650		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50		
P-620.1	Pavement Marking	SF	1,680		
P-620.2	Pavement Marking Removal	SF	100		
D-701.1	12-inch RCP Class IV	LF	187		
D-701.2	15-inch RCP Class IV	LF	254		
D-701.3	18-inch RCP Class IV	LF	570		
D-701.4	24-inch RCP Class IV	LF	420		

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	475		
D-701.6	30-inch RCP Class A-25	LF	367		
D-701.7	36-inch RCP Class A-25	LF	941		
D-701.8	42-inch RCP Class A-25	LF	186		
D-701.9	Concrete for Pipe Cradles	CY	3		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	1,308		
D-705.2	4-inch Polyethylene Pipe	LF	500		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	48		
D-705.4	6-inch Polyethylene Pipe	LF	340		
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	16		
D-751.3	Storm Drainage Inlet Type 2	EA	6		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 5

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	1		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	3		
D-752.1	Sedimentation Chamber	CY	58		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100		
L-108.3	Ground Rod	EA	26		
L-108.4	Concrete Cable Marker	EA	4		
L-110.5	2" PVC Sched. 80 conduit	LF	1,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	13		

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	2		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	2		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N\A	N\A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	15		
Midfield Terminal Complex Site Development, Phase I Total Add Alternate 1					

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200		
100.4	Demolish/Remove Existing Utilities Structures	EA	0	N\A	N\A
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	420		
308.1	Stabilized Construction Entrance	SY	70		
308.2	Silt Fence	LF	3,400		
308.3	Super Silt Fence	LF	640		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	8		
308.11	Curb Inlet Protection	EA	0	N\A	N\A
308.12	Temporary Seeding and Mulching	ACRE	16		
427.1	Oil/Water Separator	EA	1		
813.1	Roadway signs	SF	15		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	5		

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6		
16110.4	Pole Foundation in Paved Area	EA	3		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	175		
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250		
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	700		
16110.14	Electrical Equipment Pad	EA	1		

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	12		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	9		

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	7,900		
P-152.2	Unclassified Excavation	CY	16,300		
P-152.3	Unsuitable Excavation	CY	200		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	8,300		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	12,950		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	8,100		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	12,700		
P-304.3	Portland Cement	TON	590		
P-401.1	Airfield Bituminous Surface Course	TON	1,850		

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	760		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	760		
P-603.1	Bituminous Tack Coat	GAL	800		
P-610.1	Concrete Curb	LF	1,610		
P-610.2	Concrete Curb and Gutter	LF	390		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50		
P-620.1	Pavement Marking	SF	2,220		
P-620.2	Pavement Marking Removal	SF	100		
D-701.1	12-inch RCP Class IV	LF	245		
D-701.2	15-inch RCP Class IV	LF	354		
D-701.3	18-inch RCP Class IV	LF	360		
D-701.4	24-inch RCP Class IV	LF	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	477		
D-701.6	30-inch RCP Class A-25	LF	275		
D-701.7	36-inch RCP Class A-25	LF	651		
D-701.8	42-inch RCP Class A-25	LF	186		
D-701.9	Concrete for Pipe Cradles	CY	10		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	1,331		
D-705.2	4-inch Polyethylene Pipe	LF	483		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	390		
D-705.4	6-inch Polyethylene Pipe	LF	175		
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	9		
D-751.3	Storm Drainage Inlet Type 2	EA	11		

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	2		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	0	N\A	N\A
D-752.1	Sedimentation Chamber	CY	58		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100		
L-108.3	Ground Rod	EA	26		
L-108.4	Concrete Cable Marker	EA	4		
L-110.5	2" PVC Sched. 80 conduit	LF	1,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	8		

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	5		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	1		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2		
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	15		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 2**					

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	400		
100.4	Demolish/Remove Existing Utilities Structures	EA	1		
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	800		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 170,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	630		
308.1	Stabilized Construction Entrance	SY	140		
308.2	Silt Fence	LF	7,400		
308.3	Super Silt Fence	LF	1,600		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26		
308.11	Curb Inlet Protection	EA	1		
308.12	Temporary Seeding and Mulching	ACRE	25		
427.1	Oil/Water Separator	EA	2		
813.1	Roadway signs	SF	30		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	8		

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6		
16110.4	Pole Foundation in Paved Area	EA	6		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	350		
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250		
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	1,500		
16110.14	Electrical Equipment Pad	EA	3		

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	2		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	18		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	12		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 5

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	2		
P-152.1	Stripping	CY	10,900		
P-152.2	Unclassified Excavation	CY	25,000		
P-152.3	Unsuitable Excavation	CY	400		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	16,300		
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	25,652		
P-304.1	Cement-Treated Base Course (6" Depth)	SY	16,000		
P-304.2	Cement-Treated Base Course (8" Depth)	SY	25,150		
P-304.3	Portland Cement	TON	1,170		
P-401.1	Airfield Bituminous Surface Course	TON	3,860		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 5

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	2,030		
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	2,030		
P-603.1	Bituminous Tack Coat	GAL	1,800		
P-610.1	Concrete Curb	LF	1,860		
P-610.2	Concrete Curb and Gutter	LF	2,040		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	100		
P-620.1	Pavement Marking	SF	3,900		
P-620.2	Pavement Marking Removal	SF	200		
D-701.1	12-inch RCP Class IV	LF	396		
D-701.2	15-inch RCP Class IV	LF	374		
D-701.3	18-inch RCP Class IV	LF	698		
D-701.4	24-inch RCP Class IV	LF	418		

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	478		
D-701.6	30-inch RCP Class A-25	LF	405		
D-701.7	36-inch RCP Class A-25	LF	941		
D-701.8	42-inch RCP Class A-25	LF	186		
D-701.9	Concrete for Pipe Cradles	CY	10		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	2,639		
D-705.2	4-inch Polyethylene Pipe	LF	979		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	438		
D-705.4	6-inch Polyethylene Pipe	LF	523		
D-751.1	Storm Drainage Manhole	EA	4		
D-751.2	Storm Drainage Inlet Type 1	EA	19		
D-751.3	Storm Drainage Inlet Type 2	EA	12		

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	1		
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	3		
D-752.1	Sedimentation Chamber	CY	66		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	2,300		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	2,200		
L-108.3	Ground Rod	EA	52		
L-108.4	Concrete Cable Marker	EA	8		
L-110.5	2" PVC Sched. 80 conduit	LF	2,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	21		

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	7		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	3		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	2		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2		
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	30		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	30		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 3**					

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT

(WITHDRAWN NOTICE)

CONTRACTOR: _____

(Day Format 00-1 through 1-998d)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT+ADD ALTERNATE 1

_____

(Written in Numerals)

(Written in Words)

CONTRACTOR: _____

TOTAL OF ALL BID ITEMS
(Pay Items 100-1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 2

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 3

_____
(Written in Numerals)

CONTRACTOR: _____

CHERRY HILL
CONSTRUCTION, INC.
8211 Washington Blvd. P.O. Box 356
Jessup, Maryland 20794-0356
(410) 799-3577/ FAX (410) 799-5483

LETTER NO. 1

Maryland Aviation Administration
PO Box 8766
BWI Airport, MD 21240-0766

Attention ; Suzette Moore

Re: Martin State Airport , Midfield Terminal Complex
MAA - CO - 97 - 019

Fax # 410 - 859 - 5440

REMARKS :

Page 1300 - 8 of the technical specifications states that the Contractor shall obtain the permits required for connections to the existing sanitary sewer and water systems. Please clarify what permits are required and the cost of the permits.

COPY * files

SIGNED

Steve Roberts

Sheet1martins

** TOTAL PAGE.01 **

CHERRY HILL
CONSTRUCTION, INC.
8211 Washington Blvd. P.O. Box 200
Jessup , Maryland 20794-0200
(410) 799-3577/ FAX (410) 799-5453

May 16, 1998

LETTER NO. 2

Maryland Aviation Administration
PO Box 8766
BWI Airport, MD 21240-0766

Attention ; Suzette Moore

Re: Martin State Airport , Midfield Terminal Complex
MAA - CO - 97 - 019

Fax# 410 859 - 5440

REMARKS :

Bid Item 1300.12 Wilson Point Road sanitary sewer crossing .
This item covers the jacking and installation of the casing pipe for the 8" pvc sewer line under Wilson Point Road.

Please clarify what size and type of casing pipe is required , and specifications for the grouting referenced in 6.3 on page 1300-12 of the Technical Specifications.

COPY " files

SIGNED Steve Roberts

Steve Roberts

Sheet1martins

** TOTAL PAGE.01 **

PAVEX
INCORPORATED

4400 GETTYSBURG ROAD
CAMP HILL, PA 17011
TEL. (717) 761-1502
FAX (717) 761-0328

120 COCKEYSVILLE ROAD
HUNT VALLEY, MD 21030
TEL. (410) 771-0244
FAX (410) 771-0245

May 15, 1998

MAA
P.O. Box 8766
BWI Airport, MD 21240-0766

Attention: Suzette Moore

Re: MAA-CO-97-019

Dear Ms. Moore:

SP-8.05 Construction Quality Control Plan, Paragraph C states:..." The contractor's plan shall encompass all management and finished construction work, including all inspection controls and tests required for compliance with the Technical Specifications, except for those inspections and tests specifically reserved to be accomplished by the Engineer."

What are the specific inspections and tests reserved for the Engineer that are not the responsibility of the contractor?

Thank you,
Pavex, Inc.

Michael E. Edmonston

Michael E. Edmonston
Estimator

MEE/cas

c:\wptxt\office\let\bwi-mcc

SERVING THE CONSTRUCTION INDUSTRY FOR OVER 25 YEARS
EXCAVATION • PAVING • SITE UTILITIES • LANDFILLS

FACCHINA

CONSTRUCTION COMPANY, INC.

P.O. Box 186, 9320 W&W Industrial Road, La Plata, MD 20646
(301) 753-3369 FAX (301) 753-3784

May 19, 1998

Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation
FAX: 410-859-5440

Reference: Midfield Terminal Complex
Site Development, Phase I
Contract No. MAA-CO-97-019

Attention: **Ms. Suzette Moore**

Facchina Construction would like to submit for your review the following questions and concerns in reference to the above mentioned project:

1. Is the detail PRECAST YARD INLET on plan Sheet U-15 the detail to use for item D-751.2 Storm Drainage Inlet Type 2 (yard inlets to be used on the landside portion of the site)?

2. Addendum 4 indicates that CB1-8 & CB1-9 are Type 2 structures (yard inlets), shouldn't these inlets be Type 3 structures (curb inlets) since they are on the access road?

3. Addendum 4 states that storm structure DMH1-4 shown on Sheet C-07 is a Type 4 Storm Drainage Structure. The detail on plan Sheet U-17 for a Drainage Structure Type 4 is a double chamber structure with two parallel pipe entering & leaving each chamber. DMH1-4 shown on Sheet C-07 is a storm drainage manhole built over a existing 54" pipe. Are you sure you want a Type 4 Storm Drainage Structure for DMH1-4? If yes, what do we do with the chamber that doesn't have a pipe entering or leaving it?

Facchina Construction Company, Inc.
Brian Moore

ADDENDUM NO. 6

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

ADDENDUM TO PLANS AND SPECIFICATIONS

CONTRACT NO. MAA-CO-97-019
MIDFIELD COMPLEX CONSTRUCTION SITE DEVELOPMENT
AT MARTIN STATE AIRPORT

ACKNOWLEDGEMENT OF RECEIPT

The undersigned acknowledges that Addendum No. 6 to Maryland Aviation Administration Plans and Specifications for Contract No. MAA-CO-97-019 has been received by the undersigned and will be incorporated in all copies of said Plans and Specifications in the possession of the undersigned.

It is understood that all proposals submitted in response to MAA-CO-97-019 will be presumed to be based upon full knowledge of the contents of Addendum No. 6.

_____
(Company Name)

By:_____
(Signature-Authorized Official)

_____
(Title)

_____
(Date)

IMPORTANT

NOTE: PLEASE SIGN AND DATE THE "ACKNOWLEDGEMENT OF RECEIPT" AND RETURN VIA FACSIMILE (410-859-5440) IMMEDIATELY.

Maryland Department of Transportation
Maryland Aviation Administration
Office of Planning and Engineering
Lower Level, Pier A, at the Terminal Building
P.O. Box 8766
Baltimore/Washington International
Airport, Maryland 21240

ADDENDUM DATE: **MAY 26, 1998**

BID DUE DATE: **MAY 28, 1998 - 2 P.M.**

MIDFIELD TERMINAL SITE COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

CONTRACT NO. MAA-CO-97-019

ADDENDUM NO. 6

Important: Bidders must acknowledge the receipt of this Addendum on page BF.18 of the Bid Forms, Section 5, Bid Proposal stating the Addendum number. All documents must be fully executed at the time the Bid is submitted.

REVISION TO STANDARD PROVISIONS FOR CONSTRUCTION CONTRACTS:

SP-4.02 Notice to Proceed

The Notice to Proceed as defined in **GP-8.02** will be issued within one hundred and twenty (120) days after the Notice of Recommended Award.

CLARIFICATIONS/REVISIONS TO TECHNICAL PROVISIONS:

Response to Written Inquiries:

1. IA Construction Corporation, 5/22/98:

   Q. Please clarify if we will be paid for topsoil that we strip, stockpile and later place under both one of the P-152 items, as well as under Item T-905.1. Item P-152-2.2.11C conflicts with Item T-905-3.3A regarding this issue.

   A. Topsoil will be paid only once as follows:

      1. Topsoil that is stripped and disposed of off site is to be paid under Item P-152.1 Stripping.

2. Disposal of existing topsoil stockpile remaining from a previous contract is to be paid under Bid Item P-152.4 Remove Existing Soil Stockpile.
3. Placing topsoil obtained on-site or off-site is to be paid under Item T-905.1 Topsoiling.
4. Stripping and stockpiling topsoil for reuse will not be paid. Payment will be made for placing topsoil only (see item 1 above).

2. John C. Driggs Company, 5/22/98:

Q. Please clarify what type of inspections are included in "general construction inspections"?

A. General construction inspections by the Engineer include visual inspection, measurements and other means to insure work is in compliance with the Plans and Specifications. General construction inspections do not include geotechnical testing.

END OF ADDENDUM NO. 6

ADDENDUM NO. 7

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

ADDENDUM TO PLANS AND SPECIFICATIONS

CONTRACT NO. MAA-CO-97-019
MIDFIELD COMPLEX CONSTRUCTION SITE DEVELOPMENT
AT MARTIN STATE AIRPORT

ACKNOWLEDGEMENT OF RECEIPT

The undersigned acknowledges that Addendum No. 7 to Maryland Aviation Administration Plans and Specifications for Contract No. MAA-CO-97-019 has been received by the undersigned and will be incorporated in all copies of said Plans and Specifications in the possession of the undersigned.

It is understood that all proposals submitted in response to MAA-CO-97-019 will be presumed to be based upon full knowledge of the contents of Addendum No. 7.

_____
(Company Name)

By:_____
(Signature-Authorized Official)

_____
(Title)

_____
(Date)

IMPORTANT

NOTE: PLEASE SIGN AND DATE THE "ACKNOWLEDGEMENT OF RECEIPT" AND RETURN VIA FACSIMILE (410-859-5440) IMMEDIATELY.

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
Office of Planning and Engineering
Terminal Building, Lower Level, Pier A
P.O. Box 8766
Baltimore/Washington International Airport, Maryland 21240

Midfield terminal Complex Development, Phase I
at
Martin State Airport

Contract Number MAA-CO-97-019

ADDENDUM NO. 7

PRE-BID MEETING DATE:	April 15, 1998
ADDENDUM DATE:	May 26, 1998
BID DATE:	May 28, 1998

IMPORTANT: Bidders must acknowledge the receipt of this Addendum on the Bid Forms, page BF-18, stating the Addendum Number. Additionally, Bidders must acknowledge purchase of the Standard Provisions by volume and date on page BF-18.

REVISIONS ADDITIONS AND DELETIONS TO THE CONTRACT DOCUMENTS

PART VI BID FORMS

***Bid Tabulation Forms* - Add Alternate 3**

1. Item16120.1 Wires and Cables: Quantity: change "2" to "1".

2. Item 16900.1 General Instrumentation: Quantity: change "2" to "1".

ATTENTION: **Each Lump Sum (LS) Item for the Base Project and each Bid Alternate listed on Bid Tabulation Forms must have a quantity of either zero (0) for Non-Applicable Item, or one (1) for Applicable Item only.**

END OF ADDENDUM NO.7

TECHNICAL PROVISIONS

VOLUME II of II

PART VI - BID FORMS

MAA-CO-97-019
MIDFIELD TERMINAL COMPLEX
SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

MARYLAND AVIATION ADMINISTRATION
September 8, 1998

TECHNICAL PROVISIONS

PART VI

BID FORMS

PART VI
BID FORM

Section 1 - Bid Bond . . . . . BF - 1

Section 2 - Bid/Proposal Affidavit . . . . . BF - 3

Section 3 - MBE Utilization Affidavit . . . . . BF - 11

Section 4 - Subcontractor Utilization Affidavit . . . . . BF - 14

Section 5 - Bid Proposal and Bid Tabulation Forms . . . . . BF - 16

SECTION 1
BID BOND

NOTE: THIS BID BOND IS NOT REQUIRED IF THE TOTAL CONTRACT PRICE IS LESS THAN ONE HUNDRED THOUSAND DOLLARS ($100,000).

Bond Number: _____

A. KNOW ALL MEN BY THESE PRESENTS, that we _____
Bidding Company

as Principal, hereinafter called the Principal, and _____
Bonding Company

a corporation duly organized under the laws of the State of: _____
Name of State

as Surety, hereinafter called the Surety, are held and firmly bound unto the State of Maryland, hereinafter called, "State", for the sum of:

_____
(Dollars, Written in Words)

for the payment of which sum, the said Principal and the said Surety bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for:

Contract Numbers: MAA-CO-97-019

Contract Titles: Midfield Terminal Complex Site Development, Phase I

B. NOW THEREFORE, if the Principal, upon acceptance by the State of its bid identified above, within the period specified herein for acceptance (ninety (90) days, if no period is specified), shall execute such further contractual documents, if any, and give such bond(s) as may be required by the terms of the bid as accepted within the time specified (ten (10) days if no period is specified) after receipt of the forms, or in the event of failure to so execute such further contractual documents and give such bonds, if the Principal shall pay the State for any cost of procuring the work which exceeds the amount of its bid, then the above obligation shall be void and of no effect. The Surety executing this instrument hereby agrees that its obligation shall not be impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the State, notice of which extension(s) to the Surety being hereby waived; provided that such waiver of notice shall apply only with respect to extensions aggregating not more than ninety (90) calendar days in addition to the period originally allowed for acceptance of the Bid.

In Presence of:
Witness:

_____

Individual Principal

as to _____ (Seal)

In Presence of:
Witness:

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

Corporate Principal

_____ (Seal)

Name of Corporation

Attest:

_____

Corporate Secretary

By: _____

President

Affix Corporate Seal

Surety

_____

Name of Surety

Attest:

_____ (Seal)

Signature

_____

Signature of Surety

Affix Corporate Seal

_____

Bonding Agent's Name

_____

Title

_____

Agent's Address

_____

Business Address of Surety

_____

Maryland Aviation Administration

Approved as to Legal Form and Sufficiency:

this _____ day of _____, 19 ____

_____

Assistant Attorney General

SECTION 2
BID/PROPOSAL AFFIDAVIT

A. AUTHORIZED REPRESENTATIVE

I HEREBY AFFIRM THAT:

I am the _____ and the duly authorized representative of
Title

_____, and that I possess the legal authority to make
Firm
this Affidavit on behalf of myself and the business for which I am acting.

B. AFFIRMATION REGARDING BRIBERY CONVICTIONS

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business (as is defined in **Section 16-101(b)** of the State Finance and Procurement Article of the Annotated Code of Maryland), or any of its officers, directors, partners, or any of its employees directly involved in obtaining or performing contracts with public bodies (as is defined in **Section 16-101(f)** of the State Finance and Procurement Article of the Annotated Code of Maryland), has been convicted of, or has had probation before judgment imposed pursuant to **Article 27, Section 641** of the Annotated Code of Maryland, or has pleaded *nolo contendere* to a charge of, bribery, attempted bribery, or conspiracy to bribe in violation of Maryland law, or of the law of any other state or federal law, except as follows (indicate the reasons why the affirmation cannot be given and list any conviction, plea, or imposition of probation before judgment with the date, court, official or administrative body, the sentence or disposition, the name(s) of person(s) involved, and their current positions and responsibilities with the business):

_____
_____
_____
_____

C. AFFIRMATION REGARDING OTHER CONVICTIONS

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of its officers, directors, partners, or any of its employees directly involved in obtaining or performing contracts with public bodies, has:

(a) Been convicted under state or federal statute of a criminal offense incident to obtaining, attempting to obtain, or performing a public or private contract, fraud, embezzlement, theft, forgery, falsification or destruction of records, or receiving stolen property;

(b) Been convicted of any criminal violation of a state or federal antitrust statute;

(c) Been convicted under the provisions of **Title 18** or the United States Code for violation of the Racketeer Influenced and Corrupt Organization Act, **18 U.S.C. §1961**, *et seq.*, or the Mail Fraud Act, **18 U.S.C. §1341**, *et seq.*, for acts arising out of the submission of bids or proposals for a public or private contract;

(d) Been convicted of a violation of the State Minority Business Enterprise Law, **Section 14-308** of the State Finance and Procurement Article of the Annotated Code or Maryland;

(e) Been convicted of conspiracy to commit any act or omission that would constitute grounds for conviction or liability under any law or statute described in Subsections (a), (b), (c) or (d) above;

(f) Been found civilly liable under a state or federal antitrust statute for acts or omissions in connection with the submission of bids or proposals for a public or private contract;

(g) Admitted in writing or under oath, during the course of an official investigation or other proceedings, acts or omissions that would constitute grounds for conviction or liability under any law or statute described above, except as follows (indicate reasons why the affirmations cannot be given, and list any conviction, plea, or imposition of probation before judgment with the date, court, official or administrative body, the sentence or disposition, the name(s) of the person(s) involved and their current positions and responsibilities with the business, and the status of any debarment):

_____

_____

_____

_____

D. AFFIRMATION REGARDING DEBARMENT

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of it its officers, directors, partners, or any of its employees directly involved in obtaining or performing contracts with public bodies, has ever been suspended or debarred (including being, issued a limited denial of participation) by any public entity, except as follows (list each debarment or suspension providing the dates of the suspension or debarment, the name of the public entity and the status of the proceedings, the name(s) of the persons(s) involved and their current positions

and responsibilities with the business, the grounds of the debarment or suspension, and the details of each person's involvement in any activity that formed the grounds of the debarment or suspension):

_____

_____

_____

_____

E. AFFIRMATION REGARDING DEBARMENT OF RELATED ENTITIES

I FURTHER AFFIRM THAT:

(a) The business was not established and it does not operate in a manner designed to evade the application of or defeat the purpose of debarment pursuant to **Section 16-101**, *et seq.*, of the State Finance and Procurement Article of the Annotated Code of Maryland; and

(b) The business is not a successor, assignee, subsidiary, or affiliate of a suspended or debarred business, except as follows (you must indicate the reasons why the affirmations cannot be given without qualification):

_____

_____

_____

_____

F. SUB-CONTRACT AFFIRMATION

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business, has knowingly entered into a contract with a public body under which a person debarred or suspended under **Title 16** of the State Finance and Procurement Article of the Annotated Code of Maryland will provide, directly or indirectly, supplies, services, architectural services, construction related services, leases of real property, or construction.

G. AFFIRMATION REGARDING COLLUSION

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business, has:

(a) Agreed, conspired, connived, or colluded to produce a deceptive show of competition in the compilation of the accompanying bid or offer that is being submitted;

(b) In any manner, directly or indirectly, entered into any agreement of any kind to fix the bid price or price proposal of the bidder or offeror or of any competitor, or otherwise taken any action in restraint of free competitive bidding in connection with the Contract for which the accompanying bid or offer is submitted.

H. FINANCIAL DISCLOSURE AFFIRMATION

I FURTHER AFFIRM THAT:
I am aware of, and the above business will comply with, the provisions of **Section 13-221** of the State Finance and Procurement Article of the Annotated Code of Maryland, which require that every business that enters into contracts, leases, or other agreements with the State of Maryland or its agencies during a calendar year under which the business is to receive in the aggregate $100,000 or more shall, within 30 days of the time when the aggregate value of the contracts. leases or other agreements reaches $100,000, file with the Secretary of State of Maryland certain specified information to include disclosure of beneficial ownership of the business.

I. POLITICAL CONTRIBUTION DISCLOSURE AFFIRMATION

I FURTHER AFFIRM THAT:
I am aware of, and the above business will comply with the provisions of **Article 33, Sections 30-1 through 30-4** of the Annotated Code of Maryland, which requires that every person that enters into contracts, leases, or other agreements with the State of Maryland, including its agencies or a political subdivision of the State, during a calendar year in which the person receives in the aggregate $100,000 or more shall file with the Administrative Board of Election Laws a statement disclosing contributions in excess of $500 or more during the reporting period to a candidate for elective office in any primary or general election.

J. DRUG AND ALCOHOL FREE WORKPLACE
(Applicable to all contracts unless the contract is for a law enforcement agency and the agency head or the agency head's designees has determined that application of **COMAR 21.11.08** and this certification would be inappropriate in connection with the law enforcement agency's undercover operations).

I CERTIFY THAT:

1. Terms defined in **COMAR 21.11.08** shall have the same meaning when used in this certification.

2. By submission of its bid or offer, the business, if other than an individual, certifies and agrees that, with respect to its employees to be employed under a contract resulting from this solicitation, the business shall:

   (a) Maintain a workplace free of drug and alcohol abuse during the term of the Contract;

(b) Publish a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of drugs, and the abuse of drugs or alcohol is prohibited in the business' workplace and specifying the actions that will be taken against employees for violation of these prohibitions,

(c) Prohibit its employees from working under the influence of drugs or alcohol;

(d) Not hire or assign to work on the Contract anyone whom the business knows, or in the exercise of due diligence should know, currently abuses drugs or alcohol and is not actively engaged in a *bona fide* drug or alcohol abuse assistance or rehabilitation program;

(e) Promptly inform the appropriate law enforcement agency of every drug-related crime that occurs in its workplace if the business has observed the violation or otherwise has reliable information that a violation has occurred;

(f) Establish drug and alcohol abuse awareness programs to inform its employees about:

(1) The dangers of drug and alcohol abuse in the workplace;

(2) The business' policy of maintaining a drug and alcohol free workplace;

(3) Any available drug and alcohol counseling, rehabilitation, and employee assistance programs; and

(4) The penalties that may be imposed upon employees who abuse drugs and alcohol in the workplace;

(g) Provide all employees engaged in the performance of the Contract with a copy of the statement required by §J(2)(b), above;

(h) Notify its employees in the statement required by §J(2)(b), above that, as a condition of continued employment on the Contract, the employee shall:

(1) Abide by the terms of the statement; and

(2) Notify the employer of any criminal drug or alcohol abuse conviction for an offense occurring in the workplace not later that 5 days after a conviction;

(i) Notify the Procurement Officer within 10 days after receiving notice under §J(2)(h)(2), above, or otherwise receiving actual notice of a conviction;

(j) Within 30 days after receiving notice under §J(2)(h)(2), above, or otherwise receiving actual notice of a conviction, impose either of the following sanctions or remedial measures on any employee who is convicted of a drug or alcohol abuse offense occurring in the workplace:

(1) Take appropriate personnel action against an employee, up to and including termination; or

(2) Require an employee to satisfactorily participate in a *bona fide* drug or alcohol abuse assistance or rehabilitation program; and

(k) Make a good faith effort to maintain a drug and alcohol free workplace through implementation of §§J(2)(a)-(j), above.

3. If the business is an individual, the individual shall certify and agree as set forth in §J(4), below, that the individual shall not engage in the unlawful manufacture, distribution, dispensing, possession, or use of drugs or the abuse of drugs or alcohol in the performance of the Contract.

4. I acknowledge and agree that:

(a) The award of the Contract is conditional upon compliance with **COMAR 21.11.08** and this certification;

(b) The violation of the provisions of **COMAR 21.11.08** or this certification shall be cause to suspend payments under, or terminate the Contract for default under **COMAR 21.07.01.11 or 21.07.03.15**, as applicable; and

(c) The violation of the provisions of **COMAR 21.11.08** or this certification in connection with the Contract may, in the exercise of the discretion of the Board of Public Works, result in suspension and debarment of the business under **COMAR 21.08.06**.

K. CERTIFICATION OF CORPORATION REGISTRATION AND TAX PAYMENT

I FURTHER AFFIRM THAT:

1. The business named above is a domestic ____ or foreign ____ corporation registered in accordance with the Corporations and Associations Article, Annotated Code of Maryland, and that it is in good standing and has filed all of its annual reports, together with filing fees, with the Maryland State Department of Assessments and Taxation, and that the name and address of its resident agent filed with the State Department of Assessments and Taxation is:

Name: _____

Address: _____

_____

(If not applicable, so state)

2. Except as validly contested, the business has paid, or has arranged for payment of, all taxes due the State of Maryland and has filed all required returns and reports with the Comptroller of the Treasury, the State Department of Assessments and Taxation, and the Employment Security Administration, as applicable, and will have paid all withholding taxes due the State of Maryland prior to final settlement.

L. CONTINGENT FEES

I FURTHER AFFIRM THAT:
The business has not employed or retained any person, partnership, corporation, or other entity, other than a *bona fide* employee or agent working for the business to solicit or secure this agreement, and that the business has not paid or agreed to pay any person, partnership, corporation, or other entity, other than a *bona fide* employee or agent, any fee or any other consideration contingent on the making of this Contract.

M. ACKNOWLEDGEMENT

I ACKNOWLEDGE THAT:

This Affidavit is to be furnished to the Procurement Officer and may be distributed to units of: (1) the State of Maryland; (2) counties or other subdivisions of the State of Maryland; (3) other states; and (4) the Federal Government. I further acknowledge that this Affidavit is subject to applicable laws of the United States and the State of Maryland, both criminal and civil, and that nothing in this Affidavit or any contract resulting from the submission of this bid or proposal shall be construed to supersede, amend, modify or waive, on behalf of the State of Maryland, or any unit of the State of Maryland having jurisdiction, the exercise of any statutory right or remedy conferred by the Constitution and the laws of Maryland with respect to any misrepresentation made or any violation of the obligations, terms and covenants undertaken by the above business with respect to (1) this Affidavit; (2) the Contract; and (3) other Affidavits comprising part of the Contract.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THIS AFFIDAVIT ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF.

_____ _____

Date Authorized Representative or Affiant

State of _____

County (City) of _____

On this _____ day of _____, 19 ____

before me, _____, the undersigned officer,
Notary

personally appeared _____, known to me to be the
Contractor

person described in the foregoing Affidavit and acknowledged that he/she executed the same in the capacity therein stated and for the purposes therein contained. In witness whereof, I hereunto set my hand and official seal.

_____ (Seal) My Commission Expires _____

Signature Date

SECTION 3
MBE UTILIZATION AFFIDAVIT

State of _____

County (City) of _____

In connection with:

Contract Number : _____

Contract Title _____

A. AUTHORIZED REPRESENTATIVE

I HEREBY DECLARE AND AFFIRM THAT:

I am the _____
Title

and the duly authorized representative of _____
Name of Firm

whose address is _____

_____

and that I possess the legal authority to make this affidavit on behalf of myself and the firm for which I am acting.

B. I AFFIRM that _____
Name of Firm

as the General Contractor, in performing the above-referenced Contract, we shall make every effort to achieve a minimum goal as specified in the Technical Provisions. The Disadvantaged Business Enterprise (DBE) participation goal is measured by the dollar value of the Contract, including any modifications or change orders executed subsequent to the award of the Contract.

C. IT IS ACKNOWLEDGED:
That all required documentation relative to affirmative action taken by the General Contractor to seek out and consider the use of Minority Business Enterprise will be submitted to and/or made available for inspection by the Maryland Department of Transportation.

B. BASIS OF AWARD:

The Maryland Aviation Administration reserves the right to award the Contract to the lowest responsive and responsible bidder on the basis of one of the following:

1. The lowest total price bid for the **Base Project**, or

2. The lowest total price bid for the **Base Project** and **Add Alternate 1**, or

3. The lowest total price bid for the **Base Project** and **Add Alternate 2**, or

4. The lowest total price bid for the **Base Project** and **Add Alternate 3**.

C. NOTICE OF AWARD:

Notice of award as described in General Provisions, Sections **GP-2.19** and **GP-3.01** will be issued within one hundred and twenty (120) days of bid opening.

D. BID GUARANTY:

Five percent (5%) of total bid (Not required when bid is less than One Hundred Thousand Dollars ($100,000.00)).

TO THE MARYLAND DEPARTMENT OF TRANSPORTATION,
MARYLAND AVIATION ADMINISTRATION

GENTLEMEN:

A. The undersigned hereby declares to have carefully examined the Contract Documents entitled:

Contract Number: MAA-CO-97-019

Contract Title: Midfield Terminal Complex Site Development, Phase I

and to have examined the other Contract Documents (including the Standard Provisions, Addendum(s), Bid Forms, and Contract Forms), and to have carefully inspected the site(s) whereon the proposed work is to be performed.

B. The undersigned proposes and agrees to furnish all labor, materials, equipment and services necessary for the above said project for the Maryland Aviation Administration in accordance with the Specifications, and other Contract Documents including:

1. Addendum(s) issued by the Maryland Aviation Administration,

   Number(s): _____ , and

2. Standard Provisions

   Volume: _____, Date: _____

at the Unit Prices Bid as delineated on the Bid Tabulation Forms, or at the Lump Sum Price Bid as stipulated in the Contract Documents.

C. The prices shown on the Bid Tabulation Forms for the Contract entitled:

Contract Number: MAA-CO-97-019

Contract Title: Midfield Terminal Complex Site Development, Phase I

include and cover the furnishing of all materials and labor requisite and proper, and the providing of all necessary machinery, tools, apparatus, and means for performing the work, as set forth, described, and shown in the Contract Drawings, Specifications and other Contract Documents.

D. The undersigned affirms that Bid has been executed in accordance with General Provisions, Section **GP-2.06**, titled "Preparation of Bid".

FOR CORPORATIONS:

A. The undersigned Corporation affirms that it is ____ is not____ registered with the Maryland State Department of Assessments and Taxation and, if registered, is in good standing.

B. If not registered with the Maryland State Department of Assessments and Taxation, see Special Provision, Section **SP-2.03**, titled "Corporate Registration".

Construction Firm License Number: _____

Date of Issue: _____

Place of Issuance: _____

In Presence of:
Witness:

Individual Principal

_____ as to _____ (Seal)

In Presence of:
Witness:

Co-Partnership Principal

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

Corporate Principal

_____ (Seal)
Name of Corporation

Attest:

_____ By: _____ Affix Corporate Seal
Corporate Secretary President

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	7,230		
100.2	Remove Existing Chain Link Fence	LF	2,340		
100.3	Remove Existing Underdrain Pipe	LF	0	N/A	N/A
100.4	Demolish/Remove Existing Utilities Structures	EA	5		
100.5	Remove Existing Duct Bank	LF	60		
100.6	Remove Existing Conduit and Cable	LF	500		
100.7	Demolish/Remove Existing Buildings	LS	1		
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	1,200		
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	415		
100.10	Remove Existing Pipe 54" Diameter	LF	310		
101.1	Clearing and Grubbing	ACRE	12		
101.2	Clearing Isolated Trees	EA	50		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 175,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	3,735		
308.1	Stabilized Construction Entrance	SY	160		
308.2	Silt Fence	LF	13,000		
308.3	Super Silt Fence	LF	1,000		
308.4	Stone Check Dam	EA	6		
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	4		
308.9	Portable Sediment Tank	LS	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	4		
308.11	Curb Inlet Protection	EA	2		
308.12	Temporary Seeding and Mulching	ACRE	4		
427.1	Oil/Water Separator	EA	0	N/A	N/A
813.1	Roadway signs	SF	24		
1000.1	Pre-Engineered Metal Building	LS	1		
1200.1	Water Tank	LS	1		
1300.1	Water Pipe (4" Diameter)	LF	205		
1300.2	Water Pipe (8" diameter)	LF	3,620		
1300.3	Water Pipe (14" Diameter)	LF	3,825		
1300.4	Fire Hydrant	EA	1		
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	160		
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	2075		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	695		
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	3975		
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	1		
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	2		
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	1		
1300.10	Sanitary Sewer Manhole	EA	17		
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	4		
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	1		
2080.1	Asbestos Removal	LS	1		
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	1		
16000.1	Utility Cost Allowance	LS	1	Allowance	$275,000
16010.1	Basic Electrical Requirements	LS	1		
16050.1	Basic Electrical Materials and Methods	LS	1		
16100.1	Raceways, Boxes, and Cabinets	LS	1		
16110.1	Electrical Handhole	EA	46		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	14		
16110.3	Pole Foundation in Grassy Area	EA	7		
16110.4	Pole Foundation in Paved Area	EA	0	N/A	N/A
16110.5	4W-6" concrete Encased Duct	LF	1,600		
16110.6	4W-4" Concrete Encased Duct	LF	3,100		
16110.7	4W-3" Concrete Encased Duct	LF	1,500		
16110.8	2W-6" Concrete Encased Duct	LF	1,400		
16110.9	2W-4" Concrete Encased duct	LF	360		
16110.10	2W-3" Concrete Encased Duct	LF	5,500		
16110.11	2W-2" Concrete Encased Duct	LF	2,700		
16110.12	1W-4" Concrete Encased Duct	LF	0	N/A	N/A
16110.13	1W-2" Concrete Encased Duct	LF	1,900		
16110.14	Electrical Equipment Pad	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	1		
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	1		
16170.1	Motor and Circuit Disconnects	LS	1		
16195.1	Labeling and Identification	LS	1		
16321.1	Pole Mount Transformer	EA	2		
16470.1	Power Distribution Equipment	LS	1		
16510.1	Pole Mount Luminaire	EA	7		
16510.2	Exterior Wall Luminaire	EA	1		
16510.3	Interior Fluorescent Luminaire	EA	9		
16510.4	Emergency Lighting Unit	EA	2		
16510.5	Lighted Exit Sign	EA	1		
16510.6	3.5 EPA Light Pole	EA	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	7		
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	50		
P-152.2	Unclassified Excavation	CY	11,800		
P-152.3	Unsuitable Excavation	CY	1,000		
P-152.4	Remove Existing Soil Stockpile	CY	7,500		
P-152.7	Borrow	CY	0	N/A	N/A
P-209.1	Crushed Aggregate Base Course	CY	370		
P-209.2	MSHA #2 Stone Base Course	CY	750		
P-209.3	Geotextile Fabric	SY	2,200		
P-401.1	Airfield Bituminous Surface Course	TON	0	N/A	N/A
P-401.2	Airfield Bituminous Base Course	TON	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.3	MSHA Hot Mix Asphalt Surface Course (SC)	TON	500		
P-401.4	MSHA Hot Mix Asphalt Base Course (BC)	TON	500		
P-602.1	Bituminous Prime Coat	GAL	770		
P-610.1	Concrete Curb	LF	0	N/A	N/A
P-610.2	Concrete Curb and Gutter	LF	1,580		
P-610.3	Concrete Utility Encasement	CY	20		
P-610.4	Portland Cement Concrete Pavement	SY	0	N/A	N/A
P-620.1	Pavement Marking	SF	840		
P-620.2	Pavement Marking Removal	SF	0	N/A	N/A
D-701.1	12-inch RCP Class IV	LF	70		
D-701.2	15-inch RCP Class IV	LF	0	N/A	N/A
D-701.3	18-inch RCP Class IV	LF	110		
D-701.4	24-inch RCP Class IV	LF	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	0	N/A	N/A
D-701.6	30-inch RCP Class A-25	LF	61		
D-701.7	36-inch RCP Class A-25	LF	326		
D-701.8	42-inch RCP Class A-25	LF	0	N/A	N/A
D-701.9	Concrete for Pipe Cradles	CY	0	N/A	N/A
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	0	N/A	N/A
D-705.2	4-inch Polyethylene Pipe	LF	0	N/A	N/A
D-705.3	4-inch Perforated Polyethylene Pipe	LF	0	N/A	N/A
D-705.4	6-inch Polyethylene Pipe	LF	0	N/A	N/A
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	1		
D-751.3	Storm Drainage Inlet Type 2	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	4		
D-751.6	Adjust Structure to Grade	EA	0	N/A	N/A
D-752.1	Sedimentation Chamber	CY	17		
D-752.2	Endwall	CY	55		
D-752.3	Class I Rip-Rap	SY	40		
D-752.4	Grouted Rip-Rap	SY	90		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	0	N/A	N/A
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	0	N/A	N/A
L-108.3	Ground Rod	EA	0	N/A	N/A
L-108.4	Concrete Cable Marker	EA	0	N/A	N/A
L-110.5	2" PVC Sched. 80 conduit	LF	0	N/A	N/A
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Site Development

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	0	N/A	N/A
L-125.3	Two-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.4	Three-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N/A	N/A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	100		
T-905.1	Topsoiling	CY	2,000		
T-905.2	Erosion Control Netting	SY	8,200		
T-908.1	Mulching	ACRE	15		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Wetland Mitigation

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
101.3	Clearing and Grubbing, Wetland Mitigation Area	ACRE	3.6		
101.4	Clearing Isolated Trees, Type I, Wetland Mitigation Area	EA	3		
108.3	Mobilization/ Demobilization, Wetland Mitigation Area	LS	1		
109.2	Temporary Construction Items, Wetland Mitigation Area	LS	1		
308.13	Class I Rip Rap Spillway Protection, Wetland Mitigation Area	SY	185		
308.14	Stabilized Construction Entrance, Wetland Mitigation Area	SY	150		
308.15	Super Silt Fence, Wetland Mitigation Area	LF	40		
308.16	Temporary Seeding and Mulching, Wetland Mitigation Area	ACRE	3		
308.17	Turbidity Curtain, Wetland Mitigation Area	LF	625		
705.1	Permanent Seeding and Mulching, Wetland Mitigation Area	SY	8,335		
710.1	Amelanchier canadensis, 5 Gallon	EA	65		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Wetland Mitigation

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
710.2	Aronia arbutifolia "Brilliantissima", 3 Gallon	EA	30		
710.3	Cephalanthus occidentalis, 3 Gallon	EA	50		
710.4	Ilex glabra, 3 Gallon	EA	35		
710.5	Lindera benzoin, 3 Gallon	EA	25		
710.6	Myrica pensylvanica, 2 Gallon	EA	65		
710.7	Quercus borealis, 2 Inch Caliper	EA	14		
710.8	Rhus aromatica, 2 Gallon	EA	100		
710.9	Viburnum prunifolium, 5 Gallon	EA	60		
710.10	Viburnum dentatum, 3 Gallon	EA	35		
710.11	Shredded Hardwood Mulch, 3 Inch Depth	SY	480		
711.1	Panicum virgatum, 1-3/4 Inch Peat Pot	EA	9,800		
711.2	Peltandra virginica, 1 Quart Pot	EA	4,450		
711.3	Pontederia cordata, 1 Quart Pot	EA	4,450		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Wetland Mitigation

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
711.4	Scirpus pungens, 1-3/4 Inch Peat Pot	EA	4,450		
711.5	Scirpus robustus, 1 Quart Pot	EA	2,000		
711.6	Scirpus validus, 1 Quart Pot	EA	2,550		
711.7	Goose Exclosure Fence	LF	625		
P-152.5	Stripping, Wetland Mitigation Area	CY	2,895		
P-152.6	Unclassified Excavation, Wetland Mitigation Area	CY	13,500		
T-905.3	Topsoiling, Six Inch Depth, Wetland Mitigation Area	CY	2,895		
	Midfield Terminal Complex Site Development, Phase I				
	Total Base Project - Site Development and Wetland Mitigation				

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200		
100.4	Demolish/Remove Existing Utilities Structures	EA	1		
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	210		
308.1	Stabilized Construction Entrance	SY	70		
308.2	Silt Fence	LF	4,000		
308.3	Super Silt Fence	LF	960		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26		
308.11	Curb Inlet Protection	EA	1		
308.12	Temporary Seeding and Mulching	ACRE	12		
427.1	Oil/Water Separator	EA	1		
813.1	Roadway signs	SF	20		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	0	N\A	N\A
16110.4	Pole Foundation in Paved Area	EA	3		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	175		
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	0	N\A	N\A
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	800		
16110.14	Electrical Equipment Pad	EA	2		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	6		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	3,000		
P-152.2	Unclassified Excavation	CY	21,700		
P-152.3	Unsuitable Excavation	CY	450		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-152.7	Borrow	CY	200		
P-209.1	Crushed Aggregate Base Course	CY	3,350		
P-209.2	MSHA #2 Stone Base Course	CY	6,700		
P-209.3	Geotextile Fabric	SY	20,100		
P-401.1	Airfield Bituminous Surface Course	TON	2,620		
P-401.2	Airfield Bituminous Base Course	TON	3,950		
P-401.3	MSHA Hot Mix Asphalt Surface Course (SC)	TON	1,750		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.4	MSHA Hot Mix Asphalt Base Course (BC)	TON	1,750		
P-602.1	Bituminous Prime Coat	GAL	7,040		
P-610.1	Concrete Curb	LF	250		
P-610.2	Concrete Curb and Gutter	LF	1,650		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50		
P-620.1	Pavement Marking	SF	1,680		
P-620.2	Pavement Marking Removal	SF	100		
D-701.1	12-inch RCP Class IV	LF	187		
D-701.2	15-inch RCP Class IV	LF	679		
D-701.3	18-inch RCP Class IV	LF	570		
D-701.4	24-inch RCP Class IV	LF	420		
D-701.5	27-inch RCP Class A-25	LF	475		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.6	30-inch RCP Class A-25	LF	367		
D-701.7	36-inch RCP Class A-25	LF	941		
D-701.8	42-inch RCP Class A-25	LF	186		
D-701.9	Concrete for Pipe Cradles	CY	3		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	1,308		
D-705.2	4-inch Polyethylene Pipe	LF	500		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	48		
D-705.4	6-inch Polyethylene Pipe	LF	340		
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	16		
D-751.3	Storm Drainage Inlet Type 2	EA	6		
D-751.4	Storm Drainage Inlet Type 3	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.6	Adjust Structures to Grade	EA	3		
D-752.1	Sedimentation Chamber	CY	58		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100		
L-108.3	Ground Rod	EA	26		
L-108.4	Concrete Cable Marker	EA	4		
L-110.5	2" PVC Sched. 80 conduit	LF	1,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	13		
L-125.2	Relocate Existing Taxiway Edge Light	EA	2		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.3	Two-Panel Taxiway Guidance Sign	EA	2		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N\A	N\A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	15		
Midfield Terminal Complex Site Development, Phase I Total Add Alternate 1					

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200		
100.4	Demolish/Remove Existing Utilities Structures	EA	0	N\A	N\A
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	420		
308.1	Stabilized Construction Entrance	SY	70		
308.2	Silt Fence	LF	3,400		
308.3	Super Silt Fence	LF	640		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	8		
308.11	Curb Inlet Protection	EA	0	N\A	N\A
308.12	Temporary Seeding and Mulching	ACRE	16		
427.1	Oil/Water Separator	EA	1		
813.1	Roadway signs	SF	15		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	5		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6		
16110.4	Pole Foundation in Paved Area	EA	3		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	175		
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250		
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	700		
16110.14	Electrical Equipment Pad	EA	1		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	12		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	9		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	7,900		
P-152.2	Unclassified Excavation	CY	17,400		
P-152.3	Unsuitable Excavation	CY	360		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-152.7	Borrow	CY	300		
P-209.1	Crushed Aggregate Base Course	CY	2,680		
P-209.2	MSHA #2 Stone Base Course	CY	5,350		
P-209.3	Geotextile fabric	SY	16,100		
P-401.1	Airfield Bituminous Surface Course	TON	2,500		
P-401.2	Airfield Bituminous Base Course	TON	3,750		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.3	MSHA Hot Mix Asphalt Surface Course (SC)	TON	1,000		
P-401.4	MSHA Hot Mix Asphalt Base Course (BC)	TON	1,000		
P-602.1	Bituminous Prime Coat	GAL	5,640		
P-610.1	Concrete Curb	LF	1,610		
P-610.2	Concrete Curb and Gutter	LF	390		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50		
P-620.1	Pavement Marking	SF	2,220		
P-620.2	Pavement Marking Removal	SF	100		
D-701.1	12-inch RCP Class IV	LF	245		
D-701.2	15-inch RCP Class IV	LF	684		
D-701.3	18-inch RCP Class IV	LF	360		
D-701.4	24-inch RCP Class IV	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	477		
D-701.6	30-inch RCP Class A-25	LF	275		
D-701.7	36-inch RCP Class A-25	LF	651		
D-701.8	42-inch RCP Class A-25	LF	186		
D-701.9	Concrete for Pipe Cradles	CY	10		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	1,331		
D-705.2	4-inch Polyethylene Pipe	LF	483		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	390		
D-705.4	6-inch Polyethylene Pipe	LF	175		
D-751.1	Storm Drainage Manhole	EA	3		
D-751.2	Storm Drainage Inlet Type 1	EA	9		
D-751.3	Storm Drainage Inlet Type 2	EA	9		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	2		
D-751.6	Adjust Structures to Grade	EA	0	N\A	N\A
D-752.1	Sedimentation Chamber	CY	58		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100		
L-108.3	Ground Rod	EA	26		
L-108.4	Concrete Cable Marker	EA	4		
L-110.5	2" PVC Sched. 80 conduit	LF	1,000		
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	8		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	5		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	1		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2		
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	15		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 2**					

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	400		
100.4	Demolish/Remove Existing Utilities Structures	EA	1		
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	800		
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1		
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 170,000.00
109.1	Temporary Construction Items	LS	1		
206.1	Pavement Removal	SY	630		
308.1	Stabilized Construction Entrance	SY	140		
308.2	Silt Fence	LF	7,400		
308.3	Super Silt Fence	LF	1,600		
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1		
308.6	Sediment Basin Riser Discharge Structure	LS	1		
308.7	Class I Rip Rap Spillway Protection	SY	50		
308.8	Sump Pit	EA	6		
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26		
308.11	Curb Inlet Protection	EA	1		
308.12	Temporary Seeding and Mulching	ACRE	25		
427.1	Oil/Water Separator	EA	2		
813.1	Roadway signs	SF	30		
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	8		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6		
16110.4	Pole Foundation in Paved Area	EA	6		
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	350		
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250		
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	1,500		
16110.14	Electrical Equipment Pad	EA	3		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1		
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	18		
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	12		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1		
P-152.1	Stripping	CY	10,900		
P-152.2	Unclassified Excavation	CY	30,970		
P-152.3	Unsuitable Excavation	CY	640		
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-152.7	Borrow	CY	500		
P-209.1	Crushed Aggregate Base Course	CY	6,030		
P-209.2	MSHA #2 Stone Base Course	CY	12,050		
P-209.3	Geotextile Fabric	SY	36,200		
P-401.1	Airfield Bituminous Surface Course	TON	5,120		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	Airfield Bituminous Base Course	TON	7,700		
P-401.3	MSHA Hot Mix Asphalt Surface Course (SC)	TON	2,750		
P-401.4	MSHA Hot Mix Asphalt Base Course (BC)	TON	2,750		
P-602.1	Bituminous Prime Coat	GAL	12,680		
P-610.1	Concrete Curb	LF	1,860		
P-610.2	Concrete Curb and Gutter	LF	2,040		
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	100		
P-620.1	Pavement Marking	SF	3,900		
P-620.2	Pavement Marking Removal	SF	200		
D-701.1	12-inch RCP Class IV	LF	396		
D-701.2	15-inch RCP Class IV	LF	1,129		
D-701.3	18-inch RCP Class IV	LF	698		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.4	24-inch RCP Class IV	LF	418		
D-701.5	27-inch RCP Class A-25	LF	478		
D-701.6	30-inch RCP Class A-25	LF	405		
D-701.7	36-inch RCP Class A-25	LF	941		
D-701.8	42-inch RCP Class A-25	LF	186		
D-701.9	Concrete for Pipe Cradles	CY	10		
D-701.10	Seepage Pipe	LF	80		
D-705.1	Geocomposite Underdrain	LF	2,639		
D-705.2	4-inch Polyethylene Pipe	LF	979		
D-705.3	4-inch Perforated Polyethylene Pipe	LF	438		
D-705.4	6-inch Polyethylene Pipe	LF	523		
D-751.1	Storm Drainage Manhole	EA	4		
D-751.2	Storm Drainage Inlet Type 1	EA	19		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.3	Storm Drainage Inlet Type 2	EA	10		
D-751.4	Storm Drainage Inlet Type 3	EA	3		
D-751.6	Adjust Structures to Grade	EA	3		
D-752.1	Sedimentation Chamber	CY	66		
D-752.2	Endwall	CY	115		
D-752.3	Class I Rip-Rap	SY	200		
D-752.4	Grouted Rip-Rap	SY	75		
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	2,300		
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	2,200		
L-108.3	Ground Rod	EA	52		
L-108.4	Concrete Cable Marker	EA	8		
L-110.5	2" PVC Sched. 80 conduit	LF	2,000		

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	21		
L-125.2	Relocate Existing Taxiway Edge Light	EA	7		
L-125.3	Two-Panel Taxiway Guidance Sign	EA	3		
L-125.4	Three-Panel Taxiway Guidance Sign	EA	2		
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2		
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	30		
T-901.2	Wetlands Vegetation	MSF	56		
T-905.1	Topsoiling	CY	750		
T-905.2	Erosion Control Netting	SY	5,100		
T-908.1	Mulching	ACRE	30		
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 3**					

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 1

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 2

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 3

_____

(Written in Numerals)

_____

(Written in Words)

CONTRACTOR: _____

TECHNICAL PROVISIONS

VOLUME I OF II

PART I TO V

MAA-CO-97-019

MIDFIELD TERMINAL COMPLEX
SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

MARYLAND AVIATION ADMINISTRATION

MARCH 31, 1998

MARYLAND DEPARTMENT OF TRANSPORTATION

Maryland Aviation Administration

Technical Provisions

for

Contract MAA-CO-97-019

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

Martin State Airport

P.O. Box 8766
Baltimore/Washington International Airport
Maryland 21240-0766

INTRODUCTION

This book, Technical Provisions for Construction Contracts, is a supplement to the Maryland Aviation Administration's Standard Provisions for Construction Contracts, Volume I, December 1993. This book along with the Standard Provisions is intended to describe and establish all requirements and standards for this construction contract.

The requirements contained in this book shall be binding upon the parties signatory to the Contract. By submitting a bid for this Contract, the Contractor agrees to adhere to the requirements of these Provisions.

The Contractor shall be required to acknowledge possession of the Standard Provisions, Volume I, December 1993, in the space provided in the Proposal Section. Failure to acknowledge possession of the referenced Standard Provisions as required shall deem the bid to be non-responsive and subject to rejection in accordance with General Provisions, Section GP-2.17, Rejection of Individual Bids or Proposals.

TECHNICAL PROVISIONS

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TECHNICAL PROVISIONS

PART I

GENERAL INFORMATION

PART I

GENERAL INFORMATION

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GI-1.01 Contract Summary

ITEM	DESCRIPTION
Contract Title	Midfield Terminal Complex Site Development, Phase I
MAA Contract Number	MAA-CO-97-019
AIP Contract Number	Not Applicable
Applicable Standard Provisions	Volume I; December 1993
Provisions for Federal Aid Applicable	YES ( ) - NO (X)
MBE Participation Goal	16%
Contract Classification	F
Wage Rates Required	YES (X) - NO ( )
Interim Standard Provisions Addenda Included	YES (X) - NO ( )
Total Contract Duration: Base Project Base Project+Add Alternate 1 Base project+Add Alternate 2 Base Project+Add Alternate 3	 230 Calendar days 260 Calendar days 260 Calendar days 275 Calendar days
Liquidated Damages	$1000.00/calendar Day (See Section GI-1.08)
Plans & Specifications Cost	$150.00
Pre-Bid Conference Date	April 15, 1998 at 1:00 p.m.
Bids Due	**May 12, 1998 at 11:00 a.m.**
Bid Opening	**May 12, 1998 at 11:15 a.m.**

GI-1.02 Notice to Contractors

Sealed bids for the Maryland Aviation Administration (MAA) project marked Midfield Terminal Complex Site Development, Phase I, MAA-CO-97-019 will be received at the *Office of Planning and Engineering of the Maryland Aviation Administration, Lower Level, Pier A, Baltimore/Washington International Airport, Maryland 21240*, until 11:00 am, local time May 12, 1998. At 11:15 am, on this same date they will be publicly opened and read aloud. Positively no bids will be received after 11:00 am on May 12, 1998.

The work to be done under this contract includes the furnishing of all supervision, labor, materials, equipment and all incidentals necessary for the Midfield Terminal Complex Site Development, Phase I project.

The work under this contract includes, but is not limited to, the installation of infrastructure and the development of approximately 45-acre site for aviation uses at the Martin State Airport, Baltimore County, Maryland. The Maryland Aviation Administration will award the Contract to the lowest responsible and responsive bidder based on the lowest bid price. The work includes, but is not necessarily limited to: site clearing and grading; demolition of three (3) abandoned buildings on the site, and demolition of, and removal of hazardous materials from these buildings, and proper disposal of the hazardous materials; installation of site utilities including domestic and fire protection water system including a 500,000 gallon water storage tank, pumps, control systems and pumping station; gravity and force main sanitary sewer; installation of fiber optic communication cable; electrical distribution system, switchgear, transformers, duct bank, conduits and cable; site drainage and storm water quality and quantity management systems; the construction of taxiways, taxilanes, aprons, parking lots and access roads including curb and gutter and lighting, and pavement markings; seeding, topsoiling; construction of wetland mitigation and wetland replication vegetation; and erosion and sediment control measures during construction in accordance with standards and permits issued by the Maryland Department of the Environment. All work shall be performed in accordance with the Contract Drawings and as described in the Specifications. Natural gas, telephone, cable television systems, and electrical cable and distribution systems for this project will be installed by respective utility companies under utility installation allowances provided under this Contract. Work shall also includes procurement of respective utility companies construction services including all necessary permits for private and public utility connections.

Plans, Specifications, and other contract documents may be examined without charge, or Contract Drawings and Technical Provisions may be purchased for **$150.00** and Standard Provisions for **$30.00** at the Office of Planning and Engineering of the Maryland Aviation Administration at the Lower Level, Pier A, Baltimore/Washington International Airport. These payments will **not** be refunded.

A site inspection/pre-bid conference be held on April 15, 1998. at 1:00 p.m. for all interested bidders. Please assemble at Hangar 4 Classroom, Martin State Airport, Maryland.

The Bid must be accompanied by a Bid Guaranty in the amount of five per cent (5%) of the Bid Price in the name of the "State of Maryland," a Bid/Proposal Affidavit, and the Minority Business Enterprise and Subcontractor Utilization Affidavits. A Performance and a Payment Bond in the amount of the Contract Price will be required of the successful bidder if the contract price is over One Hundred Thousand Dollars ($100,000). Assistance in obtaining Bid, Performance and Payment Bonds may be available to qualifying small businesses through the Maryland Small Business Development Financing Authority (MSBDFA). Questions regarding the bonding assistance program should be referred to: MSBDFA, 217 E. Redwood Street, 22nd Floor, Baltimore, MD 21202, (410) 333-4270.

Bidders are hereby notified that in regard to any contract entered into pursuant to this advertisement, Minority Business Enterprises (MBE) will be afforded full opportunity to submit bids in response to this notice and will not be subjected to discrimination on the basis of race, color, sex, creed, or national origin. Minority Business Enterprises are encouraged to respond to this solicitation notice.

It is the goal of Maryland Department of Transportation that Minority Business Enterprises participate in all contracts. The MAA has established a minimum goal of sixteen percent (16%) participation for this Contract.

If any prospective bidders are physically impaired and are planning to attend the Pre-Bid/Site Inspection or Bid Opening meetings, please call at least two business days in advance of the meeting to (410) 859-7267 (Contact Administration), (410) 859-7111 (MAA Communications Center), or (410) 859-7227 (TDD) to advise of any reasonable accommodations required.

By submitting a response to this solicitation, a vendor shall be deemed to represent that it is not in arrears in the payment of any obligation due and owing the State of Maryland, including the payment of taxes and employee benefits, and that it shall not become so in arrears during the term of the contract if selected for contract award.
The Maryland Aviation Administration reserves the right to reject any and all bids, if in its judgement the interest of the Administration may so require.

Any questions regarding this solicitation or contract should be addressed to Ms. Suzette Moore, in writing at the Maryland Aviation Administration, Office of Planning and Engineering, or by phone at (410) 859-7792.

Alex E. Noorani, Director
Division of Engineering
Office of Planning and Engineering
Maryland Aviation Administration
Maryland Department of Transportation

GI-1.03 Notice of Pre-Bid Conference

A site inspection/Pre-Bid conference will be held on April 15, 1998 at 1:00 p.m. for all bidders. Please assemble at at Hangar 4 Classroom, Martin State Airport, Maryland. Interested bidders are encouraged to attend.

A State Equal Opportunity Officer will be available to discuss the Affirmative Action Requirements of this Contract.

GI-1.04 Description of Project

The work to be done under this contract includes the furnishing of all supervision, labor, materials, equipment, and all incidentals necessary for the Midfield Terminal Complex Site Development, Phase I project.

The work under this contract includes, but is not limited to, the installation of infrastructure and the development of approximately 45-acre site for aviation uses at the Martin State Airport, Baltimore County, Maryland. The Maryland Aviation Administration will award the Contract to the lowest responsible and responsive bidder based on the lowest bid price. The work includes, but is not necessarily limited to: site clearing and grading; demolition of three (3) abandoned buildings on the site, and demolition of, and removal of hazardous materials from these buildings, and proper disposal of the hazardous materials; installation of site utilities including domestic and fire protection water system including a 500,000 gallon water storage tank, pumps, control systems and pumping station; gravity and force main sanitary sewer; installation of fiber optic communication cable; electrical distribution system, switchgear, transformers, duct bank, conduits and cable; site drainage and storm water quality and quantity management systems; the construction of taxiways, taxilanes, aprons, parking lots and access roads including curb and gutter and lighting, and pavement markings; seeding, topsoiling; construction of wetland mitigation and wetland replication vegetation; and erosion and sediment control measures during construction in accordance with standards and permits issued by the Maryland Department of the Environment. All work shall be performed in accordance with the Contract Drawings and as described in the Specifications. Natural gas, telephone, cable television systems, and electrical cable and distribution systems for this project will be installed by respective utility companies under utility installation allowances provided under this Contract. Work shall also includes procurement of respective utility companies construction services including all necessary permits for private and public utility connections.

GI-1.05 Basis of Award

The Maryland Aviation Administration will award this Contract to the lowest responsive and responsible bidder on the basis of one of the following:

1. The lowest total price bid for the **Base Project**, or

2. The lowest total price bid for the **Base Project** and **Add Alternate 1**, or

3. The lowest total price bid for the **Base Project** and **Add Alternate 2**, or

4. The lowest total price bid for the **Base Project** and **Add Alternate 3**.

Determination of which of the preceding will be used as the basis for award will be at MAA's sole discretion. The scope of the Contract to be awarded will be subject to available funding as well as other considerations to be determined solely by MAA.

Work to be included in the **Base Project**, **Add Alternate 1**, **Add Alternate 2**, and **Add Alternate 3** is specified in the Contract Drawings, and is summarized as follows:

Base Project — The Base Project will include clearing and grubbing of the entire project site; demolition and removal of abandoned buildings (included removal and disposal of hazardous materials therein) and utilities; construction of the access road and associated storm drainage system up to Station 11+50; construction of stormwater management Pond 1; and the installation of utility services (water, fire suppression, natural gas, sanitary sewer, electrical, communications, and cable television services) to and throughout the Midfield Terminal Complex, including the extension of the proposed sanitary sewer system to the airport's Strawberry Point complex.

Add Alternate 1 — Add Alternate 1 will consist of development of the Skytech portion of the Midfield Complex. This work will include construction of the Skytech apron, Taxiway L, and associated storm drainage, lighting and signage, and other related work; construction of stormwater management Ponds 3A and 3B; extension of the access road to the Skytech apron and construction of the adjacent parking lot and associated storm drainage, electrical, and lighting facilities. Rough grading of the future hangar site will also be included.

Add Alternate 2 — Add Alternate 2 will consist of development of the Lockheed Martin portion of the Midfield Complex. This work will include construction of the Lockheed Martin apron, extension of Taxiway J, and associated storm drainage, lighting and signage, and other related work; construction of stormwater management Ponds 3A and 3B; extension of the access road to the Lockheed Martin apron and construction of the adjacent parking lot and associated storm drainage, electrical, and lighting facilities. Rough grading of the future hangar site will also be included.

Add Alternate 3 — Add Alternate 3 will consist of the all work shown under Add Alternate 1 and Add Alternate 2.

Bidders should be thoroughly familiar with the requirements of the MAA Standard Provisions and these Specifications, including the Interim Standard Provisions Addenda contained herein, especially with those requirements for unit price contracts including add and deduct alternates.

GI-1.06 Critical Path Schedule

The Contractor is required to furnish a standard bar chart construction schedule in lieu of a Critical Path Method Schedule specified in SP-8.03.

GI-1.07 Sequence of Construction

Upon receiving the Notice-to-Proceed, the Contractor shall prepare and construct the project in accordance with an approved Construction Staging Plan, unless otherwise directed by the Engineer. The Construction Staging Plan shall detail the following sequence of work:

(a) Mobilize for construction

(b) Install temporary traffic maintenance markings, signage, and furnish temporary construction items.

(c) Install erosion and sediment control measures.

(d) Clearing and grubbing, grading, and building and structure demolition, including removal and disposal of hazardous materials.

(e) Construct storm water quantity and quality management facilities including wetland replication vegetations and appurtenant drainage structures.

(h) Construct airfield and landside pavements, utilities, lighting, water tank and pumping equipment, pavement marking, signage, etc.

(I) Final clean up, systems testing and commissioning.

(j) Final inspection and occupancy by MAA.

GI-1.08 Special Construction Requirements

A. Time Restrictions:

All work within runway and taxiway object free areas shall be performed only during periods of runway or taxiway closure, which shall be between the hours of 10:00 pm and 6:00 am local time only, unless otherwise approved by the Airport Manager. The contractor shall notify the Engineer in writing at least forty-eight hours in advance of any desired closure, and approval will be granted (or denied) in writing. If the desired closure requires that a Notice to Airmen (NOTAM) be issued, such NOTAM will be issued by airport management. Work shall be permitted only during the effective hours of the particular NOTAM issued, regardless of the closure requested.

B. Deliveries and Removal:

The delivery and removal of all materials and equipment is unrestricted. Loading and unloading of equipment and materials from the airport roadways must be completed expeditiously, and parking of delivery vehicles on the airport roadways is not permitted. Deliveries by suppliers must be coordinated with the Contractor. The Contractor must be available to take all deliveries.

C. Staging Areas:

The Contractor will be provided with a staging area for his equipment during construction. The locations of the staging areas will be as shown on the plans or as determined by MAA prior to first mobilization. At MAA request any assigned staging area(s) shall be relocated within seven days of receiving prior notice. All staging area relocations originated by the MAA or the Contractor shall be at no additional cost to this contract.

The Contractor shall be responsible for the security and maintenance of his staging areas at all times. All costs incurred shall be considered incidental to work under this contract.

It is intended that equipment and materials needed for the construction will be stored in the Contractor's designated staging area. Equipment and materials necessary at the work site(s) may be transported to those site(s) only as necessary to meet approved schedules.

During the course of this contract the Contractor shall maintain all of his staging and work areas in a clean and usable condition acceptable to the Engineer.

All areas used for the storage of equipment or material shall be restored to their original condition immediately upon completion of this contract to the satisfaction of the Engineer. No additional compensation shall be provided for regrading, placement of topsoil, or seeding and mulching in these areas, or for any restoration activity required by the Engineer.

D. Contract Duration:

The contract duration for completion of this project, including mobilization, but excluding winter shutdowns as directed or approved by MAA:

i.	Base Project	230 Calendar days
ii.	Base Project + Add Alternate 1	260 Calendar days
iii.	Base Project + Add Alternate 2	260 Calendar days
iv.	Base Project + Add Alternate 3	275 Calendar days

Upon approval of the Administration, the successful bidder shall be available to begin work immediately following notice to proceed. Accordingly, the specified contract time/duration (including mobilization) shall begin on the Notice to Proceed date determined by the Administration.

The work to be completed in this project must not disrupt normal operations at the Martin State Airport. The completion of this project is critical to the operation of the airport. Therefore, the contract duration that the Contractor will be allowed to perform the work has been reduced to the minimum practical time.

E. Liquidated Damages:

Pursuant to General Provisions Articles GP-8.02 and GP-8.03, commence work on or before the date specified in the Notice to Proceed and complete the specified portions of the work within the number of calendar days identified below. In the event that the Contractor fails to complete the specified work within the specified number of days after Notice to Proceed, with the exception of extensions granted by change order, liquidated damages will be assessed pursuant to General Provisions Article GP-8.09 and as specified herein for each day the completion of the specified work is delayed.

Liquidated damages for completion of this construction project including the required milestone will be assessed at one thousand dollars ($1000) for each calendar day beyond the required contract completion date.

The Administration may deduct the sum of liquidated damages from any monies due or that may become due the Contractor under the Contract.

F. MBE Documentation:

The Maryland Aviation Administration requests all bidders to submit their MBE participation schedules with their bid submittal. MBE must be certified at the time of bid submittal.

G. Basis of Award:

The Contract will be awarded on a unit price basis. To be considered responsive, the bidder must bid on all items of the Base Project and Add Alternates. Same items within different portions of the Base Project and Add Alternates must be given the same unit prices. The Maryland Aviation Administration reserves the right to award the contract to the lowest responsive and responsible bidder based on the stipulations contained in Section GI-1.05. All work shall be accomplished in accordance with the Contract Drawings and Specifications.

H. Project Coordination:

The Contractor shall coordinate scheduling, submittals, and work of the various Items of the Technical Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

The Contractor shall verify that utility service requirements of proposed equipment are compatible with existing utilities. The Contractor shall also coordinate work of various sections having joint responsibility for installation, connection, and commissioning of such equipment.

The Contractor shall coordinate the requirements and installation of mechanical and electrical work which are indicated diagrammatically on Contract Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable. Utilize spaces efficiently to maximize accessibility for installation work covered under other Items, for maintenance, and for repairs.

Where scale of Contract Drawings is too small to show details clearly, prepare large scale sketches or drawings and submit as directed for approval.

Other construction contracts within this project site and/or elsewhere within the airport will be undertaken during the time which this project will be constructed. The Contractor shall cooperate and coordinate with Contractors working in those areas.

I. Utility Shut Downs:

The Contractor shall notify and receive approval from the Engineer seven (7) days in advance of any utility shut down that will affect the normal operations at the Martin State Airport. Utility shut downs shall only be allowed at night and during hours determined by the Engineer (normally between 12:00 midnight to 5:00 am). The Contractor shall provide the Engineer with the type of utility and duration of shut down and specific areas that will be affected as a result of this work.

J. Shop Drawings:

The time for shop drawing submittals, reviews and approvals is incorporated into the contract duration. The Contractor must submit complete shop drawing packages for each item of work. Delays caused by incomplete submittals of shop drawings by the Contractor will not be accepted by the Engineer, and the Contractor will be considered non-responsive under the Contract.

K. Access to the Site:

The Contractor's Access to the site shall be via the Airport Maintenance Complex on Strawberry Point Road, unless otherwise authorized by the Engineer. Stabilized construction entrances will be provided by the Contractor as shown on the plans, or as directed by the Engineer, and shall be the sole points of entry to the site. No dirt or debris may

be trafficked onto offsite roadways. The Contractor shall have a sweeper and water hose down equipment available at all times.

L. Airport Operations:

Although construction is largely within non-movement areas, the project site abuts active portions of the Aircraft Operations Area (AOA). The Contractor is referred to the requirements of the Special Provisions. Seven days' notice is required from the contractor to the Engineer for any activities that may impact aircraft operations. No debris shall be permitted to accumulate on or in the vicinity of the AOA. Any clean-up deemed necessary by the Engineer will be charged to the Contractor.

M. Dewatering:

The Contractor's attention is directed to the project Boring Logs shown on the Contract drawings, which indicate fluctuating and seasonally high ground water levels have been found across the site. Dewatering will be a preeminent requirement for this project and will be considered incidental for the successful construction of the project. No separate measurement or payment will be made for dewatering, or associated environmental requirements. Costs shall be included in all applicable pay items where dewatering is required.

N. Wetlands Mitigation:

Construction of wetlands mitigation is included in this contract. However, plans and specifications, including Bid Forms for the wetland mitigation are not included in these Contract Documents. Separate plans, specifications, and Bid Forms for this work will be issued as an Addendum to the Contract Documents.

O. Project Milestones:

The Contractor shall perform all work in stages shown in the Contract Drawings. However, MAA reserves the right to direct the Contractor to alter the required work sequences, and/or work areas, if necessary. Unless directed otherwises, the Contractor shall complete the work in accordance with the following milestone:

Stage I - 90 Calendar days from NTP

GI-1.09 List of Drawings

Sheet Number	Title
G-01	TITLE SHEET
G-02	DRAWING INDEX
G-03	GENERAL NOTES
G-04	SUMMARY OF ESTIMATED QUANTITIES
G-05	CONTRACTOR ACCESS AND STAGING PLAN
G-06	KEY PLAN
G-07	ABBREVIATIONS, LEGEND AND NOTES
G-08	BASE PROJECT
G-09	ADD ALTERNATE 1
G-10	ADD ALTERNATE 2
G-11	ADD ALTERNATE 3

Sheet Number	Title
T-01	SURVEY CONTROL PLAN
T-02	SURVEY AND EXISTING CONDITIONS PLAN I
T-03	SURVEY AND EXISTING CONDITIONS PLAN II
T-04	SURVEY AND EXISTING CONDITIONS PLAN III
T-05	SURVEY AND EXISTING CONDITIONS PLAN IV
T-06	SURVEY AND EXISTING CONDITIONS PLAN V
B-01	BORING LOCATION PLAN
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PART II

TECHNICAL SPECIFICATIONS

PART II

TECHNICAL SPECIFICATIONS

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ITEM 10 SPECIFICATIONS AND STANDARDS

10-1 SPECIFICATIONS

1.1 The Contractor's operations shall conform to the technical specifications, and all applicable federal, state and local regulations, codes and ordinances. When not specified, the work under this contract, shall be done in accordance with the requirements of Part II, Technical Requirements, of the Maryland Department of Transportation, State Highway Administration's "Standard Specifications for Construction and Materials" dated October 1993, revisions thereof or additions thereto, the General Provisions, and the Special Provisions. Copies of the above noted "Standard Specifications for Construction and Materials" is available for a charge from the following source:

Maryland Department of Transportation
State Highway Administration
707 North Calvert Street
Baltimore, Maryland 21203-0717
(410) 333-1305

Sections referenced in the Specifications refer to the above standard unless otherwise noted.

1.2 Any reference to a specific requirement of a numbered paragraph of the specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.

10-2 STANDARDS

2.1 The following documents are hereby included as contract documents by reference:

A. Erosion and Sediment Control, Maryland Department of Transportation, State Highway Administration, current edition, with revisions.

B. Maryland Standards and Specifications for Soil Erosion and Sediment Control, Water Resources Administration, Soil Conservation Service and State Soil Conservation Committee, current edition.

C. Book of Standards, Highways and Incidental Structures, Maryland Department of Transportation, State Highway Administration, current edition.

D. Maryland Seed Law from the Agricultural Article of the Annotated Code of Maryland, current edition.

E. Manual on Uniform Traffic Control Devices (MUTCD); US Department of Transportation, Federal Highway Administration, current edition.

F. Occupational Safety and Health Standard, Maryland Occupational Safety and Health, Maryland Division of Labor and Industry, Department of Licensing and Regulation, latest applicable standards.

2.2 In case of discrepancy between the Technical Provisions and any other provisions contained in or incorporated by reference into the contract, the Engineer shall be the sole authority on the resolution of such discrepancy and his/her decision shall be final.

10-3 CODES, PERMITS AND TEST REQUIREMENTS

3.1 All work under this contract shall comply with the provisions of these specifications, as shown on the contract drawings, or as directed by the Engineer, and shall satisfy all applicable federal, state and local codes, ordinances and regulation of the governing bodies, and all authorities having jurisdiction over the work, or services thereto, whether so specified or not, and all modifications required by such authorities shall be made by the contractor without any additional compensation beyond contract unit prices bid.

3.2 Miscellaneous work and materials required to fulfill the obvious intent of the job as indicated on the drawings, but not specifically defined, shall be performed according to the requirements of the methods selected by the Engineer as being the most appropriate.

3.3 The Contractor shall obtain and pay for all tests, permits, certificates of inspection, etc. required by the provisions of these specifications and/or the authorities having jurisdiction over this work. Such documents shall be submitted to the Engineer before the final acceptance of work or before the work begins, whichever is applicable.

3.4 The Contractor shall furnish all labor, materials, instruments, fuel, power and any incidentals required to perform any test(s) or measurement(s) as may be required by the Engineer to indicate the fulfillment of these specifications and/or his directives. Any changes or adjustments required to meet the specifications or to satisfy the Engineer shall be made by the Contractor at no expense to the Owner, and he shall furnish, at the completion of the job, a final compliance certificate to the Engineer for testing performed or adjustments made as required.

3.5 Upon completion of work and prior to final acceptance of any work, the Contractor shall demonstrate to the Engineer at his presence that all materials/equipments installed are in perfect operating condition. All defective materials or workmanship discovered as a result of these tests, measurements and/or inspections shall be removed and replaced at the Contractor's expense and the test, measurement and/or adjustment shall be repeated to meet the satisfaction of the Engineer.

3.6 All testings, adjusting, or measurements shall be performed by competent and experienced workmen skilled in their trade and in accordance with the requirements of applicable codes and standards governing such trade.

3.7 Unless directed by the Engineer otherwise, all tests, permits, certificates of inspection, etc. required by the provisions of these specifications and/or the authorities having jurisdiction over this work will apply to each item of work independently. Such document(s) shall be submitted to the Engineer before the final acceptance of each item of work, or before the work begins, whichever is applicable.

END OF ITEM 10

ITEM 100 DEMOLITION AND REMOVAL

100-1 DESCRIPTION

1.1 Work under this item will include the demolition, removal, and disposal of the following:

a) Existing concrete slabs on grade,
b) Existing chain link fence and gates (regardless of height),
c) Existing porous concrete underdrain pipe,
d) Existing utility manholes and other in-ground structures,
e) Existing concrete-encased duct bank and cable,
f) Existing electrical and communications conduit and cable,
g) Existing abandoned buildings and foundations, regardless of type of construction. This work shall include the buildings shown on the plans as well as associated structures including silos, storage sheds, vestibules, and other structures and debris in the vicinity of the buildings shown on the demolition plans, and
h) Existing concrete storm drainage pipe.

1.2 Demolition, removal, and disposal of hazardous materials contained in buildings to be removed, whose locations are shown on the plans, shall be done in strict accordance with the provisions of Item 2080. Hazardous material removal from all of the three buildings shown on the plans shall be certified complete in accordance with the provisions of Item 2080 before demolition of any of the structures may begin.

100-2 GENERAL

2.1 Any buildings and miscellaneous structures that are shown on the plans to be demolished and/or removed shall be demolished or removed, and their contents and all materials therefrom shall be disposed of off airport property in accordance with the provisions of this Item. The remaining or existing foundations, wells, cesspools, and other structures shall be demolished or destroyed by breaking out or breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least two feet below the existing surrounding ground or proposed grade shown on the plans, whichever may be lower. Any broken concrete, blocks, or other objectionable material which cannot be used in backfill shall be removed and disposed of. The holes or openings shall be backfilled in accordance with the provisions of Item P-152.

2.2 Before beginning any cutting or demolition work, the Contractor shall verify the locations of utilities to be removed and other existing utlities in the vicinity thereof. He shall contact "Miss Utility" as required by applicable laws and ordinances to determine the exact location of existing buried utilities prior to excavation, and shall dig test pits or use rods or other probing or detection devices to accurately determine utility locations as directed by the Engineer. The Contractor shall also be responsible for ensuring that neither present utility services nor airport traffic is interrupted during the prosecution of his work. Utilities to be relocated shall remain in place and operational until proposed replacement utilities are completed and shown to be functioning properly, except as approved by the Engineer.

2.3 Unless otherwise called for in the Contract Documents, items shown or identified as "to be demolished" and/or "to be demolished and removed" shall immediately be removed from airport property and disposed of in accordance with federal, State, and/or local laws and ordinances. The Contractor shall acquire all permits necessary to complete this work. Stockpiling or other storage of demolished and removed materials on airport property shall not be permitted without prior approval of airport management.

2.4 Except as otherwise noted, all material shown on the plans to be salvaged will remain airport property and shall be delivered and stored or stockpiled at a site on airport property to be designated by the Engineer. Any existing damage to such items shall be reported to the Engineer prior to removal. Should any damage occur

to such items during removal, transport, or storage the Contractor shall be responsible to the Owner for repair, replacement, or reimbursement at the discretion of the Engineer.

2.5 Items shown on the plans to remain in place shall not be disturbed or damaged. Where adjacent items are shown to be demolished or removed, the items to be so demolished and removed shall be isolated by sawing to their full depth or thickness or other means approved by the Engineer before demolition may begin. Any items to remain which may be damaged due to the Contractor's work shall be repaired or replaced at his own expense as directed by the Engineer.

2.6 Backfilling and/or grading of excavations resulting from demolition and removal work shall be done in accordance with the grading plans and the provisions of Item P-152.

100-3 CONSTRUCTION METHODS

3.1 Existing concrete slabs on grade and building foundations, including embedded items including but not limited to reinforcement, steel rails, angles, and other hardware, shall be demolished and removed to their full depth and removed from airport property.

3.2 The existing chain link fence, barbed wire, posts (including concrete foundations), gates, and other hardware shall be removed to the extents shown on the plans and disposed of off the airport property. The existing fence fabric shall cut at the locations shown on the plans (or to the nearest post) and removed, leaving a length of fabric suitable for splicing.

3.3 Existing porous concrete underdrain pipe shall be carefully excavated and removed to the extent shown on the plans. Pipe shall be removed to the end of the nearest section, and the resulting ends shall be capped with a suitable plastic or rubber device. The device shall be securely attached, by clamping or other means approved by the Engineer, resulting in a watertight seal. In no case shall the use of erosion control fabric or other permeable material be used to cap the ends of pipes to remain. The Contractor shall place temporary barricades and other markings along the taxiway as directed by the Engineer in accordance with the provisions of Item 109 before beginning this work. Should a NOTAM be required for this work, it shall requested from and be issued the Airport Manager before this work may begin.

3.4 Existing utility structures, including manholes, drainage inlets, handholes, and junction boxes shown on the plans to be removed shall be removed to their entire depth and disposed of off airport property. Utilities served by such structures shall be relocated as shown on the plans or taken out of service before any such structure may be removed.

3.5 Existing concrete encased duct banks shown on the plans to be removed shall be excavated, demolished, and removed by any means necessary to avoid damage to nearby utilities or other structures shown to remain in place. Cables in the ducts shall be removed and disposed of off airport property prior to beginning demolition work.

100-4 METHOD OF MEASUREMENT

4.1 The quantity of concrete slab on grade and/or building foundation demolition to be paid for under this item shall be the number of square yards of slab and/or foundations demolished, removed, and disposed of in accordance with applicable laws and ordinances.

4.2 The quantity of chain link fence (including gates), porous concrete underdrain pipe, concrete encased duct bank, and cable and conduit demolition and/or removal to be paid for under this item shall be the number of lineal feet of each item measured along the centerline.

4.3 The quantity of utility manholes and other in-ground structures to be removed, or of items to be removed and salvaged to the Owner, to be paid for shall be the number of such structures demolished, removed,and/or salvaged to the Owner, regardless of size. The types of structures and items to be demolished and removed under this item shall be measured separately as enumerated in Section 100-5 below.

4.4 There will be no direct measurement for payment of the demolition and removal of the existing buildings identified on the plans. Payment for this work will be made on a lump sum basis. This work shall include demolition, removal, and disposal off airport property of the buildings and their contents (not including hazardous materials removed and disposed of under Item 2080) as shown on the plans.

4.5 The quantity of pipe removal to be paid for under this item shall be number of lineal feet of each class or size measured along the centerline. The several sizes of pipe to be removed will be measured separately as specified in Section 100-5 below.

100-5 PAYMENT

5.1 Payment will be made at the contract unit price per square yard, lineal foot, or each for demolition, removal, and/or salvaging the several items shown on the plans. These prices shall be full compensation for furnishing all labor, equipment, materials, permits, including excavation, demolition, removal, disposal, salvaging, and any other incidentals necessary to complete the work in accordance with the provisions of this Item.

5.2 Payment will be made at the contract lump sum price for building demolition and removal. This price shall be full compensation for furnishing all labor, equipment, materials, and permits, including excavation, demolition, removal, disposal, salvaging, and other incidentals necessary to completely demolish and remove the buildings shown in accordance with the plans and the provisions of this Item.

Payment will be made under:

Item 100.1 **Demolish/Remove Existing Concrete Slabs -- per square yard**

Item 100.2 **Remove Existing Chain Link Fence -- per lineal foot**

Item 100.3 **Remove Existing Underdrain Pipe -- per lineal foot**

Item 100.4 **Demolish/Remove Existing Utilities Structures -- each**

Item 100.5 **Remove Existing Duct Bank -- per lineal foot**

Item 100.6 **Remove Existing Conduit and Cable -- per lineal foot**

Item 100.7 **Demolish/Remove Existing Buildings -- lump sum**

Item 100.8 **Remove Existing Pipe, Smaller than 12" Diameter -- per lineal foot**

Item 100.9 **Remove Existing Pipe, 12" to 24" Diameter -- per lineal foot**

Item 100.10 **Remove Existing Pipe, Larger than 48" Diameter -- per lineal foot**

END OF ITEM 100

ITEM 101 CLEARING AND GRUBBING

101-1 DESCRIPTION

1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Engineer.

1.2 Clearing shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, undergrowth, heavy growth of grass or weeds, debris, and rubbish of any nature, natural obstructions, loose or projecting material, or such material which in the opinion of the Engineer is unsuitable for the foundation of pavements or other required facilities, the removal of from the designated areas. The grubbing of stumps and roots will not be required. Clearing, when so designated, shall consist of the cutting and removal of isolated single trees or isolated groups of trees. The cutting of all the trees of this classification shall be in accordance with the requirements for the particular area being cleared, or as shown on the plans, or as directed by the Engineer. The trees shall be considered isolated when they are forty (40 feet or more apart, with the exception of a small clump of approximately five trees or less.

1.3 Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, debris, and rubbish of any nature, natural obstructions, or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from airport property of all spoil materials resulting from clearing and grubbing.

101-2 CONSTRUCTION METHODS

2.1 GENERAL:

A. Prior to performing and clearing and/or grubbing the Contractor shall verify that sediment and erosion controls are installed, utilities have been turned off or removed and that, where wells are present, wells and well casings are protected during the clearing and grubbing operations.

B. The areas denoted on the plans to be cleared or cleared and grubbed shall be staked on the ground by the Contractor. The clearing and grubbing shall be done at a satisfactory distance in advance of the grading operations.

C. All spoil materials removed by clearing or by clearing and grubbing shall be removed to approved disposal areas. Piles of cleared and grubbed material shall be placed either in the cleared area near the center or in adjacent open spaces where no damage to trees, other vegetation, or other property will occur during the disposal operations. The Contractor will be responsible for controlling his operations in compliance with all federal, state and local laws and regulations. All residue resulting from the clearing and grubbing operations shall be removed and disposed of off airport property, unless directed otherwise by the Engineer.

D. As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry which cannot be used in construction, and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the Engineer and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits at his own expense, he shall obtain and file with the Engineer permission in writing from the property owner for the use of private property for this purpose.

E. The removal of existing structures and utilities required to permit orderly progress of work shall be accomplished in accordance with the provisions of Item 100, unless otherwise shown on the plans. Clearing and/or clearing and grubbing in the vicinity of structures and utilities removed under Item 00000 shall be begun only after the sites have been cleared of hazardous materials. Whenever a telephone or telegraph pole, pipeline, conduit, sewer, roadway, or other utility not shown on the plans is encountered and must be removed or relocated the Contractor shall advise the Engineer who will notify the proper local authority or owner and attempt to secure prompt action.

2.2 CLEARING:

A. The Contractor shall clear the staked or indicated area of all objectionable materials. Trees unavoidably falling outside the specified limits must be cut up, removed, and disposed of in a satisfactory manner. In order to minimize damage to trees that are to be left standing, trees shall be felled toward the center of area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut to a height of not more than six inches above the ground. The grubbing of stumps and roots will be required.

B. When isolated trees are designated for clearing, the trees shall be classed in accordance with the butt diameter size as measured at a point eighteen inches above the ground.

2.3 CLEARING AND GRUBBING:

A. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed, except as otherwise shown on the plans. Tap roots and other projections over one and one-half inches in diameter shall be grubbed out to a depth of at least eighteen inches below the finished subgrade or slope elevation.

B. All holes remaining after the grubbing operation in embankment areas shall have the sides broken down to flatten out the slopes, and shall be backfilled in accordance with the provision of Item P-152. The same construction procedure shall be applied to all holes remaining after grubbing in excavation areas where the depth of holes exceeds the depth of the proposed excavation.

101-3 METHOD OF MEASUREMENT

3.1 The quantities of clearing or clearing and grubbing as shown by the limits on the plans or as ordered by the Engineer shall be the number of acres or fractions thereof, of land specifically cleared or cleared and grubbed.

3.2 When isolated trees are designated for clearing, the quantities of trees, as determined in accordance with ranges of butt diameter size, measured at a point eighteen (18) inches above the ground level at the tree, shall be paid for according to the schedule of sizes as follows:

Type I: From six (6) to eighteen (18) inches butt diameter
Type II: Over eighteen (18) inches butt diameter

3.3 No measurement or payment will be made for unauthorized work. Each tree removed without authorization will be replaced with three trees of the type selected by the Engineer at the Contractor's own expense.

101-4 BASIS OF PAYMENT

4.1 Payment shall be made at the contract unit price per acre for clearing and grubbing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

4.2 Payment shall be made at the contract unit price for clearing isolated trees. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-151.1 Clearing and Grubbing -- per acre

Item P-151.2 Clearing Isolated Trees, Type I -- each

END OF ITEM 101

ITEM 108 MOBILIZATION/DEMOBILIZATION

108-1 DESCRIPTION

1.1 This item shall consist of the performance of construction preparatory operations, including the movement of personnel, equipment and materials to and from the project site; providing or securing permits, employee identification badges, temporary parking permits, airfield operator's permits, and vehicle registration; construction stakeout; payment of performance bond, payment bond, guaranty bond, and other insurance premiums; construction stakeout; utilities location; general requirements of the Contractor not otherwise included in pay items; and for the establishment and subsequent removal of the Contractor's offices and other facilities necessary to begin and sustain work on the Contract. All equipment locations are to be staked out by the Contractor and approved by the Engineer before installation. At the completion of work all areas disturbed by the Contractor's operations shall be restored to the same conditions as existed prior to commencement of mobilization operations, to the satisfaction of the Engineer.

1.2 This item shall also include an allowance for miscellaneous construction items which may be required over the duration of the contract due to unforeseen conditions or occurrences. Use of these funds shall be on a case-by-case basis only and shall be at the sole discretion of the Engineer, and will be done in accordance with policies and procedures established by the Maryland Aviation Administration.

108-2 METHOD OF MEASUREMENT

2.1 There will be no direct measurement for payment of materials, labor, equipment, services, or fees furnished or paid by the Contractor in the performance of work under this Item. Payment for mobilization and demobilization will be made on a pro-rated basis as specified below.

2.2 There will be no direct measurement for payment of materials, labor, equipment, or services furnished by the Contractor to complete miscellaneous construction items as directed by the Engineer. Payment for miscellaneous construction items will be made on a case-by-case basis as determined by the Engineer.

108-3 BASIS OF PAYMENT

3.1 This item will be paid for at the contract lump sum price for mobilization/demobilization, which price shall be full compensation for performing the work specified and the furnishing of all materials, labor, equipment, services, fees, and incidentals necessary to mobilize and subsequently demobilize the construction preparatory operations.

3.2 Payment for this item will be made in installments. The first payment of fifty (50) percent of the lump sum price will be included in the first progress estimate following partial mobilization including the placement or erection of the Contractor's office and the initiation of construction work. The remaining 50 percent of the lump sum price will be included as installments in subsequent progress estimates. Each such installment will be determined based on the ratio of the total work completed to date to the total contract amount.

3.3 If the Contract lump sum price for mobilization/demobilization exceeds five (5) percent of the total contract amount less the price for mobilization/demobilization the first payment and subsequent installments included in progress estimates shall be based on said five (5) percent. The remainder of the contract lump sum price will be included in the semi-final estimate.

3.4 No additional payment will be made for demobilization and remobilization due to shutdowns, suspensions of the work, or for other mobilization activities.

3.5 Payment for miscellaneous construction items will be made on a case-by-case basis in the amount(s) agreed to between the Engineer and Contractor. Such amounts shall be full compensation for performing the miscellaneous work specified and for furnishing all materials, labor, equipment, services, and other incidentals necessary to complete the work. The total amounts paid under this item under the contract shall not exceed the amount of the allowance as specified in Part VI of these contract documents.

Payment will be made under:

Item 108.1 Mobilization/Demobilization -- lump sum

Item 108.2 Miscellaneous Construction Items Allowance -- lump sum

END OF ITEM 108

ITEM 109 TEMPORARY CONSTRUCTION ITEMS

109-1 DESCRIPTION

1.1 This item shall consist of furnishing all labor, materials, and equipment for temporary construction items necessary for the safe and proper execution of work and not otherwise included in Contract items. The Contractor will be expected to supply the items listed herein and other items as required in the General Construction, Safety and Phasing Notes as contained in the plans and specifications. Temporary construction items to be provided are as follows: construction barricades, temporary access roads, flaggers, radio(s), fences, gates, portable floodlighting, closed taxilane/taxiway markings, temporary signs, temporary pavement markings, steel plates for temporary covering of excavations as required, and materials, labor, and equipment as needed to keep adjacent portions of the Airport Operations Area (AOA) areas free of debris.

109-2 MATERIALS AND EQUIPMENT

2.1 Construction barricades shall be five-gallon buckets painted around the circumference with alternating four-inch wide stripes of international orange and white. Each bucket shall have a securely fitting lid with a 12-volt, high intensity yellow flashing light mounted on the lid. The buckets shall be at least half-filled with sand or other approved ballast material.

2.2 Radios shall be capable of transmitting and receiving between the Control Tower and airfield work sites on a frequency of 121.9 MHz for ground control or 154.98 MHz for Airport Operations, as specified or required herein. Sufficient radios shall be on site and operating at all times so that instructions or communications may be dispatched to all crews and/or equipment working in active portions of the Airport Operations Area (AOA).

2.3 Portable floodlighting shall be provided, as required, for construction operations. The Contractor shall provide sufficient units so that all work areas are illuminated to a level of five (5) horizontal footcandles. The lighting levels shall be calculated and measured in accordance with the current standards of the Illumination Engineering Society.

2.4 Temporary taxiway/taxilane closure markings shall be constructed of plywood, snow fence, or other material approved by the Engineer and painted aviation yellow. Sandbags or other suitable weights shall be provided to securely anchor the taxiway/taxilane closure markings to the pavement.

2.5 All materials for temporary access or bypass roads, such as crushed aggregate for surfacing and drainage pipe, shall be approved by the Engineer prior to use.

2.6 Steel plates of adequate size and thickness shall be approved by the Engineer and furnished as necessary to cover temporary excavations, unfinished structures or surfaces requiring protection or for safety purposes. Plates shall be securely fastened down and shall be adequate to safely support any anticipated loading to be imposed.

109-3 CONSTRUCTION METHODS

3.1 Construction barricades shall be placed as directed by the Engineer. Barricades will typically be placed parallel or perpendicular to the runway or taxiway centerline. Barricades shall remain in place for each phase from the beginning of construction until removal is authorized by the Engineer. All flashing lights shall be inspected daily by the Contractor and remain in operation at all times for the duration of the construction work.

3.2 Flaggers shall be provided, as necessary, to control the Contractor's traffic during the prosecution of work. All Contractor vehicles or equipment that are required to cross active pavement or safety areas shall do so

under the direct control of a competent flagger who is in direct radio contact with ground control. All aircraft traffic shall have priority over the Contractor's traffic.

3.3 Radio Communications:

Specific requirements for the following will be coordinated in advance with MAA operations.

A. Contractor shall provide two-way radio communication between certain of his personnel on the job site. The frequency utilized for these transmissions shall be selected by the Contractor and approved by the Engineer, but shall not conflict with or overlay any of the Airport's radio frequencies. The Contractor's personnel required to be provided with radio equipment shall, at minimum, include the project Superintendent, foremen of all work groups physically separated form the general vicinity of the project Superintendent, gate guards, flaggers, and others who may be working in a separate and remote area.

B. For work adjacent to or impacting taxiways or apron areas, the Contractor shall have two-way radios capable of operating on both the FAA ground control and MAA Airport Operations frequencies. Sufficient numbers of radios shall be deployed to allow each isolated area to have direct communications ability.

C. The Contractor shall also provide four portable battery operated radio units with batteries and charger for use by the Engineer. Radio equipment shall be capable of transmitting and receiving on the FAA ground control frequency (two units), and MAA Airport Operations frequency (two units). Radio equipment furnished by the Contractor shall be maintained in working order at his expense.

3.4 Portable floodlighting is required for construction during periods of limited visibility or at night. Illumination requirements shall be those contained in Paragraph 2.3.

3.5 Closed taxilane/taxiway markings shall be installed on both ends of the closed pavement or at other locations as directed by the Engineer. They shall be secured to the pavement by sandbags or other methods sufficient to withstand the effects of jet blast. Upon opening of the closed pavement, the closed taxilane/taxiway markings shall be removed.

3.6 Temporary access and bypass roads shall be constructed as shown on the plans or as approved by the Engineer. Unless otherwise approved by the Engineer, all temporary access and bypass roads shall be removed by the Contractor when no longer required.

109-4 METHOD OF MEASUREMENT

4.1 There will be no direct measurement for payment of materials, labor, equipment, or services furnished by the Contractor in the performance of work under this Item.

109-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract lump sum price for temporary construction items. This payment shall be full compensation for furnishing all materials, labor, equipment, or services for placing, moving, and removing construction barricades, constructing and removing temporary access road and security fence, providing flagmen, furnishing radios and furnishing portable floodlighting, providing temporary signs, pavement markings, furnishing and maintaining security guards at all access points, fences, gates, steel plates and for any other labor, materials, equipment, tools and incidentals necessary for temporary items required for construction of this project.

Payment for temporary construction items shall be made in accordance with the following schedule:

Monthly Estimate 1 - 20%
Monthly Estimate 2 - 20%
Monthly Estimate 3 - 20%
Monthly Estimate 4 - 20%
Monthly Estimate 5 - 10%
Monthly Estimate 6 - 10%

Payment will be made under:

Item 109.1 Temporary Construction Items -- lump sum

END OF ITEM 109

ITEM 110 METHOD OF ESTIMATING PERCENTAGE OF MATERIAL WITHIN SPECIFICATION LIMITS (PWL)

110-1 GENERAL

1.1 When the specifications provide for material to be sampled and tested on a statistical basis, the material will be evaluated for acceptance in accordance with this section. All test results for a lot will be analyzed statistically, using procedures to determine the total estimated percent of the lot that is within specification limits. This concept, termed percent within limits (PWL), is a statistically based evaluation method, whereby the PWL is computed on a lot basis, using the average (X) and standard deviation (S_n) of the specified number (n) of sublot tests for the lot and the specification tolerance limits (L for lower and U for upper) for the particular acceptance parameter. From these values, the respective Quality index (indeces) (QL for Lower Quality Index and/or QU for Upper Quality Index) is computed and the PWL for the specified n is determined from Table 1.

110-2 METHOD FOR COMPUTING PWL

2.1 The computational sequence for computing the PWL is as follows:

a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

b. Locate the sampling position within the sublot in accordance with the random sampling requirements of the specification.

c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

d. Average all sublot values within the lot to find X by using the following formula:

$$X = (x_1 + x_2 + x_3 \ldots + x_n) / n$$

Where:

X	=	Average of all sublot values within a lot
x_1, x_2	=	Individual sublot values
n	=	Number of sublots

e. Find the standard deviation S_n by use of the following formula:

$$S_n = \mathrm{SQRT}\left\{(x_1^2 + x_{12}^2 + x_3^2 \ldots + x_n^2) / (n-1)\right\}$$

Where:

S_n	=	standard deviation of the number of sublot values in the set
x_1, x_2	=	deviations of the individual sublot values x_1, $x_2 \ldots x_n$ from the average value X,

that is: $d_1 = (x_1 - X)$, $d_2 = (x_2 - X) \ldots d_n = (x_n - X)$

n = number of sublots

f. For single-sided specification limits (i.e., L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where:

L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L, using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (i.e. L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (X - L) / S_n \quad \text{and} \quad Q_U = (U - X) / Sn$$

Where:

L, U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U, using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U. Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where:

P_U = percent within lower specification limit
P_L = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project
Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

$A_1 = 96.60$
$A_2 = 97.55$
$A_3 = 99.30$
$A_4 = 98.35$

$n = 4$

2. Calculate average density for the lot.

$X = (x_1 + x_2 + x_3 \ldots + x_n) / n$
$X = (96.60 + 97.55 + 99.30 + 98.35) / 4 = 97.95\%$ density

3. Calculate the standard deviation for the lot.

$S_n = SQRT[(96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2 / (4 - 1)]$

$S_n = SQRT[(1.82 + 0.16 + 1.82 + 0.16) / 3]$

$S_n = 1.15$

4. Calculate the Lower Quality Index Q_L for the lot. (L = 96.3)

$Q_L = (X - L) / S_n$

$Q_L = (97.95 - 96.30) / 1.15$

$Q_L = 1.4384$

5. Determine PWL by entering Table 1 with $Q_L = 1.44$ and n = 4.

PWL = 98

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

$A_1 = 5.00$
$A_2 = 3.74$
$A_3 = 2.30$
$A_4 = 3.25$

2. Calculate the average air voids for the lot.

$X = (x_1 + x_2 + x_3 \ldots + x_n) / n$

$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$

$X = 3.57\%$

3. Calculate the standard deviation S_n for the lot.

$S_n = SQRT\{[(3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2 / (4 - 1)]\}$

$S_n = SQRT[(2.04 + 0.03 + 1.62 + 0.10) / 3]$

$S_n = 1.12$

4. Calculate the Lower Quality Index Q_L for the lot. (L = 2.0)

$Q_L = (X - L) / S_n$

$Q_L = (3.57 - 2.00) / 1.12$

$Q_L = 1.3992$

5. Determine P_L by entering Table 1 with $Q_L = 1.40$ and n = 4.

$P_L = 97$

6. Calculate the Upper Quality Index Q_U for the lot. (U = 5.0)

$Q_U = (U - X) / S_n = (5.00 - 3.57) / 1.12 = 1.2702$

7. Determine P_U by entering Table 1 with $Q_U = 1.27$ and $n = 4$.

   $P_U = 93$

8. Calculate Air Voids PWL

   $PWL = (P_L + P_U) - 100 = (97 + 93) - 100 = 90$

Table 1
TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)
(Positive values of Q_L and Q_U)

PWL P_L and P_U	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4716
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630
87	1.0597	1.1100	1.1173	1.1191	1.1199	1.1204
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015
83	0.9939	0.9900	0.9785	0.9715	0.9672	0.9643
82	0.9749	0.9600	0.9452	0.9367	0.9325	0.9281
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747
70	0.6787	0.6000	0.5719	0.5583	0.5504	0.5454
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592
66	0.5563	0.4800	0.4545	0.4424	0.4354	0.4310
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4031
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1592
55	0.1806	0.1500	0.1408	0.1363	0.1338	0.1322
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0792
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264
50	0.0	0.0	0.0	0.0	0.0	0.0

Table 1 (continued)
TABLE FOR ESTIMATING PERCENT OF LOT WITHIN LIMITS (PWL)
(Negative values of Q_L and Q_U)

PWL P_L and P_U	n = 3	n = 4	n = 5	n = 6	n = 7	n = 8
49	-0.036	-0.030	-0.028	-0.027	-0.026	-0.026
48	-0.072	-0.060	-0.056	-0.054	-0.053	-0.052
47	-0.108	-0.090	-0.084	-0.081	-0.080	-0.079
46	-0.144	-0.120	-0.112	-0.109	-0.107	-0.105
45	-0.180	-0.150	-0.140	-0.136	-0.133	-0.132
44	-0.216	-0.180	-0.168	-0.163	-0.160	-0.159
43	-0.251	-0.210	-0.197	-0.191	-0.187	-0.185
42	-0.287	-0.240	-0.225	-0.218	-0.214	-0.212
41	-0.322	-0.270	-0.253	-0.246	-0.241	-0.239
40	-0.356	-0.300	-0.282	-0.273	-0.269	-0.266
39	-0.391	-0.330	-0.310	-0.301	-0.296	-0.293
38	-0.425	-0.360	-0.339	-0.329	-0.323	-0.320
37	-0.458	-0.390	-0.367	-0.357	-0.351	-0.347
36	-0.491	-0.420	-0.396	-0.385	-0.379	-0.375
35	-0.524	-0.450	-0.425	-0.413	-0.407	-0.403
34	-0.556	-0.480	-0.454	-0.442	-0.435	-0.431
33	-0.587	-0.510	-0.483	-0.471	-0.463	-0.459
32	-0.618	-0.540	-0.512	-0.499	-0.492	-0.487
31	-0.649	-0.570	-0.542	-0.529	-0.521	-0.516
30	-0.678	-0.600	-0.571	-0.558	-0.550	-0.545
29	-0.707	-0.630	-0.601	-0.587	-0.579	-0.574
28	-0.736	-0.660	-0.631	-0.617	-0.609	-0.604
27	-0.763	-0.690	-0.661	-0.647	-0.639	-0.634
26	-0.790	-0.720	-0.692	-0.678	-0.670	-0.664
25	-0.816	-0.750	-0.722	-0.708	-0.700	-0.695
24	-0.841	-0.780	-0.753	-0.740	-0.732	-0.727
23	-0.866	-0.810	-0.784	-0.771	-0.764	-0.759
22	-0.889	-0.840	-0.816	-0.803	-0.796	-0.791
21	-0.912	-0.870	-0.847	-0.836	-0.829	-0.824
20	-0.934	-0.900	-0.879	-0.869	-0.862	-0.858
19	-0.955	-0.930	-0.912	-0.902	-0.896	-0.892
18	-0.974	-0.960	-0.945	-0.936	-0.932	-0.928
17	-0.993	-0.990	-0.978	-0.971	-0.967	-0.964
16	-1.011	-1.020	-1.012	-1.007	-1.003	-1.001
15	-1.028	-1.050	-1.046	-1.043	-1.041	-1.039
14	-1.044	-1.080	-1.081	-1.080	-1.080	-1.079
13	-1.059	-1.110	-1.117	-1.119	-1.119	-1.120
12	-1.073	-1.140	-1.153	-1.158	-1.161	-1.163
11	-1.086	-1.170	-1.190	-1.199	-1.204	-1.207
10	-1.098	-1.200	-1.229	-1.241	-1.249	-1.254
9	-1.108	-1.230	-1.268	-1.286	-1.296	-1.303
8	-1.118	-1.260	-1.308	-1.332	-1.346	-1.355
7	-1.126	-1.290	-1.350	-1.381	-1.399	-1.411
6	-1.134	-1.320	-1.394	-1.432	-1.456	-1.471
5	-1.140	-1.350	-1.440	-1.488	-1.518	-1.538
4	-1.145	-1.380	-1.489	-1.549	-1.587	-1.612
3	-1.149	-1.410	-1.542	-1.618	-1.666	-1.699
2	-1.152	-1.440	-1.601	-1.698	-1.761	-1.805
1	-1.154	-1.470	-1.671	-1.800	-1.888	-1.952

110-3 METHOD OF MEASUREMENT

3.1 No direct measurement for payment will be made for work under this item. All costs for evaluating materials or procedures for acceptance in accordance with the requirements of this item will be incidental to the item to be evaluated.

110-4 BASIS OF PAYMENT

4.1 No direct payment will be made for work under this item. All costs for for this item shall be included in the unit price for items to be evaluated in accordance with the provisions of this item.

END OF ITEM 110

ITEM 206 PAVEMENT DEMOLITION AND REMOVAL

206-1 DESCRIPTION

1.1 Pavement removal shall consist of full depth removal and disposal of existing bituminous or Portland cement concrete pavements or composite pavement sections regardless of thickness, length, and width, including base course and/or earth material directly under the pavements.

1.2 It is the intent of this item to effect the complete removal and disposal all materials which would be an obstruction to the completion of this work. As such any items so encountered shall be removed and disposed of as if they were specifically enumerated herein. References to pavement under this item shall not be construed as necessarily a riding surface, rather any structure or object having Portland cement and/or bituminous concrete construction regardless of its location or function.

206-2 CONSTRUCTION METHODS

2.1 Method of construction shall be subject to approval by the Engineer. No work shall begin until such approval has been obtained.

2.2 Pavement to be removed shall be broken up into pieces of such size easily handled by air-driven machinery or other suitable means. The use of explosives is not permissible. Reinforcing steel shall be cut as necessary for satisfactory disposal.

2.3 Where only a portion of the existing pavement is to be removed, special care shall be exercised to avoid damage to that portion of the pavement to remain in place. The existing pavement shall be sawcut to its full depth and to the neat lines shown on the plans. Any existing pavement or other items beyond those neat lines which is damaged or destroyed by these operations shall be replaced at the Contractor's expense.

2.4 Pavements including base and/or earth materials which are removed shall be loaded, hauled, and disposed of by the Contractor off airport property. The limits of removal shall be as required by the Engineer, which may provide for reconstruction of new pavement sections between the limits of pavement removal or other purposes desired.

2.5 Excavated areas expected to be exposed to adverse weather conditions, or when it must remain unfilled for an extended period of time, shall be immediately protected by the Contractor at his expense by a method approved by the Engineer.

2.6 Removal of pavement material beyond the limits and the thicknesses in excess of that directed by the Engineer or shown on the drawings shall be replaced to required elevation by an approved material selected by the Engineer at the Contractor's expense.

2.7 In areas of pavement removal, no separate payment will be made for removal of existing pavement markings, milling, etc.

206-3 METHOD OF MEASUREMENT

3.1 Bituminous concrete pavement, Portland cement concrete pavement, or composite sections removed as prescribed above, will be measured by the number of square yards in its original position without regard to pavement type or thickness.

3.2 There shall be no measurement or payment for the quantity of material removed for work beyond the limits designated and replacement of same with approved material.

3.3 No separate measurement or payment will be made under this item when materials and methods of construction of this item is utilized for work of similar nature under other items.

206-4 BASIS OF PAYMENT

4.1 Work under this item will be paid for at the unit price bid per square yard for pavement removal regardless of pavement type or thickness. This price shall be full compensation for sawcutting; breaking up the pavement; cutting reinforced steel, when required; loading, hauling, unloading, and disposing of all material; and for all labor, tools, equipment, supervision and incidentals necessary to complete the work.

4.2 Payment for work will be made under:

Item 206.1 Pavement Removal -- per square yard

END OF ITEM 206

ITEM 308 TEMPORARY WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL

308-1 DESCRIPTION

1.1 This item shall consist of temporary control measures as shown on the plans or as ordered by the Engineer during the life of a contract to control water pollution, soil erosion, and siltation through the use of berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

1.2 The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

1.3 Temporary controls may be required for work outside the construction limits such as borrow pit operations, equipment and materials storage sites, parking areas, waste areas, and temporary plant sites. When such off-site areas are to be disturbed, the Contractor shall prepare, submit, and gain approval of an erosion and sediment control plan from the Maryland Department of the Environment before beginning any disturbance to such areas.

308-2 MATERIALS

2.1 Materials for erosion and sediment controls shall conform to the Maryland State Highway Administration Standard Specifications for Construction and Materials, October 1993, and the 1994 Maryland Standards and Specifications for Erosion and Sediment Control. The Engineer shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

2.2 All other materials shall meet commercial grade standards and shall be approved by the Engineer before being used in the work.

308-3 CONSTRUCTION REQUIREMENTS

3.1 In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply. The Engineer shall be responsible for assuring compliance with the approved erosion and sediment control plan to the extent that construction practices, construction operations, and construction work are involved.

3.2 Authority of Engineer: The Engineer shall have the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and fill operations, and to direct the Contractor to provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment.

3.3 Construction Details:

4.1 The Contractor's attention is directed to Sections 308, 310 and 311 of the SHA Specifications. The restrictions contained therein will be strictly enforced and the Contractor is cautioned, therefore, to make every effort possible to comply with these regulations.

Within 14 days after the Notice of Award the Contractor shall submit an Erosion and Sediment Control Schedule to the Engineer indicating the sequence of construction and describing the relationship between the implementation and maintenance of control, including temporary and permanent stabilization and the various stages (phases) of soil disturbance and construction for each area. A Notice to Proceed will not be issued

until this schedule is received. The sequence of construction shall, at a minimum, include a schedule and time frames for the following activities:

a. Clearing and grubbing for those areas necessary for installation of Perimeter Controls.

b. Construction of Perimeter Controls.

c. Remaining clearing and grubbing.

d. Grading (including off-site activities).

e. Utility installation and whether storm drain will be used or blocked after construction.

f. Final grading, landscaping, stabilization.

g. Removal of Controls.

At the Preconstruction Conference, the Contractor shall present a general overview of how he will handle Erosion and Sediment Control on the Contract.

No work shall be started until the Erosion and Sediment Control schedules and methods of operations have been accepted by the Maryland Aviation Administration (MAA), the Department of Natural Resources - Water Resources Administration (DNR-WRA) and/or the Department of the Environment (MDE). This includes both on-site and off-site activities. At least five working days prior to the start of work, the Engineer will initiate and conduct an Erosion and Sediment Control Field Meeting.

In addition to the initial Erosion and Sediment Control Field Meeting, periodic in-field Erosion and Sediment Control Meetings shall be held during the period of this Construction Contract. The Engineer along with the DNR-WRA's and/or MDE's Inspector and Plan Reviewer and the Contractor shall review and evaluate the effectiveness of practices already installed and shall plan for the installation necessary to control proposed areas of soil disturbances.

The MAA, MDE and/or DNR-WRA are concerned with controlling erosion and sedimentation on construction sites. Other than listed below, one unit equaling 20 acres (871,200 ft^2) that has been cleared and grubbed can be actively graded at one time. Once grading begins in the first unit and is approximately 50 percent complete, a second unit may be cleared and grubbed. Two units (one grading operation) is defined as the Contractor's ability to provide adequate resources to perform the grading in a timely manner and provide and maintain the proper erosion and sediment control measures. The Engineer or his designate will be the final authority in this determination. A grading unit need not be 20 continuous acres.

When balancing earthwork (borrow from a cut used as fill at a location distant from the cut), consideration may be allowed by the Engineer for more than one unit of grading. When wet soil conditions are encountered, the Contractor will be allowed to clear and grub and grade another unit providing the initial unit has been properly stabilized. No more than two grading units shall be active at any time.

All appropriate perimeter controls shall be installed prior to any grubbing operations. Areas shall be permanently or temporarily stabilized within seventy-two (72) hours from disturbance. The 72-hour requirement means that the stabilization operation is complete or nearing completion. If previously stabilized areas are disturbed by the Contractor's grading operation or other activities not specifically approved by the Engineer, the cost for stabilization will be at the Contractor's expense.

The most stringent requirements for stabilization under Excavation, Embankment or Stabilization/Limits of Disturbance will be enforced.

Disposal of excess earth material on State or Federal property requires MDE approval, otherwise materials shall be disposed of at a location approved by the appropriate local Soil Conservation District for each county or the Baltimore City Department of Public Works.

The Contractor shall give particular attention to the project's construction activities that involve erosion and sediment control. The MAA and its field engineering staff will strictly enforce erosion and sediment control measures as required by the Plans, Standard Provisions, applicable referenced Standards and the Specifications.

The Contractor shall become thoroughly familiar with all provisions relative to erosion and sediment control. The Contractor is advised that terminology such as "...prior to, or as soon as practicable", and "...to the extent considered desirable and practicable", shall not be interpreted to preclude or unnecessarily delay the construction or application of erosion and sediment control measures. These terms are intended to state that erosion controls must be applied as soon as it is physically possible within any construction or grading operation which removes natural ground cover or results in any unstabilized soil condition.

The Contractor is also hereby notified that DNR-WRA and/or MDE will conduct frequent field inspections relative to sediment control compliance. If, in their judgement, noncompliance with erosion and sediment control provisions are found, their representative will immediately notify the Engineer relative to corrective action. This corrective action may require a shut-down of construction activities until such time as the noncompliance is satisfactorily corrected, and no claims to the MAA will be entertained because of a shutdown of the grading operations or the entire project.

308-4 METHOD OF MEASUREMENT

4.1 The quantity of temporary water pollution, soil erosion, and siltation control measures to be paid for shall be the number of units of each item installed in accordance with the plans and the provisions of this Item and accepted by the Engineer. Measurement of the several items shall be by the lineal foot, square yard, acre, or per each as specified in Section 5 below. There will be no direct measurement for payment of items to be paid for on a lump sum basis as specified below.

308-5 BASIS OF PAYMENT

5.1 Accepted quantities of temporary water pollution, soil erosion, and siltation control work ordered by the Engineer and measured as provided in paragraph 308-14 will be paid for under:

Item 308.1 **Stabilized Construction Entrance -- per square yard**

Item 308.2 **Silt Fence -- per lineal foot**

Item 308.3 **Super Silt Fence -- per lineal foot**

Item 308.4 **Stone Check Dam -- each**

Item 308.5 **Removable Pumping Station -- each**

Item 308.6 **Sediment Basin Riser Discharge Structure -- lump sum**

Item 308.7 **Class I Rip Rap Spillway Protection -- per square yard**

Item 308.8 **Sump Pit -- each**

Item 308.9 **Portable Sediment Tank -- lump sum**

Item 308.10 **At-Grade Inlet Protection -- each**

Item 308.11 **Curb Inlet Protection -- each**

Item 308.12 **Temporary Seeding and Mulching -- per acre**

END OF ITEM 308

ITEM 427 OIL/WATER SEPARATOR

427-1 DESCRIPTION

1.1 Work under this Item will consist of the furnishing and installation of oil/water separators to trap and separate oil from runoff from potions of the airfield apron pavement. Each oil/water separator shall be capable of treating flow at a rate of five hundred (500) gallons per minute and shall have an oil storage capacity of 5000 gallons. Work under this item shall include all associated ductile iron piping, fittings, excavation, concrete anchoring pad, anchoring straps, pea gravel backfill, alarm and control system, and other incidentals necessary to install a fully operational system.

427-2 DESIGN CRITERIA

2.1 The oil/water separator shall be a special purpose factory-assembled unit which is the standard product of a manufacturer regularly engaged in the production of such equipment.

2.2 The separator shall be designed in accordance with Chapters 3 and 5 of the American Petroleum Institute (API) Manual on Disposal of Refinery Wastes (volume on Liquid Wastes, Latest Edition) and with API Bulletin #1630, First Edition.

2.3 The oil/water separator shall be fabricated, inspected and tested for leakage before shipment from the factory as a completely assembled vessel ready for installation.

2.4 Construction and thickness of the separator shall be in strict accordance with Underwriters' Laboratories, Subject UL-58 Standard for Safety, Steel Underground Tanks for flammable and Combustible Liquids. Separator shall bear Underwriters' label.

2.5 Underground corrosion control system for the separator shall be in strict accordance with STI-P_3 specifications as applied by a licensee of the Steel Tank Institute. Separator shall bear the STI-P_3 label.

2.6 The separator shall be designed for intermittent, variable or continuous flows of water, oil and/or any combination of non-emulsified oil/water mixtures.

2.7 The separator shall process uncontrolled surges of water, oil, or water/oil mixtures ranging from zero flow up to 100 percent of maximum hydraulic throughput capacity and provide wastewater effluents, which meet Federal, State or local oil and grease discharge requirements of ten 10 ppm hydrocarbon for at least five minutes.

2.8 The separator shall have an integral oil storage capacity of at least 40 percent of the total separator volume; and minimum 2500 gallons of oil storage.

2.9 The separator shall be designed in a manner to minimize solid build-up in the oil/water separator chamber, which could reduce the oil/water separation of the unit.

2.10 The oil/water separator shall be the Model HT-5000 as manufactured by the Highland Tank and Manufacturing Company, Stoystown, Pennsylvania, or approved equal. Submit manufacturers data for approval.

427-3 MATERIALS

3.1 The separator shall be a cylindrical steel vessel and construction and thickness shall be in strict accordance with UL-58 using flat flanged heads. The separator shall have the structural capability to withstand static

and dynamic hydraulic soil, pavement, and aircraft loadings both while empty and during operating conditions.

3.2 The inlet shall be a 14-inch, 150-pound F.F. flanged connection. An inlet flow diffusing nozzle shall be installed at the inlet end of the separator, located at the furthest diagonal point distant from the outlet. The inlet shall be provided with flanged tee and isolation spool piece to permit direct connection with ductile iron pipe influent line.

3.3 The inlet nozzle shall flow against a single velocity head diffusion baffle plate set at a 45 degree angle, supported on steel supports and welded on either side of the separator wall.

3.4 A series of corrugated parallel plates shall be downstream of the velocity diffusion baffle plate and set at a 22-1/2 degree angle, spaced three inches apart, and supported by steel supports, welded to a solid steel plate on either side of the separator wall. A sludge baffle plate twelve inches in height, shall be installed at the bottom of the separator to retain settleable solids and sediment and prevent them from entering the separation chamber.

3.5 An internal discharge pipe shall be installed at the outlet end of the separator, located at the furthest diagonal point distant from the inlet, extending down to within 6 inches of the bottom of the separator and tack welded or supported to the end plate of the separator. The outlet shall be a 14-inch, 150-pound F.F. flanged connection. The outlet shall be proved with a flanged tee and isolation spool piece to permit direct connection with ductile iron pipe effluent line.

3.6 The separator shall be equipped with two 24-inch diameter API manholes, UL approved, complete with extension, flanged cover, gasket and bolts.

3.7 The separator shall be furnished with fittings for vents; oil/water interface level sensor; and waste oil pumpout, sampling, and tank gauge connection.

3.8 The separator shall be constructed for transport to job site as one integral unit, ready for immediate installation (field splicing or field fabrication are unacceptable).

3.9 Separator lifting lugs shall be located at the balance points.

3.10 The separator STI-P_3 Corrosion Control System shall include:

A. Corrosion resistant coating;

B. Cathodic Protection System with monitor;

C. Electrical Isolation;

D. 30-year warranty; and

E. UL and STI-P_3 labels.

3.11 The separator shall be furnished with a removable coalescer. The polypropylene coalescing media shall consist of a matrix of at least six layers of 32 mm strands and four layers of 16 mm strands. The multi-monofilament design shall be such that each monofilament is perpendicular to the fluid flow and also perpendicular to each monofilament. The coalescer shall be designed to intercept oil particles of less than 20 microns in size and produce an effluent quality of less than 10 ppm free petroleum hydrocarbon.

3.12 The coalescing media shall be housed in a frame with a lifting hook and arm for easy removal through a 24-inch diameter manway complete with extension, cover, gasket and bolts.

3.13 The separator shall be furnished with an automatic waste oil multi-station liquid level indicating system with control floats mounted in the tank set at approximately 20 percent and 43 percent separator volume and consisting of an interface probe with solid state controls for an audible and visual alarm system enclosed in a NEMA 4 alarm panel furnished by the separator manufacturer.

3.14 Audible and visual alarms shall be installed at the locations shown on the plans or as directed by the Engineer. The audible alarm shall have a pushbutton silencer, however, the visual alarm shall remain active until the oil in the separator is pumped out. Levels of the interface shall be adjustable.

3.15 Concrete for the oil/water separator foundation shall conform to the requirements of Item P-610.

3.16 Steps for the oil/water diversion vault shall be ductile iron, Model R-1982-J by Neenah or approved equal. Field paint a coat of bituminous paint. Steps shall conform to the requirements of the Occupational Safety and Health Standards, U.S. Department of Labor.

3.17 Access covers for the oil/water diversion vault shall be constructed of ductile iron suitable for aircraft loading as manufactured by Neenah or accepted equal. Casting shall be uniform and free of any defects, conforming to ASTM A 536-80 Grade 65-45-12. Access covers shall have the following lettering "Glycol Diversion Vault" cast in each cover. See drawings for access cover sizes.

427-4 INSTALLATION

4.1 Upon delivery of the separator and accessory equipment, the Contractor shall inspect units for damage to exterior, including protective coating and STI-P_3 system. Also, determine that all internal baffle plates and internal piping are secure.

4.2 Above ground vent piping shall be Schedule 40, threaded galvanized carbon steel pipe conforming to ASTM A53 to A120 with 150 pound malleable iron fittings conforming to ASTM A47 and A153.

4.3 Buried vent piping shall be schedule 40, threaded black steel pipe with 150 pound malleable iron fittings. All pipe and fittings including threads shall be coated with coal tar epoxy in accordance with AWWA Specification C203. Cold applied vinyl or polyethylene tape shall be applied over the coated pipe and fittings 10 to 20 mils thick. Use an effective primer and a double wrap on fittings and threads.

4.4 Pump-out pipe and interface/level sensor pipe shall be Schedule 80, flanged galvanized steel pipe, conforming to ASTM A 120.

4.5 Dielectric isolation gaskets and bushings shall be provided for all separator openings.

4.6 Manhole frames and lids shall be square and in accordance with the size shown on the plans. The frames and lids shall be ductile-iron and shall be capable of withstanding aircraftt loadings. The frames and lids shall be as shown on drawings.

4.7 Pea gravel backfill material placed to one foot above tank must be clean, washed, naturally-rounded aggregate, with particles no smaller than 1/8" nor larger than 3/4". Washed stone or gravel crushings may be used as alternate material with angular particle size not less than 1/8" nor more than 1/2". Material must meet all ASTM C-33 requirements for quality and soundness. Select backfill must meet SHA requirements for No. 57 stone. In freezing conditions, backfill material must be free of ice.

4.8 Leak monitoring wells shall be constructed of 4-inch Schedule 40 PVC slotted well screen pipe. The pipe shall have a minimum /maximum slot size of 0.20/0.25 inch and shall be screened from the bottom to within 1'-6" of the ground surface. Pipe shall be equal to EBW Model No. 773-200-02.

Install lockable well cap plug with padlock equal to EBW Model No. 772-4, 4-inch diameter.

Protect leak monitoring pipe with ten-inch diameter cast-iron manhole cover, which shall be painted white with black equilateral triangle in center for identification as monitoring well. Manhole shall be equal to EBW Model No. 810.

4.9 Excavation and backfill for the installation of the oil/water separator and appurtenances shall be performed in accordance with the requirements for Item D-752. All sheeting, shoring, bracing, and dewatering required shall be performed as a subsidiary obligation to excavation and backfill.

4.10 The backfill shall be free from material that may cause damage to the separator coating. Care shall be taken during installation that foreign matter is not introduced into the excavation or backfill.

4.11 Separator must be installed in a level and plumb position for proper system function. Piping to separator must be sloped as shown on the drawings to obtain a proper gravity system.

4.12 The bottom of the excavation shall be covered with clean sand or gravel to a depth of one foot, suitably compacted, graded, and leveled.

4.13 The separator tank hole excavation shall extend a distance of at least 3 feet around the perimeter of the separator.

4.14 An air test of the separator above ground should not exceed 5 pounds per square inch (psig) pressure while a soap solution is applied to weld seams.

4.15 Before placing the separator in the excavation, all dirt clods and similar foreign matter shall be cleaned from the separator, and areas of coating damage shall be repaired with a suitable coating recommended by the separator manufacturer.

4.16 Equipment to lift the separator shall be of adequate size to lift and lower the separator without dragging and dropping to ensure no damage to the separator or the coating.

4.17 Separator shall be carefully lifted and lowered by use of cables or chains of adequate length (not less than 45 degree included angle) attached to the lifting lugs provided. A spreader bar should be used where necessary. Under no circumstances use chains or slings around the separator shall.

4.18 Backfill consisting of clean pea gravel shall be placed along bottom sides of separator by hand shoveling and tamping to ensure that the separator is fully and evenly supported around bottom quadrant.

4.19 Separator shall be filled with clean water as soon as possible after placement on sand bed.

4.20 Select backfill and pea gravel backfill shall be deposited carefully around separator to avoid damage to coating and to at least 1 foot above the top of the separator and thoroughly tamped.

4.21 During air or hydrostatic testing of separator after installation, it is recommended that the pressure applied shall not be in excess of 5 pounds per square inch (psig) as measured at the top of the separator.

4.22 Connect all vent lines to atmosphere from manway extensions and separator unit. The discharge line shall be vented to prevent siphoning of the outlet pipe of the separator.

4.23 Metal or plastic thread or flange protectors shall be removed from the unused openings and pipe plus installed. Pipe plugs and blind flanges shipped installed in the separator should be removed from unused openings and reinstalled with proper joint compound or gaskets.

427-5 OPERATION

5.1 Before the separator is put into operation, it shall be filled with clean water, as noted in the installation instructions.

5.2 Separation within the unit shall be perpetual on a last-in, last-out basis. As influent enters the oil/water separator, a corresponding amount of separated effluent shall be automatically discharged through the outlet pipe; separating action shall begin immediately as the contaminated product enters the system.

5.3 The invert of the inlet of the separator shall be above the operating surface level of the separator to provide positive drainage of the inlet sewer. The inlet pipe to the separator shall be designed to conform to the flow capacity of the separator.

5.4 The distribution chamber shall distribute the flow in an even manner across the width of the separator and reduce the velocity.

5.5 The corrugated plate separator shall improve the hydraulic characteristics and retention performance of the oil/water separator. it shall equalize the velocity of flow across the distribution chamber and helps to capture oil/water globules that would not separate out ordinarily.

5.6 As the influent passes over the velocity head diffusion baffle, the tumbling action of the oil-laden water passing over the plate shall include the proper agitation in the stream, and cause the oils or lighter density substances to break away from the wastewater stream. s the oil starts to rise, it shall be joined by other droplets of oil and due to the buoyancy, rise rapidly to the surface. The rising rate of the oils or other floating industrial waste depends on the oil droplet size. The larger the droplet, the faster the rate of rise and separation. Free oil and other floatable industrial waste, collect together above the operating surface of the corrugated plate separator and a rapid rising of the separated products is accomplished within the distribution chamber. Sludge or heavy solids within the stream settle to the bottom of the separator, collecting behind the sludge baffle plate.

5.7 The corrugated parallel plate separator within the oil/water separator increases the effective separation surface area through the use of multiple parallel corrugated plates.

5.8 The corrugated plates shall be stacked upwards at a 22-1/2 degree angle, spaced every 3 inches apart, to prevent fouling by debris and gummy solids. Under laminar flow conditions, buoyancy forces cause oil droplets to rise and coalesce into "sheets" of oil on the underside of each of the plates, creep up the surfaces, and finally break loose at the top in the form of large globules that rapidly rise through the separating chamber to the surface. A small area at the extreme bottom of the plate pack shall be left open so that any sludge or heavy solids immediately drop and are collected by the center sludge baffle plate.

5.9 In a major oil spill condition, the separator shall be designed so that the contaminated surface increases as the water capacity decreases. In a major rainfall condition, water flow shall pass through the separator system without disturbing any standing oil or settled sludge within the system.

5.10 Under laminar flow conditions, oil droplets from all strata of the wastewater stream enter the coalescing media and attach themselves to the polypropylene strands. Once attached, the oil globules agglomerate and either wick-up or, if sufficiently large, break free and rise through the media to the surface. After reaching the surface, oil continues to move with the flow allowing for unrestricted flow conditions.

5.11 Any settleable solids that have not been trapped by the corrugated plate separator and parallel corrugated plate separator and have not been collected at the center sludge baffle plate shall attach themselves to the media strands. As they agglomerate and increase in weight, they fall through the coalescing media to the bottom of the separation chamber and collect at the coalescing media baffle plate.

5.12 Due to these self-cleaning properties of the coalescing media, maintenance requirements shall be minimal. Under oil spill conditions or if gross amounts of sludge enter the oil-water separator system, the coalescing media shall be easily removable from the units holding channel and hosed down in order to remove any gummy solids or debris that may accumulate on the fibers.

5.13 Access to separator shall be through 24-inch diameter manholes, U.L. approved, complete with extension, bolted cover and gasket.

5.14 The outlet pipe opening shall be located at the furthest point distant form the inlet; at the most quiescent zone of the oil/water separator. The invert of the outlet shall be below the operating surface level of the separator to provide positive drainage of the system. The outlet pipe to the separator shall be designed to conform to the flow capacity of the separator.

5.15 A multi-station liquid level sensor for tank gauging shall be furnished. The floats controlling the gauge shall lie in the interface of the contaminant and free water and shall be adjustable. When the desired level of oil is reached, at a predetermined level, an audible and visual alarm shall be activated. A pushbuttom shall be furnished to silence the audible alarm, however, the visual alarm shall continue to be activated until the oil is pumped out to the predetermined level.

427-6 METHOD OF MEASUREMENT

6.1 The number of oil/water separators to be paid for shall be the number of oil/water separators installed in accordance with the provisions of this Item and accepted by the Engineer.

427-7 BASIS OF PAYMENT

7.1 Payment shall be made at the contract unit price for oil/water separators. This price shall be full compensation for the furnishing of all materials, labor, equipment, and incidentals to complete each installation in accordance with the provisions of this Item. No separate payment shall be made for such incidentals as excavation, sheeting, shoring, and dewatering; bedding; concrete foundations; pipe; fittings; connections; vents, pump-out, and level sensor piping; level sensor and alarm system, including wiring and alarm panel located as shown on the plans; manhole frames and lids; and other items necessary to furnish and install each oil/water separator in accordance with the provisions of this Item.

Payment will be made under:

Item 427.1 Oil/Water Separator -- each

END OF ITEM 427

ITEM 813 ROADWAY SIGNS

813-1 GENERAL

1.1 Work under this Item shall include the provision of all labor, material, equipment, and services necessary for and reasonably incidental to furnishing and installing signs and graphics, or removing existing signs, along public and airport roads and adjacent to the parking lots as specified herein. The types and numbers of signs and graphics is shown schematically on the plans and may be subject to change by the Engineer.

1.2 This item modifies Section 183 of the SHA Standard Specifications, October 1993.

813-2 SCOPE OF WORK

2.1 Signs along public roads, airport access roads, and adjacent to parking lots area shall be made using sheet aluminum panels mounted on timber posts. Color, copy, paint, size, sheeting, hardware and finish will conform to the Standard Specifications or manufacturers data as directed by the Engineer or as shown on the plans. Completed signs shall conform with the standards of the SHA Division of Traffic and Safety. Relocation and removal of existing signs are included in this work.

2.2 Signs shown on the plans to be removed shall be removed in their entirety. Such removal shall include sign panels, posts, post foundations, and hardware. All materials removed shall be disposed of off Airport property in accordance with the contract documents.

813-3 QUALITY ASSURANCE

3.1 The work shall comply with the following codes, specifications, and standards (current editions):

A. Applicable current U.S. Department of Transportation standards, including, but not limited to, the Manual on Uniform Traffic Control Devices, latest edition.

B. SHA Standard Specifications, dated October 1993.

C. Sign Standards of the SHA Division of Traffic and Safety.

3.2 All work called for by this Item shall be done by recognized graphic fabricators and installers having at least five years' successful experience in such work.

813-4 SUBMITTALS

4.1 The contractor shall submit shop drawings for the manufacture, fabrication, and installation of sign structures at a large scale. Show posts, joints, welds, anchorage, accessory items, and finishes.

4.2 The contractor shall submit copies of manufacturer's printed specifications, anchorage details, and installation and maintenance instruction for products to be used in the fabrication and installation of signs.

813-5 DELIVERY, STORAGE AND HANDLING

5.1 Furnish factory wrapping, packaging, and other means necessary to prevent damage or deterioration during shipment, handling, storage and installation.

5.2 Maintain protective coverings in place and in good repair until removal is necessary.

5.3 Store products inside enclosed facilities or closed buildings.

5.4 Maintain storage spaces and products in dry condition.

813-6 JOB CONDITIONS

6.1 Inspection of Site. Examine related work and surfaces before starting work on this item. Report to Engineer, in writing, site conditions which will prevent the proper provision of this work. Beginning the work without reporting unsuitable conditions, constitutes acceptance of site conditions by the Contractor, with changes or additions to work caused by unsuitable conditions provided at no additional cost to the Owner.

6.2 Coordination. Coordinate and cooperate with other Contractors to enable work to proceed as rapidly and efficiently as possible. Coordinate with general Contractor, items of other trades to be furnished and set in place. Any additional work incurred resulting from lack of Contractor coordination, shall be done at no additional cost to the Owner.

813-7 SIGNS, GENERAL

7.1 Sign posts shall be of 4"x6" timber of the length required for each installation shown on the plans. Posts shall be straight without material defects, and shall have drilled holes conforming to the breakaway requirements contained in the SHA Standard Specifications. Posts shall be treated with preservative in accordance with the SHA Standard Specifications before delivery to the site.

7.2 Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.

7.3 Do not deliver units until area is ready for installation. Protect from damage during delivery, handling, storage and installation.

7.4 Verify with Engineer prior to fabrication for any revisions to Sign Schedule.

7.5 Take field measurements prior to preparation of Shop Drawings and fabrication, where possible. Allow for trimming and fittings wherever the taking of field measurements before fabrication might delay work.

7.6 Furnish anchoring devices which must be set in concrete or other material for installation of this work. Provide setting drawings, templates, instructions and direction for installation of anchorage devices.

7.7 Pre-assemble item in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary because of shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

7.8 Design Responsibility:

A. The requirements shown by the details are intended to establish basic dimensions of units or modules, profiles and sight lines of members. Within these limitations the Contractor is responsible for the construction design of the entire system, and to make whatever modifications of, and additions to the details as may be required, by the Engineer. Maintain the visual design concept as shown, including member sizes, profiles and alignment of components as accurately as possible.

B. The Contractor shall supplement the outline design shown with a detailed design for the Engineer's approval. The design drawing shall include major aspects of the system proposed, such as sections, shapes and connections of components, joint connections and anchorage to structure.

7.9 Typography:

A. Use applicable standard for all sign messages, unless shown otherwise on the Contract Drawings. Contractor shall contact Engineer for the appropriate typography.

7.10 Statement of Application:

A. The Contractor, by commending the work of this section, assumes overall responsibility as part of his warranty of the work, to assure that all assemblies, components and parts shown or required within the work of the section, comply with the contract documents or direction of the Engineer. The Contractor shall further warrant:

1. That all components, specified or required to satisfactorily complete the installation are compatible with each other and with the conditions of installations.

2. The overall effective integration and correctness of individual parts and the whole of the system.

3. Compatibility with adjoining substrates, finishes, materials and work by other trades.

7.11 Messages:

A. Full scale fabricating message patterns shall be prepared by the Contractor from sign panel layouts in accordance with the Sign Schedules. Sign panel layouts are to be enlarged for position only; are to be used for photographic reproduction. Contractor shall provide full sign patters from master alphabet and master symbols.

B. The Contractor shall not be permitted to cut apart characters, words, or message lines or in any way alter the alphabet spacing, message layouts and dimensions in the fabrication message patterns, without approval of the Engineer.

813-8 ALUMINUM PANEL

8.1 Aluminum shall be mill aluminum of the thickness required by the design (0.125 inch). All elements shall have a finish as identified hereinafter.

8.2 Metal Finish. Sign background shall be Dupon "Imron," or approved equal satin finish polyurethane enamel applied in two coats over a metal primer as per manufacturer's recommendations; i.e., clean bare metal with 225S Cleaner followed by 226S Conversion Coating.

8.3 Before painting, all loose mill scale, dirt, weld flux, weld spatter and other foreign material shall be removed. All grease and oil shall be removed by solvent. Surfaces shall be dry when paint is applied.

8.4 All exposed metal shall receive one (1) thorough prime coat of a suitable primer before leaving the shop. In addition to primer, all exposed metal shall receive two (2) color coats. Color shall match the grey of existing porcelain enamel honeycomb exterior sign panels. Color samples shall be submitted to and approved by the Engineer.

8.5 Apply each material at not less than the manufacturer's recommended spreading rate, to establish a total dry film thickness of not less than 4.0 mils for the entire coating system of prime/conversion coating and finish coats for 3-coat work.

813-10 EXTRUDED ALUMINUM PANELS

10.1 Extruded aluminum panels shall conform to the requirements of SHA Standard specifications for Construction and Material, October 1993.

10.2 Extruded aluminum panels shall have demountable copy. Copy, color, size and finish will be subject to review and approval by the Engineer and Department of Transportation, SHA Division of Traffic and Safety prior to fabrication and delivery.

813-11 INSTALLATION

11.1 Protect products against damage field handling and installation. Protect adjacent existing and newly placed construction and finishes as necessary to prevent damage during installation.

11.2 Install timber posts in holes excavated to the depths shown on the plans. Holes shall be plumb and neat, and shall be cleared of loose material before posts may be installed. Post holes shall be filled with earth or concrete as shown on the plans. Sign panels to be installed on posts set in concrete may not be installed until at least seven days after concrete placement.

11.3 Touch up paint all exposed mechanical fasteners to match color and finish of surface surrounding the fastener upon completion of installation.

813-12 FIELD QUALITY CONTROL

12.1 Signs shall be accurately cut and fit for easy assembly; install plumb, level and in proper alignment, as shown, and per manufacturer's recommendations. Manufacturing of signs shall be guaranteed against warpage, delamination or faulty veneer for the one (1) year guarantee period.

12.2 Signs shall be mounted level and plumb according to the plan locations. Where otherwise not demensioned, signs shall be installed where best suited to provide an even and consistent appearance through the project. When the exact position, angel, height or location is in doubt, the Contractor shall contact the Engineer for clarification.

12.3 The Contractor shall fabricate and assemble each unit, in the shop, complete as possible and as specified, before delivering to the job site to assure that each unit is installed with its correct components.

12.4 The Contractor shall own and be responsible for all signage that is damaged. lot or stolen while materials are on the job site and up until the completion and final acceptance of the job.

12.5 All field painting is to be executed per the manufacturer's suggested specifications and methods for surface preparation and material application as outlined in this section.

813-13 REMOVAL OF EXISTING SIGNS

13.1 Existing signs may be relocated during construction. During the installation of the new signing system, all existing and relocated signs will be removed unless otherwise noted on the plans.

13.2 To prevent confusing messages to motorists, all new signs in a particular sequence, giving similar directions, must be in place before existing signs, involving similar directions, are removed.

13.3 The Engineer, at his discretion, may direct a new sign face to be covered to avoid confusion. The sign face is to be covered by plastic sheets and attached in the back by tape. NO TAPE IS TO BE ATTACHED TO THE REFLECTIVE SHEETING.

13.4 Any removed material shall become the property of the State Highway Administration Office of Traffic & Safety Sign Shop, and shall be transported to that location, or to the Engineer.

13.5 All material, equipment and labor needed to perform the removal of existing signs shall be considered incidental to other items herein and will not be measured or paid.

813-14 RELOCATE EXISTING SIGNS

14.1 Signs relocated as part of this contract shall be removed and, if necessary, stored by the Contractor until ready for reinstallation. Reinstallation of the signs shall meet the same requirements as the installation of new sign panels.

14.2 Relocation of existing signs will not be measured. This work will be considered incidental to other items herein and will not be paid for separately.

813-15 ADJUSTING AND CLEANING

15.1 Measure vertical clearance of signs and adjust an necessary to meet the minimum requirements as indicated on Drawings.

15.2 Clean all exposed sign surfaces after completing installation.

15.3 Adjust sign panels as required to level and to tightly butt seams together.

813-16 METHOD OF MEASUREMENT

16.1 The quantity of new signs to be paid for will be measured by the area in square feet of the vertical front face of each sign fabricated, installed and accepted by the Engineer. No deduction in sign area will be made for required scoping.

16.2 The quantity of sign removal to be paid for will be the number of signs removed, regardless of the number of posts supporting each sign.

813-17 BASIS OF PAYMENT

17.1 Accepted signs will be paid for at the Contract unit price per square foot for the front vertical face area of the completed sign installed. The payment will be full compensation for all material, labor, equipment, tools, mounting hardware, drilling holes, etc., necessary to complete the work and provide a complete installation.

Payment will be made under:

Item 813.1 Roadway Signs -- per square foot

END OF ITEM 813

ITEM 1000 PRE-ENGINEERED METAL BUILDING

1000-1 DESCRIPTION

1.1 This item shall consist of the furnishing and installation of a clear span, frame pre-engineered metal building to house pumping equipment for the Midfield Complex fire suppression system, complete with concrete floor and equipment pads, concrete and cement masonry unit wall foundations, and all building accessories, including fire sprinkler system, fire extinguisher, emergency lighting and lighted exit sign, and all necessary fire department signs in accordance with the various sizes and shapes shown on the Plans.

1.2 The building system shall include but not be limited to the following:

A. Structural steel main building frames and secondary framing including purlins and girts, engineered and fabricated by the building systems supplier.

B. Insulated steel wall and roof system.

C. Exterior door, powered wall exhauster, louvers, gutters and downspouts, roof curbs, pipe flashing, all trims and paints as shown on the Plans or specified herein.

D. Fire Extinguishers, types and sizes as shown on the Plans or specified herein.

1.3 Related Sections

A. Item P-152: Excavation and Embankment.

B. Item P-610: Portland Cement Concrete.

1.4 References

A. AISI - Specification for the Design of Cold-Formed Steel Structural Members - 1986 Edition with 1989 Addendum.

B. AISC - Specification for Structural Steel Buildings - 1989.

C. AISC - Steel Design Guide Series 3 - Serviceability Design Considerations for Low-Rise Buildings - 1990.

D. ASTM A36-92 - Specification for Structural Steel.

E. ASTM A153-82(1987) - Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

F. ASTM A307-92A - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile.

G. ASTM A325-92A - Specification for High Strength Bolts for Structural Steel Joints.

H. ASTM A123-89A - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

I. ASTM A446-91 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical Quality).

J. ASTM A463-88 - Specification for Steel Sheet Cold Rolled Aluminum Coated Type 1 and Type 2.

K. ASTM A 490-92A - Specification for Quenched and Tempered Alloy Steel Bolts for Structural Steel Joints.

L. ASTM A500-92 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

M. ASTM A 501-92 - Hot Formed Welded and Seamless Carbon Steel Structural Tubing.

N. ASTM A 525-91B - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements.

O. ASTM A 529-92A - Structural Steel with 50,000 psi Minimum Yield Point.

P. ASTM A570-92 - Specification for Hot-Rolled Carbon Steel Sheet and Strip, Structural Quality.

Q. ASTM A572-92B - Specification for High Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.

R. ASTM A792-89 - Specification for Steel Sheet Aluminum Zinc Alloy Coated by the Hot-Dip Process, General Requirements.

S. ASTM C665-91 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

T. ASTM E1514-93 - Specification for Structural Standing Seam Steel Roof Panel System

U. AWS A2.4-93 - Standard Welding Symbols.

V. AWS D1.1-94 - Structural Welding Code - Steel.

W. AWS D1.3-89 - Structural Welding Code - Sheet Steel.

X. MBMA Low Rise Building Systems Manual - 1994 Edition.

Y. NAIMA 202-92 - Standard for Flexible Fiberglass Insulation Systems in Metal Buildings.

Z. SJI (Steel Joist Institute) - Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders - 1992.

AA. SSPC (Steel Structures Painting Council) - S-2-89 - Specification for Hand Tool Cleaning.

1.5 System Description

A. Clear span rigid frame; 10 foot minimum clearance. Roof Slope: 1 in 12.

B. Primary and secondary framings and lateral bracings: per the manufacturer's recommendations.

C. Wall and Roof System: Preformed steel panels and accessory components.

1.6 Design Requirements

A. Members to withstand building system dead loads, ground snow load of 25 psf, live load of 30 psf with tributary area load reduction, wind load of 80 mph, Seismic Zone 1, Building Use Occupancy Group U. All loads shall be proportioned and applied in accordance with the MBMA Low Rise Building Systems Manual.

B. Deflections shall be limited as follows:

Primary Framing	L/180 for roof snow load. H/60 for 10-year wind load.
Secondary Framing and Roof Framing for Gravity Load	L/150 for dead load + roof snow load; but not less than that required to maintain positive drainage for the greater of dead load + ½ roof snow load or dead load + 5 PSF.
Wall and Roof Framing for Wind Load	L/120 for 10-year wind load.
Sheeting	L/180 for roof snow load (but not less than 20 PSF), where L is the span of the element between support points, and H is the eve height of the building. For 10-year wind values, use 75% of the 50-year wind pressure.

C. Assembly to permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of 80 degrees F.

D. Roof drainage system to withstand rainfall intensity of 7.5 inches per hour with 5 minute duration.

E. Site Conditions: The following site features and adjacent structures must be considered in the design. Building is approximately 10 feet above surrounding terrain. Building is approximately 25 feet away from a 60 Ft. diameter x 24 Ft. high circular water tank, as shown on the Plans.

1.7 Submittals

A. Product Data: Provide data on profiles, component dimensions and fasteners.

B. Manufacturer's Installation Instructions: Indicate preparation requirements, assembly sequence.

1.8 Quality Assurance

A. Fabricate structural steel members in accordance with MBMA Low Rise Building Systems manual, and, for items not covered, AISC - Specification for Structural Steel for Buildings.

1.9 Qualifications

A. Manufacturer: The company specializing in manufacturing the products specified in this Item shall be a member of MBMA, and shall be certified in Category MB of the AISC Quality Assurance Program. The building manufacturer shall have three (3) years experience in the manufacture of steel building systems.

B. Structural framing and covering shall be the design of a licensed Professional Engineer experienced in design of this work

1.10 Field Measurements

A. Metal building contractor shall verify that field measurements are as indicated on the plans.

1.11 Warranty

A. Building manufacturer shall provide the following warranties:

i. Warranty against failures caused by faulty or substandard material - 3 years
ii. Workmanship Guarantee against failures caused by faulty erection - 1 year
iii. Galvalume Panels - 20 years
iv. Wall paint - 20 years
v. Weathertightness - 20 years

B. Building contractor shall provide the following warranties:

i. Workmanship - 5 years
ii. Weathertightness - 20 years

C. All warranties shall begin on the day when the building is inspected and accepted by the Engineer.

1.12 Administration

A. All nomenclature shall conform to the MBMA Low Rise Building Systems Manual.

B. Coordination and administration of the work shall be in accordance with the MBMA Low Rise Building Systems Manual - Common Industry Practices.

1000-2 MATERIALS

2.1 Roof System

A. Sheet Steel Stock: Galvanized to G90 designation.

B. Roof Insulation: ASTM C665, batt glass fiber type, faced with reinforced white vinyl UL flame spread classification of 25 or less where exposed, friction fit, 3 inches thick.

C. Standing Seam Roofing: Minimum 24 gauge, 2-13/16" profile, UL 90 rated snap edges.

D. Closures: Manufacturer's standard type.

E. Fasteners: Manufacturer's standard type, stainless steel finish to match adjacent surfaces when exterior exposed. Size to maintain load and weather tightness requirements.

F. Sealant: Manufacturer's standard type.

G. Exterior Surfaces of Roof panels: Precoated steel of silicone polyester finish, color to be selected from the manufacturer's standard colors by MAA.

H. Interior Surfaces of Roof Panels: Precoated steel of silicone polyester finish, color to be selected from the manufacturer's standard colors by MAA.

2.2 Wall Systems

A. Sheet Steel Stock: Galvanized to G90 designation.

B. Siding: Minimum 24 gauge metal thickness, 1-1/2" profile lapped male/female edges.

C. Wall Insulation: ASTM C665, batt glass fiber type, faced with reinforced foil UL flame spread classification of 25 or less where exposed, 4 inches thick.

D. Closures: Manufacturer's standard type.

E. Fasteners: Manufacturer's standard type, stainless steel finish to match adjacent surfaces when exterior exposed. Size to maintain load and weather tightness requirements.

F. Exterior Surfaces of Wall Panels: Precoated steel of silicone polyester finish, color to be selected from the manufacturer's standard colors by MAA.

F. Interior Surfaces of Wall Panels: Precoated steel of polyester finish, color to be selected from the manufacturer's standard colors by MAA.

2.3 Trim

A. Flashings, Internal and External Corners, Closure Pieces, Fascia, Infills, Caps: Same material and finish as adjacent material, profile to suit system; color to be selected from manufacturer's standards by MAA.

2.4 Metal Door And Frame

2.4.1 Door and frame shall be designed by the manufacturer to meet the wind load provisions as specified in section 1.5. Door shall be designed using beam action to transfer loads from jamb to jamb.

2.4.2 Door and frame construction shall be as follows:

A. Door leaves shall be full flush hollow metal doors, 1-3/4 inches thick with 20 gauge, G-60 galvanized skins over a urethane foam core. Leaf shall be reversible to work with non-handed door frames.

B. Door frames shall be non-handed (reversible) frames, 6-3/4 inches deep with a 2-inch wide face, 16 gauge, G-60 galvanized steel with square cut, butted corners. Jambs and header are of knock-down type for field assembly through bolted connections. Door frame shall be an open "C" section to "wrap-around" end of 6-1/2" girts.

C. Doors shall be manufacturer standard quality, sizes shall be as shown on the plans, and shall be designated as solid leaf door, provide shut metal trim to flash around door frame and provide a finish appearance.

D. Hardware furnished with all doors shall consist to 1-1/2 pair of butts for each leaf, a lockset in US26D or US32D finish, and an aluminum threshold (3-3/8 inches wide) with vinyl door sweep. An astragal will be furnished for active leaf of double doors as will head and foot bolts for inactive leaf. Hardware shall include:

(I) Panic exit/entrance hardware. Panic device will be touchbar type with cylindrical locks and pushbar type with mortise locks.

(ii) Surface mounted door closers

(iii) Vinyl weatherstripping kit

(iv) Stainless steel kick plate.

E. Shop prime and shop paint door; color to be selected from the manufacturer's standard colors by MAA.

2.5 Frames for Other Openings

Frames for all openings shall be designed by the manufacturer to meet the wind load provisions as specified in Section 1.5. Frames shall be designed using beam action to transfer loads from jamb to jamb. Frame shall also be designed to provide support for future installation of motor-driven rollup door.

2.6 Fabrication - Primary Framing

A. Framing Members: Clean in accordance with SSPC-SP2, prepare, and coat with building manufacturer's standard primer.

B. Hot rolled members shall be fabricated in accordance with AISC Specification for pipe, tube, and rolled structural shapes.

C. Fabricate built-up members in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

2.7 Fabrication - Wall And Roof Framing

A. Framing Members: Clean in accordance with SSPC-SP2, prepare, and coat with building manufacturer's standard primer.

B. Cold Formed Members: Cold formed structural shapes shall be fabricated in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practice.

2.8 Accessories

A. Wall louvers: shall be operable type, with pull-chain operator, weather-stripped blades, same finish as adjacent material with removable steel mesh insect screen and frame. Mounting fins for connecting to structural sub-framing shall be provided. Sizes shall be as show on the Plans.

(i) Louver shall be made of galvanized steel. Frame shall be 18 gauge (min.) and blades shall be 20 gauge (min.) material. Frame joints shall be welded. Blades shall be overlapping type, providing maximum weather tightness when closed and allowing free air flow when open.

(ii) Screens shall be 1-8/16 aluminum or fiber mesh in an extruded or formed aluminum frame. Screens shall be exterior mounted.

(iii) Structural sub-framing, consisting of angle or channel sections (hot-rolled or cold formed), shall be furnished with each louver.

(iv) Sheet metal trim shall be furnished to flash around louver and provide a finished appearance.

(v) Louvers shall be designed by the manufacturer to meet the wind load provision as specified in Section 1.5.

B. Powered wall Exhauster: shall consist of a belt-driven exhaust fan, a self-closing exterior louver, structural sub-framing to support the unit, and trim to flash around unit and provide a finished appearance.

i. Exhaust fan shall be 24 inches in diameter, four (or more) blades, belt-driven, complete with frame and mounting cage. Fan shall be powered with a 1/2 HP electric motor (460 volt, 3 phase, non-reversible, overload protection). Fan rating is 4090 CFM at 0 static pressure. Wiring and controls shall be included.

ii. Louver shall be automatic type which opens by action of exhaust air when fan is turned on and self-closes, by gravity action, when fan is shut off. Louver shall be 40" x 40". Frame and blades (interlocking type) shall be fabricated from mill finished aluminum extrusions.

iii. Structural sub-framing, consisting of cold-formed channel sections, shall be furnished with each exhaust fan. Trim shall be the building manufacturer's standard to accommodate wall panel configuration.

C. Roof Curbs and Flashing (for diesel water pump exhaust and silencer): Roof curb shall be a one piece unit consisting of a top box, or shell, and bottom skirt, or flange. Units shall be of welded construction, land top of shell shall provide a level surface for supporting mounted equipment.

i. Roof curbs unit shall be individually sized and designed to meet specific job requirements.

ii. Roof curbs shall be made of 18 gauge (min.), G-90 galvanized steel for shell and flange and shall have internal angle reinforcing as required. Paint units to match color coated roof panels.

iii. Roof curbs are supported by structural sub framing and shall be installed with flange under the roof panels. Roof panels are fastened to the flange with sealant and screws to provide a watertight assembly.

iv. Pipe Flashing shall be a one piece construction that accommodates pipes made of steel, copper, cast iron, PVC and sheet metal.

v. The building manufacturer is required to coordinate with the water pump manufacturer and/or installer for the numbers, sizes and locations of roof curbs and pipe flashing required on the building roof.

2.9 Fabrication - Gutters And Downspouts

A. Fabricate gutters from manufacturer's standard. Color as selected from manufacturer's standard offering.

B. Fabricate downspouts from manufacturer's standard. Color as selected from manufacturer's standard offering.

C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.

D. Fabricate gutter support straps of manufacturer's standard material and finish.

E. Fabricate downspout support straps of manufacturer's standard material. Color as selected from manufacturer's standard offering.

1001-3 EXECUTION

3.1 Examination

A. Verify site conditions under the General Provisions.

B. Verify that foundation, floor slab, mechanical and electrical utilities, and placed anchors are in correct position.

C. Provide access to the work as scheduled for owner provided inspections, if required.

3.2 Erection - Framing

A. Erect framing in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

B. The erector shall furnish temporary guys and bracing where needed for squaring, plumbing, and securing the structural framing against loads, such as wind loads acting on the exposed framing and seismic forces, as well as loads due to erection equipment and erection operation, but not including loads resulting from the performance of work by others. Bracing furnished by the manufacturer for the steel building system cannot be assumed to be adequate during erection. The temporary guys, braces, falseworks and cribbing are the property of the erector, and the erector shall remove them immediately upon completion of erection.

C. Do not field cut or alter structural members without approval of steel building manufacturer.

D. After erection, prime welds, abrasions, and surfaces not galvanized.

3.3 Erection - Wall And Roofing Systems

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

3.4 Erection - Gutter And Downspout

A. Install gutters and downspouts in strict accordance with manufacturer's instructions.

B. Provide concrete splash block at each downspout.

3.5 Installation - Accessories

A. Install door frame, door, in accordance with manufacturer's instructions.

B. Seal wall and roof accessories weather tight.

3.6 Tolerances

A. All work shall be performed in a workmanlike manner.

B. Install Framing in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.

1000-4 METHOD OF MEASUREMENT

4.1 Payment for pre-engineered metal building will be made on a lump sum basis wherein no measurement will be made. Reinforced Portland cement concrete for the building foundation and floor, and concrete masonry unit wall will not be separately measured for payment, but will be considered as incidentals for the building construction.

4.2 Excavation, embankment, and subgrade preparation for the building site will be measured and paid for as unclassified excavation under Item P-152.

4.3 Emergency lighting and lighted exit sign will be measured and paid under Item 16510.

1000-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract lump sum price for pre-engineered metal building which price shall be full compensation for the work specified and the furnishing of all labor, materials, equipment, and all incidentals necessary to complete the work as indicated on the plans and specified herein. The payment shall include the the costs for furnishing and installation of reinforced Portland cement concrete foundation and floor, concrete unit masonry wall, fire sprinkler system, fire extinguisher, and all building accessories.

Payment will be made under:

Item 1000.1 Pre-Engineered Metal Building -- lump sum

END OF ITEM 1000

ITEM 1200 WATER TANK

1200-1 GENERAL

1.1 SCOPE:

A. This item shall consist of the furnishing of all engineering, labor, material, equipment, tools, services, and erection of a 500,000-gallon, factory powder-coated bolted steel water storage tank and all accessories including the tank foundation as shown on the Plans and specified herein.

B. The bolted steel tank shall conform to the requirements of AWWA D103-87.

1.2 SUBMITTALS:

Shop Drawings: Submit shop drawings of the bolted steel reservoir and all accessories for review and approval by the engineer prior to beginning any related shop fabrication or erection. Include sufficient data to show that the reservoir and accessories conform to the requirements to these Specifications.

Submittals shall include:

A. Design calculations, sealed and signed by a Professional Civil or Structural Engineer.

B. Fabrication and erection drawings and details for the reservoir and all accessories.

C. Certified mill tests on steel plate and structural members demonstrating that the physical and chemical requirements of this Specification have been met.

1200-2 PRODUCTS

2.1 GENERAL DESCRIPTION:

A. Water tank shall be a 500,000-gallon, Factory powder-coated bolted steel water storage tank, Model #2400, manufactured by Superior Tank Co., Inc., Santa Fe Springs, CA, or an approved equal. Submit Manufacturers data for approval.

B. The tank manufacturer shall furnish, erect and test the tank on an approved foundation, as required by AWWA D103-87. The tank manufacturer shall be completely responsible for the construction and satisfactory performance of the tank during the guarantee period. The tank shall conform to AWWA D103-87, to the latest edition of the Uniform Building Code, and to the requirements of the plans and these Specifications. The supplier shall submit for approval complete and detailed plans for the tank and appurtenances.

C. The Factory Powder Coated, bolted steel tank shall have a nominal capacity of 500,000 gallons. It shall have a nominal diameter of 60 feet and a nominal height of 24 feet. A cone roof, sloped to drain toward the wall shall be provided. Provide the reservoir complete with all pipe connections, access openings, nozzles, taps, drains, ladders, vent, and other accessories as shown on the plans or required herein.

2.2 DESIGN DATA:

A. The following data and information are supplied as a basis for design and erection of the tank, foundation, and appurtenances:

1. Minimum capacity	500,000 gallons
2. Inside diameter	60' plus or minus
3. Minimum tank height	24' plus or minus
4. Minimum overflow height	23' plus or minus
5. Seismic zone	1
6. Liquid to be stored	Potable water
7. Wind load	100 mph
8. Deck load	25 psf
9. Allowable Soil Bearing	1800 psf
10. Design standard	AWWA. D103-87

2.3 ACCESSORIES:

A. Shell Manhole: Provide a 24 inch, minimum, hinged shell manhole located as shown on the drawings. The center of the manhole shall be located 36 inches above the bottom of the tank.

B. Manway: Provide a 24"x36" shell manway located as shown on the drawings.

C. Pipe Connections:

1. Provide backwash inlet nozzle with deflector plate, outlet nozzle with anti-vortex plate, and overflow and drain outlets as shown on the plans.

2. Provide a 1-inch NPT tank connection as shown on the plans for sampling connection.

D. Overflow pipe: Provide steel internal and external overflow pipe, internal weir box, if required, and supports as shown on the plans. Overflow pipe assembly shall be powder epoxy lined and coated.

E. Ladders:

1. Provide a galvanized steel welded exterior ladder with backguard as shown on the plans. The ladder shall have a lockable closure at the bottom.

2. Provide a galvanized steel welded interior ladder with a Safe-T-Climb assembly and backguard, or approved equal, as shown on the plans.

F. Roof Openings:

1. Two- 20 inch screened vent shall be provided on the roof. The vents shall be fabricated to provide removable screened openings between the vertical support members of the vent. The screened openings of the vent shall be sized by the manufacturer to all venting of a 8,000 gpm pumping rate. An effective area of 75% of screen opening shall be assumed. The screen shall consist of one layer of Type 316 stainless steel: 16 x 16 x 0.018 wire mesh insect screen.

2. The tank roof shall have a curbed, upward opening 24-inches square, minimum hatch located near the ladder. The curb shall extend at least 4 inches above the tank. The hatch cover shall be hinged and shall have locking provisions. The hatch cover lip shall extend for a distance of 2-inches down on the outside of the curb.

G. The tank shall have Liquid Level Indicator with Type 316 stainless steel internals and complete with float and target board assembly.

H. Gaskets and sealants shall meet or exceed AWWA, FDA, and EPA standards for potable water.

I. Anchor bolts and stirrups, if required, to be furnished by the tank manufacturer.

1200-3 EXECUTION

3.1 PROTECTIVE COATING:

A. General: All metal plates, supports, members and miscellaneous parts, except bolts, shall be Factory Powder Coated in accordance with AWWA D103, Section 10.6 and this Section. Field coating, other than touch-up, will not be permitted.

B. Surface Preparation:

1. Prior to application of coating, all metal plate, supports, members and miscellaneous parts, other than fasteners shall be thoroughly cleaned by a hot-rinse wash process followed immediately by hot air drying.

2. All steel surfaces shall be sandblasted to equivalent of a SP 6 commercial blast metal finish. The surface anchor pattern shall be no less than 1.5 mils.

3. All steel surfaces shall receive an iron phosphate coating applied with a power spray washer with not less than 25 p.s.i. pressure, followed by a warm water rinse and by an acidulated sealant. Then spray a final Deionized water rinse to prevent rusting prior to the powder coating application.

4. All steel surfaces shall drip for seven (7) minutes prior to entering the dry off oven for eight (8) minutes at 425 degrees F.

C. Coating:

1. All interior steel surfaces, support members and miscellaneous parts shall receive 5 mils minimum average dry film thickness using Fuller O'Brien "Tank Tan" (an NSF 61 approved, thermal set epoxy powder coating) or approved equal.

2. All exterior steel surfaces, support members and miscellaneous parts shall receive 3 mils minimum average dry film thickness using Fuller O'Brien "Superior Sand" (a thermal set TGIC-polyester powder coating) or approved equal.

3.2 CONSTRUCTION:

A. Field erection of Factory Powder Coated bolted steel tanks shall be in strict compliance with manufacturer's recommendations and performed by manufacturer's employees to alleviate any potential disputes in coating quality or erection thereof. Particular care shall be exercised in handling and bolting of the tank plates, supports, and members to avoid abrasion or scratching the coating. Prior to placing water in the tank, a "holiday" inspection of the entire tank, corners included, will be provided and performed by the manufacturer in the presence of the Engineer. Touch-up coating shall be done per the manufacturer's recommendations where and as directed.

3.3 TESTING AND INSPECTION:

A. General: Test storage tank after erection. Floor shall be clean and free from dirt, foreign substances, and debris.

B. Bottom: Vacuum test seams in floor plates.

C. Shell: Test by filling with water to elevation of overflow. Completed storage tank shall show no leaks at end of 24 hour test period. No charge will be made for water required to fill tank.

D. Disinfection:

1. General: After testing has been satisfactorily completed, tank shall be disinfected.

2. Standards: Disinfecting of interior surfaces shall be performed in accordance with AWWA C652-86. After disinfection, a water specimen shall be taken for bacteriological test, as prescribed at Code 40 of the Federal Regulations, Sections 141.21 through 141.30, 141.41 and 141.42.

3. After disinfection, the tank shall be filled to the overflow level and allowed to stand for 5 days, minimum. After 5 days, water specimens shall be taken for V.O.C. test per EPA 502.2. The tank may be placed into service once acceptable test results are received.

3.4 WARRANTY:

A. The tank manufacturer shall provide the following warranties:

1. Warranty against any defects in workmanship and materials - 3 Years

2. Coating warranty - 15 Years

B. Warranty period shall begin from date the tank is completely installed and accepted by the Engineer.

1200-4 METHOD OF MEASUREMENT

4.1 Payment for furnishing and installation of the water tank and all appurtenant piping, accessories, disinfection, inspection and testing will be made on a lump sum basis wherein no measurement will be made.

4.2 Payment for excavation, support of excavation, embankment and compacted backfill will be made under Item P-152.

4.3 Filter fabric and pea gravel for tank foundation will not be measured for payment, but will be considered incidental to the cost of water tank.

1200-5 BASIS OF PAYMENT

5.1 This item will be paid for at the Contract Lump Sum price, which shall be full compensation for performing all work and the furnishing of all materials, labor, tools, equipment and incidentals necessary to complete the item. No separate payment will be made for piping, connections and fittings, ladder, coating and other tank accessories, filter fabric, pea gravel, inspection, disinfection and testing or other items necessary to furnish and install the water tank as described in the Specifications and shown on the Plans.

Payment will be made under:

Item 1200.1 Water Tank -- lump sum

END OF ITEM 1200

ITEM 1300 SANITARY SEWAGE AND WATER SUPPLY SYSTEM

1300-1 DESCRIPTION

1.1 The work to be performed under this item shall include, but not be limited to, the furnishing of all materials, labor, and equipment required for the construction of gravity and force main sanitary sewers and metered water service for the project; including all necessary excavation and backfilling; the furnishing and installation of equipment, pipes, valves, manholes, cleanouts, connection to existing piping and manhole while maintaining existing sanitary sewer services and water; pavement cutting and repair; testing; and all incidentals necessary to complete the work as indicated on the plans and specified herein.

1300-2 MATERIALS AND EQUIPMENT

2.1 General

A. All materials shall be new and suitable for the conditions and duties imposed upon them after installation. Where applicable, materials and equipment shall bear the approval label of the Underwriter's Laboratories, Inc.

B. All structural steel shall be galvanized, meeting requirements of ASTM A 123. Bolts, nuts and washers shall be hot-dipped or mechanically galvanized. The coating shall meet the adherence thickness and quality requirements of ASTM A 153. Structural steel shall be galvanized after fabrication.

2.2 Shop Drawings

A. Shop drawings shall be submitted to the Engineer for approval within four weeks following the execution of the contract.

B. Shop drawings shall consist of manufacturer's catalog cuts, working drawings, wiring diagrams, certified test reports, etc. for pipe and fittings, joints, couplings, valves, gaskets, precast sanitary sewer manholes, including frame and cover and ladder rungs, casing pipe end seals, insulator pipe supports, fire hydrants, and other materials or equipment which may be requested by the Engineer.

C. Shop drawings for sanitary sewer crossing of Wilson Point Road shall consist of complete and detailed plans and schedules for the jacking operation and shall be approved by the Engineer before the work may begin. The shop drawings shall include complete details of sheeting, shoring, bracing, and dewatering for protecting the roadbed and materials and equipment to be installed.

D. The Contractor shall keep at the site at all times during construction one set of contract prints for the express purpose of showing any and all changes made during construction. The Contractor shall mark the prints showing each change and shall incorporate all changes in "Record/As-Built Drawings" to be submitted to the Engineer upon completion of the project.

2.3 Sanitary Sewer Lift Stations: The pump stations shall be of dry pit design. All motors, pumps, impellers, and equipment shall be installed on the dry side with pipe connections to the wet side (sewage pit side). The dryside pit shall be below ground with a minimum three-foot diameter entrance tube. An integral emergency power generator shall be provided and shall be located at the surface. The design and construction of hold-down pads shall be the responsibility of the Contractor. Any additional soil testing required for the design and placement of the pump station and the sewage pit shall be the responsibility of the Contractor. The pump station shall have a primary and secondary pump within the station. A concrete surface pad shall be constructed for accessibility to the pump station and sewage pit, and for mounting the emergency generator. The concrete surface pad shall be deigned to allow for proper surface drainage to be directed away from the

pump station and sewage pit. The pump station may be of fiberglas or concrete construction and the sewage pit shall be of concrete construction. Pumps shall be selected for a flow rate of 130 gallons per minute, and static and total dynamic head shall be calculated from the sanitary sewer system layout shown on the plans. Lift stations shall be as manufactured by The Gorman-Rupp Company, Mansfield, Ohio, or equal approved by the Engineer.

2.4 PVC Gravity and Force Main Sanitary Sewer: Pipe and fittings shall be PVC conforming to ASTM D 3034, SDR 35. Jointing shall be accomplished by means of elastomeric gasket joints conforming to ASTM D 3212. Gasket material shall be suitable for use with domestic sewage and shall conform to ASTM F 477.

2.5 Joints and Jointing Material for PVC Gravity and Pressure Pipe: Joints for pipe shall be socket type couplings with solvent cement weld as specified in ASTM D 2466 and D 2564 or push-on joints with elastomeric gaskets conforming to ASTM D 3139 and F 477.

2.6 Ductile Iron Water Pipe and Fittings: The pipe furnished shall be ductile iron pipe meeting the requirements of AWWA C-151, Class 52. The pipe shall be in 18-foot lengths and shall be of bell and spigot construction for mechanical joints. Bells shall be formed integrally with the pipe and contain a restrained gland and rubber gasket. The completed joint shall create a hydraulic seal capable of withstanding an internal hydrostatic pressure of 150 psi for one hour without leaking. Fittings shall be ductile or cast iron with mechanical joints and retainer glands with suitable rubber gaskets to make proper connections with new and existing pipe. Retainer glands for mechanical joint pipe shall be of a type which replaces the conventional type mechanical joint gland. Retainer glands shall have alloy case hardened set screws with square heads and cupped ends. The size and quantity of set screws shall be in accordance with the recommendation of the manufacturer.

2.7 Water Service Valves: Valves shall be gate or ball type as manufactured by Jenkins or equal.

2.8 Pipe Bedding Material: Bedding material for all pipe shall be as shown on the Plans and as specified in the Maryland "Standard Specifications for Construction Materials," October 1993.

2.9 Concrete: Where shown on the plans, concrete for pipe encasement, thrust block, or other appurtenances required under this Item, shall meet the requirements of Item P-610, except that the 28-day compressive strength may be 3000 psi minimum at the Contractor's option.

2.10 Lift Station Autodialer Alarm: Each sanitary sewer lift station shall be equipped with an automatic alarm system as shown on the plans and capable of detecting excessive levels of sewage in the wet side pit. The alarms shall be connected to the airport telephone system and shall be capable of sending simulated voice alarm messages to up to six (6) remote locations to be determined by the Engineer. If approved by the Engineer, a single autodialer unit having multiple alarm input capabilities may be installed in a central location and linked to alarm mechanisms installed in each lift station.

2.11 Tracer Wire for Nonmetallic Piping: Tracer wire shall be bare copper or aluminum wire not less than 0.10 inch in diameter and shall be provided in sufficient length to be continuous over each separate run of nonmetallic pipe.

2.12 Buried Warning and Identification Tape: Buried warning and identification tape shall be polyethylene plastic tape manufactured specifically for warning and identification of buried utility lines. Tape shall be provided in rolls, 6 inches minimum width, color codes for water or sewer service with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be "CAUTION BURIED WATER LINE BELOW" or similar wording. Code and letter coding shall be permanent, unaffected by moisture and other substances contained in trench backfill material.

2.13 Corporation stops shall have standard corporation stop thread conforming to AWWA C800 on the inlet end, with flanged joints, compression pattern flared tube couplings, or wiped joints for connections to goosenecks.

2.14 Disinfection: Chlorinating materials shall conform to the following:

Chlorine, Liquid:	AWWA B301
Hypochlorite, Calcium, and Sodium:	AWWA B300

1300-3 CONSTRUCTION METHODS

3.1 General

A. The Contractor shall furnish all materials, perform all excavation and backfill, construct all necessary joints and connections, construct all appurtenances, dispose of all surplus excavation and discard materials as may be necessary to complete the sanitary sewerage and water supply systems.

B. The Contractor shall assume all risk and bear any loss or injury to property or persons occasioned by neglect or accident during the progress of the work. The Contractor shall exercise special care during the work so as not to damage any existing utility lines or appurtenances.

C. Maintenance of Local Service: The Contractor shall exercise utmost care to avoid damage to trees and hedges, fences, electric, telephone, gas and water lines and other operating sewer lines, building, roads and all appurtenances thereto. The interruption of free access to streets and roads due to trench excavation shall be kept to a minimum. Traffic on public and airport roads shall be maintained at all times. All excavated material shall be piled in a manner that will not endanger the work and will not obstruct access to the site.

D. Gutters and ditches shall be kept clear at all times or other satisfactory provisions made. Drainage of natural water courses shall not be obstructed. All trenches, material, excavated pits, equipment and pipe which may cause a hazard or serve as obstruction to either vehicular or pedestrian traffic shall be enclosed by fences or barricades, adequately lighted, to protect persons from injury and to avoid property damage. Where traffic must cross open trenches, the Contractor shall provide suitable bridges, which will be subject to approval of the Engineer. The Contractor shall furnish temporary support, adequate protection and maintenance of all underground and surface structures, drains, telephone and electric conduits, sewers, and other obstructions encountered in the progress of the work.

E. Removal of Water: The Contractor shall at all times during construction provide proper and satisfactory means and devices for the removal of all water entering the excavated area, and he shall remove all such water as fast as it may collect to avoid interference with the prosecution of the work of the proper placing of masonry or other materials.

F. Delivery, Handling and Storage of Materials: Inspect materials delivered to site for damage. Unload and store with 'minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris. Handle pipe, fittings, valves, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry pipe to the trench; do not drag it. Do not leave plastic piping or rubber gaskets that are not to be installed immediately out in the sunlight, but store under cover out of direct sunlight.

3-2 Trench Excavation

A. The Contractor shall excavate, protect, and backfill all excavation that may be necessary for completing the work under the contract. Unless otherwise specified, excavation shall be open cut. Sheeting, shoring, and hand excavation shall be done as may be necessary for the protection of the

work and for the safety of personnel in accordance with Local, State, and Federal regulations including OSHA.

B. Trenches shall be excavated to the necessary width and depth, as shown on the Drawings and as specified or as directed.

C. The sides of the trenches shall be practically plumb and will be permitted to be sloped only with the written approval of the Engineer. Bell-holes shall be excavated in the bottoms and sides of trenches to permit the proper making of joints.

D. In paved areas the Contractor shall remove the paving for such width only as is necessary for the excavation of the trench, as shown on trench details. If the Contractor removes the paving for a greater width than is deemed necessary, or in case he removes or disturbs any paving on account of settlement, slides or caves, or in making excavation outside the lines of the work without the written order of the Engineer, the Contractor shall replace at his own expense such paving, etc., or MAA may retain from any monies due or to become due to the Contractor, the cost of permanently replacing the paving so removed.

E. The Contractor shall support the sides and ends of all excavations or structures, whenever necessary or directed, with braces, sheeting, shores or stringers of the quality and character to support the trench walls.

F. All sheeting in excavations shall be withdrawn as the backfilling is being done, except where and to such extent as the Engineer shall order,. in writing, that sheeting and shoring be left in place, or where he shall permit the same to be left in place, at the Contractor's expense and upon his request. The Contractor shall cut off any sheeting left in place, at least 18 inches below finished grade wherever ordered, and shall remove the material cut off without compensation therefore.

G. Wherever necessary, in soft ground, or for the protection of any structure or property, sheeting shall be driven, to such depth below the bottom of the trench as may be required or directed.

H. The Contractor shall be responsible for the condition of all excavations made. All slides and caves shall be removed without extra compensation, at whatever time and under whatever conditions that may occur.

I. The excavation of all trenches shall be fully completed at least 20 feet in advance of pipe laying, unless otherwise authorized or directed. The Engineer may at any time require the backfilling of open trenches over completed pipe line, if in his judgment such action is necessary, and the Contractor shall thereby have no claim for extra compensation, even though to accomplish said backfilling he is compelled temporarily to stop excavation or other work at any place. If work is stopped on any trench, for any reason except by order of the Engineer, and the excavation is left open for an unreasonable length of time in advance of construction, the Contractor shall, if so directed, backfill such trench at his own cost, and shall not again open said trench until he is ready to complete the structure therein. If the Contractor shall refuse or fail to backfill such trench completely within 48 hours after said notice, the Owner shall be authorized to do the work, and the expense thereof shall be charged to the Contractor.

J. All excavations must be kept free of water below the subgrade of the work while work is in progress. This may be accomplished by ordinary pumping methods, use of underdrains, or by wells points, whichever will produce the required results.

K. The Contractor shall complete excavations in earth as nearly as practicable to the neat lines of the structures to be built therein. All irregularities and cavities in the bottom of trenches shall be filled up to the required level with clean earth or required bedding material, firmly compacted, before pipe lines are laid therein, and without extra compensation unless said cavities have been formed by the

direction of the Engineer, and their excavation classed as excavation below subgrade. Wherever directed, the Contractor shall use aggregate meeting the requirements of AASHTO No. 57 in backfilling below subgrade.

3.3 Trench Backfill

A. It is intended that the material excavated from the trench be used for trench backfill, provided that in the opinion of the Engineer, the excavated material is suitable for backfilling. Backfill shall be placed and compacted in a controlled manner in accordance with Item P-152 and as specified below.

B. Backfill material shall be carefully deposited in the trench by methods which will not damage or disturb the pipe or structures, and shall be solidly tamped around the pipe or structure. The volume from the bottom of the trench to the spring line of the pipe shall be placed in 4-inch compacted layers. The volume from the spring line of the pipe to a point 12 inches below road subbase, or to grade, where the pipe is not laid in a road, shall be refilled in 6-inch compacted layers. All tamping of material from the bottom of the trench to the spring line shall be done by pneumatic hand tampers; or if the material is composed largely of coarse aggregate, the Engineer may require the use of other hand tampers, in order to insure protection of the pipe. Above this point, mechanical tampers capable of exerting a blow of 250 foot pounds per square foot of area of tamping face shall be employed.

C. The moisture content of the material being compacted shall be within plus or minus 3 percentage points of optimum. Material containing an excess of moisture shall be processed and dried, or permitted to dry until the moisture content is within the specified range. Material which is too dry shall be wetted until the moisture content is within the specified range.

D. The Engineer may make compaction tests of the backfilled trenches at any time during construction or upon completion of the backfill operations. If the results of any tests show that backfills do not meet the specified compaction requirements, the Contractor shall at his own expense, correct the condition, as directed by the Engineer, in such portions of the trench represented by the unsatisfactory test results.

E. From a point 8 inches below the existing base course to the surface of all trenches located in paved areas and shoulders shall be refilled with well compacted crushed stone, slag or gravel, and maintained for a minimum of 30 days before permanent repairs are made to paving. The crushed stone, slag, or gravel backfill material shall then be excavated as required, and all paving, including sidewalk, curb and gutter shall be replaced over excavations in accordance with the details shown on the Contact Drawings, Standard Details, or as required by permit of the various regulatory agencies.

F. Backfill in all excavations not in paved areas shall be restored to the condition that existed prior to beginning work, and maintained for a period of nine months following the date of conditional acceptance.

G. The Contractor shall, at his own expense, maintain all excavations in proper condition. Just prior to the termination date for maintaining excavations, the trench surfaces shall be given final reshaping where necessary. All depressions appearing in the backfilled excavations shall be properly refilled. If the Contractor fails to make repairs within 48 hours after receipt of written notice from the Owner, the Owner may backfill said depressions or protect with signs and lanterns wherever necessary without giving previous notice to the Contractor and the cost of so doing will be retained from any monies due or to become due the Contractor under the Contract. The Contractor shall be responsible for any injury or damage that may result from lack of maintenance of any backfilled excavation at any time previous to the end of the mentioned termination dates.

H. All unauthorized excavations made by the Contractor shall be immediately backfilled in accordance with the requirements of the specifications for Excavation Backfill at the Contractor's expense.

I. After completion of backfilling, all material not used therein, shall be removed and disposed of in such a manner and at such point as shall be approved or directed and all roads, sidewalks, and other places on the line of the work shall be left free, clean, and in good order. Said cleaning up shall be done by the Contractor without extra compensation and, if he fails to do such work within a reasonable time after receipt of notice, it will be performed by the owner, and the cost will be retained out of the monies due or to become due the Contractor under the contract.

3.4 Excavation Below Trench Subgrade and Backfill

A. Unsuitable or other material encountered at or below the excavation limits which in the judgment of the Engineer should be removed, shall be removed to the extent directed; and all spaces created by the removal of any and all material shall be backfilled as directed by the Engineer. Thoroughly compacted aggregate meeting the requirements of AASHTO No. 57 shall be used as backfill below subgrade.

B. In general, this item of work shall be performed when the planned subgrade is in rock and a cushion is deemed necessary or where the planned subgrade is in an unsuitable or unstable area. In any event, the work will be performed only upon the written direction of the Engineer.

3.5 Pipe Installation

A. Pipe shall be protected during handling against impact shocks and free fall and the pipe. interior shall be free of extraneous material. Pipe laying shall proceed upgrade with the spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow. Each pipe shall be laid accurately to the line and grade shown on the Plans. Pipe shall be laid and centered so that the sewer has a uniform invert. As the work progresses, the interior of the pipe shall be cleared of all superfluous materials. Before making pipe joints, all surfaces of the portions of the pipe to be joined shall be clean and dry. Lubricants, primers, and adhesives shall be used as recommended by the pipe manufacturer. The joints shall then be placed, fitted, joined, and adjusted so as to obtain the degree of water tightness required.

B. Installations of socket type solvent weld joint pipe, PVC pipe and fittings shall be installed in accordance with ASTM F 402, and all - required precautions shall be taken to assure adequate trench ventilation and protection for workers installing the pipe. Trenches shall be kept free of water and as dry as possible during bedding, laying and jointing and for as long a period as required. When work is not in progress, open ends of pipe and fittings shall be satisfactorily closed so that no trench water or other material will enter the pipe or fittings. As soon as possible after the joint is made, sufficient backfill material shall be placed along the pipe to prevent pipe movement off line or grade. Plastic pipe shall be completely covered to prevent damage from ultraviolet light. Storage facilities for plastic pipe, fittings, joint materials and solvents shall be classified and marked in accordance with NFPA 704, with classification as indicated in NFPA 49 and NFPA 325M.

C. Cutting of pipe shall be done in a neat and workmanlike manner without damage to the pipe. Unless otherwise recommended by the manufacturer and authorized by the Engineer, cutting shall be done with an approved type mechanical cutter. Wheel cutter shall be used when practicable. Squeeze type mechanical cutters shall not be used for ductile iron.

D. Water pipe shall not be laid closer horizontally than 10 feet from a sewer except where the bottom of the water pipe will be at least 12 inches above the top of the sewer pipe, in which case the water pipe shall not be laid closer horizontally than 6 feet from the sewer. Where water lines cross under gravity-flow sewer lines, the sewer pipe for a distance of at least 10 feet each side of the crossing shall be fully encased in concrete or shall be made of pressure pipe with no joint located within 3 feet horizontally of the crossing.

E. Placing and Laying: Pipe bedding and trench details shall be as shown on the Plans. Pipe and accessories shall be carefully lowered into the trench by means of derrick, ropes, belt slings, or other authorized equipment. Under no circumstances shall any of the water and sanitary line materials be dropped or dumped into the trench. Care shall be taken to avoid abrasion of the pipe coating. Except where necessary in making connections with other lines or as authorized by the Engineer, pipe shall be laid with the bells facing in the direction of laying. The full length of each section of pipe shall rest solidly upon the pipe bed, with recesses excavated to accommodate bells, couplings, and joints. Pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipe shall not be laid in water or when trench conditions are unsuitable for the work.

1. Water shall be kept out of the trench until joining is completed. When work is not in progress. open ends of pipe, fittings, and valves shall be securely closed so that no trench water, earth, or other substance will enter the pipes or fittings. Where any part of the coating or lining is damaged, the repair shall be made by the Contractor at his expense in a satisfactory manner. Ductile iron and PVC shall be installed in accordance with the details shown on the Plans.

F. Final Certification: Upon completion of the project and before final acceptance, the Contractor shall deliver to the Engineer a statement signed by the principal officer of the contracting firm stating that the installation is satisfactory and in complete accordance with the contract plans and specifications and the manufacturer's prescribed procedures and techniques.

G. Where existing manholes or sewer lines must be removed in order to construct new sewer or structure, the Contractor shall make any necessary cuts in the pipes and remove all piping and appurtenances as required to install new work.

H. Jointing

1. Ductile-Iron Pipe: Mechanical joints shall be installed in accordance with AWWA C600 for buried lines.

2. Polyvinyl Chloride (PVC) Plastic Pipe: Joints shall be made in accordance with instructions recommended by the manufacturer of the pipe.

3. Connections between different types of pipe and accessories shall be made with transition fittings approved by the Engineer.

I. All PVC pipe shall be laid true to line and grade and, where not encased, bedded in No. 6 gravel from 6 inches below the pipe to 4 inches above the top of the pipe.

J. Backfill from the top of the pipe to finished ground shall be compacted to 95 percent modified proctor density.

K. Finished ground level shall be no less than 3.5 feet above the pipe except where shown on the Plans.

L. The gravel base shall be used to adjust the pipe grade. The use of blocks will not be allowed.

M. All PVC pipe shall have a tracer wire and buried warning identification tape placed no less than 1.5 feet above top of the pipe.

N. It is intended that material excavated from the trench be used for backfill above the embedment, provided that the Engineer approves it as suitable for backfill. If the Engineer declares the excavated material unsuitable, borrow backfill with suitable material shall be provided as an extra work item.

O. The Engineer may make compaction tests of the backfilled material at any time during construction or upon completion of the backfill. If results of any test show that backfill does not meet 80 percent

Modified Proctor Density, the Contractor shall, at his own expense, correct the condition, as directed by the Engineer, in the portions of the backfill represented by the unsatisfactory test results.

P. Backfilled and excavated turfed areas shall be restored to the original condition existing prior to excavation by sodding in accordance with Maryland Department of Transportation Standard Specifications for Construction and Materials. Should the Contractor fail in such maintenance, the Owner will correct any deficiencies and deduct the cost of so doing from any monies due or to become due under the Contract.

Q. All paving shall be replaced in kind where necessary according to the details shown on the drawings.

3.6 Sanitary Sewer Manholes

Sanitart sewer manholes shall be furnished and installed in accordance with the provisions of Item D-751.

3.7 Pipe Jacking

A. The contractor shall determine the exact locations of existing utilities along the jacking alignment and in the vicinity of the jacking and receiving pits before any excavation may begin. Such location may be by electronic means or by excavation of test pits as approved by the Engineer. Test pits shall be dug by hand to the extent practicable. Under no circumstance shall the locations of existing utilities be determined solely on the basis of record drawings or other documents.

B. Excavations for the jacking and receiving pits shall be made, and sheeting, shoring, bracing, and dewatering measures installed to suit anticipated conditions. Sheeting, shoring, and/or bracing supporting the jacking pit excavation shall be capable of supporting loads imposed by the jacking equipment. Soil from the pit excavations shall be stockpiled at a location approved by the Engineer, or may be disposed of after excavation.

C. The jacking alignment, horizontally and vertically, shall be established, checked, and approved by the Engineer before jacking may begin. Guide rails shall be installed as required or as directed by the Engineer.

D. Work shall be performed in such a manner that the ground surface above the pipe will not settle. Installation of the pipe or steel casing, if required, shall be performed in a continuous operation once begun. Casing pipe, if used, shall be smooth-wall steel pipe capable of withstanding the loads inposed by the jacking apparatus. The casing exterior may be lubricated to aid in jacking. Voids occurring behind the pipe during installation shall be be filled with hydraulic cement grout, placed under pressure, upon completion of the jacking operation. Joints of steel pipe shall be butt-welded watertight as installation progresses.

E. The sanitary sewer pipe shall be installed inside the casing to the grade shown on the plans. The pipe shall be secured in place through the full length of the casing before grouting. Grouting shall be by pressure injection or other means approved by the Engineer, and shall result in minimal voids between the pipe and casing.

F. After pipe and manholes have been placed, the jacking and receiving pits shall be backfilled in accordance with the provisions of Item P-152. Sheeting, shoring, and bracing shall be removed, and the ground shall be graded and otherwise restored to the preconstruction condition, and seeded and mulched in accordance with the provisions of this Item.

3.8 Permits: The Contractor shall obtain the permits required for connections to the existing sanitary sewer and water systems. Costs for these permits shall be incidental to the work required under this Item.

1300-4 TESTING

4.1 General

A. The Contractor shall furnish all labor, tools, materials, water, and equipment including mirrors, flashlights, or other artificial lighting, weirs, pumps, compressors, stopwatch, gauges and meters, subject to the approval of the Engineer.

B. Under no circumstances will the Contractor be permitted to connect to existing systems until the new work has been tested and accepted by the Engineer.

C. Gravity Sewer: Lines shall be tested for leakage by low pressure air testing, infiltration tests or exfiltration tests, as appropriate. Prior to infiltration or exfiltration tests the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results.

D. Water service line shall be disinfected and hydrostatically tested at 150 psi as specified under "Hydrostatic Testing."

4.2 Mirror Testing

A. Upon completion of pipe laying and backfilling to a point at least 2 feet above the crown of the pipe, the Contractor will conduct a mirror test to check for defects, or leakage, and for horizontal or vertical misalignment. Mirror testing shall consist of reflecting sunlight or artificial light via mirrors through the completed section of pipe line, which in order to be accepted, shall be true and straight in horizontal and vertical alignment to allow for the full passage of the reflected light.

4.3 Infiltration and Exfiltration Testing

A. Upon completion of pipe laying and backfilling to a point at least 2 feet above the crown of the pipe of the first laid segment of pipeline between two cleanouts or manholes, the Engineer shall conduct an infiltration test if the pipeline is constructed below the ground water table or an exfiltration test if the pipeline is constructed above the ground water table.

B. Measurement of the infiltrating water shall be accomplished by the use of a weir, or other measuring device and methods acceptable to the Engineer, installed in the inlet of the lowest manhole or cleanout of the section under test. The outlet of the upstream manhole or cleanout shall be plugged.

C. Measurement of exfiltration shall be made by plugging the inlets of the upstream and downstream cleanouts or manholes of the section under test, filling the section and upstream manhole with water and measuring the volume of water leaving the manhole or cleanout over a 24 hour period.

D. Leakage shall not exceed 0.20 gallons per inch of nominal internal diameter per hour per 100 feet of line.

E. Should the test section fail to meet the requirements of these specifications, the Contractor shall make whatever corrections are necessary including removing and relaying the pipeline, until the requirements have been met.

F. Performance of this testing on the initial segment of pipeline installed will permit observation of the quality of construction workmanship required to achieve the specified contract requirements and shall be the basis upon which all subsequent work will be tested, judged and accepted.

G. Pipelines subject to exfiltration testing which are laid on grades where a water load may produce pressures in excess of the joint design capacity shall be tested using a low pressure air test.

4.4 Low Pressure Air Testing

A. Upon completion of pipe laying-and backfilling to a point at least two feet above the crown of the pipe of the first laid segment of pipeline between two cleanouts or manholes, the Engineer shall conduct a low pressure air test where excessive grades preclude proper testing by the exfiltration method.

B. The Contractor shall furnish an inflatable rubber ball of a size that will inflate to fit snugly into the pipe to be tested. The ball may, at the option of the Contractor, be used without a tag line, or a rope or cord may be fastened to the ball to enable the Contractor to know and control its position at all times. The ball shall be placed in the last manhole or cleanout on the pipe to be cleaned, and water shall be introduced behind it. The ball shall pass through the pipe with only the pressure of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole or cleanout where its presence is noted. In the event cemented or wedged debris, or a damaged pipe shall stop the ball, the Contractor shall remove the obstruction and/or replace the pipe.

C. Immediately following the pipe cleaning described, the pipe installation shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 psi greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.

D. The rate of air loss shall then be determined by measuring the time' interval required for the internal pressure to decrease from 3.5 to 2.5 psi greater than the average back pressure of any ground water that may submerge the pipe.

E. The pipeline shall be considered acceptable, when tested at an average pressure of 3.0 psi greater than the average back pressure of any ground water that may submerge the pipe, if (1) the total rate of air loss from (2) the section under test does not lose air at a rate greater than 0.0030 cfm per square foot of internal pipe surface.

F. The requirements of this Specification shall be considered satisfied if the time required in seconds for the pressure to decrease from 3.5 psi to 2.5 psi greater than the average back pressure of any ground water that may submerge the pipe is not less than that computed by either of the following equations:

$$tQ = .011\, d_1^2 L_1 + .011\, d_2^2 L_2 + \ldots + .011\, d_n^2 L_n \ldots$$

in which $tQ = \sum K$

$$K = .011\, d_2 L$$

$$tQ = \sum K \div \text{by} \sum c$$

4.5 Hydrostatic Testing

A. The pipeline shall be filled with water, supplied by the Contractor, as directed by the Engineer and the pressure raised to obtain a minimum test pressure of 25 psi for sanitary force main and 150 psi for water service line measured at the highest point of the section of pipeline under test. This test pressure shall be maintained for thirty (30) minutes. Should this test show or cause any defects, such defects shall be remedied by the Contractor and 'the pipe shall be retested by him. This procedure shall be repeated until the test requirements have been met. After the successful completion of the pressure test, the pipe shall be subjected to a leakage test using the same minimum working pressure established for the pressure test, measured at the highest point of the section of pipeline under test, or as specified in the special Provisions. This test shall be of twenty four (24) hours duration during which time the

leakage shall not exceed 0.04 gallons per inch of nominal diameter per hour per 100 feet of line. The Contractor shall make any and all repairs that may be necessary until the leakage test requirements have been met.

B. Concurrent Hydrostatic Tests: The Contractor may elect to conduct the hydrostatic tests using either or both of the following procedures. Regardless of the sequence of tests employed, the results of pressure tests, leakage tests, and disinfection shall be satisfactory as specified. All replacement, repair or retesting required shall be accomplished by the Contractor at no additional cost to the State.

1. Pressure test and leakage test may be conducted concurrently.

2. Hydrostatic tests and disinfection may be conducted concurrently, using the water treated for disinfection to accomplish the hydrostatic tests. If water is lost when treated for disinfection and air is admitted to the unit being tested, or if any repair procedure results in contamination of the unit, disinfection shall be reaccomplished.

C. Disinfection: Before acceptance of potable water operation, each unit of completed water line shall be disinfected as prescribed by AWWA C651. After pressure tests have been made, the unit to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material. The chlorinating material shall be either liquid chlorine, calcium hypochlorite, or sodium hypochlorite. The chlorinating material shall provide a dosage of not less than 50 ppm and shall be introduced into the water lines in an approved manner. In no case will the agent be introduced into the line in a dry solid state. The treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria. Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 25 ppm of free chlorine residual throughout the line at the end of the retention period. All valves on the lines being disinfected shall be opened and closed several times during the contact period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. The Engineer will take samples of water in proper sterilized containers for bacterial examination. The disinfection shall be repeated until tests indicate the absence of pollution for at least two full days. The unit will not be accepted until satisfactory bacteriological results have been obtained.

1300-5 METHOD OF MEASUREMENT

5.1 The length of pipe to be paid for shall be measured in lineal feet along the centerline of pipe in place, completed, and accepted by the Engineer. The several classes, types, and sizes shall be measured separately. All fittings, concrete encasement, concrete thrust blocks, and other incidentals required under this Item shall be included in the footage as typical pipe sections in the pipe being measured.

5.2 The number of fire hydrants, sanitary sewage pump stations, and sanitary sewer manholes to be paid for will be the number of each furnished, installed, completed, tested, and accepted by the Engineer.

5.3 There will be no direct measurement for payment of the work required for the jacked pipe installation of the sanitary sewer crossing of Wilson Point Road. Payment for this work will be on lump sum basis, and shall include the work required between and including the jacking and receiving pits shown on the plans. Sanitary sewer manholes to be installed in the jacking and receiving pits shall be paid for separately as specified elsewhere in this Item.

1300-6 BASIS OF PAYMENT

6.1 Payment will be made at the contract unit price per lineal foot for each kind of pipe of the type and size designated. These prices shall be full compensation for furnishing all materials and for all preparation,

excavation, and installation of these materials; and for all labor, equipment, tools, testing, and incidentals necessary to complete the item.

6.2 Payment will be made at the contract unit price for each fire hydrant, sanitary sewer manhole, and sanitary sewage pump station. These prices shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, testing, and incidentals necessary to complete the item.

6.3 Payment will be made at the contract lump sum price for the Wilson Point Road sanitary sewer crossing. This price shall be full compensation for include costs of locating existing utilities; excavation and support of the jacking and receiving pits, including support of existing utilities, as necessary; jacking and installation of pipe casing, installation and grouting of the sewer pipe; and backfilling and restoration of the pit sites following work; and other incidentals necessary to complete the work in accordance with the provisions of this Item.

Payment will be made under:

Item 1300.1 Water Pipe (4" diameter) -- per lineal foot

Item 1300.2 Water Pipe (8" diameter) -- per lineal foot

Item 1300.3 Water Pipe (14" diameter) -- per lineal foot

Item 1300.4 Fire Hydrant -- each

Item 1300.5 Sanitary Sewer Pipe (1¼" diameter) -- per lineal foot

Item 1300.6 Sanitary Sewer Pipe (4" diameter) -- per lineal foot

Item 1300.7 Sanitary Sewer Pipe (6" diameter) -- per lineal foot

Item 1300.8 Sanitary Sewer Pipe (8" diameter) -- per lineal foot

Item 1300.9 Sanitary Sewer Pump Station -- each

Item 1300.10 Sanitary Sewer Manhole -- each

Item 1300.11 Sanitary Sewer Air Release Valve and Vault -- each

Item 1300.12 Wilson Point Road Sanitary Sewer Crossing -- lump sum

END OF ITEM 1300

PART 1 GENERAL

1.1 REFERENCE

A. All applicable requirements of other portions of the Contract Documents apply to the Work of this Section, including but not limited to Division 1, General Requirements.

1.2 GENERAL

A. Asbestos abatement includes either removal, O&M, repair, enclosure or encapsulation as a single work task or in any combination of tasks.

1.3 DESCRIPTION OF WORK:

A. Removal of all asbestos-containing pipe insulation, duct insulation and floor covering materials from the building identified as Building Number One on the project drawings. Quantities shown on drawings.

B. Removal of all asbestos-containing pipe insulation, duct insulation and floor covering materials from the building identified as Building Number Two on the project drawings. Quantities shown on drawings.

C. Removal of all asbestos-containing pipe insulation, duct insulation and floor covering materials from the building identified as Building Number Three on the project drawings. Quantities shown on drawings.

D. Removal of all asbestos-contaminated materials from all three buildings is required. This includes all materials that can not be completely decontaminated prior to removal from the site.

1.4 REFERENCES

A. All applicable requirements of other portions of the contract documents apply to the Work of this Section.

B. The information contained herein has been compiled from Environmental and Occupational Health and Safety information. The Asbestos Removal Contractor shall bear complete responsibility for worker safety and adherence to all laws, regulations and standards. Neither the Engineer nor his representatives shall be

responsible for the Asbestos Removal Contractor's and/or Subcontractor's Work described in this Section.

All of the regulations and/or publications listed in paragraph 1.8, REGULATORY REQUIREMENTS, form a part of this specification by reference.

1.5 ABATEMENT DEFINITIONS/ABBREVIATIONS

A. Abatement: Procedure to control or otherwise limit fiber release from friable asbestos-containing materials or asbestos contaminated materials. Includes all five methods; removal, encapsulation, enclosure, O&M and repair.

B. Aggressive Sampling: An air sampling technique typically used for final clearance wherein the area and surfaces around the air sample are agitated, brushed, or blown with air jets or mechanical fans, or otherwise disturbed in an effort to resuspend any settled dust and detect the presence of residual asbestos fibers.

C. Air Lock: A system for permitting entrance or exit without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two curtained doorways at least three feet apart.

D. Air Sampling: See Area Monitoring below.

E. Air Monitoring Technician: An independent technician retained by the Engineer fully trained in the air sampling process in accordance with existing regulations who shall conduct air monitoring.

F. Amended Water: Water containing a wetting agent or surfactant.

G. Asbestos: A class of magnesium-silicate minerals that occur in fibrous form. Minerals that are included in this group are Chrysotile, Crocidolite, Amosite, Anthophylite asbestos, Tremolite asbestos, and Actinolite asbestos.

H. Asbestos-Containing Building Material (ACBM): Material composed of asbestos of any type and in any amount greater than one percent by weight, either alone or mixed with other fibrous or nonfibrous materials used in the construction of the structure and/or the protection of the structure from fire hazard.

I. Asbestos-Containing Material (ACM): Material composed of asbestos of any type and in an amount greater than one percent by weight, either alone or mixed with other fibrous or nonfibrous materials.

J. Asbestos-Contaminated Material: Any materials, substances or item impregnated or coated (no matter how lightly) with asbestos fibers.

K. Asbestos Fibers: A particulate form of asbestos, tremolite, anthophylite or actinolite, 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

L. Asbestos Filtration Device (HEPA Negative Air Filtration System): Filtered exhaust ventilation equipment used for drawing air from inside containment/regulated work areas. Such equipment must have at least three filter stages, including readily accessible pre-and secondary filters, and a final filter which must be a High Efficiency Particulate Air (HEPA) filter rated 99.97% effective in capturing particles having diameters of 0.3 micrometers or greater.

M. Asbestos Removal Contractor/Contractor: An Asbestos Removal Contractor with a valid license, certification or registration issued by a governmental authority of the State in which the Work is to be performed, to perform directly or indirectly in any asbestos hazard abatement activity.

N. Area Monitoring (Air Sampling): Sampling for asbestos fiber concentrations in the air within the regulated/containment area and outside the regulated/containment area which is representative of the airborne concentrations of asbestos fibers which may reach the breathing zone.

O. Barrier: Polyethylene sheeting and/or other materials which, when used in conjunction with the existing floors, ceilings, and walls of the structure, form the containment/regulated area. The barrier separates the contaminated work environment from the uncontaminated environment.

P. Clean Room: An uncontaminated room outside the containment/regulated area, but adjacent to, with provisions for storage of worker's street clothes and protective equipment.

Q. Curtained Doorway: Device to allow entrance or exit from one room to another while restricting air movement between the rooms. Two Curtained Doorways should be spaced a minimum of three feet apart to form an Air Lock.

R. Decontamination Area: An enclosed area adjacent to or connected to the regulated area and consisting of an equipment room, shower area, and clean room which is used for decontamination of workers, materials and equipment.

S. Disposal: All specified procedures necessary to transport and deposit the ACM or asbestos-contaminated waste materials removed from a building to an approved waste disposal site in compliance with existing Sections 61.152 and .156 of the EPA Regulations (40 CFR 61), and Sections 172.101 and 173.1090 of the DOT Regulations (40 CFR), or such other or additional regulations as may be in force.

T. Encapsulant: A liquid material which can be applied to ACM which controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant).

U. Encapsulate: The process whereby an encapsulant is applied to ACM to control the release of asbestos fibers into the air.

V. Enclosed Regulated Area: A regulated area which has been isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris. A local exhaust system is required.

W. EPA (U.S. EPA): United States Environmental Protection Agency.

X. Equipment Room (Change Room): A room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

Y. Fibers: A slender and greatly elongated natural or synthetic filament (such as wool, cotton, asbestos, gold, glass, or rayon) typically capable of being spun into yarn.

Z. Friable Asbestos Material: Material that contains more than one percent asbestos by weight which can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

AA. Glovebag Technique: A method with limited applications for removing small sections of asbestos-containing material from short piping runs, valves, joints, elbows, and other nonplanar surfaces in a noncontained regulated area. The glovebag assembly is a manufactured or fabricated device consisting of a

glovebag (constructed of 6 mil transparent polyethylene or polyvinylchloride plastic), two inward projecting longsleeve gloves, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or material to be removed and contains all asbestos fibers released during the removal process.

BB. HEPA Negative Air Filtration System: High efficiency particulate air (HEPA) filtered exhausting equipment with a UL 586 filter system capable of collecting and retaining asbestos fibers. Filters shall be of 99.97 percent efficiency for retaining 0.3 micrometer diameter particles. (This system also applies to HEPA vacuuming equipment).

CC. HVAC: Heating, ventilating and air conditioning; all building mechanical equipment including supply and return ductwork, unit ventilators, fan-coil units, blower cabinets and fans, control devices, damper assemblies and other similar mechanical equipment.

DD. Independent Testing Laboratory: A qualified organization capable of performing air sampling analysis (PCM) or (TEM) and bulk sampling analysis (PLM) with no affiliation with Asbestos Removal Contractor or Engineer and in possession of an EPA interim accreditation as a minimum and/or NIOSH certification.

EE. Lagging: Thermal insulation used to prevent heat loss or condensation from pipes, boilers and similar mechanical equipment. The insulation may be covered with a metal jacket.

FF. NIOSH: National Institute for Occupational Safety and Health.

GG. Non-friable asbestos material is considered hazardous during removal and disposal procedures.

HH. OSHA: United States Department of Labor, Occupational Safety and Health Administration.

II. Permissible Exposure Limit (PEL): An airborne concentration of asbestos of 0.1 fiber (longer than 5 micrometers) per cubic centimeter of air as an 8-hour time weighted average.

JJ. Phase Contrast Microscopy (PCM): A method of counting fibers through air sampling, regardless of composition, using NIOSH Method 7400 procedures and counting only fibers equal to or longer than 5 micrometers with a

length-to-diameter ratio equal to or greater than 3:1. The microscope shall be equipped with a blue or green filter, 8 to 10X eyepiece, and 40 to 45X phase objective (total magnification ca 400X); numerical aperture: 0.65 to 0.75.

KK. Personal Monitoring: Sampling of asbestos fiber concentrations within the breathing zone of an employee. The responsibility of the Contractor.

LL. Polarized Light Microscopy (PLM): A method of identifying minerals through the use of a light microscope equipped with two polarizing filters to observe specific optical characteristics of the sample. This method is used to analyze asbestos bulk samples.

MM. Prior Experience: Experience required of the Asbestos Removal Contractor/Subcontractor on asbestos projects of similar nature and scope to insure capability of performing the asbestos removal in a satisfactory manner. Similarities shall be in areas related to material composition, project size, number of employees and the engineering work practice and personal protection controls required.

NN. Regulated/Containment Areas: Established work areas where airborne concentrations of asbestos, exceed or can reasonably be expected to exceed the asbestos permissible exposure limit prescribed above in Paragraph 1.04.II in this section.

OO. Removal: All specified procedures necessary to gather, enclose in polyethylene bags and/or sealed drums, and make ready for disposal all removed ACM or asbestos-contaminated material.

PP. Surfactant: A chemical wetting agent added to water to reduce its surface tension and thereby improve its penetrating capabilities into ACM.

QQ. Transmission Electron Microscopy (TEM): A method of identifying asbestos fibers collected through air sampling using a 80-120kV transmission electron microscope capable of performing electron diffraction with a fluorescent screen inscribed with calibrated gradations.

RR. Thermal System Insulation (TSI): Material applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.

SS. Wash Room (Shower Room): A shower room between the Clean Room and the Decontamination room of the decontamination area with facilities for showering and equipment cleaning.

TT. Wet Cleaning: The process of removing ACM residual debris or asbestos-contaminated material from building surfaces, equipment, objects, tools, disposal containers, etc. This may be accomplished by washing with cloths, mops, sponges, or brushes, or by showering with water in the Wash Room.

1.6 DESCRIPTION OF ABATEMENT

A. The Work in this Section shall include providing all labor, equipment, materials, appurtenances, and incidental required for the complete removal, containment, transporting, and disposal of ACM as listed in Paragraph 1.2A, SUMMARY, to include the cleaning/decontamination and/or collection and disposal of adjacent materials which may become contaminated during the removal process.

B. The total quantity of asbestos containing material and/or other potentially contaminated materials shall be field verified by the Asbestos Removal Contractor through the pre-bid walk through and inspection prior to bidding the project. The cost for the removal and possible replacement of specified materials or items shall be derived through this walk through quantitative survey of existing conditions and a thorough examination of the project sketches and documents. That total cost shall not be increased if during the process of Work the Asbestos Removal Contractor decides that additional removal or replacement covered by this Scope of Work must occur in the work areas.

C. The surfaces which were in contact with the removed asbestos containing material yet remaining after removal shall be cleaned until no visual debris is evident, then encapsulated with an encapsulant creating a lock down membrane over the entire surface. The encapsulant shall be reviewed for conformance by the Engineer prior to any application.

D. The Asbestos Removal Contractor shall provide all items in accordance with this Paragraph.

1. The Asbestos Removal Contractor shall secure the immediate work area(s) during work periods for the duration of the Project as required by either the General Conditions, Specifications, federal and state regulations governing asbestos removal and disposal, and OSHA requirements. The Asbestos

Removal Contractor is totally responsible for all safety and security of Asbestos Removal Contractor equipment.

2. Transfer of the removed asbestos material from the building to the transporting vehicle shall be accomplished through the nearest exit. The proposed exits to be used shall be reviewed by the Engineer for acceptability prior to usage. No other exits will be used without prior written acknowledgement of the Engineer, except for emergency situations. The Asbestos Removal Contractor shall be responsible for controlling both vehicle and pedestrian traffic without endangering other personnel and/or the public during the transferring of ACM.

3. The Asbestos Removal Contractor shall seal off areas of the building acknowledged by the Engineer and proceed with work allowing only authorized personnel directly involved in the removal of asbestos to enter.

E. Project Log

1. The Asbestos Removal Contractor shall maintain a daily Project Log. The log shall be used each day of the project to record the following information:
   a. Name of project superintendent, air monitoring technician, and actual time physically on job for both persons.
   b. Brief description of daily Work accomplishments.
   c. Listing of all employees on the job.
   d. Description of any significant events, incidents, or unusual occurrences, including but not limited to, deviations of plans, contract requirements, or specifications noted Engineer, Oversight Inspector, Air Monitoring Technician, or Asbestos Removal Contractor representative, emergencies, accidents or dangerous conditions, and steps taken to assure continued security of the Work area.

2. The log will also include copies of routine inspection reports, results of air monitoring and analysis, project minutes, chain-of-custody forms and any other routine documents relating to project activities. The log for the project will be made immediately available for inspection by the Engineer.
3. At the completion of the project, the Asbestos Removal Contractor shall forward two (2) copies of the project log to the Engineer.

F. Project Visitor's Log: The Asbestos Removal Contractor shall maintain a Project Visitor's Log which will contain the following as a minimum.

1. Signatures with date and time, by all visitors including the Engineer, private or governmental inspectors, and Asbestos Removal Contractor representatives not involved in the daily removal activities.

2. All visitors who, for any reason, enter the regulated area, reason for entry, date and duration of time in the Work Area, activities in Work area, safety precautions used and safety equipment used.

3. Submit two (2) complete copies to the Engineer upon completion of the Project.

1.7 SUBMITTALS

A. All submittals shall conform completely to the requirements of the Contract Documents, including all requirements set forth in this and other Sections.

B. All prospective Asbestos Removal Contractors shall submit for approval, and as a condition under the Contract, the following documentation:

1. A notarized letter from an officer of the organization stating that the prospective Asbestos Removal Contractor is thoroughly familiar with Federal and State EPA, OSHA, NESHAP, and other institutional requirements for removal, handling, transporting, and disposal of asbestos hazardous materials.

2. Proof of successful completion of at least three (3) similar projects. The proof or documentation shall include:
   a. Description of projects.
   b. Size and duration of projects.
   c. Project references.
   d. All State certification requirements as applicable.
   e. Statement of Performance Bond Eligibility.

3. Records to indicate that the asbestos hazardous material from at least three (3) previous projects have been properly disposed of at an EPA approved and licensed landfill. The site must be authorized by the authority having jurisdiction to receive such wastes.

4. Records indicating that the prospective Asbestos Removal Contractor has knowledge or experience in proper engineering techniques, i.e., cocooning,

HEPA exhausts filtration, air locks, etc. needed to contain asbestos and prevent the release of fibers.

C. Prior to commencing work and as a condition under the Contract, the Asbestos Removal Contractor shall document with the Certificate of Worker's Acknowledgement through the submittal process, the proof that Asbestos Removal Contractor's employees have:

1. Passed required medical examination.
2. Attended and successfully completed worker training course.
3. Been fitted, tested and trained in the use and maintenance of the respirator equipment.

No worker shall be permitted to work on this Project unless a properly documented Certificate of Worker's Acknowledgement has been signed by the worker and submitted for him. A copy of this Certificate is attached at the end of this Section.

D. The Asbestos Removal Contractor must have satisfactorily performed the removal of asbestos from buildings on at least three projects where the volume of materials removed was equal to or greater that for this project. Submit with the bid, the name, address and telephone numbers of the Engineer and EPA representative for each of the three projects for verification that the removal was performed in full compliance with all EPA and U.S. Department of Labor, OSHA required procedures.

E. Prior to commencing Work at the Project, the Asbestos Removal Contractor shall meet with the Engineer to discuss the details of the air monitoring program.

F. Plan of Work Procedure

1. The Asbestos Removal Contractor shall submit to the Engineer before proceeding with the Project, a detailed plan of the Work procedures to be used in the removal and/or demolition of materials containing asbestos. The plan shall include but not be limited to the following:
   a. Plan overview of asbestos removal.
   b. Details of all equipment to be used, including negative pressure equipment, filters, showers, change rooms, clean rooms, disposal drums or containers, water filters and other miscellaneous items.
   c. Sequence of operation for the scheduling of each work area, and a detailed schedule of Work within each building or work area that shall meet the constraints specified in Paragraph 1.5.F, and the Contract requirements.

d. Documentation of records, including health records of all personnel involved in the removal of asbestos, data on site for disposal, name of air monitoring analytical laboratory, and copies of letters of notification of intended asbestos removal to all Federal, State, or local regulatory agencies having jurisdiction within that State, as required.

e. A detailed narrative description of how the Work is to be accomplished. This shall include a description of any sealed areas, negative pressure equipment and filters, location of decontamination rooms, showers, change rooms, and associated access, methods of actual asbestos removal, methods of encapsulation, cleanup, routing of asbestos and all other operating procedures.

f. Provide a detailed health and safety plan to include all clothing, respirators, masks and filters and other equipment to be used by personnel that will be exposed to asbestos fibers. Provide details of the worker educational training programs. Provide a listing of all worker procedural and safety requirements.

g. Limits of operational parameters, including friable asbestos fibers concentrations inside and outside work areas, negative pressure limits within any enclosures and on site storage limits of asbestos containers.

h. Emergency procedures in the event the air monitoring outside of any work area should indicate asbestos fiber levels exceeding the allowable limit.

2. This plan shall be sent to the Engineer before starting the Project. This submittal shall be in accordance with submittal requirements. The plan shall be either accepted or rejected for compliance with regulations.

G. Asbestos Removal Contractor's Compliance Data

1. Asbestos Removal Contractor shall submit to the Engineer within four (4) days after load-out, an original copy of the chain-of-custody forms signed by the disposal site operator evidencing acceptance of the waste ACM.

2. At completion of the Work the Asbestos Removal Contractor shall submit to the Engineer two (2) copies of the personnel air monitoring data compiled during the Work. The format shall be: air monitoring form, air sampling log, laboratory results, equipment used data, and calibration data all bound in a complete packet.

1.8 REGULATORY REQUIREMENTS

A. The regulations and publications listed in the following paragraphs are hereby incorporated into this specification.

B. Code of Federal Regulations (CFR)

1.	29 CFR 1910.20	Access to Employee Exposure and Medical Records
2.	29 CFR 1910.145	Specifications for Accident Prevention Signs and Tags
3.	29 CFR 1910.134	Respiratory Protection
4.	29 CFR 1910 (Subpart 2)1001	Toxic and Hazardous Substances (US OSHA)
5.	29 CFR 1910.120	Hazardous Communications Regulations
6.	29 CFR 1926.1101	Asbestos, Tremolite, Anthophylite, and Actinolite
7.	29 CFR 1926.1-.1051	Construction Industry Safety & Health Standards (US OSHA)
8.	40 CFR 61, Subpart A & B	General Provisions
9.	40 CFR 61, Subpart M	National Emission Standard for Asbestos
10.	40 CFR 241	Guidelines for the Land Disposal of Solid Wastes
11.	40 CFR 257	Criteria for Classification of Solid Waste Disposal Facilities and Practices

12.	Parts 1 & 2	Asbestos-Containing Materials in School Buildings - EPA
13.	EPA560/5 - 83-002	Guidance for Controlling Friable ACM in Buildings
14.	COMAR 26.11.21	Maryland State Department of the Environment Control of Asbestos

C. American National Standards Institute (ANSI)

1.	Z9.2-79	Fundamentals Governing the Design and Operation of Local Exhaust Systems
2.	Z88.2-80	Practices for Respiratory Protection

D. National Institute of Occupational Safety and Health (NIOSH)

1. Manual of Analytical Methods, 2nd Ed., Vol. 1, Physical and Chemical Analysis Method (P&CAM):

2.	Method 7400	Fibers (N1, 3rd Ed., Vol. 1)

3. Respiratory Protection - An Employer's Manual & Respiratory Protection - A Guide for the Employee

E. U.S. Department of Transportation

1.	CFR Title 49 Parts 172.101 & 173.1090	Hazardous Material Regulations

F. Underwriters Laboratories, Inc. (UL) Publications

1.	586-77 (R 1982)	Test Performance of High Efficiency, Particulate, Air Filter Units

G. Other Regulations: All other federal, state, county, municipal, and local statutes, ordinances, regulations, or rules pertaining to asbestos, including its abatement, storage, transportation and disposal; construction safety and health and hazard communication (worker right-to-know), and contractor or other licensure, certification and regulation, which are now in effect or which may come into effect prior to project completion.

1.9 SPECIAL WARRANTY (Not Used)

1.10 COORDINATION AND SCHEDULING

A. All Work within a regulated area of the building not related to asbestos removal shall cease except for plant operation required to be maintained for which provisions shall be made during asbestos removal operations as specified.

B. The work site shall be made available to authorized government personnel who have authority to inspect the work site and to conduct inspections and make tests for EPA and OSHA compliance. The work site may also be visited by the Engineer, State regulatory personnel or the State Industrial Commission.

1.11 JOB CONDITIONS

A. Dress and Equipment (Minimum Requirements)

1. Workers shall wear disposable, full-body coveralls and disposable head covers in the work area. Footwear may be disposable. Non-disposable footwear shall be left in the work area at all times until disposal at job completion. **Hard hats shall be worn.**

2. According to OSHA CFR Title 29, Section 1910.1001, SEC, Engineering Controls are required to meet exposure limits. For this reason, air cleaning mechanisms are required to minimize airborne fibers.

3. The Asbestos Removal Contractor shall screen workers to determine if they are able to perform the work and wear respirators, and shall also instruct and train his employees in the need for and the method of performing proper work practices. The Asbestos Removal Contractor shall supervise these work practices to assure compliance. The respirator face piece must trap no facial hair.

4. In accordance with NIOSH, OSHA and ANSI Regulations, the respirator program must include of the following information:
   a. Single use, disposable respirators are prohibited.
   b. Employee training covering the hazards of asbestos, respiratory protection and decontamination procedures.
   c. Daily personal monitoring of the most highly exposed worker in accordance with the "EPA Guidance Document," page 47, Personnel Monitoring.

d. Powered air purifying respirators with high efficiency purifying filters (NIOSH Type H) shall be worn by all workers during all phases of gross removal (abatement).

e. Medical exams consisting of, at a minimum, chest X-rays, pulmonary function tests, and history of respiratory disease.

5. The Asbestos Removal Contractor's employees shall be instructed on the dangers of asbestos exposure, on respirator use, decontamination, and OSHA Regulations. The Asbestos Removal Contractor shall supervise work practices to assure compliance with regulations.

B. Change Rooms

1. Provide, as a minimum, a temporary or portable unit with a separate decontamination room and a clean room for personnel required to wear whole body protective clothing. Provide areas for storage of clothing for each asbestos worker. Keep street clothing and street shoes in the clean areas. Workers shall be free of asbestos fibers prior to entering the clean area. Method of decontamination shall be reviewed for compliance by the Engineer. Locate showers between the decontamination room and the clean room and require all employees to shower before changing into street clothes. Clean asbestos contaminated work clothing in accordance with 29 CFR 1910.1001. Unit shall be attached to the individual work site isolated area in accordance with regulations. The unit shall be checked for compliance by the Engineer's Representative.

2. Eating or smoking by Asbestos Removal Contractor's and Engineer's personnel or others shall not be allowed within the regulated areas, including adjacent change rooms. The only movement allowed by personnel from the regulated area, including decontamination room to the clean area, shall be through a shower. Entering or exiting through a disposal or equipment decontamination structure by any personnel shall not be allowed.

PART 2 PRODUCTS

2.1 EQUIPMENT/MATERIALS

A. Furnish Engineer with properly fitting, disposable protective clothing as required for use by the Engineer.

B. Respirators: Select respirators approved by the Mine Safety and Health Administration (MSHA) and the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing asbestos fibers. Provide personnel engaged in the removal or demolition of pipes, structures, or equipment covered or insulated with asbestos, or in the removal or demolition of asbestos, or in the removal or demolition of asbestos insulation or covering, with respirators as presented in 29 CFR 1926.58.

Types of Allowable Respirators	Fibers Longer Than 5 Micrometers Per Cubic Centimeter of Air
Reusable half-mask air purifying*, powered air purifying*, or Type C supplied air, continuous flow or pressure demand class	Less than 2.0
Powered air purifying*, or Type C supplied air, continuous flow or pressure demand class	2.0 - 20.0
Type C supplied air, continuous flow or pressure demand class	Greater than 20.0

* Air purifying respirators must be equipped with HEPA filters.

C. Special Clothing: Furnish personnel exposed to airborne concentrations of asbestos fibers with disposable protective whole body clothing, head coverings, gloves, and foot coverings as required for the particular work process. Furnish disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Use tape to secure sleeves at the wrists and to secure foot coverings at the ankles.

D. Change Rooms: Provide a temporary unit with a separate decontamination room and a clean room for personnel required to wear whole body protective clothing. Locate showers between the decontamination room and the clean room.

E. Eye Protection: Provide goggles for personnel engaged in asbestos operations when the use of a full face respirator is not required, such as disposal container loadout.

F. Warning Signs and Labels

1. Provide warning signs at approaches to regulated areas containing airborne asbestos fibers. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Providd signs in all relevant languages.

2. Warning Signs: Provide warning signs that are of sufficient size (minimum 14" x 20") to be clearly legible and display the following information:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

3. Warning Labels: Provide labels of sufficient size (minimum 3" x 5") to be clearly legible, printed in large, bold letters on a contrasting background, and displaying the following legend:

CANCER AND LUNG DISEASE HAZARD
DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST

G. Negative Pressure Differential: Provide a negative pressure differential in the regulated area. Filters on vacuums and exhaust equipment shall be UL 586-labeled HEPA filters. Negative pressure equipment shall be sufficient to maintain a minimum pressure differential of minus 0.02 inch of water column relative to adjacent, unsealed areas. The negative pressure system shall be operated continuously, 24 hours a day, until the regulated area enclosure is removed. Replace filters as required to maintain the efficiency of the system. The building HVAC system shall not be used as the exhaust system for the regulated area.

H. Air Circulation in the Work Area: For the purposes of this Section, air circulation refers to either the introduction of outside air to the work area or the circulation and cleaning of air within the work area. The Asbestos Removal Contractor is responsible for determining air circulation requirements,

specifically calculating the number of air filtration devices necessary to meet the required four (4) air changes per hour. The Asbestos Removal Contractor is also responsible for having at least one (1) additional air filtration device for each active work area as back-up in case of equipment failure or breakdown.

I. Tools and Equipment

1. Airless Sprayer: An airless sprayer, suitable for application of encapsulating material, shall be used.

2. Scaffolding: Scaffolding, as required to accomplish the specified work, shall meet all applicable safety regulations.

3. Transportation Equipment: Transportation equipment as required, shall be suitable for loading, temporary storage, transporting , and unloading of contaminated waste without exposure to persons or property.

4. Vacuum Equipment: All vacuum equipment utilized in the work area shall utilize HEPA filtration systems.

5. Water Sprayer: The water sprayer shall be an airless or other low pressure sprayer for amended water application.

6. HEPA filtration units efficient to 99.97% for 0.3 micron particles.

7. Other Tools and Equipment: The Asbestos Removal Contractor shall provide all other suitable tools for the stripping, removal, encapsulation, and disposal activities including but not limited to: knives, brushes, sponges, shovels, brooms, carts, etc..

J. Materials

1. Encapsulants: The encapsulating agent shall meet the following criteria:
   a. They shall withstand environmental impact or abrasion and protect the encapsulated surface.
   b. Encapsulants selected for use by the Asbestos Removal Contractor shall be one of those demonstrating effective performance under tests conducted by an independent testing laboratory and reviewed by the Engineer for compliance.
   c. They shall have high flame retardant characteristics, and a low toxic fume and smoke emission rating.

d. They shall not be noxious or toxic to application workers, or subsequent workers in the area.
e. They shall have some permeability to water vapor to prevent condensation accumulation, and resist solution by common cleaning agents.
f. They shall be water insoluble when cured.
g. They shall have acceptable weathering and aging characteristics.
h. They shall be acceptable by architectural standards.
i. They shall be compatible with all insulating material or coating systems that may be applied to the stripped surfaces.
j. They shall be demonstrably capable of adhering to the surfaces of the substrate such as steel, plaster, ductile iron, base plaster, etc.
k. They must contain a light tint to distinguish between encapsulated and non-encapsulated areas. (Food coloring is not acceptable.)
l. Encapsulants must be compatible with surface material applied to and replacement materials to be applied thereover.
m. Manufacturer:
    1) Arpin Products, Inc., Asbury Park, NJ.
    2) Better Working Environments, Inc., Carson City, NV.
    3) Certified Technologies Corporation, Eden Prairie, MN.
    4) Fiberlock Technologies, Inc., ABC Encapsulating Compound.
    5) Or Equal.

2. Surfactant: As a minimum the surfactant shall be 50% polyoxyethylene ether and 50% polyglycol ester, equal to Aqua-Grow Corporation of New Jersey. Mix according to manufacturer's written instructions.

3. Construction Materials: Lumber, nails, hardware, shower stalls, hoses, plumbing, drain pans, sump pumps, storage drums, etc.

4. Sheeting, Glue and Duct Tape: Sufficient quantities of 6 mil, flame retardant polyethylene, glue, and duct tape to perform all required sealing, regulated area construction, and wrapping of specific waste.

PART 3 EXECUTION

3.1 WORK PROCEDURES

A. Perform asbestos removal work in accordance with 29 CFR 1926.58 and as specified herein. Use wet removal procedures. Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking,

drinking, chewing tobacco or chewing gum shall not be permitted in the regulated area. Personnel of other trades not engaged in the removal and disposal of asbestos shall not be exposed at any time to airborne concentrations of asbestos in excess of 0.01 fibers unless the personnel protection provisions of this specification are complied with by the trade personnel. Protect by wrapping with polyethylene or temporarily disconnect electrical service when wet removal is performed and provide temporary electrical service protected by a ground fault circuit interrupter if electrical service is disconnected.

B. Furnishings: Furniture and non-attached equipment shall be removed from the area of work by the Asbestos Removal Contractor before asbestos removal begins, carefully storing in a location designated by the Engineer, and replaced by the Asbestos Removal Contractor at the completion of the Work in that individual area.

C. Enclosed Regulated Area Requirements - Masking and Sealing

1. Seal openings in areas where the release of airborne asbestos fibers could occur. Establish a regulated area with the use of curtains, portable partitions, or other enclosures in order to prevent the escape of asbestos fibers from the contaminated area. The established regulated area shall be provided with protective covering of walls with a continuous membrane of two layers of minimum 6-mil plastic sheet sealed with tape to prevent water or other damage and three layers of 6-mil plastic sheet over floors extending a minimum of 24 inches up walls. All penetrations of the floor, walls, and ceiling shall be sealed with 6-mil polyethylene plastic and duct tape. Seal joints using spray adhesive and duct tape. Openings will be allowed in enclosures of regulated areas for the supply and exhaust of air for the Local Exhaust System.

2. Decontamination Area: Construct a three (3) chambered decontamination area consisting of the units defined. The area shall be connected to the regulated area. All waste water from the shower room shall be filtered in accordance with current regulations before discharge.

3. Debris Port: Construct a debris removal chamber adequate for container sizes utilized in accordance with current regulations.

D. Removal of Building Components

1. After isolation of regulated area as described in previous sections and initiation of negative pressure ventilation, remove any building components required to be saved or for gaining access from within the work area, carefully. If components are to be reused, vacuum them with a HEPA filtered vacuum cleaner and carefully damp sponge and wrap cleaned components in 4 mil polyethylene sheeting and seal with tape. Store as designated by Engineer outside of the work area. If components are to be discarded it is not necessary to clean them, but wrap in a similar fashion and stage for disposal in the waste containers pass-out airlock.

2. If during any component removal operation a major release episode occurs, the Asbestos Removal Contractor shall immediately notify the Engineer and implement response actions in accordance with current regulations and the personnel protective provisions of this specification.

3. Upon complete removal of all component systems, abatement of asbestos-containing materials specified in this specification may be accomplished.

E. Asbestos Handling Procedures

1. General Procedures: Sufficiently wet the asbestos material with a fine spray of amended water during removal, cutting, or other handling to reduce the emission of airborne fibers. Remove material and immediately place in plastic disposal bags. Where unusual circumstances prohibit the use of plastic disposal bags, the Asbestos Removal Contractor shall submit, in the asbestos plan, an alternate proposal for removal of asbestos materials and containment of asbestos fibers. (Such as double wrap with 6 mil polyethylene for non-friable transite panels.)

2. Glovebag Removal: This procedure is principally for removal of pipe insulation in areas where other methods of asbestos removal can be avoided. Employee protective equipment is required, but only as a safeguard against an accidental bag puncture, defective bag failure, or similar adverse event.
   a. Asbestos Removal Contractor shall seal off all exits and entries to work area with 6-mil plastic including windows, vents and access doors.
   b. Asbestos Removal Contractor shall establish and construct an air-lock near the door assigned by the Engineer, for exit and entry into work area.

c. Any furniture or fixtures unable to be removed shall be covered with 6-mil plastic.
d. Lay down one layer of 6-mil plastic as a drop cloth beneath area being removed as a safety measure. Drop cloth shall be disposed of as contaminated waste.
e. Prior to installation of glovebag, the tools necessary for removal shall be put into the glovebag tool pouch to avoid the reopening of glovebag during removal process for additional tools.
f. Wet wipe everything in area for glovebag use.
g. Wrap glovebag around area of removal, fold excess top edges over and staple (or close zipper, depending on bag type). Seal top edge and side cuts with duct tape or locking straps. Ensure that top edge and sides (including over insulation area), are fastened together so that an airtight seal is formed.
h. Insert nozzle of sprayer in glovebag and seal around nozzle with tape. Sprayer shall not be removed until removal of glovebag.
i. Seal the outside edges of the glovebag with duct tape for double protection against breaking the seal of the bag.
j. Following removal of insulation material, insure that all visible material is inside bag.
k. Spray all tools in glovebag while glovebag is still attached.
l. Properly seal glovebag, remove the glovebag from the pipe, and place in a second impermeable bag.
m. Wet wipe and wash all tools and removal area thoroughly.
n. Dispose of bag in labeled waste drum or other approved container.
o. Clean-up in accordance with Article 3.2 of this Section.

F. Non-Friable Asbestos Materials

1. Sufficiently wet asbestos material with a fine spray of amended water during removal or other handling to reduce the emission of airborne fibers. Abrading, sanding, drilling, cutting, or machining of these materials is prohibited unless approved by the Engineer. Do not allow excessive water to accumulate in the work area. Keep all removed material wet enough to prevent fiber release until it can be containerized for disposal. Every effort should be made to perform this removal work during non-freezing periods. However, if work area temperatures are below 32°F and amended water is subject to freezing, the addition of ethylene glycol in amounts sufficient to prevent freezing is permitted. All residual water shall be collected and filtered in accordance with regulations before discharge.

2. Asbestos-containing material shall be removed in manageable sections. Removed material shall be containerized before moving to a new location for continuance of work. Surrounding areas shall be periodically sprayed and maintained in a wet condition until visible material is cleaned up.

3. Asbestos-containing material removed from the building shall not be dropped or thrown to the floor. Material should be removed as intact sections whenever possible and carefully lowered to the floor. Asbestos materials in open containers shall be kept wet at all times.

4. Containers (drums or 6-mil polyethylene bags or wrap) shall be sealed when full. Wet material will be heavy and double bagging or wrapping of waste material is required. Bags, if used, shall not be overfilled. They should be securely sealed to prevent accidental opening and leakage by tying tops of bags in an overhand knot or by taping in gooseneck fashion. Do not seal bags with wire or cord. Bags shall be placed in drums for staging and transportation to the disposal site. Bags shall be decontaminated on exterior surfaces by wet cleaning before being placed in clean drums and sealed with locking ring tops. Where unusual circumstances prohibit use of plastic disposal bags or drums, the Asbestos Removal Contractor shall submit, in the asbestos plan, an alternate proposal for removal, containerizing, and disposal of the asbestos materials and fibers.

5. Asbestos containing or contaminated waste with sharp edged components (e.g. nails, screws, metal lath, tin sheeting) that could otherwise tear polyethylene bags shall be placed directly into drums for disposal.

G. Air Monitoring: Monitoring of airborne concentrations of asbestos fibers shall be in accordance with 29 CFR 1926.58 and as specified herein.

1. The Asbestos Removal Contractor shall perform exposure monitoring in compliance with OSHA regulations for his employees.

2. The Asbestos Removal Contractor shall keep a log of exposure monitoring activities he performs, and an updated copy of the log shall be submitted to the Engineer at the end of each work week. A complete log of air samples and results shall be submitted to the Engineer at the completion of the Project.

3. It is the Asbestos Removal Contractor's responsibility to furnish and maintain exposure monitoring equipment required. The Asbestos Removal Contractor shall bear costs in connection with exposure monitoring and reporting required.

4. The Engineer may procure personal air samples of Asbestos Removal Contractor's or Engineer's employees to measure work area exposures. If the air monitoring in the work area indicates a fiber concentration above one-tenth of a fiber per cubic centimeter (0.1 f/cc) TWA_8 or one fiber per cubic centimeter (1.0 f/cc) for a 30 minute period, the Asbestos Removal Contractor shall implement appropriate engineering controls in an attempt to reduce concentrations to or below this level.

5. The Engineer may perform air monitoring outside of and adjacent to the work areas. If these measurements indicate contamination outside of the work area from asbestos hazard abatement work, the Engineer may notify the Owner to direct the Asbestos Removal Contractor to immediately cease operations until the presence of contamination is verified and corrected to the satisfaction of the Engineer. The Asbestos Removal Contractor shall resume asbestos operations only upon receiving written authorization from the Engineer.

6. The Asbestos Removal Contractor shall facilitate and cooperate fully with air monitoring performed per this Section, and shall take no action intended to distort or falsify measurements of fiber concentrations and shall not interfere with these air monitoring activities. In the event that the Asbestos Removal Contractor fails to comply with these provisions, the Engineer may notify the Owner to direct the Asbestos Removal Contractor to stop work.

7. Sampling and analytical work performed shall be in conformance with NIOSH Method 7400 for work area monitoring and personal air monitoring.

8. Copies of air monitoring records performed by the Engineer will be submitted to the Asbestos Removal Contractor on a weekly basis.

9. It is the Engineer's responsibility to furnish and maintain air monitoring equipment and supplies in connection with monitoring, testing, and reporting performed. The Owner shall bear these costs except to the extent

that the air monitoring indicates contamination due to the Asbestos Removal Contractor's work.

10. For the purpose of final clearance testing at completion of work area decontamination or as otherwise specified, the Engineer will procure air samples for phase contrast microscopy (PCM) analysis per NIOSH Method 7400.
    a. If analysis by PCM indicate that the concentration of fibers in and of these samples exceed the limit of quantification for PCM (0.01 f/cc), the Asbestos Removal Contractor shall continue to air and surface clean the work area interior until air monitoring has indicated that fiber concentrations have fallen below this limit.

11. The Asbestos Removal Contractor shall provide at least two, 20 amp, 120 VAC electrical circuits for Engineer's use during clearance sampling.

12. The Engineer will bear costs in connection with the initial air sampling and reporting required. The Asbestos Removal Contractor shall bear subsequent air sampling and reporting costs ($25 per PCM sample procured) accrued if the 0.01 f/cc limit is exceeded on the initial sampling.

H. Site Inspection: While performing asbestos removal work, the Asbestos Removal Contractor shall be subject to on-site inspection by the Engineer who may be assisted by safety or health personnel. If the Work is in violation of specification requirements or Federal requirements, the Engineer will issue a stop work order to be in effect immediately and until the violation is corrected. Standby time and expenses required to correct the violation shall be at the Asbestos Removal Contractor's expense.

I. Encapsulate

1. After the asbestos material has been removed to the greatest extent possible all permanent exposed surfaces shall be coated with an approved encapsulant to permanently bind (lock down) any remaining fibers in place. Encapsulant shall be applied by airless sprayers and in accordance with manufacturer's recommendations.

2. The encapsulant shall have an adequate tint to easily distinguish between sections encapsulated and sections not encapsulated.

3. As a minimum the following surfaces shall be encapsulated after the asbestos-containing material has been removed.
   a. The edges of the metal framing that were in contact with any transite wall partitions or bakelite counter tops.
   b. The HVAC ducting exposed from the removal operation.
   c. The piping exposed from the removal operation.
   d. The plaster ceiling or wall exposed from the removal operation.
   e. All other non-asbestos materials that were in contact with asbestos-containing materials.

3.2 CLEANUP AND DISPOSAL

A. Cleanup: Maintain surfaces of the regulated area free of accumulations of asbestos-containing material. Restrict the spread of dust and debris; keep waste from being distributed over the general area. Do not dry sweep or blow down the space with compressed air. Clean all surfaces in the work area and other contaminated areas with water and/or HEPA vacuum equipment. After cleaning the work area, allow 24 hours for settlement of dust and wet clean or clean again with HEPA vacuum equipment all surfaces in the work area. When asbestos removal, disposal, and cleanup are complete the Engineer will visually inspect the affected surfaces for residual asbestos materials and accumulated dust. The Asbestos Removal Contractor shall reclean areas showing dust or residual asbestos materials. If recleaning is required, monitor the airborne fiber concentrations during recleaning. After final cleanup, remove filters on the building HVAC system and provide new filters. Dispose of filters as asbestos-contaminated materials. Re-establish HVAC, mechanical, and electrical systems to proper working order. Notify the Engineer before unrestricted entry is permitted. The Engineer shall have the option to perform independent monitoring to certify the areas are safe before entry is permitted.

B. Disposal of Asbestos Material

1. Collect asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing which may produce airborne concentration of asbestos fibers; place in sealed impermeable bags imprinted with a caution label and place in a second bag or drum.

2. Once double bagged or placed in drums or otherwise containerized (wrapped) and asbestos-containing materials have been removed from the work area, they shall be loaded into an enclosed truck for transportation to

the designated disposal site. Asbestos waste shall not be allowed to be placed in trucks with non-asbestos waste.

3. The enclosed cargo area of the truck shall be free of debris and lined with 6-mil polyethylene sheeting to prevent contamination from leaking or spilled containers. Floor sheeting shall be installed first and extend up the sidewalls. Wall sheeting shall be overlapped and taped into place so that no materials may escape to the environment.

4. Drums shall be placed on level surfaces in the cargo area and packed tightly together to prevent shifting and tipping. Do not throw containers into the cargo area.

5. Personnel loading asbestos containing waste shall be protected by disposable clothing including head, body, and foot protection and at a minimum, half-facepiece, dual cartridge respirators equipped with high efficiently particulate air (HEPA) filters.

6. Large steel dumpsters (roll-off type) may be used for asbestos waste disposal. These shall be lined with polyethylene and shall have doors, tops, or covers that can be closed and locked to prevent vandalism or other disturbance of the containerized asbestos debris and wind dispersion of asbestos fibers. Uncontainerized asbestos materials shall not be placed in these type dumpsters, nor shall they be used for non-asbestos waste. Bags shall be placed, not thrown, into these containers to avoid splitting.

7. Dispose of waste asbestos material at an EPA or a state permitted disposal site off Owner property as reviewed by the Engineer.

8. For temporary storage, store sealed impermeable bags in asbestos waste drums. Areas for interim storage of asbestos waste-containing containers shall be approved by the Engineer. A lockable storage truck on site will be permitted in designated areas. All removed ACM waste shall be transported from the site.

9. Procedure for hauling and disposal shall comply with 40 CFR 61, Subpart M, 40 CFR 241 and 257, and State, regional, and local standards.

10. Upon reaching the disposal site, trucks are to approach the dump location as closely as possible for unloading of the asbestos-containing waste.

11. Bags, drums, and components shall be inspected by the Asbestos Removal Contractor and landfill operator as they are offloaded at the disposal site. Material in damaged containers shall be repacked in empty drums or bags as necessary. Uncontaminated drums may be recycled if the landfill is licensed to accept bagged materials. The Engineer may observe off-loading procedures at any time deemed necessary to assure compliance with these specifications and current regulations.

12. Waste containers shall be placed on the ground at the disposal site, not pushed or thrown out of trucks since the weight of wet material could rupture containers.

13. Personnel off-loading containers at the disposal site shall wear protective equipment consisting of disposable head, body, and foot protection and, at a minimum, half-facepiece, dual cartridge respirators equipped with HEPA filters. Following the removal of all containerized waste, the truck cargo area shall be decontaminated to meet the no visible residue criteria. Polyethylene sheeting shall be removed and discarded along with contaminated cleaning materials and protective clothing, in bags or drums at the disposal site. The Asbestos Removal Contractor shall submit all chain-of-custody forms signed by the disposal site operator accepting the waste ACM, to the Engineer for review for compliance to regulations.

C. Re-establishment of the Work Area and System

1. Re-establishment of the work area shall only occur following the completion of clean-up procedures and after clearance air monitoring has been performed and documented to the satisfaction of the Engineer.

2. The Asbestos Removal Contractor and Engineer shall visually inspect the work area for any remaining visible residue. Evidence of asbestos materials will necessitate additional cleaning requirements.

3. Following satisfactory clearance of the work area, remaining barriers may be removed and disposed of as asbestos contaminated waste.

3.3 CERTIFICATE OF VISUAL INSPECTION

A. Following this Section is a "Certificate of Visual Inspection". This certification is to be completed by the Asbestos Removal Contractor and certified by the Air Monitoring Technician . Submit completed Certificates with Application for

final payment. Final payment will not be made until this Certification is executed.

++ END OF SECTION ++

Attachments

Certificate of Worker's Acknowledgement
Certificate of Visual Inspection
Sample results

final payment. Final payment will not be made until this Certification is executed.

PART 4 METHOD OF MEASUREMENT

4.1 There will be no direct measurement for payment of the work specified in this Item. Work under this Item will be paid for on a lump sum basis as specified in Section 5.1 below.

PART 5 BASIS OF PAYMENT

5.1 Payment will be made at the contract lump sum price for asbestos removal. This price shall be full compensation for all materials, equipment, labor, and incidentals necessary to complete the item in accordance with the plans and the provisions of this Item.

Payment will be made under:

Item 2080.1 Pumphouse Equipment, Pipe, and Fittings -- lump sum

END OF ITEM 2080

SECTION 15000 PUMPHOUSE EQUIPMENT, PIPE, AND FITTINGS

15000-1 GENERAL

1.1 DESCRIPTION

This Section includes the furnishing and installation of two (2) fire pump units, pipe, valves, fittings, and incidental accessories necessary for the complete installation of the fire pump system to supply water at rated capacity and total head required for fire-suppression services for the Midfield Complex, as shown on the Plans and specified herein..

1.2 SYSTEM PERFORMANCE REQUIREMENTS

Provide fire pump systems that include fire pump units, pressure-maintenance pump units, accessories, and piping that comply with performance requirements specified and are compatible with building fire-protection systems.

A. Pump, Equipment, Accessory, and Piping Pressure Rating: 175 psig minimum, except where a higher rating is indicated.

1.3 SUBMITTALS

A. Submit the following to the Engineer for approval:

1. Product data for fire pump units and pressure pump units. Include clearly stated rated capacities of each selected model, performance curve with each selection point indicated, driver, pump controller, furnished specialties, and accessories; plus weights (shipping and installed).

2. Product certificates signed by manufacturers of fire pumps, certifying that their products comply with specified requirements.

3. Test curves of fire pump manufacturer's factory tests for each fire pump, and certificates signed by manufacturer verifying that the test results comply with specified requirements.

4. Welding procedure specifications for each welding process, welding procedure qualifications test records, and welder qualification test records complying with requirements specified in the "Quality Assurance" Article.

5. Shop drawings showing layout and connections for fire pump units and pressure-maintenance pump units. Show pumps, drivers, controllers, accessories, and piping. Include setting drawings with templates and directions for installation of foundation bolts, anchor bolts, and other anchorages.

6. Shop drawings may be incorporated into other Division 15 fire-protection piping system shop drawings.

7. Wiring diagrams detailing field-installed wiring for power, signal, and control systems.

8. Field-acceptance test data showing proper performance according to provisions specified.

9. Maintenance data for each fire pump and pressure-maintenance pump unit to include in the "Operating and Maintenance Manual" specified in Division 1 Section "Project Closeout."

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firms whose fire pumps, pressure maintenance pumps, drivers, controllers, and accessories are listed by product name and manufacturer in the UL "Fire Protection Equipment Directory" and FM "Approval Guide" and that comply with requirements indicated. The following listings are not required:

   i UL listing and FM approval of pressure-maintenance pumps.

   ii FM approval of pressure-maintenance pump controllers.

   iii UL listing of flow-measuring systems.

B. Single-Source Responsibility: Obtain fire pump units and pressure-maintenance-pump units, components, and accessories from a single source. Include a source with responsibility and accountability to answer and resolve problems regarding compatibility, installation, performance, and acceptance of units.

C. Provide listing/approval stamp, label, or other marking on equipment made to specified standards.

D. Comply with local fire department/marshal standards pertaining to material, hose threads, and installation.

E. Comply with requirements of NFPA 20 "Standard for the Installation of Centrifugal Fire Pumps" for fire pumps, drivers, controllers, accessories, and installation.

F. Comply with requirements of NFPA 70 "National Electrical Code" for electrical materials and installation.

G. Comply with requirements of FM "Approval Guide" applicable to fire pumps, drivers, controllers, and accessories, and provide system capable of FM acceptance.

H. Regulatory Requirements: Comply with provisions of the following:

   i ASME B31.9 "Building Services Piping" for water supply and drain piping materials, products, and installation.

   ii ASME "Boiler and Pressure Vessel Code," Section IX, "Welding and Brazing Qualifications" for qualifications for welding processes and operators.

I. Manufacturer's Factory Tests: Perform factory test for each fire pump.

J. Design Criteria: The Drawings indicate sizes, profiles, connections, and dimensional requirements of fire pump and pressure-maintenance pump units and are based on specific manufacturer types and models indicated. Pump units having equal performance characteristics by other manufacturers may be considered, provided that deviations in dimensions and profiles do not change the design concept or intended performance as judged by the Architect. The burden of proof for equality of units is on the proposer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Shipping: After assembling and testing fire pumps and pressure-maintenance pumps, clean flanges and exposed machined metal surfaces and treat with an anticorrosion compound. Protect flanges, pipe openings, and nozzles.

B. Store fire pumps, pressure-maintenance pumps, drivers, controllers, and accessories in a clean dry place.

C. Retain shipping flange protective covers and protective coatings during storage.

D. Protect bearings and couplings against damage from sand, grit, or other foreign matter.

E. Extended Storage Greater Than 5 Days: Dry internal parts with hot air or vacuum-producing device to prevent rusting. Upon drying, coat internal parts with protective liquid, such as light oil. Dismantle bearings and couplings, dry and coat with acid-free heavy oil, and then tag and store in a dry location.

F. Comply with manufacturer's rigging instructions for handling.

15000-2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

(a) Horizontal Fire Pumps:

(i) Armstrong Darling, Inc.
(ii) Aurora Pump, General Signal Corp.
(iii) Fairbanks Morse Pump Div., Colt Industries.
(iv) ITT A-C Pump, ITT Fluid Technology Corp.
(v) Patterson Pump Co. Subsid., Gorman-Rupp Co.
(vi) Peerless Pump, Sterling Fluid Products, Inc.
(vii) Reddy-Buffaloes Pump, Inc.

(b) Diesel-Engine Fire Pump Drivers:

(i) Caterpillar, Inc.
(ii) Clarke GM Diesel, Inc.
(iii) Cummins Engine Co., Inc.

(c) Multistage, Pressure-Maintenance Pumps:

(i) Aurora Pump, General Signal Corp.
(ii) Grundfos Pumps Corp.
(iii) ITT A-C Pump, ITT Fluid Technology Corp.
(iv) Patterson Pump Co. Subsid., Gorman-Rupp Co.
(v) Peerless Pump, Sterling Fluid Products, Inc.
(vi) Taco, Inc.

(d) Regenerative-Turbine, Pressure-Maintenance Pumps:

(i) Aurora Pump, General Signal Corp.
(ii) Burks Pumps, Inc.
(iii) Fairbanks Morse Pump Div., Colt Industries.
(iv) ITT A-C Pump, ITT Fluid Technology Corp.

(v) MTH Tool Co., Inc.

(vi) Pump Controllers and Alarm Panels:

(vii) Firetrol, Inc.
(viii) Hubbell Industrial Controls, Inc.
(ix) Joslyn Clark Controls, Inc. Subsid., Joslyn Corp.
(x) Master Control Systems, Inc.
(xi) Metron, Inc.

(e) Flow-Measuring Systems:

(i) Barco Div., Marison Industries.
(ii) Dieterich Standard, Dover Industries Co.
(iii) Gerand Engineering Co.
(iv) Meriam Instrument Div., Scott & Fetzer Co.
(v) Preso Industries, Ltd.
(vi) Reddy-Buffaloes Pump, Inc.
(vii) Victaulic Company of America.

2.2 FIRE PUMPS

(1)Description: Horizontally mounted, single-stage, double-suction type, UL 448, factory-assembled and -tested, bronze-fitted, axially split case, diesel-drive, horizontal fire pump, of capacities and characteristics indicated.

(2)Description: Horizontally mounted, multistage, single-suction type, UL 448, factory-assembled and -tested, bronze-fitted, axially split case, diesel-drive, horizontal fire pump, of capacities and characteristics indicated.

(3)Characteristics: Capable of furnishing not less than 150 percent of rated capacity at not less than 65 percent of total rated head. Shutoff head is limited to 120 percent of total rated head.

(4)Casing Construction: Axially split case, centrifugal design; cast-iron pump casing with suction and discharge flanges machined to ASME B16.1 dimensions, and 125-psig (860kPa) pressure rating, except where 250-psig (1725kPa) rated flanges are indicated.

(5)Impeller Construction: Statically and dynamically balanced, of construction to match type fire pump, fabricated from cast bronze, keyed to shaft.

(6)Wear Rings: Replaceable, bronze.

(7)Pump Shaft and Sleeve: Steel shaft with bronze sleeve.

(8)Pump Shaft Bearings: Grease-lubricated ball bearings contained in cast-iron housing.

(9)Seals: Stuffing box with minimum of 4 rings of graphite-impregnated braided yarn with bronze lantern ring between center 2 graphite rings, and bronze packing gland.

(10)Pump Couplings: Flexible, capable of absorbing torsional vibration and shaft misalignment, with metal coupling guard.

(11)Finish: Manufacturer's standard red paint applied to factory-assembled and -tested units before shipping.

(12)Nameplates: Complete with capacities, characteristics, and other pertinent data.

2.3 DRIVERS

A. Diesel Engines: UL 1247, horizontal shaft, open-type diesel engine, of scheduled capacity. Provide the following accessories for automatic operation:

(a)Emergency Manual Operator: Factory wired for standby engine starting and operation in case of main controller or wiring malfunction.

(b)Engine Cooling System: Factory-installed water piping, valves, strainer, pressure regulator, heat exchanger, coolant pump, bypass piping, and fittings. Piping is ASTM B 88, Type L (ASTM B 88M, Type B), copper water tube; ASME B16.22, wrought-copper, solder-joint pressure fittings; and ASTM B 32, Alloy Sb5 solder.

(c)Flexible exhaust connector.

(d)Exhaust Silencer: Residential type.

(e)Exhaust Silencer: Industrial type.

(f)Engine-Jacket Water Heater: Factory-installed electric elements.

(g)Dual Batteries: Lead-acid-storage type, providing 100 percent standby reserve capacity.

(h)Fuel System: According to NFPA 20.

(i)Fuel Storage Tank: Size indicated, with floor legs and direct-reading level gage. Include secondary-containment tank, with capacity at least that of fuel storage tank.

(j)Exhaust System: ASTM A 53, Type E or S, Schedule 40, black steel pipe, ASME B16.9 weld-type pipe fittings, ASME B16.5 steel flanges, and ASME B16.21 nonmetallic gaskets. Fabricate double-wall, ventilated thimble from steel pipe.

2.4 CONTROLLERS

A. Description: Combined automatic and nonautomatic operation, complying with UL 508, UL listed and FM approved, factory assembled and wired, and factory tested for capacities and characteristics, and with features indicated.

B. Fire-Pump-Engine Controllers: Listed for diesel-drive, fire pump service, and capable of performing or containing the following features:

i. Built-in dual battery charger.
ii. Time clock for weekly automatic test.
iii. System pressure recorder, electric alternating current driven with spring backup.
iv. Timing relay for automatic stop.
v. Power failure start, with time delay to prevent start at momentary loss of power.
vi. Low-fuel-level alarm.
vii. Alarm contacts for remote alarm of "Engine Run," "Switch Off," and "Engine Failure."
viii. Pump room alarms, including both audible and visible signals.

C. Enclosure: NEMA ICS 6, Type 2, dripproof, indoor, except where special-purpose enclosure is indicated.

D. Include controls, devices, alarms, functions, and operations listed in NFPA 20, as required for driver and controller, and specific items listed for controller.

E. Nameplates: Provide nameplate complete with capacity, characteristics, approvals and listings, and other pertinent data on enclosure door.

F. Fire-Pump Controller Enclosure Mounting: Wall- or floor-stand mounting, as indicated, for field electrical connections.

G. Fire-Pump Controller Enclosure Mounting: Wall mounting for field electrical connections.

H. Fire-Pump Controller Enclosure Mounting: Floor-stand mounting for field electrical connections.

I. Fire-Pump-Controller Enclosure Mounting: Pump-base mounting and factory wired.

J. Finish: Manufacturer's standard red paint applied to factory-assembled and -tested units before shipping.

K. Controller Sensing Pipes: Fabricate pipe and fittings according to NFPA 20 with nonferrous-metal sensing piping, 1/2-inch (13-mm) size, with globe valves for testing controller mechanism from system to pump controller as indicated. Include a bronze check valve with a 3/32-inch (2.4-mm) orifice in the clapper or a ground-face union with a noncorrosive diaphragm having a 3/32-inch (2.4-mm) orifice.

2.5 ALARM PANELS

A. Description: NEMA ICS 6, Type 1 enclosure, remote wall-mounting-type panel with audible and visible alarms matching controller. Include the following features and manufacturer's standard features:

i. Engine running.
ii. Main switch off or in manual position.
iii. Engine trouble.
iv. Low-water alarm.
v. Low fuel.

B. Mounting: Wall mounting.

C. Finish: Manufacturer's standard red paint applied to factory-assembled and -tested units before shipping.

2.6 ACCESSORIES

A. Match fire pump suction and discharge ratings as required for fire pump capacity rating. Include the following accessories:

i. Automatic, air-release valve.
ii. Casing relief valve.
iii. Suction and discharge pressure gages.
iv. Eccentric tapered reducer at suction inlet.
v. Concentric tapered reducer (increaser) at discharge outlet.
vi. Test-Header Manifold: Ductile-iron or brass body for hose valves. Include nozzle outlets arranged in a single line; horizontal, flush-wall mounting attachment; and rectangular, brass, escutcheon plate with lettering equivalent to "PUMP TEST CONNECTION."

(i)Escutcheon Plate Finish: Polished chrome plate.
(ii)Escutcheon Plate Finish: Rough brass.

vii. Test-Header Manifold: Ferrous for hose valves. Include bronze or cast-iron, exposed-type, valve header with nozzle outlets; and round brass escutcheon plate with lettering equivalent to "PUMP TEST CONNECTION." Finish is manufacturer's standard.
viii. Hose Valves: UL 668, straightway pattern, bronze. Include cap attached to valve with chain and NFPA 1963 hose thread that conforms to local fire department standards on valve outlet. Valve and cap finish is same as test-header-manifold escutcheon plate finish.
ix. Ball Drip Valve: UL 1726.
x. Main Relief Valve: UL 1478, pilot operated.
xi. Main Relief Valve: UL 1478, spring loaded.
xii. Discharge Cone: Closed.
xiii. Discharge Cone: Open.

B. Finish: Manufacturer's standard red paint applied to factory-assembled and -tested units before shipping, except where brass or another finish is specified.

2.7 PRESSURE-MAINTENANCE PUMPS

A. Multistage Pressure-Maintenance Pumps: Centrifugal, vertical construction, base mounted, factory assembled, and factory tested for capacities and characteristics indicated.

B. Regenerative-Turbine, Pressure-Maintenance Pumps: Close-coupled construction, for pad mounting, factory assembled, and factory tested for capacities and characteristics indicated.

1. Capacities: Not less than rated capacity at not less than total rated head indicated.

2. Construction: Cast-iron pump casing with suction and discharge connections of size indicated, threaded, or flanged and machined to ASME B16.1 dimensions, and 125-psig (860kPa) minimum pressure rating, except where 250-psig (1725kPa) rated flanges are indicated.

i. Impeller: Bronze or stainless steel.
ii. Shaft: Stainless steel.
iii. Seals: Mechanical.

C. Nameplates: Provide nameplate complete with capacity, characteristics, and other pertinent data.

D. Finish: Manufacturer's standard red paint applied to factory-assembled and -tested units before shipping.

2.8 PRESSURE-MAINTENANCE PUMP ELECTRIC-MOTOR DRIVERS

A. Electric-Motor Drivers: NEMA MG 1, open-dripproof, squirrel-cage, induction motors. Include construction that complies with NFPA 20 and NFPA 70, and wiring compatible with controller.

B. Finish: Manufacturer's standard red paint applied to factory-assembled and -tested units before shipping.

C. Nameplates: Complete with motor horsepower (kW), characteristics, and other pertinent data.

2.9 PRESSURE-MAINTENANCE PUMP CONTROLLERS

A. Description: Across-the-line type; complying with UL 508; UL listed; factory assembled, wired, and tested; and combined automatic and nonautomatic operation. Include types, capacities, characteristics, and features indicated for electric-drive, pressure-maintenance pump service.

B. Enclosure: NEMA ICS 6, Type 2, wall mounted, for field electrical wiring.

C. Include controls, devices, alarms, functions, and operations listed in NFPA 20, and specific items listed.

D. Rate controller for scheduled horsepower (kW) and provide the following items:

1. Fusible disconnect switch.
2. Pressure switch.
3. "HAND-OFF-AUTO" selector switch.
4. Pilot light.
5. Running-period timer.

E. Nameplates: Complete with capacity, characteristics, approvals and listings, and other pertinent data on enclosure door.

F. Mounting: Wall type for field electrical connections.

G. Finish: Manufacturer's standard red paint applied to factory-assembled and -tested units before shipping.

H. Controller Sensing Pipes: Fabricate pipe and fittings according to NFPA 20 with nonferrous-metal sensing piping, 1/2-inch (13-mm) size, with globe valves for testing controller mechanism from system to pump controller as indicated. Include a bronze check valve with a 3/32-inch (2.4-mm) orifice in the clapper or a ground-face union with a noncorrosive diaphragm having a 3/32-inch (2.4-mm) orifice.

2.10 PRESSURE-MAINTENANCE PUMP ACCESSORIES

A. Match pressure-maintenance pump suction and discharge ratings as required for pump capacity rating. Include the following accessories:

1. Casing relief valve.
2. Suction and discharge pressure gages.

2.11 FLOW-MEASURING SYSTEMS

A. Description: FM-approved systems that indicate flow in gpm (L/s) to not less than 175 percent of fire pump rated capacity. Include sensing element of size to match pipe, tubing, flow meter, and fittings.

B. Pressure Rating: 175 psig (1200 kPa) minimum.

C. Sensing Element: Venturi, annular probe, or orifice plate flow sensor.

D. Flow Meter: Compatible with flow-sensing element and direct reading in gpm (L/s); dial not less than 4-1/2 inches (115 mm) in diameter or equivalent.

1. Permanently Mounted: Flow meter suitable for wall mounting with copper tubing for connecting to flow-sensing element.
2. Portable: Flow meter, with two 12-foot (4-m) hoses, in carrying case with handle.

E. Include complete operating instructions.

2.12 SOURCE QUALITY CONTROL

A. Factory Tests: Hydrostatically test and test run fire pumps before shipment. Test at 150 percent of shutoff head plus suction head, but not less than 250 psig (1725 kPa). Produce certified test curves showing head capacity and brake-horsepower (kW) of each pump.

2.13 GROUT

A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.

B. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout.

C. Properties: Nonstaining, noncorrosive, and nongaseous.

D. Recommended Uses: Interior and exterior applications.

E. Design Mix: 5000 psi (34.50 MPa), 28-day compressive strength.

F. Packaging: Factory premixed and packaged.

15000-3 EXECUTION

A EXAMINATION

1. Examine areas, equipment foundations, and conditions with Installer present for compliance with requirements for installation and other conditions affecting fire pump performance. Do not proceed with installation until unsatisfactory conditions have been corrected.

2. Examine fire-protection piping systems. Verify actual locations of piping connections before installation.

3.2 CONCRETE EQUIPMENT BASES

A. Install concrete equipment bases of dimensions indicated for fire pumps, pressure-maintenance pumps, and controllers. Refer to Division 3 Section "Cast-in-Place Concrete" and Division 15 Section "Basic Mechanical Materials and Methods."

3.3 INSTALLATION

A. Comply with manufacturer's written installation and alignment instructions and with NFPA 20 and FM standards.

B. Install pumps in locations indicated and arrange to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

C. Set base-mounted pumps on concrete equipment bases. Disconnect coupling halves before setting. Do not reconnect couplings until alignment operations have been completed.

1. Support pump base plate on rectangular metal blocks and shims, or on metal wedges having small taper, at points near foundation bolts to provide a gap of 3/4 to 1-1/2 inches (19 to 38 mm) between pump base and foundation for grouting.
2. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and suction and discharge flanges of pump to verify that they are level and plumb.

D. Install suction and discharge pipe sizes equal to or greater than the diameter of fire pump nozzles.

E. Install valves of types and at locations indicated that are same size as piping connecting fire pumps, bypasses, test headers, and other piping systems.

F. Install pressure gages on suction and discharge of fire pumps at integral pressure gage tappings provided.

G. Support pumps and piping separately so that weight of piping system does not rest on pumps.

H. Install piping accessories, hangers and supports, anchors, valves, meters and gages, and equipment supports as indicated for complete installation.

I. Install water supply and drain piping for diesel-engine heat exchangers. Extend drain piping from heat exchangers to point of disposition, as indicated. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation and joint construction.

J. Install exhaust system piping for diesel engines. Extend to point of termination outside structure. Install pipe and fittings with welded joints, and components having flanged connections with gasketed joints. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation and joint construction.

K. Install condensate drain piping for diesel-engine exhaust system. Extend drain piping from low points of exhaust system to condensate traps and to point of disposition, as indicated. Refer to Division 15 Section "Basic

Mechanical Materials and Methods" for basic piping installation and joint construction.

L. Install flow meters and sensing elements where indicated. Install flow-measuring system components and make connections according to manufacturer's written installation instructions.

M. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted. Furnish copy of manufacturer's wiring diagram submittal to Electrical Installer.

1. Verify that electrical wiring installation is according to manufacturer's submittal and installation requirements of Division 16 Sections. Do not proceed with equipment startup until wiring installation is acceptable.

3.4 ALIGNMENT

A. Align fire pump and driver shafts after complete unit has been leveled on foundation and after grout has set and foundation bolts have been tightened.

B. After alignment is correct, tighten foundation bolts evenly but not too firmly. Fill base plate completely with nonshrink, nonmetallic grout with metal blocks and shims or wedges in place. After grout has hardened, fully tighten foundation bolts. Check alignment and take corrective measures required.

C. Make piping connections, check alignment, and take corrective measures required.

1. Adjust alignment of pump and driver shafts for angular and parallel alignment by 1 of 2 methods specified in Hydraulic Institute Standards Section "Centrifugal Pumps--Instructions for Installation, Operation and Maintenance."
2. Alignment Tolerances: Meet manufacturer's recommendations.

3.5 CONNECTIONS

A. Connect water supply to fire pumps and pressure-maintenance pumps.

B. Connect fire pump and pressure-maintenance pump discharge piping to building fire-protection water systems.

C. Connect cooling-system water supply and drain piping to diesel-engine heat exchangers.

D. Connect exhaust system piping to diesel engines.

E. Connect flow-measuring system components according to manufacturer's written installation instructions.

F. Connect fire pump controllers to building fire alarm system. Refer to Division 16 Section "Fire Alarm Systems."

G. Electrical wiring and connections are specified in Division 16 Sections.

3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of factory-authorized service representative to supervise field assembly of components, installation of fire pump units and pressure-maintenance pump units, including piping and electrical connections, and field acceptance tests. Report test results in writing.

B. Check suction lines connections for tightness to avoid drawing air into pumps.

C. Perform field-acceptance tests of each fire pump unit (fire pump, driver, and controller) and system piping, when fire pump unit installation is complete. Comply with operating instructions and procedures of NFPA 20 to demonstrate compliance with requirements. Where possible, field-correct malfunctioning equipment, then retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or that does not perform as specified and as indicated, then retest to demonstrate compliance. Verify that each fire pump unit performs as specified and as indicated.

3.7 COMMISSIONING

A. Startup Services: Provide services of factory-authorized service representative to provide startup service and to demonstrate and train Owner's maintenance personnel as specified below.

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
3. Review data in the "Operating and Maintenance Manual." Refer to Division 1 Section "Project Closeout."
4. Schedule training with at least 7 days' advance notice.
5. Provide fire hoses in number, size, and of length required to reach a storm drain or other acceptable location to dispose of fire pump test water. These fire hoses are for field acceptance tests only and are not intended to become property of the Owner.

B. Final Checks Before Startup: Perform the following preventive-maintenance operations and checks before startup:

1. Lubricate oil-lubricated bearings.
2. Remove grease-lubricated bearing covers and flush bearings with kerosene and thoroughly clean. Fill with new lubricant according to manufacturer's recommendations.
3. Disconnect coupling and check electric motor for proper rotation. Rotation shall match direction of rotation marked on pump casing.
4. Check that pump is free to rotate by hand. Do not operate the pump if it is bound or if it drags even slightly until cause of trouble is determined and corrected.
5. Install coolant in cooling system. Fill closed-loop cooling system with potable water and add rust inhibitor.
6. Install coolant in cooling system. Fill closed-loop cooling system with solution of 50 percent potable water and 50 percent ethylene glycol permanent antifreeze. Add rust inhibitor if not included in antifreeze.

C. Starting procedure for pumps:

1. Prime pump by opening suction valve and closing drains, and prepare pump for operation.
2. Open sealing liquid supply valve if pump is so fitted.
3. Start motor.
4. Open discharge valve slowly.
5. Observe leakage from stuffing boxes and adjust sealing liquid valve for proper flow to ensure lubrication of packing. Do not tighten gland immediately, but let packing run in before reducing leakage through stuffing boxes.
6. Check general mechanical operation of pump and motor.

15000-4 METHOD OF MEASUREMENT

4.1 There will be no direct measurement for payment of the work specified in this Item. Work under this Item will be paid for on a lump sum basis as specified in Section 5.1 below.

15000-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract lump sum price for pumphouse equipment, pipe, and fittings. This price shall be full compensation for all materials, equipment, labor, and incidentals necessary to complete the item in accordance with the plans and the provisions of this Item.

Payment will be made under:

Item 15000.1 Pumphouse Equipment, Pipe, and Fittings -- lump sum

END OF ITEM 15000

ITEM 16000 UTILITY COST ALLOWANCE

16000-1 DESCRIPTION

1.1 This item consists of funds included in the bids to be used to pay charges from utility companies to reimburse them for costs they incur due to construction of this project. The utility companies to whom payments shall be made include: Baltimore Gas & Electric Company (BG&E), Bell Atlantic Company, and Comcast Cablevision (cable television provider). Utility costs incurred will include charges for:

A. Providing primary electric power distribution to the site including underground cables, pad mounted transformers, switchgear, and electric services as shown and described within the contract drawings and specifications.

B. Providing natural gas distribution extension to the site including underground piping and tubing, valves, meters, and leak detection equipment in accordance with utility company policy.

C. Providing telephone distribution extension for proposed services at the midfield site. Bell Atlantic will furnish and install wiring and termination equipment. Contractor will install concrete pad and all necessary conduits, including excavation, pavement removal, trenching, backfilling, termination cabinets, handholes, pavement restoration, etc.

D. Providing distribution extension of cable television utility system. Contractor will install all necessary conduits, including excavation, pavement removal, trenching, backfilling, termination cabinets, handholes, pavement restoration, etc.

E. Relocation of existing cables and conduits and associated facilities necessitated by construction activities such as new drainage items, landscaping, etc.

16000-2 EQUIPMENT AND MATERIALS

2.1 Contractor will be responsible for furnishing all equipment and materials except for the specific items specified herein, which will be furnished by the utility companies.

16000-3 CONSTRUCTION METHODS

3.1 Installation will be by the utility company. No overhead power lines or power poles shall be installed. The Contractor shall contact the utility company, coordinate with same and authorize services as required. The MAA shall be informed of all contacts and service arrangements.

BG&E Contact:	Bell Atlantic Contact:	Comcast CableVision Contact:
Ms. Cynthia M. Upton	Mr. S. S. Sweet	Mr. Wayne Slechter
Baltimore Gas & Electric Company	Bell Atlantic	Comcast CableVision
Marketing and Energy Services	7133 Rutherford Road	8031 Corporate Drive
7225 Windsor Boulevard	Second Floor	Baltimore, Maryland 21236
Baltimore, Maryland 21244	Woodlawn, Maryland 21244	(410) 931-4600
(410) 265-4040	(410) 281-7539	

3.2 The Contractor is to arrange a meeting with the BG&E Power Company, Bell Atlantic Company, Comcast Cablevision representatives, and MAA to establish a suitable schedule for utiliity service connections before any equipment or material related to the utility distribution extensions is installed. The Contractor shall not disconnect, de-energize, reconnect, tamper or otherwise handle any of the utility companies service wires.

Work to be accomplished in making the required service connections to the utility companies supplied points of service is to be supplied by the Contractor.

The Contractor is required to make necessary arrangements with the utility companies to insure having needed services available at the time of systems power-up. Lack of service at the time of power-up is not considered a valid reason for any work time extension. Difficulties in securing the utility companies services are to be reported to the Engineer at the earliest possible time.

Contractor shall locate all utility lines in advance of construction and coordinate relocations with utility companies as required.

This coordination item shall not be measured, and no separate payment shall be made. This work shall be incidental to the installation of utility work.

16000-4 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 This item will not be measured. Payments will be made to the Contractor on the basis of actual costs billed (as shown on utility invoices) by BG&E, Bell Atlantic, and Comcast Cablevision plus 5 percent for Contractor's overhead and profit. Payment will be made under "Utility Cost Allowance." Partial payments will be made out of the allowance amount as bills are received from the utilities. Contractor shall furnish proof to the MAA that utility payments have been made after he receives payment from MAA. The Contractor shall include the figure indicated in the proposal form in his bid for this item. The Contractor will not be entitled to any unspent portion of monies from this allowance.

All work to be performed by the Contractor is included in other specification items. The Contractor will not be paid for any work under this item which will be used exclusively for payments to BG&E, Bell Atlantic or Comcast Cablevision.

Payment will be made under:

Item 16000.1 Utility Cost Allowance -- lump sum

END OF ITEM 16000

ITEM 16010 BASIC ELECTRICAL REQUIREMENTS

16010-1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Sections, apply to this and the other electrical sections.

1.2 SUMMARY

A. This section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this section to expand the requirements specified elsewhere:

1. Submittals.
2. Coordination drawings.
3. Record documents.
4. Maintenance manuals.
5. Electrical installations.
6. Cutting and patching.

1.3 SUBMITTALS

A. General: Follow the procedures specified in Standard Provisions for Shop Drawings except as modified or directed by this Specifications.

B. Increase, by the quantity listed below, the number of electrical related shop drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Consulting Engineer.

1. Shop Drawings - Initial Submittal: 1 additional blue- or black-line prints.
2. Shop Drawings - Final Submittal: 1 additional blue- or black-line prints.
3. Product Data: 1 additional copy of each item.
4. Samples: 1 addition as set.

C. Additional copies may be required by individual sections of these Specifications.

D. Schedule: All shop drawings shall be submitted for approval and be approved with a "conform" or "conform as noted" rating prior to fabrication, and/or installation as applicable. MAA will complete each shop drawing submittal evaluation in 21 calendar days after submittal reception. A shop drawing disapproval will not be grounds for Construction Duration delays.

1.4 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:
   a. Equipment connections and support details.

b. Sizes and location of required concrete pads and bases.

2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the hangars during construction.
3. Prepare site plans, elevations, and details to indicate cabinets, junction boxes, handholes, underground conduits, lighting poles to co-ordinate with other trades.

1.5 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Standard Provisions. In addition to the requirements specified, indicate installed conditions for:

1. Major raceway systems, size and location, locations of control devices; distribution and branch electrical circuitry; and circuit breaker size and arrangements.
2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.6 MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Standard Provisions. In addition to the requirements specified, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturers printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

1.8 GUARANTEE

A. The Contractor shall guarantee to make good any and all defects in his work, exclusive of lamps, which may develop due to defective workmanship or materials, within one year from the date of final acceptance of the work by the Administration.

B. During the one-year guarantee period, the system supplier shall schedule maintenance inspections of the system on a quarterly basis.

1.9 TESTS

The Contractor shall furnish all labor, materials, instruments and equipment necessary for testing the electrical system in accordance with the NETA Acceptance Standards during the progress of the work and after the installation is completed. The Contractor shall demonstrate to the satisfaction of the Engineer as a minimum the following:

A. That all lighting, power phase, neutral and control circuits are continuous and free from short circuits and unspecified grounds.

ITEM 16010 BASIC ELECTRICAL REQUIREMENTS

16010-1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Sections, apply to this and the other electrical sections.

1.2 SUMMARY

A. This section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this section to expand the requirements specified elsewhere:

1. Submittals.
2. Coordination drawings.
3. Record documents.
4. Maintenance manuals.
5. Electrical installations.
6. Cutting and patching.

1.3 SUBMITTALS

A. General: Follow the procedures specified in Standard Provisions for Shop Drawings except as modified or directed by this Specifications.

B. Increase, by the quantity listed below, the number of electrical related shop drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Consulting Engineer.

1. Shop Drawings - Initial Submittal: 1 additional blue- or black-line prints.
2. Shop Drawings - Final Submittal: 1 additional blue- or black-line prints.
3. Product Data: 1 additional copy of each item.
4. Samples: 1 addition as set.

C. Additional copies may be required by individual sections of these Specifications.

D. Schedule: All shop drawings shall be submitted for approval and be approved with a "conform" or "conform as noted" rating prior to fabrication, and/or installation as applicable. MAA will complete each shop drawing submittal evaluation in 21 calendar days after submittal reception. A shop drawing disapproval will not be grounds for Construction Duration delays.

1.4 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:
   a. Equipment connections and support details.

b. Sizes and location of required concrete pads and bases.

2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the hangars during construction.
3. Prepare site plans, elevations, and details to indicate cabinets, junction boxes, handholes, underground conduits, lighting poles to co-ordinate with other trades.

1.5 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Standard Provisions. In addition to the requirements specified, indicate installed conditions for:

1. Major raceway systems, size and location, locations of control devices; distribution and branch electrical circuitry; and circuit breaker size and arrangements.
2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

1.6 MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Standard Provisions. In addition to the requirements specified, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturers printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

1.8 GUARANTEE

A. The Contractor shall guarantee to make good any and all defects in his work, exclusive of lamps, which may develop due to defective workmanship or materials, within one year from the date of final acceptance of the work by the Administration.

B. During the one-year guarantee period, the system supplier shall schedule maintenance inspections of the system on a quarterly basis.

1.9 TESTS

The Contractor shall furnish all labor, materials, instruments and equipment necessary for testing the electrical system in accordance with the NETA Acceptance Standards during the progress of the work and after the installation is completed. The Contractor shall demonstrate to the satisfaction of the Engineer as a minimum the following:

A. That all lighting, power phase, neutral and control circuits are continuous and free from short circuits and unspecified grounds.

B. That the insulation resistance to ground and between all other conductors in the same cable or conduit is not less than 50 megohms.

C. That all circuits are properly connected in accordance with applicable wiring diagrams.

D. That all circuits are operable. Lights shall be operated with no failures within a continuous 48-hour period prior to acceptance.

16010-2 - PRODUCTS (Not Applicable)

16010-3 - EXECUTION

3.1 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the lighting fixtures.

B. Refer to equipment specifications for rough-in requirements.

3.2 ELECTRICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate electrical systems, equipment, and materials installation with other trades.
2. Verify all dimensions by field measurements.
3. Coordinate the installation of required supporting devices and sleeves to be poured-in-place concrete and other structural components, as they are constructed.
4. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work.
5. Where mounting heights are not detailed or dimensioned, field coordinate with other trades or existing conditions to provide adequate clearances.
6. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer.
7. Install systems, materials, and equipment level and plumb, parallel and perpendicular to structure.
8. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
9. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with corresponding Technical Specification and SHA Standard Specification. In addition to the requirements specified, the following requirements apply:

1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
   a. Uncover Work to provide for installation of ill-timed work.
   b. Remove and replace defective Work.
   c. Remove and replace Work not conforming to requirements of the Contract Documents.

d. Remove samples of installed Work as specified for testing.
e. Install equipment and materials on existing pole foundations as shown on drawings.
f. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer observation of concealed Work.

2. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.
3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

16010-4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

Measurement will be made for the work items of this section will be lump sum.

16010-5 - BASIS OF PAYMENT

5.1 BASIS OF PAYMENT

Payment for the work of this Section will be made at the contract lump sum price for the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

Payment will be made under:

Item 16010.1 Basic Electrical Requirements – lump sum

END OF SECTION 16010

ITEM 16050 BASIC ELECTRICAL MATERIALS AND METHODS

16050-1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Items, apply to this and the other electrical items.

B. Requirements specified in "Basic Electrical Requirements" apply to this Item.

1.2 SUMMARY

A. This Section includes limited scope general construction materials and methods for application with electrical installations as follows:

1. Selective demolition including:

a. Nondestructive removal of materials and equipment.

b. Dismantling electrical materials and equipment made obsolete by these installations.

2. Miscellaneous metals for support of electrical materials and equipment.

3. Nailers, blocking, fasteners, and anchorage for support of electrical materials and equipment.

4. Joint sealers for sealing around electrical materials and equipment; and for sealing penetrations in handholes and foundation walls.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Standard Provisions.

B. Product data for the following products:

1. Joint sealers.

C. Shop drawings detailing fabrication and installation for metal fabrications, and anchorage for electrical materials and equipment.

D. Samples of joint sealer, consisting of strips of actual products showing full range of colors available for each product.

E. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this Section.

F. Schedules indicating proposed methods and sequence of operations for selective demolition prior to commencement of Work. Include coordination and details for dust and noise control.

1. Coordinate sequencing with construction phasing and Owner occupancy.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer for the installation and application joint sealers and access panels.

B. Qualify welding processes and welding operators in accordance with AWS "Structural Welding Code".

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver joint sealer materials in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, cuing time, and mixing instructions for multi-component materials.

B. Store and handle joint sealer materials in compliance with the manufacturers' recommendations to prevent their deterioration and damage.

1.6 PROJECT CONDITIONS

A. Conditions Affecting Selective Demolition: The following project conditions apply:

1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.

2. Locate, identify, and protect electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

B. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

1.7 SEQUENCE AND SCHEDULING

A. Notify the Engineer at least 5 days prior to commencing demolition operations.

B. Perform demolition in phases.

16050-2 - PRODUCTS

2.1 MISCELLANEOUS METALS

A. Steel plates, shapes, bars, and bar grating: ASTM A 36.

B. Cold-Formed Steel Tubing: ASTM A 500.

C. Hot-Rolled Steel Tubing: ASTM A 501.

D. Steel Pipe: ASTM A 53, Schedule 40, welded.

E. Steel channel: ASTM A569-72.

F. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout, recommended for interior and exterior applications.

G. Fasteners: Zinc-coated, type, grade, and class as required.

2.2 JOINT SEALERS

A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

B. Colors: As selected by the Engineer from manufacturer's standard colors.

C. Elastomeric Joint Sealers: Provide the following types:

1. One-part, nonacid-cuing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.

2. One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.

D. Acrylic-Emulsion Sealants: One-part, nonsag, mildew-resistant, paintable complying with ASTM C 834 recommended for exposed applications on interior and protected exterior locations involving joint movement of not more than plus or minus 5 percent.

16050-3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of joint sealers and access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 SELECTIVE DEMOLITION

A. General: Demolish, remove, demount, and disconnect abandoned electrical materials and equipment indicated to be removed.

B. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment.

16050-4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. Measurement will be made for the work of this Section will be lump sum.

5.1 BASIS OF PAYMENT

A. Payment for the work of this Section will be included as part of the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

Payment will be made under:

Item 16050.1 Basic Electrical Materials and Methods -- per Lump Sum

END OF ITEM 16050

ITEM 16100 RACEWAYS, BOXES, AND CABINETS

16100-1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Items, apply to this and the other electrical items.

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Raceways include the following:

1. Rigid metal conduit.

C. Boxes, enclosures, and cabinets include the following:

1. Device boxes.
2. Outlet boxes.
3. Pull and junction boxes.
4. Cabinets and hinged cover enclosures.

D. The following Items contain requirements that relate to this Item:

1. "Supporting Devices" for raceway and box supports.
2. "Wiring Devices" for devices installed in boxes.

1.3 SUBMITTALS

A. General: Submit the following according to the Standard Provisions.

B. Product data for junction boxes, hinged cover enclosures, and cabinets.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms unlisted and Labeled: As defined in the "National Electrical Code," Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory (NRTL) as defined in OSHA Regulation 1910.7.

C. Coordinate layout and installation of raceway and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering Products that may be incorporated in the Work include, but are not limited to, the following:

1. Metal Conduit and Tubing:

   a. Monogram Co., AFC.

   b. Afflex Corp

   c. Allied Tube and Conduit, Grinnell Co.

   d. Anamet, Inc., Anaconda Metal Hose.

   e. Anixter Brothers, Inc.

   f. Carol Cable Co., Inc.

   g. Cole-Flex Corp.

   h. Flexcon, Inc., Coleman Cable Systems, Inc.

   i. Spiraduct, Inc.

   j. Triangle PWC, Inc.

   k. Wheatland Tube Co.

2. Conduit Bodies and Fittings:

   a. Scott Fetzer Company, Adalet-PLM.

   b. American Electric, Construction Materials Group.

   c. Emerson Electric Co., Appleton Electric Co.

   d. Carlon.

   e. Hubbell, Inc., Killark Electric Manufacturing Co.

   f. General Signal, O-Z/Gedney Unft.

   g. Spring City Electrical Manufacturing Co.

3. Boxes, Enclosures, and Cabinets:

   a. Scott Fetzer Company, Adalet-PLM.

   b. Butler Manufacturing Co., Walker Division.

   c. Cooper Industries, Midwest Electric.

d. Electric Panelboard Co., Inc.

e. Erickson Electrical Equipment Co.

f. American Electric, FL Industries.

g. Hoffman Engineering Co., Federal-Hoffman, Inc.

h. Hubbell Inc., Killark Electric Manufacturing Co.

i. General Signal, O-Z/Gedney.

j. Parker Electrical Manufacturing Co.

k. Raco, Inc., Hubbell Inc.

l. Robroy Industries, Inc., Electrical Division.

m. Spring City Electrical Manufacturing Co.

n. Square D Co.

o. Thomas & Betts Corp.

p. Woodhead Industries, Inc., Daniel Woodhead Co.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. Fittings: NEMA FB 1, compatible with conduit/tubing materials.

2.3 OUTLET AND DEVICE BOXES

A. Materials: Cast aluminum or zinc plated iron alloy boxes with gasketed cover suitable for wet locations.

B. Compliances: NEMA FB 1; UL Standand 514; ANSI Standard C33.84; Fed Spec. W-C-586.

2.4 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA Type 3R and Type 4X as shown on contract drawings.

B. Cast Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.

2.5 CABINETS AND ENCLOSURES

A. Hinged Cover Enclosures: NEMA 250, metal enclosure with continuous hinge cover and flush latch. Finish inside and out with manufacturer's standard enamel.

B. Cabinets: NEMA 250, Type 3R, Type 4X and Type 12 as shown on contract drawings, metal enclosure with removable interior panel and removable front, finished inside and out with manufacturer's paint finish as shown on the drawings. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring

of different systems and voltage, and include accessory feet where required for freestanding equipment.

16100-3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of the raceway system. Do not proceed with installation until
unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

A. Outdoors: Use the following wiring methods:

1. Exposed: Rigid metal conduit.

2. Direct buried concrete encase PVC SCH 80 conduit.

3. Boxes and Enclosures: NEMA Type 3R or Type 4X.

B. Indoors: Use the following wiring methods:

1. Exposed: Rigid steel conduit.

2. Boxes and Enclosures: NEMA Type 4X and Type 12, metal.

3.3 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Install raceways level and square and at proper elevations. Provide adequate headroom.

C. Complete raceway installation before starting conductor installation.

D. Support raceway as specified in "Supporting Devices".

E. Use temporary closures to prevent foreign matter from entering raceway.

F. Protect stub-ups from damage where conduits rise through concrete pad and floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

G. Make bends and offsets so the inside diameter is not reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight
legs of offsets parallel.

H. Use raceway fittings compatible with raceway and suitable for use and location.

I. Raceways Embedded in Slabs: Install in middle third of the slab thickness where practical, and leave at least 1 inch (25 mm) concrete cover.

1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.

2. Space raceways laterally to prevent voids in the concrete.

3. Run conduit larger than 1-inch trade size parallel to or at right angles to main reinforcement. When at right angles to reinforcement, place conduit close to slab support.

J. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.

2. Make bends in parallel or banked runs from same center line to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.

K. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.

2. Use insulating bushings to protect conductors.

L. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter squarely, and install the locknuts with dished part against the box. Where terminations cannot be made secure with one locknut, use two locknuts, one inside and one outside the box.

M. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.

N. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line having not less than 200-lb (90 kg) tensile strength. Leave not less than 12 inches (300 mm) of slack at each end of the pull wire.

O. Telephone System Raceways 2-inch Trade Size and Smaller: In addition to the above requirements, install in maximum lengths of 150 feet (45 m) and with a maximum of two 90-deg bends or equivalent. Install pull or junction boxes where necessary to comply with these requirements.

P. Install raceway sealing fittings according to the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL-listed sealing compound. Install raceway sealing fittings at the following points and elsewhere as indicated:

1. Where conduits pass from warm locations to cold locations, such as the boundaries of air-conditioned spaces.

2. Where otherwise required by the NEC.

Q. Stub-Up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs, and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit.

R. Install hinged cover enclosures and cabinets plumb. Support at each corner.

S. Provide grounding connections for raceway, boxes, and components as instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's

torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that coatings, finishes, and cabinets are without damage or deterioration at Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

3.5 CLEANING

A. Upon completion of installation of system, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

16100-4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. Measurement will be made for the work items of this Item will be lump sum.

16100-5 - BASIS OF PAYMENT

5.1 BASIS OF PAYMENT

A. Payment for the work of this Item will be made at the contract lump sum price for the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

Payment will be made under:

Item 16100.1 Raceways, Boxes and Cabinets -- lump sum

END OF ITEM 16100

ITEM 16110 ELECTRICAL DUCTS, POLE FOUNDATIONS, EQUIPMENT PADS, MANHOLES, AND HANDHOLES

16110-1DESCRIPTION

The work to be performed under this item includes, but is not limited to, the furnishing of all materials, labor, tools, and equipment required for the construction of underground electrical ducts, pole foundations, manholes, equipment pads, and handholes for the project; including all necessary pavement removal, excavation, backfilling and repaving; the furnishing and installation of manholes, pavement cutting and repair, testing; and all incidentals necessary to complete the work as indicated on the Plans and/or specified herein.

16110-2MATERIALS AND EQUIPMENT

2.1 General

a. All materials shall be new and suitable for the conditions and duties imposed upon them after installation. Where applicable, materials and equipment shall bear the approval label of the Underwriter's Laboratories, Inc.

2.2 Shop Drawings

a. Shop drawings shall consist of manufacturer's catalog cuts, working drawings, certified test reports, etc., and other materials or equipment which may be requested by the Engineer.

b. The Contractor shall keep at the site at all times during construction, one set of contract prints for the express purpose of showing any and all changes made during construction. The Contractor shall mark the prints showing each change and shall incorporate all changes in "Record/As-Built Drawings" to be submitted to the Engineer upon completion of the project.

2.3 Rigid Non-Metallic Conduit: Rigid non metallic conduit shall be High impact PVC (polyvinyl chloride) in accordance with NEMA TC2, 90° C. UL labeled, all fittings shall conform to TC3. Provide schedule 80 conduit and fittings, suitable for concrete encasement and direct burial.

2.4 Concrete Encasement: All electrical conduit below grade shall be encased in concrete.

2.5 Pull Wire for Nonmetallic Conduit: All conduit shall be provided with a plastic pull wire between pull points. Wire shall have no less than 200 pound tensile strength.

2.6 Buried Warning and Identification Tape: Buried warning and identification tape shall be polyethylene plastic tape manufactured specifically for warning and identification of buried utility lines. Tape shall be provided in rolls, 6 inches minimum width, color codes for electrical service with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be "CAUTION ELECTRICAL LINE BELOW" or similar wording. Code and letter coding shall be permanent, unaffected by moisture and other substances contained in trench backfill material.

2.7 Asphalt reinforcing Fabric: A nonwoven polypropylene fabric, heat set on one side having an asphalt retention of 0.20 gallons per sq. yd., with a minimum weight od 3.6 oz/sq. yd. as measured per ASTM Method D-3776. Fabric shall be Petromat as manufactured by AMOCO Fabrics and Fibers Co. or approved equal.

2.8 Handholes and Manholes: Construct at the locations and to the dimensions shown in the drawings. All handholes and manholes shall have a reinforcing collar, frame and cover as shown in the drawings.

2.9 Counterpoise wire: A number 8 AWG bare copper conductor, as specified in section 16450 shall be installed approximately 8" above conduits top.

16110-3- CONSTRUCTION METHODS

3.1 General

a. The Contractor shall furnish all materials, perform all excavation and backfill, construct all necessary joints and connections, construct all appurtenances, dispose of all surplus excavation and discard materials as may be necessary to complete the electrical ducts systems.

b. The Contractor shall assume all risk and bear any loss or injury to property or persons occasioned by neglect or accident during the progress of the work. The Contractor shall exercise special care during the work so as not to damage any existing utility lines or appurtenances.

c. Maintenance of Local Service: The Contractor shall exercise utmost care to avoid damage to trees and hedges, fences, electric, telephone, gas and water lines and other operating sewer lines, building, roads and all appurtenances thereto. The interruption of free access to streets and roads due to trench excavation shall be kept to a minimum. Traffic on airport driveway entrance shall be maintained at all times. All excavated material shall be piled in a manner that will not endanger the work and will not obstruct access to the site.

d. Gutters and ditches shall be kept clear at all times or other satisfactory provisions made. Drainage of natural water courses shall not be obstructed. All trenches, material, excavated pits, equipment and pipe which may cause a hazard of serve as obstruction to either vehicular or pedestrian traffic shall be enclosed by fences or barricades, adequately lighted, to protect persons from injury and to avoid property damage. Where traffic must cross open trenches, the Contractor shall provide suitable steel plates which will be subject to approval of the Engineer. The Contractor shall furnish temporary support, adequate protection and maintenance of all underground and surface structures, drains, telephone and electric conduits, sewers, and other obstructions encountered in the progress of the work.

e. Removal of Water: The Contractor shall at all times during construction provide proper and satisfactory means and devices for the removal of all water entering the excavated area, and he shall remove all such water as fast as it may collect to avoid interference with the prosecution of the work or unsuitable conditions for the proper placing of materials.

f. Delivery, Handling and Storage of Materials: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store conduit under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of conduit and fittings free of dirt and debris. Handle conduit, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Carry pipe to the trench; do not drag it. Do not leave plastic conduit or materials that are not to be installed immediately out in the sunlight, but store under cover out of direct sunlight.

3-2 Trench and Pole Foundations Excavation

a. The Contractor shall excavate, protect, and back-fill all excavation that may be necessary for completing the work under the contract. Unless otherwise specified, excavation shall be fixed saw cut and as detailed in the drawings and specifications. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed.

b. In existing paved areas the Contractor shall remove the paving by a mechanized sawcut method for such width only as is necessary for the excavation of the trench, or pole foundation as shown on drawing details. If the Contractor removes the paving for a greater width than is deemed necessary, or in case he removes or disturbs any paving on account of settlement, slides or caves, or in making excavation outside

the lines of the work without the written order of the Engineer, the Contractor shall replace at his own expense such paving, or MAA may retain from any monies due or to become due to the Contractor, the cost of permanently replacing the paving so removed. The Contractor shall support the sides and ends of all excavations or structures, whenever necessary or directed, with braces or equivalent methods.

c. The Contractor shall be responsible for the condition of all excavations made. All slides and caves shall be removed without extra compensation, at whatever time and under whatever conditions that may occur.

d. The excavation of all trenches shall be fully completed in advance of conduit laying, unless otherwise authorized or directed. The Engineer may at any time require the backfilling of open trenches over completed conduit ducts, if in his judgment such action is necessary, and the Contractor shall thereby have no claim for extra compensation, even though to accomplish said backfilling he is compelled temporarily to stop excavation or other work at any place. If work is stopped on any trench, for any reason except by order of the Engineer, and the excavation is left open for an unreasonable length of time in advance of construction, the Contractor shall, if so directed,- backfill such trench at his own cost, and shall not again open said trench until he is ready to complete the related work therein. If the Contractor shall refuse or fail to backfill such trench completely within 48 hours after said notice, the Owner shall be authorized to do the work, and the expense thereof shall be charged to the Contractor.

e. All excavations must be kept free of water below the subgrade of the work while work is in progress. This may be accomplished by ordinary pumping methods, use of underdrains, or by wells points, whichever will produce the required results.

f. Pole foundation excavation shall be performed with mechanized auger equipment. Hole diameter shall be uniform from top to bottom. Expansion material shall be installed around circular pole foundation to interface with the full pavement thickness. Concrete encased ducts interface with pole foundations shall also have expansion material

3.3 Conduit installation and Trench Backfill

a. A flat layer of fine earth material, at least 4" thick (loose measurement) shall be placed in the bottom of the trench as bedding for the duct. The bedding material shall consist of soft dirt, sand and other fine fill, and it shall contain no particles that would be retained in a ¼" sieve. The bedding material shall be tamped until firm. When connecting handholes or manholes the conduit shall be installed with a slope toward manholes or handholes. Counterpoise copper wires shall be terminated at both ends in every duct section either at the grounding rods of lighting poles or handholes.

b. It is intended that the material excavated from the trench be used for trench backfill, provided that in the opinion of the Engineer, the excavated material is suitable for backfilling.

c. Backfill material shall be carefully deposited in the trench by methods which will not damage or disturb the conduit or structures, and shall be solidly tamped around the conduits. The volume from the bottom of the trench to a point 12 inches below road sub-base, or to grade, where the conduit is not laid in a road, shall be refilled in 6-inch compacted layers. All tamping of material from the bottom of the trench to the spring line shall be done by pneumatic hand tampers; or if the material is composed largely of coarse aggregate, the Engineer may require the use of other hand tampers, in order to insure protection of the pipe. Above this point, mechanical tampers capable of exerting a blow of 250 foot pounds per square foot of area of tamping face shall be employed.

d. The subgrade reinforcing fabric shall be installed at the locations indicated in the drawings.

e. The moisture content of the material being compacted shall be within plus or minus 3 percentage points of optimum, as determined by AASHTO Designation T-99. Material containing an excess of moisture shall be processed and dried, or permitted to dry until the moisture content is within the specified range. Material which is too dry shall be wetted until the moisture content is within the specified range.

f. The Engineer may make compaction tests of the backfilled trenches at any time during construction or upon completion of the backfill operations. If the results of any tests show that backfills do not meet the specified compaction requirements, the Contractor shall at his own expense, correct the condition, as directed by the Engineer, in such portions of the trench represented by the unsatisfactory test results.

g. Backfill in all excavations not in paved areas shall be restored to the condition that existed prior to beginning work, and maintained for a period of three months following the date of conditional acceptance. Where sod has been removed, it shall be replaced after the backfilling is completed. All areas disturbed by the trenching, storing of dirt or construction materials and equipment shall be restored to its original condition. Restoring includes any necessary topsoiling, sodding, liming, seeding, mulching and turfing materials, equipment and labor.

h. The Contractor shall, at his own expense, maintain all excavations and disturbed surfaces in proper condition. Just prior to the termination date for maintaining excavations, the trench surfaces shall be given final reshaping where necessary. All depressions appearing in the backfilled excavations shall be properly refilled. If the Contractor fails to make repairs within 48 hours after receipt of written notice from the Owner, the Owner may backfill said depressions or protect with signs and lanterns wherever necessary without giving previous notice to the Contractor and the cost of so doing will be retained from any monies due or to become due the Contractor under the Contract. The Contractor shall be responsible for any injury or damage that may result from lack of maintenance of any backfilled excavation at any time previous to the end of the mentioned termination dates.

i. All unauthorized excavations made by the Contractor shall be immediately backfilled in accordance with the requirements of the specifications for Excavation Backfill at the Contractor's expense.

j. After completion of backfilling, all material not used therein, shall be removed and disposed of in such a manner and at such point as shall be approved or directed and all roads, sidewalks, and other places on the line of the work shall be left free, clean, and in good order. Said cleaning up shall be done by the Contractor without extra compensation and, if he fails to do such work within a reasonable time after receipt of notice, it will be performed by the owner, and the cost will be retained out of the monies due or to become due the Contractor under the contract.

k. For concrete encased conduits see Item ____ for applicable construction methods.

3.4 Bituminous Asphalt Pavement and Overlay Reinforcing Fabric:

Refer to Item ____ for trench asphalt pavement repair and use of reinforcing fabric requirements.

16110-4- METHOD OF MEASUREMENT

Measurement will be made for this work which will be paid for on a unit price basis, complete, installed and functional.

4.1 No additional measurement for manhole, handhole, or equipment pad connections, or lighting pole foundation connections shall be made.

16110-5- BASIS OF PAYMENT

5.1 General

Payment for materials furnished and work done under the Contract will be made on a unit price basis as herein stipulated, for all materials supplied and work done under authorization of the Engineer. The Contractor shall not be entitled to receive additional compensation for anything furnished or done, except for such extra work as shall be required by written order. It is intended that all work required for a fully functioning electrical duct system be

included in this item whether shown on the Contract Drawings or included in the Specifications. The absence of work not specifically described in the Standard Specifications or shown on the Contract Drawings shall be interpreted as meaning that the cost of any such work contemplated by the Contract Documents, shall be included in the unit price bid for related items.

In the event that the Contractor is required to perform additional work by written order, the Contractor shall agree to perform such work at the corresponding contracted unit price rate for the item as quoted for the entire work.

Item 16110.1	**Electrical Handhole -- each**
Item 16110.2	**Electrical Manhole -- each**
Item 16110.3	**Pole foundation in grassy area -- each**
Item 16110.4	**Pole foundation in paved area -- each**
Item 16110.5	**4W-6" Concrete Encased Duct -- per lineal foot**
Item 16110.6	**4W-4" Concrete Encased Duct -- per lineal foot**
Item 16110.7	**4W-3" Concrete Encased Duct -- per lineal foot**
Item 16110.8	**2W-6" Concrete Encased Duct -- per lineal foot**
Item 16110.9	**2W-4" Concrete Encased Duct -- per lineal foot**
Item 16110.10	**2W-3" Concrete Encased Duct -- per lineal foot**
Item 16110.11	**2W-2" Concrete Encased Duct -- per lineal foot**
Item 16110.12	**1W-4" Concrete Encased Duct -- per lineal foot**
Item 16110.13	**1W-2" Concrete Encased Duct -- per lineal foot**
Item 16110.14	**Electrical Equipment Pad -- each**
Item 16110.15	**Electrical Vault -- each**

END OF ITEM 16110

ITEM 16120 WIRES AND CABLES

16120-1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Items, apply to this and the other electrical items.

1.2 SUMMARY

A. This includes electric power, communication, and control wires and cables and associated splices, connectors, and terminations for wiring systems rated 600 volts and less.

B. The following Items contain requirements that relate to this Item:

1. Basic Electrical Requirements
2. Basic Electrical Materials and Methods

1.3 SUBMITTALS

A. General: Submit the following according to the Standard Provisions.

B. Manufacturer's product data on materials specified herein.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms Listed and Labeled: As defined in the "National Electrical Code, Article 100".
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.5 SEQUENCING AND SCHEDULING

A. Coordination: Coordinate layout and installation of cable with other installations.

1. Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Engineer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire and cable according to NEMA WC-26.

16120-2- PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with require manufacturers offering products that may be incorporated in the Work includes but are not limited to, the following:

1. Wires and Cables:

a. American Insulated Wire Corporation, Leviton Manufacturing Co.
b. Brand-Rex Cable Systems, Bdntec Corp.
c. Carol Cable Company, Inc.
d. Senator Wire & Cable Co.
e. Southwire Co.
f. Chromatic Technologies, Inc.

2. Connectors for Wires and Cables:
a. AFC, Monogram Co.
b. AMP, Inc.
c. Anderson, Square D Co.
d. Electrical Products Division, 3M Co.
e. O-Z/Gedney Unit, General Signal.

2.2 POWER WIRES AND CABLES

A. Building Wire and Cable

1. UL-listed building wires and cables with conductor material, insulation type cable construction, and rating as specified in Part 3 "Applications" Article.
2. Rubber Insulation: Conform to NEMA WC 3.
3. Thermoplastic Insulation: Conform to NEMA WC 5.
4. Solid conductor for 1 0 AWG and smaller; stranded conductor for larger than 1 0 AWG.

B. Overhead Service Drop Cable

1. Configuration: Triplex - ACSR Neutral
2. Material: Stranded aluminum conductors with XLP insulation. Size as shown on contract drawings.

2.3 COMMUNICATION FIBER OPTIC CABLE

A. Fiber Optic Cable shall be twelve (24) fiber, heavy duty outdoor type, all glass graded index profile, multimode, Core 62.5 microns, 125 microns cladding in a loose tube buffer. Buffer tubes shall be blocked to prevent water penetration.

B. Strength member shall be Kevlar with a low smoke and flame retardant spread, outer jacket.

C. Cable shall withstand short term pulling loads up to 1000 pounds.

2.4 CONTROL CABLES

A. Type TC multiconductor control cable with THWN-2 (PVC/nylon) insulated stranded copper conductors. Number and size of conductors as shown on the contract drawings.

B. Overall outer jacker shall be heat, moisture, and sunlight resistant polyvinyl chloride (PVC).

2.5 CONNECTORS AND SPLICES

A. UL-listed factory-fabricated wiring connectors of size, ampacity rating, material, and type and class for application and for service indicated. Select to comply with Project's installation requirements and as specified in Part 3 "Applications" Article.

16120-3- EXECUTION

3.1 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with installation tolerances and other conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Feeders: Type THHN/THWN, copper conductor, in raceway.

B. Branch Circuits: Type THHN/THWN, copper conductor, in raceway.

3.3 INSTALLATION

A. Install wires and cables as indicated, according to manufacturers written instructions and the NECA "Standard of Installation."

B. Pull conductors into raceway simultaneously where more than one is being installed in same raceway.

1. Use pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation.
2. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

C. Conductor Splices: Keep to minimum.

1. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
2. Use splice and tap connectors that are compatible with conductor material.

D. Wiring at Outlets: Install with at least 12 inches (300 mm) of slack conductor at each outlet.

E. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturers published torque-tightening values for equipment connectors. Where manufacturers torquing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A.

F. Fiber optic cables shall be not be spliced, unless approved by the Engineer. Splicing method shall be fusion with .3 db maximum loss. Splicing shall include all fibers.

3.4 FIELD QUALITY CONTROL

A. Testing Firm: Provide the services to perform specified field quality-control testing.

B. Testing: Upon installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.

1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA Standard ATS, Section 7.3.1. Certify compliance with test parameters.

C. Correct malfunctioning products at site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units, and retest.

16120-4- METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. Measurement will be made for the work item of this Item by Lump Sum.

16120-5- BASIS OF PAYMENT

5.1 BASIS OF PAYMENT

A. Payment for the work of this Item will be included as part of the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

Item 16120.1 Wires and Cables -- lump sum

END OF ITEM 16120

ITEM 16141 WIRING DEVICES

16141-1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Sections, apply to this and the other electrical sections.

1.2 SUMMARY

A. This section shall include switches, receptacles, and control devices required for a complete installation as shown and specified.

B. The following Sections contain requirements that relate to this section:

1. Raceways, Boxes, and Enclosures.
2. Wires and Cables.
3. Labeling and Identification.
4. Lighting Equipment.

1.3 SUBMITTALS

A. General: Submit the following according to the Standard Provisions.

B. Submit manufacturer's product data on all products specified herein.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.

1. The Terms Listed and Labeled: As defined in the "National Electrical Code, Article 100".
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.5 SEQUENCING AND SCHEDULING

A. Coordination: Coordinate layout and installation of devices with other existing installations. Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Engineer.

16141-2- PRODUCTS

2.1 GENERAL

A. Switches and Receptacles

1. Receptacles
   a. Wall receptacles shall be NEMA 5-20R duplex rated 20 amperes at 120 VAC of the two-pole, three wire type. They shall be suitable for use with a three-

wire polarized plug having two parallel blades and shall have the third leg grounded. Receptacle circuits shall have ground fault protection for personnel.

b. Receptacles shall be specification grade.

c. Device boxes shall be of the type appropriate for each location as specified under Section 16100.

2. Switches

a. Lighting switches shall be rated 20 amperes at 120/277 VAC, toggle operated, plastic enclosed, single pole, three-way or four-way as shown or required.

b. Switches shall be suitable for controlling HID type lighting.

c. Device boxes for switches shall be of the type appropriate for each location as specified under Section 16100.

3. Contactors

a. Electrically operated, mechanically held, 6 pole, 20 ampere.

b. Furnish exterior lighting contractor in enclosure with hand/off/auto control switch.

c. Exterior lighting contractor shall be suitable for use with photoswitches.

4. Photoswitches

a. Furnish turn-lock type photoswitch wall or roof mounted for automatic control of exterior lighting.

b. Furnish all mounting and wiring accessories.

16141-3- EXECUTION

3.1 GENERAL

A. Wall receptacles and switches shall be mounted at 48 inches above the finished floor of the maintenance building and, or as directed by the Engineer.

B. Install all devices in accordance with Section 16010.

16141-4- METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

Measurement will be made for the work item of this Section by Lump Sum.

16141-5- BASIS OF PAYMENT

5.1 BASIS OF PAYMENT

Payment for the work of this Section will be made at the contract lump sum price for the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

Payment for work will be made under:

Item 16141-1 Wiring Devices -- lump sum

END OF SECTION 16141

SECTION 16170 MOTOR AND CIRCUIT DISCONNECTS

16170-1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Items, apply to this and the other electrical items.

1.2 SUMMARY:

A. This Item specifies requirements for safety switches.

1.3 RELATED WORK OF OTHER SECTIONS:

A. It shall be the responsibility of the Contractor to coordinate work between all sections and trades required for the proper completion of the work of this Item.

1.4 REFERENCES AND STANDARDS:

A. All work shall be performed in accordance with the designated standards or references specified and all current addendums, parts or revisions to said references or standards.

B. In event if a duplication, conflict or contradiction in or between the specified references listed herein the most stringent requirements shall prevail as determined by the Engineer.

C. All products, materials, equipment, installation and/or systems shall be provided and installed in full compliance with the references and/or standards specified and the codes, rules or regulations governing same. Where standards are specified, and have more than one part, applicable part or parts as determined by the Engineer shall govern.

1.5 SUBMITTALS:

A. Manufacturer's printed specifications and details.

16170-2 - PRODUCTS

2.1 SAFETY SWITCHES:

A. Safety type disconnecting switches shall be heavy duty, Class 3, Design 3, unless otherwise indicated, mounted in NEMA 4X enclosures. Enclosures exposed to wet or rain conditions shall be NEMA 3R, rain-tight type. Switches shall be rated at 600 volts minimum or as required by the voltage of the circuit on which they are utilized. Switches shall be rated in horsepower, and each shall be capable of interrupting the locked rotor current of the motor for which used. The current will be assumed as ten (10) times the full rated load current.

B. The switches shall be of the quick-make, quick-break type, and all parts shall be mounted on insulating bases to permit replacement of any part from the front of the switch.

C. Safety switches located at motors and which are used as disconnects for maintenance only, shall be unfused.

16170-3 - EXECUTION

3.1 INSTALLATION:

A. Provide nameplate on cover of each switch indicating purpose or load served by the safety switch. Rivet or bolt and gasket the nameplate on cover of NEMA 3R or NEMA 4X enclosures.

B. Install switches so that the maximum height above the floor to the center of the operating handle does not exceed 6'-0".

16170-4- METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. Measurement will be made for the work item of this Item by lump sum.

16170-5- BASIS OF PAYMENT

5.1 BASIS OF PAYMENT

A. Payment for the work of this Item will be included as part of the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

Item 16170-1 **Motor and Circuit Disconnects -- lump sum**

END OF ITEM 16170

SECTION 16195 LABELING AND IDENTIFICATION

16195-1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Items, apply to this and the other electrical items.

B. Requirements of the following Items.

1. "Basic Electrical Requirements"
2. "Basic Electrical Materials and Methods"

1.2 SUMMARY:

A. This Item specifies the requirements for labeling and identification as specified herein for all indicated electrical items, including:

1. Plastic laminate nameplates to identify Disconnect Switches, Starting Devices, Control Switches.

2. Wire markers at each end of all feeders and control wiring, and feeder wires only in all junction and pull boxes.

3. Labels for exposed conduits, conduits containing feeders, and communications.

4. Identification labeling for raceways, cables, underground conduits and conductors.

5. Operational instruction signs.

6. Warning and caution signs.

7. Equipment labels and signs.

B. Related Items: The following items contain requirements that relate to this item.

1. Wires and Cables for requirements for color coding of conductors for phase identification.

1.3 REFERENCES AND STANDARDS:

A. All work shall be performed in accordance with the designated standards or references specified and all current addendums, parts or revisions to said references or standards.

B. In event if a duplication, conflict or contradiction in or between the specified references listed herein the most stringent requirements shall prevail as determined by the Engineer.

C. All products, materials, equipment, installation and/or systems shall be provided and installed in full compliance with the references and/or standards specified and the codes, rules or regulations governing same. Where standards are specified, and have more than one part, applicable part or parts as determined by the Engineer shall govern.

1.4 SUBMITTALS:

A. Descriptive literature for materials and products specified.

16195-2 - PRODUCTS

2.1 MATERIALS:

A. Equipment Nameplates:

1. Nameplates shall be white core, black laminated plastic having engraved letters.

2. Letter size and nomenclature shall be as specified hereinafter.

B. Conduit Labels:

1. Labels on feeder conduits shall be colored adhesive bands as specified. Letters for lettering on conduit shall be at least 1" inch high.

2. Labels on communication conduits shall be 2 blue bands.

C. Wire Markers: Numerical and alphabetical legends shall be printed in sharp, clear, bold face type. Legends shall be black on an opaque white background. Wire markers shall be plasticized cloth type Brady B-500, Thomas and Belts WBC or Engineer approved equal.

D. Adhesive bands shall be W.H. Brady Co. "Quick-Label" or Engineer approved equal.

E. Underground Line Marking Tape shall be permanent, bright-colored, continuous printed, plastic tape compounded for direct-buried conduit not less than 6 inches wide by 4 mils thick. Printed legend indicative of general type of underground line below.

16195-3 - EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other designations used in electrical identification work with corresponding designations specified or indicated. Install numbers, lettering, and colors as approved in submittals and as required by code.

B. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.

C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

D. Conduit Identification:

1. The following areas shall be identified:

a. On entire surface of exposed conduits.

2. Apply identification to areas as follows:

a. Clean surface of dust, loose material, and oily films before painting.

b. Prime surfaces: For galvanized metal, use single-component acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units, use heavy-duty acrylic resin block filler. For concrete surfaces, use clear alkali-resistant alkyd binder-type sealer.

c. Apply one intermediate and one finish coat of orange silicone alkyd enamel.

d. Apply primer and finish materials in accordance with manufacturers instructions.

E. Identify Raceways of Certain Systems with Color Banding: Band exposed or accessible raceways of the following systems for identification. Bands shall be pretensioned, snap-around colored plastic sleeves, colored adhesive marking tape, or a combination of the two. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side. Install bands at changes in direction, at penetrations of walls and floors, and at 40-foot maximum intervals in straight runs.

F. Identify Junction, Pull, and Connection Boxes: Code-required caution sign for boxes shall be pressure-sensitive, self-adhesive label indicating system voltage in black, prepainted on orange background. Install on outside of box cover. Also label box covers with identity of contained circuits. Use pressure-sensitive plastic labels at exposed locations and similar labels or plasticized card stock tags at concealed boxes.

G. Conductor Color Coding: Provide color coding for secondary service, feeder, and branch circuit conductors throughout the project secondary electrical system as follows:

208/120 Volts	Phase	480/277 Volts
Black	A	Yellow
Red	B	Brown
Blue	C	Orange
White	Neutral	White
Green	Ground	Green

H. Use conductors with color factory-applied the entire length of the conductors except as follows:

1. The following field-applied color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.

a. Apply colored, pressure-sensitive plastic tape in half- lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last two laps of tape with no tension to prevent possible unwinding. Use 1-inch-wide tape in colors as specified. Do not obliterate cable identification markings by taping. Tape locations may be adjusted slightly to prevent such obliteration.

b. In lieu of pressure-sensitive tape, colored cable ties may be used for color identification. Apply three ties of specified color to each wire at each terminal or splice point starting 3 inches from the terminal and spaced 3 inches apart. Apply with a special tool or pliers, tighten for snug fit, and cut off excess length.

I. Power Circuit Identification: Securely fasten identifying metal tags or aluminum wraparound marker bands to cables and feeders in pull boxes, junction boxes, and Electrical Closets with ¼-inch steel letter and number stamps with legend to correspond with designations on Drawings. If metal tags are provided, attach them with approximately 55-lb test monofilament line or one-piece self-locking nylon cable ties.

J. Tag or label conductors as follows:

1. Future Connections: Conductors indicated to be for future connection or connection under another contract with identification indicating source and circuit numbers.

2. Multiple Circuits: Where multiple branch circuits or control wiring are present in the same box or enclosure (except for three-circuit, four-wire home runs), label each conductor or cable. Provide legend indicating source, voltage, circuit number, and phase for branch circuit wiring. Phase and voltage of branch circuit wiring may be indicated by mean of coded color of conductor insulation. For control wiring, use color coding or wire/cable marking tape at terminations and at intermediate locations where conductors appear in wiring boxes, and control cabinets. Use consistent letter/number conductor designations throughout on wire/cable marking tapes.

3. Match identification markings with designations used in panelboards shop drawings, Contract Documents, and similar previously established identification schemes for the facility's electrical installations.

K. Apply warning, caution, and instruction signs and stencils as follows:

1. Install warning, caution, or instruction signs where required by NEC, where indicated, or where reasonably required to assure safe operation and maintenance of electrical systems and of the items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.

L. Install equipment/system circuit/device identification as follows:

1. Apply equipment identification labels of engraved plastic-laminate on each major unit of electrical equipment in building, including central or master unit of each electrical system. This includes alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide single line of text, with ½-inch-high lettering on 1½-inch-high label (2-inch-high where two lines are required), white lettering in black field. Text shall match terminology and numbering of the Contract Documents and shop drawings. Apply labels for each unit of the following categories of electrical equipment.

a. Panelboards, electrical cabinets, and enclosures.

b. Contactors.

c. Dimmers.

d. Control devices.

M. Apply circuit/control/item designation labels of engraved plastic laminate for disconnect switches, breakers, pushbuttons, pilot lights, and similar items for power distribution and control components above, except panelboards and alarm/signal components,

ITEM 16470 POWER DISTRIBUTION EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Sections, apply to this and the other electrical sections.

1.2 REFERENCE STANDARDS

A. American National Standards Institute, (ANSI).

B. National Electrical Manufacturers Association (NEMA).

C. National Fire Protection Association (NFPA): National Fire Codes 70, National Electrical Code

D. Underwriters' Laboratories (UL).

E. US Department of Agriculture; Rural Electrification Administration Bulletins 803 & 804.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements in following order of precedence:

a. Codes, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction over installation, materials, inspection, and testing, including local electrical codes and requirements.
b. Applicable provisions of National Electrical Code, latest edition.
c. Provisions specified in this Section.

2. Manufacturing workmanship and materials shall comply with applicable provisions of NEMA, ANSI, ICEA, and UL standards.
3. Electrical equipment shall be UL listed and comply with UL standards in all cases where UL has published lists and standards applicable to type of equipment required to be provided.

1.4 PRODUCT HANDLING

A. Store indoors boxes, panelboards, circuit and other items subject to damage due to exposure to weather conditions and moisture accumulations; and protect from damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with require manufacturers offering products that may be incorporated in the Work includes but are not limited to, the following:

1. General Electric.

2. Gould.
3. Square D.
4. Westinghouse.

2.2 DISTRIBUTION PANELBOARD

A. Type:

1. Dead front type with interiors completely factory assembled.
2. Comply with NEMA PB 1.
3. Hinged doors with cylinder locks keyed alike.
4. Directory cards on inside of door.

B. Panel Bussing, Neutral Bars, and Connections Straps:

1. Copper bolted together.
2. Phase bussing: Full height without size reduction.
3. Equip neutral bars and circuit breakers with solderless load connectors.

C. Branch Circuit Breakers: Furnish spaces for future addition with bus connection straps for maximum device rating which can be installed.

D. Panelboard Enclosure:
1. NEMA 12/3R.
2. Provide minimum wiring gutter space of 4 in. on sides.
3. Provide additional gutter space in panels having branch circuit conductors larger than No. 4/0.
4. Finish: Manufacture's standard grey paint finish.

F. Circuit Breakers:
1. Molded case, thermal magnetic type.
2. Arrange breakers rated 400 amperes and less in double row construction.

G. For distribution panelboard serving as main distribution panelboard meeting following requirements:

1. Ratings, capacities, and characteristics shall equal requirements of service entrance equipment.
2. Provide ground fault protection including:
   a. Branch (GFI) circuit breakers shall detect low level ground faults.
   b. Ground fault protection equipment shall include sensor, current monitor, and test circuit with pushbutton.
3. Provide ground bus.

2.3 DRY TYPE TRANSFORMER

A. Ratings:
1. General Purpose Dry Type; ANSI/NEMA ST 20, 1986
2. Insulation rating: 150 degree winding temperature rise above 40 degree C ambient.
3. kVA and Voltage ratings as shown on the drawings.
4. Sound Level: Not to exceed 45 dB.
5. Primary Taps: 4 - 2 1/2% full capacity minimum. Two above, two below nominal primary voltage.

B. Construction:
1. Steel ventilated enclosure (NEMA 3R) with manufacturer's standard grey painted finish.

2. Coil Conductors: Continuous copper windings with terminations brazed or welded.
3. Core and coil isolated from enclosure using vibration absorbing mounts.
4. Furnish manufacturers wall mounting brackets.

2.4 SAFETY SWITCHES

A. Ratings:
1. Enclosed safety switch (NEMA KS1-1983, Type HD)
2. 100 Amp, 3 Pole, 480 Vac.
3. Suitable for use as service entrance equipment.
4. NEMA 3R or 4X enclosure, as shown on the contract drawings.
5. Full cover interlocks.

B. Construction: Metal enclosure.

2.5 OVERHEAD SERVICES

A. Poles: 35 ft., Class 5 treated wood pole.

B. Service Masts and Weatherheads: 1" rigid galvanized steel secured to pole at 4 ft. intervals.

C. Overhead Wire Supports: Material and installation shall be furnished in accordance with the US Department of Agriculture Rural Electrification Administration standards for overhead electric utility distribution systems.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install panelboards indoors level with top of box or cabinet 6 ft. 6 in. above finished floor.
B. Mounting:
1. Dry wall construction: Toggle bolts.
2. Concrete and masonry construction: Expansion shields with bolts or screws.
3. Plywood backboards: Screws.
4. Building structural steel members: Weld preformed channel to structural steel members.

C. Type directory cards indicating circuits and areas served.

D. Install all equipment in accordance with requirements of Section 16050.

PART 4 - METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

Measurement will be made for the work item of this Section by lump sum.

PART 5 - BASIS OF PAYMENT

5.1 BASIS OF PAYMENT

Payment for the work of this Section will be included as part of the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

Payment for work will be made under:

Item 16470-1 **Power Distribution Equipment -- lump sum**

END OF SECTION 16470

ITEM 16510 LIGHTING

16510-1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Items, apply to this and the other electrical items.

B. Requirements of the following Items apply:

1. "Basic Electrical Requirements"
2. "Grounding"
3. "Wires and Cables"
4. "Raceways, Boxes, and Cabinets"
5. "Electrical Ducts, Pole Foundations, Equipment Pads, Manholes, and Handholes"

The Contractor shall be responsible for the proper mounting and orientation of all lighting fixtures to be installed under this Contract. All locations shall be examined by the Engineer before proceeding with the ordering of materials or the construction of foundations.

1.2 SUMMARY:

A. This Item specifies requirements for providing lighting systems completely lamped and wired as indicated.

1.3 REFERENCES AND STANDARDS:

A. All work shall be performed in accordance with the designated standards or references specified and all current addendums, parts or revisions to said references or standards.

B. In event of a duplication, conflict or contradiction in or between the specified references listed herein the most stringent requirements shall prevail as determined by the Engineer.

C. All products, materials, equipment, installation and/or systems shall be provided and installed in full compliance with the references and/or standards specified and the codes, rules or regulations governing same. Where standards are specified, and have more than one part, applicable part or parts as determined by the Engineer shall govern.

D. The following is a listing of the publications referenced in this Section:

1. American National Standards Institute (ANSI):
2. National Fire Protection Association ((NFPA):
3. Underwriters Laboratories, Inc. (UL):
4. Illuminating Engineers Society (IES):
   Handbooks, Reference, and Application Volumes.

1.4 SUBMITTALS:

A. Shop drawings and data for lighting fixtures, showing types, size, accessories, installation details and other details of construction including complete bill of materials showing quantity, description and rating of all components, sizes and gages of material and finish of specified items.

B. Manufacturer's data for all fixtures indicating mechanical and electrical construction.

C. Lighting fixture photometrics with fixture output in candela, coefficient of utilization table, and isofoot candle curves. Format data in accordance with I.E.S. recommended practices.

D. Lamp manufacturer's data showing spectral power distribution curve, color temperature, and the "x, y" coordinates locating the chromaticity on the C.I.E chromaticity diagram for each lamp to be provided.

16510-2- PRODUCTS

2.1 LIGHTING FIXTURES AND ACCESSORIES:

A. General:

1. Lighting fixtures and accessories shall conform to the requirements of UL1572 and NEMA LE-3. Lighting fixtures shall be provided complete with lamps of the number, type, voltage and wattage shown. Lighting fixture and corresponding pole shall have the same dark bronze color.
2. Luminaries type and manufacturer shall be as shown in the Fixture Schedule included with the drawings.
3. Manufacturers for all luminaries shall be as shown on the fixture schedule in the plans.

B. POLE MOUNTED LUMINARIES

Pole mounted luminaries shall be rectilinear semi-cutoff luminaries with high pressure sodium lamps (unless otherwise noted) conforming to the following:

1. The housing shall be rectilinear in shape totally enclosed and be a one-piece die-cast aluminum housing with a dark bronze polyester powder paint finish. The door shall be a one piece die-cast aluminum piece with a no-tools access design to all parts. All exposed hardware shall be made of stainless steel.
2. Optical assembly shall have an aluminum reflector with an anodized finish chemically bonded. Reflector shall be field rotatable. Lens cover shall be heat and impact resistant, tempered flat glass. Lamp socket shall be heavy duty.
3. The optical assembly shall produce a light distribution as shown on the contract drawing luminaire schedule.
4. All fixtures shall bear UL 1572 suitable for wet locations.
5. The luminary ballast shall be capable of providing reliable lamp starting down to -20 degrees F., shall have a power factor of .90 or higher, and shall be of the regulating type providing ± 10 percent lamp power regulation with a ± 10 percent variation from rated input voltage. Ballast shall be suitable for use on 277 volt circuits.

C. T-HANGAR AREA LIGHTING FLOODLIGHTS

1. The housing shall be a two piece die-cast aluminum housing with hinged gasketed front for relamping access. All aluminum parts shall have an electrocoat dark bronze finish. All exposed hardware shall be made of stainless steel. A rifle aiming type with adjustable aiming stops shall be provided. Mounting system shall be knuckle slipfitter type suitable for 1.9" to 2.38" diameter tenon.
2. Optical assembly shall be sealed with an aluminum reflector with an anodized finish chemically bonded. Lens cover shall be heat and impact resistant, tempered flat glass. The optical assembly shall provide precise vertical beam control. Lamp socket shall be heavy duty. Glare control shields shall be provided.
3. The reflector assembly shall have IES 6x6 distribution.
4. All fixtures shall bear UL 1572 suitable for wet locations.

5. The luminary ballast shall be capable of providing reliable lamp starting down to -20 degrees F., shall have a power factor of .90 or higher, and shall be of the regulating type providing ±10 percent lamp power regulation with a ±10 percent variation from rated input voltage. Ballast shall be suitable for use on 240 volt circuits.

E. EXTERIOR WALL LUMINAIRES

1. General: Exterior wall mounted lighting fixtures shall be UL listed for wet location applications.
2. Provide integral photocell control for exterior lighting fixtures.
3. HID Lamps: Provide the number, type, and wattage indicated. Provide lamp type conforming to ANSI C78.
4. HID Ballasts: HID ballasts shall conform to UL 1029 and ANSI C82.4, "Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type)" constant wattage autotransformer (CWA) or regulator, high power factor type, unless otherwise indicated. Ballasts shall operate on the voltage system to which they are connected. Single-lamp ballasts shall have a minimum starting temperature of minus 30 degrees C. Ballasts shall be designed for installation in a normal ambient temperature of 40 degrees C. Ballasts shall be constructed so that open circuit operation will not reduce the average life. High pressure sodium (HPS) ballasts shall have a solid-state ignitor/starter with an average life in the pulsing mode of 10,000 hours at an ignitor/starter case temperature of 90 degrees C. Average life is defined as the time after which 50 percent will have failed and 50 percent will have survived under normal conditions.

F. INTERIOR FLUORESCENT LUMINAIRES

1. General: Conform to UL 1570, except for damp and wet locations conform to UL 57.
2. Fluorescent Lamps: Provide the number, type, and wattage indicated. Provide lamps conforming to American National Standards Institute (ANSI) C78.
3. Fluorescent Ballasts: Provide fluorescent ballasts conforming to UL 935, "Fluorescent-Lamp Ballasts," ANSI C82.1, "Ballasts for Fluorescent Lamps - Specifications." Provide fixtures labeled by CBM and certified by Electrical Testing Laboratories (ETL). Ballasts shall be high power factor type, unless indicated otherwise, designed to operate on the voltage system to which they are connected. Ballasts shall be Class P with sound rating "A" unless otherwise noted. Fixtures and ballasts shall be designed and constructed to limit the ballast case temperature to 90 degrees C. when installed in an ambient temperature of 40 degrees C.
   a. Low Temperature Ballasts: Provide fluorescent ballasts having a minimum starting temperature of minus 20 degrees C. in fixtures located where ambient temperature may fall below 50 degrees F.
   b. Energy-Saving Ballasts: Provide electronic high frequency energy-saving fluorescent ballasts of the CBM certified full light output type, compatible for use with energy-saving lamps tested in accordance with ANSI C82.2, "Fluorescent Lamp Ballasts - Methods of Measurement," methods.
4. Electromagnetic Interference Filters: Provide electromagnetic interference filters in fluorescent fixtures. Filters shall be integral to the fixture assembly, one filter per ballast and shall suppress electromagnetic interference as required by MIL-STD-461, "Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference."
5. Lamp Sockets: Comply with UL 542 and ANSI C81.20, "Electric Lamp Bases and Holders - Fluorescent Types, Specifications for."

G. EMERGENCY LIGHTING

1. General: Provide emergency lighting equipment conforming to UL 924, NFPA 70 and NFPA 101.
2. Types: Provide types of emergency lighting equipment as follows:
   a. Lens type self-contained emergency lighting unit as described
   b. Housing: Steel painted satin black housing.
   c. Battery shall be maintenance free, nickel cadmium with full 5-year warranty plus minimum 5-year pro-rata.
   d. Unit shall have solid state automatic charger, capable of fully recharging in 12 hours.
   e. Switching and controls sealed transfer switch, test switch, short circuit protection and low voltage, deep discharge disconnect, high charge indicating light. Sealed relay activates lamp when supply voltage drops to 80 percent of nominal.
   f. Lamps: Minimum two 6-watt tungsten halogen lamp.
   g. Surface mounting.

H. LIGHTED EXIT SIGNS

1. General: Provide exit signs conforming to UL 924, NFPA 70 and NFPA 101.
2. Housing: Impact resistant polycarbonate housing and stencil face lens.
3. Provide AC powered exit signs with battery back-up and automatic high/low trickle charger in a self-contained power pack. Battery shall be sealed, maintenance-free, nickel cadmium type with a 15-year life expectancy and a 5-year full warranty plus 7-year pro-rata.
4. Luminaire Requirements:
   a. Letters shall be 6 inches tall with 3/4 inch strokes formed by a stencil face.
   b. Provide red letters on white face.
   c. Provide 2, 7 watt compact fluorescent lamps.
   d. Provide single or double face as indicated.
   e. Provide ceiling, end wall, back wall or pendant mounting as indicated.
   f. Units mounted exposed to weather or damp/wet environment shall have a damp or wet UL label as appropriate and shall not be constructed of steel.
   g. Provide internal provisions for grounding.

I. FIBERGLASS LIGHTING POLES

1. Pole shall be hollow single piece straight round tapered fiberglass unit with smooth finish brown color pigmented resin. Poles shall be non conductive and chemically inert.
2. Poles shall be designed for a minimum safety factor of 2 to 1 and have no more than a 10% deflection at full wind loading. Pole recommended loading shall be 3.5 square feet at 100 m.p.h. E.P.A. Poles indicated to carry banners shall have recommended loading shall be 10 square feet at 100 m.p.h.
3. Poles shall have an hot galvanized steel anchor base bonded to the pole with a high strength adhesive and coated with a matching urethane finish. The shaft of the base mount shall be arc welded to the inside and outside of the base plate entire circumference.
4. All anchor bolts and nuts shall be furnished with pole.
5. Pole top shall be provided with an aluminum cap, tenon shaped to accept the pole mounted luminary being supported. Cap shall be coated with matching urethane finish.
6. Poles shall be equipped with a reinforced handhole, oval shape 3x5 inches with matching finished aluminum cover.
7. Poles manufacturer shall be W. J. Watley Inc., Commerce City, Colorado. Heavy Duty Series A3324 for poles without banners and Series A43 for poles with banners.

J. CABLE CONNECTORS AND CONNECTOR KITS

1. Connector kits shall conform to the materials and construction requirements of SHA Standard Specifications, Section 810.
2. Connector kits shall be provided for each lighting pole. Provide non-fused connectors for all neutral conductors.

2.2 GROUNDING

All conduit systems, electrical equipment, equipment enclosures, conduit ducts, lighting poles and accessories shall be grounded in accordance with Section 16450 requirements of the specifications.

2.3 LABELING AND IDENTIFICATIONS

All electrical equipment wiring installed under this contract shall be properly labeled per the requirements of Section 16195 of these Specifications.

2.4 FOUNDATIONS:

A. Excavation, concrete work, grounding and backfill are included in other sections of this work.

16510-3- EXECUTION

3.1 INSTALLATION:

A. Lighting fixtures installation shall conform with the requirements of NFPA 70.

B. Provide nighttime adjustment of all adjustable lighting units and floodlighting, etc. as required to the satisfaction of the Engineer.

3.2 TESTS

The Contractor shall furnish all labor, materials, instruments and equipment necessary for testing the wiring system during the progress of the work and after the installation is completed. The Contractor shall demonstrate to the satisfaction of the Engineer the following:

A. That all lighting, power and control circuits are continuous and free from short circuits and unspecified grounds.

B. That the insulation resistance to ground and between all other conductors in the same cable or conduit is not less than 50 megohms.

C. That all circuits are properly connected in accordance with applicable wiring diagrams.

D. That all circuits are operable. Lights shall be operated with no failures within a continuous 48-hour period prior to acceptance.

16510-4- METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

A. Measurement will be made for the work item of this Item by unit.

16510-5 - BASIS OF PAYMENT

5.1 BASIS OF PAYMENT

A. Payment for the work of this Item will be included as part of the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems. Payment will be made under:

Item 16510.1	**Pole Mount Luminaire -- each**
Item 16510.2	**Exterior Wall Luminaire -- each**
Item 16510.3	**Interior Fluorescent Luminaire -- each**
Item 16510.4	**Emergency Lighting Unit -- each**
Item 16510.5	**Lighted Exit Sign -- each**
Item 16510.6	**3.5 EPA Light Pole -- each**
Item 16510.7	**10 EPA Light Pole -- each**

END OF ITEM 16510

ITEM 16900 GENERAL INSTRUMENTATION

16900-1- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and Standard Provisions of Contract, including Technical Provisions and all Technical Specification Sections, apply to this and the other electrical sections.

1.2 SUMMARY

A. This section shall include the automatic telephone dialer and alarm reporting system to be interconnected with the sewage pump station high level alarm panels, oil/water separator high level alarm panels, fire alarm panel, and diesel fuel level indicators as shown on the contract drawings.

B. The following Sections contain requirements that relate to this section:

1. Raceways, Boxes, and Enclosures.
2. Wires and Cables.
3. Labeling and Identification.

1.3 SUBMITTALS

A. General: Submit the following according to the Standard Provisions.

B. Submit manufacturer's product data on telephone autodialer/alarm reporting system.

1.4 QUALITY ASSURANCE

A. Uniformity: Unless otherwise specified, equipment or material of same type of classification, shall be products of same manufacturer. All material shall be new and of the latest design of manufacturer providing equipment or material.

B. Design: Equipment and accessories not specifically described or identified by manufacturer's catalog numbers shall be designed in conformity with ISA, ANSI, ASME, ASTM, and other applicable technical standards and shall have a neat and finished appearance.

C. Comply with NFPA 70 "National Electrical Code" for components and installation.

1.5 SEQUENCING AND SCHEDULING

A. Coordination: Coordinate layout and installation of devices with other existing installations. Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Engineer.

16900-2- PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering Products that may be incorporated in the Work include, but are not limited to, the following:

1. Omega Engineering, Inc.
2. EOS Research LTD.
3. Odessa Engineering, Inc.
4. RACO Manufacturing and Engineering Co.

2.2 AUTODIALER

A. The automatic dialing alarm system shall be microprocessor based and shall have the capability to monitor at least 16 inputs configured as analog inputs, discrete inputs (dry contact) or a combination of both analog and discrete inputs. In addition, the autodialer shall monitor the AC power supplied to it. Upon detecting an alarm on any of its inputs, or detecting loss of its AC power, the autodialer shall dial a minimum of two user-programmed telephone numbers.

The autodialer shall deliver to the called party(s) an audio (speech-synthesized English) or printed (facsimile) report on alarm conditions that are present including location of each alarm. In addition to voice or facsimile reports, the unit shall be able to provide data communication via an integral telephone modem to a remotely located "personal" computer.

A datalogger shall be an integral part of the autodialer and provide the ability to log data from all 16 inputs and store this information internally for retrieval at any time via modem. Data logging intervals shall be variable from seconds to several hours.

The autodialer shall be provided with all software and system programming for remote retrieval and monitoring of system input channels.

The autodialer construction shall conform to the following:

1. Enclosure: Minimum rating of NEMA 4X.
2. Environmental Limits: Temperature : 0-49 degrees Celsius. Humidity: 0 - 90% non-condensing.
3. Power Requirements: 115 VAC, 60 Hz, with integral battery back-up.
4. Transient voltage/surge protection shall be provided on power line, telephone and input channels. Solid state surge protection provided on digital input, telephone and AC power circuitry.
5. Analog Inputs: 4-20 mA, 10 bit resolution.
6. Discrete Inputs: dry contact.

2.3 LEVEL ALARMS

A. Design: Local alarm panels for tank high level monitoring shall be enclosed in a NEMA 4X enclosure. The panel shall have audible and visual alarm annunciators with silencing pushbutton. Level sensor shall be a float activated switch.

B. Regulatory Requirements:

1. Sensing circuit of all monitoring equipment must be U.L. listed intrinsically safe for Class I, Class II, Division I groups C thru G.
2. Monitoring panel must be labeled by Underwriters Laboratory.

16900-3- EXECUTION

3.1 GENERAL

A. Install all devices in accordance with Section 16010.

16900-4- METHOD OF MEASUREMENT

4.1 METHOD OF MEASUREMENT

Measurement will be made for the work item of this Section by Lump Sum.

16900-5- BASIS OF PAYMENT

5.1 BASIS OF PAYMENT

Payment for the work of this Section will be included as part of the payment item listed below. This payment shall be full compensation for furnishing all materials and for all preparation, placing of materials, and installation of connections as required for complete operation of systems.

Payment for work will be made under:

Item 16900-1 **General Instrumentation -- lump sum**

END OF SECTION 16900

ITEM P-152 EXCAVATION AND EMBANKMENT

152-1 DESCRIPTION

1.1 This item covers excavation, disposal, placement, grading, and compaction of all materials within the limits of the work required to construct taxiways, aprons, and intermediate as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical section shown on the plans.

1.2 All material excavated shall be classified as follows:

A. Stripping. Stripping shall be defined as the removal of material to a minimum depth of six inches below existing ground in areas requiring embankment or where the elevation of the bottom of the proposed pavement subgrade is less than six inches below existing ground elevation. If deeper stripping is required to completely remove encountered root mat such deeper removal shall be performed only as directed by the Engineer. Stripping shall be performed only to the extent required under paragraph 2.4 or to accumulate the quantity of material required for topsoil cover of the stormwater management basins as shown on the plans, whichever quantity is greater.

B. Unclassified Excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature, which is not otherwise classified and paid for under the following items.

C. Unsuitable Excavation. Any material containing vegetable or organic matter, such as muck, peat, organic silt, sod, decaying stumps, roots, logs, or humus shall be considered unsuitable for use in embankment construction. Material, when approved by the Engineer as suitable to support vegetation, may be used on the embankment slope.

D. Removal of Existing Soil Stockpile. This classification shall consist of the removal from the site of the existing soil stockpile remaining from a previous contract. Soil in this stockpile may be used in the work at the Contractor's option, with the approval of the Engineer and subject to the suitability requirements of paragraph 2.1A below.

152-2 CONSTRUCTION METHODS

2.1 GENERAL:

A. Before beginning excavation, grading, and embankment operations in any area, the area shall be completely cleared and grubbed in accordance with Item P-151. Embankment areas shall then be completely stripped of grass, sod, and other organic materials not suitable for use in construction the embankment. Any existing drainage pipes, structures, conduit, cable, and other items shown on the plans to be removed shall be removed and disposed of as specified elsewhere in the Contract Documents.

B. The suitability of material to be placed in embankments shall be subject to approval by the Engineer. All unsuitable material excavated shall be disposed of off airport property. Material that is otherwise suitable shall be not classified as unsuitable solely on the basis of high moisture content. Such wet material, where necessary to construct embankment, shall be allowed to dry to within the moisture content provisions of this Item.

C. When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the Engineer shall immediately be notified and operations shall be temporarily discontinued. At the direction of the Engineer, the Contractor shall excavate the site in such a manner

as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

D. Those areas outside of the pavement areas in which the top layer of soil material has become compacted, by hauling or other activities of the Contractor shall be scarified and disked to a depth of four inches, in order to loosen and pulverize the soil.

E. If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the Engineer, who shall arrange for their removal if necessary. The Contractor shall, at his/her own expense, satisfactorily repair or pay the cost of all damage to such facilities or structures which may result from any of the Contractor's operations during the period of the contract.

2.2 EXCAVATION:

A. No excavation shall be started until the work has been staked out by the Contractor and the Engineer has obtained elevations and measurements of the ground surface. All suitable excavated material shall be used in the formation of embankment, subgrade, or for other purposes shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

B. When the volume of the excavation exceeds that required to construct the embankments to the grades indicated, the excess shall be used to grade the areas of ultimate development or disposed of as directed. When the volume of excavation is not sufficient for constructing the fill to the grades indicated, the deficiency shall be obtained from borrow areas.

C. The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the work.

1. Selective Grading. When selective grading is indicated on the plans, the more suitable material as designated by the Engineer shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas so that it can be measured for payment for rehandling as specified in paragraph 3.3.

2. Undercutting. Rock, shale, hardpan, loose rock, boulders, organic material, or other material unsatisfactory for runway safety areas, subgrades, roads, shoulders, or any areas intended for turfing shall be excavated to a minimum depth of twelve inches, or to the depth specified by the Engineer, below the subgrade. Muck, peak, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the plans. This excavated material shall be paid for at the contract unit price per cubic yard for unsuitable excavation. The excavated area shall be refilled with suitable material, obtained from the grading operations or borrow areas, and thoroughly compacted by rolling. The necessary refilling will constitute a part of the embankment. Where rock cuts are made and refilled with selected material, any pockets created in the rock surface shall be drained in accordance with the details shown on the plans.

3. Overbreak. Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Engineer. The Engineer shall determine if the displacement of such material was unavoidable and his/her decision shall be final. All overbreak shall be graded or removed by the Contractor and disposed of as directed; however, payment will not be made for the removal and disposal of overbreak which the Engineer determines as avoidable. Unavoidable overbreak will be classified as "Unclassified Excavation."

4. Removal of Utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by someone other than the Contractor, e.g., the utility unless otherwise shown on the plans. All existing foundations shall be excavated for at least two (2) feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed. All foundations thus excavated shall be backfilled with suitable material and compacted as specified herein.

5. Compaction Requirements. The subgrade under all areas to be paved shall be prepared as follows:

   a. The bottommost six inches of subgrade, as determined from the proposed layout, grading, and pavement sections shown on the plans, shall be compacted as follows:

      (1) Cohesive soils -- 90 per cent of the maximum dry density determined by ASTM D 1557, or

      (2) Non-Cohesive soils -- 95 per cent of the maximum dry density determined by ASTM D 1557.

   b. The topmost twelve inches of subgrade, as determined from the proposed layout, grading, and pavement sections shown on the plans, shall be compacted as follows:

      (1) Cohesive soils -- 95 per cent of the maximum dry density determined by ASTM D 1557, or

      (2) Non-Cohesive soils -- 100 per cent of the maximum dry density determined by ASTM D 1557.

   c. For this contract, cohesive soils shall be defined as those soils having a plasticity index of greater than six (6) when tested in accordance with ASTM D 4318. All other soils, regardless of gradation, shall be defined as non-cohesive.

   d. Excavation, spreading, and compaction of in-place soils will be required to the extent necessary to improve the subgrade to the densities specified above. Such excavation of the subgrade will not be required if the in-place density of the soil is found to meet the requirements above. In no event shall the subgrade density requirements specified above be waived without the expressed written consent of the Engineer. Excavation, placement, and reworking of soils which may be required to meet the density requirements of this section will be paid for as unclassified excavation.

D. The in-place field density shall be determined in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. Stones or rock fragments larger than four inches in their greatest dimension will not be permitted in top six inches of the subgrade. The finished grading operations, conforming to the typical cross section, shall be completed and maintained ahead of the paving operations as appropriate or as directed by the Engineer.

E. In cuts, all loose or protruding rocks on the back slopes shall be bared loose or otherwise removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the Engineer.

F. Blasting will be not permitted on any part of the work.

2.3 DRAINAGE EXCAVATION:

A. Excavation required for the construction of stormwater management basins, temporary or permanent ditches, temporary levee construction, or for any other drainage facilities, as designed or as shown on the plans. The work shall be performed in accordance with the Contractor's approved construction phasing plan and schedule. All satisfactory material excavated shall be placed in fills to the extent required, and unsuitable material shall be removed from airport property. Intercepting or temporary ditches shown on the plans or required by existing conditions to facilitate construction of embankments shall be constructed prior to starting adjacent excavation operations. All necessary work shall be performed to secure a finish true to the lines, elevations, and cross-sections shown on the plans.

B. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

C. The proposed stormwater management basins shown on the plans shall be rough graded to approximately six inches below the final grades and elevations shown on the plans to accommodate the placement of topsoil as specified in Item T-905.

D. Work under this section, including the fine grading of stormwater management basins, shall not be measured separately, but shall be paid for as unclassified excavation.

2.4 STORMWATER MANAGEMENT POND CONSTRUCTION

A. Before beginning pond construction the Contractor shall submit to the Engineer for approval a plan specifying the horizontal and vertical control to be used in constructing each of the proposed stormwater management ponds. Where pond geometry and drainage structures are shown on the plans, they shall be included in the Contractor's grading control plan. This plan shall also include the means by which the control will be maintained throughout construction and shall be prepared by a professional property line surveyor registered in the State of Maryland. All control shall be located outside the limits of the ponds and shall not be altered without the approval of the Engineer.

B. Excavation and grading of the ponds shall be done in accordance with grade staking laid out in accordance with the approved control plan. Any deviations from the approved grading plan shall be approved by the Engineer before being implemented. Fine grading included in the pond construction shall be done to the extent necessary to permit the placement of topsoil in accordance with the provisions of Item T-905.

C. At the completion of fine grading the Contractor shall conduct an as-built survey of the ponds. This survey shall be prepared by a professional property line surveyor registered in the State of Maryland and shall show the proposed grading and drainage structure locations and elevations (from the plans) and the as-constructed conditions, including (at a minimum) the pond grading and drainage structure locations and elevations. Other features, including but not limited to approved revisions to pond control, shall be included. Any discrepancies in the work, as determined by the as-built survey, shall be corrected by the Contractor without delay. Any required re-survey shall be performed to include such corrections. The completed pond plans shall be submitted to the Engineer for approval.

D. Completion of the pond construction, which will include topsoiling, installation of erosion control netting, planting of permanent pond vegetation, and seeding shall be done only after the as-built pond plans have been approved by the Engineer in writing.

E. Work under this section, including the fine grading of stormwater management basins, shall not be measured separately, but shall be paid for as unclassified excavation.

2.5 PREPARATION OF EMBANKMENT AREA:

A. Where an embankment, regardless of height, is to be constructed all sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed, and the cleared surface shall

be completely broken up by plowing or scarifying to a minimum depth of six inches as specified in paragraph 2.2. The area so scarified shall be compacted as specified in section 2.5 below.

C. Where embankments are to be placed on natural slopes steeper than three horizontal to one vertical, horizontal benches shall be constructed as shown on the plans or as necessary to ensure the stability of the embankment as directed by the Engineer.

D. No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and/or stripping and the quantity of excavation removed will be paid for under the respective items of work.

2.6 FORMATION OF EMBANKMENTS:

A. Embankments shall be formed in successive horizontal layers of not more than eight inches in loose depth for the full width of the cross section, unless otherwise approved to the Engineer.

B. The grading operations shall be conducted, and the various soil strata shall be placed, to produce a soil structure a shown on the typical cross section or as directed. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

C. Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, or other unsatisfactory conditions of the field. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.

D. The material in the layer shall be within ± 2 percent of optimum moisture content before rolling to obtain the prescribed compaction. In order to achieve a uniform moisture content throughout the layer, wetting or drying of the material and manipulation shall be required when necessary. Should the material be too wet to permit proper compaction or rolling, all work on all of the affected portions of the embankment shall be delayed until the material has dried to the required moisture content. Sprinkling of dry material to obtain the proper moisture content shall be done with approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times. Samples of all embankment materials for testing, both before and after placement and compaction, will be taken for each 500 cubic yards of embankment placed. Where visibly different materials are used in the same 500 cubic yard portion of embankment each such material shall be sampled and tested. Based on these tests, the Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content in order to achieve the correct embankment density.

E. Rolling operations shall be continued until the embankment is compacted to not less than 95 percent of maximum dry density for noncohesive soils, and 90 percent of maximum dry density for cohesive soils as determined by ASTM D 1557. The final eighteen inches of embankment under all areas to be paved shall be compacted in accordance with the provisions of section 2.2.

F. On all areas outside of the pavement areas, no compaction will be required on the top 4 inches.

G. The in-place field density shall be determined in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. When the nuclear method (ASTM D 2922) is used, the gauge shall be calibrated at least once per day. In addition, when directed by the Engineer, the moisture content of soils tested using the gauge shall be determined by ASTM D 2216. Should the moisture content so determined differ from that determined by the nuclear gauge, the Engineer may order more frequent calibration of the device, replacement with a properly functioning gauge, or determination of in-place moisture content using ASTM D 2216.

H. Compaction areas shall be kept separate, and no layer shall be covered by another until the proper density is obtained.

I. During construction of the embankment, the Contractor shall route his/her equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

J. In the construction of embankments, layer placement shall begin in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished pavement grade line.

K. When rock and other embankment material are excavated at approximately the same, time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated under the future paved areas. Stones or fragmentary rock larger than four inches in their greatest dimensions will not be allowed in the top six inches of the subgrade. Rockfill shall be brought up in layers as specified or as directed and every effort shall be exerted to fill the voids with the finer material forming a dense, compact mass. Rock or boulders shall not be disposed of outside the excavation or embankment areas, except at places and in the manner designated by the Engineer.

L. When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in layers of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in layers not exceeding two feet in thickness. Each layer shall be leveled and smoothed with suitable leveling equipment and by distribution of spalls and finer fragments of rock. These type lifts shall not be constructed above an elevation four feet below the finished subgrade. Density requirements will not apply to portions of embankments constructed of materials which cannot be tested in accordance with specified methods.

M. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material.

N. There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in layers, compacting, disking, watering, mixing, grading, sloping, and other necessary operations for construction of embankments will be included in the contract price for unclassified excavation.

2.7 FINISHING AND PROTECTION OF SUBGRADE:

A. After the subgrade has been substantially completed the full width shall be conditioned by removing any soft or other unstable material which will not compact properly. The resulting areas and all other low areas, holes or depressions shall be brought to grade with suitable select material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans.

B. Grading of the subgrade shall be performed so that it will drain readily. The Contractor shall take all precautions necessary to protect the subgrade from damage. He shall limit hauling over the finished subgrade to that which is essential for construction purposes.

C. All ruts or rough places that develop in a completed subgrade shall be smoothed and recompacted.

D. No subbase, or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer.

2.8 HAUL:

All hauling will be considered a necessary and incidental part of the work. Its cost shall be considered by the Contractor and included in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

2.9 TOLERANCES:

A. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a sixteen-foot straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of one-half inch, or shall not be more than 0.05 foot from true grade as established by grade hubs or pins. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting by sprinkling and rolling.

B. On other areas, the surface shall be of such smoothness that it will not vary more than 0.10 foot from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

2.10 DISPOSITION OF EXCESS EXCAVATION:

A. All excess excavation, regardless of classification, not used in embankments or shoulders in accordance with the plans or the direction of the Engineer shall be disposed aof by the Contractor off airport property. Such removal shall performed in accordance with applicable laws, ordinances, and regulations. Stockpiling of excess excavation prior to removal from the site will be permitted at the location(s) and in the quantities approved by the Engineer. All costs for such removal shall be incidental to the materials excavated as defined in Section 1.2.

2.11 TOPSOIL:

A. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its proper and final section of finished construction, the material shall be stockpiled at locations approved by the Engineer. Stockpiles shall not be placed within 600 feet of runway pavement, 100 feet of taxiway pavement, or at any location and height at which the stockpile would become an obstruction to air navigation as defined in FAR Part 77, Objects Affecting Navigable Airspace. Stockpiles shall not be placed on areas which subsequently will require any excavation or embankment. If, in the judgment of the Engineer, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further rehandling.

B. Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans or as directed by the Engineer, or as required in Item T-905.

C. When stockpiling of topsoil and later rehandling of such material is directed by the Engineer, the material so rehandled shall be paid for at the contract unit price per cubic yard for "Topsoiling," as provided in Item T-905.

152-3 METHOD OF MEASUREMENT

3.1 The quantity of excavation in the various classifications to be paid for shall be the number of cubic yards measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, the quantity of embankment placed, or the quantity of material used for purposes other than those directed.

3.3 Stockpiled stripped topsoil shall be paid for on the basis of the number of cubic yards measured in the stockpiled position as soon as the material has been stockpiled.

3.4 For payment specified by the cubic yard, measurement for all excavation shall be computed by the average end area method. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by the cross-sections shown on the plans, subject to verification by the Engineer. After completion of all earthwork operations and prior to the placing of base or subbase material, the final excavation quantities shall be verified by means of field cross-sections taken randomly at intervals not exceeding fifty linear feet.

Final field cross-sections shall be taken if the following changes have been made:

1. Plan width of embankments or excavations are changed by more than plus or minus 1.0 foot, or

2. Plan elevations of embankments or excavations are changed by more than plus or minus 0.5 foot.

152-4 BASIS OF PAYMENT

4.1 For "Stripping" payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

4.2 For "Unclassified excavation" payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

4.3 For "Unsuitable Excavation" payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-152.1 **Stripping -- per cubic yard**

Item P-152.2 **Unclassified Excavation -- per cubic yard**

Item P-152.3 **Unsutable Excavation -- per cubic yard**

Item P-152.4 **Remove Existing Soil Stockpile -- per cubic yard**

TESTING REQUIREMENTS

ASTM D 698	Tests for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound (2.5 kg) Rammer and 12-inch (300 mm) Drop
ASTM D 1556	Test for Density of Soil In-Place by the Sand Cone Method
ASTM D 1557	Tests for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-pound (4.5 kg) Rammer and 18-inch (45 cm) Drop
ASTM D 2167	Test for Density of Soil In-Place by the Rubber Balloon Method

ASTM D 2922 Test Methods for Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)

ASTM D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils

END OF ITEM P-152

ITEM P-209 CRUSHED AGGREGATE BASE COURSE

209-1 DESCRIPTION

1.1 This item consists of a base course composed of crushed aggregates constructed on a prepared subgrade in accordance with these specifications and in conformity to the dimensions and typical cross sections shown on the plans.

209-2 MATERIALS

2.1 AGGREGATE:

A. Aggregates shall consist of clean, sound, durable particles of crushed stone, crushed gravel, or crushed slag and shall be free from coatings of clay, silt, vegetable matter, and other objectionable materials and shall contain no clay balls. Fine aggregate passing the No. 4 sieve shall consist of fines from the operation of crushing the coarse aggregate. If necessary, fine aggregate may be added to produce the correct gradation. The fine aggregate shall be produced by crushing stone, gravel, or slag that meet the requirements for wear and soundness specified for coarse aggregate.

B. The crushed slag shall be an air-cooled, blast furnace slag and shall have a unit weight of not less than 70 pounds per cubic foot when tested in accordance with ASTM C 29.

C. The crushed aggregate portion which is retained on the No. 4 sieve shall contain not more than 15 percent, by weight, of flat or elongated pieces as defined in ASTM D 693 and shall have at least 90 percent by weight of particles with at least two fractured faces and 100 percent with at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 to count as two fractured faces.

D. The percentage of wear shall not be greater than 45 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 12 percent, after 5 cycles, when tested in accordance with ASTM C 88.

E. The fraction passing the No. 40 sieve shall have a liquid limit no greater than 25 and a plasticity index of not more than 4 when tested in accordance with ASTM D 4318. The fine aggregate shall have a minimum sand equivalent value of 35 when tested in accordance with ASTM D 2419.

1. Sampling and Testing. Aggregates for preliminary testing shall be furnished by the Contractor prior to the start of production. All tests for initial aggregate submittals necessary to determine compliance with the specification requirements will be made by the Engineer at no expense to the Contractor.

Samples of aggregates shall be furnished by the Contractor at the start of production and at intervals during production. The sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval of specific lots of aggregates from the standpoint of the quality requirements of this section.

In lieu of testing, the Engineer may accept certified state test results indicating that the aggregate meets specification requirements.

Samples of aggregates to check gradation shall be taken by the Engineer at least once daily. Sampling shall be in accordance with ASTM D 75, and testing shall be in accordance with ASTM C 136 and C 117.

2. Gradation Requirements. The gradation (job mix) of the final mixture shall fall within the design range indicated in Table 1, when tested in accordance with ASTM C 117 and C 136. The final gradation shall be continuously well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

Table 1
REQUIREMENTS FOR GRADATION OF AGGREGATE

Sieve Size	Design Range Percentage by Weight Passing Sieves	Job Mix Tolerances
2"	100	--
1½"	95-100	±8%
1"	70-95	±8%
¾"	55-85	±8%
No. 4	30-60	±8%
No. 30	12-30	±5%
No. 200	0-8	±3%

The job mix tolerances in Table 1 shall be applied to the job mix gradation to establish a job control grading band. The full tolerance still will apply if application of the tolerances results in a job control grading band outside the design range.

The fraction of the final mixture that passes the No. 200 sieve shall not exceed 60 percent of the fraction passing the No. 30 sieve.

209-3 CONSTRUCTION METHODS

3.1 PREPARING UNDERLYING COURSE:

The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed thereon. Material shall not be placed on frozen subgrade.

3.2 MIXING:

The aggregate shall be uniformly blended during crushing operations or mixed in a plant. The plant shall blend and mix the materials to meet the specifications and to secure the proper moisture content for compaction.

3.3 PLACING:

A. The crushed aggregate base material shall be placed on the moistened subgrade in layers of uniform thickness with a mechanical spreader.

B. The maximum depth of a compacted layer shall be 6 inches (150 mm). If the total depth of the compacted material is more than six inches, it shall be constructed in two or more layers. In multi-layer construction, the base course shall be placed in approximately equal-depth layers.

C. The previously constructed layer should be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

3.4 COMPACTION:

A. Immediately upon completion of the spreading operations, the crushed aggregate shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density.

B. The moisture content of the material during placing operations shall not be below, nor more than 1-1/2 percentage points above, the optimum moisture content as determined by ASTM D 1557.

3.5 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY:

A. Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2000 square yards. A lot will consist of one-half day's production where a day's production is expected to consist of between 2000 and 4000 square yards.

B. Each lot shall be divided into two equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665.

C. Each lot will be accepted for density when the field density is at least 100 percent of the maximum dry density of laboratory specimens prepared from samples of the base course material delivered to the job site. The specimens shall be compacted and tested in accordance with ASTM D 1557, Method D. The in-place field density shall be determined in accordance with ASTM D 1556, ASTM D 2167. If the specified density is not attained, the entire lot shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached.

D. In lieu of the core method of field density determination, acceptance testing may be accomplished using a nuclear gage in accordance with ASTM D 2922. The gage should be field calibrated in accordance with paragraph 4 of ASTM D 2922. Calibration tests shall be conducted on the first lot of material placed that meets the density requirements.

E. Use of ASTM D 2922 results in a wet unit weight, and when using this method, ASTM D 3017 shall be used to determine the moisture content of the material. The calibration curve furnished with the moisture gages shall be checked as described in paragraph 7 of ASTM D 3017. The calibration checks of both the density and moisture gages shall be made at the beginning of a job and at intervals as determined by the Engineer.

F. If a nuclear gage is used for density determination, two random readings shall be made for each sublot.

3.6 FINISHING:

A. The surface of the aggregate base course shall be finished by blading or with automated equipment especially designed for this purpose.

B. In no case will the addition of thin layers of material be added to the top layer of base course to meet grade. If the elevation of the top layer is 1/2 inch or more below grade, the top layer of base shall be scarified to a depth of at least three inches, new material added, and the layer shall be blended and

recompacted to bring it to grade. If the finished surface is above plan grade, it shall be cut back to grade and rerolled.

3.7 SURFACE TOLERANCES:

The finished surface shall not vary more than 3/8 inch when tested with a sixteen-foot straightedge applied parallel with or at right angles to the centerline of course placed. Any deviation in excess of this amount shall be corrected by the Contractor at the Contractor's expense.

3.8 THICKNESS CONTROL:

The completed thickness of the base course shall be within 1/2 inch of the design thickness. Four determinations of thickness shall be made for each lot of material placed. The lot size shall be consistent with that specified in paragraph 3.5. Each lot shall be divided into four equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Where the thickness is deficient by more than 1/2 inch, the Contractor shall correct such areas at no additional cost by excavating to the required depth and replacing with new material. Additional test holes may be required to identify the limits of deficient areas.

3.9 MAINTENANCE:

The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted. Equipment used in the construction of an adjoining section may be routed over completed portions of the base course, provided no damage results and provided that the equipment is routed over the full width of the base course to avoid rutting or uneven compaction.

209-4 METHOD OF MEASUREMENT

4.1 The quantity of crushed aggregate base course to be paid for will be determined by measurement of the number of square yards of material in the various course depths specified actually constructed and accepted by the Engineer as complying with the plans and specifications.

209-5 BASIS OF PAYMENT

5.1 Payment shall be made at the contract unit price per square yard for crushed aggregate base course placed in the course depths specified. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-209.1 **Crushed Aggregate Base Course (12" depth) -- per square yard**

Item P-209.2 **Crushed Aggregate Base Course (14" depth) -- per square yard**

Item P-209.3 **Crushed Aggregate Base Course (15" depth) -- per square yard**

TESTING REQUIREMENTS

ASTM C 29 Unit Weight of Aggregate

ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate

ASTM C 117	Materials Finer than 75um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM D 75	Sampling Aggregate
ASTM D 693	Crushed Stone, Crushed Slag, and Crushed Gravel for Dry-or Water-Bound Macadam Base Courses and Bituminous Macadam Base and Surface Courses of Pavements.
ASTM D 698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in (305mm) Drop
ASTM D 1556	Density of Soil in Place by the Sand Cone Method
ASTM D 1557	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.5kg) Rammer and 18 in (457 mm) Drop
ASTM D 2167	Density of Soil in Place by the Rubber-Ballon Method
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D 3017	Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D 3665	Random Sampling of Paving Materials
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

END OF ITEM P-209

ITEM P-304 CEMENT-TREATED BASE COURSE

304-1 DESCRIPTION

1.1 This item shall consist of a base course composed of mineral aggregate and Portland cement uniformly blended and mixed with water. The mixed material shall be spread, shaped, and compacted in accordance with these specifications and in conformity to the lines, grades, dimensions, and typical cross-sections shown on the plans. Taxiway, apron, roadway pavements shall be built in a series of parallel lanes using a plan of processing that reduces longitudinal and transverse joints to a minimum.

304-2 MATERIALS

2.1 PORTLAND CEMENT:

Portland cement shall conform to the requirements of ASTM C 150, Type I or ASTM C 595.

2.2 WATER:

Water shall be clean, clear, and free from injurious amounts of sewage, oil, acid, strong alkalies, or vegetative matter, and it shall be free from clay or silt. If the water is of questionable quality, it shall be tested in accordance with the requirements of AASHO T 26. Water known to be of potable quality may be used without testing.

2.3 AGGREGATE:

A. The aggregate shall be select granular materials meeting the gradation requirements given in Table 1. The material shall be free of roots, sod, and weeds. The crushed or uncrushed aggregate shall consist of hard, durable particles of accepted quality, free from an excess of flat, elongated, soft, or disintegrated pieces, or objectionable matter. The method used in producing the aggregate shall be such that the finished product shall be as consistent as practicable. All stones and rocks of inferior quality shall be wasted.

B. Aggregates suspected of containing injurious quantities of sulfates shall be examined petrographically in accordance with ASTM C 295.

C. The aggregate shall conform to the gradation shown in Table 1 when tested in accordance with ASTM C 136.

Table 1
AGGREGATE FOR CEMENT-TREATED BASE COURSE

Sieve Designations (square openings)	Percentage by Weight Passing Sieves
¾"	100
No. 4	55-100
No. 10	45-100
No. 40	25-80
No. 80	10-35

D. The gradations in the table represent the limits which shall determine suitability of aggregate for use from the sources of supply. The final gradations decided on, within the limits designated in the table, shall be well graded from coarse to fine and shall not vary form the low limit on one sieve to the high limit on adjacent sieves, or vice versa. The portion of the base aggregate, including any blended material, passing the No. 40 sieve shall have a liquid limit of not more than twenty-five (25) and a plasticity index of not more than six (6) when tested in accordance with ASTM D 4318.

E. The Contractor shall sample and test aggregates, from each source obtained, proposed for use in the work. Sampling shall be in accordance with ASTM D 75 and will be subject to observation by the Engineer. No aggregate shall be used in production of mixtures without prior approval. Should the Contractor elect to supply blended aggregates from more than one source, samples from each source proposed shall tested in accordance with this section and Section 3.1.

2.4 CURING MATERIAL:

A. Curing materials shall be one or more of the following:

1. Water.
2. Burlap.
3. Waterproof paper conforming to the requirements of ASTM C 171.

304-3 CEMENT CONTENT

3.1 Prior to start of work, materials proposed for use in the work shall be sampled and tested by the Contractor to determine the suitability for the proposed use and the quantity of cement required in the mix. The cement content for construction shall be that at which the mix develops a seven-day compressive strength of at least 750 psi **and** the freeze-thaw loss is less than fourteen per cent by weight. The testing procedure shall be as follows:

A. Compressive Strength:

1. Mold five (5) sets of at least two (2) specimens each in accordance with ASTM D 1557, Method C. Specimens shall be prepared using materials meeting the requirements specified herein. The specimens shall be prepared in split or single-piece molds with extensions, resulting in specimens having a height-to-diameter ratio of approximately 1.5. In no case shall the use of tapered molds be permitted. Each set of specimens shall be prepared using cement contents varying by approximately one-half percent by weight, e.g. 6.0%, 6.5%, 7.0%, 7.5%, and 8.0%. The cement contents to be used for this testing shall be at the Contractor's sole discretion.

2. The specimens shall be moist-cured for seven (7) days, then tested for compression strength, both in accordance with ASTM D 1633. Corrections of compressive strength shall be made in accordance with ASTM C 42. Both uncorrected and corrected compressive strengths shall be reported.

B. Freeze-Thaw:

1. An additional five (5) sets of at least two (2) specimens each shall be prepared as in Paragraph 3.1A above and tested for in accordance with ASTM D 560. The size and nature of the particles lost during the testing period shall be noted and reported. The weight of particles lost may also be reported at the Contractor's discretion.

C. In no event shall the same specimens used for freeze-thaw testing be used also for compressive strength testing. Submission of test results and/or data for specimens so used shall be rejected without review by the Engineer, and new specimens shall be made and tested.

D. Results of the completed testing shall be submitted to the Engineer for review and approval. The Engineer shall determine the cement content to be used based on the test results submitted, and such decision shall be final. Should the specimens tested not meet the requirements specified above, the Contractor shall perform additional testing as required to meet the requirements at no additional cost to MAA.

E. No material shall be produced or placed for payment until a mix design is approved by the Engineer.

3.2 For bidding purposes only, the approximate quantity of cement required for this contract shall be based on a cement content of seven (7) per cent, by weight, of cement-treated base course in the various thicknesses and areas to be placed. The actual cement content to be used for the work shall be determined by the Engineer based on the sampling and testing conducted as specified in Section 3.1 above.

304-4 CONSTRUCTION METHODS

4.1 WEATHER LIMITATIONS:

The cement-treated base shall not be mixed or placed while the atmospheric temperature is below 40°F or when conditions indicate that the temperature may fall below 35°F within 24 hours or when the weather is rainy. Cement-treated base shall not be placed on frozen subgrade or mixed when aggregate is frozen.

4.2 OPERATION AT PITS:

A. All work involved in clearing and stripping pits, including handling unsuitable material, shall be performed by the Contractor. The Contractor shall notify the Engineer sufficiently in advance of opening of any designated pit to permit staking of boundaries at the site, to take elevations and measurements of the ground surface before material is produced, to permit the Engineer to take samples of the material for tests to determine its quality and gradation, and to prepare a preliminary design of base mixture.

B. The pits, as utilized, shall be opened immediately to expose vertical faces of the various strata of acceptable material and, unless otherwise directed, the material shall be secured in successive vertical cuts extending through all the exposed strata in order to secure a uniform material.

4.3 PREPARING UNDERLYING COURSE:

The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts of soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected before the base course is placed thereon.

4.4 MIXING:

The aggregate shall be proportioned and mixed with cement and water in a central mixing plant. The plant shall be equipped with feeding and metering devices which will introduce the cement, aggregate, and water into the mixer in the quantities specified. Mixing shall continue until a thorough and uniform mixture has been obtained.

4.5 PLACING:

The mixture shall be transported to the job site in suitable vehicles and shall be deposited on the moistened subbase in uniform layers by means of approved mechanical spreaders. Not more than sixty (60) minutes shall elapse between the start of moist mixing and the start of compaction of the cement-treated mixture on the prepared subgrade.

4.6 COMPACTION:

Immediately upon completion of the spreading operations, the mixture shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density. The field density of the compacted mixture shall be at least 96 percent of the maximum density of laboratory specimens prepared from samples of the cement-treated base material taken from the material in place. The specimens shall be compacted and tested in accordance with ASTM D 1557, Method C. The in-place field density shall be determined in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. Any mixture that has not been compacted shall not be left undisturbed for more than thirty (30) minutes. The moisture content of the mixture at the start of compaction shall not be below nor more than two percentage points above the optimum moisture content. The optimum moisture content shall be determined in accordance with ASTM D 1557 and shall be less than that amount which will cause the mixture to become unstable during compaction and finishing.

4.7 ACCEPTANCE SAMPLING AND TESTING OF CEMENT-TREATED BASE COURSE (COMPACTION):

A. Immediately upon completion of the spreading operations, the mixture shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density. The cement-treated base course shall be accepted for density on a lot basis. A lot will consist of 3000 square yards and will be divided into four equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665.

B. Each lot of compacted material will be accepted, with respect to density, when the average field density is equal to or greater than 96 percent of the maximum density of laboratory specimens prepared form samples of cement-treated base course taken from the material in place.

C. The laboratory specimens shall be compacted and tested in accordance with ASTM D 1557, Method C. The in-place field density shall be determined in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922.

D. The lot will be accepted without adjustment in payment if the average density, based on four acceptance tests of the lot, is greater than or equal to 96 percent. If the average density does not meet this requirement, the Contractor may elect to leave the lot in place at a reduced unit price determined in accordance with Table 2.

Table 2
SLIDING SCALE PAY FACTORS

Average Density	Recommended Payment
96.00 and higher	100%
95.00-95.99	95%
94.00-94.99	90%
93.00-93.99	75%
Lower than 93.00	reject

E. Any mixture that has not been compacted shall not be left undistributed for more than 30 minutes. The moisture content of the mixture at the start of compaction shall not be below nor more than two (2) percentage points above the optimum moisture content. The optimum moisture content shall be

determined in accordance with ASTM D 558 and shall be less than that amount which will cause the mixture to become unstable during compaction and finishing.

4.8 LAYER THICKNESS:

The maximum depth of a compacted layer shall be eight (8) inches, and no layer shall be less than four (4) inches when compacted. In multilayer contruction, the surface of the compacted material shall be kept moist until covered witht he next layer. Successive layers shall be placeed and compacted so that the requried total depth of the base course is completed the same day.

4.9 FINISHING:

Finishing operations shall be completed during daylight hours, and the completed base course shall conform to the required lines, grades, and cross-section. If necessary, the surface shall be lightly scarified to eliminated any imprints made by the compacting or shaping equipment. The surface shall then be recompacted to the required density. The compaction and finishing operations shall be completed withing two (2) hours of the time water is added to the mixture and shall produce a smooth, dense surface that is free of surface checking, tearing, ridges, or loose material.

4.10 SURFACE TOLERANCE:

The finished surface shall not vary more than 3/8 inch when tested with a sixteen-foot straightedge applied parallel with, or at right angles to, the centerline of the base course placed. Any deviation in excess of this amount shall be corrected by the Contractor at his own expense by means approved by the Engineer.

4.11 CONSTRUCTION JOINTS:

A. At the end of each day's construction, a transverse construction joint shall be formed by a header or by cutting back into the compacted material to form a true and stable vertical face free of loose material.

B. Longitudinal joints shall be formed by cutting back into the compacted material to form a true and stable vertical edge free of loose material.

C. Transverse and longitudinal joints shall be sawed only after initial set has occurred, and shall result in minimal unraveling of the edges to remain. Sawing may be done the day after placement, but in any case shall proceed at least 500 feet ahead of successive placement unless otherwise approved by the Engineer.

D. The sawing of transverse and/or longitudinal joints between adjacent placements (e.g. paving lanes) may be waived by the Engineer if the second placement follows the first by less than sixty (60) minutes and, in the Engineer's judgement, the resulting interface between the two placements is a tightly compacted and cemented joint. Such judgement may be based on visual inspection. The Engineer may require verification of this by means of inspecting and testing (in compression) core samples drilled at age fourteen (14) days at randomly selected locations along the joint.

4.12 PROTECTION AND CURING:

A. The completed cement-treated base course shall be cured using one of the methods listed in Section 2.4. Regardless of the curing method selected, the Contractor shall keep the surface of all cement-treated base course placed in a moist condition for the first seven days after placement. The Contractor shall keep a sufficient supply of water on the site at all times for the performance of this work. Water for this purpose only may obtained from designated fire hydrants or other sources on the airport (with the prior approval of the Engineer), or from another source of the Contractor's choosing. Should an on-airport source be used, a fair and reasonable charge may be made to the Contractor for the water used, at MAA's discretion. Such usage may be metered, estimated based on the capacity of the equipment

used, or measured by any means deemed appropriate by the Engineer. At MAA's discretion, monies so charged will be paid directly to MAA or may be deducted from payments due the Contractor over the course of the work.

B. Water for curing the completed cement-treated base course shall be applied by spraying.

C. Finished portions of the base course shall remain undisturbed for the first seven days after placement. that are used by equipment in the construction of an adjoining section shall be protected to prevent marring or damaging the completed work. The stabilized area shall be protected from freezing during the curing period.

304-5 METHOD OF MEASUREMENT

5.1 The quantity of cement-treated base to be paid for will be the number of square yards of base constructed in accordance with the neat lines, grades, and elevations shown on the plans, the provisions of this Item, and accepted by the Engineer.

304-6 BASIS OF PAYMENT

6.1 Payment shall be made at the contract unit price per square yard for the various depths of cement-treated base course specified. This price shall be full compensation for furnishing all materials, and for all preparation, manipulation, and placing of these materials; and for all labor, equirment, tools, and incidentals necessary to complete the item. Costs for furnishing the quantity of Portland cement used shall not be included in this price, but will be paid for as specified in Section 6.2.

Each lot of cement-treated base course will be accepted for density at the full contract unit price when the results of four density tests indicate that the average density is equal to or greater than 96 percent as determined by paragraph 304-4.6. Each lot not meeting this requirement will be accepted at an adjusted contract unit price in accordance with Table 2.

6.2 Payment shall be made at the contract unit price per ton for Portland cement. This price shall be full compensation for furnishing this material; for all delivery to the mixing location, and incorporation of this material; and for all labor, equipment, tools, and incidentals necessary to furnish the item.

Payment will be made under:

Item P-304.1 **Cement-Treated Base Course (6" depth) -- per square yard**

Item P-304.2 **Cement-Treated Base Course (8" depth) -- per square yard**

Item P-304.3 **Portland Cement -- per ton**

TESTING REQUIREMENTS

ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C 295	Petrographic Examination of Aggregates for Concrete
ASTM D 75	Sampling Aggregates
ASTM D 558	Moisture-Density Relations of Soil-Cement Mixtures

ASTM D 560	Freezing-and-Thawing Tests of Compacted Soil-Cement Mixtures
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
ASTM D 1633	Compressive Strength of Molded Soil-Cement Cylinders
ASTM D 2167	Density of Soil in place by the Rubber-Balloon Method
ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D 3665	Random Sampling of Paving Materials
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
AASHTO T 26	Quality of Water to be Used in Concrete

MATERIAL REQUIREMENTS

ASTM C 150	Portland Cement
ASTM C 595	Blended Hydraulic Cements

END OF ITEM P-304

ITEM P-401 PLANT MIX BITUMINOUS PAVEMENTS

401-1 DESCRIPTION

1.1 This item shall consist of a surface and base course composed of mineral aggregate and bituminous material mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, or elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

1.2 The surface course for airfield pavements shown on the plans shall be constructed using the bituminous mixture specified herein. Surface and base courses for roadway and parking lot pavements shall be constructed of Hot Mix Asphalt Surface (SC Type A) and Hot Mix Asphalt Base (BC) in accordance with the State Highway Administration Standard Specifications.

401-2 MATERIALS

2.1 AGGREGATE:

A. Aggregates shall consist of crushed stone, crushed gravel, or crushed slag with or without sand or other inert finely divided mineral aggregate. The portion of materials retained on the No. 8 sieve is coarse aggregate. The portion passing the No. 8 sieve and retained on the No. 200 sieve is fine aggregate, and the portion passing the No. 200 sieve is mineral filler.

B. Coarse Aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from adherent films of matter that would prevent thorough coating and bonding with the bituminous material and be free from organic matter and other deleterious substances. The percentage of wear shall not be greater than forty (40) percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed ten (10) percent, or the magnesium sulfate soundness loss shall not exceed thirteen (13) percent, after five cycles, when tested in accordance with ASTM C 88.

C. Aggregate shall contain at least seventy (70) percent by weight of individual pieces having two or more fractured faces and eighty-five (85) percent by weight having at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces. Fractured faces shall be obtained by crushing.

D. The aggregate shall not contain more than eight (8) percent, by weight, of flat or elongated pieces, when tested in accordance with ASTM D 4791.

E. Slag shall be air-cooled, blast furnace slag, and shall have a compacted weight of not less than seventy (70) pounds per cubic foot when tested in accordance with ASTM C 29.

F. Fine Aggregate. Fine aggregate shall consist of clean, sound, durable, angular shaped particles produced by crushing stone, slag, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter and shall contain no clay balls. The fine aggregate, including any blended material for the fine aggregate, shall have a plasticity index of not more than 6 and a liquid limit of not more than twenty-five (25) when tested in accordance with ASTM D 4318.

G. Natural (nonmanufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. The amount of sand to be added will be adjusted to produce mixtures conforming to requirements of this specification.

H. The aggregate shall have sand equivalent values of 35 or greater when tested in accordance with ASTM D 2419.

I. Sampling. ASTM D 75 shall be used in sampling coarse and fine aggregate, and ASTM C 183 shall be used in sampling mineral filler.

2.2 MINERAL FILLER:

If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D 242.

2.3 BITUMINOUS MATERIAL:

Bituminous material shall conform to the requirements of ASTM D 3381, Grade AC-20.

A. The Contractor shall furnish vendor's certified test reports for each lot of bituminous material shipped to the project. The vendor's certified test report for the bituminous material can be used for acceptance or tested independently by the Engineer.

2.4 PRELIMINARY MATERIAL ACCEPTANCE:

A. Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:

1. Coarse Aggregate.

   (a) Percent of wear.
   (b) Soundness.
   (c) Unit weight of slag.

2. Fine Aggregate.

   (a) Liquid limit.
   (b) Plastic index.
   (c) Sand equivalent.

3. Mineral Filler.

4. Bituminous Material.

The certification(s) shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material meets the specification requirement.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

401-3 COMPOSITION

3.1 COMPOSITION OF MIXTURE:

The bituminous plant mix shall be composed of a mixture of well-graded aggregate, filler if required, and bituminous material. The several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

3.2 JOB MIX FORMULA:

A. No bituminous mixture for payment shall be produced until a job mix formula has been approved by the Engineer. The bituminous mixture shall be designed using procedures contained in Chapter III, MARSHALL METHOD OF MIX DESIGN, of the Asphalt Institute's Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete, and shall meet the requirements of Tables 1 and 2.

B. The design criteria in Table 1 are target values necessary to meet the acceptance requirements contained in paragraph 401-5.2b. The criteria is based on a production process which has a material variability with the following standard deviations:

Stability (lbs.)	=	270
Flow (0.01 in)	=	1.5
Air Voids (%)	=	0.65

C. If material variability exceeds the standard deviations indicated, the job mix formula and subsequent production targets should be based on a stability greater than shown in Table 1, and the flow and air voids should be targeted close to the mid-range of the criteria in order meet the acceptance requirements.

D. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867, is less than 75, the aggregates shall be rejected or the asphalt treated with an approved anti-stripping agent. The amount of anti-stripping agent added to the asphalt shall be sufficient to produce a TSR of not less than 75. If an antistrip agent is required, it will be provided by the Contractor at no additional cost.

E. The job mix formula shall be submitted in writing by the Contractor to the Engineer at least thirty (30) days prior to the start of paving operations and shall include as a minimum:

1. Percent passing each sieve size.
2. Percent of asphalt cement.
3. Asphalt viscosity or penetration grade.
4. Number of blows of hammer compaction per side of molded specimen.
5. Mixing temperature.
6. Compaction temperature.
7. Temperature of mix when discharged from the mixer.
8. Temperature-viscosity relationship of the asphalt cement.
9. Plot of the combined gradation on the Federal Highway Administration (FHWA) 45 power gradation curve.
10. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight verses asphalt content.
11. Percent natural sand.
12. Percent fractured faces.
13. Percent elongated particles.

14. Tensile Strength Ratio (TSR).

15. Antistrip agent (if required).

F. The Contractor shall submit samples to the Engineer, upon request, for job mix formula verification testing.

G. The job mix formula for each mixture shall be in effect until modified in writing by the Engineer. Should a change in sources of materials be made, a new job mix formula must be approved by the Engineer before the new material is used.

Table 1
MARSHALL DESIGN CRITERIA

Test Property	Design Criteria
Number of blows	75
Stability, pounds (minimum)	1800
Flow, 0.01 in.	8-16
Air voids (percent)	3-5
Percent voids in mineral aggregate, minimum	15

H. The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory screens, will conform to the gradation or gradations specified in Table 2 when tested in accordance with ASTM Standard C 136 and C 117.

I. The gradations in Table 2 represent the limits which shall determine the suitability of aggregate for use from the sources of supply. The aggregate, as selected (and used in the JMF), shall have a gradation within the limits designated in Table 2 and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa, but shall be well graded from coarse to fine.

J. Deviations from the final approved mix design for bitumen content and gradation of aggregates shall be within the action limits for individual measurements as specified in paragraph 6.5A. The limits still will apply if they fall outside the master grading band in Table 2.

K. The maximum size aggregate used shall not be more than one-half of the thickness of the course being constructed.

Table 2
AGGREGATE – BITUMINOUS PAVEMENTS

Sieve Size	Percentage by Weight Passing Sieve
¾ inch	100
½ inch	79-99
⅜ inch	68-88
No. 4	48-68
No. 8	33-53
No. 16	20-40
No. 30	14-30
No. 50	9-21
No. 100	6-16
No. 200	3-6
Asphalt percent	5.0-7.5

L. The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute Manual Series No. 2 (MS-2), Appendix A.

3.3 RECYCLED ASPHALT CONCRETE:

A. Recycled asphalt concrete shall consist of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, asphalt cement, and recycling agent, if necessary. Reclaimed asphalt pavement may be used only for base and surface courses of roadway and parking lot pavements as approved by the Engineer. Reclaimed asphalt pavement shall not be permitted on apron or taxiway pavement courses.

B. The RAP shall be of a consistent gradation and asphalt content. The Contractor may obtain the RAP from the job site or an existing source.

C. All new aggregates used in the recycled mix shall meet the requirements of paragraph 2.1. New bituminous material shall meet the requirements of paragraph 2.3. Recycling agents shall meet the requirements of ASTM D 4552.

D. The recycled asphalt concrete mix shall be designed using procedures contained in the Asphalt Institute's Manual Series Number 20 (MS-20), Asphalt Hot-Mix Recycling, in conjunction with MS-2 (MS-2). The job mix shall meet the requirements of paragraph 3.2. In addition to the requirements of paragraph 3.2, the job mix formula shall indicate the percent of reclaimed asphalt pavement, the percent and viscosity grade of new asphalt, the percent and grade of hot-mix recycling agent (if used), and the properties (including viscosity and penetration) of the asphalt blend.

E. The Contractor shall submit documentation to the Engineer, indicating that the mixing equipment proposed for use is adequate to mix the percent of RAP shown in the job mix formula and meet all local and national environmental regulations.

3.4 TEST SECTION:

A. Prior to full production, the Contractor shall prepare and place a quantity of bituminous mixture according to the job mix formula. The amount of mixture should be sufficient to construct a test section 300 feet long and 20 feet wide placed in two lanes, with a longitudinal cold joint, and shall be of the same depth specified for the construction of the course which it represents. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.

B. Three random samples shall be taken at the plant and tested for stability, flow, and air voids in accordance with paragraph 5.1B2. Two random samples of mixture shall be taken at the plant and tested for aggregate gradation and asphalt content in accordance with paragraphs 6.3A and 3B and evaluated in accordance with paragraphs 6.5B1 and B2. Three randomly selected cores shall be taken from the finished pavement mat, and three from the longitudinal joint, and tested in accordance with paragraph 5.1D3. Random sampling shall be in accordance with procedures contained in ASTM D 3665.

C. Mat density and air voids shall be evaluated in accordance with paragraph 5.2I1. Stability and flow shall be evaluated in accordance with paragraph 5.2I2. Joint density shall be evaluated in accordance with paragraph 5.2I3.

D. Voids in the mineral aggregate (VMA), for each plant sample, shall be computed in accordance with procedures contained in Chapter III, MARSHALL METHOD OF MIX DESIGN, of the Asphalt Institute's Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete.

E. The test section shall be considered acceptable if:

1. Marshall stability, flow, mat density, air voids, and joint density are 90 percent or more within limits,

2. Gradation and asphalt content are within the action limits specified in paragraphs 6.5B1 and B2, and

3. The voids in the mineral aggregate is within the limits of Table 1.

F. If the initial test section should prove to be unacceptable, the necessary adjustments to the job mix formula, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that are not acceptable shall be removed at the Contractor's expense. Full production shall not begin until an acceptable section has been constructed and accepted by the Engineer. The initial test section, whether acceptable or unacceptable, and any subsequent section that meets specification requirements shall be paid for in accordance with paragraph 8.1.

G. Job mix control testing shall be performed by the Contractor at the start of plant production and in conjunction with the calibration of the plant for the job mix formula. It should be recognized that the aggregates produced by the plant may not satisfy the gradation requirements or produce a mix that exactly meets the JMF. In those instances, it will be necessary to reevaluate and redesign the mix using

plant-produced aggregates. Specimens should be prepared and the optimum bitumen content determined in the same manner as for the original design tests.

3.5 TESTING LABORATORY:

A. The laboratory used to develop the job mix formula shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements shall be submitted to the Engineer prior to the start of construction. The certification shall contain as a minimum:

1. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

2. A listing of equipment to be used in developing the job mix.

3. A copy of the laboratory's quality control system.

4. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

401-4 CONSTRUCTION METHODS

4.1 WEATHER LIMITATIONS:

The bituminous mixture shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than 45°F. The temperature requirements may be waived by the Engineer, if requested; however, all other requirements including compaction shall be met.

4.2 BITUMINOUS MIXING PLANT:

Plants used for the preparation of bituminous mixtures shall conform to the requirements of ASTM D 995 with the following changes:

A. Truck Scales. The bituminous mixture shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor's expense. Scales shall be inspected and sealed as often as the Engineer deems necessary to assure their accuracy. Scales shall conform to the requirements of the General Provisions, Section 90-01.

B. Testing Facilities. The Contractor shall provide laboratory facilities at the plant for the use of the Engineer's acceptance testing and the Contractor's quality control testing, in accordance with paragraph 6.2.

C. Inspection of Plant. The Engineer, or Engineer's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

D. Storage Bins and Surge Bins. Paragraph 3.9 of ASTM D 995 is deleted. Instead, the following applies. Use of surge bins or storage bins for temporary storage of hot bituminous mixtures will be permitted as follows:

1. The bituminous mixture may be stored in surge bins for period of time not to exceed three (3) hours.

2. The bituminous mixture may be stored in insulated storage bins for a period of time not to exceed 24 hours.

The bins shall be such that mix drawn from them meets the same requirements as mix loaded directly into trucks. If the Engineer determines that there is an excessive amount of heat loss, segregation or oxidation of the mixture due to temporary storage, no overnight storage will be allowed.

4.3 HAULING EQUIPMENT:

Trucks used for hauling bituminous mixtures shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

4.4 BITUMINOUS PAVERS:

A. Bituminous pavers shall be self-propelled, with an activated screed, heated as necessary, and shall be capable spreading and finishing courses of bituminous plant mix material which will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

B. The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

C. If an automatic grade control device is used, the paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent.

D. The controls shall be capable of working in conjunction with any of the following attachments:

1. Ski-type device of not less than thirty (30) feet in length.

2. Taut stringline (wire) set to grade.

3. Short ski or shoe.

4. Laser control.

4.5 ROLLERS:

Rollers of the vibratory, steel wheel, and pneumatic-tired type shall be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the bituminous mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition. The use of equipment which causes excessive crushing of the aggregate will not be permitted.

4.6 PREPARATION OF BITUMINOUS MATERIAL:

The bituminous material shall be heated in a manner that will avoid local overheating and provide a continuous supply of the bituminous material to the mixer at a uniform temperature. The temperature of the bituminous material delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F.

4.7 PREPARATION OF MINERAL AGGREGATE:

The aggregate for the mixture shall be heated and dried prior to introduction into the mixer. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F when the asphalt is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

4.8 PREPARATION OF BITUMINOUS MIXTURE:

The aggregates and the bituminous material shall be weighed or metered and introduced into the mixer in the amount specified by the job mix formula.

The combined materials shall be mixed until the aggregate obtains a uniform coating of bitumen and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95 percent of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all bituminous mix upon discharge shall not exceed 0.5 percent.

4.9 PREPARATION OF THE UNDERLYING SURFACE:

Immediately before placing the bituminous mixture, the underlying course shall be cleaned of all dust and debris. A tack coat shall be applied in accordance with Item P-603.

4.10 TRANSPORTING, PLACING, AND FINISHING:

A. The bituminous mixture shall be transported from the mixing plant to the site in vehicles conforming to the requirements of paragraph 4.3. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Adequate artificial lighting shall be provided night placements. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

B. The Contractor may elect to use a material transfer vehicle to deliver mix to the paver.

C. The mix shall be placed and compacted at a temperature suitable for obtaining density, surface smoothness, and other specified requirements but not less than 250°F.

D. Upon arrival, the mixture shall be placed to the full width by a bituminous paver. It shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the bituminous mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of twelve (15) feet except where edge lanes require less width to complete the area. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least one (1) foot. The joint in the surface top course of designated taxiway and taxilane pavements, however, shall be at the centerline of the pavement. Transverse joints in one course shall be offset by at least ten (10) feet from transverse joints in the previous course.

E. Transverse joints in adjacent lanes shall be offset a minimum of ten (10) feet.

F. On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

4.11 COMPACTION OF MIXTURE:

A. After placing, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be compacted as soon as possible when the mixture has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor.

B. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once.

C. Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained.

D. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened (and scrapers used), but excessive water will not be permitted.

E. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers.

F. Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

4.12 JOINTS:

A. The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

B. The roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods all contact surfaces shall be given a tack coat of bituminous material before placing any fresh mixture against the joint.

C. Longitudinal joints which are irregular, damaged, uncompacted, or otherwise defective shall be cut back to expose a clean, sound surface for the full depth of the course. All contact surfaces shall be given a tack coat of bituminous material prior to placing any fresh mixture against the joint.

401-5 MATERIAL ACCEPTANCE

5.1 ACCEPTANCE SAMPLING AND TESTING:

All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the Engineer at no cost to the Contractor. Testing organizations performing these tests shall meet the requirements of ASTM D 3666. All equipment in Contractor furnished laboratories shall be calibrated by the testing organization prior to the start of operations.

A. Plant-Produced Material. Plant-produced material shall be tested for stability, flow, and air voids on a lot basis. Sampling shall be from material deposited into trucks at the plant or from trucks at the job site. A lot will consist of:

1. One day's production not to exceed 2,000 tons, or

2. A half day's production where a day's production is expected to consist of between 2,000 and 4,000 tons, or

3. Similar subdivisions for tonnages over 4,000 tons.

B. Where more than one plant is simultaneously producing material for the job, the lot sizes shall apply separately for each plant.

1. Sampling. Each lot will consist of four equal sublots. Sufficient material for preparation of test specimens will be sampled by the Engineer on a random basis, in accordance with the procedures contained in ASTM D 3665. One set of laboratory compacted specimens will be prepared for each sublot in accordance with ASTM D 1559, paragraph 4.5, at the number of blows required by paragraph 401-3.2, Table 1. Each set of laboratory compacted specimens will consist of three test portions prepared from the same sample increment.

   The sample of bituminous mixture may be put in a covered metal tin and placed in an oven for not more than thirty (30) minutes to maintain the heat. The compaction temperature of the specimens should be as specified in the job mix formula.

2. Testing. Sample specimens shall be tested for stability and flow in accordance with ASTM D 1559, paragraph 5. Air voids will be determined by the Engineer in accordance with ASTM D 3203.

   Prior to testing, the bulk specific gravity of each test specimen shall be measured by the Engineer in accordance with ASTM D 2726 or D 1188, whichever is applicable, for use in computing air voids and pavement density.

   For air voids determination, the theoretical maximum specific gravity of the mixture shall be measured twice for each lot in accordance with ASTM D 2041, Type C or D container. Samples shall be taken on a random basis in accordance with ASTM D 3665. The value used in the voids computation for each sublot shall be the average of the two maximum specific gravity measurements for the lot.

   The stability, flow, and air voids for each sublot shall be computed by averaging the results of the three test specimens representing that sublot.

3. Acceptance. Acceptance of plant produced material for stability, flow, and air voids shall be determined by the Engineer in accordance with the requirements of paragraph 5.2E.

C. Field Placed Material. Material placed in the field shall be tested for mat and joint density on a lot basis.

1. Mat Density. The lot size shall be the same as that indicated in paragraph 5.1A and shall be divided into four equal sublots. One core of finished, compacted materials shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Cores shall not be taken closer than one foot from a transverse or longitudinal joint.

2. Joint Density. The lot size shall be the total length of longitudinal joints constructed by a lot of material as defined in paragraph 5.1A. The lot shall be divided into four equal sublots.

   One core of finished, compacted materials shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665.

3. Sampling. Samples shall be neatly cut with a core drill. The cutting edge of the core drill bit shall be of hardened steel or other suitable material with diamond chips embedded in the metal cutting edge. The minimum diameter of the sample shall be three inches. Samples that are clearly defective, as a result of sampling, shall be discarded and another sample taken. The Contractor shall furnish all tools, labor, and materials for cutting samples and filling the cored pavement. Cored holes shall be filled in a manner acceptable to the Engineer and within one day after sampling.

4. Testing. The bulk specific gravity of each cored sample will be measured by the Engineer in accordance with ASTM D 2726 or D 1188, whichever is applicable. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the average bulk specific gravity of all laboratory prepared specimens for the lot, as determined in paragraph 5.1B2.

5. Acceptance. Acceptance of field placed material for mat density will be determined by the Engineer in accordance with the requirements of paragraph 5.2F. Acceptance for joint density will be determined in accordance with the requirements of paragraph 5.2G.

D. Partial Lots, Plant-Produced Material. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, the following procedure will be used to adjust the lot size and the number of tests for the lot.

   The last batch produced where production is unexpectedly halted will be sampled and its properties shall be considered as representative of the particular sublot from which it was taken. Where three sublots are produced, they shall constitute a lot. Where one or two sublots are produced, they shall be incorporated into the next lot and the total number of sublots shall be used in the acceptance plan calculation, i.e., $n = 5$ or $n = 6$, for example.

E. Partial Lots, Field-Placed Material. The lot size for field placed material shall correspond to that of the plant material, except that in no cases less than (3) cored samples shall be obtained, i.e., $n = 3$.

5.2 ACCEPTANCE CRITERIA:

A. General. Acceptance will be based on the following characteristics of the bituminous mixture and completed pavement as well as the implementation of the Contractor's Quality Control plan and test results:

1. Stability
2. Flow
3. Air voids
4. Mat density
5. Joint density
6. Thickness
7. Smoothness
8. Grade

B. Stability, flow, and air voids will be evaluated for acceptance in accordance with paragraph 5.2E. Mat density will be evaluated for acceptance in accordance with paragraph 5.2F. Joint density will be evaluated for acceptance in accordance with paragraph 5.2G.

C. Acceptance for mat density and air voids will be based on the criteria contained in paragraph 5.2I1. Acceptance for stability and flow will be based on the criteria contained in paragraph 5.2I2. Acceptance for joint density will be based on the criteria contained in paragraph 5.2I3. Thickness will be evaluated by the Engineer for compliance in accordance with paragraph 5.2I4. Acceptance for smoothness will be based on the criteria contained in paragraph 5.2I5. Acceptance for grade will be based on the criteria contained in paragraph 5.2I6.

D. The Engineer may at any time, not withstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of bituminous mixture which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or improper mix temperature. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if he can demonstrate in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

E. Stability, Flow, Air Voids. Acceptance of each lot of plant produced material for stability, flow, and air voids shall be based on the percentage of material within specification limits (PWL). The PWL plan considers the variability (standard deviation) of the material and the testing procedures, as well as the average (mean) value of the test results. If a material with high variability is produced, the production target must be adjusted as outlined in paragraph 3.2 to achieve a PWL of 90 or more.

F. Mat Density. Acceptance of each lot of in-place pavement for mat density shall be based on the percentage of material within specification limits (PWL). If a material with high variability is produced, then a higher target density must be maintained in order to achieve a PWL of 90 or more.

G. Joint Density. Acceptance of each lot of in-place pavement for joint density shall be based on the percentage of material within specification limits (PWL). If a material with high variability is produced, then a higher target density must be maintained in order to achieve a PWL of 90 or more.

H. Percentage of Material Within Specification Limits (PWL). The percentage of material within specification limits (PWL) shall be determined in accordance with procedures specified in Section 110, of these Technical Specifications. The specification tolerance limits (L) and (U) are contained in Table 3.

I. Acceptance Criteria.

1. Mat Density and Air Voids. If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. If the PWL is less than 90 percent, payment shall be made in accordance with paragraph 8.1A.

2. Stability and Flow. If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. If the PWL is less than 90 percent, the Contractor shall determine the reason and take corrective action. If the PWL is below 80 percent, the Contractor must stop production and make adjustments to the mix.

3. Joint Density. If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. If the PWL is less than 90 percent, the Contractor shall evaluate the method of compacting joints. If the PWL is below 80 percent, the Contractor shall stop production until the reason for poor compaction can be determined.

4. Thickness. Thickness shall be evaluated for compliance by the Engineer to the requirements shown on the plans. Measurements of thickness shall be made by the Engineer using the cores extracted for each sublot for density measurement.

5. Smoothness. The finished surfaces of the pavement shall not vary more than 1/4 inch for the surface course or 3/8 inch for the base course when tested with a twelve-foot straightedge. The lot size shall be 2000 square yards. Measurements will be made perpendicular and parallel to the centerline (or direction of paving) at distances not to exceed 50 feet. When more than 15 percent of all measurements within a lot exceed the specified tolerance, the Contractor shall remove the deficient area and replace with new material. Sufficient material shall be removed to allow placement of the minimum mat thickness specified in paragraph 4.10C. Skin patching shall not be permitted. High points may be ground off.

6. Grade. The finished surface of the pavement shall not vary from the gradeline elevations and cross sections shown on the plans by more than ½ inch. The finished grade of each lot will be determined by running levels at intervals of 50 feet or less longitudinally and transversely to determine the elevation of the completed pavement. The lot size shall be 2000 square yards. When more than 15 percent of all the measurements within a lot are outside the specified tolerance, the Contractor shall remove the deficient area and replace with new material. Sufficient material shall be removed to allow placement of the minimum mat thickness specified in paragraph 4.10C. Skin patching for correcting low areas shall not be permitted. High points may be ground off.

Table 3
ACCEPTANCE LIMITS FOR STABILITY, FLOW, AIR VOIDS, AND DENSITY

Test Property	Specification Tolerance	
	L	U
Number of Blows	75	--
Stability, pounds, minimum	1800	--
Flow, 0.01 inch	8	16
Air voids total mix	2.0%	5.0%
Density	96.3%	--
Joint density	93.3%	--

5.3 RESAMPLING PAVEMENT:

A. General. Resampling of a lot of pavement for mat density will be allowed if the Contractor requests, in writing, within 48 hours after receiving the written test results from the Engineer. A retest will consist of all the sampling and testing procedures contained in paragraphs 5.1C and 5.2F. Only one resampling per lot will be permitted.

1. A redefined PWL shall be calculated for the resampled lot. The number of tests used to calculate the redefined PWL shall include the initial tests made for that lot plus the retests.

2. The cost for resampling and retesting shall be borne by the Contractor.

B. Payment for Resampled Lots. The redefined PWL for a resampled lot shall be used to calculate the payment for that lot in accordance with Table 6.

C. Outliers. If the tests within a lot include a very large or a very small value which appears to be outside the normal limits of variation, check for an outlier in accordance with ASTM E 178, at a significance level of 5 percent, to determine if this value should be discarded when computing the PWL.

401-6 CONTRACTOR QUALITY CONTROL

6.1 GENERAL:

The Contractor shall develop a Quality Control Program in accordance with Section ISPA-1.15 of Part V, Interim Standard Provisions Addenda, of the Technical Provisions. The program shall address all elements which affect the quality of the pavement including, but not limited to:

A. Mix Design
B. Aggregate Grading
C. Quality of Materials
D. Stockpile Management
E. Proportioning
F. Mixing and Transportation
G. Placing and Finishing
H. Joints
I. Compaction
J. Surface smoothness

6.2 TESTING LABORATORY:

A. The Contractor shall provide a fully equipped asphalt laboratory located at the plant or job site. It shall be available for joint use by the Contractor for quality control testing and by the Engineer for acceptance testing and must have adequate equipment for the performance of the tests required by these specifications. The Engineer shall have priority in use of the equipment necessary for acceptance testing.

B. The effective working area of the laboratory shall be a minimum of 150 square feet with a ceiling height of not less than 7.5 feet. Lighting shall be adequate to illuminate all working areas. It shall be equipped with heating and air conditioning units to maintain a temperature of 70°F ± 5°.

C. Laboratory facilities shall be kept clean and all equipment shall be maintained in proper working condition. The Engineer shall be permitted unrestricted access to inspect the Contractor's laboratory facility and witness quality control activities. The Engineer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

6.3 QUALITY CONTROL TESTING:

The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to these specifications and as set forth in the Quality Control Program. The testing program shall include, but not necessarily limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

A. Asphalt Content. A minimum of two extraction tests shall be performed per lot in accordance with ASTM D 2172 for determination of asphalt content. The weight of ash portion of the extraction test, as described in ASTM D 2172, shall be determined as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture.

The use of the nuclear method for determining asphalt content in accordance with ASTM D 4125 is permitted, provided that it is calibrated for the specific mix being used.

B. Gradation. Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with AASHTO T 30 and ASTM C 136 (Dry Sieve). When asphalt content is determined by the nuclear method, aggregate gradation shall be determined from hot bin samples on batch plants, or from the cold feed on drum mix or continuous mix plants, and tested in accordance with ASTM C 136 (dry sieve) using actual batch weights to determine the combined aggregate gradation of the mixture.

C. Moisture Content of Aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

D. Moisture Content of Mixture. The moisture content of the mixture shall be determined once per lot in accordance with ASTM D 1461.

E. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the bitumen in the storage tank, the mixture at the plant, and the mixture at the job site.

F. In-Place Density Monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D 2950.

G. Additional Testing. Any additional testing that the Contractor deems necessary to control the process may be performed at the Contractor's option.

H Monitoring. The Engineer reserves the right to monitor any or all of the above testing.

6.4 SAMPLING:

When directed by the Engineer, the Contractor shall sample and test any material which appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

6.5 CONTROL CHARTS:

A. The Contractor shall maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for aggregate gradation and asphalt content.

B. Control charts shall be posted in a location satisfactory to the Engineer and shall be kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the Engineer may suspend production or acceptance of the material.

1. Individual Measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation and asphalt content. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

Table 4
CONTROL CHART LIMITS FOR INDIVIDUAL MEASUREMENTS

Sieve Opening	Action Limit	Suspension Limit
¾ inch	0%	0%
½ inch	±6%	±9%
⅜ inch	±6%	±9%
No. 4	±6%	±9%
No. 16	±5%	±7.5%
No. 50	±13%	±4.5%
No. 200	±2%	±3%
Asphalt Content	±0.5%	±0.7%

2. Range. Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed for each lot as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

Table 5
CONTROL CHART LIMITS BASED ON RANGE
(Based on n = 2)

Sieve Opening	Suspension Limit
½ inch (12.5 mm)	11%
⅜ inch (9.5 mm)	11%
No. 4 (4.75 mm)	11%
No. 16 (1.18 mm)	9%
No. 50 (0.30 mm)	6%
No. 200 (0.075 mm)	3.5%
Asphalt Content	0.8%

3. Corrective Action. The Quality Control Plan shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a

process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

a. One point falls outside the Suspension Limit line for individual measurements or range; or

b. Two points in a row fall outside the Action Limit line for individual measurements.

401-7 METHOD OF MEASUREMENT

7.1 Plant mix bituminous concrete pavement shall be measured by the number of tons used in the accepted work. Quantities of the various bituminous mixtures, i.e. P-401, MSHA surface and base course, shall be measured and recorded separately. Recorded batch weights or truck scale weights will be used to determine the basis for the tonnage.

401-8 BASIS OF PAYMENT

8.1 Payment for an accepted lot of bituminous concrete pavement shall be made at the contract unit price per ton for bituminous mixture adjusted according to paragraph 401-8.1A. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

A. Basis of Adjusted Payment. Each lot shall be accepted at the full contract price when the percent within limits (PWL) for mat density and air voids equals or exceeds 90 percent. Each lot not meeting the 90 percent PWL requirement will be accepted at an adjusted contract unit price in accordance with Table 6. Payment shall be calculated for both mat density and air voids, and payment shall be based on the lower of the two values.

Table 6
PRICE ADJUSTMENT SCHEDULE

Percentage of Material Within the Specification Limit	Percent of Contract Unit Price to be Paid
90-100	100
80-90	0.5×PWL + 55.0
65-80	2.0×PWL - 65.0
below 65	see note below

Note: The lot shall be removed and replaced. However, the Engineer may decide to accept the deficient lot. In that case, if the Engineer and Contractor agree in writing that the lot shall not be removed it will be paid for at fifty (50) percent of the contract price.

Payment will be made under:

Item P-401.1 **Airfield Bituminous Surface Course -- per ton**

Item P-401.2 **MSHA Hot Mix Asphalt Surface Course (SC) -- per ton**

TESTING REQUIREMENTS

ASTM C 29	Unit Weight of Aggregate
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Test Method for Materials Finer than 75-um (No.200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C 183	Sampling Hydraulic Cement
ASTM C 566	Total Moisture Content of Aggregate by Drying
ASTM D 75	Sampling Aggregates
ASTM D 995	Requirements for Mixing Plants for Hot-Mixed Hot-Laid Bituminous Paving Mixtures
ASTM D 118	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1461	Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 1559	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2489	Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 2726	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Method
ASTM D 3665	Random Sampling of Paving Materials
ASTM D 3666	Inspection and Testing Agencies for Bituminous Paving Materials
ASTM D 4125	Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 4791	Flat or Elongated Particles in Coarse Aggregate
ASTM D 4867	Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM E 178	Practice for Dealing With Outlying Observations
AASHTO T 30	Mechanical Analysis of Extracted Aggregate
Asphalt Institute Manual No. 2 (MS-2)	Mix Design Methods for Asphalt Concrete
Asphalt Institute Manual No. 20 (MS-20)	Hot-Mix Recycling

MATERIAL REQUIREMENTS

ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
ASTM D 946	Asphalt Cement for Use in Pavement Construction
ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 4552	Classifying Hot-Mix Recycling Agents

END OF ITEM P-401

ITEM P-603 BITUMINOUS TACK COAT

603-1 DESCRIPTION

1.1 This item shall consist of preparing and treating a bituminous, aggregate subbase, or concrete surface with bituminous material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

603-2 MATERIALS

2.1 BITUMINOUS MATERIALS:

The bituminous material shall be either cutback or emulsified asphalt tar and shall conform to the requirements of Table 1. The type, grade, controlling specification, and application temperature of bituminous material to be used shall be specified by the Engineer.

Table 1
BITUMINOUS MATERIAL

Type and Grade	Specification	Application Temperature (°F)
Emulsified Asphalt		
SS-1, SS-1h	ASTM D 977	75-130
CSS-1, CSS-1h	ASTM D 2397	75-130
Cutback Asphalt		
RC-70	ASTM D 2028	120-160

603-3 CONSTRUCTION METHODS

3.1 WEATHER LIMITATIONS:

The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is above 60°F. The temperature requirements may be waived, but only when so directed by the Engineer.

3.2 EQUIPMENT:

A. The Contractor shall provide equipment for heating and applying the bituminous material.

B. The distributor shall be designed, equipped, maintained, and operated so that bituminous material at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10 percent. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

C. A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

3.3 APPLICATION OF BITUMINOUS MATERIAL:

A. Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or airblast to remove all loose dirt and other objectionable material.

B. Emulsified asphalt shall be diluted by the addition of water when directed by the Engineer and shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before any of the overlying mixture is placed on the tacked surface.

C. The bituminous material including vehicle or solvent shall be uniformly applied with a bituminous distributor at the rate of 0.05 to 0.15 gallons per square yard depending on the condition of the existing surface. The type of bituminous material and application rate shall be approved by the Engineer prior to application.

D. Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit drying out and setting of the tack coat. This period shall be determined by the Engineer. The surface shall then be maintained by the Contractor until the next course has been placed. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

3.4 BITUMINOUS MATERIAL-CONTRACTOR'S RESPONSIBILITY:

A. Samples of the bituminous material that the Contractor proposes to use, together with a statement as to its source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the bituminous material to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials so demonstrated by service tests, shall be acceptable.

B. The Contractor shall furnish the vendor's certified test reports for each carload, or equivalent, of bituminous material shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the bituminous material shall not be interpreted as a basis for final acceptance. All such test reports shall be subject to verification by testing samples of material received for use on the project.

3.5 FREIGHT AND WEIGH BILLS:

Before the final estimate is allowed, the Contractor shall file with the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the bituminous materials actually used in the construction covered by the contract. The Contractor shall not remove bituminous material from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer. Copies of freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

603-4 METHOD OF MEASUREMENT

4.1 The bituminous material for tack coat shall be measured by the gallon. Volume shall be corrected to the volume at 60°F in accordance with ASTM D 1250 for cutback asphalt and Table IV-3 of The Asphalt Institute's Manual MS-6 for emulsified asphalt. Water added to emulsified asphalt will not be measured for payment.

603-5 BASIS OF PAYMENT

5.1 Payment shall be made at the contract unit price per gallon of bituminous material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-603.1 **Bituminous Tack Coat – per gallon**

MATERIAL REQUIREMENTS

ASTM D 633	Volume Correction Table for Road Tar
ASTM D 977	Emulsified Asphalt
ASTM D 1250	Petroleum Measurement Tables
ASTM D 2028	Liquid Asphalt (Rapid-Curing Type)
ASTM D 2397	Cationic Emulsified Asphalt
AASHTO M 52	Tar for Use in Road Construction
Asphalt Institute Manual MS-6 Table IV-3	Temperature-Volume Corrections for Emulsified Asphalts

END OF ITEM P-603

ITEM P-605 JOINT SEALING FILLER

605-1 DESCRIPTION

1.1 This item shall consist of providing and installing a silicone sealant capable of sealing joints in bituminous and Portland cement concrete pavements.

605-2 MATERIALS

2.1 JOINT SEALANT:

A. Silicone sealant (non-acid curing) material shall meet the requirements shown in Table 1.

Table 1
SILICONE SEALANT REQUIREMENTS

Test	Test Method	Requirement
Flow	MIL-S-8802	0.3 maximum
Tack-Free Time	MIL-S-8802	90 minutes maximum
Durometer Hardness[1]	ASTM D 2240	10-25
Modulus at 150% elongation[1]	ASTM D 412 (Die C)	75 psi maximum
Elongation[1]	ASTM D 412 (Die C)	800% minimum
Adhesion to Concrete	MIL-S-8802	20 pounds minimum
Movement	ASTM C 719	±50% minimum

[1] Sample cured seven days at 77°F ± 2°F and 50% ± 5% relative humidity.

B. Each lot or batch of sealing compound shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, shelf life, and storage instructions. In addition, the Contractor shall supply the manufacturer's certification stating that the compound meets the requirements of this specification.

2.2 BACKER ROD:

The backer rod shall be a non-moisture absorbing resilient material. The rod shall be compatible with the sealant and no bond or reaction shall occur between the rod and the sealant.

605-3 CONSTRUCTION METHODS

3.1 WEATHER LIMITATIONS:

Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be above 40°F at the time of installation of the joint sealant.

3.2 EQUIPMENT:

A. Air Compressor. Air compressors shall be equipped with suitable traps capable of removing all free water and oil from the compressed air and shall be capable of furnishing air with a pressure greater than 90 psi.

B. Extrusion Equipment. Cold applied joint sealing compound shall be applied by means of pressure equipment that will force the sealing material to the bottom of the joint and completely fill the joint without voids and without spilling the material on the surface of the pavement. Before sealing the joints, the Contractor shall demonstrate that the equipment and procedures for preparing, mixing, and placing the sealant will produce a satisfactory joint seal.

3.3 PREPARATION OF JOINTS:

A. Immediately after joint sawing is completed, any resulting cement slurry shall be completely removed from the joints by water washing followed by brushing, if required. Joints shall then be blown clean and dry with compressed air. Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the Engineer before work may continue.

B. Backer rod shall then be installed. When the surfaces are clean and dry, and just prior to placement of the sealant, compressed air shall be used to blow out the joint and remove all residual dust. Joints shall then be inspected by the Engineer and approved before sealing may begin.

3.4 INSTALLATION OF SEALANTS:

A. Sealant shall be installed in a continuous operation and shall adhere to the concrete and be free of voids. The sealant shall be tooled as necessary to produce a concave surface shown on the plans. Tooling shall be completed before the initial skin forms on the surface of the sealant.

B. Sealant which does not bond to joint walls, contains voids, or fails to set to a tack-free condition will be rejected and replaced by the Contractor at his own expense.

605-4 METHOD OF MEASUREMENT

4.1 There will be no direct measurement for payment of the quantity of joint sealant used. All costs for joint sealant shall be incidental to the various items being sealed.

605-5 BASIS OF PAYMENT

5.1 There will be no direct payment for the work done under this Item. All costs for preparing joints, furnishing and installing backer rod and sealant, and other materials, labor, equipment, and other incidentals necessary to complete the item shall be incidental to the various items being sealed.

MATERIAL REQUIREMENTS

FAA Engineering Brief Number 36 — **Silicone Joint Sealants for Airfield Pavements**

END OF ITEM P-605

ITEM P-610 PORTLAND CEMENT CONCRETE

610-1 DESCRIPTION

1.1 This item shall consist of plain and reinforced Portland cement concrete and structures, prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans.

1.2 This item shall also consist of plain and reinforced Portland cement concrete pavement, prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans.

610-2 MATERIALS

2.1 GENERAL:

A. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. Representative preliminary samples of the materials shall be sampled and tested by the Contractor. Materials shall be stored and handled to insure the preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed therein.

B. In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

C. In lieu of further requirements, locally availble concrete of the strengths specified herein will be accepted provided 28-day compressive strength test results, actual mix designs, and material certifications are submitted and approved by the Engineer. This provision shall also apply to concrete used in the construction of airfield pavements, except that approval for use shall be based on the flexural strength requirements contain herein.

D. Prior to the use of materials the Contractor shall submit certified test reports to the Engineer for approval. The certifications shall show the appropriated ASTM tests for each material, the test results, acceptance criteria, and a statement that the material passed or failed.

2.2 COARSE AGGREGATE:

A. The coarse aggregate for concrete shall meet the requirements of ASTM C 33.

B. Coarse aggregate shall be well graded from coarse to fine and shall meet one of the gradations shown in Table 1, using ASTM C 136.

2.3 FINE AGGREGATE:

A. The fine aggregate for concrete shall meet the requirements of ASTM C 33.

B. The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of Table 2, when tested in accordance with ASTM C 136.

Table 1
GRADATION FOR COARSE AGGREGATE

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
1 inch	100
3/4 inch	90-100
3/8 inch	20-55
No. 4	0-10

Table 2
GRADATION FOR FINE AGGREGATE

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
3/8 inch	100
No. 4	95-100
No. 16	45-80
No. 30	25-55
No. 50	10-30
No. 100	2-10

C. Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, provided that such deficiency does not exceed 5% and is remedied by the addition of pozzolanic or cementitious materials other than portland cement, as specified in paragraph 2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

2.4 CEMENT:

A. Cement shall conform to the requirements of ASTM C 150, Type I or ASTM C 595.

B. The Contractor shall furnish vendors' certified test reports for the cement proposed for use. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

2.5 WATER:

The water used in concrete shall be free from sewage, oil, acid, strong alkalies, vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested in accordance with AASHO T 26. Water known to be of potable quality may be used without testing.

2.6 ADMIXTURES:

A. The use of any material added to the concrete mix shall be approved by the Engineer. Before approval of any material, the Contractor shall be required to submit the results of complete physical and chemical analyses made by an acceptable testing laboratory. Subsequent tests shall be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

B. Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolans meeting the requirements of ASTM C 618.

C. Air-entraining admixtures shall meet the requirements of ASTM C 260. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

D. Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C 494, Type A, water-reducing or Type D, water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions.

2.7 PREMOLDED JOINT MATERIAL:

Premolded joint material for expansion joints shall meet the requirements of ASTM D 1752. Premolded joint material meeting the requirements of ASTM D 1751 shall be used only for expansion joints in concrete curb or curb and gutter.

2.8 JOINT SEALANT:

Joint sealant shall meet the requirements of Item P-605.

2.9 STEEL REINFORCEMENT:

Reinforcing shall consist of deformed bars conforming to the requirements of ASTM A 615, Grade 60. Tie bars used in the construction of concrete pavement may be of Grade 40 steel at the Contractor's option.

2.10 COVER MATERIALS FOR CURING:

Curing materials shall conform to one of the following specifications:

Waterproof paper for curing concrete	ASTM C 171
Polyethylene Sheeting for Curing Concrete	ASTM C 171
Liquid Membrane-Forming Compounds for Curing Concrete	ASTM C 309, Type 2

610-3 CONSTRUCTION METHODS

3.1 GENERAL:

The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified herein. All machinery and equipment owned or controlled by the Contractor, which he proposes to use on the work, shall be of sufficient size to meet the requirements of the work, and shall be such as to produce satisfactory work; all work shall be subject to the inspection and approval of the Engineer.

3.2 CONCRETE COMPOSITION:

A. Structural Concrete. The concrete shall develop a compressive strength of 4000 psi in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Concrete for items specified elsewhere in these Technical Requirements shall meet the requirements of this paragraph, except the strength of the concrete used may be as specifically provided for the item to be constructed. The concrete shall contain not less than 470 pounds of cement per cubic yard, and shall contain five (5) percent of entrained air, plus or minus one (1) percent, as determined by ASTM C 231. Fresh concrete shall have a slump of not more than four (4) inches as determined by ASTM C 143.

B. Pavement Concrete. The concrete shall be designed achieve a flexural strength of 650 psi at an age of twenty-eight (28) days. The mix shall contain a minimum of 500 pounds of cement per cubic yard, and the water-cement ratio shall not exceed 0.50 by weight. The Contractor shall submit to the Engineer for approval a mix design showing the proportions and flexural strength obtained from the concrete at ages of seven (7) and twenty-eight (28) days. Flexural strength specimens shall be prepared in accordance with ASTM C 31 and tested in accordance with ASTM C 78. The mix shall be a workable concrete having a slump between one and two inches as determined by ASTM C 143 and an entrained air content of between 4.5 and 6.5 per cent when tested in accordance with ASTM C 173 or ASTM C 213.

C. The mix designs shall include copies of test reports, including test dates, and shall include complete lists of the materials and proportions used and the results of tests conducted on the fresh concrete and compressive and flexural specimens prepared. The mix design and test results shall be submitted to the Engineer at least fifteen (15) days prior to anticipated use. Production shall not begin until the mix designs are approved in writing by the Engineer.

3.3 ACCEPTANCE SAMPLING AND TESTING:

A. Concrete for each structure will be accepted on the basis of the compressive strength specified in paragraph 3.2. The concrete shall be sampled in accordance with ASTM C 172. Compressive strength specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

B. Concrete used in constructing apron pavements will be accepted on the basis of the flexural strength specified in paragraph 3.2. The concrete shall be sampled in accordance with ASTM C 172. Flexural strength specimens shall be prepared in accordance with ASTM C 31 and tested in accordance with ASTM C 78.

3.4 PROPORTIONING AND MEASURING DEVICES:

When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

3.5 CONSISTENCY:

The consistency of the concrete shall be checked by the slump test specified in ASTM C 143.

3.6 MIXING:

Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C 94.

3.7 MIXING CONDITIONS:

A. The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F without permission of the Engineer. If permission is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F nor more than 100°F. The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his/her expense.

B. Retempering of concrete by adding water or any other material shall not be permitted.

C. The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

3.8 FORMS:

A. Concrete shall not be placed until all the forms and reinforcement have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as designed on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes.

B. Internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a nonstaining mineral oil which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least thirty (30) hours from vertical faces, walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 60% of the design strength of the concrete has developed.

3.9 PLACING REINFORCEMENT:

All reinforcement, including tie bars and smooth dowels, shall be accurately placed, as shown on the plans, and shall be firmly held in position during concreting. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

3.10 EMBEDDED ITEMS:

Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood shall be avoided. The concrete shall be spaded and thoroughly consolidated around and against embedded items.

3.11 PLACING CONCRETE:

A. All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than one (1) hour after water has been added to the mix. Fresh concrete which is older than one hour or which has reached a temperature of 90°F shall be rejected. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than five (5) feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from standing or running water, or upon properly consolidated soil.

B. The concrete shall be consolidated with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate consolidation. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish consolidation but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully

placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

3.12 CONSTRUCTION JOINTS:

When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, and splicing of reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete which has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste, grout, or other approved bonding agent.

3.13 EXPANSION JOINTS:

Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

3.14 SAWED JOINTS:

Contraction joints in concrete pavement shall be sawed. Saws used shall be adequate for cutting hardened concrete and capable of cutting a groove in a straight line, producing a slot at least 1/8 inch wide to the depth shown on the plans. Sawing shall commence as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and before uncontrolled shrinkage cracking of the pavement occurs. Should such uncontrolled cracking occur, the concrete shall be removed and replaced as directed by the Engineer.

3.14 DEFECTIVE WORK:

Any defective work disclosed after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

3.15 SURFACE FINISH:

A. All exposed concrete surfaces shall be true, smooth, free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck-off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces. Excessive amounts of water shall not be permitted during floating and finishing work

B. When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

3.16 CURING AND PROTECTION:

All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete

shall be cured as soon as it has sufficiently hardened by covering with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least 3 days. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has been placed.

3.17 DRAINS OR DUCTS:

Pipe, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

3.18 COLD WEATHER PROTECTION:

A. When concrete is placed at temperatures below 40°F, the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50°F and 100°F.

B. Calcium chloride may be incorporated in the mixing water only when previously approved and as directed by the Engineer. Not more than 2 pounds of Type 1 nor more than 1.6 pounds of Type 2 calium chloride shall be added per bag of cement. After the concrete has been placed, the Contractor shall provide sufficient protection such as cover, canvas, framework, heating apparatus, etc., to enclose and protect the structure and maintain the temperature of the mix at not less than 50°F until at least 60% of the designed strength has been attained.

3.19 FILLING JOINTS:

All joints which require sealing shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint sealing shall not be started until after final curing has occurred and shall be done only when the concrete is completely dry. Joint cleaning and sealing shall be done in accordance with the provisions of Item P-605.

610-4 METHOD OF MEASUREMENT

4.1 There will be no direct measurement for payment of the quantity of Portland cement concrete, reinforcing steel, and other incidental items used in the work except as specifically provided in this Item. Concrete used in the construction of items specified elsewhere in the several Items of these Technical Requirements shall be incidental to the items to be constructed, unless specified otherwise.

4.2 The quantity of concrete curb and curb and gutter to be paid for will be measured by the number of lineal feet of each constructed as shown on the plans and accepted by the Engineer.

4.3 The quantity of concrete utility encasement to be paid for shall be the number of cubic yards of concrete utility encasement placed in accordance with the plans and accepted by the Engineer.

4.4 The quantity of Portland cement concrete pavement to be paid for shall be the number of square yards of concrete pavement placed in accordance with the neat lines shown on the plans and accepted by the Engineer.

610-5 BASIS OF PAYMENT

5.1 Payment shall be made at the contract unit price per lineal foot for concrete curb and curb and gutter. These prices shall be full compensation for furnishing all materials and for all preparation, delivering, and

installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

5.2 Payment shall be made at the contract unit price per cubic yard for concrete utility encasement. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

5.3 Payment shall be made at the contract unit price per square yard for Portland cement concrete pavement. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-610.1 **Concrete Curb -- per lineal foot**

Item P-610.2 **Concrete Curb and Gutter -- per lineal foot**

Item P-610.3 **Concrete Utility Encasement -- per cubic yard**

Item P-610.4 **Portland Cement Concrete Pavement -- per square yard**

TESTING REQUIREMENTS

ASTM C 31	Making and Curing Test Specimens in the Field
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 78	Test for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C 138	Unit Weight, Yield, and Air Content of Concrete
ASTM C 143	Slump of Portland Cement Concrete
ASTM C 173	Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 173	Test for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM D 3664	Random Sampling of Construction Materials

MATERIAL REQUIREMENTS

ASTM A 184	Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	Welded Steel Wire Fabric for Concrete Reinforcement
ASTM A 497	Specification for Welded Deformed Steel Wire Fabric for Concrete Pavement
ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM A 616	Specification for Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A 617	Specification for Axle-Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C 33	Specification for Concrete Aggregates
ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 171	Specification for Sheet Materials for Curing Concrete
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Specification ro Chemical Admixtures for Concrete
ASTM C 595	Specification for Blended Hydraulic Cements
ASTM C 618	Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

END OF ITEM P-610

ITEM P-620 PAVEMENT MARKING AND MARKING REMOVAL

620-1 DESCRIPTION

1.1 This item shall consist of the painting of markings and stripes and the removal of existing markings on the surfaces of taxiways, taxilanes, roadways, and parking lots applied in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer.

620-2 MATERIALS

2.1 MATERIALS ACCEPTANCE. The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site.

2.2 PAINT. Paint shall be waterborne, epoxy, or methacrylate base in accordance with the requirements of this Item. Paint shall be furnished in white (37925) and yellow (33538 or 33655) colors meeting the requirements Federal Standard No. 595. Paint shall be Type I, standard drying time, as determined by ASTM D 711.

A. WATERBORNE PAINT. Paint shall meet the requirements of Federal Specification TT-P-1952.

B. EPOXY PAINT. Paint shall be a two component, minimum 99 percent solids type system conforming to the following:

1. Pigments. Component A. Epoxy resin shall be 75 to 79 per cent by weight.

   a. White: Titanium Dioxide, ASTM D 476, Type II shall be 18 percent minimum (16.5 percent minimum at 100 percent purity).

   b. Yellow: Titanium Dioxide, ASTM D 476, Type II shall be 14 to 17 percent.

2. Epoxy Content. Component A. The weight per epoxy equivalent, when tested in accordance with ASTM D 1652 shall be the manufacturer's target plus or minus 50.

3. Amine Number. Component B. When tested in accordance with ASTM D 2074 shall be the manufacturer's target plus or minus 50.

4. Prohibited Materials. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen, as defined in 29 CFR 1910.1200.

5. Daylight Directional Reflectance:

   a. White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141, Method 6121.

   b. Yellow: The daylight directional reflectance of the yellow paint shall not be less than 38 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141. The x and y values shall be consistent with the Federal Hegman yellow

color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

x .462	x .470	x .479	x .501
y .438	y .455	y .428	y .452

6. Accelerated weathering.

   a. Sample preparation. Apply the paint at a wet film thickness of 0.013 inch to four 3"x6" aluminum panels prepared as described in Federal Test Method Standard No. 141, Method 2013. Air dry the sample 48 hours under standard conditions.

   b. Testing conditions. Test in accordance with ASTM G 53 using both Ultra Violet (UV-B) Light and condensate exposure, 72 hours total, alternating 4 hours UV exposure at 60°C, and 4 hours condensate exposure at 40°C.

   c. Evaluation. Remove the samples and condition for 24 hours under standard conditions. Determine the directional reflectance and color match using the procedures in paragraph 620-2.2b(5) above. Evaluate for conformance with the color requirements.

7. Volatile Organic Content. Determine the volatile organic content in accordance with 40 CFR Part 60 Appendix A, Method 24.

8. Dry Opacity. Use Procedure B, Method B of Method 4121 of Federal Test Method Standard No. 141. The wet film thickness shall be 0.015 inch. The minimum opacity for white and colors shall be 0.92.

9. Abrasion resistance. Subject the panels prepared in paragraph 620-2.2b(6) to the abrasion test in accordance with ASTM D 968, Method A, except that the inside diameter of the metal guide tube shall be from 0.747 to 0.750 inch. Five liters of unused sand shall be used for each test panel. The test shall be run on two test panels. Both baked and weathered paint films shall require not less than 150 liters of sand for the removal of the paint films.

10. Hardness, Shore. Hardness shall be at least 80 when tested in accordance with ASTM D 2240.

C. METHACRYLATE. Paint shall be a two-component, minimum 99 percent solids type system conforming to the standards listed below. Methacrylate resin shall be 18 percent minimum.

1. Pigments. Component A. Percent by weight.

   a. White: Titanium Dioxide, ASTM D 476, Type II shall be 6 percent minimum. Methacrylate resin shall be 18 percent minimum.

   b. Yellow: Titanium Dioxide, ASTM D 476, Type II shall be 6 percent minimum.

2. Prohibited Materials. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen, as defined in 29 CFR 1910.1200.

3. Daylight Directional Reflectance:

   a. White: The daylight directional reflectance of the white paint shall not be less than 80 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141, Method 6121.

b. Yellow: The daylight directional reflectance of the yellow paint shall not be less than 55 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

x .462	x .470	x .479	x .501
y .438	y .455	y .428	y .452

4. Accelerated weathering:

a. Sample preparation. Apply the paint at a wet film thickness of 0.013 inch to four 3 by 6 inch aluminum panels prepared as described in Method 2013 of Federal Test Method Standard No. 141. Air dry the sample 48 hours under standard conditions.

b. Testing conditions. Test in accordance with ASTM G 53 using both Ultra Violet (UV-B) Light and condensate exposure, 72 hours total, alternating 4 hours UV exposure at 60°C, and 4 hours condensate exposure at 40°C.

c. Evaluation. Remove the samples and condition for 24 hours under standard conditions. Determine the directional reflectance and color match using the procedures in paragraph 2.2C3 above. Evaluate for conformance with the color requirements.

5. Volatile Organic Content. Determine the volatile organic content in accordance with 40 CFR Part 60 Appendix A, Method 24.

6. Dry opacity. Use Procedure B, Method B of Method 4121 of Federal Test Method Standard No. 141. The wet film thickness shall be 0.015 inch. The minimum opacity for white and colors shall be 0.92.

7. Abrasion resistance. Subject the panels prepared in paragraph 620-2.2c(4) to the abrasion test in accordance with ASTM D 968, Method A, except that the inside diameter of the metal guide tube shall be from 0.747 to 0.750 inch. Five liters of unused sand shall be used for each test panel. The test shall be run on two test panels. Both baked and weathered paint films shall require not less than 150 liters of sand for the removal of the paint films.

8. Hardness, Shore. Hardness shall be at least 80 when tested in accordance with ASTM D 2240.

2.3 REFLECTIVE MEDIA. Glass beads shall meet the requirements of Fed. Spec. TT-B-1325, Type III. Glass beads shall be treated with adhesion promoting and/or flotation coatings as specified by the manufacturer of the paint.

620-3 CONSTRUCTION METHODS

3.1 WEATHER LIMITATIONS:

The painting shall be performed only when the surface is dry, when the atmospheric temperature is above 45°F and rising, and when the weather is not foggy or windy.

3.2 EQUIPMENT:

A. All equipment for the work shall be approved by the Engineer and shall include the apparatus necessary to properly clean the surface to be painted, a mechanical marking machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

B. The mechanical marker shall be an atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross-section and clear-cut edges without running, spattering, or overspray.

C. Glass spheres shall be dispensed by an apparatus designed specifically for this purpose which can be attached to the marking machine. The dispenser shall be capable of dispensing glass spheres in a uniform manner across the full width of the markings to be painted.

D. Sandblasting and waterblasting equipment shall operate at a pressure and delivery rate sufficient for removing existing pavement markings and cleaning surfaces to be painted without damaging the surface of the pavement. The cleaning equipment proposed for use shall be tested on an area to be determined by the Engineer. Such testing shall be conducted in the presence of the Engineer, who shall approve the use of the equipment before further work may begin.

3.3 MARKING REMOVAL AND PREPARATION OF SURFACE:

A. Markings to be removed shall be removed by sandblasting or high-pressure water. Areas which cannot satisfactorily cleaned shall be scrubbed as directed by the Engineer with a solution of trisodium phosphate (ten per cent by weight in water). Removal shall be done in a manner which will not cause damage to pavement surfaces. Pavement damaged as a result of this work which in the opinion of the Engineer is due to the Contractor's negligence, or could have been avoided, shall be removed and replaced by the Contractor at his own expense. The limits of such removal and replacement shall be determined by the Engineer.

B. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material which would reduce the bond between the paint and the pavement. The area to be painted shall be thoroughly cleaned by sweeping, blowing, scrubbing with trisodium phophate solution as specified in the preceding paragraph, or by other methods as required to remove all dirt, laitance, and loose materials.

C. Paint shall not be applied to Portland cement concrete pavement until the concrete in the areas to be painted is clean of curing material. Sandblasting or high-pressure water shall be used to remove curing material from concrete surfaces.

3.4 LAYOUT OF MARKINGS:

On those sections of pavement where no previously applied markings are available to serve as a guide, the proposed markings shall be laid out in advance of the paint application. The marking layout shall be approved by the Engineer before paint may be applied.

3.5 APPLICATION:

A. Markings shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface have been approved by the Engineer. The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rates shown in Table 1. The addition of thinner will not be permitted. A period of 48 hours shall elapse between placement of a bituminous surface course and application of the paint.

Table 1
APPLICATION RATES FOR PAINT AND GLASS BEADS

Type of Paint	Paint (SF/gal)	Glass Beads (lb/gal)
Waterborne	115 max.	7 min.
Epoxy	90 max.	15 min.
Methacrylate	90 max.	15 min.

B. The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and the dimensions shall be within a tolerance of plus or minus 5 percent. Glass spheres shall be distributed to the surface of the marked areas immediately after application of the paint.

3.6 PROTECTION:

After application of the paint, all markings shall be protected from damage until the paint is dry. All surfaces shall be protected from disfiguration by spatter, splashes, spillage, or drippings of paint.

620-4 METHOD OF MEASUREMENT

4.1 The quantity of pavement markings to be paid for shall be the number of square feet of painting, regardless of color, performed in accordance with the provisions of this Item and accepted by the Engineer.

4.2 The quantity of pavement marking removal to be paid for shall be the number of square feet of existing pavement markings removed in accordance with the provisions of this Item and accepted by the Engineer.

620-5 BASIS OF PAYMENT

5.1 Payment shall be made at the contract unit price per linear foot for pavement marking. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

5.2 Payment shall be made at the contract unit price per linear foot for pavement marking removal. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-620.1 **Pavement Marking -- per square foot**

Item P-620.2 **Pavement Marking Removal -- per square foot**

MATERIAL REQUIREMENTS

ASTM D 476 Specification for Titanium Dioxide

ASTM D 711 No-Pick-Time of Traffic Paint

ASTM D 968 Abrasion Resistance of Organic Coatings by Falling Abrasive

ASTM D 2240	Shore Hardness
ASTM G 53	Standard Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials
Fed.Spec. TT-P-1952	Paint, Traffic and Airfield Marking, Water Emulsion Base
Fed.Spec. TT-P-110	Paint, Traffic Black (Nonreflectorized)
Fed.Spec. TT-B-1325	Beads (Glass Spheres) Retroreflective

END OF ITEM P-620

ITEM D-701 PIPE FOR STORM DRAINS AND CULVERTS

701-1 DESCRIPTION

1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

701-2 MATERIALS

2.1 Materials shall meet the requirements shown on the plans and specified below.

2.2 PIPE:

Reinforced concrete pipe 24" in diameter and smaller shall be C-wall bell and spigot pipe meeting the requirements of ASTM C 76, Class IV. Reinforced concrete pipe 27" in diameter and larger shall be bell and spigot pipe meeting the requirements of ASTM C 361, Class A-25. For ASTM C 361 pipe the largest wall thickness for the class and size shown on the plans shall be used.

2.3 RUBBER GASKETS:

Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C 443.

2.4 CONCRETE:

Concrete for pipe cradles shall conform to the requirements of Item P-610, except that the 28-day compressive strength may be 2000 psi at the Contractor's option.

701-3 CONSTRUCTION METHODS

3.1 EXCAVATION:

A. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material and/concrete cradle under and around the pipe, but it shall not be less than the external diameter of the pipe plus twelve inches on each side. The trench walls shall be approximately vertical.

B. Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least twelve inches or one-half inch for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The width of the excavation shall be at least one foot greater than the horizontal outside diameter of the pipe. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over six inches in uncompacted depth to form a uniform but yielding foundation.

C. Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The Engineer shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

D. The excavation for pipes that are placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

E. All costs for dewatering required to install pipe in accordance with the provisions of this Item shall be incidental to the costs of the several classes and sizes of pipe to be installed.

3.2 BEDDING:

A. Concrete Pipe.

1. Stone Bedding. Bedding shall consist of granular material having a thickness of at least six inches below the bottom of the pipe and extending up around the pipe for a depth of not less than 50 percent of the pipe's vertical outside diameter. The layer of bedding material shall be shaped to fit the pipe for at least 10 percent of the pipe's vertical diameter and shall have recesses shaped to receive the bell of bell and spigot pipe. The bedding material shall be crushed aggregate meeting the gradation requirements of AASHTO T 27, Band 57.

2. Concrete Cradle. Cradles for reinforced concrete pipe at stormwater management basin outfalls shall be continuous along the full length of the pipe runs shown and shall be constructed in accordance with the details shown on the plans.

B. Flexible Pipe. Bedding for flexible pipe shall be of sand or native fine granular material roughly shaped to fit the pipe. The bedding shall have a maximum particle size of 1/4 inch, and shall not have angular edges which could puncture or damage the pipe. The bedding shall be placed to the dimensions shown on the plans and shall be placed in layers and thoroughly compacted.

3.3 LAYING PIPE:

A. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell ends of rigid and flexible pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade. The pipe shall be firmly and accurately set to line and grade, using laser equipment as appropriate. The invert of each run of pipe shall be smooth and uniform.

3.4 JOINING PIPE:

A. Joints shall be made with rubber gaskets. Rubber ring gaskets shall be installed to form a flexible watertight seal. The method of joining pipe sections shall be such that the ends are fully entered and the inner surfaces are reasonably flush and even. Joints shall be thoroughly lubricated and rubber gaskets installed before pipe sections are joined.

B. PVC and Polyethylene Pipe. Joints for PVC pipe shall conform to the requirements of ASTM D 3212. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M 252.

3.5 BACKFILLING:

A. Pipes shall be inspected before any backfill is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense.

B. Material for backfill shall be crushed aggregate meeting the gradation requirements of paragraph 3.2A or fine, readily compatible soil, or granular material selected from the excavation or a source of the Contractor's choosing. It shall not contain frozen lumps, stones that would be retained on a 2-inch sieve, chunks of highly plastic clay, or other objectionable material. No less than 95 percent of a granular backfill material shall pass through a ½ inch sieve, and no less than 95 percent of it shall be retained on a No. 4 sieve.

C. When the top of the pipe is even with or below the top of the trench, the backfill shall be compacted in layers not exceeding six inches on both sides of the pipe and shall be brought up one foot above the

top of the pipe or to natural ground level, whichever is greater. Care shall be exercised to thoroughly compact the backfill material under the haunches of the pipe. Material shall be brought up evenly on both sides of the pipe.

D. When the top of the pipe is above the top of the trench, the backfill shall be compacted in layers not exceeding six inches and shall be brought up evenly on both sides of the pipe to one foot above the top of the pipe. The width of backfill on each side of the pipe for the portion above the top of the trench shall be equal to twice the pipe's diameter or twelve feet, whichever is less.

E. Underneath areas to be paved, and other areas shown on the plans or designated by the Engineer, granular backfill (#57 stone) shall be placed to a minimum depth of twelve inches over rigid pipe. The aggregate shall be placed in layers not exceeding six inches in depth and thoroughly tamped.

E. For PVC and polyethylene pipe, the backfill shall be placed in two stages; first to the top of the pipe and then at least twelve inches over the top of the pipe. The backfill material shall meet the requirements of paragraph 701-3.2c.

F. All backfill shall be compacted to the density required under Item P-152.

701-4 METHOD OF MEASUREMENT

4.1 The length of pipe to be paid for shall be the number of linear feet of pipe installed in accordance with the plans and the provisions of this Item and accepted by the Engineer. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types and size shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

4.2 The quantity of Portland cement concrete for pipe cradles to be paid for shall be the number of cubic yards of concrete placed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

701-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per linear foot for each kind of pipe of the type, class, and size installed. These prices shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-701.1 **12-inch RCP Class IV -- per lineal foot**

Item D-701.2 **15-inch RCP Class IV -- per lineal foot**

Item D-701.3 **18-inch RCP Class IV -- per lineal foot**

Item D-701.4 **24-inch RCP Class IV – per lineal foot**

Item D-701.5 **27-inch RCP Class A-25 -- per lineal foot**

Item D-701.6 **30-inch RCP Class A-25 -- per lineal foot**

Item D-701.7 **36-inch RCP Class A-25 -- per lineal foot**

Item D-701.8	**42-inch RCP Class A-25 -- per lineal foot**
Item D-701.9	**Concrete for Pipe Cradles -- per cubic yard**
Item D-701.10	**Seepage Pipe -- per lineal foot**

MATERIAL REQUIREMENTS

ASTM C 76	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets

END OF ITEM D-701

ITEM D-705 PAVEMENT UNDERDRAINS FOR AIRPORTS

705-1 DESCRIPTION

1.1 This item shall consist of the installation of a geocomposite pavement subgrade drainage system in accordance with the plans and the provisions of this Item.

705-2 MATERIALS

2.1 GEOCOMPOSITE DRAIN AND FITTINGS:

The geocomposite drain shall have a flexible rectangular cross-section consisting of a geotextile fabric and a polyethylene support core. The drain system shall be installed with fittings suitable for capping drain ends, making connections to corrugated drainage tubing specified in paragraph 2.2 below, and other fittings as required to install the complete system shown on the plans. The geocomposite shall be suitable for either manual or machine installation. The geocomposite shall have a minimum flow capacity of ten gallons per minute per square foot when installed in a vertical orientation at a gradient of 0.5 foot per foot of length (0.5%). The core shall permit unobstructed inflow through one or both sides through a fabric having an apparent opening size (AOS) smaller than 0.24 mm (approximately No. 70 Sieve). This filter capability shall be achieved, if necessary, by enclosing the geocomposite in a geotextile filter meeting this AOS criterion. The geocomposite and accompanying fittings shall also meet the requirements of Table 1.

Table 1
PHYSICAL REQUIREMENTS FOR GEOCOMPOSITE DRAINS

Property	Criteria	Test Method
Grab Tensile Strength, pounds, min.	90	ASTM D 4632
Elongation, % min.	50	ASTM D 4632
Puncture Strength, pounds, min.	45	ASTM D 4833
Burst Strength, psi, min.	150	ASTM D 3786
Trapezoidal Tear, pounds, min.	40	ASTM D 4533
Coefficient of Permeability, cm/sec, min.	0.20	ASTM D 4491

2.2 PIPE:

The pipe shall conform with the following:

Corrugated Polyethylene Drainage Tubing	AASHTO M 252
Corrugated Polyethylene Pipe	AASHTO M 294

2.4 POROUS BACKFILL:

Porous backfill shall be sand for masonry mortar meeting the material requirements of ASTM C 144, except that the gradation shall conform to that shown in Table 1 when tested in accordance with ASTM C 136.

Table 1
GRADATION OF POROUS BACKFILL

Sieve Designation (square openings)	Percentage Passing by Weight
No. 4	100
No. 8	95-100
No. 16	70-100
No. 30	40-75
No. 50	10-35
No. 100	2-10
No. 200	0-5

705-3 CONSTRUCTION METHODS

3.1 EQUIPMENT:

All equipment necessary and required for the proper installation of the geocomposite underdrain shall be on the project, in first-class working condition, and approved by the Engineer before construction may begin.

3.2 TRENCH EXCAVATION:

A. Trenches to receive the geocomposite drain shall be excavated by equipment intended specifically for the purpose, and shall be capable of excavating a neat vertical trench at least four inches but not more than eight inches wide and to the depths shown on the plans. The trench bottom shall be cleaned of loose material and checked for grade before the geocomposite may be placed.

B. Trenches for perforated and solid-walled corrugated pipe drains shall be excavated to a width of at least twice the pipe diameter and to the depths shown on the plans. The trench walls shall be neat and vertical, and the bottom shall be cleaned of loose material and checked for grade before pipe may be placed.

C. The trench bottom shall be so shaped that the geocomposite or pipe may be firmly seated and in continuous contact with the bottom of the trench. Spaces for fittings, where required, shall be excavated accurately to size to provide displacement for the fittings.

D. Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least four inches. The excavation below grade shall be backfilled with mortar sand backfill and lightly compacted in layers not over six inches in uncompacted depth to form a uniform but yielding foundation.

E. Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with mortar sand for the full trench width. The Engineer shall determine the depth of removal necessary. The mortar sand shall be compacted to the degree required to provide adequate support for the pipe.

F. Excavated material shall be disposed of by the Contractor off airport property. The excavation shall not be carried below the depth shown on the plans. When such overexcavation is done, the trench shall

be backfilled at the Contractor's expense with material approved by the Engineer and compacted to the density required in Item P-152.

G. The Contractor shall do such trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to governing laws and ordinances. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the completion of the backfill. The sheathing or shoring shall be pulled as the granular backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per foot for the geocomposite system.

3.3 LAYING AND INSTALLING GEOCOMPOSITE DRAIN AND PIPE:

A. The geocomposite shall be set and firmly seated in the trench bottom in accordance with the elevations shown on the plans. Deviations from plan invert elevations shall not be permitted. The geocomposite shall be placed against the downgrade side of the trench, as shown on the plans, and shall be oriented so that water may enter from the upgrade side of the drain. The drain shall be held firmly against the trench wall until the mortar sand backfill is placed.

B. Perforated pipe shall be placed and firmly seated in mortar sand bedding in the center of the trench. Perforated pipe shall be installed with the perforated portion of the pipe oriented downward.

C. End caps, splices, and connections, where required, shall be made using PVC or polyethylene tape or fittings made for the purpose intended and that will maintain the structural integrity of the section while preventing the intrusion of soil or bedding sand. Splices and connections shall be made before the drain or pipe is laid in the trench. The upgrade end of pipelines, not terminating in a structure, shall be plugged or capped as approved by the Engineer. Pipelines ending in a drainage inlet or manhole shall be installed in openings provided or cut through structure walls. Pipe ends shall be grouted in place and cut to flush with the structure wall.

D. Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and relaid without extra compensation.

3.4 MORTAR:

The mortar shall conform to the requirements of Item D-751 and shall be of sufficient consistency for making watertight connections to structures. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted.

3.6 BACKFILLING:

A. Mortar sand backfill shall be placed in the trench against and over the geocomposite drain or pipe as shown on the plans. Special care shall be taken in placing the backfill. The granular backfill shall not contain a damaging amount of foreign matter, nor shall earth from the sides of the trench or from the windrow be allowed to filter into the backfill. When recommended by the geocomposite drain manufacturer, a template shall be used to properly place and keep the geocomposite firmly in position against the trench wall. The backfill shall be placed in loose layers not exceeding six inches in depth and compacted by hand and pneumatic tampers. Backfilling and compaction shall be done in a manner to avoid injurious top or side pressure on the drain or pipe. The granular backfill shall be made to the top of the trench, as shown on the plans.

B. When drain or pipe and sand backfill is to be placed underneath areas to be paved or in adjacent areas prior to the completion of grading or subgrade operations, the backfill material shall be placed immediately after laying the pipe and to the depth shown on the plans. During subsequent construction operations, this backfill shall not be disturbed until such time as the subgrade preparatory operations

are to be completed. When such work is to be completed, the top of the sand backfill shall be exposed. Any portion of the sand backfill which contains objectionable material shall be removed and replaced with suitable material. The cost of removing and replacing any such unsuitable material shall be borne by the Contractor.

C. When drain or pipe and sand backfill are installed underneath areas to be paved following subgrade preparatory operations, the sand backfill over the geocomposite drain or perforated pipe shall be placed to an elevation of two inches above the bottom of the subbase course. Immediately prior to the placing of the subbase course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material which remains over the underdrain trench shall be removed and replaced. The subbase material shall be placed to provide clean contact between the subbase material and the underdrain granular backfill material for the full width of the underdrain trench.

705-4 METHOD OF MEASUREMENT

4.1 The length of geocomposite underdrain and corrugated drainage pipe to be paid for shall be the number of lineal feet, measured along its centerline, installed in accordance with the plans and the provisions of this Item and accepted by the Engineer. The several types and sizes of pipe shall be measured separately. Fittings, splices, and connections required to complete the system shown on the plans shall be included in the length measured.

705-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per lineal foot for geocomposite underdrain. This price shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

5.2 Payment will be made at the contract unit price per lineal foot for each kind of the type and size of corrugated drainage pipe. This price shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-705.1 **Geocomposite Underdrain – per lineal foot**

Item D-705.2 **4-inch Polyethylene Pipe -- per lineal foot**

Item D-705.3 **4-inch Perforated Polyethylene Pipe-- per lineal foot**

Item D-705.4 **6-inch Polyethylene Pipe – per lineal foot**

MATERIAL REQUIREMENTS

ASTM C 136 Sieve or Screen Analysis of Fine and Coarse Aggregates

ASTM C 144 Aggregate for Masonry Mortar

ASTM C 150 Portland Cement

ASTM D 3786	Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics -- Diaphragm Bursting Strength Method
ASTM D 3787	Bursting Strength of Knitted Goods -- Constant-Rate-of-Traverse (CRT) Ball Burst Test
ASTM D 4583	Trapezoidal Tearing Strength of Nonwoven Fabrics
ASTM D 4632	Tensile Strength of Nonwoven Fabrics
AASHTO M 252	Corrugated Polyethylene Drainage Tubing

END OF ITEM D-705

ITEM D-751 MANHOLES, CATCH BASINS, AND INLETS

751-1 DESCRIPTION

1.1 This item shall consist of construction of manholes and storm drainage inlets, and adjusting existing structure tops to proposed grades, at the locations shown and conforming to the lines, grades, and dimensions shown on the plans or required by the Engineer.

1.2 Structures located within or adjacent to the Airport Operations Area (AOA) or shown on the plans to be subjected to aircraft loads shall be constructed as shown on the plans and in accordance with the provisions of this Item. Other structures, such as stuctures within or adjacent to access roads and parking lots shall be constructed in accordance with applicable provisions of the SHA Standard Specifications for Construction and Materials, October 1993.

1.3 Drainage structures to be installed under this contract shall be classified as follows:

Manhole Storm drainage manholes capable of supporting AASHTO HS20 loads. These structures will be installed on the landside portion of the site, in and around the proposed access roads and parking lots.

Type I Inlets and manholes capable of supporting aircraft loads. These structures will be installed on the airside portion of the site, which includes the proposed aprons and taxiways and the turfed areas between the future hangars and the existing Taxiway F.

Type II Yard inlets capable of supporting AASHTO HS20 loads. These structures will be installed on the landside portion of the site, in and around the proposed access roads and parking lots.

Type III Curb inlets. These structures will be installed on the landside portion of the site, in and around the proposed access roads and parking lots.

751-2 MATERIALS

2.1 BRICK:

Brick shall conform to the requirements of ASTM C 32, Grade SM.

2.2 MORTAR:

Mortar shall consist of one part Portland cement and two parts sand. The cement shall conform to the requirements of ASTM C 150, Type I. The sand shall conform to the requirements of ASTM C 144.

2.3 CONCRETE:

Plain and reinforced concrete used in precast and cast-in-place structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

2.6 FRAMES, COVERS, AND GRATES:

A. The castings shall conform to one of the following requirements:

1. Gray iron castings shall meet the requirements of ASTM A 48, Class 30B and 35B.

2. Malleable iron castings shall meet the requirements of ASTM A 47.

3. Steel castings shall meet the requirements of ASTM A 27.

4. Structural steel for grates and frames shall conform to the requirements of ASTM A 283, Grade D.

5. Ductile iron castings shall conform to the requirements of ASTM A 536.

B. All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings specified.

C. Frames and covers or grates shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure. Structure covers shall be stamped as shown on the plans to indicate the type of utility served by the structure.

D. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A 123.

2.7 STEPS:

The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of bituminous paint, when directed.

751-3 CONSTRUCTION METHODS

3.1 EXCAVATION:

A. The Contractor shall do all excavation for structures and structure footings to the lines and grades or elevations, shown on the plans, or as directed by the Engineer. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximate only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.

B. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

C. The Contractor shall do all bracing, sheathing, shoring, or dewatering necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws and ordinances. Costs of bracing, sheathing, shoring, or dewatering shall be included in the unit price bid for the structure.

D. Unless otherwise provided, bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner which will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

E. After each excavation is completed, the Contractor shall notify the Engineer to that effect; and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.

3.2 BRICK STRUCTURES:

A. Foundations. A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed in accordance with the requirements of Item P-610.

B. Laying Brick. All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it which can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint. Any bricks that may be loosened after the mortar has taken its set, shall be removed, cleaned, and relaid with fresh mortar. No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.

C. Joints. All joints shall be slushed with mortar at every course, but slushing alone will not be considered adequate for making an acceptable joint. Exterior faces shall be laid up in advance of backing. Exterior faces shall be back plastered or pargeted with a coat of mortar not less than ⅜ inch thick before the backing is laid up. Prior to pargeting, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than ¼ inch nor more than ½-inch wide and whatever width is adopted shall be maintained uniform throughout the work.

D. Pointing. Face joints shall be neatly struck, using the weather joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.

E. Cleaning. Upon completion of the work all exterior surfaces shall be thoroughly cleaned by scrubbing and washing down with water and, if necessary to produce satisfactory results, cleaning shall be done with a 5% solution of muriatic acid which shall then be rinsed off with liberal quantities of clean fresh water.

F. Curing and Cold Weather Protection. In hot or dry weather, or when directed by the Engineer, the brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost in the brick or when the air temperature is below 50°F unless the Contractor has on the project ready to use, suitable covering and artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60°F for the duration of the curing period.

3.3 CONCRETE STRUCTURES:

A. Concrete structures shall be built on prepared foundations, conforming to the dimensions and form indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the Engineer before the concrete is poured.

B. All invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped downward toward the outlet.

3.4 PRECAST CONCRETE STRUCTURES:

Precast concrete structures shall be installed on prepared or previously placed slab foundations and shall conform to the dimensions and locations shown on the plans. All precast concrete sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily, and all jointing and connections shall be cemented with mortar. The top of the upper precast concrete member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. Knockout panels or openings for future pipe connections shall be provided where called for by the plans. Structure inverts shall be shaped with concrete as shown on the plans, resulting in flow lines which are smooth, uniform, and cause minimum resistance to flow. The metal steps which are embedded or built into the side walls shall be aligned and placed at vertical intervals of twelve inches.

3.6 INLET AND OUTLET PIPES:

Inlet and outlet pipes shall extend through openings provided in the walls of the structures for a sufficient distance beyond the outside surface to allow for connections, but shall be cut off flush with the wall on the inside surface, unless otherwise directed. Once pipe is installed, openings shall be sealed with brick and mortar or concrete to form a water-tight, neat connection.

3.7 PLACEMENT AND TREATMENT OF CASTINGS, FRAMES, AND FITTINGS:

A. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the Engineer, and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

B. When frames or fittings are to be placed upon previously constructed masonry, the bearing surface or masonry shall be brought true to line and grade and shall present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed and approved by the Engineer. All units shall set firm and secure. After the frames or fittings have been set in final position and the concrete or mortar has been allowed to harden for seven days, then the grates or covers shall be placed and fastened down.

3.8 INSTALLATION OF STEPS:

A. The steps shall be installed as indicated on the plans or as directed by the Engineer. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is placed. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least seven days. After this period has elapsed, the steps shall be cleaned and painted, unless they have been galvanized.

B. When steps are required with precast concrete structures, they shall be cast into the sides of the structure at the time the sections are manufactured, or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

C. In lieu of steps, prefabricated ladders may be installed. In the case of brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes.

3.9 BACKFILLING:

A. After a structure has been completed, the area around it shall be filled with approved material, in horizontal layers not to exceed eight inches in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Engineer.

B. Backfilling shall not be placed against any structure until permission is given by the Engineer. In the case of cast-in-place concrete, such permission shall not be given until the concrete has been in place seven days, or until tests made by the laboratory under supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

C. Backfill shall not be measured for direct payment. Performance of this work shall be considered as a incidental and subsidiary obligation of the Contractor covered under the contract unit price for the structure involved.

3.10 CLEANING AND RESTORATION OF SITE:

A. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

B. After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

751-4 METHOD OF MEASUREMENT

4.1 The number of manholes and storm drainage inlets to be paid for shall be the number of structures constructed and installed in accordance with the plans and the provisions of this Item and accepted by the Engineer. The several types of structures will be paid for separately in accordance with the provisions of paragraph 5.1 below.

4.2 The number of structure adjustments to grade to be paid for shall be the number of structures constructed and installed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

751-5 BASIS OF PAYMENT

5.1 Payment at the contract unit prices per each for manholes and inlets. These prices shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials; furnishing and installation of such special items and connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, tools and incidentals necessary to complete the item.

Payment will be made under:

Item D-751.1 **Storm Drainage Manhole -- each**

Item D-751.2 **Storm Drainage Inlet, Type I -- each**

Item D-751.3 **Storm Drainage Inlet, Type II -- each**

Item D-751.4 **Storm Drainage Inlet, Type III -- each**

Item D-751.5 **Storm Drainage Inlet, Type IV -- each**

Item D-751.6 **Adjust Structure to Grade -- each**

MATERIAL REQUIREMENTS

ASTM A 27	Mild to Medium-Strength Carbon-Steel Castings for General Application
ASTM A 47	Malleable Iron Castings
ASTM A 48	Gray Iron Castings
ASTM A 123	Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip
ASTM A 283	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars
ASTM A 536	Ductile Iron Castings
ASTM C 32	Sewer and Manhole Brick
ASTM C 144	Aggregate for Masonry Mortar
ASTM C 150	Portland Cement
AASHTO M 36	Zinc-Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains

END OF ITEM D-751

ITEM D-752 MISCELLANEOUS DRAINAGE STRUCTURES

752-1 DESCRIPTION

1.1 This item shall consist of reinforced concrete endwalls, sedimentation chambers, energy-dissipating outlet structures, rip rap, and other miscellaneous drainage structures constructed in accordance with the plans and the provisions of this Item and as directed by the Engineer. The structures shall be classified and described as follows:

A.	Endwall	Concrete endwall with concrete apron and wingwalls, with or without energy-dissipating structures as shown on Sheets U-18B and U-18C of the plans.
B.	Sedimentation Chamber	Three-chamber concrete sedimentation chamber as shown on Sheets U-18 and U-18A of the plans.
C.	Class I Rip Rap	Rip rap aprons placed adjacent to concrete endwalls.
D.	Grouted Rip Rap	Grouted Class I rip rap placed on spillways constructed within stormwater management basins

752-2 MATERIALS

2.1 CONCRETE:

Reinforced concrete shall meet the requirements of Item P-610.

2.2 REINFORCING STEEL:

Reinforcing steel shall be Grade 60 deformed bars meeting the requirements of ASTM A 615.

2.3 PIPE:

Pipe used in energy-dissipating endwalls shall be PVC pipe meeting the requirements of Fed. Spec. W-C-571, Type I.

2.3 RIP RAP:

Stone for outlet protection and spillways shall be Class I rip rap meeting the requirements of the SHA Standard Specifications for Construction and Materials, October 1993.

2.4 GROUT:

Grout for rip rap spillways shall meet the requirements of the SHA Standard Specifications for Construction and Materials, October 1993.

2.5 FILTER FABRIC:

Filter fabric shall meet the requirements of Item 308.

752-3 CONSTRUCTION METHODS

3.1 EXCAVATION:

A. Trenches and foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the plans. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximate only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.

B. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grade shall not be made until just before the concrete or reinforcing steel is to be placed.

C. The Contractor shall do all bracing, sheathing, shoring, and dewatering necessary to perform and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for each structure. Costs for dewatering shall be incidental to Item xxxx.

D. Unless otherwise provided, bracing, sheathing, or shoring involved therewith shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner which will not disturb or mar finished concrete. The cost of removal shall be included in the unit price bid for each structure.

E. After each excavation is completed, the Contractor shall notify the Engineer to that effect, and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.

3.3 CONCRETE STRUCTURES:

A. Concrete structures shall be built on prepared foundations, conforming to the dimensions and form indicated on the plans. Concrete formwork, reinforcement, and placement shall conform to the requirements of Item P-610. Any reinforcement and embedded items required shall be placed as indicated on the plans and shall be approved by the Engineer before the concrete is placed. When cast-in-place structures are to be constructed in separate concrete placements, PVC waterstops shall be used.

B. All endwall aprons and invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flowing water. Concrete aprons shall be constructed smooth and level as shown on the plans.

C. Forms shall be removed in accordance with the provisions of Item P-610.

3.4 PRECAST CONCRETE STRUCTURES:

A. Precast concrete structures shall be installed on prepared or previously placed slab foundations and shall conform to the dimensions and locations shown on the plans. All precast concrete sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily, and all jointing and connections shall be watertight and cemented with mortar. The top of the upper precast concrete member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Structure inverts shall be shaped with concrete as shown on the plans, resulting in flow lines which are smooth, uniform, and cause minimum resistance to flow. The metal steps which are embedded or built into the side walls shall be aligned and placed at vertical intervals of twelve inches.

B. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. Knockout panels or openings for future pipe connections shall be provided where called for by the plans. Where openings for future pipe are provided, the openings shall be closed and made watertight using brick and mortar or other suitable means approved by the Engineer.

3.5 INLET AND OUTLET PIPES:

Inlet and outlet pipes shall extend through openings provided in the walls of the structures for a sufficient distance beyond the outside surface to allow for connections, but shall be cut off flush with the wall on the inside surface, unless otherwise directed. Once pipe is installed, openings shall be sealed with brick and mortar or concrete to form a water-tight, neat connection.

3.6 PLACEMENT AND TREATMENT OF CASTINGS, FRAMES, AND FITTINGS:

A. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the Engineer, and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

B. When frames or fittings are to be placed upon previously constructed masonry, the bearing surface or masonry shall be brought true to line and grade and shall present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed and approved by the Engineer. All units shall set firm and secure. After the frames or fittings have been set in final position and the concrete or mortar has been allowed to harden for 7 days, then the grates or covers shall be placed and fastened down.

3.7 BACKFILLING:

After a structure has been completed, backfilling with approved material shall be accomplished as specified in Item P-152. No backfilling shall be placed against any structure until permission is given by the Engineer. In the case of cast-in-place concrete, such permission shall not be given until the concrete has been in place seven days, or until tests made by the laboratory under the supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it. Backfill shall be incidental to the contract price for each structure.

3.8 INSTALLATION OF FILTER FABRIC:

Where specified on the plans filter fabric shall be spread uniformly over the prepared surface. The fabric shall be unrolled directly on the surface to the lines and dimensions shown. The filter fabric shall be lapped a minimum of twelve inches in each direction and shall be anchored in position with approved anchoring devices.

3.9 INSTALLATION OF RIP RAP:

Stone for rip rap shall be placed by methods that will produce a compact uniform blanket of rip rap protection having a reasonbly smooth surface. Rip rap shall be placed to its full depth in one operation and in a manner which will avoid displacing the underlying material or tearing or puncturing the filter fabric. Placing of rip rap by end dumping or by other methods likely to cause segregation or damage to the ground surface or filter fabric will not be permitted. Hand placing or rearranging of individual stones by mechanical equipment may be required to the extent necessary to secure the results specified. Where grouted rip rap is to be installed, rip rap shall be placed in general accordance with the provisions of Item P-610, using forms as required or directed by the Engineer.

3.10 CLEANING AND RESTORATION OF SITE:

After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankment, shoulders, or removed from the site. The Contractor shall restore all disturbed areas as shown on the plans or to their original condition. After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

752-4 METHOD OF MEASUREMENT

4.1 The quantity of concrete sedimentation chamber and endwall construction to be paid for shall be the number of cubic yards of concrete placed in accordance with the plans and the provisions of this Item and accepted by the Engineer. The quantity of concrete to be paid for will be determined from the neat lines for each structure shown on the plans. No separate measurement for payment will be made of the preparation, excavation, reinforcing, formwork, backfill, or any other incidentals neccessary to complete each structure.

4.2 The quantity of rip rap and grouted rip rap to be paid for shall be the number of square yards of rip rap and grouted rip rap installed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

752-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per cubic yard for concrete sedimentation chambers and endwalls. This price shall be full compensation for furnishing all materials and for all preparation, excavation, formwork, placing the materials, and backfill, and for all labor, equipment, tools, and incidentals necessary to complete each structure.

5.2 Payment will be made at the contract unit price per square yard for Class I rip rap and grouted rip rap. This price shall be full compensation for furnishing all materials and for all preparation, excavation, placing the materials, and backfill, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-752.1	**Sedimentation Chamber -- per cubic yard**
Item D-752.2	**Endwall -- per cubic yard**
Item D-752.3	**Class I Rip Rap -- per square yard**
Item D-752.4	**Grouted Rip Rap -- per square yard**

TESTING REQUIREMENTS

ASTM D 698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 kg) Rammer and 12-in (305 mm) Drop
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
ASTM D 2167	Density of Soil in Place by the Rubber-Ballon Method

END OF ITEM D-752

ITEM L-108 INSTALLATION OF UNDERGROUND CABLE FOR AIRPORTS

108-1 DESCRIPTION

1.1 This item shall consist of furnishing and installing underground cable for the taxiway lighting and signage system only in accordance with these specifications at the locations shown in the plans. This item shall include the excavation and backfill of the trench and the installation of cable and counterpoise wire in trench, duct, or conduit. It shall include splicing, cable marking, and testing of the installation and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the Engineer. This item shall not include the installation of the duct or conduit. Cable for landside electrical systems shall be furnished and installed in accordance with the provisions of Item 16120.

108-2 EQUIPMENT AND MATERIALS

2.1 GENERAL

A. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall have the prior approval of the FAA, and are listed in Advisory Circular (AC) 150/5345-1, Approved Airport Equipment. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the Engineer.

B. Underground cable shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits.

C. If telephone control cable is specified, copper shielded, polyethylene insulated and jacketed, No. 19 AWG telephone cable conforming to the United States Department of Agriculture, Rural Electrification Administration (REA) Bulletin 345-14, REA Specification for Fully Color-Coded, Polyethylene Insulated, Double Polyethylene-Jacketed Telephone Cables for Direct Burial, shall be used.

D. Where counterpoise conductors are to be installed and where soil conditions would adversely affect bare copper wire, thermoplastic wire conforming to Fed. Spec. J-C-30, Type TW, 600 volt, may be used.

E. Cable type, size, number of conductors, strand and service voltage shall be specified in the plans and/or proposal.

2.3 BARE COPPER WIRE (COUNTERPOISE). Bare copper wire for counter-poise installations shall be stranded wire conforming to ASTM Specifications B 3 and B 8.

2.4 CABLE CONNECTIONS. In-line connections of underground primary cables shall be of the type called for in the plans or in the proposal, and shall be one of the types listed below. When the plans or the proposal permit a choice of connection, the Contractor shall indicate in the bid the type of connection he proposes to furnish.

A **The Field-attached Plug-in Splice.** Figure 3 of AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors, employing connector kits, is approved for field attachment to single conductor cable.

B. **The Factory-Molded Plug-in Splice.** Specification for L-823 Connectors, Factory-Molded to Individual Conductors, are approved.

108-2.5 CONCRETE. Concrete for cable markers shall conform to Specification Item P-610, Structural Portland Cement Concrete.

108-3 CONSTRUCTION METHODS

3.1 GENERAL.

A. The Contractor shall install the specified cable at the approximate locations indicated in the airport lighting layout plans. The Engineer shall indicate specific locations.

B. Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isoating transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections, unless otherwise authorized in writing by the Engineer or shown in the plans.

3.2 INSTALLATION IN DUCT OR CONDUIT.

A. This item includes the installation of the cable in duct or conduit as described below. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be in accordance with the latest National Electric Code, or the code of the local agency having jurisdiction.

B. The Contractor shall make no connections or joints of any kind in cables installed in conduits or ducts.

C. The duct or conduit shall be installed as a separate item in accordance with Item L-110, Installation of Airport Underground Electrical Duct. The Contractor shall make sure that the duct is open, continuous, and clear of debris before installing cable. The cable shall be installed in a manner to prevent harmful stretching of the conductor, injury to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a duct under the same contract, all cable shall be pulled in the duct at the same time. The pulling of a cable through ducts or conduits may be accomplished by handwinch or power winch with the use of cable grips or pulling eyes. Pulling tensions should be governed by recommended standard practices for straight pulls or bends. A lubricant recommended for the type of cable being installed shall be used where pulling lubricant is required. Duct or conduit markers temporarily removed for excavations shall be replaced as required.

3.3 TRENCHING.

A. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Road patrols or graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches below finished grade, except as follows:

1. When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches unless otherwise specified.

2. Minimum cable depth when crossing under a railroad track, shall be 42 inches unless otherwise specified.

3. The Contractor shall excavate all cable trenches to a width not less than 6 inches. The trench shall be widened where more than two cables are to be installed parallel in the same trench. Unless

otherwise specified in the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

4. When rock excavation is encountered, the rock shall be removed to a depth of at least 3 inches below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a ¼ inch sieve. The Contractor shall ascertain the type of soil or rock to be excavated before bidding. All excavation shall be unclassified.

3.4 INSTALLATION IN TRENCHES.

A. The Contractor shall not use a cable plow for installing the cable. Mechanical cable-laying equipment may be used in conjunction with a trenching machine if specified on project plans and specifications; and it should provide for physical inspection of cable prior to backfilling. Sharp bends or kinks in the cable shall not be permitted.

B. Cables shall be unreeled in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end.

C. Where two or more cables are laid parallel in the same trench, they shall be placed laterally a minimum distance of 3 inches apart, and the trench shall be widened sufficiently to accomplish this.

D. Cables crossing over each other shall have a minimum of 3-inch vertical displacement with the topmost cable depth at or below the minimum required depth below finished grade.

E. Not less than 1 foot of cable slack shall be left on each side of all connections, insulating transformers, light units, and at all other points where cable is connected to field equipment. The slack cable shall be placed in the trench in a series of S curves. Additional slack cable shall be left in runway light bases, handholes, manholes, etc., where it is required to bring the cable above ground level to make connections. The amount of slack cable shall be stipulated by the Engineer, or as shown in the plans and specifications.

3.5 BACKFILLING.

A. After the cable has been installed, the trench shall be 3 inches deep, loose measurement, and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. This layer shall not be compacted. the second layer shall be 5 inches deep, loose measurement, and shall contain no particles that would be retained on a 1-inch sieve. The remainder of the backfill shall be excavated or imported mineral and shall not contain stone or aggregate larger than 4 inches maximum diameter. The third and subsequent layers of the backfill shall not exceed 8 inches in maximum depth, loose measurement.

B. The second, and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent undisturbed soil, and to the satisfaction of the Engineer. If necessary to obtain the desired compaction, the backfill material shall be moistened or aerated as required.

C. Trenches shall not be excessively wet and shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement. Any excess excavated material shall be removed and disposed of in accordance with instructions issued by the Engineer.

3.6 RESTORATION.

Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the trenching, storing of dirt, cable laying, pad construction, and other work shall be restored to its

original condition. The restoration shall include any necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging or mulching. All such work shall be performed in accordance with the FAA standard turfing specifications. the Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance.

3.7 CABLE MARKERS.

A. The location of runway light circuits shall be marked by a concrete slab marker, 2 feet square and 4 inches thick, extending approximately 1 inch above the surface. Each cable run from the line of runway lights to the equipment vault shall also be marked at approximately every 200 feet along the cable run, with an additional marker at each change of direction of cable run. All other cable buried directly in the earth shall be marked in the same manner. The Contractor shall not install slab markers where cable lies in straight lines between obstruction light poles which are spaced 300 feet apart, or less. Cable markers shall be installed immediately above the cable. The Contractor shall impress the word "cable" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches high and 3 inches wide, with strokes ½ inch wide and ¼ inch deep.

3.8 SPLICING.

A. Connections of the type shown in the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

1. **Field-attached Plug-in Splices.** These shall be assembled in accordance with manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. In all cases the joint where the connectors come together shall be wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1½ inch on each side of the joint.

2. **Factory-Molded Plug-in Splices.** These shall be made by plugging directly into mating connectors. In all cases, the joint where the connectors come together shall be wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1½ inch on each side of the joint.

3.9 BARE COUNTERPOISE WIRE INSTALLATION AND GROUNDING FOR LIGHTNING PROTECTION.

A. A stranded bare copper wire, No. 8 AWG minimum size, shall be installed for lightning protection of the underground cables. The bare counterpoise wire shall be installed in the same trench and for the entire length of the insulated cables it is designed to protect, and shall be placed at a distance of approximately 4 inches from the insulated cable. The counterpoise wire shall be securely attached to each light fixture base. The counterpoise wire shall also be securely attached to copper or copper-clad ground rods installed not more than 1,000 feet apart around the entire circuit. The ground rods shall be of the length and diameter specified in the plans, but in no case shall they be less than 8 feet long nor less than ⅝ inch in diameter.

3.10 TESTING.

a. The Contractor shall furnish all necessary equipment and appliances for testing the underground cable circuits after installation. The Contractor shall test and demonstrate to the satisfaction of the Engineer the following:

1. That all lighting power and control circuits are continuous and free from short circuits.

2. That all circuits are free from unspecified grounds.

3. That the insulation resistance to ground of all nongrounded series circuits is not less than 50 megohms.

4. That the insulation resistance to ground of all nongrounded conductors of multiple circuits is not less than 50 megohms.

5. That all circuits are properly connected in accordance with applicable wiring diagrams.

6. That all circuits are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than ½ hour.

METHOD OF MEASUREMENT

4.1 The quantity of cable and counterpoise to be paid for shall be the number of lineal feet of cable and counterpoise wire installed in duct or conduit, measured between taxiway edge lights and/or signs, tested and ready for operation and accepted by the Engineer. Separate measurement shall be made for each type of cable and counterpoise wire installed.

4.2 The quantity of ground rods to be paid for shall be the number of ground rods installed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

4.3 The quantity of concrete cable markers to be paid for shall be the number of concrete cable markers installed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

BASIS OF PAYMENT

5.1 Payment will be made at the contract unit prices for cable and bare counterpoise wire installed in trench or duct in place by the Contractor and accepted by the Engineer. These prices shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the items.

5.2 Payment will be made at the contract unit price for each ground rod and concrete cable marker installed by the Contractor and accepted by the Engineer. These prices shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item L-108.1	**No. 8 AWG 5 kV Underground Cable, installed in duct or conduit -- per lineal foot**
Item L-108.2	**No. 8 AWG Bare Counterpoise Wire, installed in trench -- per lineal foot**
Item L-108.3	**Ground Rod -- each**
Item L-108.4	**Concrete Cable Marker – each**

MATERIAL REQUIREMENTS

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle Cable Connectors

Fed. Spec. J-C-30	Cable and Wire, Electrical Power, Fixed Installation
Fed. Spec. HH-I-595	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic, for Low-Temperature Application
ASTM B 3	Soft or Annealed Copper Wire
ASTM B 8	Concentric-Lay-Stranded Cooper Conductor, Hard, Medium-Hard, or Soft
MIL-I-3825	Insulation Tape, Electrical, Self-Fusing, For Use in Electronics, Communications, and Allied Equipment
MIL-I-7798	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

END OF ITEM L-108

ITEM L-110 INSTALLATION OF AIRPORT UNDERGROUND ELECTRICAL DUCT

110-1 DESCRIPTION

1.1 This item shall consist of underground electrical ducts installed in accordance with this specification at the locations and in accordance with the dimensions, designs, and details shown in the plans. This item shall include the installation of all underground electrical ducts or underground conduits. It shall also include all trenching, backfilling, removal, and restoration of any paved areas; manholes, concrete encasement, mandreling installation of steel drag wires and duct markers, capping, and the testing of the installation as a completed duct system ready for installation of cables, to the satisfaction of the Engineer.

110-2 EQUIPMENT AND MATERIALS

2.1 GENERAL.

All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Engineer.

2.2 PLASTIC CONDUIT.

A. Plastic conduit and fittings shall conform to the requirements of Fed. Spec. W-C-1094 and shall be one of the following, as specified in the proposal:

1. Type I -- suitable for underground use either directly in the earth or encased in concrete.

2. Type II -- suitable for either above ground or underground use.

2.3 CONCRETE. Concrete shall conform to Item P-610, Portland Cement Concrete.

110-3 CONSTRUCTION METHODS

3.1 GENERAL.

A. The Contractor shall install underground ducts at the approximate locations indicated in the airport layout plans. The Engineer shall indicate specific locations as the work progresses. Ducts shall be of the size, material, and type indicated in the plans or specifications. Where no size is indicated in the plans or specifications, the ducts shall be not less than 3 inches inside diameter. All duct lines shall be laid so as to grade toward handholes, manholes and duct ends for drainage. Grades shall be at least 3 inches per 100 feet. On runs where it is not practicable to maintain the grade all one way, the duct lines shall be graded from the center in both directions toward manholes, handholes, or duct ends. Pockets or traps where moisture may accumulate shall be avoided.

B. The Contractor shall mandrel each duct. An iron-shod mandrel, not more than ¼ inch smaller than the bore of the duct shall be pushed through each duct by means of jointed conduit rods. The mandrel shall have a leather or rubber gasket slightly larger than the duct hole.

C. All ducts installed shall be provided with a No. 10 gauge galvanized iron or steel drag wire for pulling the permanent wiring. Sufficient length shall be left in manholes or handholes to bend the drag wire back to prevent it from slipping back into the duct. Where spare ducts are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed by the duct manufacturers, or with hardwood plugs conforming accurately to the shape of the duct and having the larger end of the plug

at least ¼ inch greater in diameter than the duct

D. All ducts shall be securely fastened in place during construction and progress of the work and shall be plugged to prevent seepage of grout, water, or dirt. Any duct section having a defective joint shall not be installed.

E. All ducts, except steel conduit, installed under runways, taxiways, aprons, and other paved areas shall be encased in a concrete envelope.

F. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

G. Trenches for ducts may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of road patrols or graders shall not be used to excavate the trench. The Contractor shall ascertain the type of soil or rock to be excavated before bidding. All excavation shall be unclassified.

3.2 DUCTS ENCASED IN CONCRETE.

A. Unless otherwise shown in the plans, concrete-encased ducts shall be installed so that the top of the concrete envelope is not less than 18 inches below the finished subgrade where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches below finished grade where installed in unpaved areas. Ducts under paved areas shall extend at least 3 feet beyond the edges of the pavement or 3 feet beyond any underdrains which may be installed alongside the paved area. Trenches for concrete-encased ducts shall be opened the complete length before concrete is laid so that if any obstructions are encountered, proper provisions can be made to avoid them. All ducts for concrete encasements shall be placed on a layer of concrete not less than 3 inches thick prior to its initial set. Where two or more ducts are encased in concrete, the Contractor shall space them not less than 1½ inches apart (measured from outside wall to outside wall) using spacers applicable to the type of duct. As the duct laying progresses, concrete not less than 3 inches thick shall be placed around the sides and top of the duct bank. End bells or couplings shall be installed flush with the concrete encasement where required.

B. When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where otherwise shown on the plans. under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5 foot intervals.

C. When clay or soapstone ducts are specified, they shall be installed with concrete encasement as described above. Clay conduit shall be of the single-bore type. Where the self-centering socket-joint type of single clay duct is used, conduit shall be built up, tier by tier, and separated only by sufficient mortar or fine aggregate concrete to bed the ducts evenly and fill all voIds between ducts. Single ducts shall be jointed together and the joints grouted with portland cement mortar. A suitable gasket (of rubber or other approved material) shall first be placed in the receptacle end of the duct, prior to the joining operation, in order to exclude all mortar from the duct.

D. Where the square bore butt-joint type of clay duct, single or multicell, is used, sections shall be aligned with at least four steel dowel pins and joints wrapped with duct tape 6 inches wide and lapped 6 inches. All joints in a bank of single-bore ducts shall be staggered, beginning evenly from the manhole or handhole, by means of short lengths 6, 8, 9, 12, and 15 inches long. Cement mortar shall be trowled around each and every joint. Voids in the duct bank, caused by the external shape of the corners of the conduit, shall also be filled with mortar. The joining and joints of soapstone duct shall be done in accordance with the manufacturer's recommendations.

3.3 DUCTS WITHOUT CONCRETE ENCASEMENT.

A. Trenches for single-duct lines shall be not less than 6 inches nor more than 12 inches wide, and the trench for two or more ducts installed at the same level shall be proportionately wider. Trench bottoms for ducts without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the duct along its entire length.

B. A layer of fine earth material, at least 4 inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the duct. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a ¼ inch sieve. The bedding material shall be tamped until firm.

C. Unless otherwise shown in plans, ducts for direct burial shall be installed so that the tops of all ducts are at least 18 inches below the finished grade.

D. When two or more ducts are installed in the same trench without concrete encasement, they shall be spaced not less than 2 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction.

E. Trenches shall be opened the complete length before duct is installed so that if any obstructions are encountered, proper provisions can be made to avoid them.

3.4 DUCT MARKERS.

A. The location of the ends of all ducts shall be marked by a concrete slab marker 2 feet square and 4 inches thick extending approximately 1 inch above the surface. The markers shall be located above the ends of all ducts or duct banks, except where ducts terminate in a handhole, manhole, or building.

B. The Contractor shall impress the word "duct" on each marker slab. He shall also impress on the slab the number and size of ducts beneath the marker. The letters shall be 4 inches high and 3 inches wide with width of stroke½ inch and ¼ inch deep or as large as the available space permits.

3.5 BACKFILLING.

A. After concrete-encased ducts have been properly installed and the concrete has had time to set, the trench shall be backfilled in at least two layers with excavated material not larger than 4 inches in diameter and thoroughly tamped and compacted to at least the density of the surrounding undisturbed soil. If necessary to obtain the desired compaction, the backfill material shall be moistened or aerated as required. Trenches shall not be excessively wet and shall not contain pools of water during backfilling operations.

B. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

C. Any excess excavated material shall be removed and disposed of in accordance with instructions issued by the Engineer.

D. For ducts without concrete envelope, 8 inches of sand, soft earth, or other fine fill (loose measurement) shall be placed around the ducts and carefully tamped around and over them with hand tampers. The remaining trench may be filled with regular run of excavated material and thoroughly tamped as specified above.

3.6 RESTORATION.

Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All

areas disturbed by the trenching, storing of dirt, cable laying, pad construction and other work shall be restored to its original condition. The restoration shall include any necessary topsoiling, fertilizing, liming, seeding, sprigging, or mulching. All such work shall be performed in accordance with the FAA Standard Turfing Specifications. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance.

110-4 METHOD OF MEASUREMENT

4.1 The quantity of underground electrical duct and concrete encased duct to be paid for shall the number of lineal feet, measured along the centerline, installed in accordance with the plans and the provisions of this Item and accepted by the Engineer. The several sizes, numbers, and classes of duct and concrete-encased duct shall be measured separately.

110-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price for each type and size of single-way or multi-way duct completed and accepted. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-110.5 2" PVC Sched. 40 Conduit -- per lineal foot

MATERIAL REQUIREMENTS

Fed. Spec. W-C-1094 — Conduit and Fittings; Nonmetallic, Rigid, (Plastic)

END OF ITEM L-110

ITEM L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS

125-1 DESCRIPTION

1.1 This item shall consist of furnishing and installing new or relocating existing medium-intensity taxiway edge lights and furnishing and installing new or modifying existing taxiway guidance signs in accordance with the plans and the provisions of this Item. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the Engineer.

1.2 Additional details pertaining to a specific system covered in this item are contained in the Federal Aviation Administration Advisory Circulars listed below:

AC 150/5340-24	Runway and Taxiway Edge Lighting Systems.
AC 150/5340-18C	Standards for Airport Sign Systems
AC 150/5345-1U	Approved Airport Equipment
AC 150/5345-7D	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26B	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42C	Specification for Airport Light Bases, Transformer Houses, Junction Boxes, and Accessories
AC 150/5345-44F	Specification for Runway and Taxiway Signs
AC 150/5345-46A	Specification for Runway and Taxiway Edge Light Fixtures
AC 150/5345-47A	Isolation Transformers for Airport Lighting Systems

125-2 EQUIPMENT AND MATERIALS

2.1 GENERAL.

A. Airport lighting equipment and materials covered by FAA specifications shall have prior approval of the Federal Aviation Administration, Airport Service, Washington, D.C. 25090, and shall be as listed in Advisory Circular 150/5345-1U, Approved Airport Lighting Equipment.

B. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through the manufacturer's certification of compliance with the applicable specifications.

C. Lists of the equipment and materials required for a particular system are contained in the applicable advisory circulars.

2.2 TAPE.

Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88, respectively, as manufactured by the Minnesota Mining and Manufacturing Company, or an approved equal.

2.3 CONCRETE.

Concrete for sign support slabs and light base encasement shall meet the requirements of Item P-610, Portland Cement Concrete, except that the compressive strength may be not less than 3000 psi at the Contractor's option.

2.4 CONDUIT.

A. Rigid steel conduit and fittings shall conform to the requirements of Fed. Spec. WW-C-581.

B. Plastic conduit and fittings shall conform to the requirements of Fed. Spec. W-C-1094 and shall be one of the following, as appropriate:

1. Type I -- suitable for underground use either directly in the earth or encased in concrete.

2. Type II -- suitable for either above ground or underground use.

2.5 SQUEEZE CONNECTORS.

Squeeze connectors, if specified, shall be as manufactured by Crouse-Hinds Company, type CGB cable connector with neoprene rubber bushing, or approved equal.

2.6 TEES.

Large radius bend tees, if specified, shall be as manufactured by Crouse-Hinds Company No. ET-43 or approved equal.

125-3 CONSTRUCTION METHODS

3.1 GENERAL.

The installation and testing details for the systems shall be as specified in the applicable advisory circulars.

3.2 INSTALLING EDGE LIGHTS.

The light bases, isolation transformers, and fixtures shall be installed at the locations shown on and in the manner shown on the plans. Excavations for light bases shall be dug true to line and grade. Remove loose material from the bottom of the excavation and tamp the bottom and sides firm. Set the light base in position, with the top at the required elevation, make conduit connections as required, and secure to reinforcing. Concrete shall be placed only after the position (horizontal and vertical) of each fixture has been verified correct. Where possible, concrete for light bases and adjoining concrete-encased duct should be placed in the same pour.

3.3 INSTALLING GUIDANCE SIGNS.

A. The guidance sign bases, isolation transformers, and fixtures shall be installed at the locations shown on and in the manner shown on the plans. Excavations for light bases and sign base slabs shall be dug true to line and grade. Remove loose material from the bottom of the excavation and tamp the bottom and sides firm. Set the light base in position, with the top at the required elevation, and secure to reinforcing. Concrete shall be placed only after the position (horizontal and vertical) of each fixture has been verified correct. Where possible, concrete for light bases and adjoining concrete-encased duct should be placed in the same pour.

B. Where the plans call for adding one or more modules to an existing sign, the new modules shall be added on the side opposite the side nearest the taxiway edge. The end of the existing concrete sign foundation

125-4 METHOD OF MEASUREMENT

4.1 The quantity of taxiway edge lights to be paid for under this item shall be the number of lights installed in accordance with the plans and the provisions of this item and accepted by the Engineer.

4.2 The quantity of relocated taxiway edge lights to be paid for will be the number of existing edge light fixtures, including isolation transformers, relocated and reinstalled on new light bases in accordance with the plans and the provisions of this Item and accepted by the Engineer.

4.3 The quantity of taxiway guidance signs to be paid for shall be the number of signs installed in accordance with the plans and the provisions of this Item and accepted by the Engineer. The several sizes (classified by the number of modules) of signs shall be measured separately.

4.4 The quantity of taxiway guidance sign modifications to be paid for shall be the number of sign modules installed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

4.5 The quantity of replacement taxiway guidance sign legend panels to be paid for shall be the number of legend panels installed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

125-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price for each medium intensity taxiway edge light, relocated taxiway edge light, taxiway guidance sign, taxiway guidance sign modification, or replacement legend panel installed. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-125.1	**Medium Intensity Taxiway Light, Base Mounted -- each**
Item L-125.2	**Relocate Existing Taxiway Edge Light -- each**
Item L-125.3	**Two-Panel Taxiway Guidance Sign -- each**
Item L-125.4	**Three-Panel Taxiway Guidance Sign -- each**
Item L-125.5	**Modify Existing Taxiway Guidance Sign -- each**
Item L-125.6	**Replace Existing Taxiway Guidance Sign Panel -- each**

MATERIAL REQUIREMENTS

Fed. Spec. WW-C-581	Conduit, Metal, Rigid; and Coupling, Elbow; and Nipple, Electrical conduit: Zinc-Coated

INSTALLATION REQUIREMENTS

AC 150/5340-24	Runway and Taxiway Edge Light Systems

END OF ITEM L-125

ITEM T-901 SEEDING

901-1 DESCRIPTION

1.1 This item shall consist of soil preparation, seeding the areas shown on the plans or as directed by the Engineer in accordance with these specifications.

901-2 MATERIALS

2.1 SEED:

A. The species and application rates of grass, legume, and cover-crop seed furnished shall be those shown on the plans. Seed shall conform to the requirements of 1994 Standards and Specifications for Erosion and Sediment Control, Maryland Department of the Environment.

B. Seed shall be furnished separately or in mixtures in standard containers with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the Engineer duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within 6 months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of a mixture, the proportions of each kind of seed.

2.2 LIME:

Lime shall be ground limestone containing not less than 85% of total carbonates, and shall be ground to such fineness that 90% will pass through a No. 20 mesh sieve and 50% will pass through a No. 100 mesh sieve. Coarser material will be acceptable, providing the rates of application are increased to provide not less than the minimum quantities and depth specified in the special provisions on the basis of the two sieve requirements above. Dolomitic lime or a high magnesium lime shall contain at least 10% of magnesium oxide. Lime shall be applied at the rate of two tons per acre. All liming materials shall conform to the requirements of ASTM C 602.

2.3 FERTILIZER:

A. Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-soluble potash. They shall be applied at the rate and to the depth specified herein, and shall meet the requirements of Fed. Spec. O-F-241 and applicable state laws. They shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers.

B. The fertilizers may be supplied in one of the following forms:

1. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;

2. A finely-ground fertilizer soluble in water, suitable for application by power sprayers; or

3. A granular or pellet form suitable for application by blower equipment.

C. Fertilizers shall be spread at the rate of 1500 pounds per acre.

2.4 WETLANDS VEGETATION:

Permanent vegetation to be planted in stormwater management basins shall be of the varieties shown on the plans. Vegetation shall be furnished and planted in strict accordance with the plans and the requirements of the 1994 Standards and Specifications for Erosion and Sediment Control, Maryland Department of the Environment.

2.5 SOIL FOR REPAIRS:

The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the Engineer before being placed.

901-3 CONSTRUCTION METHODS

3.1 ADVANCE PREPARATION AND CLEANUP:

A. After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris which might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

B. An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches (125 mm) as a result of grading operations and, if immediately prior to seeding, the top 3 inches (75 mm) of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

C. However, when the area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory seedbed by discing, or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

3.2 DRY APPLICATION METHOD:

A. Liming. Lime shall be applied separately and prior to the application of any fertilizer or seed and only on seedbeds which have previously been prepared as described above. The lime shall then be worked into the top 3 inches (75 mm) of soil after which the seedbed shall again be properly graded and dressed to a smooth finish.

B. Fertilizing. Following advance preparations and cleanup fertilizer shall be uniformly spread at the rate which will provide not less than the minimum quantity stated in paragraph 901-2.3.

C. Seeding. Grass seed shall be sown at the rate specified in paragraph 901-2.1 immediately after fertilizing, and the fertilizer and seed shall be raked within the depth range stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in the special provisions, a cover crop shall be sown by the same methods required for grass and legume seeding.

D. Rolling. After the seed has been properly covered, the seedbed shall be immediately compacted by means of an approved lawnroller, weighing 40 to 65 pounds per foot (60 to 97 kg per meter) of width for clay soil (or any soil having a tendency to pack), and weighing 150 to 200 pounds per foot (223 to 298 kg per meter) of width for sandy or light soils.

3.3 WET APPLICATION METHOD:

A. General. The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

B. Spraying Equipment. The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons (190 liters) over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

1. The unit shall also be equipped with a pressure pump capable of delivering 100 gallons (380 liters) per minute at a pressure of 100 pounds per square inch (690 kPa). The pump shall be mounted in a line which will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8 inch (15 mm) solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

2. The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet (6 to 30 m). One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For case of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

3. In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet (15 m) in length shall be provided to which the nozzles may be connected.

C. Mixtures. Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds (100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) of water.

D. All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. Brackish water shall not be used at any time. The Contractor shall identify to the Engineer all sources of water at least 2 weeks prior to use. The Engineer may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source which is disapproved by the Engineer following such tests.

E. All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within 2 hours from the time they were mixed or they shall be wasted and disposed of at locations acceptable to the Engineer.

F. Spraying. Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches (8 cm), after which the seedbed shall again be properly graded and dressed to a smooth finish.

G. Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray which shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

H. Particular care shall be exercised to insure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area. Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

I. On surfaces which are to be mulched as indicated by the plans or designated by the Engineer, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

3.4 MAINTENANCE OF SEEDED AREAS:

A. The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the Engineer. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

B. When either the dry or wet application method outlined above is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the Engineer. If at the time when the contract has been otherwise completed it is not possible to make an adequate determination of the color, density, and uniformity of such stand of grass, payment for the unaccepted portions of the areas seeded out of season will be withheld until such time as these requirements have been met.

901-4 METHOD OF MEASUREMENT

4.1 The quantity of seeding to be paid for shall be the number of acres of seeding, measured on the ground surface, completed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

4.2 The quantity of wetlands vegetation to be paid for shall be the number of thousands of square feet or fraction thereof of wetlands vegetation, measured on the ground surface, completed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

901-5 BASIS OF PAYMENT

5.1 Payment shall be made at the contract unit price per acre or fraction thereof of seeding, which price and payment shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this Item.

5.2 Payment shall be made at the contract unit price per thousand square feet or fraction thereof of wetlands vegetation, which price and payment shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

Item T-901.1	**Seeding -- per acre**
Item T-901.2	**Wetlands Vegetation -- per thousand square feet**

MATERIAL REQUIREMENTS

ASTM D 977	Emulsified Asphalt
Fed. Spec. JJJ-S-181B	Agricultural Seeds
Fed. Spec. O-F-241D	Commercial Mixed Fertilizer

END OF ITEM T-901

ITEM T-905 TOPSOILING

905-1 DESCRIPTION

1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from stockpiled topsoil resulting from stripping operations performed under Item P-152, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer. This item shall include furnishing and installing erosion control netting on prepared surfaces inside stormwater management basins as shown on the plans.

1.2 The quantity of topsoil work required under this Item shall be limited to the quantity required to cover the surfaces of the proposed stormwater management basins as shown on the plans. The approximate quantity required to accomplish this is shown on the plans. The Contractor shall be responsible for verifying the actual quantity of topsoil required from the grades and sections shown on the plans. Any topsoil remaining after the completion of this work, or topsoil stripped in excess of the quantity required shall, at MAA's option, remain the property of MAA, and the Contractor shall be entitled to no additional compensation under this Item.

905-2 MATERIALS

2.1 TOPSOIL:

Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches or more in diameter), clay lumps or similar objects. Brush and other vegetation which will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sods and herbaceous growth such as grass and weeds are not to be removed but shall be thoroughly broken up and intermixed with the soil during handling operations. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the association of official agricultural chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). there shall be not less than 20% nor more than 80% of the material passing the 200 mesh (0.075 mm) sieve as determined by the wash test in accordance with ASTM C 117. Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

2.2 INSPECTION AND TESTS:

The topsoil shall be inspected to determine if the stripped material meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in 905-2.1.

2.3 EROSION CONTROL NETTING:

Erosion control netting shall be of the type specified on the plans and shall meet the requirements of the 1994 Standards and Specifications for Erosion and Sediment Control, Maryland Department of the Environment.

905-3 CONSTRUCTION METHODS

3.1 GENERAL:

A. Areas to be topsoiled shall be shown on the plans. If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

B. Suitable equipment necessary for proper preparation and treatment of the ground and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the Engineer before the various operations are started.

3.2 PREPARING THE GROUND SURFACE:

A. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other means approved by the Engineer, to a minimum depth of 2 inches (50 mm) to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 inches (50 mm) in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

B. Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and properly compacted condition to prevent, insofar as practical, the formation of low places or pockets where water will stand.

3.3 OBTAINING TOPSOIL:

A. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the Engineer. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed. When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the Engineer. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the Engineer. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoiling purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

B. When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the Engineer. The Contractor shall notify the Engineer sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

3.4 PLACING TOPSOIL:

A. The topsoil shall be evenly spread on the prepared areas to a uniform depth of 2 inches (50 mm) after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

B. After spreading, any large, stiff clods and hard lumps shall be broken with a pulverizer or by other effective means, and all stones or rocks (2 inches (50 mm) or more in diameter), roots, litter, or any foreign matter shall be raked up and disposed of by the Contractor. after spreading is completed, the topsoil shall be satisfactorily compacted by rolling with a cultipacker or by other means approved by the Engineer. The compacted topsoil surface shall conform to the required lines, grades, and cross sections. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed.

3.5 PLACING EROSION CONTROL NETTING

Following the placement, spreading, and grading of topsoil in the proposed stormwater management basins, erosion control shall be placed across the pond bottoms up to the elevations shown on the plans. Netting shall be placed in continuous lapped fashion by unrolling as close to its final position as practicable. The netting shall not be stretched to deformity during placement and shall be anchored with staples as soon as possible after being set in its final position. Netting shall be protected from damage until seeding to follow has been established. Netting which becomes torn or otherwise damaged shall be repaired or replaced by the Contractor as directed by the Engineer.

905-4 METHOD OF MEASUREMENT

4.1 The quantity of topsoiling to be paid for shall be the number of cubic yards of topsoil placed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

4.2 The quantity of erosion control netting to be paid for shall be the number of square yards measured on the ground placed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

905-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per cubic yard for topsoiling (obtained on the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

5.2 Payment will be made at the contract unit price per square yard for erosion control netting. This price shall be full compensation for furnishing all materials and for all preparation and placing of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item T-905.1 **Topsoiling -- per cubic yard**

Item T-905.2 **Erosion Control Netting -- per square yard**

END OF ITEM T-905

ITEM T-908 MULCHING

908-1 DESCRIPTION

1.1 This item shall consist of furnishing, hauling, placing, and securing mulch on surfaces indicated on the plans or designated by the Engineer.

908-2 MATERIALS

2.1 MULCH MATERIAL:

A. Acceptable mulch shall be the materials listed below or any approved locally available material that is similar to those specified. Low grade, musty, spoiled, partially rotted hay, straw, or other materials unfit for animal consumption will be acceptable. Mulch materials, which contain matured seed of species which would volunteer and be detrimental to the proposed overseeding, or to surrounding farm land, will not be acceptable. Straw or other mulch material which is fresh and/or excessively brittle, or which is in such an advanced stage of decomposition as to smother or retard the planted grass, will not be acceptable.

1. Hay. Hay shall be native hay, sudan grass hay, broomsedge hay, legume hay, or similar hay or grass clippings.

2. Straw. Straw shall be the threshed plant residue of oats, wheat, barley, rye, or rice from which grain has been removed.

3. Hay Mulch Containing Seed. Hay mulch shall be mature hay containing viable seed of native grasses or other desirable species stated in the special provisions or as approved by the Engineer. The hay shall be cut and handled so as to preserve the maximum quantity of viable seed. Hay mulch which cannot be hauled and spread immediately after cutting shall be placed in weather-resistant stacks or baled and stored in a dry location until used.

4. Manufactured Mulch. Cellulose-fiber or wood-pulp mulch shall be products commercially available for use in spray applications.

5. Asphalt Binder. Asphalt binder material shall conform to the requirements of ASTM D 977, Type SS-1 or RS-1.

2.2 INSPECTION:

Within 5 days after acceptance of the bid, the Engineer shall be notified of sources and quantities of mulch materials available and the Contractor shall furnish him with representative samples of the materials to be used. These samples may be used as standards with the approval of the Engineer and any materials brought on the site which do not meet these standards shall be rejected.

908-3 CONSTRUCTION METHODS

3.1 MULCHING:

A. Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding.

The spreading of the mulch may be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

B. Mulch material shall be furnished, hauled, and evenly applied on the area shown on the plans or designated by the Engineer. Straw or hay shall be spread over the surface to a uniform thickness at the rate of 2 to 3 tons per acre (1800-2700 kg per acre) to provide a loose depth of not less than 1½ inches (37 cm) nor more than 3 inches (75 mm). Other organic material shall be spread at the rate directed by the Engineer. Mulch may be blown on the slopes and the use of cutters in the equipment for this purpose will be permitted to the extent that at least 95% of the mulch in place on the slope shall be 6 inches (150 mm) or more in length. When mulches applied by the blowing method are cut, the loose depth in place shall be not less than 1 inch (25 mm) nor more than 2 inches (50 mm).

3.2 SECURING MULCH:

A. The mulch shall be held in place by light discing, a very thin covering of topsoil, small brush, pins, stakes, wire mesh, asphalt binder, or other adhesive material approved by the Engineer. Where mulches have been secured by either of the asphalt binder methods, it will not be permissible to walk on the slopes after the binder has been applied. The Contractor is warned that in the application of asphalt binder material he must take every precaution to guard against damaging or disfiguring structures or property on or adjacent to the areas worked and that he will be held responsible for any such damage resulting from his/her operations.

B. If the "peg and string" method is used, the mulch shall be secured by the use of stakes or wire pins driven into the ground on 5-foot (150 m) centers or less. Binder twine shall be strung between adjacent stakes in straight lines and crisscrossed diagonally over the mulch, after which the stakes shall be firmly driven nearly flush to the ground to draw the twine down tight onto the mulch.

3.3 CARE AND REPAIR:

A. The Contractor shall care for the mulched areas until final acceptance of the project. Such care shall consist of providing protection against traffic or other use by placing warning signs, as approved by the Engineer, and erecting any barricades that may be shown on the plans before or immediately after mulching has been completed on the designated areas.

B. The Contractor shall be required to repair or replace any mulching that is defective or becomes damaged until the project is finally accepted. When, in the judgment of the Engineer, such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement shall be borne by the Contractor. However, once the Contractor has completed the mulching of any area in accordance with the provisions of the specifications and to the satisfaction of the Engineer, no additional work at his/her expense will be required, but subsequent repairs and replacements deemed necessary by the Engineer shall be made by the Contractor and will be paid for as additional or extra work.

C. If the "asphalt spray" method is used, all mulched surfaces shall be sprayed with asphalt binder material so that the surface has a uniform appearance. The binder shall be uniformly applied to the mulch at the rate of approximately 8.0 gallons (32 liters) per 1,000 square feet (100 square meters), or as directed by the Engineer, with a minimum of 6.0 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 square meters) depending on the type of mulch and the effectiveness of the binder securing it. Bituminous binder material may be sprayed on the mulched slope areas from either the top or the bottom of the slope. An approved spray nozzle shall be used. The nozzle shall be operated at a distance of not less than 4 feet (120 cm) from the surface of the mulch and uniform distribution of the bituminous material shall be required. A pump or an air compressor of adequate capacity shall be used to insure uniform distribution of the bituminous material.

D. If the "asphalt mix" method is used, the mulch shall be applied by blowing, and the asphalt binder material shall be sprayed into the mulch as it leaves the blower. The binder shall be uniformly applied to the mulch at the rate of approximately 8.0 gallons (32 liters) per 1,000 square feet (100 square meters) or as directed by the Engineer, with a minimum of 6.0 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 square meters) depending on the type of mulch and the effectiveness of the binder securing it.

908-4 METHOD OF MEASUREMENT

4.1 The quantity of mulching to be paid for shall be the number of acres of mulch placed in accordance with the plans and the provisions of this Item and accepted by the Engineer.

908-5 BASIS OF PAYMENT

5.1 Payment will be made at the contract unit price per acre for mulching. This price shall be full compensation for furnishing all materials and for placing and anchoring the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item T-908.1 **Mulching -- per acre**

MATERIAL REQUIREMENTS

ASTM D 977 Emulsified Asphalt

END OF ITEM T-908

TECHNICAL PROVISIONS

PART III

SPECIAL PROVISIONS FORMS

PART III

SPECIAL PROVISIONS FORMS

SP-1.01 Request for Information (SP-4.14) SP-1

SP-1.02 Substitution Request (SP-5.04) SP-3

SP-1.03 Subcontractor Statement of Acknowledgment (SP-8.01) SP-7

SP-1.04 Minority Business Enterprise Utilization Statement (SP-9.02) SP-9

SP-1.05 Submittal Register (SP-8.06) SP-10

SP-1.01 Request for Information (SP- 4.14)

Contractor:	Contractor's Architect:
Address:	Address:
Phone:	Phone:

Contract Title:	Contract Number:

RFI Number:	Date of Request:	Date Response Required (7 days minimum):

Description of RFI:

As Built Sketches Enclosed:	Specification Paragraph Ref:	Drawing Reference:

Contractor's Recommendation:

Cost Impact:	Schedule Impact:

Subcontractors Affected:

Subcontractors Coordinated With:

Submitted by:

SP-1.02 Substitution Request (SP- 5.04)

Contract Title:	Item #:
Contract Number:	Section #:
Contractor:	Paragraph #:
Item Specified:	
Proposed Substitution:	

Fill in the blanks below (incomplete forms will not be considered):

A. Does the substitution affect dimensions shown on the Drawings?

Yes No

B. Will the undersigned pay for changes to the building design, including engineering and detailing cost caused by the requested substitution?

Yes No

C. What affect does substitution have on other trades?

D. What affect does substitution have on construction schedules?

E. Manufacturer's guarantees of proposed and specified items are:

Same _____ Different _____

Explain if different:

F. Reason for request:

G. Itemized comparison of specified item with the proposed substitution; list significant variations:

H. Accurate cost data comparing proposed substitution with product specified:

I. Designation of maintenance services and sources:

J. Attach complete technical data, including laboratory tests, If applicable.

K. Include complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation.

L. Submit with the request all necessary samples and substantiating data to prove equal quality and performance to the item specified in the Contract. Clearly mark the Manufacturer's literature to indicate equality in performance.

The Contractor certifies that the proposed substituted product is of equal performance and assumes the liability for equal performance, design, and compatibility with adjacent materials.

The undersigned states that the function, appearance, and quality of the proposed substituted product is equivalent or superior to the specified item/product. Signature shall be the principal having the authority to legally bind his/her firm to the above terms. Failure to provide legally binding signature will result in retraction of approval.

Corporate Officer:

Signature Date

Address:

SP-1.03 Subcontractor Statement of Acknowledgment (SP-8.01)

PART I - STATEMENT OF PRIME CONTRACTOR

1. PRIME CONTRACT #:	2. CONTRACT TITLE:
3. SUBCONTRACTOR #:	4. DATE SUBCONTRACT AWARDED:
4. PRIME CONTRACTOR (Name, Address, Phone)	5. SUBCONTRACTOR (Name, Address, and Phone)

6. The Prime Contractor states that under the Contract shown in Item 1, a subcontract was awarded on the date shown in

Item 4 by (name of awarding firm): ___

to the subcontractor in Item 5 for the following work:

7. Name and Title	8. Signature	9. Date

PART II - ACKNOWLEDGEMENT OF SUBCONTRACTOR

10. The subcontractor acknowledges that, as a minimum, the following clauses of the Contract shown in item 1 are included in the subcontract:

GENERAL PROVISIONS	SPECIAL PROVISIONS	FEDERAL-AID PROVISIONS	CONTRACTOR AFFIRMATIVE ACTION PROGRAM
GP-2.05	SP-1.06		AAP-1.01
GP-7.01	SP-6.03		AAP-2.02
GP-7.02	SP-6.04		
GP-7.05	SP-6.05		
GP-7.13	SP-6.06		
GP-7.14	SP-8.01		
GP-7.20	SP-8.07		
GP-7.23	SP-9.01		
GP-7.30			
GP-7.36			
GP-8.01			
GP-9.01			

11. NAME(S) OF ANY HIGHER, OR LOWER TIER SUBCONTRACTORS, IF ANY:

12. Name and Title	13. Signature	14. Date

SP-1.04 Minority Business Enterprise Utilization Statement (SP-9.02)

Contract Title:	Page _____ of _____
Contract Number:	Date:
Contractor Name:	Invoice Number:
MBE Utilization To-Date (%):	MBE Goal (%):

GENERAL CONTRACTOR STATEMENT		
Payment Through Last Period	Payment This Period	Total Payment To Date

MBE SUBCONTRACTOR PARTICIPATION		
Payment Through Last Period	Payment This Period	Total Payment To Date
MBE Subcontractor Number 1 (Name):		
MBE Subcontractor Number 2 (Name):		
MBE Subcontractor Number 3 (Name):		
MBE Subcontractor Number 4 (Name):		
MBE Subcontractor Number 5 (Name):		

SP-1.05 Submittal Register (SP-8.06)

CONTRACT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I													CONTRACT NUMBER: MAA-CO-97-019								
PROJECT LOCATION: MARTIN STATE AIRPORT, MARYLAND													CONTRACTOR:								
		TYPE OF SUBMITTAL									CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		MAA ACTION		
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	SHOP DWG	SAMPLE	MFGS DATA	CERTIFICATE	TEST REPORT	SOFTWARE	OTHER AS NOTED	TECH DATA	GUARANTEE	INFORMATION ONLY	MAA APPROVAL	SUBMIT	APPROVAL NEEDED BY	MATERIALS NEEDED BY	DATE	SUBMIT TO MAA	SUBMIT	DATE	REMARKS
10	Specifications and Standards							X												Permits
100	Demolition							X												Miss Utility
427	Oil/Water separator			X	X				X	X										
813	Roadway Sign	X							X											
1000	Pre-Engineered Metal Building			X					X	X										
1200	Water Tank	X		X	X	X			X	X										
1300	San. Sewage and Water Supply System	X		X	X	X			X	X										
2080	Asbestos Removal				X															
15000	Pumphouse Equip., Pipe and Fitting	X		X	X	X			X	X										
500	Bituminous Asphalt		X	X	X	X		X												
501	Crushed Aggregate Base Course				X	X		X												
508	Pavement Milling			X				X												
515	Chain Link Fence	X		X	X			X												

CONTRACT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I													CONTRACT NUMBER: MAA-CO-97-0 9								
PROJECT LOCATION: MARTIN STATE AIRPORT, MARYLAND													CONTRACTOR:								
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL									CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		MAA ACTION		REMARKS
		SHOP DWG	SAMPLE	MFGS DATA	CERTIFICATE	TEST REPORT	SOFTWARE	OTHER AS NOTED	TECH DATA	GUARANTEE	INFORMATION ONLY	MAA APPROVAL	SUBMIT	APPROVAL NEEDED BY	MATERIALS NEEDED BY	DATE	SUBMIT TO MAA	SUBMIT	DATE	
16050	Basic Electrical Materials and Methods	X	X	X	X			X												Schedules
16100	Raceways, Boxes and Cabinets			X																
16120	Wires and Cables					X														
16170	Motor and Circuit Disconnects	X		X																
16195	Labeling and Identification			X																
16321	Transformers	X		X	X	X		X												Maintenance
16450	Grounding					X														
16510	Lighting	X		X				X	X											Photometrics
16782	Closed Circuit TV System Modifications	X		X				X												Wiring Diagrams

CONTRACT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I	CONTRACT NUMBER: MAA-CO-97-019
PROJECT LOCATION: MARTIN STATE AIRPORT, MARYLAND	CONTRACTOR:

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL									CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		MAA ACTION		REMARKS
		SHOP DWG	SAMPLE	MFGS DATA	CERTIFICATE	TEST REPORT	SOFTWARE	OTHER AS NOTED	TECH DATA	GUARANTEE	INFORMATION ONLY	MAA APPROVAL	SUBMIT	APPROVAL NEEDED BY	MATERIALS NEEDED BY	DATE	SUBMIT TO MAA	SUBMIT	DATE	

CONTRACT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I													CONTRACT NUMBER: MAA-CO-97-019								
PROJECT LOCATION: MARTIN STATE AIRPORT, MARYLAND													CONTRACTOR:								
ITEM NO.	DESCRIPTION OF ITEM SUBMITTED	TYPE OF SUBMITTAL									CLASSIFICATION		CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION		MAA ACTION		REMARKS
		SHOP DWG	SAMPLE	MFGS DATA	CERTIFICATE	TEST REPORT	SOFTWARE	OTHER AS NOTED	TECH DATA	GUARANTEE	INFORMATION ONLY	MAA APPROVAL	SUBMIT	APPROVAL NEEDED BY	MATERIALS NEEDED BY	DATE	SUBMIT TO MAA	SUBMIT	DATE	

TECHNICAL PROVISIONS

PART IV

WAGE RATES

STATE OF MARYLAND
DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. EUTAW STREET, ROOM 607
BALTIMORE, MARYLAND 21202-2272
(410) 767-2342

The wage rates to be paid laborers and mechanics on the contract described below is announced by order of the Commissioner of Labor and Industry.

It is mandatory upon the successful bidder and any subcontractor under him, to pay not less than the specific rates to all workers employed by them in execution of this contract. Reference: Annotated Code of Maryland State Finance and Procurement, Section 17-201 thru 17-226 inclusive.

These rates were taken from the locality determination dated January 5, 1998 for Baltimore County, issued pursuant to the Commissioner's authority under State Finance and Procurement Article Section 17-209, Annotated Code of Maryland.

Suzette Moore, Manager, Contract Administration — March 26, 1998
(Name and Title of Requesting Officer) — (Date of Issue)

Maryland Aviation Administration, P.O. Box 8766, BWI Airport, Md 21240
(Department, Agency or Bureau) (Address)

Baltimore County: Martin State Airport-Midfield Terminal Complex Site Development-Phase I
(Location and Description of work)

Project NO. MAA-CO-97-019

CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFIT PAYMENTS
ASBESTOS/INSULATION WORKER	$21.00	$6.21
CARPENTER	$16.72	$5.80
CEMENT MASON-FINISHER	$19.18	$3.19
ELECTRICIAN	$22.40	$8.46
IRONWORKER	$21.14	$8.27
CHAIN LINK FENCE ERECTOR	$17.69	$7.30

PREVAILING WAGE
INSTRUCTIONS FOR THE CONTRACTOR

The contractor shall submit two complete copies of his payroll records and the payroll records of each of his subcontractors-one copy to the Contracting Officer and one to the Commissioner of Labor & Industry, 1100 N. Eutaw Stree, Room 607, 6th Floor, Baltimore, Maryland 21201, where they will be available for inspection during business hours. These payroll records **MUST BE SUBMITTED WITHIN 14 CALENDAR DAYS AFTER THE END OF EACH PAYROLL PERIOD** and shall contain the following information: Name, address & **TELEPHONE NUMBER**; location and project number of the job; Employees name, address, social security number, exact and specific work classification, hours-straight time and overtime-worked each day, total hours-straight time and overtime-worked rate of pay and gross wages earned. Employee's address may be dropped after it has been reported one time. Payrolls shall be submitted on U.S. Department of Labor Wage and Hour Public Contracts Division Payroll Form WH-347 or its equivalent and contain only information relevant to the job and be serially numbered starting with payroll number one.

The contractor shall be responsible for submission of all subcontractors' payroll records covering work performed directly at the work site. Each copy of the payroll records shall be accompanied by a statement signed by the contractor or the subcontractor, indicating that the wage rates contained therein are not less than those established by the Commissioner as set forth in the contract, that the classification set forth for each worker or apprentice conforms with the work performed, and that the contractor or subcontractor, as the case may be, has complied with the provisions of the law.

A contractor or subcontractor may make **deductions** that are (1) required by law; (2) required by a collective bargaining agreement between a bona fide labor organization and the contractor or subcontractor; or (3) contained in **WRITTEN AGREEMENT** between an employee and an employer undertaken at the beginning of employment, if the agreement is submitted by the employer to the **PUBLIC BODY** awarding the public work and is approved by the public body as fair and reasonable.

If the contractor is delinquent in submitting payroll records, processing of partial payment estimates may be held in abeyance pending receipt of the records. In addition, if the contractor is delinquent in submitting the payroll records, the contractor shall be liable to the Contracting Public Body for liquidated damages. The liquidated damages shall constitute the sum of $10.00 for each calendar day that the records are late.

Only apprentices registered with the Maryland State Apprenticeship and Training Council shall be employed on Prevailing Wage projects. Apprentices shall be paid a percentage of the determined journeyperson's wage rate for the specific craft.

OVERTIME rates shall be paid by the general contractors and subcontractors under its contracts and agreements with their employees which in no event shall be less than time and one-half the prevailing hourly rate of wages for all hours worked **IN EXCESS OF EIGHT (8) HOURS IN ANY ONE CALENDAR DAY** and work performed on Sundays and legal holidays.

Contractors and subcontractors employing a classification of worker for which a wage rate was not issued, shall notify the Commissioner of Labor & Industry, Prevailing Wage Section, for the purpose of obtaining the wage rate for said classification **PRIOR TO BEING EMPLOYED** on this project.

pw-6 Updated: 10-17-97

STATE OF MARYLAND
DEPARTMENT OF LABOR, LICENSING AND REGULATION
DIVISION OF LABOR AND INDUSTRY
PREVAILING WAGE SECTION
1100 N. EUTAW STREET, ROOM 607
BALTIMORE, MARYLAND 21202-2272
(410) 767-2342

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These rates were taken from the locality determination dated January 5, 1998 for Baltimore County, issued pursuant to the Commissioner's authority under State Finance and Procurement Article Section 17-209, Annotated Code of Maryland.

Suzette Moore, Manager, Contract Administration — March 26, 1998
(Name and Title of Requesting Officer) — (Date of Issue)

Maryland Aviation Administration, P.O. Box 8766, BWI Airport, Md 21240
(Department, Agency or Bureau) (Address)

Baltimore County: Martin State Airport-Midfield Terminal Complex Site Development-Phase I
(Location and Description of work)

Project NO. MAA-CO-97-019

CLASSIFICATION:	BASIC HOURLY RATE	FRINGE BENEFIT PAYMENTS
ASBESTOS/INSULATION WORKER	$21.00	$6.21
CARPENTER	$16.72	$5.80
CEMENT MASON-FINISHER	$19.18	$3.19
ELECTRICIAN	$22.40	$8.46
IRONWORKER	$21.14	$8.27
CHAIN LINK FENCE ERECTOR	$17.69	$7.30

Baltimore County: Martin State Airport-Midfield Terminal Complex Site Development-Phase I-Project NO. MAA-CO-97-019

CLASSIFICATION	BASIC HOURLY RATE	FRINGE BENEFIT PAYMENTS
GLAZIER	$21.14	$8.27
LABORER:		
COMMON OR UNSKILLED	$10.75	$1.625
MASON TENDER	$ 9.98	
PIPELAYER	$13.00	$0.99
ASPHALT RAKER	$11.40	$2.69
AIR TOOL OPERATOR	$ 9.82	$2.88
CONCRETE SURFACER	$12.55	$2.56
ASBESTOS OR LEAD ABATEMENT	$10.75	$1.625
HAZARDOUS MATERIAL HANDLER	$10.75	$1.625
SHEETMETAL WORKER	$19.37	$6.52
TRUCK DRIVER:		
DUMP TRUCK	$13.66	$4.60 +a+b
FLAT BED	$13.66	$4.60 +a+b
PICK-UP	$13.66	$4.60 +a+b
TRAILER	$13.94	$4.60 +a+b
WATER, FUEL TRUCK	$13.66	$4.60 +a+b
POWER EQUIPMENT OPERATORS:		
BACKHOE	$15.89	$5.35 +a
BOBCAT	$14.21	$3.51
BULLDOZER	$15.97	$5.35 +a
CRANE	$16.84	$5.35 +a
EXCAVATOR	$16.84	$5.35 +a
FORKLIFT	$13.11	$2.015
GRADALL	$16.84	$5.35 +a
GRADER	$16.84	$5.35 +a
LOADER	$16.84	$5.35 +a
MECHANIC	$17.01	$6.60 +a
OILER	$12.76	$5.35 +a
PAVER	$15.97	$5.35 +a
ROLLER	$15.97	$5.35 +a
SCRAPER/PAN	$16.84	$5.35 +a
TRACTOR W/ATTACHMENTS	$16.84	$5.35 +a

a PAID HOLIDAYS: New Years Day, Memorial Day, July 4th, Labor Day, Veteran's Day, Thanksgiving day, & Christmas Day.

b PAID VACATIONS: Employees with 1 year service-1 week paid vacation;
2 years service-2 weeks paid vacation
10 years service-3 weeks paid vacation

WELDER, RIGGER, CAULKER - Receive rate prescribed for craft performing operation to which welding, rigging, or caulking is incidental.

PREVAILING WAGE
INSTRUCTIONS FOR THE CONTRACTOR

The contractor shall submit two complete copies of his payroll records and the payroll records of each of his subcontractors-one copy to the Contracting Officer and one to the Commissioner of Labor & Industry, 1100 N. Eutaw Stree, Room 607, 6th Floor, Baltimore, Maryland 21201, where they will be available for inspection during business hours. These payroll records **MUST BE SUBMITTED WITHIN 14 CALENDAR DAYS AFTER THE END OF EACH PAYROLL PERIOD** and shall contain the following information: Name, address & **TELEPHONE NUMBER**; location and project number of the job; Employees name, address, social security number, exact and specific work classification, hours-straight time and overtime-worked each day, total hours-straight time and overtime-worked rate of pay and gross wages earned. Employee's address may be dropped after it has been reported one time. Payrolls shall be submitted on U.S. Department of Labor Wage and Hour Public Contracts Division Payroll Form WH-347 or its equivalent and contain only information relevant to the job and be serially numbered starting with payroll number one.

The contractor shall be responsible for submission of all subcontractors' payroll records covering work performed directly at the work site. Each copy of the payroll records shall be accompanied by a statement signed by the contractor or the subcontractor, indicating that the wage rates contained therein are not less than those established by the Commissioner as set forth in the contract, that the classification set forth for each worker or apprentice conforms with the work performed, and that the contractor or subcontractor, as the case may be, has complied with the provisions of the law.

A contractor or subcontractor may make deductions that are (1) required by law; (2) required by a collective bargaining agreement between a bona fide labor organization and the contractor or subcontractor; or (3) contained in **WRITTEN AGREEMENT** between an employee and an employer undertaken at the beginning of employment, if the agreement is submitted by the employer to the **PUBLIC BODY** awarding the public work and is approved by the public body as fair and reasonable.

If the contractor is delinquent in submitting payroll records, processing of partial payment estimates may be held in abeyance pending receipt of the records. In addition, if the contractor is delinquent in submitting the payroll records, the contractor shall be liable to the Contracting Public Body for liquidated damages. The liquidated damages shall constitute the sum of $10.00 for each calendar day that the records are late.

Only apprentices registered with the Maryland State Apprenticeship and Training Council shall be employed on Prevailing Wage projects. Apprentices shall be paid a percentage of the determined journeyperson's wage rate for the specific craft.

OVERTIME rates shall be paid by the general contractors and subcontractors under its contracts and agreements with their employees which in no event shall be less than time and one-half the prevailing hourly rate of wages for all hours worked **IN EXCESS OF EIGHT (8) HOURS IN ANY ONE CALENDAR DAY** and work performed on Sundays and legal holidays.

Contractors and subcontractors employing a classification of worker for which a wage rate was not issued, shall notify the Commissioner of Labor & Industry, Prevailing Wage Section, for the purpose of obtaining the wage rate for said classification **PRIOR TO BEING EMPLOYED** on this project.

pw-6 Updated: 10-17-97

TECHNICAL PROVISIONS

PART V

INTERIM STANDARD PROVISIONS ADDENDUM

STANDARD PROVISIONS FOR CONSTRUCTION CONTRACTS
VOLUME I, DECEMBER 1993

Amended February 15, 1998

PART V

INTERIM STANDARD PROVISIONS ADDENDUM

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PART I CODE OF MARYLAND REGULATIONS (COMAR) REVISIONS/INFORMATION

I. COMAR 21.06.07 - BID AND CONTRACT SECURITY/BONDS
Subsection .01 - General

A. Effective May 20, 1996, as amended by the Board of Public Works, the requirement for bonding (bid, payment, and performance) is raised from $50,000 to $100,000, unless otherwise specified.

B.(4) Effective May 20, 1996, as amended by the Board of Public Works, an irrevocable letter of credit in a form satisfactory to the Attorney General and issued by a financial institution approved by the State Treasurer is an acceptable form of security.

B.(5) Effective January 26, 1998, as adopted by the Board of Public Works, the granting of a mortgage or deed of trust on real property located in the State of Maryland is an acceptable form of performance security on construction contracts when:

1. such security is satisfactory to the procurement officer;

2. the face amount of the instrument does not exceed 75% of the Contractor's equity interest in the property; and

3. the assignment of the mortgage or deed of trust is recorded in the county land records pursuant to Real Property, Article §3-103 Annotated Code of Maryland.

II. BONDING ASSISTANCE

Assistance in obtaining bid, performance and payment bonds may be available to qualifying small businesses through the Maryland Small Business Development Financing Authority (MSBDFA). MSBDFA can directly issue bid, performance or payment bonds up to $750,000. MSBDFA may also guaranty up to 90% of a surety's losses as a result of a contractor's breach of contract; MSBDFA's exposure on any bond guaranteed may not, however, exceed $900,000. Bonds issued directly by the program will remain in effect for the duration of the contract, and those surety bonds that are guaranteed by the program will remain in effect for the duration of the surety's exposure under the contract.

To be eligible for bonding assistance, a business must first be denied bonding by at least one surety in both the standard and specialty markets within 90 days of submitting a bonding application to MSBDFA. The applicant must employ fewer than 500 full-time employees or have gross sales of less than $50 million annually, have its principal place of business in Maryland or be a Maryland resident, must not subcontract more than 75 percent of the work, and the business or its principals must have a reputation of good moral character and financial responsibility.

Finally, it must be demonstrated that the bonding or guarantee will have a measurable economic impact, through job creation and expansion of the state's tax base. Applicants are required to work through their respective bonding agents in applying for assistance under the program. Questions regarding the bonding assistance program should be referred to:

Maryland Department of Business and Economic Development
Maryland Small Business Development Financing Authority
217 East Redwood Street, 22nd Floor
Baltimore MD 21202
Phone (410) 333-4270
Fax (410) 333-6931

III. COMAR 21.07.02 - MANDATORY CONSTRUCTION CONTRACT CLAUSES

Subsection .05-1 - Disputes

(Adopted January 26, 1998 by the Board of Public Works)

A. This Contract is subject to the provisions of State Finance and Procurement Article, Title 15, Subtitle 2, Annotated Code of Maryland, and COMAR 21.10.

B. Except as otherwise provided in this Contract, or by law, all disputes arising under or as a result of a breach of this Contract that are not disposed of by mutual agreement shall be resolved in accordance with this clause.

C. As used herein, "claim" means a written demand or assertion by one of the parties seeking, as a legal right, the payment of money, adjustment or intepretation of contract terms, or other relief, arising under or relating to this Contract. A voucher, invoice, or request for payment that is not in dispute when submitted is not a claim under this clause. However, if the submission subsequently is not acted upon in a reasonable time, or is disputed as to liability of amount, it may be converted to a claim for the purpose of this clause.

D. Within 30 days after Contractor knows or should have know of the basis for a claim relating to this Contract, Contractor shall file a written notice of claim with the Procurement Officer.

E. Contemporaneously with, or within 30 days after, the filing of a notice of claim, Contractor shall submit the written claim to the Procurement Officer. If Contractor so requests, the Procurement Officer, on conditions the Procurement Officer deems satisfactory to the unit, may extend the time in which a Contractor must submit the claim. An example of when a Procurement Officer may grant an extension includes situations in which the Procurement Officer finds that a contemporaneous or timely cost quantification following the filing of the notice of claim is impossible or impractical.

F. The claim shall set forth all the facts surrounding the controversy. Contractor, at the discrretion of the Procurement Officer, may be afforded an opportunity to be heard and to offer evidence in support of the claim.

G. The Procurement Officer shall mail or deliver written notification of the final decision within:

(1) 90 days after the Procurement Officer receives the claim if the claim is an amount for which the Appeals Board accelerated procedure, set forth in **COMAR 21.10.06.12**, may be used;

(2) 180 days after the Procurement Officer receives the claim for a claim not covered under §H(1) of this regulation; or

(3) A longer period that the Procurement Officer and Contractor agree to in writing.

H. The final decision may award a contract claim only for those expenses incurred not more than 30 days before Contractor was initially required to have filed the notice of claim.

I. The Procurement Officer's decision is the final action of the Administration. If the Procurement Officer fails to render a final decision within the time required, Contractor may deem the failure to be a final decision not to pay the claim.

J. If the final decision grants the claim in part and denies the claim in part, the Administrator shall pay the Contractor the undisputed amount. Payment of the partial claim is not an admission of liability by the Administration and does not preclude the Administration from recovering the amount paid if a subsequent determination modifies the final decision.

K. Contractor may file a written appeal with the Maryland State Board of Contract Appeals within 30 days of receipt of notice of decision.

L. Pending resolution of a claim, Contractor shall proceed diligently with the performance of the Contract in accordance with the Procurement Officer's decision.

IV. COMAR 21.10.04 - CONTRACT CLAIMS AND DISPUTES

Subsection .02 - Filing of Claim by Contractor
(Amended October 6, 1997 by the Board of Public Works)

B. Contemporaneously with or within 30 days of the filing of a notice of a claim, but no later than the date that final payment is made, a contractor shall submit the claim to the appropriate procurement officer. On conditions the Procurement Officer considers satisfactory to the unit, the Procurement Officer may extend the time in which a contractor, after timely submitting a notice of claim, must submit a contract claim under a procurement contract for construction. An example of when a Procurement Officer may grant an extension includes situations in which the Procurement Officer finds that a contemporaneous or timely cost quantification following the filing of the notice of claim is impossible or impractical. The claim shall be in writing and shall contain:

(1) An explanation of the claim, including reference to all contract provisions upon which it is based;

(2) The amount of the claim;

(3) The facts upon which the claim is based;

(4) All pertinent data and correspondence that the contractor relies upon to substantiate the claim; and

(5) A certification by a senior official, officer, or general partner of the contractor or the subcontractor, as applicable, that, to the best of the person's knowledge and belief, the claim is made in good faith, supporting data are accurate and complete, and the amount requested accurately reflects the contract adjustment for which the person believes the procurement agency is liable.

Subsection .04 - Disposition of Claim
(Amended October 6, 1997 by the Board of Public Works)

A. The Procurement Officer may conduct discussions or negotiations regarding the claim and, subject to approval by the reviewing authority and the Office of the Attorney General, and consistent with the budget and applicable law, may settle the claim. The settlement agreement shall be written, shall provide for an appropriate release, and shall be supported by a written determination of the Procurement Officer that the settlement is in the best interests of the State.

B-D. If discussions or negotiations are not conducted or if the claim is not settled, the Procurement Officer shall prepare a written, recommended decision on the claim, which shall be furnished to the Contractor by certified mail, return receipt requested, or any other method that provides evidence of receipt, within:

E. (1) 90 days after the Procurement Officer receives the claim if the claim is an amount for which the Appeals Board accelerated procedure, set forth in **COMAR 21.10.06.12**, may be used;

(2) 180 days after the Procurement Officer receives the claim for a claim not covered under §C(1) above; or

(3) A longer period that the Contractor agrees to in writing.

(4) Failure to reach a decision within the time prescribed in Section C(1), (2) or (3) above shall be considered a decision to deny the claim that may be appealed in accordance with **COMAR 21.10.04.06**.

(5) The final decision may award a contract claim only for those expenses incurred not more than 30 days before the notice of claim was initially required to have been submitted.

(6) If the final decision grants the claim in part and denies the claim in part, the Administration shall pay the Contractor the amount granted. Payment of the partial claim is not an admission of liability by the unit on the claim and does not preclude the unit from recovering the amount paid if a subsequent determination modifies the final decision.

SP-3.04 Builder's Risk Insurance

Contractor shall at its own cost insure the work on an "all risk" basis and keep it insured at all times during the period of construction, until receipt of notice of final acceptance from the Administration. The amount of insurance shall be, at all times, at least equal to the amount paid on account of work and materials plus the value of work and materials furnished or delivered but not yet paid for by the Administration. The Administration shall be named as loss payee under the builder's risk policy.

SP-4.09 Dust Control and Housekeeping

A. The Contractor shall maintain the work during construction and until the work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

B. The Contractor shall maintain all existing utilities in an operational manner or standard as required by the Engineer.

C. The Contractor shall be responsible for the control of dust in his/her own construction zone, and along all haul routes. The Contractor shall be liable for any damage caused as a result of dust arising out of negligent control and maintenance. Housekeeping of the entire construction area should be done on a continuous basis.

D. The Contractor shall be responsible for safeguarding his/her construction area against thunderstorms and high winds. The Contractor shall monitor weather reports daily. If severe weather is forecasted, the Contractor shall properly secure all construction material and equipment and ensure that the construction site is free of all loose debris which could be blown off/around by the wind. When severe weather is forecasted to develop after working hours, the Contractor shall inspect the construction site at the end of the day to insure that the site is secured for high winds. The Contractor shall be liable for any damages caused as a result of blown debris, negligent control and maintenance.

E. All work shall be properly protected during construction including the shielding of soft or fragile materials, when necessary and/or upon Engineers request, the temporary plugging of open lines and conduits during construction. At completion of each construction area(s), the work area(s) shall be thoroughly cleaned and all tools, equipment, obstructions, or debris as a result of the Contractor's operation shall be removed from the premises.

F. If the Contractor fails to properly remove materials dropped, tracked, deposited, spilled, or blown onto existing facilities, within twenty-four (24) hours, the removal will be performed by the Maryland Aviation Administration, and the direct cost thereof plus one hundred percent (100%) of said cost will be deducted from monies due, or to become due the Contractor.

SP-4.14 Request for Information Procedures

This section specifies administrative and procedural requirements for handling and processing of Requests For Information (RFI) initiated by the Contractor seeking clarification of contract drawings and specifications modifications. A sample RFI form is included under these Special Provisions, Section 10, **SP-10.01** and in the Technical Provisions.

A. Submit RFI as soon as an issue requiring clarification arises. Allow a minimum of seven (7) business days for a response from the Administration.

B. Completely identify all work affected by the RFI with reference to all pertinent drawing numbers and specification paragraphs.

C. Clearly identify field conditions or as-built conditions that affect the work on sketches attached to the RFI.

D. If RFI addresses a conflict in the Contract Documents, clearly describe all dimensions, materials, and other data necessary to enable the Administration to respond to the RFI.

E. Include a suggested solution to the issue addressed in the RFI. If, upon review of the RFI by the Administration, a solution is determined to affect construction time or costs, the Contractor shall be required to submit a proposed change order request in accordance with **GP-4.06**, Changes.

F. Allow each subcontractor or supplier involved in, or affected by the RFI, to review the request prior to submission to the Administration.

G. Incomplete RFI's will not be considered and will be returned to the Contractor.

SP-4.15 Supervision by the Engineer

The work is to be carried out under the supervision of the Engineer and to his/her entire satisfaction. The work and materials shall be strictly of the best quality of the kinds herein specified; and should any work or materials other than those specified or shown be introduced into the construction of the work, the Engineer, or authorized agent, shall have full power to reject them, and they shall be removed from the premises within twenty-four (24) hours by the Contractor after being notified to do so.

SP-4.16 Burning and Welding Permits

A burning and welding must be obtained by the Contractor from the Airport Operations Center before burning, welding, or use of an open flame on airport property. The Contractor shall comply with all requirements of the permit at all times.

SP-6.01 Security and Safety

A. **Airport Security**

1. All Contractor employees shall comply with all BWI Airport security regulations, as mandated by the Federal Aviation Administration (FAA). The Airport shall take immediate and aggressive action to ensure compliance with Federal Aviation Regulation (FAR) Part 107 (Airport Security).

2. Security is to be maintained at all times. If security is breached or penetrated in any manner or form at any time during this contract, the Contractor is required to immediately restore "security" regardless of the circumstances. The Contractor shall be responsible for maintaining the integrity of the Controlled Access Security System for the duration of this contract.

B. **BWI Airport Access Badges**

1. All Contractor personnel who, in the performance of their duties, must have unescorted access to the Security Identification Display Area (SIDA) of the Airport shall first obtain a valid BWI Airport-issued Access (Identification) Badge from the Administration. Prior to badge issuance, the individual requesting a badge must first undergo a 10-year employment history review including a five-year verification by the employer, in accordance with FAR Part 107.

   If the work to be completed by a particular sub-contractor is short-term, and appropriately badged personnel are available, said employees may be escorted. The escort(s) must stay with the non-badged employee(s) at all times, and be able to "control" that person(s).

2. The Administration office or section with the primary duty of managing the subject contract (known as the Airport Operator) shall perform the necessary employment history review and verification on one (1) of the Contractor's managers or supervisors, who shall then be responsible for verifying all subsequent Contractor's employees and signing access badge applications. A letter to the Administration indicating who shall be responsible for the employment verifications, along with an "authorized signature" shall be required.

3. Contractor personnel shall not be permitted to begin work on the job site until issued an access badge. Badges must be displayed at all times while the employee is in the SIDA.

4. The Administration reserves the right to confiscate and suspend the access badge of any employee allegedly involved in any felonious act or security violation at the Airport; and, upon a guilty, nolo contendere, or probation before judgement disposition of the charge, to revoke the access badge.

5. The Contractor is hereby warned that all persons not properly identified by an Airport-issued access badge may be challenged, and if positive identification or association cannot be made, the appropriate corrective action shall be taken.

6. At the completion of the contract or in the event any employees are terminated, the Contractor must return all access badges and airfield vehicle permits to the Procurement Officer for computer deprogramming.

7. The Contractor is also responsible for the cost of replacement badges, if lost.

C. **Access Badge Procedures**

1. All BWI Airport access badge applicants and those requesting the authority to authorize others to have unescorted access privileges to the SIDA must thoroughly complete a BWI Airport Access Badge Application and Attachments.

2. The Contractor shall verify the identity of the access badge applicant through the presentation of two forms of identification, one (1) with the individual's photograph.

3. The access badge applicant must satisfactorily undergo a review, by the present employer, covering the past 10 years of employment history, and verification of the five (5) years preceding the date the access investigation is initiated. Information on the most recent five (5) years must be verified in writing, by documentation, by telephone, or in person. If verification is made by telephone, the information shall be obtained from a person in a position to speak on behalf of the company, and who has access to those records used to verify the information being requested.

4. The BWI Airport Access Badge Application along with the Attachments shall be submitted to the Administration prior to access badge issuance. The applicant's "access investigation" information shall be maintained by the employing agency/company in written form until 180 days after the termination of the individual's authority for unescorted access. The "access investigation" records

must include: the application, the employment verification information obtained by the employer, the names of those from whom the employment verification information was obtained, the date the contact was made, and any other information as required by the Assistant Administrator for Civil Aviation Security.

D. **Airfield Vehicle Ramp Permit/Temporary Airfield Vehicle Registration**

1. The Contractor shall secure from the Airport Operations Center an airfield vehicle ramp permit or temporary airfield vehicle registration to facilitate unescorted vehicular movement around the airfield areas, where necessary, to fulfill the obligations of this contract.

2. The Contractor shall abide by all driving rules and regulations at BWI Airport as determined and approved by the Administration.

E. **Airport Perimeter Access Control**

1. Dependent on the contract's scope of work, perimeter access control may be an issue. All perimeter fence gates (manual and automatic) must be secured or manned (guarded) at all times. Any access portal (gates/doors) found to be unsecured, or any entry by an unauthorized person(s) and/or vehicle(s) shall subject the Contractor to a FAA-imposed penalty or fine of up to $10,000 per occurrence, and/or suspension/revocation of the violator's BWI Airport access badge.

2. Gate attendants (guards) may be Contractor employees, or others hired by the Contractor for this sole purpose. It shall be the responsibility of the Contractor to ensure all required security training is completed and understood. All gate attendants must have been issued a BWI Airport access badge prior to manning any access portal. The access badge must be displayed at all times while in the SIDA. Specific FAA-mandated security rules and regulations, as well as BWI Airport Security Program requirements will be provided by the Airport Security Center.

F. **Vehicular Movement on the Air Operations Area (AOA)**

1. Control of vehicular traffic on the AOA is regulated by Code of Maryland Regulation (COMAR) 11.03.01.04. Detailed regulations are available at the Airport Security Center (Study Guide -- COMAR 11.03.01.04). As part of the Airfield Safety Training requirements, and prior to taking the written test, this Study Guide shall be provided to all appropriate personnel.

2. All vehicles shall be inspected and approved for operating on the AOA by the Administration's Division of Maintenance, prior to airfield vehicle registration. Vehicles satisfactorily completing the safety inspection shall be registered by the Airport Operations Center.

G. **Penalties**

In the event that the Administration shall be subject to any fine or penalty by reason of any violation at BWI Airport of any governmental (including FAA) rules, regulations, or standards as they now exist or may hereafter be promulgated or enacted, the Administration may conduct an investigation and make a determination as to the identity of the party responsible for the violation. If it is determined by the Administration that the Contractor is responsible for all or part of the fine or penalty, the Contractor shall pay said amount of the fine or penalty. The Administration and the Contractor shall each have the right to contest the validity or amount of such fine or penalty before the governmental entity seeking to impose such fine or penalty. In addition, the Administration and the Contractor are each entitled to a hearing regarding the Administration's determination pursuant to the Laws of Maryland, Transportation Article, Section 5-209

and 5-210, the Maryland Administrative Procedure Act and COMAR Title 11, Subtitle 01, Chapter 14 entitled "Procedure for Hearings in Contested Cases."

SP-6.03 Safety Requirements During Construction

A. For all projects within the airfield, the Contractor shall acquaint his/her supervisors and employees with the Airport activity and operations that are inherent to Baltimore/Washington International and/or Martin State Airports and shall conduct his/her construction activities to conform to all routine and emergency air traffic requirements and guidelines for safety specified herein.

B. The Contractor shall not allow employees, subcontractors, suppliers, or any other unauthorized person to enter or remain in any airport area which would be hazardous to persons or to aircraft operations.

C. The Contractor shall be aware of the following types of safety problems and/or hazards:

1. Trenches, holes, or excavations on or adjacent to any open runway or in safety areas.

2. Unmarked/unlighted holes or excavation in any apron, open taxiway, open taxilane, or related safety area.

3. Mounds or piles of earth, construction materials, temporary structures, or other objects in vicinity of the open runway, taxiways, taxilanes, or in a related safety, approach, or departure area.

4. Vehicles, equipment, excavations, stockpiles, or other materials which could degrade or otherwise interfere with electronic signals from radios or NAVAIDs.

5. Pavement drop-offs or pavement-turf lips (either permanent or temporary) which could cause, if crossed at normal operating speeds,damage to aircraft that normally use the Airport. The normal maximum is 1-1/2 inches for either pavement drop-offs or pavement-turf lips.

6. Unmarked utility, Navaid, weather service, runway lighting, or other power or signal cables that could be damaged during construction.

7. Objects (whether or not marked or flagged) or activities anywhere on or in the vicinity of Airport which could be distracting, confusing, or alarming to pilots during aircraft operations.

8. Unflagged/unlighted low visibility items (such as tall cranes, drills, and the like) anywhere in the vicinity of active runways, or in any approach or departure area.

9. Misleading or malfunctioning obstruction lights or unlighted/unmarked obstructions in approach to any open runway.

10. Inadequate approach/departure surfaces (These surfaces are needed to assure adequate landing/takeoff clearance over obstructions or work or storage areas).

11. Inadequate, confusing, or misleading (to user pilots) marking/lighting of runways, taxiways or taxilanes (including displaced or relocated threshold).

12. Water, snow, dirt, debris, or other transient accumulation which temporarily obscures pavement marking or pavement edges, or derogates visibility of runway/taxiway marking or lighting, or of construction and maintenance areas.

13. Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of airport operations area.

14. Trash or other materials with FOD potential, whether on runways, taxiways, aprons, or in related safety areas.

15. Inadequate barricading or other marking to separate construction or maintenance areas from open aircraft operating areas.

16. Failure to control vehicle and human access to, and nonessential non-aeronautical activities in, active aircraft operating areas.

17. Failure to maintain radio communication between construction/ maintenance vehicles and ATCT.

18. Construction/maintenance activities or materials which could hamper the response of aircraft rescue and fire fighting equipment from reaching all aircraft or any parts of the runway/taxiway system, to runway approach and departure areas, and to aircraft parking locations.

19. Bird attractants such as edibles (food scraps, etc.) or other miscellaneous garbage, other trash, or ponded water on Airport.

D. The Contractor is totally responsible for safety and health on the project. The Contractor shall conduct activities so as not to violate any safety standards contained herein. The Contractor shall inspect all construction and storage areas as often as necessary to be aware of conditions, and promptly take all steps necessary to prevent/remedy any unsafe or potentially unsafe conditions or activities discovered. If the Engineer becomes aware of any conditions which poses a serious or imminent danger to the health or safety of the public or Administration personnel, the Engineer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Contractor or the Contractor's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Procurement Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not be entitled to any equitable adjustment of the Contract price or extension of time of the performance schedule on any stop work order issued under this clause. The Contractor shall insert this clause, including this paragraph, with appropriate changes in the designation of the parties, in all subcontracts. At no time shall the Contractor be relieved of the responsibility to be aware and correct any unsafe conditions.

E. Before actual commencement of construction activity, the Contractor shall, through the Airport Management, give notice, using the NOTAM system, of proposed time and date of commencement of construction as well as the length and duration of the work in such areas. Upon completion of work and return of all such areas to standard conditions the Contractor shall, through the Airport Management, give notice, using the NOTAM system, of completion of construction.

F. All Contractor's vehicles that are authorized to operate on the Airport outside of the designated construction area limits or haul routes as specified and in the active AOA shall display in full view above the vehicle a 3' x 3' or larger, orange and white checkerboard flag, each checkerboard color being square. Any vehicle operating in the active AOA during the hours of darkness shall be equipped with a flashing amber (yellow) dome-type light, mounted on top of the vehicle and of such intensity to conform to local codes for maintenance and emergency vehicles.

G. Vehicles making only occasional visits to the job site are exempt from the identification requirements contained in Paragraph F. provided that they are escorted into, through, and out of the Airport secured area by a properly identified vehicle.

H. Radio communications are required between the Contractor's representative and the ATCT. Radio contact is required at all times while the Contractor has personnel and equipment on the project site and while they are in an active AOA of the Airport. Radios shall be furnished by the Contractor and shall be capable of transmitting and receiving at a ground frequency of 121.9 MHZ for BWI Airport and 121.8 MHZ for Martin State Airport. Sufficient radios shall be on site and operating at all times so that instructions or

communications may be dispatched to all crews and/or equipment working in an active AOA within one minute after receipt from the ATCT.

I. Debris, waste and loose material (including dust and dirt) capable of causing damage to aircraft landing gear or propellers or being ingested in jet engines shall not be allowed on active aircraft movement areas or adjacent grassed areas. Materials observed to be within these areas shall be removed immediately and/or continuously by the Contractor during construction.

J. The Contractor shall furnish, at his/her own expense, flagmen as necessary to control his/her traffic in accordance with these specifications unless otherwise directed by the Engineer, in which case the direction of the Engineer shall be followed.

K. All Contractor's vehicles that are required to cross active runways, ramp areas, taxiways and aprons shall do so under the direct control of a competent flagman who is in direct radio contact with ATCT. All aircraft traffic on runways, ramp areas, taxiways and aprons shall have priority over Contractor's traffic. Radios shall be supplied by the Contractor and shall be capable of transmitting and receiving at a frequency of 121.9 MHZ for BWI Airport and 121.8 MHZ for Martin State Airport.

L. Where project access requires travel on or across runways, ramp areas, taxiways, or aircraft aprons, all personnel shall keep such surfaces clear of debris. At no time shall the Contractor's vehicles or personnel be allowed to enter or cross active runways or clear zones without proper authorization obtained through ground control.

M. Open flame, welding or torch cutting operations are prohibited unless adequate fire and safety precautions have been taken and the procedure previously approved by the Engineer.

N. Equipment and stockpiled material shall be constrained in a manner to prevent movement resulting from aircraft jet blast or wind conditions.

O. The Contractor shall provide timber or bucket type construction barricades with flashing yellow lights as shown on the drawings or directed by the Engineer to delineate the work areas when these areas are closed to airport traffic. Open trenches, excavations and stockpiled material located in the AOA shall be prominently marked with aviation orange flags and lighted by approved light units during hours of restricted visibility and darkness.

P. All materials and equipment when not in use shall be placed in approved areas where they will not constitute a hazard to aircraft operations and not penetrate clearance surfaces defined in Federal Aviation Regulation, Part 77 (**14 CFR, Part 77**).

Q. The Contractor shall adhere to the requirements of Order **EA 5210.1**, "Safety Requirements on Airports During Construction," current edition and Advisory Circular **150/5370-2C**, "Operational Safety on Airports During Construction." Where **Part 77, EA 5210.1** and Advisory Circular **150/5370-2C** are in conflict, the most restrictive requirement shall be met.

R. Maximum equipment height shall not exceed twenty (20) feet unless prior approval is obtained from the Engineer.

S. Debris, waste and loose material (including dust and dirt) capable of causing damage to aircraft landing gear, propellers or being ingested in jet engines shall not be allowed on active aircraft movement areas or adjacent grassed areas. Materials observed to be within these areas shall be removed immediately and/or continuously by the Contractor during construction.

T. Upon completion of any stage/phase of the work the Engineer will arrange a physical inspection with Airport operations personnel prior to opening for aircraft use any runway, taxiway, ramp area or airport roadway that has been closed for work, on or adjacent thereto, that has been used for a crossing point or haul route by the Contractor.

U. Entrance to the airfield is subject to strict security regulations. All personnel entering the airfield must obtain and display security identification badges and all vehicles must have and display special permits issued by the Maryland Aviation Administration. The cost of these security items is fully refundable upon their return. The Contractor shall be responsible for assuring that all their employees who have unescorted access to the airfield, have background checks, including at a minimum, references and prior employment histories to the extent necessary to verify representations made by the employee relating to employment in the preceding five (5) years.

V. The smoking or carrying of lighted tobacco, or other products is strictly prohibited on the airside of the airport. Failure to comply may result in fines and/or suspension of individual security badges.

SP-6.04 Safety and Health Plan

A. **Related Documents**. The following is a list of publications which form a part of these Specifications by reference:

1. OSHA General Industry Safety and Health Standards **(29 CFR 1910)** and OSHA Construction Industry Standards **(29 CFR 1926)**. One source of these regulations is OSHA Publication **2207**, which includes a copy of both Parts 1910 and 1926 as they relate to construction safety and health. It is for sale by the Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

2. National Emission Standards for Hazardous Air Pollutants **(40 CFR 61)**.

3. Environmental Protection Agency Final Rule **(40 CFR 761)**.

4. Federal Standard **313A** - Material Safety Data Sheets, Preparation and Submission.

B. **Definition of Hazardous Materials.** All Contractor's bound to the terms of this Contract shall refer to the definitions for hazardous and toxic materials/substances included in **Sub-parts H and Z of 29 CFR 1910**, and to others as additionally defined in Federal Standard **313A**. Those most commonly encountered include asbestos, polychlorinated biphenyls (PCB), explosives, and radioactive material, but may include others. The most likely products to contain asbestos are sprayed-on fireproofing, insulation, boiler lagging and pipe covering. Likely products to contain PCB are transformers, capacitors, voltage regulators and oil switches.

C. **Quality Assurance:**

1. Representatives of the Contractor shall meet with the Engineer and/or their representative prior to the start of work under this Contract for the purpose of reviewing the Contractor's safety and health provisions pertinent to the work to be performed under this Contract. The Contractor shall be prepared to discuss, in detail, the measures that are intended to be taken to control any unsafe or unhealthy conditions associated with the work to be performed under this Contract. The level of detail for the safety meeting is dependant upon the nature of the work and the potential inherent hazards. The Contractor's principal on-site representative(s), the general superintendent and the safety representative(s) shall attend this meeting.

2. All work, including contact with and handling of hazardous materials, the disturbance and dismantling of structures containing hazardous materials, and/or the disposal of hazardous materials, shall comply with the applicable requirements of **29 CFR 1926/1910** and **40 CFR 761**. Work involving the disturbance or dismantling of asbestos or asbestos containing materials shall also comply with the requirements of **40 CFR 61, Subparts A and M**. All work shall comply with all applicable state and municipal safety and health requirements. Where there is a conflict between applicable regulations, the most stringent shall apply.

3. The Contractor shall assume full responsibility for compliance with all applicable regulations pertaining to the health and safety of personnel during the execution of the work, and shall hold the Administration harmless for any action on the Contractor's part, or that of the Contractor's employees or subcontractors that result in illness, injury or death.

D. **Submittals:**

1. A copy of each accident report that the Contractor or subcontractors submit to their insurance carriers shall be forwarded to the Engineer as soon as possible, but in no event later than seven (7) days after the day the accident occurred.

2. A copy of the Monthly Injury/Illness Report for the Contractor and each Subcontractor of every tier shall be forwarded to the Engineer as soon as possible, but in no event later than seven (7) days after the end of each month. A copy of the standard report form is included under these Special Provisions Section 10, **SP-10.06.**

3. If hazardous materials are disposed of off-site, submit copies of permits from applicable Federal, State or Municipal authorities and necessary certificates that the material has been disposed of as per applicable regulations.

4. If required, a hazardous material handling plan may be necessary. The plan shall contain the following:

   a. Number, type, and experience of employees to be used for the work;
   b. Description of how applicable safety and health regulations and standards are to be met;
   c. Type of protective equipment and work procedures to be used;
   d. Emergency procedures for accidental spills or exposures;
   e. Procedures for disposing of or storing the toxic/hazardous materials;
   f. Identification of possible hazards, problems, and proposed control mechanisms;
   g. Protection of public or others not related to the operation;
   h. Interfacing and control of subcontractors, if any;
   i. Identification of any required analyses, test demonstrations, and validation requirements; and
   j. Method of certification for compliance.

5. The Contractor shall provide to the Administration, for approval, a detailed accident prevention/safety program related to its work and the subcontractors work within fifteen (15) days after Notice to Proceed and before the first progress payment.

6. The Contractor's written accident prevention/safety program shall, as a minimum, address the following areas:

   a. The Contractor shall designate the individual or individuals responsible for implementation of the accident prevention/safety program as well as designating those responsible for the development of safety policy and procedures, indoctrination of new employees, project site inspection responsibilities, and the conduct of the Contractor's weekly safety meetings, as well as responsibility for submission of necessary reports related to project injuries and/or safety;

   b. Accident Prevention:

      (1) The Contractor shall specify the scope of indoctrination for new employees, procedures for weekly safety meetings, and the scope and frequency of project site inspections;

      (2) The Contractor shall specify the availability of, and enforcement of, procedures for the use of protective devices such as head protection, eye protection, hearing protection, respirators, safety belts and lanyards, wet weather gear, fire resistant blankets and/or

barriers, and any other devices used for the protection of the individual employee's health and safety; and

(3) The Contractor shall specify the availability on site and the type of instrumentation to be used to determine flammable gases, oxygen levels, noise levels, gas sampling, and such other instrumentation as may be required to ensure a safe working environment;

(4) The program shall cover, in addition to accident and injury prevention procedures, specific procedures for fire protection and prevention of damage to property, as well as such other procedures beyond statutory requirements that may be necessary to conduct the work in a safe manner and provide maximum protection for the health and safety of all employees; and

(5) The Contractor's program shall set forth specific actions that will be taken to require compliance with the Contractor's accident prevention/safety program by its subcontractors.

c. The Contractor's representatives shall attend the weekly project safety committee meeting.

7. The Engineer may withhold processing of the Contractor's progress payment for failure to submit the project safety plan, or any other required reports within the time period specified in these specifications.

E. **Products:**

1. Special facilities, devices, equipment, clothing, and similar items used by the Contractor in the execution of the work shall comply with the applicable regulations.

2. The Contractor shall bring to the attention of the Engineer any material suspected of being hazardous that he/she encounters during execution of the work. A determination will be made by the Engineer as to whether the Contractor shall perform tests to determine if the material is hazardous. If the Engineer directs the Contractor to perform tests, and/or if the material is found hazardous and additional protective measures are needed, a change order may be required, subject to applicable provisions of the Contract.

F. **Execution:**

1. When the Contractor is notified by the Engineer of any noncompliance with the provisions of the Contract and the action(s) to be taken, the Contractor shall immediately, if so directed, or within 48 hours after receipt of a notice of violation correct the unsafe or unhealthy condition. If the Engineer becomes aware of any conditions which poses a serious or imminent danger to the health or safety of the public, Administration personnel and their agents, or the Contractor's personnel, the Engineer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. If the Contractor fails to comply promptly, all or any part of the of the work being performed may be stopped by the Engineer with a "stop work order" in accordance with the General Provisions Section **GP-8.07**, Suspension of Work. When, in the opinion of the Engineer, satisfactory corrective action has been taken to correct the unsafe and unhealthy condition, a start work order will be issued immediately. The Contractor shall not be allowed any extension of time or compensation for damages by reason of or in connection with such suspension of work. The Contractor shall insert this clause, with appropriate changes in the designation of the parties, in all subcontracts. At no time shall the Contractor be relieved of the responsibility to be aware and correct any unsafe conditions.

2. The Contractor shall take all necessary precautions to prevent injury to the public, or damage to property of others. For the purposes of this Contract, the public shall include all persons not employed by the Contractor or a subcontractor working under its direction.

3. Storing, positioning, or use of equipment, tools, materials, scraps, and trash in a manner likely to present a hazard to the public or building occupants by its accidental shifting, ignition, or other hazardous qualities is strictly prohibited.

SP-8.03 Critical Path Method Schedules

A. **General:**

1. Careful evaluation and pricing of the schedule provisions of this Contract are important to assure compliance with the language and intent of the schedule specification. The schedule provisions are designed to provide the Contractor with a tool for planning and controlling the work. The schedule provisions must be strictly followed to insure both timely progress payments and equitable compensation for changes and delays. The Contractor must perform work in accordance with the approved Critical Path Method (CPM) Schedule to achieve timely completion of all Contract milestones and to avoid acceleration, termination for default, and end of Contract claims for liquidated damages. The Contractor must give the schedule provisions particular consideration and resolve any areas of uncertainty by asking appropriate questions prior to bid opening.

   The time of submission requirements for the Critical Path Method Schedule included in this section shall supersede the thirty (30) day requirements of the General Provisions Section **GP-8.04**: Progress Schedule and the Special Provisions Section **SP-8.02**: Schedules.

   Time of submission requirements for projects is shown in the following table:

Time of Submission Requirements Schedule
(Number of Calendar Days After Notice-to-Proceed)

Activity Description	Project Duration less than 400 days	Project Duration greater than 400 days
Notice to Proceed	0	0
Contractor Designates Scheduling Rep.	2	2
Schedule Requirements Review Meeting	5	7
Contractor Presentation to Engineer	10	14
Preliminary Network Submission	14	21
Engineer's Review of Prelim. Network #1 Due	18	35
Submit Revised Preliminary Network	24	42
Engineer's Review of Prelim. Network #2 Due	27	49
Planned Acceptance of Preliminary Network	28	50
Submit Detailed Network #1	18	35
Joint Review Meeting #1	25	49
Submit Revised Version of Detailed Network #1	30	56
Engineer's Review of Detail Network #1 Due	35	63
Submit Detailed Network #2	40	77
Joint Review Meeting #2	45	84
Submit Revised Version of Detailed Network #2	50	91
Engineer's Review of Detail Network #2 Due	55	98
Planned Acceptance of Construction Schedule	57	100

2. The Contractor shall provide CPM format, with horizontal activity schedules, written in software, with detailed entries for each activity in each portion of the work, in chronological order, as defined in the following criteria.

a. The purpose of the Project Schedule shall be to:

(1) Assure adequate planning, scheduling and reporting during execution of the work by the Contractor;

(2) When more than one Prime Contractor is working at a site, assure coordination of the work of the Contractor and the various subcontractors and suppliers at all tiers;

(3) Assist the Contractor and Engineer in monitoring the progress of the work and evaluating proposed changes to the Contract and the Project Schedule; and

(4) Assist the Engineer and the Contractor in the preparation and evaluation of the Contractor's monthly progress payments.

b. The Project Schedule shall employ the CPM using retained logic for the planning, scheduling and reporting of the work to be performed under the Contract. The schedule will be produced utilizing the most current version of Primavera Project Planner (P3) software system, or fully transferrable to P-3 (refer to "Products (Scheduling Software)" under this item). The type of schedule shall be Precedence Diagramming Method (PDM). Definitions applicable to this Article include the following:

(1) **Project Schedule** The Project Schedule includes the preliminary network, the computer generated network and computer produced reports as stipulated in the requirement of this Section;

(2) **Critical Path** The Critical Path is the sequence of the activities in the Project Schedule network which requires the longest total amount of time to complete the work or any path(s) which have total float less than one (1) working day;

(3) **Network** - The Network is the graphic representation of the Project Schedule prepared using the CPM. The Network shows the sequence and interdependence of the activities, and planned and actual progress by activity, required for complete performance of the work;

(4) **Working Day** A working day is any calendar day scheduled for active performance of Contract requirements; and

(5) **Key Plans** Graphic representations of the Contractor's planned breakdown of the project for scheduling purposes. The key plans will clearly define the boundaries of the work for each designated area. The boundaries of each area may change depending on the phase of construction. The alpha-numeric codes on the key plans shall match the code values for the "Area" in the schedule.

c. The Project Schedule shall include a preliminary network, which shall be used to monitor the progress of the work during the first one hundred and twenty (120) calendar days of the Contract and during the development and acceptance process of the detailed network.

d. The Contractor shall provide a preliminary network, a detailed network and computer-produced schedule and cost reports as stipulated herein.

e. The Contractor shall provide the computer processing of the computer-produced schedule and cost reports required under the Contract at no cost to the Administration.

f. The Contractor shall meet with the Engineer per the time of submission requirements schedule to conduct a joint review of the Project Schedule requirements of the Contract to assure the Administration of the Contractor's and subcontractor's understanding of the requirements of this Section. Refer to "Schedule Approval Process" under this item.

g. Per the time of submission requirements schedule, there will be a formal presentation by the Contractor. The Contractor's General Superintendent shall conduct the formal presentation utilizing milestone bar charts of the approach the Contractor will take to complete the project within the contractual milestones. The Contractor shall provide proposed key plans (8-1/2" x 11") of the project and each structure for each phase throughout the duration of the project. The Contractor shall also provide proposed codes and code values of activities for the project. The key plans and coding descriptions shall match exactly.

h. The individual who will input information into the scheduling software shall attend all schedule related meetings and all monthly update meetings throughout the duration of the Contract in addition to the General Superintendent.

3. Contractor's Representatives:

a. Per the time of submission requirements schedule, the Contractor shall designate in writing an authorized representative in the Contractor's organization who shall be responsible for coordinating with the Engineer during the preparation and maintenance of the Project Schedule. The Contractor's representative may not be replaced by the Contractor without prior written consent of the Engineer.

b. The Contractor's representative shall have complete authority to act on behalf of the Contractor in fulfilling the Project Schedule requirements of the Contract and such authority shall not be interrupted throughout the duration of the Contract unless approved in writing by the Engineer.

c. The Contractor agrees that whenever the Engineer advises the Contractor in writing that the Contractor's representative is not performing his/her duties to the satisfaction of the Administration, the Contractor shall replace such representative at no additional cost to the Administration and designate in writing, within seven (7) calendar days, a new authorized representative satisfactory to the Engineer.

4. Preliminary Network:

a. Per the time of submission requirements schedule, the Contractor shall submit for the Engineer's review, computer diskettes, one (1) sepia and four (4) color coded prints of the revised Preliminary Network (Logic Diagram) which shall be neatly organized and plotted, time scaled from left to right on either 24" x 36" or 30" x 42" standard size sheets with suitable notation relating the interface points among sheets. The Contractor's General Superintendent shall present the construction approach and explain the schedule logic, durations, sequencing, cost loading and resource loading. Resource loading includes the planned utilization of manpower and equipment on the project. The Contractor's submittal shall state which days of the week will be planned workdays and dates of all scheduled non-workdays (holidays). The preliminary network shall cover the following Project phases and/or activities:

(1) Proposed procurement activities to be accomplished during the first one hundred and twenty (120) calendar days of the Contract.

(a) The proposed one hundred and twenty (120) calendar day procurement activities shall include mobilization, shop drawings and sample submittal and the fabrication and delivery of key and long-lead procurement elements. The schedule shall indicate intended submittal dates and realistic delivery dates for fabrication and delivery activities.

(b) The Administration's review of shop drawings, samples and requested substitutions shall be identified as network activities. The minimum duration for these activities shall be twenty-one (21) calendar days for specified product submittal, twenty-one (21) calendar days for submittal of products required by performance specifications and other named manufacturers, and forty five (45) calendar days for requested substitutions.

(c) The proposed one hundred and twenty (120) calendar day procurement activities shall be incorporated into the Detailed network (discussed hereinafter) including all revisions approved or required by the Engineer.

b. Proposed construction activities to be accomplished during the first one hundred and twenty (120) calendar days of the Contract.

(1) Activity duration shall be in units of whole working days and shall be limited to a maximum of fifteen (15) working days for each activity.

(2) The proposed one hundred and twenty (120) calendar day construction activities shall be incorporated into the detailed network (discussed hereafter) including all revisions approved by the Engineer.

5. The proposed procurement and construction activities described above shall include the information required under the following paragraphs:

a. Summary activities not specified which are necessary to properly indicate:

(1) The approach to scheduling the remaining work areas or phases of the work. The work for each phase or area must be represented by at least one summary activity such that they cumulatively indicate the entire Project Schedule. Incorporate milestone events and dates in the Project Schedule as required by the Contract Documents; and

(2) The approximate cost and duration for each summary activity shall be shown on the Preliminary Network and shall include the Contractor's best estimate of the work it represents. The Contract price remaining after cost-loading shall be distributed among the summary activities by approximate value of each summary activity;

b. The Preliminary Network shall be the basis for progress payments during the first one hundred and twenty (120) calendar days of the Contract while the Detailed Network (discussed hereafter) is being developed and accepted.

c. The Preliminary Network shall be updated on a monthly basis while the Detailed Network is being developed. The monthly updating of the Preliminary Network shall be consistent with the procedures and requirements described in the Detailed Network portion of this specification, except the computer-produced schedule and cost reports will not become a part of the Detailed Network until after the acceptance of the Detailed Network by the Engineer.

d. The Preliminary Network, including schedule logic, durations, sequencing, cost loading and resource loading, shall be used as follows for the preliminary review of time extension request(s) during the first one hundred and twenty (120) calendar days of the Contract while the Detailed Network is being developed:

(1) When change modifications are initiated, delays are experienced, or the Contractor desires to revise the Preliminary Network, the Contractor shall submit to the Engineer a written Time Impact Analysis as required under the "Time Impact Analysis for Change Orders and Delay" section of these specifications, except theactivities and event times in the Time Impact Analysis shall be those included in the latest Preliminary Network update; and

(2) The final determination with regard to the extent of a time extension to be granted to the Contractor shall be determined in accordance with the "Time Impact Analysis for Change Orders and Delay" section of these specifications, subsequent to the development, review, and acceptance of the Detailed Network. Extensions of time are considered pending until the extension can be justified by the Detailed Network, after acceptance by the Engineer. The Contractor may be requested by the Engineer to revise the Time Impact Analysis to reflect approved revisions which may have been made to the Preliminary Network during the development, review and acceptance of the Detailed Network. If so requested, the Contractor shall provide the revision to the satisfaction of the Engineer.

e. Per the time of submission requirements schedule, the Engineer shall meet with the Contractor to discuss any concerns the Engineer may have in regard to the Preliminary Network. The Contractor shall submit the revised Preliminary Network to the Engineer, for acceptance, within the time specified in the time of submission requirements schedule.

f. If revision to the Preliminary Network is contemplated by the Contractor during the preparation of the Detailed Network, the Contractor shall so advise the Engineer in accordance with the "Detailed Network" and "Project Schedule Updating" sections of these specifications, and prior to submission of the Detailed Network.

6. Detailed Network:

a. Schedule Development by the Contractor (First Submission):

(1) Per the time of submission requirements schedule, the Contractor shall submit computer diskettes, one (1) sepia and four (4) color coded prints of its proposed Detailed Network (hereafter referred to as the Network) to the Engineer. The Contractor's General Superintendent shall present the construction approach and explain the schedule logic, durations and sequencing. The Network shall cover the entire Contract time and incorporate in detail the first one hundred and twenty (120) calendar days of the Preliminary Network including all requested revisions (reviewed and accepted) by the Engineer. The Network shall be neatly organized and plotted time scaled from left to right on either 24" x 36" or 30" x 42" standard size sheets with suitable notation relating the interface points among sheets. The Contractor's network shall consist of, but not be limited to, the following:

(a) Proposed procurement activities;
(b) Proposed construction activities;
(c) Proposed duration for activities;
(d) Proposed sequencing of activities;
(e) Milestone events as required by the Contract Documents;
(f) Proposed area (location) of activities;
(g) Proposed phase of activities; and
(h) Proposed Subcontractor and Trade breakdown.

(2) The following shall be depicted on the Network for each activity:

(a) The Contractor shall initialize a numeric activity number for all schedule activities. The Contractor shall submit to the Engineer for review and approval the prepared activity number structure. The activity number shall be limited to a maximum of ten (10) numbers; no letters, no spaces, no symbols;

(b) Concise description of the work represented by the activity (maximum forty-eight (48) characters). The work related to each activity shall be limited to one work trade and one floor or other building as required by the Specifications. All descriptions shall include area designations which match the key plans submitted by the Contractor;

(c) Activity duration in whole working days with a maximum duration of fifteen (15) workdays each, unless otherwise approved or directed by the Engineer, except for non-construction activities including mobilization, shop drawing and sample submittal, fabrication of materials, delivery of materials and equipment and concrete curing;

(d) Work area code for construction activities (maximum six (6) characters). All abbreviations shall be fully described in a legend attached to the Network. As requested by the Engineer, either prior or subsequent to the acceptance of the Network the Contractor shall provide, without additional cost to the Administration, a graphic illustration of the relationship of construction activities to intended work areas as identified by the Contractor on prints of the Contract Drawings;

(e) Performance responsibility by discipline code: MECH, ELEC, etc., or other acceptable abbreviations approved by the Engineer (maximum of six (6) characters). Each subcontractor shall be coded separately and each trade within each subcontract shall also be coded separately. All abbreviations shall be fully described in a legend attached to the Network;

(f) The contractor shall identify the area (location) in which the activity is to be performed; and

(g) The contractor shall identify the phase of the project in which the activity is to be performed.

(3) In developing the Network, the Contractor shall be responsible for assuring that subcontractor and supplier work at all tiers, as well as its own work, is included in the Network.

(4) The Network as developed shall show the sequence and interdependence of activities required for complete performance of the work. The Contractor shall be responsible for assuring all work sequences are logical and the Network shows a coordinated plan of the work.

(5) Proposed durations assigned to each activity shall be the Contractor's best estimate of time required to complete the activity considering the scope and resources planned for the activity.

(6) Failure by the Contractor to include any element of work required for performance of the Contract shall not excuse the Contractor from completing all work within the Contract time.

(7) Seasonal weather conditions shall be considered and included in the planning and scheduling of all work influenced by high or low ambient temperatures and/or precipitation to ensure completion of all work within the Contract time. Seasonal weather conditions shall be determined by an assessment of average historical climatic conditions based upon the preceding ten (10) year records published for the locality by the National Ocean and Atmospheric Administration (NOAA) and entitled, "Local Climatological Data". The local NOAA weather station is currently located at BWI Airport. Special Provision Section **SP-8.12**, Time Extensions for Unusually Severe Weather, is to be utilized inconjunction with this item. Time extensions granted for abnormal weather are not compensable.

(8) If the Engineer questions the Contractor's proposed activities, logic or durations, the Contractor shall, within seven (7) calendar days of receipt of the Engineer's request, provide a satisfactory revision to, or adequate justification for, these activities, logic, durations, manpower, cost, or equipment loading to the satisfaction of the Engineer.

(9) In the event that the approved schedule indicates the Contractor's plan to finish prior to the Contract completion date, the Contractor and the Administration shall execute a change order adjusting the Contract completion date to coincide with the Contractor's planned finish date at no expense to the Administration.

b. Schedule Development by Contractor (Second Submission):

(1) Within fourteen (14) calendar days after receipt of the Engineer's comments of the first detailed submission, there shall be a second submission. The second submission shall include all cost manpower and equipment loading. The format for the submission shall be the same as required in the "Detailed Network; Schedule Development by the Contractor (First Submission)."

(2) The following shall be depicted on the network for each activity:

(a) The assigned dollar value (cost-loading) and quantities of each activity of the Network, which shall cumulatively equal the Contract price. Mobilization, bond and insurance costs may be shown separately; however, other general requirement costs, overhead, profit, etc., shall be prorated through all activities. Delivery activities may be cost-loaded and shall be shown separate from the related fabrication activity. Material submittal activities shall not be cost loaded. Activity cost estimates shall be stated in at least the same level of detail as, and shall correlate with, the breakdown of the total Contract price as set forth in the General Provisions Section **GP-9.03**, Progress Payments;

(b) The manpower-loading of each activity of the network (total number of workmen, not total number of crews). In addition, the Contractor shall prepare and submit a separate manpower per day summary analysis in graphic format, depicting man days by principal trades and aggregate. The graph shall show the number of may days of effort, by month, over the duration of the Project Schedule. This manpower-loading graph shall be computer generated from the Contractor's schedule data;

(c) The assignment to applicable activities of the Network of all major construction equipment to be utilized by the Contractor and subcontractor at all tiers in prosecuting the work; and

(d) If the Contractor plans to invoice for stored materials, an activity must be included in the Network with an activity duration of zero (0) days.

c. Joint Review, Revisions, and Acceptance:

(1) The Engineer and the Contractor shall meet within the time of submission requirements schedule of the Contractor's First Submission for joint review, correction or adjustment of the proposed Network. The Engineer and the Contractor shall meet within the time of submission requirements schedule of the Contractor's second submission for joint review, correction or adjustment of the proposed Network and resource loading. Any areas which, in the opinion of the Engineer, conflict with timely completion of the Contract shall be subject to revision by the Contractor.

(2) In the event the Contractor fails to define any element of work, activity, or logic and the Engineer review does not detect this omission or error, such omission or error, when discovered by the Contractor or the Engineer, shall be corrected by the Contractor at the next monthly Schedule Update (as discussed hereinafter) and shall not affect the Contract time.

(3) As required by the time of submission requirements schedule, the Contractor shall revise the Network in accordance with agreements reached during the joint review meetings and submit computer diskettes, one (1) Diaza (reproducible) mylar sepia and four (4) color coded prints of the revised Network.

(4) Upon establishment of an agreed-upon Project Schedule, the Contractor (Authorized Representative and General Superintendent) shall sign and date on the face of the Project Schedule documents (the Network and computer- produced Schedule and Cost Report), which shall then indicate the Contractor's acceptance and approval of the Project Schedule.

(5) Acceptance by the Engineer of the Contractor's approved Project Schedule will be a condition precedent to the making of any progress payments under the Contract after the first one hundred and twenty (120) calendar days of the Contract.

(6) Upon acceptance of the Project Schedule by the Engineer, the cost-loaded values of the Project Schedule will be used as a basis for determining progress payments. Monthly progress payments shall be based upon information developed at the monthly Schedule Update. The computer-produced Cost Report will be utilized by the Engineer for verification of the Application for Payment submitted by the Contractor. Acceptance by the Engineer of the Contractor's Project Schedule does not relieve the Contractor of any responsibility whatsoever for the accuracy or feasibility of the Project Schedule, or of the Contractor's ability to meet the Contract Completion Date. Nor does such acceptance create a warranty, expressed or implied, or acknowledge or admit the reasonableness of the activities, logic, durations, manpower, cost or equipment loading of the Contractor's Project Schedule.

7. Project Schedule Updating:

a. The Project Schedule shall be updated on a monthly basis throughout the entire Contract time and until the Contract's Substantial Completion. The Contractor shall meet with the Engineer each month at the Schedule Update meeting to review actual progress made through the data date of the Schedule Update, including dates activities started and/or completed. The data date

of each Schedule Update shall be on or before the seventh (7th) day preceding the progress payment submittal deadline. Contractor-prepared estimates of the percent completion of each schedule activity and the necessary supporting data shall be submitted on or before the data date referenced above and shall include the following information:

(1) One (1) marked-up copy of the previous months Schedule Update Network indicating the progress on schedule activities and the revised (current) remaining durations. This marked-up copy shall be clearly legible and shall be accomplished by use of felt-tip markers and red ink.

(2) One (1) original and three (3) reproduced marked-up copies of the previous months Schedule Update computer-produced reports coordinated with the requirements of the above paragraphs and indicating actual activity start and/or complete dates, revised (current) remaining durations, and percent complete with regard to activity cost/progress.

(3) The Contractor shall indicate in writing those activities he/she plans to work on during the following month and current or anticipated conditions which may delay the work.

(4) Any additional written information necessary to support the above.

b. In case of disagreements at the schedule update meeting, concerning actual progress to date, the Engineer's determination shall govern.

c. Upon completion of the schedule update meeting, which shall occur on or before the seventh (7th) day preceding the progress payment submittal deadline, the Contractor shall revise the Project Schedule to reflect progress as of the data date of the Schedule Update and any required revisions to the Project Schedule, and carry out a computer-produced calculation to determine the status of the Project Schedule. The Contractor shall process the schedule within three (3) calendar days and forward the update and pay request to the Engineer. The Engineer shall review the update upon receipt, and shall process the monthly request for payment based upon the accepted update.

d. Each Project Schedule Update, based upon the Contractor's input as discussed above, will be forwarded to the Engineer and will include three (3) copies of the following information:

(1) A list of all activities completed during the preceding month;

(2) A list of all activities started but not completed during the preceding month, including percent complete;

(3) A list of any revisions to the schedule logic, initial activity durations, or activity costs;

(4) Computer Diskettes (2 copies);

(5) The following computer produced reports:

(a) Total Float Report by Area;
(b) Detailed Cost Report by Contractor and all Subcontractors;
(c) Summary Cost Report by Contractor and all Subcontractors;
(d) Detailed Labor Report by Contractor and all Subcontractors;
(e) Summary Labor Report by Contractor and all Subcontractors;
(f) Detailed Equipment Report by Contractor and all Subcontractors;
(g) Summary Equipment Report by Contractor and all Subcontractors;
(h) 60-Day Look-Ahead Bar Chart by Area (Early and Late Bars);
(i) Summary Bar Chart by Area;
(j) Detailed Bar Chart by Area (Early and Late Bars); and
(k) Early Start Sort of all Activities by Area.

(6) The Total Float and Early Start computer-produced Schedule Reports listed above shall include, for each activity depicted on the Network, the following information:

(a) Activity Number(s);
(b) Activity Description;
(c) Original Duration;
(d) Remaining Duration;
(e) Activity Responsibility Code;
(f) Activity Early Start Date;
(g) Activity Early Finish Date;
(h) Activity Late Start Date;
(i) Activity Late Finish Date;
(j) Total Float;
(k) Percent Complete;
(l) Actual Start Date; and
(m) Actual Finish Date.

e. If the Engineer does not record any exceptions to the published Project Schedule Update within seven (7) calendar days of its receipt, the Engineer will be deemed to have accepted the schedule.

f. The monthly updating of the Project Schedule shall be an integral part and basic element of the estimate upon which progress payments will be made. If, in the judgement of the Engineer, the Contractor fails or refuses to provide information required to accomplish a complete Project Schedule Update or revision as specified hereafter, the Contractor shall be deemed to have not provided the required estimate upon which progress payments may be made, and shall not be entitled to progress payments until it has furnished the information necessary for a complete Schedule Update to the satisfaction of the Engineer.

8. Project Schedule Revisions:

a. Updating the Project Schedule to reflect actual progress made up to the date of a Schedule Update shall not be considered revisions to the Project Schedule.

b. If, as a result of the monthly Schedule Update, it appears the Project Schedule no longer represents the actual prosecution and the progress of the work, the Engineer will request, and the Contractor shall submit, a revision to the Project Schedule. The Contractor shall not artificially improve its progress by revising schedule logic restraints or shortening planned activity durations. The Contractor may improve its progress by performing sequential activities concurrently or by performing activities more quickly than planned, but such improvements shall not be recorded on the schedule until they have actually been achieved by the Contractor. Additionally, the Contractor shall not artificially worsen or exacerbate delays caused by the Administration by revising schedule logic restraints or lengthening planned activity durations. It is understood and agreed that if the Contractor falls behind in meeting the schedule, as presented in the currently monthly schedule update, the Contractor has extended the critical path for achieving project completion and affected the schedule float time available for use by the Administration.

c. The Contractor may also request revisions to the Project Schedule in the event the Contractor's planning for the work is revised. If the Contractor desires to make changes in the Project Schedule to reflect revisions in its method of operating and scheduling of the work, the Contractor shall notify the Engineer in writing, stating the reason for the proposed revisions. Accepted revisions will be incorporated into the Project Schedule at the next monthly Schedule Update.

d. If revision to the Project Schedule is contemplated, the Contractor or the Engineer shall so advise the other in writing at least seven (7) calendar days prior to the next Schedule Update meeting, describing the revision and setting forth the reasons thereof.

e. Revisions directed by the Engineer to the Project Schedule will not be incorporated into the Project Schedule without written notice to the Contractor, who shall respond in writing within seven (7) calendar days, either agreeing with the Engineer's proposed revision, or setting forth justification why it should not be accomplished. If the Contractor's justification for not accomplishing the revision is accepted, such revision will not be incorporated into the Project Schedule. The Contractor's failure to respond in writing within seven (7) calendar days will be deemed to be an acceptance of the Engineer-directed revisions, and such revisions shall be incorporated into the Project Schedule.

f. Requests for revisions of activity manpower, activity costs, or redistribution of activity costs shall be made in accordance with the requirements of the "Project Schedule Updating" section of the specifications.

9. Time Impact Analysis for Proposed Change Orders and Delays.

a. When change orders are indicated, delays are experienced, or the Contractor, in accordance with the "Project Schedule Updating" section of these specifications, desires to revise the Project Schedule, the Contractor shall submit to the Engineer a written Time Impact Analysis illustrating the influence of each change order or delay on the Contract time. Each Time Impact Analysis shall include a Fragmentary Network (Network analysis) demonstrating how the Contractor proposes to incorporate the change order or delay into the Project Schedule. The Time Impact Analysis shall demonstrate the time impact based on the date the change order is given to the Contractor or the date the delay occurred; the status of construction at that point

in time; and the event time computation of all affected activities. The event times used in the Time Impact Analysis shall be then included in the latest Project Schedule Update or as adjusted by mutual agreement.

b. Activity delays shall not automatically mean that an extension of the Contract time is warranted or due the Contractor. It is possible that a change order or delay will not affect existing critical activities or cause non-critical activities to become critical. A change order or delay may result in only absorbing a part of the available total float that may exist within an activity chain of the Network, thereby not causing any effect on the Contract time.

c. Float is not for the exclusive use or benefit of either the Administration or the Contractor. Extension of the Contract time will be granted only to the extent the equitable time adjustments to the activity or activities affected by the change order or delay exceeds the total (positive or zero) float of a critical activity (or path) and extends the Contract time set forth in the General Provisions Section **GP-8.03**, Prosecution of the Work, and Section **GP-8.09**, Liquidated Damages.

d. Four (4) copies of each Time Impact Analysis shall be submitted in accordance with the following:

(1) Along with the proposal for any requested change;

(2) Within seven (7) calendar days after receipt of a written change order under General Provisions Section **GP-4.06**, Changes, and Special Provisions Section **SP-8.06**, Changes.

(3) Within seven (7) calendar days after the furnishing of a written notice by the Engineer as set forth under the General Provisions Section **GP-4.06**, Changes, and Special Provisions Section **SP-8.06**, Changes.

(4) Within seven (7) calendar days from the beginning of a delay from unforeseeable causes as set forth in General Provisions Section **GP-8.08**, Termination for Default - Damages for Delay - Time Extensions, provided that the Contractor complies with the General Provisions Section **GP-4.06**, Changes, and Special Provisions Section **SP-8.06**, Changes.

e. In cases where the Contractor does not submit a Time Impact Analysis within the time requirements stated above, it is mutually agreed that the particular change order or delay does not require an extension of the Contract time.

f. Approval or rejection of each Time Impact Analysis by the Engineer shall be made after receipt of each Time Impact Analysis, unless subsequent meetings and negotiations are necessary. Upon approval, a copy of the Time Impact Analysis signed by the Engineer shall be returned to the Contractor, and incorporated into the Project Schedule at the next monthly Schedule Update.

g. Time Impact Analysis related to an extension of the Contract time and/or change order work shall be incorporated into and attached to the applicable change order.

10. Responsibility for Completion:

a. The Contractor shall furnish sufficient forces, offices, facilities and equipment, and shall work such hours including night shift and overtime operations, as necessary to ensure the prosecution of the work in accordance with the current monthly Project Schedule Update. If the Contractor falls behind in meeting the Project Schedule as noted by negative float in the current monthly Project Schedule Update, the Contractor shall take such steps as may be necessary to improve its progress without additional cost to the Administration. The provision of this paragraph shall not be construed as prohibiting the Contractor from increasing the hours of work, the number of shifts, overtime operations and/or the amount of construction plant and equipment or working on Saturdays, Sundays and holidays, provided the Contractor gives reasonable notice to the Engineer as required under Special Provisions Section **SP-7.03**, Night Work, and Section **SP-7.04**, Saturday, Sunday, and Holiday Work.

b. Failure of the Contractor to comply with the requirements of this paragraph shall be a basis for determination by the Engineer that the Contractor is not prosecuting the work with such diligence as will ensure completion within the Contract time. Upon such determination, the Engineer may terminate the Contractor's right to proceed with the work or any separable part thereof, in accordance with the General Provisions Section **GP-8.08**, Termination for Default, Damages for Delay - Time Extensions, or may take such other actions as may be deemed appropriate.

11. Performance Monitoring:

a. The Engineer may elect throughout or at any time during the Contract to record the number of workers and construction equipment working on each schedule activity in each area of the Contract and give a copy of this log to the Contractor who shall be responsible for advising the Engineer, without additional cost to the Administration, of any error in this work history, in writing, within seven (7) calendar days of receipt of same. This information will be used by the Engineer in its evaluation of the adequacy of the Contractor's performance and on-site manpower staffing, as well as in the evaluation of any Contractor claims.

b. Each Monday morning (or following day if a holiday) the Contractor shall submit to the Engineer, on portions of the current computer- produced Schedule Reports, a Status Report of any progress which has occurred in any schedule activity, including:

(1) Percent Complete; and

(2) Actual Start/Finish Dates.

c. This Status Report shall also include a check mark indicating which activities the Contractor plans to start, or to continue during that week. This Status Report shall serve as a basis for discussion at the project progress meetings. These actual start and finish dates and percentages of completion estimates will be used by the Engineer to record actual progress and evaluate the monthly Project Schedule Update.

B. **Products (Scheduling Software):**

1. The scheduling software used by the Contractor shall be capable of importing/exporting data to/from Primavera Project Planner (P-3), latest version. The proposed software shall be capable of transferring the information without degradation in the data, including but not limited to, scheduling logic and sequencing, activities, durations, cost loading, etc. The storage media shall be 3.5" double sided, high density (1.44MB) floppy disks, DOS, or Windows compatible.

2. The proposed software shall meet the following minimum criteria.

   a. Scheduling:

      (1) Provide daily scheduling units;
      (2) Provide thirty (30) independent scheduling calendars;
      (3) Sort information with a minimum of twenty eight (28) criteria selections;
      (4) User defined statusing;
      (5) F-S, S-S, F-F, and S-F relationships with positive/negative lags;
      (6) Unlimited projects and target schedules;
      (7) Dependent or independent sub-project schedule;
      (8) Provide intelligent alphanumeric activity identifiers - 4 fields;
      (9) Provide Activity coding: 64 characters in 20 fields;
      (10) Data and and duration constraints;
      (11) Provide ability to Summarize Master networks;
      (12) Provide Milestones and flags for constraints;
      (13) Provide contiguous and interruptible activity scheduling;
      (14) Provide suspend and resume dates;
      (15) Provide resource driven durations; and
      (16) Provide Activity and procurement matrix reports.

   b. Resource Management:

      (1) Unlimited resources per activity and per project;
      (2) Provide variable resource usage;
      (3) Prioritized forward and backward leveling and smoothing;
      (4) Provide hierarchial resource codes;
      (5) Provide resource lags and durations;
      (6) Fixed crew size or available staffing resource allocation;
      (7) Provide resource loading bar charts;
      (8) Provide nonlinear resource profiles;
      (9) Provide productivity reporting;
      (10) Provide internal means for time sheet data entry; and
      (11) Provide resource matrix report.

   c. Cost Control:

      (1) Autocost: user-definable progress calculations;
      (2) Variable unit prices over time;
      (3) 12 character account code including cost type;

(4) Wild-card selection and roll-up;
(5) Summarize costs at any level;
(6) Performance-adjusted cost-to complete calculation;
(7) Unit pricing/costing analysis;
(8) Cash flow project with payment lag;
(9) Earned value analysis; and
(10) Actual-this-period calculations.

d. Management Graphics:

(1) Gantt charts (bar charts);
(2) Time-scaled logic diagrams;
(3) Pure logic plots;
(4) Portrait or landscape orientation;
(5) On-screen drawing tools to create lines, boxes, symbols and logo, and add to text;
(6) Early, late and target dates;
(7) Progress and critical activities highlighting;
(8) Horizontal banding (user-defined sequence);
(9) Summary bars;
(10) Discrete activities within summary bars;
(11) Resource supply and demand curves;
(12) Comparative resource application charts;
(13) Cash flow curves;
(14) Resource requirement graphics;
(15) Cash flow and bar chart combination;
(16) Import HPGL files from graphics packages;
(17) Point size control of lettering; and
(18) Bar sizing and spacing.

e. Graphic User interface Features:

(1) Create, modify, arrange, personalize networks on screen;
(2) Create, store, recall fragnets;
(3) Choice of shape and color for activity;
(4) Click on activities to define relationships and to edit activity data;
(5) Cut, copy, and paste functions;
(6) Mark and group functions;
(7) Horizontal banding by code;
(8) Collapse and explode activity groups;
(9) 6 levels of zoom plus cosmic view; and
(10) WYSIWYG output.

f. Reporting:

(1) Provide fill-in the blank Custom report writer without a command language to operate;
(2) More than one hundred (100) standard scheduling, resource and cost reports; and
(3) Batch and series reporting.

g. Multiuser Features (for LAN environments):

(1) Read-write, read only and exclusive access;
(2) File and record-locking;
(3) Simultaneous updating, reporting, and plotting;
(4) User name and password protection;
(5) Integrated electronic mail and bulletin board; and
(6) Network administrative program (NETSET).

SP-8.04 Progress Meetings

A. The Contractor shall attend weekly progress meetings with the Engineer. The meetings shall be attended by the Contractor's key project personnel. The overall status of the Contract shall be reviewed with particular attention to planned activities with special emphasis toward planned interruptions to existing utilities or services.

B. The Contractor shall prepare for each meeting a bar chart construction schedule depicting the work accomplished the previous week and planned activities for the upcoming two week period. This schedule shall be directly related to the specified Bar Chart or Critical Path Method Construction Schedule. Any deviations from this planned schedule shall be documented in writing and immediately brought to the attention of the Engineer. All deviations from this planned schedule shall be subject to the Engineer's review and approval.

SP-8.05 Construction Quality Control Plan

A. It shall be the responsibility of the Contractor to provide and maintain a Construction Quality Control Plan (hereinafter "Plan") for all phases of the project. This requirement is in addition to any acceptance testing performed by the Engineer or his/her laboratory. Within three (3) weeks after Notice to Proceed for the Contract, the Contractor shall submit the Plan to the Engineer for approval. The Plan shall conform to the requirements of this Item. The Administration will consider an interim Plan for the first sixty (60) days of operation. The Contractor's work may be suspended or progress payments may be withheld if the Contractor fails to submit the required and satisfactory Plan as scheduled.

B. The Contractor shall maintain an effective Plan that complies with the Technical Specifications. The Plan shall encompass all actions involving selection of construction material sources and suppliers, on-site and off-site fabrication of the Contractor-furnished items to be included in the work, on-site and off-site production of construction materials, work placement procedures, workmanship, inspection, and testing. Detailed Plan requirements for certain items of Contractor-procured equipment to be installed in the finished work or off-site prefabricated materials are covered in the Technical Specifications. The Contractor shall not build upon or conceal any feature of the work containing uncorrected defects. Payment on such defective or deficient features will be withheld until they are satisfactorily corrected or other action has been taken as authorized.

C. The Contractor shall maintain a Plan to provide the necessary supervision, inspection, and testing of all items of work, including that of his/her suppliers and subcontractors, that will assure the compliance of all work with applicable specifications and drawings in respect to the Contractor-furnished equipment, materials, workmanship, construction, finish, functional performance and identification. The Contractor's Plan shall

encompass all management and finished construction work, including all inspection controls and tests required for compliance with the Technical Specifications, except for those inspections and tests specifically reserved to be accomplished by the Engineer. Results of tests conducted by the Engineer may be provided to the Contractor.

D. The Plan shall be adequate to cover all construction operations, including both on-site and off-site fabrication, and shall be keyed to the proposed construction sequence. The Engineer shall be notified at least forty eight (48) hours in advance of the preparatory and initial phases of inspection and all phases of inspection shall be made a matter of record in the Plan documentation. The Plan shall include as a minimum at least three (3) phases of inspection for all definable features of work, as follows:

1. A preparatory inspection shall be performed prior to beginning any work on any definable feature of work. It shall include a review of Contract requirements; a check to assure that all materials and/or equipment has been tested, submitted, and approved; a check to assure that provisions have been made to provide required control testing; examination of the work area to ascertain that all preliminary work has been completed; and a physical examination of materials and equipment to assure that they conform to approved shop drawings or submittal data and that all materials and/or equipment is on hand.

2. An initial inspection shall be performed as soon as a representative portion of the particular feature of work has been accomplished and shall include examination of the quality of workmanship, a review of control testing for compliance with the Contract requirements, use of defective or damaged materials, omissions, and dimensional requirements.

3. Follow-up inspections shall be performed daily to assure continuing compliance with the Contract requirements, including control testing, until completion of the particular feature of work.

E. The Contractor shall maintain current records for all inspections and tests performed throughout the life of the Contract, in a form approved by the Engineer. These records shall include, but not be limited to, factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved, identification of operators and inspectors, results of inspections or tests, nature of defects, causes for rejection, etc., proposed remedial and corrective actions taken. These records must cover both conforming and defective or deficient features and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the Contract. Legible copies of these records must be furnished to the Engineer daily, or at such other intervals as directed. The records shall cover all work placement subsequent to the previously furnished records and shall be verified by the Contractor or designated representative.

F. The Contractor shall identify a qualified individual within his/her organization who shall be responsible for overall management of the Plan and shall maintain an adequate staff under his/her direction to perform, monitor, and evaluate the Contractor-performed inspection and tests required by the Technical Specifications. The individual designated to direct the program shall report to the Contractor's management at a level not lower than the Superintendent, and shall have the necessary authority to discharge his/her responsibility. **When required, the Contractor must designate at least one qualified individual who will be assigned full-time responsibilities for the administration and execution of the CQC Plan. The individual(s) shall not have any other responsibilities other than those specified in this section of the Standard Provisions.**

G. Approval of the Plan shall not relieve the Contractor of his/her responsibility to comply with the requirements of the Contract Documents. The Plan shall be revised or updated as required or as requested by the Engineer. No additional cost or time extensions will be allowed for the Contractor's resubmittal of plans. This document shall include as a minimum:

1. An organization chart showing the portion of the Contractor's corporate organization which is concerned with the on-site construction activities;

2. The Contractor's on-site organization chart including his/her quality control organization;

3. Types of personnel (work classification) to be used in the quality control organization, required qualification standards, and the planned duration of their services;

4. Authority and responsibilities of quality control personnel;

5. Operational procedures for accomplishing and reviewing work, supervision, inspections, tests, construction material production controls, fabrication controls, certifications, documentation of quality control operations, and inspections and tests, including those for subcontractors. These procedures shall include the methods to be utilized during the procurement cycle (order to delivery) for those items of materials or equipment which require source inspection, shop fabrication, and operations away from the work site;

6. Methods and procedures for selecting suppliers;

7. The Contractor's plan for the testing and certification of welders;

8. Methods and procedures for indoctrination and instruction of quality control personnel, construction supervisors, and foremen;

9. An appropriate schedule of submission of the detailed CQC Plans required by the Technical Specifications;

10. A copy of the letter of direction to the Contractor's representative andhis/her staff for quality control which defines their delegated duties and responsibilities; and

11. When the quality control functions are to be accomplished by personnel not located at the site and/or not directly under the control of the Project Manager, the on-site/off-site coordinating procedures and authorities shall be covered in detail in the specific Plan(s) involved.

H. At least thirty (30) calendar days prior to starting any specific phase of the work as identified in the various Technical Specifications, the Contractor shall submit to the Engineer for review and approval three (3) copies of a detailed Plan covering the following general items and any additional pertinent items. Such approval shall not relieve the Contractor of his/her responsibility for the compliance with the Contract requirements. Similar categories of work may be consolidated into a single plan even though they may relate to several different Technical Specifications Sections. If the majority of any one phase of the work is to be accomplished by a subcontractor, the subcontractor's Plan may form the basic document, supplemented by those actions, inspections, and reports to be accomplished or made by the Contractor's quality control staff. In addition, the Contractor's Plan Representative shall have job site discussions with the Engineer on the

interrelationship of their activities before starting each major phase of construction. These meetings shall be monthly or as otherwise required by the Engineer.

1. The specific requirements stated in the Technical Specifications;

2. Phased inspection procedures as stated in paragraph "Quality Control System";

3. Total list of all tests to be performed by the Contractor, and the respective test methods and copies of forms to be used for recording inspection results, performance, or test data;

4. Procedures and methods for documentation and submittal for factory or off-site inspections;

5. Names of laboratories or individuals designated to accomplish the various types of inspection and test work;

6. The Contractor's program for regular indoctrination, coordination, and orientation meetings to keep workmen and craftsmen apprised of peculiar requirements for the succeeding period and general findings on work placement during preceding period;

7. Specific reports to be rendered to the Engineer including the normal time required for processing information or data;

8. Documentation procedures which reference applicable specifications, Contract Drawings, and shop drawings; and

9. Pending submission and approval of CQC Plans, the Contractor shall submit written interim quality control reports as directed by the Engineer.

I. All inspections and Contractor-required tests involving the recording of equipment or system performance data, including all corrective actions taken, shall be recorded on approved forms and endorsed by the Contractor's CQC Manager. The Contractor shall also prepare a monthly report, or at such intervals as directed by the Engineer, which summarizes all quality control operations.

J. This summary report shall identify inspections made, deficiencies found, corrective action taken, preparation status of plans being developed, and status of plans requiring resubmission under this section. These inspection reports shall be completed and transmitted by the Superintendent to the Engineer.

K. All quality control records, other than those specified in the paragraphs above entitled, "Inspection Records" and "Performance Reports," shall be maintained in a central on-site location by the Contractor.

L. These records shall include all quality control sampling data; factory tests and/or manufacturer's certifications; quality control coordinating actions; records of quality control training; and routine hydrostatic, electrical continuity, grounding, welding and line cleaning tests. The quality control records will be available for examination, and the Contractor shall provide copies of specific tests and data as requested by the Engineer. The requirements to maintain quality control records, as described above, shall not be construed to relieve the Contractor from submitting samples, test data, shop drawings, material certificates, or other information required elsewhere in the Contract.

M. If the Engineer determines that the Contractor's Plan or its operation are deficient in the identification and correction of nonconforming quality of workmanship or materials, documentation, or other operational procedures, the Contractor shall correct and/or modify his/her quality control system as directed. In addition, the Contractor shall take prompt action to correct conditions which have resulted or might result in substandard or defective materials, parts, components, or services. This action shall include preventive measures as well as correction of conditions which have occurred. The Contractor shall document his/her efforts to correct existing deficiencies and to minimize their future occurrence. Reports prepared shall carry follow-up action on all deficiencies until adequate correction has been made. The Contractor shall not build upon or conceal any feature of the work containing uncorrected defects.

N. Inspection and test results and detailed examination of deficient or failed articles shall be used to determine the nature and basic causes of deficiencies or failures. The Contractor shall provide samples of the deficient or failed articles to the Engineer upon request.

O. The Contractor shall provide and maintain gauges and other measuring and testing devices necessary to assure that articles conform to the Contract requirements. These devices shall be calibrated against certified measurement standards which have known valid relationships to national standards. At established periods to assure continued accuracy. Records shall be maintained of the data resulting from calibration operations. Any equipment exceeding its required due date or tolerance and any nonconforming articles shall be suitably isolated, tagged, or otherwise marked to prevent its use without written permission of the Engineer.

P. If the Contractor's work does not conform to the requirements of the construction documents, the Engineer may issue a non-conformance report to the Contractor. The Contractor must correct all deficiencies, or otherwise respond to the report, within ten (10) calendar days of issuance of the report by the Engineer. If the work remains unresolved at the time of processing of the progress payment, the Engineer may withhold monies due to the Contractor until the deficiencies are corrected.

SP-8.06 Shop Drawings, Product Data, and Samples

A. **General.** Shop drawings shall include, but are not limited to, drawings, diagrams, illustrations, schedules, performance charts, brochures and other data prepared by the Contractor, subcontractor, manufacturer, supplier, or distributor which illustrates how specific portions of the work shall be fabricated and/or installed. The Contract performance period outlined in the Contract Documents includes time for the review and approval of the Contractor's shop drawings. The Engineer's review of shop drawings, samples and requested substitutions shall be as follows:

1. Specified product submittal: twenty-one (21) calendar days

2. Submittal of products required by performance specifications and other named manufacturers: twenty-one (21) calendar days

3. Requested substitutions: forty-five (45) calendar days

4. Review time will begin and end with dates received and returned from the representative of the Administration.

B. **Submittal Register**:

1. The Contractor shall complete and submit two copies of "Submittal Register Form" listing each and every item of equipment, material, certification, samples, etc. for which approvals are required by the specifications no later than seven (7) days after Notice to Proceed has been issued. The Engineer may request submittals in addition to those listed when deemed necessary.

2. For select contracts, completed "Submittal Register Form" will be included in the Technical Provisions listing major submittal items. This Register shall not be construed to include a comprehensive listing of all documents to be submitted by the Contractor for approval. The Contractor must review and complete the Register listing all the required submittals and necessary details. The completed Submittal Register shall be submitted to the Engineer no later than seven (7) days after Notice to Proceed has been issued.

3. The approved Submittal Register will become a scheduling document and will be used to control submittals throughout the life of the Contract. The Submittal Register and the Project Schedule shall be coordinated by inserting the Register Schedule into the Project Schedule to form one complete scheduling document. Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time shall be allowed on the register for review and approval. Approved Submittal Register shall not be construed as relieving the Contractor from submitting every and all submittals required by the Specifications and/or the Engineer.

4. A sample "Submittal Register Form" is included under Special Provisions, Section 10, **SP-10.04**, and in the Technical Provisions.

C. **Submission Requirements**. Within seven (7) days after the Notice to Proceed, the Contractor shall submit for review and approval a preliminary schedule of Shop Drawing submittal. After review and verifying all field measurements, the Contractor shall submit to the Engineer for approval in accordance with this schedule, the required shop drawings checked and stamped with the Contractor's approval stamp. The stamp should include the name of the project, drawing number, specification section number, and specific article the Drawing references. All submittal should be transmitted far enough in advance of the scheduled dates of installation to provide adequate time for reviews and approval, for possible revision and resubmittal, and for placing orders and securing delivery.

D. **Submissions**:

1. Samples, drawings, specifications, catalogs, etc., submitted for approval shall be properly labeled indicating specific service for which materials or equipment are to be used including, section and article numbers of the Specifications governing, Contractor's name, and title of the Contract. Catalogs, pamphlets or other documents submitted to describe items on which approval is being requested shall be specific and identification in catalogs, pamphlets, etc., of the item submitted shall be clearly made in ink. Data of a general nature will not be accepted. Six (6) samples are required on finish color submissions.

2. Any costs incurred by the Contractor or the Administration due to the resubmittal of documents caused by inaccuracy, lack of coordination, and/or checking shall be the responsibility of the

Contractor. Each variation from the Contract Specifications and Drawings shall be noted on the submittal. The Contractor shall also state the reason for such variations. If these requirements are not met, the submittal may be returned for corrective action.

3. The Contractor shall carefully control his/her procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved Submittal Register.

E. **Submittal Classification**:

1. Administration Approved: Administration approval is required for extensions of design, critical materials, deviations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Engineer. Within the terms of this Contract, they are considered to be "shop drawings".

2. Information only: All submittals not requiring Administration approval will be for information only. They are not considered to be shop drawings as outlined in 1. above.

F. **Schedule of Submission**. The Contractor shall submit for approval two (2) sepia reproducible and two (2) ozalid prints of shop drawings as called for in the Specifications or necessary for the work. If any contradiction exists between this requirement and the particular Specification, this requirement shall supersede. Send Shop Drawings to the organization designated by the Administration at the pre-construction meeting.

G. **Certificates of Compliance**. Any certificates required for demonstrating proof of compliance of materials with specification requirements shall be executed in four (4) copies. Each certificate shall be signed by an official authorized to certify in behalf of the manufacturing company. The certificate shall contain the name and address of the Contractor, the project name and location, the quantity and date or dates of shipment or delivery to which the certificate applies. Copies of laboratory test reports submitted with certificates shall contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material that meet the requirements of the specification.

H. **Templates/Patterns**. The Contractor shall furnish all necessary templates, patterns, etc., for installing work, and for the purpose of making the general arrangement of the systems. All work included in the Drawings and details shall be consulted in connection with mechanical and electrical installations. Where the exact location of fixtures and equipment are not specifically located, the Contractor shall obtain this information in the field or from the Engineer.

I. **Process of Approval**. The Engineer, on receiving sepia reproducible, will promptly approve them or indicate desired corrections, and return one (1) sepia of each drawing to the Contractor. The Contractor shall make all corrections and resubmit drawings which are not approved in accordance with requirements for first submission. If the Contractor considers any correction indicated on the submittals to constitute a change to the Contract, notice as required under **GP-4.06**, Changes, shall be given promptly to the Engineer.

J. **Withholding of Payment**. Payment for materials incorporated in the work will not be made if required approval has not been obtained.

K. **Interpretation**. Approval by the Engineer shall not be construed as a complete check but will indicate only that the general method of construction and detailing is satisfactory. Approval of drawings shall not be considered as a guarantee of measurements of building conditions. Where drawings are approved, said approval does not mean the drawings have been checked in detail; said approval does not in any way relieve the Contractor from his/her responsibility or necessity for furnishing material or performing work as required by the Contract Drawings and Specifications.

L. **Use**. Use of shop drawings in fabrication or erection will not be permitted until approved, stamped, and dated by the Engineer. All shop drawings will be numbered consecutively by the Engineer when approved. Before submission for approval, drawings and schedules shall be fully checked by the Contractor for materials, sizes, dimensions, details, and shall bear evidence of the Contractor's verification and approval. All drawings shall be on same size sheets.

M. **Distribution**. After approval of the shop drawings, the Contractor shall furnish prints to other Contractors furnishing work which will or may be affected by his/her work.

N. **Work Prosecution**. The Contractor shall follow drawings in laying out work and check drawings of the various trades to verify spaces in which work will be installed. Maximum headroom and space conditions should be maintained, and where they appear inadequate, the Engineer shall be notified before proceeding with installations.

O. **Construction Drawings**. If directed by the Engineer, the Contractor shall, without extra charge, make reasonable modifications in layout as needed to prevent conflict with work of other trades or for proper execution of the work. Detailed drawings of proposed departures due to actual field conditions or other causes shall be submitted to the Engineer for approval and any such changes shall be made without additional cost to the Owner.

P. **Additional Materials and/or Equipment**. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings, and accessories which may be required. The Contractor shall carefully investigate the structural and finish conditions affecting his/her work and shall arrange such work accordingly, furnishing such fittings, valves, transitions, pull or junction boxes, and accessories as may be required to meet such conditions at no additional cost to the Owner.

Q. **Variances**. Where variances occur between the Contract Drawings and Specifications or within either document itself, the item or arrangement of better quality, greater quality, or higher cost shall be included in the Contract Price. The Engineer will decide on the item and manner in which the work shall be installed.

R. **Time Extensions**. Failure by the Contractor to submit revised Shop Drawings in ample time for further review shall not entitle him to an extension of Contract time, and no claim for extension by reason of such default will be allowed.

S. **Quality Control:**

1. Source limitations. To the greatest extent possible for each unit of work, and subject to the restrictions of the Buy American Act, provide products, materials, or equipment of a singular generic kind from a single source.

2. Compatibility of Options. Where more than one choice is available as options for the Contractor's selection of a product or material, select an option that is compatible with other products and materials already selected. Total compatibility among options is not assured by limitations within the Contract Documents, but must be provided by the Contractor. Compatibility is a basic general requirement of product/material selections.

T. **Product Delivery/Storage/Handling.** Deliver, handle, and store products in accordance with manufacturer's recommendations and by methods and means that will prevent damage, deterioration, and loss, including theft, and protect against damage from climatic conditions. Control delivery schedules to minimize long-term storage of products at the site and over crowding of construction spaces and staging area. In particular, provide delivery/installation coordination to ensure minimum holding or storage times for products recognized to be flammable, hazardous, easily damages, or sensitive to deterioration, theft, and other sources of loss. Damaged or defective items, in the opinion of the Engineer, shall be replaced at no cost to the Administration.

U. **Products:**

1. General Product Compliance:

a. General. The compliance requirements for individual products, as indicated in the Contract Documents, are multiple in nature and may include generic, descriptive, performance, prescriptive, compliance with standards, conformance with graphic details, and other similar forms and methods of indicating requirements, all of which must be complied with.

b. Procedures for Selecting Products. The Contractor's options for selecting products are limited by Contract Document requirements and governing regulations, and are not controlled by industry traditions or procedures experienced by the Contractor on previous construction projects. Required procedures include, but are not necessarily limited to, the following for various indicated methods of specifying:

(1) Standards, Codes and Regulations. Where only compliance with an imposed standard, code, or regulation is required, selection from among complying products is the Contractor's option.

(2) Performance Requirements. Provide products that comply with specific performances indicated, and that are recommended by the Manufacturer (in published product literature) for the applications indicated. Overall performance of a product is implied where the product is specified with only certain specific performance requirements.

(3) Products Specified as Acceptable: Any products complying with the Specifications can be proposed whether listed specifically or not on the listing of acceptable products or manufacturers. Acceptable product items are listed for the convenience of the Contractor, but are not to be considered an all-inclusive list.

(4) Visual Matching. Where matching with an established sample is required, the Engineer will render the final judgement of whether a product proposed by the Contractor matches a sample satisfactorily.

(5) Visual Selection. Except as otherwise indicated, where specified product requirements include "... as selected from the Manufacturer's standard colors, patterns, textures..." or words of similar effect, the selection of manufacturer and basic product (complying with requirements) is the Contractor's option, and subsequent selection of color, pattern, and texture is the Engineer's selection. A phrase such as "...as selected from the Manufacturer's full color line..." means selection of standard or optional colors regularly produced by the selected manufacturer.

c. General Requirements for Electrical Work: The following applies to electrical work unless otherwise specified:

(1) Comply with the National Electrical Code.

(2) Conduits, Wiring and Equipment. Arrange generally as indicated. Any change resulting in a savings in labor or materials shall be made only in accordance with a contract change order. Deviations are permitted only where necessary to avoid interferences and only after drawings showing the proposed deviations have been submitted to and approved by the Engineer.

(3) Ratings. The motor horsepower and apparatus wattage ratings shown or specified are estimated values, and the corresponding sizes of feeders and other electrical equipment indicated to serve them are minimum sizes. Motors of greater horsepower and apparatus with larger wattage ratings may be furnished if necessary to meet the requirements of the various sections of the Specifications in which they are specified. Where larger motors or apparatus with larger wattage ratings are furnished, increase the capacity of the feeders and other electrical equipment serving them to correspond, at no additional cost to the Administration, in each case in which the Engineer determines that apparatus meeting the Specification requirements and requiring a horsepower or wattage not exceeding that listed is available from two or more sources.

2. General Product Requirements:

a. General. All equipment, material, and articles incorporated into the work covered by this Contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in the Contract. References in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition. The Contractor may, at its option, use any equipment, material, article, or process that, in the judgement of the Engineer, is equal to that named in the Specifications, unless otherwise specifically provided in the Contract. Provide products that are undamaged and unused at the time of installation, and that are complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and is suitable for the intended use and effect.

b. Standard Products. Products shall be essentially the standard catalogued products of manufacturers regularly engaged in production of such products and shall be the

manufacturers' latest standard design that complies with the Specification requirements. Equipment shall essentially duplicate items that have been in satisfactory commercial and industrial use at least two (2) years, or more if otherwise specified, prior to bid opening; or, in lieu thereof, shall have been used and operated in a test installation that, in the opinion of the Engineer, duplicates its field performance for the same period of time. The Engineer reserves the right to require the Contractor to submit evidence of this effect for approval. When two units of that same class of equipment are required, these units shall be the product of a single manufacturer; however, the component parts of the system may not require to be the products of the same manufacturer.

c. Continued Availability. Products that, by nature of their application, are likely to be needed at a later date for maintenance and repair or replacement work shall be current models for which replacement parts are available.

V. **Working Drawings for Falsework Systems.** Falsework systems plans (design and construction) shall be the responsibility of the Contractor, includingsubmitting and obtaining written acceptance of the design and plans by the Engineer before erection.

1. The Contractor shall utilize a Professional Engineer (PE) registered in the State of Maryland who has a minimum of five years experience in falsework design. The falsework design calculation and plans shall be signed by the PE and bear the seal of the PE. The submittal of the design and falsework plans shall include the PE's resume showing evidence of the required experience.

2. The Contractor's plans and design calculations shall evaluate and qualify all products and components including manufactured products and proprietary items for their intended service. Acceptance by the Engineer of falsework systems shall not in any way relieve the Contractor of the responsibility for the safety and adequacy of the design and construction for the falsework systems and operations, including all components.

3. Every structure in the Contract will require a separate falsework design analysis, separate plans and design submittals as set forth above. This applies even though structures may appear to be identical.

4. Each falsework system shall be designed to have the capacity to support all vertical and horizontal loading with enough redundancy to prevent progressive failure. Vertical loading, differential settlement forces, live load where applicable, and all horizontal lateral and longitudinal forces shall be taken into account. Unbalanced temporary loading caused by placement sequence shall also be provided for in the design. Adequate diagonal bracing in all planes shall be employed.

5. All falsework systems designs and plans shall provide for adequate foundations with bearings below the frost line or on rock or on piling and for possible settlement. If additional subsurface data is necessary, it shall be obtained and analyzed for proper design of the plans and performance of construction.

6. Falsework designs and plans shall include protection against impact from uncontrolled highway vehicles, accidental collision of a crane boom, or other construction equipment and vehicles, traffic vibration, flood waters, high winds, and any other envisioned contingent situations.

SP-9.01 Payroll Records

(Amended February 9, 1998 by the Board of Public Works)

A. Include for each apprentice, proof that the apprentice is in an apprenticeship program:

(a) Registered with the Maryland Apprenticeship and Training Council of the Department of Labor, Licensing, and Regulation; and

(b) Approved by the Bureau of Apprenticeship and Training of the U.S. Department of Labor.

SP-9.03 Payment

When the Contractor requests payment allowance for materials in accordance with **GP-9.01**, Payment, Paragraph 3, the following terms and conditions will apply:

A. For permanent materials delivered to the project site, or stored in an approved location off-site, an allowance of one hundred percent (100%) of the material cost plus freight charges as invoiced may be made. The allowance will be based upon validated invoices or bills for such materials, including freight charges, and a copy thereof shall be made a part of the documented records for the project. All permanent materials approved for payment will have been tested by the Administration for compliance with the requirements of the Contract Documents. Payment will only be made for permanent materials which conform to the requirements of the Contract Documents.

B. No allowance will be made for fuels, form lumber, falsework, temporary structures or other materials of any kind which will not become an integral part of the finished construction.

C. All permanent materials for which an allowance is requested shall be stored in an approved manner where damage is not likely to occur. If any of the stored materials are lost or become damaged in any manner, the Contractor shall be responsible for repairing or replacement of such damaged materials. The value of the lost or damaged permanent material will be deducted from the Contractor's subsequent progress payments until replacement has been accomplished.

D. Permanent material for which payment has been made, either wholly or partially, shall not be removed from the approved location until such time that it is incorporated into the work, unless authorized by the Engineer.

E. The following must accompany the written request for payment of stored materials:

1. Consent of the Surety specifying the material type and the bid items in which the material is to be used.

2. Validated invoices showing that payment for the material has been made.

3. A notarized statement from the Contractor attesting that the invoices, as submitted do not include charges and/or fees for placing, handling, erecting or any other charges and/or markups other than the actual material cost, sales tax(es) if applicable, and freight charges.

4. Bill of lading showing delivery of the material.

5. Inspection test reports, certifications required by the Contract Documents and approved by the Engineer.

6. Nothing in these specifications shall be interpreted as requiring the Administration to pay for stored materials. The Administration shall decide on a case-by-case basis whether stored materials shall be paid for. Some factors the Administration will consider are: the Contractor's ability to meet the project schedule and milestones, the effectiveness of the Contractor's Quality Control Plan, the number of unilateral extra work orders the Administration issues, how record drawings are being kept up, the status of material submittals, the effectiveness of the Contractor's safety, erosion and sediment control programs and the on-going cleanliness of the project site. No payment will be made for stored materials which have not been submitted and accepted.

7. If the permanent material is stored outside of the general vicinity of the airport, the Contractor must pay for the Administration's representative's transportation and lodging to the see the permanent materials.

SP-9.07 Prompt Payment to Subcontractors

A. The Prime Contractor is responsible for making timely payments to all subcontractors and suppliers as required in **the 1988 edition of the State Finance and Procurement Article of the Annotated Code of Maryland, Section 17-106.**

B. The Administration has established the following time frame for subcontractor payment.

1. Once the monthly progress estimate is processed and payment is received by the Prime Contractor, payment is to be made to all subcontractors within ten (10) calendar days.

2. Each month, the Engineer will review the current pay items with the Prime Contractor and all involved subcontractors to ensure that all work satisfactorily completed within specifications is included in the monthly progress payment. For payment purposes, the same quantity totals used to compute the payment to the Prime Contractor will be the basis for payment to the subcontractor.

3. If the subcontractor does not receive payment within the required ten (10) days, the subcontractor shall notify the Engineer in writing of the amount in dispute including item numbers, if appropriate, and payment quantity for each. The Engineer will then notify the Director of Engineering of the dispute. The Director of Engineering or his representative will verbally contact the Prime Contractor within forty eight (48) hours to ascertain whether or not a performance dispute exists which necessitates non-payment to the subcontractor.

4. If a performance dispute exists, the Prime Contractor must demonstrate that there exists a valid basis to withhold payment from the subcontractor.

5. If the Prime Contractor withholds payment from a subcontractor, the Prime Contractor shall provide the subcontractor written notice of the withholding of payment. The notice shall detail the reasons for withholding payment as well as the amount. A copy of the notice shall be provided to the Surety and the Administration.

If no valid dispute exists, the Prime Contractor will be asked to make immediate payment to the subcontractor. The subcontractor will be responsible for notifying the Administration's Director of Engineering if this payment is not made. Upon receipt of notification, the Director of Engineering will schedule a meeting to verify and discuss the non-payment issue. This meeting will be held at the Maryland Aviation Administration, Office of Planning and Engineering within forty eight (48) hours (2 working days of the Administration's contact with the subcontractor).

Invited to this meeting will be the Prime Contractor, the subcontractor, the Director of Engineering, and the Engineer. The purpose of this meeting will be to establish why payment was not made to the subcontractor in the required ten (10) days. If it is determined that the Prime Contractor is delinquent in payment to the subcontractor, further progress payments to the Prime Contractor may be withheld until the subcontractor is paid.

6. If the next monthly estimate becomes due and payment to the subcontractor has not been corrected by the Prime Contractor, the monthly estimate will **NOT** be processed and another meeting will be held at the Maryland Aviation Administration, Office of Planning and Engineering to correct the problem. Should the results of this second meeting reveal that payment to the subcontractor continues to be delinquent, the Director of Engineering may order a suspension of work based upon the failure of the Contractor to carry out the provisions of the Contract or he may allow work to continue and withhold future estimate payments as state above.

C. If this issue cannot be resolved and work is suspended, the Contractor may appeal the decision of the Director of Engineering to the Procurement Officer in accordance with **GP-5.15**, Disputes. The Procurement Officer will render a final decision on this issue in accordance with **GP-5.15**.

D. It is the responsibility of the Prime Contractor to notify the Engineer when payment has been made. The Engineer will verify the payment with the subcontractor to ensure payment was received.

E. Any administrative costs incurred by the Administration shall be deducted from the Prime Contractor's retainage at the conclusion of the project.

F. Nothing in this special provision will prevent the subcontractor from pursuing a claim with the Surety under the Prime Contractor's payment bond at any time.

SP-9.05 Force Account Work

In addition to **GP-9.02**, Force Account Work (Paragraph 3), the following requirements shall apply:

A. The Contractor shall receive the current rental rates recommended in the Rental Rate Blue Book for Construction Equipment for the use of any machinery or special equipment authorized by the Engineer. The rental rates must be agreed upon in writing before work is begun, except in the those cases where the Engineer finds that an emergency exists. Payment will be made for the actual number of hours the equipment is at the work site. The maximum number of hours allowed for each working day will be eight (8) or the actual number of hours in operation, whichever is greater. Weekly rates will be used on the force account project if the total time exceeds three (3) days. Monthly rates will be used for all equipment used on the force account project if the total time exceeds three (3) weeks.

B. Approved transportation charges will be paid from and to the nearest source if the equipment is brought to the project specifically for use on the force account work and is not used on any other work.

C. The rental rate will consist of the sum of the rate for the basic piece of equipment, the rates for attachments (where applicable), and the estimated hourly operating cost.

D. The above component parts of the rate are to be obtained from the Rental Rate Blue Book when listed in that book. If a piece of equipment is not listedin the Rental Rate Blue Book, then the rate will be the prevailing rate being paid in the area where the force account work is being performed.

E. When the equipment is used in excess of eight (8) hours per day, or forty (40) hours per week, the excess time will be considered as overtime. The rental rates for this overtime will be the sum of fifty percent (50%) of the rate for the basic piece of equipment, fifty percent (50%) of the rates for attachments where applicable and one hundred percent (100%) of the estimated hourly operating costs above.

F. Whenever equipment is ordered by the Engineer to be held on the project on a standby basis, or when the Administration is obligated for other reasons to pay for idle equipment, the rate will be seventy five percent (75%) of the rental rate with no allowance for operating costs. Standby or idle time cannot exceed eight (8) hours per day and will not be allowed for Saturday, Sunday, or holidays. Non-operating time for equipment required for force account work is not considered standby or idle time if the equipment is operated and used at least once during each working day.

G. Regional Rate Modifications and Life Expectancy Adjustments will not be allowed.

SP-9.06 Progress Payments

In addition to **GP-9.03**, Progress Payments, the following information and documentation is required to be included in any proper invoice for payment.

A. Original construction schedule, look-ahead construction schedule, updated construction progress schedule, recovery construction schedule, whichever are appropriate.

B. Certified payroll records for the General Contractor and all subcontractors working on the Contract.

C. Certification that the as-built drawings have been updated and jointly reviewed by the Engineer and the Contractor's representative for the month that payment is requested.

D. Copies of invoices and all documentation necessary for payment with regards to materials stored which have not been incorporated into the work, but for which payment is requested.

E. Copies of completed Monthly Minority Subcontractor Utilization Forms.

F. Certification of payment from the subcontractors as required by **GP-9.01**, Scope of Payment.

G. Copy of all the Contractor's Quality Control Reports for the period being invoiced.

H. Contractor Quality Control Plan submitted by the Contractor and approved by the Engineer.

I. Contractor Safety Plan and/or reports submitted by the Contractor and approved by the Engineer.

The Contractor is responsible to submit with its invoice, additional information or documentation which may be required elsewhere in this Contract. If the Contractor does not submit the required information, processing of the progress payment may be withheld by the Engineer, or the Administration.

SP-10.01 Request for Information (SP-4.14)

Contractor:	Architect/Engineer:
Address:	Address:
Phone:	Phone:

Contract Title:	Contract Number:

RFI Number:	Date of Request:	Date Response Required (7 days minimum):

Description of RFI:		
As Built Sketches Enclosed:	Specification Paragraph Ref:	Drawing Reference:
Contractor's Recommendation:		

Cost Impact:	Schedule Impact:
Subcontractors Affected:	
Subcontractors Coordinated With:	
Submitted by:	
Architect/Engineer Reply to RFI:	
Signed:	Date:

MONTHLY INJURY/ILLNESS REPORT
(TO BE COMPLETED AND MAILED BY THE 7TH DAY OF EACH MONTH)

FOR THE MONTH OF:_____

PROJECT NUMBER: _____

PROJECT NAME: _____

PROJECT LOCATION: _____

CONTRACTOR OR _____
SUBCONTRACTOR _____
ADDRESS _____

TELEPHONE NO.: FAX NO.:

1. HOURS WORKED	
2. LOST TIME CASES	
3. RECORDABLE CASES	
4. LOST WORK DAYS	
5. CARRY OVER LOST WORK DAYS	
6. TOTAL LOST WORK DAYS	

COMMENTS:

PREPARED BY: **DATE:**

PART III CONTRACTOR AFFIRMATIVE ACTION PROGRAM

Section 2 Affirmative Action/Equal Employment Opportunity Program

A. AAP-2.08 - Utilization of Unions is deleted in its entirety.

PART IV MINORITY BUSINESS ENTERPRISE PROGRAM

Section 2 - Contractual Requirements

A. The Maryland Department of Transportation (Department) has established a program under which MBE participation will be assessed without consideration of the cost of supplying structural steel. The cost of supplying structural steel will be excluded from the proposed value of MBE participation. This program applies only to the cost of supplying structural steel, and the installation costs and other costs related to structural steel erection may still be included in a contractor's proposed Affirmative Action Plan. The Administration reserves the right to verify the accuracy of any dollar value included on the Contractor's Affirmative Action Plan, including the value associated with the supply and installation of structural steel.

B. It is the goal of the Department that MBEs participate in all contracts. Each contract contains a goal for MBE participation (see Contract Summary GI-1.01). The goal may be met using any combination of MBE, DBE and WBE.

A study prepared for the State of Maryland entitled The Utilization of Minority Businesses by the State of Maryland (Dec 1994) determined the availability of MBEs in construction as follows: African-American/Black - 7.1%; Hispanic - 2.8%; Asian and Native Americans - 2.3%; and white women - 5.4%. These percentages equal 17.6% of the total number of construction firms available in the Maryland Economic Region as defined in the study.

Where subcontracting opportunities exist, bidders are encouraged to consider these availability percentages in meeting the MBE goal for this contract.

C. **Minority Business Enterprise Amendment of 1995**

The State Finance And Procurement, Section 14-302(2)(i) , Procurement From Minority Businesses, effective June 30, 1995, applies to Department construction contracts in excess of $100,000. This Act requires that contractors shall provide documentation of the following:

1. That at least ten (10) days before bid opening MBEs were solicited through written notices identifying specific work categories appropriate for subcontracting;

2. Provide information on the type of work being solicited and specific instructions on how to submit a bid to the contractor;

3. Make personal contact with MBE firms;

4. Assist MBE firms to fulfill bonding requirements or obtain waiver of those requirements;

5. Publicize contracting opportunities to MBEs by attending pre-bid meetings or other meetings

scheduled by the Administration;

6. Provide the Administration, upon acceptance of bids from subcontractors a listing of MBEs with whom contractor negotiated, including price quotes from all MBE and non-MBE firms.

The Administration shall determine contractor's *Good Faith* compliance with these requirements. Contractor will be required to renegotiate any subcontract if the Administration makes a determination that contractor is not in compliance with the provisions of this subtitle and subsection. An appropriate report will be filed in accordance with these provisions.

AGREEMENT

A. THIS AGREEMENT:

MADE THIS 4th DAY OF September 19 98

by and between IA CONSTRUCTION CORPORATION

hereinafter called the "Contractor", and the Maryland Aviation Administration, hereinafter called the "Administration".

WHEREAS, the Contract for furnishing all labor and material and delivering and completing:

Contract Number: MAA - CO- 97-019

Contract Title: Midfield Terminal Complex - Martin State Airport

for the Maryland Aviation Administration of the Maryland Department of Transportation, subject to all the conditions, covenants, stipulations, terms and provisions contained in certain plans and specifications, a copy of which is hereto attached, and in all respects made a part hereof, has recently been awarded to the Contractor by the Administration at and for a sum equal to the aggregate cost thereof at the prices named therefor, in the proposal attached hereto.

AND WHEREAS, it was one of the conditions of said award that a formal contract should be executed by and between the Contractor and the Administration evidencing the terms of said award.

NOW THEREFORE, THIS AGREEMENT WITNESSETH, that the Contractor does hereby covenant and agree with the Administration that

IA CONSTRUCTION CORPORATION

will well and faithfully, furnish all labor and material, and deliver and complete, the said

Contract Number: MAA - CO - 97-019

Contract Title: Midfield Terminal Complex - Martin State Airport

for the Maryland Aviation Administration of the Department of Transportation, in accordance with each and every one of the conditions, covenants, stipulations, terms, and provisions contained in said specifications, at and for a sum equal to the aggregate cost thereof, at the prices named therefor, in the Bid Proposal attached hereto, and will well and faithfully comply with and perform each and every obligation imposed upon:

IA CONSTRUCTION CORPORATION
firm

by said specifications or the terms of said award.

AND, the Administration does hereby covenant and agree with the Contractor that it will pay to the Contractor, when due and payable under the terms of said specifications and of said award, the sum stated on the following page; and that it will well and faithfully comply with and perform each and every obligation imposed upon it by said specifications or by the terms of said award.

B. The Contractor agrees to be bound by all of the terms and conditions of the documents set forth in the Table of Contents, attached hereto, all of which documents are attached hereto or intended to be attached as part hereof to the extent such terms and conditions are applicable to the performance of this Agreement.

C. This Agreement contains the entire agreement between the parties. It may not be altered or supplemented orally, but only by agreement in writing, signed by the party against whom enforcement of any waiver, alteration, supplement of discharge is sought.

D. It is agreed and understood by all parties hereto that the execution of this Agreement and its effectiveness is contingent upon approval by the Secretary of Transportation and the Board of Public Works of Maryland and this Agreement shall be considered to bind the parties hereto in accordance with the Constitution and laws of the State of Maryland.

E. IN WITNESS WHEREOF, the parties of these presents have hereunto caused this Agreement to be executed, the day and year first above mentioned.

In Presence of:
Witness:

_____ as to

Individual Principal

_____ (Seal)

In Presence of:
Witness:

_____ as to

Co-Partnership Principal

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

Corporate Principal

IA CONSTRUCTION CORPORATION
Name of Corporation

Attest:

James J. Kutys
Corporate Secretary, James J. Kutys

23-2224715
Contractor's Federal Tax ID Number
or Social Security Number

By: _____
President

Affix Corporate Seal

Robert S. Field
Printed or Typed Name

MARYLAND AVIATION ADMINISTRATION

APPROVED FOR $ 5,167,567.61
Written in Numerals

Five Million, One Hundred Sixty-Seven Thousand, Five Hundred Sixty-Seven and 61/100 Dollars
Written in Words

Madonna J. Copper
Witness

Theodore E. Mathias
Executive Director

APPROVED AS TO FORM AND LEGAL SUFFICIENCY THIS 4th day of September, 19 98

Joy R. Daramola-Wengel
Assistant Attorney General

I hereby certify that Item 1 1-C was approved with/~~without~~ discussion by the Board of ~~Public~~ Works on BPW—09/02/98

Signature

9/2/98
Date

Joseph Nessel - (410) 859-7726

DEPARTMENT OF TRANSPORTATION

ACTION AGENDA

CONSTRUCTION CONTRACT

ITEM: 1-C

MARYLAND AVIATION ADMINISTRATION: Baltimore/Washington International Airport (BWI)

CONTRACT NO. & TITLE: MAA-CO-97-019
Midfield (General Aviation) Complex Site Development, Phase I at Martin State Airport (MTN)

DESCRIPTION: This Contract provides for the construction of the infrastructure for a 45-acre General Aviation Midfield Complex at MTN. The work includes, construction of taxiways, aprons, vehicular parking area, and access roads. Work also includes wetland mitigation; installation of fiber optic communication cable; electrical distribution system; fire protection water system; removal/disposal of hazardous materials and demolition of three abandoned buildings.

PROCUREMENT METHOD: **Competitive Sealed Bidding**

AWARD: IA Construction, Inc.
White Marsh, MD

- This Contract was advertised in the Maryland Contract Weekly, The Baltimore Sun, and the Baltimore Times.
- The Notice to Contractors was sent to ten (10) minority organizations and to the following area construction industry clearinghouses: Dodge Reports, Construction Market Data, Building Congress, and Blue Reports. Copies were also sent to Environmental Contract Opportunity Report, Center for Aviation Research & Education, The Walbrook news, and Airport Consultants Council.

CONTINUED

ITEM: 1-C
Continued

- Thirty-five (35) contractors, four (4) of which were not Maryland firms, purchased plans and specifications. Copies of the plans and specifications were sent to seven (7) MBE organizations.

- 16% of the work will be performed by MDOT certified MBE firms.

AMOUNT: $5,167,567.61

A Performance Bond, of 100% of the award amount, exists for this Contract.

FUND SOURCE: 100% Special Funds budgeted to MAA

Appropriation Code: 29.09.00.03
Object/Subobject: 1455
Title of Program: Airport Facilities & Capital Equipment

BIDS:

IA Construction, Inc. White Marsh MD	$5,167,567.61
Cherry Hill Construction, Inc. Jessup MD	$5,736,683.10
Pavex , Inc. Hunt Valley MD	$5,889,173.22
Facchina Construction Company Glen Burnie MD	$5,921,458.50
Columbia Construction, Inc. Lanham MD	$6,061,667.10
Cossentino Construction Company Baltimore MD	$6,606,754.42

CONTINUED

ITEM: 1-C
Continued

REMARKS The Engineer's Estimate for this project is $5,659,744.00. The contract duration is 260 calendar days.

The first contract milestone calls for the Contractor to complete within 90 days the site preparation and provide access for Lockheed-Martin Corporation to begin construction, at its own expense, a 40,000 square foot aircraft hangar and contiguous operations and support area. (Item 32-GM, 9/2/98 BPW) Lockheed-Martin has begun expanding its fleet at MTN and will take delivery of new aircraft in 1999 which will be housed and maintained in the new facility.

"The Office of the State Comptroller has verified, under Control No. 98-6068-1111, that the recommended contractor has **no known deficiencies** in the payment of its Maryland tax obligations. Verification has also been obtained from the Comptroller's Office, or Department of Assessments and Taxation, as applicable, that the contractor is appropriately registered to conduct business within the State to the extent required by the laws of Maryland."

The Contractor is a resident business under the guidelines of BPW Advisory P-003-95 **Revised**.

Board of Public Works Action - The above-mentioned Item was:

Approved Disapproved Deferred Withdrawn

With Discussion Without Discussion Received

Parris N. Glendening
Governor

David L. Winstead
Secretary

Maryland Aviation Administration

*"To provide services to our customers and the air transportation industry
To foster and develop aviation in Maryland • To develop and empower our employees."*

Theodore E. Mathison Executive Director

MEMORANDUM

TO: Brian McAllister
Board of Public Works Coordinator
Office of Administrative Services

FROM: Nicholas J. Schaus
Deputy Administrator

DATE: AUG 1 2 1998

SUBJECT: Request for Approval of Construction
Contract No. MAA-CO-97-019, Midfield Complex Construction Site
Development at Martin State Airport

The Board of Public Works Action\Agenda Item and specified attachments appended to this memorandum are provided to support the subject request. Please place this contract on the September 2, 1998 Board of Public Works Agenda.

- Date of Consolidated Transportation Program approval for the proposed contract:

  January 20, 1998

- Date solicitation appeared in the Maryland Register:

  March 31, 1998

- Is DOT Contractor's Affirmative Action Plan included as part of the Contract?

  Yes

- Is Contract Affidavit included in the Contract?

  Yes

- Small site location sketch attached?

  Yes

- Contract has been approved as to form and legal sufficiency by Assistant Attorney General:

  Dora R. Dakanoto-Wengel
  Assistant Attorney General

- Name and phone number of person to contact for additional information on this contract:

  T. Suzette Moore (410) 859-7792

- Additional comment pertinent to approval of award of contract:

  N/A

- The Procurement Officer certifies that this procurement process was consistent with the requirements of COMAR Title 21:

  T. Suzette Moore (ltr)
  Joseph C. Nessel, Director
  Capital Program Division
  Office of Planning and Engineering

NJS:pah

Attachments

Joseph Nessel - (410) 859-7726

BPW--

DEPARTMENT OF TRANSPORTATION

ACTION AGENDA

CONSTRUCTION CONTRACT

ITEM: -C

MARYLAND AVIATION ADMINISTRATION: Baltimore/Washington International Airport (BWI)

CONTRACT NO. & TITLE: MAA-CO-97-019
Midfield (General Aviation) Complex Site Development, Phase I at Martin State Airport (MTN)

DESCRIPTION: This Contract provides for the installation of infrastructure and development of an approximate 45-acre site for aviation uses. The work includes, construction of taxiways, taxilanes, aprons, parking lots, and access roads; construction of wetland mitigation; installation of fiber optic communication cable; electrical distribution system; fire protection water system; removal/disposal of hazardous materials and demolition of three abandoned buildings.

PROCUREMENT METHOD: **Competitive Sealed Bidding**

AWARD: IA Construction, Inc.
White Marsh MD

- This contract was advertised in the Maryland Contract Weekly, The Baltimore Sun, and the Baltimore Times.
- The Notice to Contractors was sent to ten (10) minority organizations and to the following area construction industry clearinghouses: Dodge Reports, Construction Market Data, Building Congress, and Blue Reports. Copies were also sent to Environmental Contract Opportunity Report, Center for Aviation Research & Education, The Walbrook news, and Airport Consultants Council.

CONTINUED

- Thirty-five (35) contractors, four (4) of which were not Maryland firms, purchased plans and specifications. Copies of the plans and specifications were sent to seven (7) MBE organizations.
- 16% of the work will be performed by MDOT certified MBE firms.

AMOUNT: $5,167,567.61

A Performance Bond, of 100% of the award amount, exists for this Contract.

FUND SOURCE: 100% Special Funds budgeted to MAA

Appropriation Code: 29.09.00.03
Object/Subobject: 14.55
Title of Program: Airport Facilities Capital Equipment

BIDS:

IA Construction, Inc. White Marsh MD	$5,167,567.61
Cherry Hill Construction, Inc. Jessup MD	$5,736,683.10
Pavex , Inc. Hunt Valley MD	$5,889,173.22
Facchina Construction Company Glen Burnie MD	$5,921,458.50
Columbia Construction, Inc. Lanham MD	$6,061,667.10
Cossentino Construction Company Baltimore MD	$6,606,754.42

CONTINUED

REMARKS The Engineers Estimate for this project is $5,659,744. The contract duration is 260 calendar days.

The first contract milestone calls for Lockheed-Martin to be able to access its portion of the Midfield Complex within 90 days to begin the nine month construction of an approximate 60,000 square foot hangar and contiguous operations support areas. Lockheed-Martin has begun expanding its fleet at MTN and will take delivery of new aircraft in 1999 thus requiring access to its site no later than Spring 1999, but preferably Winter 1999.

"The Office of the State Comptroller has verified, under Control No. 98-6068-1111, that the recommended contractor has **no known deficiencies** in the payment of its Maryland tax obligations. Verification has also been obtained from the Comptroller's Office, or Department of Assessments and Taxation, as applicable, that the contractor is appropriately registered to conduct business within the State to the extent required by the laws of Maryland."

The Contractor is a resident business under the guidelines of BPW Advisory P-003-95 **Revised.**

Board of Public Works Action - The above-mentioned Item was:

Approved Disapproved Deferred Withdrawn

With Discussion Without Discussion Received

DOT CONTRACT FUND CERTIFICATION

COMAR 21.03.03.01

ide the following fund sources information:

OT Contracting Element: Maryland Aviation Administration-

ract Number and Title/Description: Contract No. MAA-CO-97-019
Midfield Complex Construction Site Development at Martin State Airport

ract Amount: $5,167,567.61

dget Authority:

udget Appropriation Code No. 29.09.00.03
Title of Budget Program: Airport Facilities and Capital Equipment
Object/Subobject of Expenditure: 14.55 Land/Structure-Construction Contract Cost
f funds for this expenditure are not budgeted, funds will be made available by:
(1) Subdivision by reducing, deleting, or deferring a budgeted item within the same Object, identified as:

(2) Object Transfer, made possible by:

(3) Budget Amendment, made possible by:

ederal Aid Agreement #/Grant #/Project #:

S: percentage from: Special 100% Federal (AIP) __
Local __ PFC Revenue __

ected Cash Flow (Multi-year contracts only): Current FY: $
Next FY: $

pital Project Data (Applies to capital items ____)

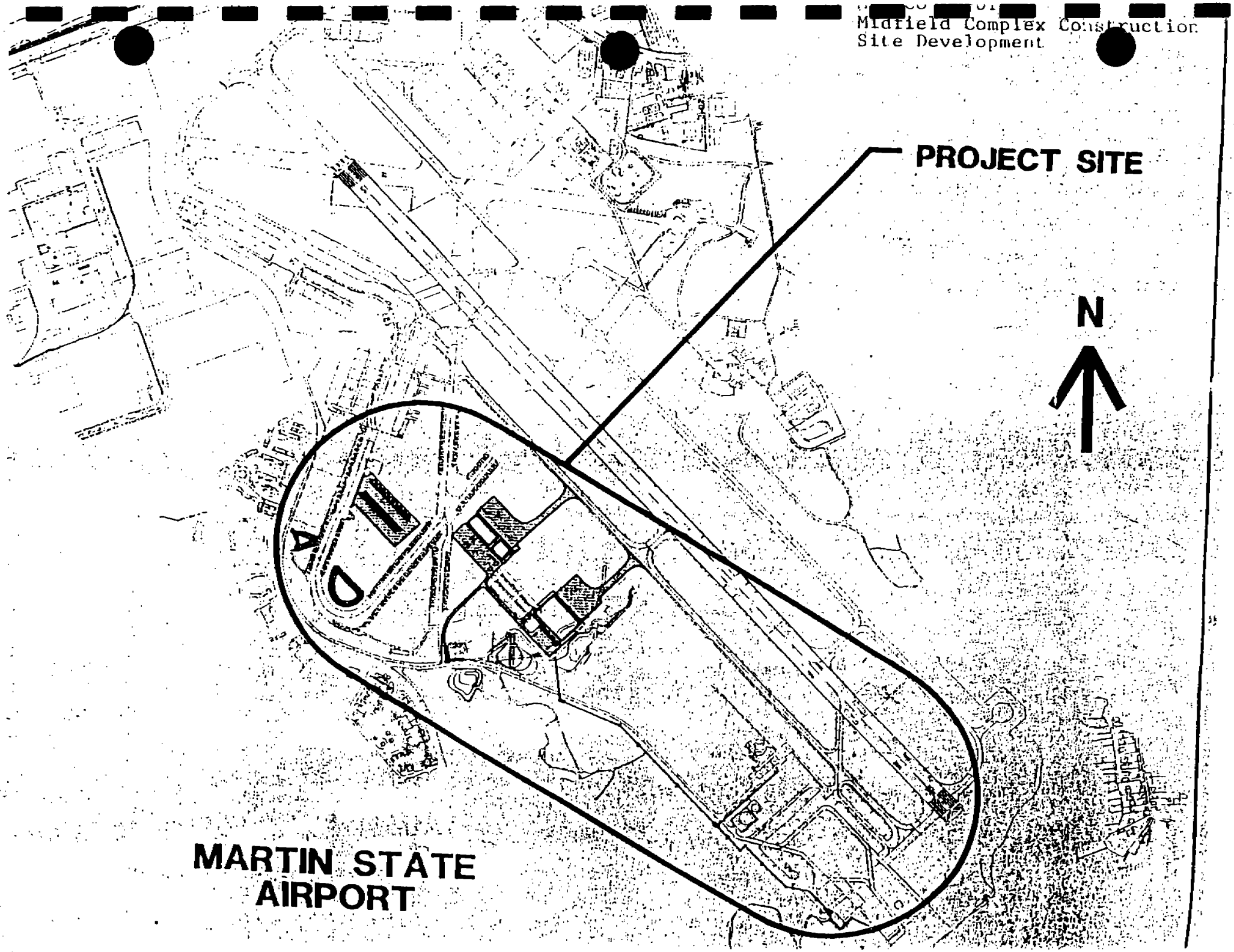
A. Consolidated Transportation Program Reference - Page 72, Line 18.
B. Comprehensive Work Schedule (date of CWS Quarterly update May 27, 1998, Attachment A, Page 6, Item 29, PIN #400202-40
C. Projection of operating income (Indicate impact of completion of contract on operating income. If no impact, so indicate.)
19__, $__; 19__, $__; 19__, $__: No Impact
D. Projection of operating expense impact. (Indicate impact of completion of contract on operating expense. If no impact, so indicate.)
19__, $____; 19__, $____; 19__, $____: No impact

availability approval (to be signed by the authorized officer of DOT contract originating element, see Exhibit 14 for authorizations.)

n O. Elliott
Director of Finance

Aug 12, 1998
Date

Midfield Complex Construction
Site Development



PERFORMANCE BOND

NOTE: THIS PERFORMANCE BOND IS NOT REQUIRED IF THE TOTAL CONTRACT PRICE IS LESS THAN FIFTY THOUSAND DOLLARS ($50,000).

Bond Number: 19-004-749

IA CONSTRUCTION CORPORATION
Principal

P.O.BOX 210
WHITEMARSH, MD 21162
Business Address of Principal

LIBERTY MUTUAL INSURANCE COMPANY
Surety

Obligee

a corporation of the State of

MASSACHUSETTS

and authorized to do business in the State of Maryland

STATE OF MARYLAND

By and through the following

Administration Marvland Aviation

Penal Sum of bond (express in figures and words)

$5,167,567.61

(Dollars, Written in Figures)

Five Million, One Hundred and Sixty-seven Thousand, Five Hundred and Sixty-seven ----------61/100

(Dollars, Written in Words)

Date of Contract: _____, 19 98

Date Bond Executed: August 28, _____, 19 98

Contract Title: Midfield Terminal Complex - Martin State Airport

Contract Number: MAA - CO -97-019

A. KNOW ALL MEN BY THESE PRESENTS, That we, the Principal named above and Surety named above, being authorized to do business in Maryland, and having business addresses as shown above, are held and firmly bound unto the Obligee named above, for the use and benefit of claimants as herein after defined, in the Penal Sum of this Payment Bond stated above, for the payment of which Penal Sum we bind ourselves, our heirs, executors, administrators, personal representatives, successors, and assigns jointly and severally, firmly by these co-sureties, bind ourselves, our successors and assigns, in such Penal Sum jointly and severally as well as severally only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each co-surety binds itself, jointly and severally with the Principal, for the payment of such sum as appears above its name below, but if no limit of liability is indicated, the limit of such liability shall be the full amount of the Penal Sum.

B. WHEREAS, Principal has entered into or will enter into a contract with the State, by and through the Administration named above acting for the State of Maryland, which Contract is described and dated as shown above, and incorporated herein by reference. The Contract and all items incorporated into the Contract, together with any and all changes, extensions of time, alterations, modifications, or additions to the Contract or to the work to be performed thereunder or to the Plans, Specifications, and Standard Provisions, or any of them, or to any other items incorporated into the Contract shall hereinafter be referred to as "the Contract".

C. WHEREAS, it is one of the conditions precedent to the final award of the Contract that these presents be executed.

D. NOW THEREFORE, the condition of this obligation is such that if the Principal shall promptly make payments to all claimants as hereinafter defined, for all labor and materials furnished, supplied and reasonably required for use in the performance of the Contract, then this obligation shall be null and void otherwise it shall remain in full force and effect, subject to the following conditions:

1. A claimant is defined to be any and all of those persons supplying labor and materials (including lessors of the equipment to the extent of the fair market value thereof) to the Principal or its subcontractors and subcontractors in the prosecution of the work provided for in the Contract, entitled to the protection provided by Section 9-113 of the Real Property Article of the Annotated Code of Maryland, as from time to time amended.

2. The above named Principal and Surety hereby jointly and severally agree with the Obligee that every claimant as herein defined, who has not been paid in full may, pursuant to and when in compliance with the provisions of the aforesaid Section 9-113, sue on this Bond for the use of such claimant, prosecute the suit to final judgement for such sum or sums as may be justly

due claimant and have execution thereon. The Obligee shall not be liable for the payment of any costs or expenses of any such suit.

E. The Surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this Payment Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

F. This Payment Bond shall be governed by and construed in accordance with the laws of the State of Maryland and any reference herein to Principal or Surety in the singular shall include all entities in the plural who or which are signatories under the Principal or Surety heading below.

G. IN WITNESS WHEREOF, Principal and Surety have set their hands and seals to this Payment Bond. If any individual is a signatory under the Principal heading below, then each such individual has signed below on his/her own behalf, has set forth below the name of the firm, if any, in whose name he or she is doing business, and has set forth below his/her title as a sole proprietor. If any partnership or joint venture is a signatory under the Principal heading below, then all members of each such partnership or joint venture have signed below, each member has set forth below the name of the partnership or joint venture, and each member has set forth below his or her title as a general partner, limited partner, or member of joint venture, whichever is applicable. If any corporation is a signatory under the Principal or Surety heading below, then each such corporation has caused the following: the corporation's name to be set forth below, a duly authorized representative of the corporation to affix below the corporation's seal and to attach hereto a notarized corporate resolution or power of attorney authorizing such action, and each such duly authorized representative to sign below and to set forth below his or her title as a representative of the corporation. If any individual acts as a witness to any signature below, then each such individual has signed below and has set forth below his or her title as a witness. All of the above has been done as of the date of bond shown above.

In Presence of:
Witness:

Individual Principal

_____ as to _____ (Seal)

In Presence of:
Witness:

Co-Partnership Principal

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

Corporate Principal

IA CONSTRUCTION CORPORATION (Seal)
Name of Corporation

Attest:

James J. Kutys
Corporate Secretary

By: _____ Affix Corporate Seal
President ROBERT S. FIELD

LIBERTY MUTUAL INSURANCE COMPANY
Name of Surety

Attest:

Julianne R. DeVita (Seal)
Signature Julianne R. DeVita

Wendy Lee Wadkins Affix Corporate Seal
Signature of Surety

Willis Corroon Corporation of PA
Bonding Agent's Name

WENDY LEE WADKINS
ATTORNEY-IN-FACT
Title

P.O. Box 9052, Radnor, PA 19087-9052
Agent's Address

600 W. Germantown Pike, Suite 300
Business Address of Surety

COUNTERSIGNED BY:
Brian D. O'Rourke
Brian D. O'Rourke/Maryland Resident Agent

Plymouth Meeting, Pennsylvania 19462

Maryland Aviation Administration

Approved as to Legal Form and Sufficiency:

this 4th day of September, 19 98

Joy R. Sakamoto-Wengel
Assistant Attorney General

Liberty Mutual Insurance Company
Statutory Balance Sheet
(dollars in thousands)

Assets	December 31, 1997
Bonds	11,609,662
Common & Preferred Stocks	4,446,583
Real Estate	128,301
Cash & Short-Term Investments	242,970
Other Invested Assets	271,268
Subtotal Cash and Invested Assets	16,698,784
Premium in Course of Collection*	1,521,916
Reinsurance Recoverables on Loss and Loss Adjustment Expense Payments	183,530
Interest, Dividends and Real Estate Income Due and Accrued	168,557
Other Assets	779,394
TOTAL ADMITTED ASSETS	19,352,181

Liabilities and Surplus	
Reserve for Losses and Loss Adjustment Expenses	10,208,483
Reserve for Unearned Premiums	1,629,832
Reinsurance Payable on Paid Loss and Loss Adjustment Expenses	36,194
Federal Income Tax and State Premium Tax Accrued	91,774
Other Liabilities	1,319,565
TOTAL LIABILITIES	13,285,848
[illegible]ssigned Surplus	4,924,567
[illegible]anty Funds	1,250
[illegible]plus Notes	1,140,516
TOTAL SURPLUS	6,066,333
TOTAL LIABILITIES AND SURPLUS	19,352,181

(*Excludes premiums more than 90 days due)

COMMONWEALTH OF MASSACHUSETTS

SS:

COUNTY OF SUFFOLK

Dennis Langwell, being duly sworn, says: That he is Vice President and Comptroller of Liberty Mutual Insurance Company; that said Company is a mutual insurance company duly organized, existing and engaged in business as a surety by virtue of the laws of the Commonwealth of Massachusetts and has duly complied with all the requirements of the laws of said Commonwealth and of the laws of the State of _____ applicable to said Company and is duly qualified to act as surety under such laws; that said Company has also complied with and is duly qualified to act as surety on federal bonds under Section 9305 of Title 31 of the United States Code.

That the foregoing is a full, true and correct statement of the financial condition of said Company an the 31st day December, 1997.

Sworn to before me this 31st day of March, 1998

Patricia Smith

My Commission Expires Jan. 19, 2001

Dennis J. Langwell

Vice President and Comptroller

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND. 426052

This Power of Attorney limits the act of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

LIBERTY MUTUAL INSURANCE COMPANY
BOSTON, MASSACHUSETTS

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS: That **Liberty Mutual Insurance Company** (the "Company"), a Massachusetts mutual insurance company, pursuant to and by authority of the By-law and Authorization hereinafter set forth, does hereby name, constitute and appoint, **JOHN K. JOHNSON, WENDY LEE WADKINS, KAREN E. HEIN, ALL OF THE CITY OF RADNOR, STATE OF PENNSYLVANIA** .....

, each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations in the penal sum not exceeding **FIFTY MILLION**********_____DOLLARS ($ **50,000,000**********) each, and the execution of such bonds or undertakings, in pursuance of these presents, shall be as binding upon the Company as if they had been duly signed by the president and attested by the secretary of the Company in their own proper persons.

That this power is made and executed pursuant to and by authority of the following By-law and Authorization:

ARTICLE XVI - Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer or other official of the company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the company by their signature and execution of any such instruments and to attach thereto the seal of the company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

By the following instrument the chairman or the president has authorized the officer or other official named therein to appoint attorneys-in-fact:

Pursuant to Article XVI, Section 5 of the By-laws, Assistant Secretary Garnet W. Elliott is hereby authorized to appoint such attorneys-in-fact as may be necessary to act in behalf of the company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

the By-law and the Authorization above set forth are true copies thereof and are now in full force and effect.

IN WITNESS WHEREOF, this instrument has been subscribed by its authorized officer and the corporate seal of the said Liberty Mutual Insurance Company has been affixed thereto in Plymouth Meeting, Pennsylvania this 21st day of January, 19 98.

LIBERTY MUTUAL INSURANCE COMPANY

By Garnet W. Elliott
Garnet W. Elliott, Assistant Secretary

COMMONWEALTH OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 21st day of January, A.D. 19 98, before me, a Notary Public, personally came the individual, known to me to be the therein described individual and officer of Liberty Mutual Insurance Company who executed the preceding instrument, and he acknowledged that he executed the same and that the seal affixed to the said preceding instrument is the corporate seal of said company; and that said corporate seal and his signature subscribed thereto was duly affixed and subscribed to the said instrument by authority and direction of the said company.

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my official seal at Plymouth Meeting, PA, the day and year first above written.

NOTARIAL SEAL
DONNA E. SHIELDS, Notary Public
City of Philadelphia, Phila. County
My Commission Expires Feb. 2, 2000

Donna E. Shields
Notary Public

CERTIFICATE

I, the undersigned, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy, is in full force and effect on the date of this certificate; and I do further certify that the officer who executed the said power of attorney was one of the officers specially authorized by the chairman or the president to appoint any attorney-in-fact as provided in Article XVI, Section 5 of the By-laws of Liberty Mutual Insurance Company.

This certificate may be signed by facsimile under and by authority of the following vote of the board of directors of Liberty Mutual Insurance Company at a meeting duly called and held on the 12th day of March, 1980.

VOTED that the facsimile or mechanically reproduced signature of any assistant secretary of the company wherever appearing upon a certified copy of any power of attorney issued by the company, shall be valid and binding upon the company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the said company, this 28th day of August, 19 98.

Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER December 31, 19 99.

Not valid for mortgage, letter of credit, bank deposit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.

PAYMENT BOND

NOTE: THIS PAYMENT BOND IS NOT REQUIRED IF THE TOTAL CONTRACT PRICE IS LESS THAN FIFTY THOUSAND DOLLARS ($50,000).

Bond Number: 19-004-749

IA CONSTRUCTION CORPORATION
Principal

P.O. BOX 210
WHITEMARSH, MD 21162
Business Address of Principal

LIBERTY MUTUAL INSURANCE COMPANY
Surety

Obligee

a corporation of the State of

MASSACHUSETTS
and authorized to do business in the State of Maryland

STATE OF MARYLAND

By and through the following

Administration Maryland Aviation

Penal Sum of bond (express in figures and words):

$5,167,567.61
(Dollars, Written in Figures)

Five Million, One Hundred and Sixty-seven Thousand, Five Hundred and Sixty-seven ----------61/100
(Dollars, Written in Words)

Date of Contract: _____, 19 98

Date Bond Executed: August 28, 19 98

Contract Title: Midfield Terminal Complex - Martin State Airport

Contract Number: MAA - CO -97-019

A. KNOW ALL MEN BY THESE PRESENTS, That we, the Principal named above and Surety named above, are held and firmly bound unto the Obligee named above in the Penal Sum of this Performance Bond stated above, for the payment of which Penal Sum we bind ourselves, our heirs, executors, administrators, personal representatives, successors, and assigns, jointly and severally, firmly by these presents.

However, where Surety is composed of corporations acting as co-sureties, we, the co-sureties, bind ourselves, our successors and assigns, in such Penal Sum jointly and severally as well as severally only for the purpose of allowing a joint action or actions against any or all of us, and for all other purposes each co-surety binds itself, jointly and severally with the Principal, for the payment of such sum as appears above its name below, if no limit of liability is indicated, the limit of such liability shall be the full amount of the Penal Sum.

B. WHEREAS, Principal has entered into or will enter into a contract with the State of Maryland, by and through the Administration named above acting for the State of Maryland, which contract is described and dated as shown above, and incorporated herein by reference. The Contract and all items incorporated into the Contract, together with any and all changes, extensions of time, alterations, modifications, or additions to the contract or to the work to be performed thereunder or to the Plans, Specifications, and Standard Provisions, or any of them, or to any other items incorporated into the Contract shall hereinafter be referred to as "the Contract".

C. WHEREAS, it is one of the conditions precedent to the final award of the Contract that these presents be executed.

D. NOW, THEREFORE, during the original term of said Contract, during any extensions thereto that may be granted by the Administration, and during the guarantee and warranty period, if any, required under the Contract, unless otherwise stated therein, this Performance Bond shall remain in full force and effect unless and until the following terms and conditions are met:

1. Principal shall well and truly perform the Contract; and

2. Principal and Surety shall comply with the terms and conditions contained in this Performance Bond.

E. Whenever Principal shall be declared by the Administration to be in default under the Contract, the Surety may, within fifteen (15) days after notice of default from the Administration, notify the Administration of its election to either promptly proceed to remedy the default or promptly proceed to complete the Contract in accordance with and subject to its terms and conditions. In the event the Surety

does not elect to exercise either of the above stated options, then the Administration thereupon shall have the remaining Contract work completed, Surety to remain liable hereunder for all expenses of completion up to but not exceeding the penal sum state above.

F. The Surety hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligations on this Performance Bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the work or to the Specifications.

G. This Performance Bond shall be governed by and construed in accordance with the laws of the State of Maryland and any reference herein to Principal or Surety in the singular shall include all entities in the plural who or which are signatories under the Principal or Surety heading below.

H. IN WITNESS WHEREOF, Principal and Surety have set their hands and seals to this Performance Bond. If any individual is a signatory under the Principal heading below, then each such individual has signed below on his or her own behalf, has set forth below the name of the firm, if any, in whose name he or she is doing business, and has set forth below his or her title as a sole proprietor. If any partnership or joint venture is a signatory under the Principal heading below, then all members of each such partnership or joint venture have signed below, each member has set forth below the name of the partnership or joint venture, and each member has set forth below his or her title as a general partner, limited partner, or member of joint venture, whichever is applicable.

I. If any corporation is a signatory under the Principal or Surety heading below, then each such corporation has caused the following: the corporation's name to be set forth below, a duly authorized representative of the corporation to affix below the corporation's seal and to attach hereto a notarized corporate resolution or power of attorney authorizing such action, and each such duly authorized representative to sign below and to set forth below his or her title as a representative of the corporation. If any individual acts as a witness to any signature below, then each such individual has signed below and has set forth below his or her title as a witness. All of the above has been done as of the date of bond shown above.

In Presence of:
Witness:

Individual Principal

_____ as to _____ (Seal)

In Presence of:
Witness:

Co-Partnership Principal

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

Corporate Principal

Attest:

James J. Intrys
Corporate Secretary

IA CONSTRUCTION CORPORATION (Seal)
Name of Corporation

By:
President ROBERT S. FIELD

Affix Corporate Seal

Attest:

Julianne R. DeVita (Seal)
Signature Julianne R. DeVita

Willis Corroon Corporation of PA
Bonding Agent's Name

P.O. Box 9052, Radnor, PA 19087-9052
Agent's Address

COUNTERSIGNED BY:

Brian D. O'Rourke/Maryland Resident Agent

LIBERTY MUTUAL INSURANCE COMPANY
Name of Surety

Wendy Lee Wadkins
Signature of Surety

Affix Corporate Seal

WENDY LEE WADKINS/ATTORNEY-IN-FACT
Title

600 W. Germantown Pike, Suite 300
Business Address of Surety

Plymouth Meeting, Pennsylvania 19462

Maryland Aviation Administration

Approved as to Legal Form and Sufficiency:

this 4th day of September, 19 98

Joy R. Nakamoto-Wengel
Assistant Attorney General

Liberty Mutual Insurance Company
Statutory Balance Sheet
(dollars in thousands)

Assets	December 31, 1997
Bonds	11,609,662
Common & Preferred Stocks	4,446,583
Real Estate	128,301
Cash & Short-Term Investments	242,970
Other Invested Assets	271,268
Subtotal Cash and Invested Assets	16,698,784
Premium in Course of Collection*	1,521,916
Reinsurance Recoverables on Loss and Loss Adjustment Expense Payments	183,530
Interest, Dividends and Real Estate Income Due and Accrued	168,557
Other Assets	779,394
TOTAL ADMITTED ASSETS	19,352,181

Liabilities and Surplus	
Reserve for Losses and Loss Adjustment Expenses	*10,208,483
Reserve for Unearned Premiums	1,629,832
Reinsurance Payable on Paid Loss and Loss Adjustment Expenses	36,194
Federal Income Tax and State Premium Tax Accrued	91,774
Other Liabilities	1,319,565
TOTAL LIABILITIES	13,285,848
Unassigned Surplus	4,924,567
Guaranty Funds	1,250
Surplus Notes	1,140,516
TOTAL SURPLUS	6,066,333
TOTAL LIABILITIES AND SURPLUS	19,352,181

(*Excludes premiums more than 90 days due)

COMMONWEALTH OF MASSACHUSETTS

SS:

COUNTY OF SUFFOLK

Dennis Langwell, being duly sworn, says: That he is Vice President and Comptroller of Liberty Mutual Insurance Company; that said Company is a mutual insurance company duly organized, existing and engaged in business as a surety by virtue of the laws of the Commonwealth of Massachusetts and has duly complied with all the requirements of the laws of said Commonwealth and of the laws of the State of _____ applicable to said Company and is duly qualified to act as surety under such laws; that said Company has also complied with and is duly qualified to act as surety on federal bonds under Section 9305 of Title 31 of the United States Code.

That the foregoing is a full, true and correct statement of the financial condition of said Company an the 31st day December, 1997.

Sworn to before me this 31st day of March, 1998

Patricia Smith

My Commission Expires Dec. 19, 2003

Dennis J. Langwell

Vice President and Comptroller

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND. 426056

This Power of Attorney limits the act of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

LIBERTY MUTUAL INSURANCE COMPANY
BOSTON, MASSACHUSETTS

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS: That **Liberty Mutual Insurance Company** (the "Company"), a Massachusetts mutual insurance company, pursuant to and by authority of the By-law and Authorization hereinafter set forth, does hereby name, constitute and appoint, **JOHN K. JOHNSON, WENDY LEE WADKINS, KAREN E. HEIN, ALL OF THE CITY OF RADNOR, STATE OF PENNSYLVANIA**

, each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations in the penal sum not exceeding **FIFTY MILLION**********DOLLARS ($ **50,000,000**********) each, and the execution of such bonds or undertakings, in pursuance of these presents, shall be as binding upon the Company as if they had been duly signed by the president and attested by the secretary of the Company in their own proper persons.

That this power is made and executed pursuant to and by authority of the following By-law and Authorization:

ARTICLE XVI - Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer or other official of the company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the company by their signature and execution of any such instruments and to attach thereto the seal of the company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

By the following instrument the chairman or the president has authorized the officer or other official named therein to appoint attorneys-in-fact:

Pursuant to Article XVI, Section 5 of the By-laws, Assistant Secretary Garnet W. Elliott is hereby authorized to appoint such attorneys-in-fact as may be necessary to act in behalf of the company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

the By-law and the Authorization above set forth are true copies thereof and are now in full force and effect.

IN WITNESS WHEREOF, this instrument has been subscribed by its authorized officer and the corporate seal of the said Liberty Mutual Insurance Company has been affixed thereto in Plymouth Meeting, Pennsylvania this 21st day of January, 19 98.

LIBERTY MUTUAL INSURANCE COMPANY

By Garnet W. Elliott
Garnet W. Elliott, Assistant Secretary

COMMONWEALTH OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 21st day of January A.D. 19 98, before me, a Notary Public, personally came the individual, known to me to be the therein described individual and officer of Liberty Mutual Insurance Company who executed the preceding instrument, and he acknowledged that he executed the same and that the seal affixed to the said preceding instrument is the corporate seal of said company; and that said corporate seal and his signature subscribed thereto was duly affixed and subscribed to the said instrument by authority and direction of the said company.

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my official seal at Plymouth Meeting, PA, the day and year first above written.

NOTARIAL SEAL
DONNA E. SHIELDS, Notary Public
City of Philadelphia, Phila. County
My Commission Expires Feb. 8, 2001

Donna E. Shields
Notary Public

CERTIFICATE

I, the undersigned, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy, is in full force and effect on the date of this certificate; and I do further certify that the officer who executed the said power of attorney was one of the officers specially authorized by the chairman or the president to appoint any attorney-in-fact as provided in Article XVI, Section 5 of the By-laws of Liberty Mutual Insurance Company.

This certificate may be signed by facsimile under and by authority of the following vote of the board of directors of Liberty Mutual Insurance Company at a meeting duly called and held on the 12th day of March, 1980.

VOTED that the facsimile or mechanically reproduced signature of any assistant secretary of the company wherever appearing upon a certified copy of any power of attorney issued by the company, shall be valid and binding upon the company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the said company, this 28th day of August, 19 98.

Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER December 31, 19 99.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.

CONTRACT AFFIDAVIT

A. AUTHORIZED REPRESENTATIVE

I HEREBY AFFIRM THAT:

I am the PRESIDENT
(title)
and the duly authorized representative of IA CONSTRUCTION CORPORATION
(firm)
and that I posses the legal authority to make this Affidavit on behalf of myself and the business for which I am acting.

B. CERTIFICATION OF CORPORATION REGISTRATION AND TAX PAYMENT

I FURTHER AFFIRM THAT:

1. The business named above is a domestic _____ foreign XX corporation registered in accordance with the Corporations and Associations Article, Annotated Code of Maryland, and that it is in good standing and has filed all of its annual reports, together with filing fees, with Maryland State Department of Assessments and Taxation, and that the name and address of its resident agent filed with the State Department of Assessments and Taxation is:

   Name: CSC

   Address: 11 EAST CHASE STREET, BALTIMORE, MD. 21202

2. Except as validly contested, the business has paid, or has arranged for payment of, all taxes due the State of Maryland and has filed all required returns and reports with the Comptroller of the Treasury, the State Department of Assessments and Taxation, and the Employment Security Administration, as applicable, and will have paid all withholding taxes due the State of Maryland prior to final settlement.

C. CERTAIN AFFIRMATIONS VALID

I FURTHER AFFIRM THAT:

To the best of my knowledge, information, and belief, each of the affirmations,

certifications, or acknowledgements contained in that certain Bid/Proposal Affidavit, dated MAY 28, 19 98, and executed by me for the purpose of obtaining the Contract to which this Affidavit is attached remains true and correct in all respects as if made as of the date of this Contract Affidavit and as if fully set forth herein.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THIS AFFIDAVIT ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF.

August 31,1998
Date

Affiant Robert S. Field, President

State of Pennsylvania

County (City) of Delaware

On this 31st day of August, 19 98

before me, Marie M. Kent, the undersigned officer,
Notary

personally appeared Robert S. Field, known to me to be the
Contractor

person described in the foregoing Affidavit and acknowledged that he/she executed the same in the capacity therein stated and for the purposes therein contained. In witness whereof, I hereunto set my hand and official seal.

Notarial Seal
Marie M. Kent, Notary Public
Chadds Ford Twp., Delaware County
My Commission Expires Aug. 29, 2002
Member, Pennsylvania Association of Notaries

Marie M Kent (Seal) My Commission Expires
Signature Date

MARYLAND DEPARTMENT OF TRANSPORTATION
SCHEDULE FOR PARTICIPATION OF MINORITY BUSINESS ENTERPRISES

PRIME CONTRACTOR — NAME OF FIRM — ADDRESS (Number, Street, City, State, Zip) TELEPHONE: Area Code (410 335-0391
A Construction Corp PO Box 210 White Marsh, MD 21162

2. PROJECT LOCATION (Number, Street, City, State, Zip)
Martin State Airport - Midfield Terminal Complex Site Development

PROJECT NUMBER: MAA-CO-97-019

4. TOTAL CONTRACT DOLLAR AMOUNT: $ 5,167,567.61

5. LIST THE DATA REQUESTED FOR EACH MINORITY FIRM INVOLVED IN THIS PROJECT:

a. MINORITY FIRM: Stella May Contracting Inc 1512 Edgewood Rd Edgewood MD 21040
(Name of Firm) (Number) (Street) (City) (State) (Zip)

Work or Service to be performed: Furnish and Install Water and Sanitary Sewer Lines and Structures

Project Commitment Date: NTP Project Completion Date: 260 Calendar Days

Agreed Dollar Amount: $ 827,682.00 Percentage of Total Contract: 16.0 %

b. MINORITY FIRM: _____
(Name of Firm) (Number) (Street) (City) (State) (Zip)

Work or Service to be performed:

Project Commitment Date: Project Completion Date:

Agreed Dollar Amount: $ _____ Percentage of Total Contract: _____ %

c. MINORITY FIRM: _____
(Name of Firm) (Number) (Street) (City) (State) (Zip)

Work or Service to be performed:

Project Commitment Date: Project Completion Date:

Agreed Dollar Amount: $ _____ Percentage of Total Contract: _____ %

d. MINORITY FIRM: _____
(Name of Firm) (Number) (Street) (City) (State) (Zip)

Work or Service to be performed:

Project Commitment Date: Project Completion Date:

Agreed Dollar Amount: $ _____ Percentage of Total Contract: _____ %

e. MINORITY FIRM: _____
(Name of Firm) (Number) (Street) (City) (State) (Zip)

Work or Service to be performed:

Project Commitment Date: Project Completion Date:

Agreed Dollar Amount: $ _____ Percentage of Total Contract: _____ %

6. MINORITY FIRMS TOTAL DOLLAR AMOUNT: $ 827,682.00 MINORITY FIRMS TOTAL PERCENTAGE 16.0 %

REMARKS (Use Plain Bond for Additional Comments)
N/A

DO NOT WRITE BELOW THIS LINE — **MBE MDOT USE ONLY**

8. THIS FORM PREPARED BY:
(First) (Middle Initial) (Last) (Title)

9. APPROVED: X YES ☐ NO

12-2-1998
DATE

Erika D Gardner MAA
SIGNATURE — ADMINISTRATION — MINORITY BUSINESS ENTERPRISE OFFICER

NOTE: If the Minority Contractor Project Disclosure and Participation Statement is submitted after Bid opening, a copy of the conditional contract with each Minority Business Enterprise must be submitted with the statement and schedule for participation.

FORM D-EEO-003 (July 1995) ADMINISTRATION COPY

RETURN TO:
Minority Business Enterprise Office
Maryland Department of Transportation
P.O. Box 8755
Baltimore-Washington Int'l Airport, Md. 21240
(410) 859-7327

MARYLAND DEPARTMENT OF TRANSPORTATION

If any item does not apply, please mark "N/A"

MINORITY CONTRACTOR PROJECT DISCLOSURE AND PARTICIPATION STATEMENT

1. PRIME CONTRACTOR – NAME OF FIRM – COMPLETE ADDRESS
STELLA MAY CONTRACTING, INC.
1512 EDGEWOOD ROAD
EDGEWOOD, MD 21040

2. PROJECT NUMBER: MAA-CO-97-019

3. PROJECT LOCATION (Number, Street, City, State, Zip)
MARTIN STATE AIRPORT

4. PROJECT COMMITMENT DATE: NTP

5. SUBCONTRACTOR ENTERPRISE (Check one)
☐ Individual ☐ Partnership ☒ Corporation ☐ Joint Venture

6. THE UNDERSIGNED SUBCONTRACTOR IS PREPARED TO PERFORM THE WORK/SERVICE HEREIN DESCRIBED IN CONNECTION WITH THE PROJECT

WORK OR SERVICE	Commitment Date	Completion Date
FURNISH AND INSTALL WATER AND SANITARY SEWER LINES AND STRUCTURES	NTP	260 CALENDAR DAYS

This work/service will not be subcontracted to any non-minority firm.

BID PRICE FOR THIS WORK/SERVICE: $ 827,682.00

7. SOURCE AND AMOUNT OF WORKING CAPITAL

SOURCE	AMOUNT	REMARKS
Line of Credit and Cash On Hand	100,000.00	

8. SUBCONTRACTOR'S SUPERVISION STAFF TO INCLUDE FOREMEN (Name, Address, Social Security Number, Title)
Thomas R. Phillips 3100 Scarboro Rd. Street, MD 149-40-7763 Foreman

9. BONDS – AMOUNT AND TYPE REQUIRED BY PRIME CONTRACTOR
N/A

10. BONDING COMPANY – NAME AND ADDRESS
N/A

11. BONDS GUARANTEED BY THIRD PARTY ☐ YES ☐ NO IF YES – NAME AND ADDRESS
N/A

12. DOLLAR AMOUNT OF THIS PROJECT ALLOCATED FOR MATERIAL PURCHASES. $ 380,000

13. PERCENTAGE OF WORK PERFORMED BY OTHER THAN OWN WORK SOURCE (Include Name of Company and Address): 0 %
(Use back if necessary)

14. STATE THE TERMS OF ANY ORAL OR WRITTEN AGREEMENT(S) OR UNDERSTANDING(S) WITH NON-MINORITY PERSONS OR FIRMS RELATING TO ASSISTANCE, FINANCIAL OR OTHERWISE, TO BE PROVIDED BY SAID PERSONS OR FIRMS.
N/A

THE UNDERSIGNED SUBCONTRACTOR WILL ENTER INTO A WRITTEN CONTRACT WITH: IA CONSTRUCTION CORPORATION FOR THE WORK/SERVICE INDICATED ABOVE UPON THE PRIME CONTRACTOR'S EXECUTION OF A CONTRACT WITH THE MARYLAND DEPARTMENT OF TRANSPORTATION. THE UNDERSIGNED SUBCONTRACTOR IS CERTIFIED BY THE MARYLAND DEPARTMENT OF TRANSPORTATION AS A MINORITY BUSINESS ENTERPRISE, AS OF (DATE) 12-1-97

Stella M. Milan
SIGNATURE SUBCONTRACTOR

STELLA MAY CONTRACTING, INC.
PRINT/TYPE NAME OF FIRM

1512 EDGEWOOD ROAD
NUMBER STREET

EDGEWOOD, MD 21040 8/28/98
CITY STATE ZIP DATE

I AGREE TO THE TERMS AND CONDITIONS STATED ABOVE

Approved Sept. 2, 1998
Erika D Gardner, MAA

SIGNATURE PRIME CONTRACTOR

IA CONSTRUCTION CORPORATION
PRINT/TYPE NAME OR FIRM

PO BOX 210 10711 PHILADELPHIA RD
NUMER STREET

WHITE MARSH, MD 21162 8/28/98
CITY STATE ZIP DATE

FORM D-EEO-004 (July 1995)

ADMINISTRATION COPY

ESCROW ACCOUNTS FOR RETAINED FUNDS

Contractor: IA CONSTRUCTION CORPORATION

Contractor's Identification Number: 23-2224715

The Contractor is given the option of selecting an escrow agent for retained funds on this Contract.

_____ Escrow option not selected.

XX Escrow option selected.

Escrow Agent Name: FMB Trust Company, National Association

Escrow Agent Address: 25 S. Charles Street, 101-591, Baltimore, MD 21201

Name of Account Manager: Lisa Pedzich

Account Number: 74349

Surety Name: LIBERTY MUTUAL INSURANCE COMPANY

Surety Address: 600 W. GERMANTOWN PIKE, SUITE 300, PLYMOUTH MEETING, PA 19462

A. The selection of an option must be exercised on this form at the time of signing the Contract.

B. If a Contractor elects to utilize the escrow account procedure described in this section, the Contractor shall indicate the election in the space provided. If the Contractor fails to indicate an election or then refuses the election, the Contractor shall forfeit rights to the use of the escrow account.

C. In a Department of Transportation or Maryland Transportation authority construction or reconstruction contract, in order to have retained funds paid to an escrow agent, a Contractor, the Contractor's escrow agent, and the Contractor's surety must execute an escrow agreement form to be submitted to the Department of Transportation or the Maryland Transportation authority for approval.

A. ESCROW AGREEMENT:

1. THIS AGREEMENT (The "Agreement") made and entered into pursuant to Section 15-108, State Finance and Procurement Article Annotated Code of Maryland, by, between and among the Maryland Aviation Administration an agency of the Department of Transportation; ("MAA"), and

IA CONSTRUCTION CORPORATION
Name of Contractor located at

P.O. BOX 210, WHITEMARSH, MD 21162
Address of Contractor ("CONTRACTOR") and

FMB Trust Company, National Association
Bank or Trust Company located at

25 S. Charles Street, 101-591, Baltimore, MD 21201
Address of Bank or Trust Company

2. A Maryland financial institution having trust powers and its principal place of business in the State of Maryland and insured by an Agency or instrumentality of the Federal Government, hereinafter called "ESCROW AGENT", and

LIBERTY MUTUAL INSURANCE COMPANY
Name of Surety located at

600 W. GERMANTOWN PIKE, SUITE 300, PLYMOUTH MEETING, PA 19462
address of surety ("SURETY")

3. The MAA and the CONTRACTOR have entered into a contract with respect to the Maryland Aviation Administration

Contract Number: MAA - CO - 97-019

Contract Title: Midfield Terminal Complex - Martin State Airport

4. Pursuant to the Contract and the general laws of the State of Maryland, certain sums otherwise due to the CONTRACTOR are to be retained by MAA to insure full and satisfactory completion of the Contract by the CONTRACTOR.

B. The CONTRACTOR hereby exercises the option of selecting an ESCROW AGENT for funds retained by MAA under the Contract, in accordance with Section 15-108 of the State Finance and Procurement Article of the Annotated Code of Maryland and selects ESCROW AGENT.

1. In consideration of the covenants and conditions herein set forth the parties of this Agreement agree as follows:

a. That this Agreement neither amends nor modifies, the Contract.

b. That the CONTRACTOR hereby assigns to the ESCROW AGENT its right to receive the sums of money retained by the Maryland Aviation Administration pursuant to GP-9.03 of the General Provisions of the Standard Provisions for Construction Contracts ("hereinafter GP-9.03"), and any revisions thereto.

c. The ESCROW AGENT hereby agrees to deposit and maintain the amounts of money received pursuant to this Agreement into an interest bearing account. The ESCROW AGENT shall provide a monthly statement showing all account transactions to: Manager, Accounting Section, Maryland Aviation Administration, P.O. Box 8766, Baltimore/Washington International Airport 21240-0766.

d. MAA agrees to pay to the ESCROW AGENT all monies retained under GP-9.03, unless

(1) the Contract involves a federally funded project, and the application of Section 13-1106 would jeopardize timely recovery of federal funds, or

(2) MAA withholds such funds for lack of progress or other CONTRACTOR violations.

e. Interest on retained amounts deposited with the ESCROW AGENT shall be payable to CONTRACTOR only in accordance with directions provided by MAA.

f. The form of the account used shall be as agreed by CONTRACTOR and ESCROW AGENT, provided however, that no form of account shall be used which could, under any circumstances, result in a loss or diminution of any part of the principal, if any portion of the retained amounts or interest thereon was withdrawn or paid prior to the maturity date for the deposit.

g. Any service charge or fee assessed to the account shall be paid by the CONTRACTOR and cannot be deducted from the principal.

h. ESCROW AGENT may

(1) invest the funds paid into the account only in approved securities specified in Paragraphs i. and j. hereof.

(2) pay earnings on the investments to Contractor to the extent the Contractor is entitled to such amounts under Paragraph e. of this Agreement.

i. That the following securities, and none other, are approved securities for all purposes of this agreement.

(1) United States Treasury Bonds, United States Treasury Notes, United States Treasury Certificates of Indebtedness or United States Treasury Bills.

(2) Bonds, notes and other evidences of indebtedness unconditionally guaranteed as to the payment of principal and interest by the United States.

(3) Bonds or notes of the State of Maryland.

(4) Bonds of any political subdivision of the State of Maryland, if such bonds carried a Standard and Poor's or Moody's Investors Service Rating of "A" or better on the later of

(a) the date of purchase of such security by the ESCROW AGENT, or

(b) the date of payment to the ESCROW AGENT of funds used to purchase such bonds.

(5) Certificates of deposit issued by federally insured financial institutions located within the State of Maryland.

j. No security is approved which matures later than the anticipated final payment under:

Contract Number: MAA - CO - 97-019

Contract Title: Midfield Terminal Complex - Martin State Airport

k. The risk of loss or diminution of the principal of any funds invested under the terms of this Agreement shall be solely upon the CONTRACTOR.

l. CONTRACTOR agrees that it will not assign, pledge, discount, sell or otherwise transfer or dispose of its interest in the retained amounts or any part thereof, except to SURETY.

m. The ESCROW AGENT may release the retained amounts only as directed by MAA in accordance with Section 15-108 of the State Finance and Procurement Article of the Annotated Code of Maryland, and shall be fully liable to MAA for any funds which ESCROW AGENT held pursuant to this Agreement and which are released in the absence of, or in derogation of, MAA instructions.

n. At the time of final payment, in the event any sums of monies are paid to the Department of Transportation or MAA pursuant to Section 15-108 of the State Finance and Procurement Article of the Annotated Code of Maryland, such monies shall include a pro-rata share of the interest accrued as of the date of the final payments.

C. This Agreement shall be governed by the laws of the State of Maryland and shall not be binding on any party hereto until and unless executed by all parties hereto.

Executed by CONTRACTOR at Whitemarsh

Maryland, this 28tth day of August, 19 98.

IA CONSTRUCTION CORPORATION
Contractor

Signature

ROBERT S. FIELD
PRESIDENT
Title

Executed by ESCROW AGENT at Baltimore

Maryland, this 1st day of September, 19 98.

Escrow Agent: FMB Trust Company, National Associatin

Signature

Vice President
Title

Executed by SURETY at Radnor, Pennsylvania

Maryland, this 28th day of August, 19 98.

Surety: LIBERTY MUTUAL INSURANCE COMPANY

Signature

WENDY LEE WADKINS/ATTORNEY-IN-FACT
Title

Executed by MARYLAND AVIATION ADMINISTRATION at Bwi Airport

Maryland, this 4th day of September, 19 98.

Approved as to Form and Legal Sufficiency

ASSISTANT ATTORNEY GENERAL

By: Joy R. Yamamoto-Wengel Date: 9/4/98

EXECUTIVE DIRECTOR

By: Theodore C. Mathias Date: 9/4/98

Liberty Mutual Insurance Company
Statutory Balance Sheet
(dollars in thousands)

Assets	December 31, 1997
Bonds	11,609,662
Common & Preferred Stocks	4,446,583
Real Estate	128,301
Cash & Short-Term Investments	242,970
Other Invested Assets	271,268
Subtotal Cash and Invested Assets	16,698,784
Premium in Course of Collection*	1,521,916
Reinsurance Recoverables on Loss and Loss Adjustment Expense Payments	183,530
Interest, Dividends and Real Estate Income Due and Accrued	168,557
Other Assets	779,394
TOTAL ADMITTED ASSETS	19,352,181

Liabilities and Surplus	
Reserve for Losses and Loss Adjustment Expenses	10,208,483
Reserve for Unearned Premiums	1,629,832
Reinsurance Payable on Paid Loss and Loss Adjustment Expenses	36,194
Federal Income Tax and State Premium Tax Accrued	91,774
Other Liabilities	1,319,565
TOTAL LIABILITIES	13,285,848
Unassigned Surplus	4,924,567
Guaranty Funds	1,250
Surplus Notes	1,140,516
TOTAL SURPLUS	6,066,333
TOTAL LIABILITIES AND SURPLUS	19,352,181

(*Excludes premiums more than 90 days due)

COMMONWEALTH OF MASSACHUSETTS

SS:

COUNTY OF SUFFOLK

Dennis Langwell, being duly sworn, says: That he is Vice President and Comptroller of Liberty Mutual Insurance Company; that said Company is a mutual insurance company duly organized, existing and engaged in business as a surety by virtue of the laws of the Commonwealth of Massachusetts and has duly complied with all the requirements of the laws of said Commonwealth and of the laws of the State of _____ applicable to said Company and is duly qualified to act as surety under such laws; that said Company has also complied with and is duly qualified to act as surety on federal bonds under Section 9305 of Title 31 of the United States Code.

That the foregoing is a full, true and correct statement of the financial condition of said Company an the 31st day December, 1997.

Sworn to before me this 31st day of March, 1998

Patricia Smith

My Commission Expires Jan. 19, 2001

Vice President and Comptroller

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND. 426055

This Power of Attorney limits the act of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

LIBERTY MUTUAL INSURANCE COMPANY
BOSTON, MASSACHUSETTS

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS: That **Liberty Mutual Insurance Company** (the "Company"), a Massachusetts mutual insurance company, pursuant to and by authority of the By-law and Authorization hereinafter set forth, does hereby name, constitute and appoint, **JOHN K. JOHNSON, WENDY LEE WADKINS, KAREN E. HEIN, ALL OF THE CITY OF RADNOR, STATE OF PENNSYLVANIA** .....

, each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations in the penal sum not exceeding **FIFTY MILLION**********_____DOLLARS ($ **50,000,000**********) each, and the execution of such bonds or undertakings, in pursuance of these presents, shall be as binding upon the Company as if they had been duly signed by the president and attested by the secretary of the Company in their own proper persons.

That this power is made and executed pursuant to and by authority of the following By-law and Authorization:

ARTICLE XVI - Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer or other official of the company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the company by their signature and execution of any such instruments and to attach thereto the seal of the company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

By the following instrument the chairman or the president has authorized the officer or other official named therein to appoint attorneys-in-fact:

Pursuant to Article XVI, Section 5 of the By-laws, Assistant Secretary Garnet W. Elliott is hereby authorized to appoint such attorneys-in-fact as may be necessary to act in behalf of the company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

t the By-law and the Authorization above set forth are true copies thereof and are now in full force and effect.

N WITNESS WHEREOF, this instrument has been subscribed by its authorized officer and the corporate seal of the said Liberty Mutual Insurance Company has been affixed thereto in Plymouth Meeting, Pennsylvania this 21st day of January, 19 98.

LIBERTY MUTUAL INSURANCE COMPANY

By Garnet W. Elliott
Garnet W. Elliott, Assistant Secretary

COMMONWEALTH OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 21st day of January, A.D. 19 98, before me, a Notary Public, personally came the individual, known to me to be the therein described individual and officer of Liberty Mutual Insurance Company who executed the preceding instrument, and he acknowledged that he executed the same and that the seal affixed to the said preceding instrument is the corporate seal of said company; and that said corporate seal and his signature subscribed thereto was duly affixed and subscribed to the said instrument by authority and direction of the said company.

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my official seal at Plymouth Meeting, PA, the day and year first above written.

Donna E. Shields
Notary Public

CERTIFICATE

I, the undersigned, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy, is in full force and effect on the date of this certificate; and I do further certify that the officer who executed the said power of attorney was one of the officers specially authorized by the chairman or the president to appoint any attorney-in-fact as provided in Article XVI, Section 5 of the By-laws of Liberty Mutual Insurance Company.

This certificate may be signed by facsimile under and by authority of the following vote of the board of directors of Liberty Mutual Insurance Company at a meeting duly called and held on the 12th day of March, 1980.

VOTED that the facsimile or mechanically reproduced signature of any assistant secretary of the company wherever appearing upon a certified copy of any power of attorney issued by the company, shall be valid and binding upon the company with the same force and effect as though manually affixed.

TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the said company, this 28th day of August, 19 98.

Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER December 31, 19 99.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day

Certificate of Insurance

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON YOU THE CERTIFICATE HOLDER. THIS CERTIFICATE IS NOT AN INSURANCE POLICY AND DOES NOT AMEND, EXTEND, OR ALTER THE COVERAGE AFFORDED BY THE POLICIES LISTED BELOW.

This is to Certify that

[redacted] Construction Corp.
[redacted] P.O. Box 8
Concordville, PA 19931
D#6

← Name and address of Insured.

LIBERTY MUTUAL®

Is, at the issue date of this certificate, insured by the Company under the policy(ies) listed below. The insurance afforded by the listed policy(ies) is subject to all their terms, exclusions and conditions and is not altered by any requirement, term or condition of any contract or other document with respect to which this certificate may be issued.

TYPE OF POLICY	EXP. DATE ☐ CONTINUOUS ☐ EXTENDED ☒ POLICY TERM	POLICY NUMBER	LIMIT OF LIABILITY	
WORKERS COMPENSATION	4-1-99	WC2-131-004090-418	COVERAGE AFFORDED UNDER WC LAW OF THE FOLLOWING STATES: DE,MD,NJ,NY,PA,VA	**EMPLOYERS LIABILITY** Bodily Injury By Accident $500,000 Each Accident Bodily Injury By Disease $500,000 Policy Limit Bodily Injury By Disease $500,000 Each Person
GENERAL LIABILITY ☒ OCCURRENCE ☐ CLAIMS MADE [redacted]	4-1-99 RETRO DATE	RG2-131-004090-428 **	General Aggregate - Other than Products/Completed Operations $3,000,000 Products/Completed Operations Aggregate $3,000,000 Bodily Injury and Property Damage Liability $2,000,000 Per Occurrence Personal Injury Included Above Per Person/ Organization Other	Other
AUTOMOBILE LIABILITY ☒ OWNED ☒ NON-OWNED ☒ HIRED	4-1-99	AS2-131-004090-428 **	$2,000,000 Each Accident - Single Limit B.I. and P.D. Combined Each Person Each Accident or Occurrence Each Accident or Occurrence	
OTHER				

**MARYLAND AVIATION ADMINSTRATION AND ITS EMPLOYEES ARE INCLUDED AS ADDITONAL INSURED WITH RESPECT TO THE OPERATIONS OF THE NAMED INSURED ON THIS PROJECT.

ADDITIONAL COMMENTS

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT -- MARTIN STATE AIRPORT
CONTRACT No. MAA-CO-97-019

* If the certificate expiration date is continuous or extended term, you will be notified if coverage is terminated or reduced before the certificate expiration date.

SPECIAL NOTICE-OHIO: ANY PERSON WHO, WITH INTENT TO DEFRAUD OR KNOWING THAT HE IS FACILITATING A FRAUD AGAINST AN INSURER, SUBMITS AN APPLICATION OR FILES A CLAIM CONTAINING A FALSE OR DECEPTIVE STATEMENT IS GUILTY OF INSURANCE FRAUD.

IMPORTANT NOTICE TO FLORIDA POLICYHOLDERS AND CERTIFICATE HOLDERS: IN THE EVENT YOU HAVE ANY QUESTIONS OR NEED INFORMATION ABOUT THIS CERTIFICATE FOR ANY REASON, PLEASE CONTACT YOUR LOCAL SALES PRODUCER, **WHOSE NAME AND TELEPHONE NUMBER APPEARS IN THE LOWER RIGHT HAND CORNER OF THIS CERTIFICATE.** THE APPROPRIATE LOCAL SALES OFFICE MAILING ADDRESS MAY ALSO BE OBTAINED BY CALLING THIS NUMBER.

NOTICE OF CANCELLATION: (NOT APPLICABLE UNLESS A NUMBER OF DAYS IS ENTERED BELOW.) BEFORE THE STATED EXPIRATION DATE THE COMPANY WILL NOT CANCEL OR REDUCE THE INSURANCE AFFORDED UNDER THE ABOVE POLICIES UNTIL AT LEAST 30 DAYS NOTICE OF SUCH CANCELLATION HAS BEEN MAILED TO:

CERTIFICATE HOLDER

MARYLAND AVIATION ADMINISTRATION
P. O. BOX 8766
BWI AIRPORT, MD 21240-0766

28 AUGUST 1998

360

Liberty Mutual Group

Christine Wuslich
AUTHORIZED REPRESENTATIVE

Rockville, Md. (973) 740-9400
OFFICE PHONE NUMBER DATE ISSUED

BS772A R12

This certificate is executed by LIBERTY MUTUAL GROUP as respects such insurance as is afforded by Those Companies

BS 772L R2

J&H MARSH & MCLENNAN, INC.

CERTIFICATE OF INSURANCE

CERTIFICATE NUMBER: # 58551

PRODUCER

J&H Marsh & McLennan, Inc.
44 Whippany Road
P. O. Box 1966
Morristown, NJ 07962-1966

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER OTHER THAN THOSE PROVIDED IN THE POLICY. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES LISTED HEREIN.

COMPANIES AFFORDING COVERAGE

COMPANY LETTER	A AMERICAN NATIONAL FIRE
COMPANY LETTER	B
COMPANY LETTER	C
COMPANY LETTER	D

INSURED

IA Holdings #2
P. O. Box 8
Route 202 South
Concordville, PA 19331

D#6

COVERAGES

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE LISTED HEREIN HAVE BEEN ISSUED TO THE INSURED NAMED HEREIN FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THE CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES LISTED HEREIN IS SUBJECT TO ALL THE TERMS, CONDITIONS AND EXCLUSIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

CO LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	GENERAL LIABILITY				GENERAL AGGREGATE	$
	☐ COMMERCIAL GENERAL LIABILITY				PRODUCTS-COMP/OP AGG	$
	☐ CLAIMS MADE ☐ OCCUR.				PERSONAL & ADV INJURY	$
	OWNER'S CONTRACTOR'S PROT.				EACH OCCURRENCE	$
					FIRE DAMAGE (Any one fire)	$
					MED. EXPENSE (Any one person)	$
	AUTOMOBILE LIABILITY				COMBINED SINGLE LIMIT	$
	☐ ANY AUTO				BODILY INJURY (Per person)	$
	☐ ALL OWNED AUTOS				BODILY INJURY (Per accident)	$
	☐ SCHEDULED AUTOS				PROPERTY DAMAGE	$
	☐ HIRED AUTOS					
	☐ NON-OWNED AUTOS					
	GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
	☐ ANY AUTO				OTHER THAN AUTO ONLY	
					EACH ACCIDENT	$
					AGGREGATE	$
A	EXCESS LIABILITY	TUU 903-58-12-01	4/01/98	4/01/99	EACH OCCURRENCE	$ 10000000
	☐ UMBRELLA FORM				AGGREGATE	$ 10000000
	☐ OTHER THAN UMBRELLA FORM					
	WORKERS' COMPENSATION AND EMPLOYERS LIABILITY				STATUTORY LIMITS	
					EACH ACCIDENT	$
					DISEASE - POLICY LIMIT	$
					DISEASE - EACH EMPLOYEE	$
	OTHER					

MARYLAND AVIATION ADMINISTRATION AND ITS EMPLOYEES ARE INCLUDED AS ADDITIONAL INSURED WITH RESPECT TO THE OPERATIONS OF THE NAMED INSURED ON THIS PROJECT.

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/SPECIAL ITEMS

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT -- MARTIN STATE AIRPORT
CONTRACT No. MAA-CO-97-019

CERTIFICATE HOLDER

MARYLAND AVIATION ADMINISTRATION
P. O. BOX 8766
BWI AIRPORT, MD 21240-0766
28 AUGUST 1998

CANCELLATION

SHOULD ANY OF THE POLICIES LISTED HEREIN BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE INSURER AFFORDING COVERAGE WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED HEREIN, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER AFFORDING COVERAGE, ITS AGENTS OR REPRESENTATIVES, OR THE ISSUER OF THIS CERTIFICATE.

J&H MARSH & MCLENNAN, INCORPORATED
BY: William E. Lyons

MMI 1 (6/95) VALID AS OF: 3/31/98

SECTION 1
BID BOND

NOTE: THIS BID BOND IS NOT REQUIRED IF THE TOTAL CONTRACT PRICE IS LESS THAN ONE HUNDRED THOUSAND DOLLARS ($100,000).

Bond Number: 425932

A. KNOW ALL MEN BY THESE PRESENTS, that we **IA CONSTRUCTION CORPORATION**
Bidding Company

as Principal, hereinafter called the Principal, and Liberty Mutual Insurance Company
Bonding Company

a corporation duly organized under the laws of the State of: Massachusetts
Name of State

as Surety, hereinafter called the Surety, are held and firmly bound unto the State of Maryland, hereinafter called, "State", for the sum of:

Five Percent of The Total Amount Bid
(Dollars, Written in Words)

for the payment of which sum, the said Principal and the said Surety bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for:

Contract Numbers: MAA-CO-97-019

Contract Titles: Midfield Terminal Complex Site Development, Phase I

B. NOW THEREFORE, if the Principal, upon acceptance by the State of its bid identified above, within the period specified herein for acceptance (ninety (90) days, if no period is specified), shall execute such further contractual documents, if any, and give such bond(s) as may be required by the terms of the bid as accepted within the time specified (ten (10) days if no period is specified) after receipt of the forms, or in the event of failure to so execute such further contractual documents and give such bonds, if the Principal shall pay the State for any cost of procuring the work which exceeds the amount of its bid, then the above obligation shall be void and of no effect. The Surety executing this instrument hereby agrees that its obligation shall not be impaired by any extension(s) of the time for acceptance of the bid that the Principal may grant to the State, notice of which extension(s) to the Surety being hereby waived; provided that such waiver of notice shall apply only with respect to extensions aggregating not more than ninety (90) calendar days in addition to the period originally allowed for acceptance of the Bid.

In Presence of:
Witness:

_____

Individual Principal

as to _____ (Seal)

In Presence of:
Witness:

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

Corporate Principal

IA CONSTRUCTION CORPORATION (Seal)

Name of Corporation

Attest: Rita M. Marvel

Corporate Secretary

Rita M. Marvel
Assistant Secretary

By: _____ Affix Corporate Seal

President ROBERT S. FIELD
PRESIDENT

Surety

LIBERTY MUTUAL INSURANCE COMPANY

Name of Surety

Attest: Julianne T. DeVita (Seal)

Signature Julianne R. DeVita

Wendy Lee Wadkins Affix Corporate Seal

Signature of Surety

Willis Corroon Corp. of PA

Bonding Agent's Name

WENDY LEE WADKINS/ATTORNEY-IN-FACT

Title

P.O. Box 9052

Agent's Address

600 W. Germantown Pike, Suite 300

Business Address of Surety

Radnor, PA 19087-9052

Plymouth Meeting, PA 19462

Maryland Aviation Administration

Approved as to Legal Form and Sufficiency:

this 4th day of September, 19 98

Joy R. Takamoto-Wengel

Assistant Attorney General

Liberty Mutual Insurance Company
Statutory Balance Sheet
(dollars in thousands)

Assets	December 31, 1997
Bonds	11,609,662
Common & Preferred Stocks	4,446,583
Real Estate	128,301
Cash & Short-Term Investments	242,970
Other Invested Assets	271,268
Subtotal Cash and Invested Assets	16,698,784
Premium in Course of Collection*	1,521,916
Reinsurance Recoverables on Loss and Loss Adjustment Expense Payments	183,530
Interest, Dividends and Real Estate Income Due and Accrued	168,557
Other Assets	779,394
TOTAL ADMITTED ASSETS	19,352,181

Liabilities and Surplus	
Reserve for Losses and Loss Adjustment Expenses	10,208,483
Reserve for Unearned Premiums	1,629,832
Reinsurance Payable on Paid Loss and Loss Adjustment Expenses	36,194
Federal Income Tax and State Premium Tax Accrued	91,774
Other Liabilities	1,319,565
TOTAL LIABILITIES	13,285,848
Unassigned Surplus	4,924,567
Guaranty Funds	1,250
Surplus Notes	1,140,516
TOTAL SURPLUS	6,066,333
TOTAL LIABILITIES AND SURPLUS	19,352,181

(*Excludes premiums more than 90 days due)

COMMONWEALTH OF MASSACHUSETTS

SS:

COUNTY OF SUFFOLK

Dennis Langwell, being duly sworn, says: That he is Vice President and Comptroller of Liberty Mutual Insurance Company; that said Company is a mutual insurance company duly organized, existing and engaged in business as a surety by virtue of the laws of the Commonwealth of Massachusetts and has duly complied with all the requirements of the laws of said Commonwealth and of the laws of the State of MY applicable to said Company and is duly qualified to act as surety under such laws; that said Company has also complied with and is duly qualified to act as surety on federal bonds under Section 9305 of Title 31 of the United States Code.

That the foregoing is a full, true and correct statement of the financial condition of said Company an the 31st day December, 1997.

Sworn to before me this 31st day of March, 1998

Patricia Smith

My Commission Expires Jan 19, 2001

Dennis J. Langwell

Vice President and Comptroller

THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND. 425932

This Power of Attorney limits the act of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

LIBERTY MUTUAL INSURANCE COMPANY
BOSTON, MASSACHUSETTS

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS: That **Liberty Mutual Insurance Company** (the "Company"), a Massachusetts mutual insurance company, pursuant to and by authority of the By-law and Authorization hereinafter set forth, does hereby name, constitute and appoint, **JOHN K. JOHNSON, WENDY LEE WADKINS, KAREN E. HEIN, ALL OF THE CITY OF RADNOR, STATE OF PENNSYLVANIA** .....

, each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations in the penal sum not exceeding **FIFTY MILLION**********_____DOLLARS ($ **50,000,000**********) each, and the execution of such bonds or undertakings, in pursuance of these presents, shall be as binding upon the Company as if they had been duly signed by the president and attested by the secretary of the Company in their own proper persons.

That this power is made and executed pursuant to and by authority of the following By-law and Authorization:

ARTICLE XVI - Execution of Contracts: Section 5. Surety Bonds and Undertakings.
Any officer or other official of the company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the company by their signature and execution of any such instruments and to attach thereto the seal of the company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

By the following instrument the chairman or the president has authorized the officer or other official named therein to appoint attorneys-in-fact:

Pursuant to Article XVI, Section 5 of the By-laws, Assistant Secretary Garnet W. Elliott is hereby authorized to appoint such attorneys-in-fact as may be necessary to act in behalf of the company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

The By-law and the Authorization above set forth are true copies thereof and are now in full force and effect.

IN WITNESS WHEREOF, this instrument has been subscribed by its authorized officer and the corporate seal of the said Liberty Mutual Insurance Company has been affixed thereto in Plymouth Meeting, Pennsylvania this 21st day of January, 19 98.

LIBERTY MUTUAL INSURANCE COMPANY

By Garnet W. Elliott
Garnet W. Elliott, Assistant Secretary

COMMONWEALTH OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 21st day of January, A.D. 19 98, before me, a Notary Public, personally came the individual, known to me to be the therein described individual and officer of Liberty Mutual Insurance Company who executed the preceding instrument, and he acknowledged that he executed the same and that the seal affixed to the said preceding instrument is the corporate seal of said company; and that said corporate seal and his signature subscribed thereto was duly affixed and subscribed to the said instrument by authority and direction of the said company.

IN TESTIMONY WHEREOF, I hereunto set my hand and affix my official seal at Plymouth Meeting, PA, the day and year first above written.

NOTARIAL SEAL
DONNA E. SHIELDS, Notary Public
City of Philadelphia, Phila. County
My Commission Expires ...

Donna E. Shields
Notary Public

CERTIFICATE

I, the undersigned, Assistant Secretary of Liberty Mutual Insurance Company, do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy, is in full force and effect on the date of this certificate; and I do further certify that the officer who executed the said power of attorney was one of the officers specially authorized by the chairman or the president to appoint any attorney-in-fact as provided in Article XVI, Section 5 of the By-laws of Liberty Mutual Insurance Company.

This certificate may be signed by facsimile under and by authority of the following vote of the board of directors of Liberty Mutual Insurance Company at a meeting duly called and held on the 12th day of March, 1980.

VOTED that the facsimile or mechanically reproduced signature of any assistant secretary of the company wherever appearing upon a certified copy of any power of attorney issued by the company, shall be valid and binding upon the company with the same force and effect as though manually affixed.

IN TESTIMONY WHEREOF, I have hereunto subscribed my name and affixed the corporate seal of the said company, this 12th day of May, 19 98.

Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER December 31, 19 99.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.

PART VI
BID FORM

Section 1 - Bid Bond . . . . . BF - 1

Section 2 - Bid/Proposal Affidavit . . . . . BF - 3

Section 3 - MBE Utilization Affidavit . . . . . BF - 11

Section 4 - Subcontractor Utilization Affidavit . . . . . BF - 14

Section 5 - Bid Proposal and Bid Tabulation Forms . . . . . BF - 16

SECTION 2
BID/PROPOSAL AFFIDAVIT

A. AUTHORIZED REPRESENTATIVE

I HEREBY AFFIRM THAT:

I am the PRESIDENT and the duly authorized representative of
Title

IA CONSTRUCTION CORPORATION
Firm, and that I possess the legal authority to make this Affidavit on behalf of myself and the business for which I am acting.

B. AFFIRMATION REGARDING BRIBERY CONVICTIONS

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business (as is defined in **Section 16-101(b)** of the State Finance and Procurement Article of the Annotated Code of Maryland), or any of its officers, directors, partners, or any of its employees directly involved in obtaining or performing contracts with public bodies (as is defined in **Section 16-101(f)** of the State Finance and Procurement Article of the Annotated Code of Maryland), has been convicted of, or has had probation before judgment imposed pursuant to **Article 27, Section 641** of the Annotated Code of Maryland, or has pleaded *nolo contendere* to a charge of, bribery, attempted bribery, or conspiracy to bribe in violation of Maryland law, or of the law of any other state or federal law, except as follows (indicate the reasons why the affirmation cannot be given and list any conviction, plea, or imposition of probation before judgment with the date, court, official or administrative body, the sentence or disposition, the name(s) of person(s) involved, and their current positions and responsibilities with the business):

N/A

C. AFFIRMATION REGARDING OTHER CONVICTIONS

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of its officers, directors, partners, or any of its employees directly involved in obtaining or performing contracts with public bodies, has:

(a) Been convicted under state or federal statute of a criminal offense incident to obtaining, attempting to obtain, or performing a public or private contract, fraud, embezzlement, theft, forgery, falsification or destruction of records, or receiving stolen property;

(b) Been convicted of any criminal violation of a state or federal antitrust statute;

(c) Been convicted under the provisions of **Title 18** or the United States Code for violation of the Racketeer Influenced and Corrupt Organization Act, **18 U.S.C. §1961**, *et seq.*, or the Mail Fraud Act, **18 U.S.C. §1341**, *et seq.*, for acts arising out of the submission of bids or proposals for a public or private contract;

(d) Been convicted of a violation of the State Minority Business Enterprise Law, **Section 14-308** of the State Finance and Procurement Article of the Annotated Code or Maryland;

(e) Been convicted of conspiracy to commit any act or omission that would constitute grounds for conviction or liability under any law or statute described in Subsections (a), (b), (c) or (d) above;

(f) Been found civilly liable under a state or federal antitrust statute for acts or omissions in connection with the submission of bids or proposals for a public or private contract;

(g) Admitted in writing or under oath, during the course of an official investigation or other proceedings, acts or omissions that would constitute grounds for conviction or liability under any law or statute described above, except as follows (indicate reasons why the affirmations cannot be given, and list any conviction, plea, or imposition of probation before judgment with the date, court, official or administrative body, the sentence or disposition, the name(s) of the person(s) involved and their current positions and responsibilities with the business, and the status of any debarment):

N/A

D. AFFIRMATION REGARDING DEBARMENT

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business, or any of it its officers, directors, partners, or any of its employees directly involved in obtaining or performing contracts with public bodies, has ever been suspended or debarred (including being, issued a limited denial of participation) by any public entity, except as follows (list each debarment or suspension providing the dates of the suspension or debarment, the name of the public entity and the status of the proceedings, the name(s) of the persons(s) involved and their current positions

and responsibilities with the business, the grounds of the debarment or suspension, and the details of each person's involvement in any activity that formed the grounds of the debarment or suspension):

N/A

E. AFFIRMATION REGARDING DEBARMENT OF RELATED ENTITIES

I FURTHER AFFIRM THAT:

(a) The business was not established and it does not operate in a manner designed to evade the application of or defeat the purpose of debarment pursuant to **Section 16-101**, *et seq.*, of the State Finance and Procurement Article of the Annotated Code of Maryland; and

(b) The business is not a successor, assignee, subsidiary, or affiliate of a suspended or debarred business, except as follows (you must indicate the reasons why the affirmations cannot be given without qualification):

N/A

F. SUB-CONTRACT AFFIRMATION

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business, has knowingly entered into a contract with a public body under which a person debarred or suspended under **Title 16** of the State Finance and Procurement Article of the Annotated Code of Maryland will provide, directly or indirectly, supplies, services, architectural services, construction related services, leases of real property, or construction.

G. AFFIRMATION REGARDING COLLUSION

I FURTHER AFFIRM THAT:
Neither I, nor to the best of my knowledge, information, and belief, the above business, has:

(a) Agreed, conspired, connived, or colluded to produce a deceptive show of competition in the compilation of the accompanying bid or offer that is being submitted;

(b) In any manner, directly or indirectly, entered into any agreement of any kind to fix the bid price or price proposal of the bidder or offeror or of any competitor, or otherwise taken any action in restraint of free competitive bidding in connection with the Contract for which the accompanying bid or offer is submitted.

H. FINANCIAL DISCLOSURE AFFIRMATION

I FURTHER AFFIRM THAT:
I am aware of, and the above business will comply with, the provisions of **Section 13-221** of the State Finance and Procurement Article of the Annotated Code of Maryland, which require that every business that enters into contracts, leases, or other agreements with the State of Maryland or its agencies during a calendar year under which the business is to receive in the aggregate $100,000 or more shall, within 30 days of the time when the aggregate value of the contracts. leases or other agreements reaches $100,000, file with the Secretary of State of Maryland certain specified information to include disclosure of beneficial ownership of the business.

I. POLITICAL CONTRIBUTION DISCLOSURE AFFIRMATION

I FURTHER AFFIRM THAT:
I am aware of, and the above business will comply with the provisions of **Article 33, Sections 30-1 through 30-4** of the Annotated Code of Maryland, which requires that every person that enters into contracts, leases, or other agreements with the State of Maryland, including its agencies or a political subdivision of the State, during a calendar year in which the person receives in the aggregate $100,000 or more shall file with the Administrative Board of Election Laws a statement disclosing contributions in excess of $500 or more during the reporting period to a candidate for elective office in any primary or general election.

J. DRUG AND ALCOHOL FREE WORKPLACE
(Applicable to all contracts unless the contract is for a law enforcement agency and the agency head or the agency head's designees has determined that application of **COMAR 21.11.08** and this certification would be inappropriate in connection with the law enforcement agency's undercover operations).

I CERTIFY THAT:

1. Terms defined in **COMAR 21.11.08** shall have the same meaning when used in this certification.

2. By submission of its bid or offer, the business, if other than an individual, certifies and agrees that, with respect to its employees to be employed under a contract resulting from this solicitation, the business shall:

   (a) Maintain a workplace free of drug and alcohol abuse during the term of the Contract;

(b) Publish a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of drugs, and the abuse of drugs or alcohol is prohibited in the business' workplace and specifying the actions that will be taken against employees for violation of these prohibitions,

(c) Prohibit its employees from working under the influence of drugs or alcohol;

(d) Not hire or assign to work on the Contract anyone whom the business knows, or in the exercise of due diligence should know, currently abuses drugs or alcohol and is not actively engaged in a *bona fide* drug or alcohol abuse assistance or rehabilitation program;

(e) Promptly inform the appropriate law enforcement agency of every drug-related crime that occurs in its workplace if the business has observed the violation or otherwise has reliable information that a violation has occurred;

(f) Establish drug and alcohol abuse awareness programs to inform its employees about:

(1) The dangers of drug and alcohol abuse in the workplace;

(2) The business' policy of maintaining a drug and alcohol free workplace;

(3) Any available drug and alcohol counseling, rehabilitation, and employee assistance programs; and

(4) The penalties that may be imposed upon employees who abuse drugs and alcohol in the workplace;

(g) Provide all employees engaged in the performance of the Contract with a copy of the statement required by §J(2)(b), above;

(h) Notify its employees in the statement required by §J(2)(b), above that, as a condition of continued employment on the Contract, the employee shall:

(1) Abide by the terms of the statement; and

(2) Notify the employer of any criminal drug or alcohol abuse conviction for an offense occurring in the workplace not later that 5 days after a conviction;

(i) Notify the Procurement Officer within 10 days after receiving notice under §J(2)(h)(2), above, or otherwise receiving actual notice of a conviction;

(j) Within 30 days after receiving notice under §J(2)(h)(2), above, or otherwise receiving actual notice of a conviction, impose either of the following sanctions or remedial measures on any employee who is convicted of a drug or alcohol abuse offense occurring in the workplace:

(1) Take appropriate personnel action against an employee, up to and including termination; or

(2) Require an employee to satisfactorily participate in a *bona fide* drug or alcohol abuse assistance or rehabilitation program; and

(k) Make a good faith effort to maintain a drug and alcohol free workplace through implementation of §§J(2)(a)-(j), above.

3. If the business is an individual, the individual shall certify and agree as set forth in §J(4), below, that the individual shall not engage in the unlawful manufacture, distribution, dispensing, possession, or use of drugs or the abuse of drugs or alcohol in the performance of the Contract.

4. I acknowledge and agree that:

(a) The award of the Contract is conditional upon compliance with **COMAR 21.11.08** and this certification;

(b) The violation of the provisions of **COMAR 21.11.08** or this certification shall be cause to suspend payments under, or terminate the Contract for default under **COMAR 21.07.01.11 or 21.07.03.15**, as applicable; and

(c) The violation of the provisions of **COMAR 21.11.08** or this certification in connection with the Contract may, in the exercise of the discretion of the Board of Public Works, result in suspension and debarment of the business under **COMAR 21.08.06**.

K. CERTIFICATION OF CORPORATION REGISTRATION AND TAX PAYMENT

I FURTHER AFFIRM THAT:

1. The business named above is a domestic ____ or foreign ✓ corporation registered in accordance with the Corporations and Associations Article, Annotated Code of Maryland, and that it is in good standing and has filed all of its annual reports, together with filing fees, with the Maryland State Department of Assessments and Taxation, and that the name and address of its resident agent filed with the State Department of Assessments and Taxation is:

Name: THE CORPORATION TRUST INC

Address: 32 SOUTH STREET

BALTIMORE, MD 21202

(If not applicable, so state)

2. Except as validly contested, the business has paid, or has arranged for payment of, all taxes due the State of Maryland and has filed all required returns and reports with the Comptroller of the Treasury, the State Department of Assessments and Taxation, and the Employment Security Administration, as applicable, and will have paid all withholding taxes due the State of Maryland prior to final settlement.

L. CONTINGENT FEES

I FURTHER AFFIRM THAT:
The business has not employed or retained any person, partnership, corporation, or other entity, other than a *bona fide* employee or agent working for the business to solicit or secure this agreement, and that the business has not paid or agreed to pay any person, partnership, corporation, or other entity, other than a *bona fide* employee or agent, any fee or any other consideration contingent on the making of this Contract.

M. ACKNOWLEDGEMENT

I ACKNOWLEDGE THAT:

This Affidavit is to be furnished to the Procurement Officer and may be distributed to units of: (1) the State of Maryland; (2) counties or other subdivisions of the State of Maryland; (3) other states; and (4) the Federal Government. I further acknowledge that this Affidavit is subject to applicable laws of the United States and the State of Maryland, both criminal and civil, and that nothing in this Affidavit or any contract resulting from the submission of this bid or proposal shall be construed to supersede, amend, modify or waive, on behalf of the State of Maryland, or any unit of the State of Maryland having jurisdiction, the exercise of any statutory right or remedy conferred by the Constitution and the laws of Maryland with respect to any misrepresentation made or any violation of the obligations, terms and covenants undertaken by the above business with respect to (1) this Affidavit; (2) the Contract; and (3) other Affidavits comprising part of the Contract.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THIS AFFIDAVIT ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF.

5/28/98
Date

Authorized Representative or Affiant

ROBERT S. FIELD
PRESIDENT

State of PENNSYLVANIA

County ~~(City)~~ of DELAWARE

On this 28th day of MAY, 19 98

before me, KATHLEEN B. JONES, the undersigned officer,
Notary

personally appeared ROBERT S. FIELD, known to me to be the
Contractor

person described in the foregoing Affidavit and acknowledged that he/she executed the same in the capacity therein stated and for the purposes therein contained. In witness whereof, I hereunto set my hand and official seal.

Notarial Seal
Kathleen B. Jones, Notary Public
Chadds Ford Twp., Delaware County
My Commission Expires Aug. 29, 1998
Member, Pennsylvania Association of Notaries

Kathleen B Jones (Seal) My Commission Expires _____
Signature Date

SECTION 3
MBE UTILIZATION AFFIDAVIT

State of PENNSYLVANIA

County ~~(City)~~ of DELAWARE

In connection with:

Contract Number : MAA-CO-97-019

Contract Title MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE 1

A. AUTHORIZED REPRESENTATIVE

I HEREBY DECLARE AND AFFIRM THAT:

I am the PRESIDENT
Title

and the duly authorized representative of IA CONSTRUCTION CORPORATION
Name of Firm

whose address is P.O. BOX 210
10711 PHILADELPHIA ROAD
WHITE MARSH, MD 21162

and that I possess the legal authority to make this affidavit on behalf of myself and the firm for which I am acting.

B. I AFFIRM that IA CONSTRUCTION CORPORATION
Name of Firm

as the General Contractor, in performing the above-referenced Contract, we shall make every effort to achieve a minimum goal as specified in the Technical Provisions. The Disadvantaged Business Enterprise (DBE) participation goal is measured by the dollar value of the Contract, including any modifications or change orders executed subsequent to the award of the Contract.

C. IT IS ACKNOWLEDGED:
That all required documentation relative to affirmative action taken by the General Contractor to seek out and consider the use of Minority Business Enterprise will be submitted to and/or made available for inspection by the Maryland Department of Transportation.

D. I ACKNOWLEDGE:

That this Affidavit is to be furnished to the Secretary of the Maryland Department of Transportation and may be distributed to boards, commissions, administrations, departments and agencies of: (1) the State of Maryland; and (2) counties or other subdivisions of the State of Maryland; and (3) other states; and (4) the Federal Government. I further acknowledge that this Affidavit is subject to applicable laws of the United States and the State of Maryland, both criminal, and civil, and that nothing in this Affidavit or the Contract shall be construed to supersede, amend, modify or waive, on behalf of the Maryland Department of Transportation, the Maryland Board of Public Works and any other office or agency of the State of Maryland having jurisdiction, and the exercise of any statutory right or remedy conferred by the Constitution and the Laws of Maryland in respect to any misrepresentation made or any violation of the obligations, terms and covenants undertaken by the above firm in respect to (1) this Affidavit, (2) the Contract, and (3) other Affidavits comprising part of the proposal documents associated with the Contract.

IN MAKING THIS AFFIDAVIT, I represent that I have personal knowledge of the matters and facts herein stated.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THE FOREGOING DOCUMENT ARE TRUE AND CORRECT, AND THAT I AM AUTHORIZED, ON BEHALF OF THE ABOVE FIRM, TO MAKE THIS AFFIDAVIT.

Date 5/28/98 Affiant _____

ROBERT S. FIELD
PRESIDENT

State of PENNSYLVANIA

County ~~(City)~~ of DELAWARE

On this 28th day of MAY, 19 98

before me, KATHLEEN B. JONES, the undersigned officer,
Notary

personally appeared ROBERT S. FIELD, known to me to be the
Contractor

person described in the foregoing Affidavit and acknowledged that he/she executed the same in the capacity therein stated and for the purposes therein contained. In witness whereof, I hereunto set my hand and official seal.

Notarial Seal
Kathleen B. Jones, Notary Public
Chadds Ford Twp., Delaware County
My Commission Expires Aug. 29, 1998
Member, Pennsylvania Association of Notaries

Kathleen B Jones (Seal) My Commission Expires _____
Signature Date

SECTION 4
SUBCONTRACTOR UTILIZATION AFFIDAVIT

State of PENNSYLVANIA

County ~~(City)~~ of DELAWARE

In connection with:
Contract Number MAA-CO-97-019

Contract Title MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

A. AUTHORIZED REPRESENTATIVE

I HEREBY DECLARE AND AFFIRM THAT:

I am the PRESIDENT
Title

and the duly authorized representative of ~~IA CONSTRUCTION CORPORATION~~
Name of Firm

whose address is P.O. BOX 210
~~10711 PHILADELPHIA ROAD~~
WHITE MARSH, MD 21162

and that I possess the legal authority to make this affidavit on behalf of myself and the firm for which I am acting.

B. I FURTHER AFFIRM:
That in the solicitation of subcontract quotations or offers, Minority Business Enterprise (MBE) subcontractors were provided not less than the same information and amount of time to respond as were non-MBE subcontractors, and that the solicitation process was conducted in such a manner as to otherwise not place MBE subcontractors at a competitive disadvantage to non-MBE subcontractors.

C. I ACKNOWLEDGE:
That this Affidavit is to be furnished to the Secretary of the Maryland Department of Transportation and may be distributed to boards, commissions, administrations, departments and agencies of: (1) the State of Maryland; and (2) counties or other subdivisions of the State of Maryland; and (3) other states; and (4) the Federal Government. I further acknowledge that this Affidavit is subject to applicable laws of the United States and the State of Maryland, both criminal and civil, and that nothing in this Affidavit or the Contract shall be construed to supersede, amend, modify or waive, on behalf of the Maryland Department of Transportation, the Maryland Board of Public Works and any other office or agency of the State of Maryland having jurisdiction, and the exercise of any statutory right or remedy conferred by the Constitution and the Laws of

Maryland in respect to any misrepresentation made or any violation of the obligations, terms and covenants undertaken by the above firm in respect to (1) this affidavit, (2) the Contract, and (3) other Affidavits comprising part of the proposal documents associated with the Contract.

IN MAKING THIS AFFIDAVIT, I represent that I have personal knowledge of the matters and facts herein stated.

I DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THE FOREGOING DOCUMENT ARE TRUE AND CORRECT, AND THAT I AM AUTHORIZED, ON BEHALF OF THE ABOVE FIRM, TO MAKE THIS AFFIDAVIT.

5/28/98
Date

Affiant

ROBERT S. FIELD
PRESIDENT

State of PENNSYLVANIA

County ~~(City)~~ of DELAWARE

On this 28th day of May, 1998

before me, KATHLEEN B. JONES, the undersigned officer,

Notary

personally appeared ROBERT S. FIELD, known to me to be the

Contractor

person described in the foregoing Affidavit and acknowledged that he/she executed the same in the capacity therein stated and for the purposes therein contained. In witness whereof, I hereunto set my hand and official seal.

Notarial Seal
Kathleen B. Jones, Notary Public
Chadds Ford Twp., Delaware County
My Commission Expires Aug. 29, 1998
Member, Pennsylvania Association of Notaries

Kathleen B Jones (Seal) My Commission Expires

Signature

Date

SECTION 5
BID PROPOSAL

IA CONSTRUCTION CORPORATION

Name of Firm

23-2224715

Federal Tax ID or Social Security Number

PO Box 210 10711 Philadelphia Rd White Marsh, MD 21162

Address

MADE THIS 28th DAY OF May ,19 98

CONTRACT NUMBER: MAA-CO-97-019

CONTRACT TITLE: Midfield Terminal Complex Site Development, Phase I

BIDS DUE: May ~~12~~ 28 1998 at ~~11:00 A.M.~~ 2:00 PM RSF

Date and Time

BID OPENING: May ~~12~~ 28 1998 at ~~11:15 A.M.~~ 2:15 PM RSF

Date and Time

A. TIME OF COMPLETION:

1. **Base Bid**

The contract duration for completion of this project, including mobilization will be as follows:

Base Project:	230 calendar days
Base Project+Add Alternate 1:	260 calendar days
Base Project+Add Alternate 2:	260 calendar days
Base Project+Add Alternate 3:	275 calendar days

The successful bidder will be required to begin work immediately following Notice to Proceed.

B. BASIS OF AWARD:

The Maryland Aviation Administration reserves the right to award the Contract to the lowest responsive and responsible bidder on the basis of one of the following:

1. The lowest total price bid for the **Base Project**, or

2. The lowest total price bid for the **Base Project** and **Add Alternate 1**, or

3. The lowest total price bid for the **Base Project** and **Add Alternate 2**, or

4. The lowest total price bid for the **Base Project** and **Add Alternate 3**.

C. NOTICE OF AWARD:

Notice of award as described in General Provisions, Sections **GP-2.19** and **GP-3.01** will be issued within one hundred and twenty (120) days of bid opening.

D. BID GUARANTY:

Five percent (5%) of total bid (Not required when bid is less than One Hundred Thousand Dollars ($100,000.00)).

TO THE MARYLAND DEPARTMENT OF TRANSPORTATION,
MARYLAND AVIATION ADMINISTRATION

GENTLEMEN:

A. The undersigned hereby declares to have carefully examined the Contract Documents entitled:

Contract Number: MAA-CO-97-019

Contract Title: Midfield Terminal Complex Site Development, Phase I

and to have examined the other Contract Documents (including the Standard Provisions, Addendum(s), Bid Forms, and Contract Forms), and to have carefully inspected the site(s) whereon the proposed work is to be performed.

B. The undersigned proposes and agrees to furnish all labor, materials, equipment and services necessary for the above said project for the Maryland Aviation Administration in accordance with the Specifications, and other Contract Documents including:

1. Addendum(s) issued by the Maryland Aviation Administration,

   Number(s): 1, 2, 3, 4, 5, 6, 7 , and

2. Standard Provisions

   Volume: 1 , Date: December 1993

at the Unit Prices Bid as delineated on the Bid Tabulation Forms, or at the Lump Sum Price Bid as stipulated in the Contract Documents.

C. The prices shown on the Bid Tabulation Forms for the Contract entitled:

Contract Number: MAA-CO-97-019

Contract Title: Midfield Terminal Complex Site Development, Phase I

include and cover the furnishing of all materials and labor requisite and proper, and the providing of all necessary machinery, tools, apparatus, and means for performing the work, as set forth, described, and shown in the Contract Drawings, Specifications and other Contract Documents.

D. The undersigned affirms that Bid has been executed in accordance with General Provisions, Section **GP-2.06**, titled "Preparation of Bid".

FOR CORPORATIONS:

A. The undersigned Corporation affirms that it is ✓ is not ____ registered with the Maryland State Department of Assessments and Taxation and, if registered, is in good standing.

B. If not registered with the Maryland State Department of Assessments and Taxation, see Special Provision, Section **SP-2.03**, titled "Corporate Registration".

Construction Firm License Number: 03 017086

Date of Issue: 5/1/97

Place of Issuance: Baltimore County

In Presence of:
Witness:

Individual Principal

_____ as to _____ (Seal)

In Presence of:
Witness:

Co-Partnership Principal

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

_____ as to By: _____ (Seal)

Corporate Principal

IA CONSTRUCTION CORPORATION (Seal)

Name of Corporation

Attest:

Rita M. Marvel
Corporate Secretary Rita M. Marvel
Assistant Secretary

By: _____
President ROBERT S. FIELD

Affix Corporate Seal

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	7,230	3.87	27,980.10
100.2	Remove Existing Chain Link Fence	LF	2,340	2.15	5031.00
100.3	Remove Existing Underdrain Pipe	LF	0	N/A	N/A
100.4	Demolish/Remove Existing Utilities Structures	EA	5	519.75	2598.75
100.5	Remove Existing Duct Bank	LF	60	10.40	624.00
100.6	Remove Existing Conduit and Cable	LF	500	3.12	1560.00
100.7	Demolish/Remove Existing Buildings	LS	1	N/A	51,186.74
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	1,200	8.32	9984.00
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	415	9.36	3884.40
100.10	Remove Existing Pipe 54" Diameter	LF	310	12.47	3865.70
101.1	Clearing and Grubbing	ACRE	12	0.01	0.12
101.2	Clearing Isolated Trees Type I	EA	50	140.33	7016.50

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1	N/A	79,000.00
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 175,000.00
109.1	Temporary Construction Items	LS	1	N/A	98173.00
206.1	Pavement Removal	SY	3,735	1.70	6349.50
308.1	Stabilized Construction Entrance	SY	160	13.00	2080.00
308.2	Silt Fence	LF	13,000	1.00	13,000.00
308.3	Super Silt Fence	LF	1,000	6.00	6000.00
308.4	Stone Check Dam	EA	6	300.00	1800.00
308.5	Removable Pumping Station	EA	1	1550.57	1550.57
308.6	Sediment Basin Riser Discharge Structure	LS	1	0.01	0.01
308.7	Class I Rip Rap Spillway Protection	SY	50	25.00	1250.00
308.8	Sump Pit	EA	4	500.00	2000.00
308.9	Portable Sediment Tank	LS	1	500.00	500.00

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	4	200.00	800.00
308.11	Curb Inlet Protection	EA	2	200.00	400.00
308.12	Temporary Seeding and Mulching	ACRE	4	717.26	2869.04
427.1	Oil/Water Separator	EA	0	N/A	N/A
813.1	Roadway signs	SF	24	25.00	600.00
1000.1	Pre-Engineered Metal Building	LS	1	N/A	54,339.90
1200.1	Water Tank	LS	1	N/A	173992.55 ~~3788.04~~ RSF
1300.1	Water Pipe (4" Diameter)	LF	205	31.19	6393.95
1300.2	Water Pipe (8" diameter)	LF	3,620	60.29	218249.80
1300.3	Water Pipe (14" Diameter)	LF	3,825	42.62	163021.50
1300.4	Fire Hydrant	EA	1	3638.25	3638.25 ~~3638.50~~ RSF
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	160	20.79	3326.40
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	2075	20.79	43139.25

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	695	20.79	14449.05
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	3975	20.79	82640.25
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	1	135,135.00	135135.00
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	2	135135.00	270270.00
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	1	155925.00	155925.00
1300.10	Sanitary Sewer Manhole	EA	17	2079.00	35343.00
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	4	2286.90	9147.60
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	1	41580.00	41580.00
2080.1	Asbestos Removal	LS	1	24028.76	24028.76
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	1	N/A	237006.00 ~~161122.50~~ RSF
16000.1	Utility Cost Allowance	LS	1	Allowance	$275,000
16010.1	Basic Electrical Requirements	LS	1	N/A	11434.50
16050.1	Basic Electrical Materials and Methods	LS	1	N/A	11434.50
16100.1	Raceways, Boxes, and Cabinets	LS	1	N/A	11434.50
16110.1	Electrical Handhole	EA	46	1179.83	54272.18

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	14	3638.25	50935.50
16110.3	Pole Foundation in Grassy Area	EA	7	686.07	4802.49
16110.4	Pole Foundation in Paved Area	EA	0	N/A	N/A
16110.5	4W-6" concrete Encased Duct	LF	1,600	38.46	61536.00
16110.6	4W-4" Concrete Encased Duct	LF	3,100	31.19	96689.00
16110.7	4W-3" Concrete Encased Duct	LF	1,500	27.03	40545.00
16110.8	2W-6" Concrete Encased Duct	LF	1,400	25.99	36386.00
16110.9	2W-4" Concrete Encased duct	LF	360	21.83	7858.80
16110.10	2W-3" Concrete Encased Duct	LF	5,500	19.75	108625.00
16110.11	2W-2" Concrete Encased Duct	LF	2,700	16.63	44901.00
16110.12	1W-4" Concrete Encased Duct	LF	0	N/A	N/A
16110.13	1W-2" Concrete Encased Duct	LF	1,900	11.43	21717.00
16110.14	Electrical Equipment Pad	EA	1	5197.50	5197.50

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	1	5197.50	5197.50
16120.1	Wires and Cables	LS	1	77962.50	77962.50
16141.1	Wiring Devices	LS	1	1039.50	1039.50
16170.1	Motor and Circuit Disconnects	LS	1	1039.50	1039.50
16195.1	Labeling and Identification	LS	1	1663.20	1663.20
16321.1	Pole Mount Transformer	EA	2	2079.00	4158.00
16470.1	Power Distribution Equipment	LS	1	7796.25	7796.25
16510.1	Pole Mount Luminaire	EA	7	654.89	4584.23
16510.2	Exterior Wall Luminaire	EA	1	155.93	155.93
16510.3	Interior Fluorescent Lminaire	EA	9	155.93	1403.37
16510.4	Emergency Lighting Unit	EA	2	311.85	623.70
16510.5	Lighted Exit Sign	EA	1	467.78	467.78
16510.6	3.5 EPA Light Pole	EA	0	N/A	N/A

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	7	1372.14	9604.98
16900.1	General Instrumentation	LS	1	27027.00	27027.00
P-152.1	Stripping	CY	50	6.10	305.00
P-152.2	Unclassified Excavation	CY	11,250	8.50	95625.00
P-152.3	Unsuitable Excavation	CY	200	8.50	1700.00
P-152.4	Remove Existing Soil Stockpile	CY	7,500	5.15	38625.00
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	0	N/A	N/A
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	2,830	7.30	20659.00
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	0	N/A	N/A
P-304.1	Cement-Treated Base Course (6" Depth)	SY	0	N/A	N/A
P-304.2	Cement-Treated Base Course (8" Depth)	SY	2,630	5.00	13150.00
P-304.3	Portland Cement	TON	90	106.00	9540.00
P-401.1	Airfield Bituminous Surface Course	TON	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 5

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	365	35.00	12775.00
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	365	35.00	12775.00
P-603.1	Bituminous Tack Coat	GAL	105	1.00	105.00
P-610.1	Concrete Curb	LF	0	N/A	N/A
P-610.2	Concrete Curb and Gutter	LF	1,580	12.00	18960.00
P-610.3	Concrete Utility Encasement	CY	20	363.83	7276.60
P-610.4	Portland Cement Concrete Pavement	SY	0	N/A	N/A
P-620.1	Pavement Marking	SF	840	1.40	1176.00
P-620.2	Pavement Marking Removal	SF	0	N/A	N/A
D-701.1	12-inch RCP Class IV	LF	70	27.03	1892.10
D-701.2	15-inch RCP Class IV	LF	0	N/A	N/A
D-701.3	18-inch RCP Class IV	LF	110	34.30	3773.00
D-701.4	24-inch RCP Class IV	LF	0	N/A	N/A

MAY 21 '98 04:32PM P.9/22

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 5

MAY 21 '98 04:32PM

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	0	N/A	N/A
D-701.6	30-inch RCP Class A-25	LF	61	64.45	3931.45
D-701.7	36-inch RCP Class A-25	LF	326	76.92	25075.92
D-701.8	42-inch RCP Class A-25	LF	0	N/A	N/A
D-701.9	Concrete for Pipe Cradles	CY	0	N/A	N/A
D-701.10	Seepage Pipe	LF	80	20.79	1663.20
D-705.1	Geocomposite Underdrain	LF	0	N/A	N/A
D-705.2	4-inch Polyethylene Pipe	LF	0	N/A	N/A
D-705.3	4-inch Perforated Polyethylene Pipe	LF	0	N/A	N/A
D-705.4	6-inch Polyethylene Pipe	LF	0	N/A	N/A
D-751.1	Storm Drainage Manhole	EA	3	3222.45	9667.35
D-751.2	Storm Drainage Inlet Type 1	EA	0	N\A	N\A
D-751.3	Storm Drainage Inlet Type 2	EA	1	1975.05	1975.05

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	4	2702.70	10,810.80
D-751.5	Storm Drainage Inlet Type 4	EA	1	10 395.00	10,395.00
D-751.6	Adjust Structure to Grade	EA	0	N/A	N/A
D-752.1	Sedimentation Chamber	CY	17	1039.50	17671.50
D-752.2	Endwall	CY	55	873.79	48058.45
D-752.3	Class I Rip-Rap	SY	40	23.22	928.80
D-752.4	Grouted Rip-Rap	SY	90	44.39	3995.10
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	0	N/A	N/A
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	0	N/A	N/A
L-108.3	Ground Rod	EA	0	N/A	N/A
L-108.4	Concrete Cable Marker	EA	0	N/A	N/A
L-110.5	2" PVC Sched. 80 conduit	LF	0	N/A	N/A
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	0	N/A	N/A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	0	N/A	N/A
L-125.3	Two-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.4	Three-Panel Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N/A	N/A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N/A	N/A
T-901.1	Permanent Seeding	ACRE	15	845.11	12676.65
T-901.2	Wetlands Vegetation	MSF	100	43.89	4389.00
T-905.1	Topsoiling	CY	2,000	6.85	13700.00
T-905.2	Erosion Control Netting	SY	8,200	0.94	7708.00
T-908.1	Mulching	ACRE	15	291.06	4365.90

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

WETLAND MITIGATION

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
101.3	Clearing and Grubbing, Wetland Mitigation Area	AC	3.6	0.01	0.04
101.4	Clearing Isolated Trees, Type I, Wetland Mitigation Area	EA	3	140.33	420.99
108.3	Mobilization/ Demobilization, Wetland Mitigation Area	LS	1	N/A	0.01
109.2	Temporary Construction Items, Wetland Mitigation Area	LS	1	N/A	8170.47
308.13	Class I Rip Rap Spillway Protection, Wetland Mitigation Area	SY	185	22.04	4077.40
308.14	Stabilized Construction Entrance, Wetland Mitigation Area	SY	150	24.93	3739.50
308.15	Super Silt Fence, Wetland Mitigation Area	LF	40	4.72	188.80
308.16	Temporary Seeding and Mulching, Wetland Mitigation Area	AC	3	784.82	2354.46
308.17	Turbidity Curtain, Wetland Mitigation Area	LF	625	28.25	17656.25
705.1	Permanent Seeding and Mulching, Wetland Mitigation Area	SY	8,335	0.36	3000.60
710.1	Amelanchier canadensis, 5 Gallon	EA	65	21.17	1376.05

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
710.2	Aronia arbutifolia "Brilliantissima", 3 Gallon	EA	30	18.61	558.30
710.3	Cephalanthus occidentalis, 3 Gallon	EA	50	18.61	930.50
710.4	Ilex glabra, 3 Gallon	EA	35	21.15	740.25
710.5	Lindera benzoin, 3 Gallon	EA	25	18.61	465.25
710.6	Myrica pensylvanica, 2 Gallon	EA	65	13.90	903.50
710.7	Quercus borealis, 2 Inch Caliper	EA	14	166.32	2328.48
710.8	Rhus aromatica, 2 Gallon	EA	100	13.90	1390.00
710.9	Viburnum prunifolium, 5 Gallon	EA	60	20.79	1247.40
710.10	Viburnum dentatum, 3 Gallon	EA	35	17.97	628.95
710.11	Shredded Hardwood Mulch, 3 Inch Depth	SY	480	3.12	1497.60
711.1	Panicum virgatum, 1-3/4 Inch Peat Pot	EA	9,800	1.72	16856.00
711.2	Peltandra virginica, 1 Quart Pot	EA	4,450	2.03	9033.50
711.3	Pontederia cordata, 1 Quart Pot	EA	4,450	2.03	9033.50

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - BASE PROJECT

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
711.4	Scirpus pungens, 1-3/4 Inch Peat Pot	EA	4,450	1.66	7387.00
711.5	Scirpus robustus, 1 Quart Pot	EA	2,000	1.98	3960.00
711.6	Scirpus validus, 1 Quart Pot	EA	2,550	1.98	5049.00
711.7	Goose Exclosure Fence	LF	625	1.65	1031.25
P-152.5	Stripping, Wetland Mitigation Area	CY	2,895	0.01	28.95
P-152.6	Unclassified Excavation, Wetland Mitigation Area	CY	14,200	5.40	76680.00
T-905.3	Topsoiling, Six Inch Depth, Wetland Mitigation Area	CY	2,895	6.00	17370.00
Midfield Terminal Complex Site Development, Phase I **Total Base Project**				N/A	3,775,674.86

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200	3.12	624.00
100.4	Demolish/Remove Existing Utilities Structures	EA	1	519.75	519.75
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400	3.12	1248.00
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1	74,000.00	74,000.00
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1	ROF N/A ~~41,674.36~~	22163.00 ~~41,674.36~~
206.1	Pavement Removal	SY	210	1.70	357.00
308.1	Stabilized Construction Entrance	SY	70	13.00	910.00
308.2	Silt Fence	LF	4,000	1.00	4000.00
308.3	Super Silt Fence	LF	960	6.00	5760.00
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1	1550.57	1550.57
308.6	Sediment Basin Riser Discharge Structure	LS	1	N\A	.01
308.7	Class I Rip Rap Spillway Protection	SY	50	25.00	1250.00
308.8	Sump Pit	EA	6	500.00	3000.00
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26	200.00	5200.00
308.11	Curb Inlet Protection	EA	1	200.00	200.00
308.12	Temporary Seeding and Mulching	ACRE	12	717.26	8607.12
427.1	Oil/Water Separator	EA	1	59,875.20	59875.20
813.1	Roadway signs	SF	20	25.00	500.00
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	3	1,179.83	3,539.49

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	0	N\A	N\A
16110.4	Pole Foundation in Paved Area	EA	3	852.39	2557.17
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	175	31.19	5458.25
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	0	N\A	N\A
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	800	11.43	9,144.00
16110.14	Electrical Equipment Pad	EA	2	5197.50	10,395.00

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1	N\A	1663,20
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	6	654,89	3,929.34
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	3	1060,29	3,180.87

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1	N\A	2,702.70
P-152.1	Stripping	CY	3,000	6.10	18,300.00
P-152.2	Unclassified Excavation	CY	31,700	5.50	174,350.00
P-152.3	Unsuitable Excavation	CY	200	8.50	1,700.00
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	8,000	7.00	56,000.00
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	12,700	8.40	106,680.00
P-304.1	Cement-Treated Base Course (6" Depth)	SY	7,900	4.00	31,600.00
P-304.2	Cement-Treated Base Course (8" Depth)	SY	12,450	5.00	62,250.00
P-304.3	Portland Cement	TON	580	106.00	61,480.00
P-401.1	Airfield Bituminous Surface Course	TON	2,010	36.00	72,360.00

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	1,270	35.00	44,450.00
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	1,270	35.00	44,450.00
P-603.1	Bituminous Tack Coat	GAL	1,000	1.00	1,000.00
P-610.1	Concrete Curb	LF	250	12.00	3,000.00
P-610.2	Concrete Curb and Gutter	LF	1,650	12.00	19,800.00
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50	52.00	2,600.00
P-620.1	Pavement Marking	SF	1,680	1.40	2,352.00
P-620.2	Pavement Marking Removal	SF	100	5.20	520.00
D-701.1	12-inch RCP Class IV	LF	187	27.03	5,054.61
D-701.2	15-inch RCP Class IV	LF	254	31.19	7,922.26
D-701.3	18-inch RCP Class IV	LF	570	34.30	19,551.00
D-701.4	24-inch RCP Class IV	LF	420	43.66	18,337.20

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 5

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	475	57.17	27,155.75
D-701.6	30-inch RCP Class A-25	LF	367	64.45	23,653.15
D-701.7	36-inch RCP Class A-25	LF	941	76.92	72,381.72
D-701.8	42-inch RCP Class A-25	LF	186	100.83	18,754.38
D-701.9	Concrete for Pipe Cradles	CY	3	155.93	467.79
D-701.10	Seepage Pipe	LF	80	20.79	1,663.20
D-705.1	Geocomposite Underdrain	LF	1,308	4.58	5,990.64
D-705.2	4-inch Polyethylene Pipe	LF	500	5.22	2,610.00
D-705.3	4-inch Perforated Polyethylene Pipe	LF	48	5.22	250.56
D-705.4	6-inch Polyethylene Pipe	LF	340	5.68	1,931.20
D-751.1	Storm Drainage Manhole	EA	3	3222.45	9,667.35
D-751.2	Storm Drainage Inlet Type 1	EA	16	6,133.05	98,128.80
D-751.3	Storm Drainage Inlet Type 2	EA	6	1,975.05	11,850.30

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	1	2,702.70	2,702.70
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	3	2,079.00	6,237.00
D-752.1	Sedimentation Chamber	CY	58	1,039.50	60,291.00
D-752.2	Endwall	CY	115	873.78	100,484.70
D-752.3	Class I Rip-Rap	SY	200	23.22	4,644.00
D-752.4	Grouted Rip-Rap	SY	75	44.39	3,329.25
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150	1.04	1,196.00
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100	1.04	1,144.00
L-108.3	Ground Rod	EA	26	83.16	2,162,16
L-108.4	Concrete Cable Marker	EA	4	259.88	1,039.52
L-110.5	2" PVC Sched. 80 conduit	LF	1,000	5.20	5,200.00
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	13	779.63	10,135.19

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 1

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	2	519.75	1,039.50
L-125.3	Two-Panel Taxiway Guidance Sign	EA	2	4885.65	9,771.30
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1	5483.36	5,483.36
L-125.5	Modify Existing Taxiway Guidance Sign	EA	0	N\A	N\A
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15	845.11	12,676.65
T-901.2	Wetlands Vegetation	MSF	56	43.89	2,457.84
T-905.1	Topsoiling	CY	750	6.85	5,137.50
T-905.2	Erosion Control Netting	SY	5,100	0.94	4,794.00
T-908.1	Mulching	ACRE	15	291.06	4,365.90
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 1**					1589888.14

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	200	3.12	624.00
100.4	Demolish/Remove Existing Utilities Structures	EA	0	N\A	N\A
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	400	3.12	1,248.00
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1	97,500.00	97,500.00
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 85,000.00
109.1	Temporary Construction Items	LS	1	N/A	24910.00
206.1	Pavement Removal	SY	420	1.70	714.00
308.1	Stabilized Construction Entrance	SY	70	13.00	910.00
308.2	Silt Fence	LF	3,400	1.00	3,400.00
308.3	Super Silt Fence	LF	640	6.00	3,840.00
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1	1550.57	1550.57
308.6	Sediment Basin Riser Discharge Structure	LS	1	N/A	0.01
308.7	Class I Rip Rap Spillway Protection	SY	50	25.00	1,250.00
308.8	Sump Pit	EA	6	500.00	3,000.00
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	8	200.00	1,600.00
308.11	Curb Inlet Protection	EA	0	N\A	N\A
308.12	Temporary Seeding and Mulching	ACRE	16	717.26	11,476.16
427.1	Oil/Water Separator	EA	1	59,875.20	59,875.20
813.1	Roadway signs	SF	15	25.00	375.00
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
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Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	5	1,179.83	5,899.15

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 5

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6	686.07	4,116.42
16110.4	Pole Foundation in Paved Area	EA	3	852.39	2,557.17
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	175	31.19 ~~75.00~~ RS.E	5,458.25
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250	16.63	4,157.50
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	700	11.43	8,001.00
16110.14	Electrical Equipment Pad	EA	1	5,197.50	5,197.50

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1	N/A	1,663.20
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	12	654.89	7,858.68
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	9	1,060.29	9,542.61

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1	N/A	2,702.70
P-152.1	Stripping	CY	7,900	6.10	48,190.00
P-152.2	Unclassified Excavation	CY	16,300	2.25	36,675.00
P-152.3	Unsuitable Excavation	CY	200	8.50	1,700.00
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	8,300	7.00	58,100.00
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	12,950	8.40	108,780.00
P-304.1	Cement-Treated Base Course (6" Depth)	SY	8,100	4.00	32,400.00
P-304.2	Cement-Treated Base Course (8" Depth)	SY	12,700	5.00	63,500.00
P-304.3	Portland Cement	TON	590	106.00	62,540.00
P-401.1	Airfield Bituminous Surface Course	TON	1,850	36.00	66,600.00

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	760	35,00	26,600.00
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	760	35,00	26,600.00
P-603.1	Bituminous Tack Coat	GAL	800	1.00	800,00
P-610.1	Concrete Curb	LF	1,610	12.00	19,320.00
P-610.2	Concrete Curb and Gutter	LF	390	12.00	4,680.00
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	50	52.00	2,600.00
P-620.1	Pavement Marking	SF	2,220	1.40	3,108,00
P-620.2	Pavement Marking Removal	SF	100	5.20	520,00
D-701.1	12-inch RCP Class IV	LF	245	27.03	6,622,35
D-701.2	15-inch RCP Class IV	LF	354	31.19	11,041.26
D-701.3	18-inch RCP Class IV	LF	360	34.30	12,348.00
D-701.4	24-inch RCP Class IV	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	477	57.17	27,270.09
D-701.6	30-inch RCP Class A-25	LF	275	64.45	17,723.75
D-701.7	36-inch RCP Class A-25	LF	651	76.92	50,074.92
D-701.8	42-inch RCP Class A-25	LF	186	100.83	18,754.38
D-701.9	Concrete for Pipe Cradles	CY	10	155.93	1,559.30
D-701.10	Seepage Pipe	LF	80	20.79	1,663.20
D-705.1	Geocomposite Underdrain	LF	1,331	4.58	6,095.98
D-705.2	4-inch Polyethylene Pipe	LF	483	5.22	2,521.26
D-705.3	4-inch Perforated Polyethylene Pipe	LF	390	5.22	2,035.80
D-705.4	6-inch Polyethylene Pipe	LF	175	5.68	994.00
D-751.1	Storm Drainage Manhole	EA	3	3,222.45	9,667.35
D-751.2	Storm Drainage Inlet Type 1	EA	9	6,133.05	55,197.45
D-751.3	Storm Drainage Inlet Type 2	EA	11	1,975.05	21,725.55

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 5

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	0	N/A	N/A
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	0	N\A	N\A
D-752.1	Sedimentation Chamber	CY	58	1,039.50	60,261.00
D-752.2	Endwall	CY	115	873.78	100,484.70
D-752.3	Class I Rip-Rap	SY	200	23.22	4,644.00
D-752.4	Grouted Rip-Rap	SY	75	44.39	3,329.25
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	1,150	1.04	1,196.00
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	1,100	1.04	1,144.00
L-108.3	Ground Rod	EA	26	83.16	2,162.16
L-108.4	Concrete Cable Marker	EA	4	259.88	1,039.52
L-110.5	2" PVC Sched. 80 conduit	LF	1,000	5.20	5,200.00
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	8	779.63	6,237.04

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

BID TABULATION FORMS - ADD ALTERNATE 2

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	5	519.75	2,598.75
L-125.3	Two-Panel Taxiway Guidance Sign	EA	1	4,885.65	4,885.65
L-125.4	Three-Panel Taxiway Guidance Sign	EA	1	5,483.36	5,483.36
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2	665.28	1,330.56
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	15	845.11	12,676.65
T-901.2	Wetlands Vegetation	MSF	56	43.89	2,457.84
T-905.1	Topsoiling	CY	750	6.85	5,137.50
T-905.2	Erosion Control Netting	SY	5,100	0.94	4,794.00
T-908.1	Mulching	ACRE	15	291.06	4,365.90
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 2**					139,892.63

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
100.1	Demolish/Remove Existing Concrete Slabs	SY	0	N\A	N\A
100.2	Remove Existing Chain Link Fence	LF	0	N\A	N\A
100.3	Remove Existing Underdrain Pipe	LF	400	3.12	1,248.00
100.4	Demolish/Remove Existing Utilities Structures	EA	1	519.75	519.75
100.5	Remove Existing Duct Bank	LF	0	N\A	N\A
100.6	Remove Existing Conduit and Cable	LF	800	3.12	2,496.00
100.7	Demolish/Remove Existing Buildings	LS	0	N\A	N\A
100.8	Remove Existing Pipe Smaller than 12" Diameter	LF	0	N\A	N\A
100.9	Remove Existing Pipe 12" to 24" Diameter	LF	0	N\A	N\A
100.10	Remove Existing Pipe 54" Diameter	LF	0	N\A	N\A
101.1	Clearing and Grubbing	ACRE	0	N\A	N\A
101.2	Clearing Isolated Trees Type I	EA	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
108.1	Mobilization/Demobilization	LS	1	~~$5~~ N/A	$4,000.00
108.2	Miscellaneous Construction Items Allowance	LS	1	Allowance	$ 170,000.00
109.1	Temporary Construction Items	LS	1	N/A	6040.00
206.1	Pavement Removal	SY	630	1.70	1,071.00
308.1	Stabilized Construction Entrance	SY	140	13.00	1,820.00
308.2	Silt Fence	LF	7,400	1.00	7,400.00
308.3	Super Silt Fence	LF	1,600	6.00	9,600.00
308.4	Stone Check Dam	EA	0	N\A	N\A
308.5	Removable Pumping Station	EA	1	1,550.57	1,550.57
308.6	Sediment Basin Riser Discharge Structure	LS	1	N/A	0.00
308.7	Class I Rip Rap Spillway Protection	SY	50	25.00	1,250.00
308.8	Sump Pit	EA	6	500.00	3,000.00
308.9	Portable Sediment Tank	LS	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
308.10	At-Grade Inlet Protection	EA	26	200.00	5,200.00
308.11	Curb Inlet Protection	EA	1	200.00	200.00
308.12	Temporary Seeding and Mulching	ACRE	25	717.26	17,931.50
427.1	Oil/Water Separator	EA	2	59,875.20	119,750.40
813.1	Roadway signs	SF	30	25.00	750.00
1000.1	Pre-Engineered Metal Building	LS	0	N\A	N\A
1200.1	Water Tank	LS	0	N\A	N\A
1300.1	Water Pipe (4" Diameter)	LF	0	N\A	N\A
1300.2	Water Pipe (8" diameter)	LF	0	N\A	N\A
1300.3	Water Pipe (14" Diameter)	LF	0	N\A	N\A
1300.4	Fire Hydrant	EA	0	N\A	N\A
1300.5	Sanitary Sewer Pipe (1-1/4" Diameter)	LF	0	N\A	N\A
1300.6	Sanitary Sewer Pipe (4" Diameter)	LF	0	N\A	N\A

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
1300.7	Sanitary Sewer Pipe (6" Diameter)	LF	0	N\A	N\A
1300.8	Sanitary Sewer Pipe (8" diameter)	LF	0	N\A	N\A
1300.9.1	Sanitary Sewer Pump Station (100 GPM)	EA	0	N\A	N\A
1300.9.2	Sanitary Sewer Pump Station (130 GPM)	EA	0	N\A	N\A
1300.9.3	Sanitary Sewer Pump Station (225 GPM)	EA	0	N\A	N\A
1300.10	Sanitary Sewer Manhole	EA	0	N\A	N\A
1300.11	Sanitary Sewer Air Release Valve and Vault	EA	0	N\A	N\A
1300.12	Wilson Point Road Sanitary Sewer Crossing	LS	0	N\A	N\A
2080.1	Asbestos Removal	LS	0	N\A	N\A
15000.1	Pumphouse Equipment, Pipe, and Fittings	LS	0	N\A	N\A
16000.1	Utility Cost Allowance	LS	0	N\A	N\A
16010.1	Basic Electrical Requirements	LS	0	N\A	N\A
16050.1	Basic Electrical Materials and Methods	LS	0	N\A	N\A
16100.1	Raceways, Boxes, and Cabinets	LS	0	N\A	N\A
16110.1	Electrical Handhole	EA	8	1,179.83	1,179.83

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 5

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.2	Electrical Manhole	EA	0	N\A	N\A
16110.3	Pole Foundation in Grassy Area	EA	6	686.67	4,116.42
16110.4	Pole Foundation in Paved Area	EA	6	852.39	5,114.34
16110.5	4W-6" concrete Encased Duct	LF	0	N\A	N\A
16110.6	4W-4" Concrete Encased Duct	LF	350	31.19	10,916.50
16110.7	4W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.8	2W-6" Concrete Encased Duct	LF	0	N\A	N\A
16110.9	2W-4" Concrete Encased duct	LF	0	N\A	N\A
16110.10	2W-3" Concrete Encased Duct	LF	0	N\A	N\A
16110.11	2W-2" Concrete Encased Duct	LF	250	16.63	4,157.50
16110.12	1W-4" Concrete Encased Duct	LF	0	N\A	N\A
16110.13	1W-2" Concrete Encased Duct	LF	1,500	11.43	17,145.00
16110.14	Electrical Equipment Pad	EA	3	5,197.50	15,592.50

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16110.15	Electrical Vault	EA	0	N\A	N\A
16120.1	Wires and Cables	LS	1 & RSF	N/A	3,326.40
16141.1	Wiring Devices	LS	0	N\A	N\A
16170.1	Motor and Circuit Disconnects	LS	0	N\A	N\A
16195.1	Labeling and Identification	LS	0	N\A	N\A
16321.1	Pole Mount Transformer	EA	0	N\A	N\A
16470.1	Power Distribution Equipment	LS	0	N\A	N\A
16510.1	Pole Mount Luminaire	EA	18	654.89	11,788.02
16510.2	Exterior Wall Luminaire	EA	0	N\A	N\A
16510.3	Interior Fluorescent Lminaire	EA	0	N\A	N\A
16510.4	Emergency Lighting Unit	EA	0	N\A	N\A
16510.5	Lighted Exit Sign	EA	0	N\A	N\A
16510.6	3.5 EPA Light Pole	EA	12	1,060.29	12,723.48

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
16510.7	10 EPA Light Pole	EA	0	N\A	N\A
16900.1	General Instrumentation	LS	1 ~~2~~ RST	N/A	5,105.40
P-152.1	Stripping	CY	10,900	6.10	66,490.00
P-152.2	Unclassified Excavation	CY	25,000	4.25	106,250.00
P-152.3	Unsuitable Excavation	CY	400	8.50	3,400.00
P-152.4	Remove Existing Soil Stockpile	CY	0	N\A	N\A
P-209.1	Crushed aggregate Base Course (12" Depth)	SY	16,300	7.00	114,100.00
P-209.2	Crushed Aggregate Base Course (14" Depth)	SY	0	N\A	N\A
P-209.3	Crushed Aggregate Base Course (15" Depth)	SY	25,652	8.40	215,476.80
P-304.1	Cement-Treated Base Course (6" Depth)	SY	16,000	4.00	64,000.00
P-304.2	Cement-Treated Base Course (8" Depth)	SY	25,150	5.00	125,750.00
P-304.3	Portland Cement	TON	1,170	106.00	124,020.00
P-401.1	Airfield Bituminous Surface Course	TON	3,860	36.00	138,960.00

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
P-401.2	MSHA Hot Mix Asphalt Surface Course (SC)	TON	2,030	35.00	71,050.00
P-401.3	MSHA Hot Mix Asphalt Base Course (BC)	TON	2,030	35.00	71,050.00
P-603.1	Bituminous Tack Coat	GAL	1,800	1.00	1,800.00
P-610.1	Concrete Curb	LF	1,860	12.00	22,320.00
P-610.2	Concrete Curb and Gutter	LF	2,040	12.00	24,480.00
P-610.3	Concrete Utility Encasement	CY	0	N\A	N\A
P-610.4	Portland Cement Concrete Pavement	SY	100	52.00	5,200.00
P-620.1	Pavement Marking	SF	3,900	1.40	5,460.00
P-620.2	Pavement Marking Removal	SF	200	5.20	1,040.00
D-701.1	12-inch RCP Class IV	LF	396	27.03	10,703.88
D-701.2	15-inch RCP Class IV	LF	374	31.19	11,665.06
D-701.3	18-inch RCP Class IV	LF	698	34.30	23,941.40
D-701.4	24-inch RCP Class IV	LF	418	43.66	18,249.88

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-701.5	27-inch RCP Class A-25	LF	478	57.17	27,327.26
D-701.6	30-inch RCP Class A-25	LF	405	64.45	26,102.25
D-701.7	36-inch RCP Class A-25	LF	941	76.92	72,381.72
D-701.8	42-inch RCP Class A-25	LF	186	100.83	18,754.38
D-701.9	Concrete for Pipe Cradles	CY	10	155.93	1,559.30
D-701.10	Seepage Pipe	LF	80	20.79	1,663.20
D-705.1	Geocomposite Underdrain	LF	2,639	4.58	12,086.62
D-705.2	4-inch Polyethylene Pipe	LF	979	5.22	5,110.38
D-705.3	4-inch Perforated Polyethylene Pipe	LF	438	5.22	2,286.36
D-705.4	6-inch Polyethylene Pipe	LF	523	5.68	2,970.64
D-751.1	Storm Drainage Manhole	EA	4	3,222.45	12,889.80
D-751.2	Storm Drainage Inlet Type 1	EA	19	6,133.05	116,527.95
D-751.3	Storm Drainage Inlet Type 2	EA	12	1,975.05	23,700.60

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
D-751.4	Storm Drainage Inlet Type 3	EA	1	2,702.70	2,702.70
D-751.5	Storm Drainage Inlet Type 4	EA	0	N\A	N\A
D-751.6	Adjust Structures to Grade	EA	3	2,079.00	6,237.00
D-752.1	Sedimentation Chamber	CY	66	1,039.50	68,607.00
D-752.2	Endwall	CY	115	873.78	100,484.70
D-752.3	Class I Rip-Rap	SY	200	23.22	4,644.00
D-752.4	Grouted Rip-Rap	SY	75	44.39	3,329.25
L-108.1	No. 8 AWG 5 KV Underground Cable Installed in Duct or Conduit	LF	2,300	1.04	2,392.00
L-108.2	No. 8 AWG Bare Counterpoise Wire Installed in Trench	LF	2,200	1.04	2,288.00
L-108.3	Ground Rod	EA	52	83.16	4,324.32
L-108.4	Concrete Cable Marker	EA	8	259.88	2,079.04
L-110.5	2" PVC Sched. 80 conduit	LF	2,000	5.20	10,400.00
L-125.1	Medium Intensity Taxiway Light Base Mounted	EA	21	779.63	16,372.23

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I
AT MARTIN STATE AIRPORT

Addendum 4

BID TABULATION FORMS - ADD ALTERNATE 3

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE ($)	TOTAL PRICE ($)
L-125.2	Relocate Existing Taxiway Edge Light	EA	7	519.75	3,638.25
L-125.3	Two-Panel Taxiway Guidance Sign	EA	3	4,885.65	14,656.95
L-125.4	Three-Panel Taxiway Guidance Sign	EA	2	5,483.37	10,966.74
L-125.5	Modify Existing Taxiway Guidance Sign	EA	2	665.25	1,330.50
L-125.6	Replace Existing Taxiway Guidance Sign Panel	EA	0	N\A	N\A
T-901.1	Permanent Seeding	ACRE	30	845.11	25,353.30
T-901.2	Wetlands Vegetation	MSF	56	43.89	2,457.84
T-905.1	Topsoiling	CY	750	6.85	5,137.50
T-905.2	Erosion Control Netting	SY	5,100	0.94	4,794.00
T-908.1	Mulching	ACRE	30	291.00	8,731.80
Midfield Terminal Complex Site Development, Phase I **Total Add Alternate 3**					2,383,246.08

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT

3,775,674.86

RSF ~~5,365,563.00~~

(Written in Numerals)

THREE MILLION SEVEN HUNDRED SEVENTY FIVE THOUSAND SIX HUNDRED SEVENTY FOUR DOLLARS (Written in Words) EIGHTY SIX CENTS

CONTRACTOR: IA CONSTRUCTION CORPORATION

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 1

5,365,563.00
(Written in Numerals)

FIVE MILLION THREE HUNDRED SIXTY FIVE THOUSAND FIVE HUNDRED SIXTY THREE DOLLARS (Written in Words) NO CENTS

CONTRACTOR: IA CONSTRUCTION CORPORATION

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 2

5,167,567.49

(Written in Numerals)

FIVE MILLION ONE HUNDED SIXTY SEVEN THOUSAND FIVE HUNDRED SIXTY SEVEN DOLLARS (Written in Words) FORTY NINE CENTS

CONTRACTOR: IA CONSTRUCTION CORPORATION

TOTAL OF ALL BID ITEMS
(Pay Items 100.1 through T-908.1)

FOR

MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE I

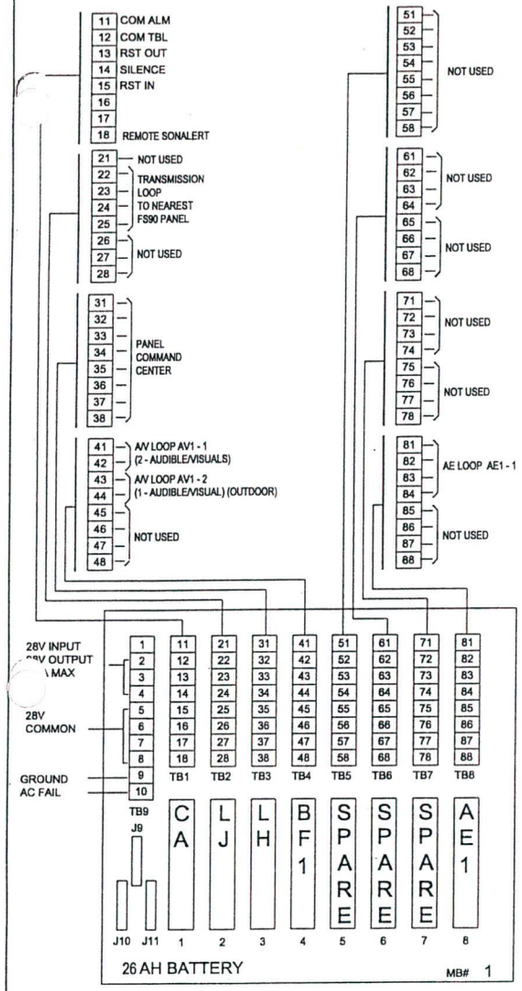
MARTIN STATE AIRPORT

BASE PROJECT + ADD ALTERNATE 3

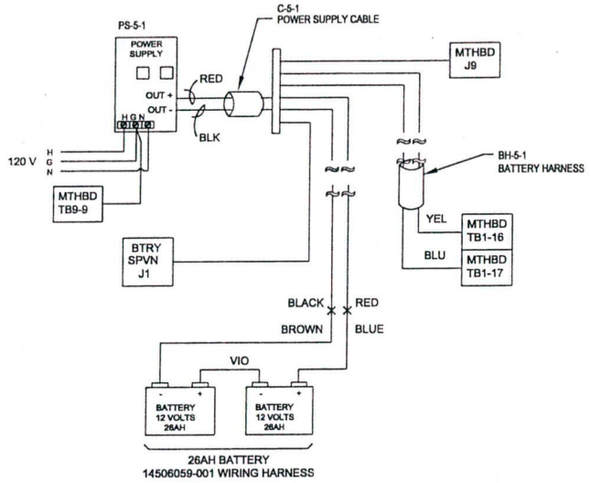
6,158,920.94
(Written in Numerals)

SIX MILLION ONE HUNDRED FIFTY EIGHT THOUSAND NINE HUNDRED TWENTY DOLLARS AND NINETY FOUR CENTS
(Written in Words)

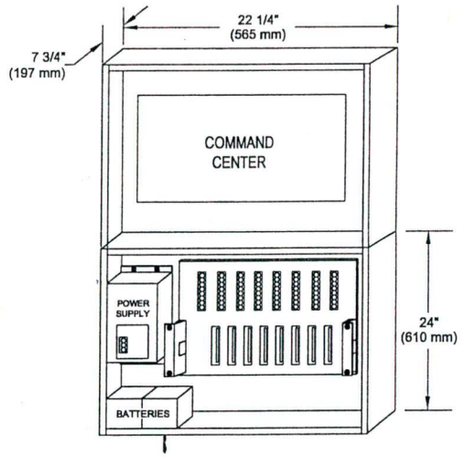
CONTRACTOR: IA CONSTRUCTION CORPORATION



FS90+ FIRE ALARM PANEL INTERNAL SCHEMATIC



FIRE ALARM PANEL POWER

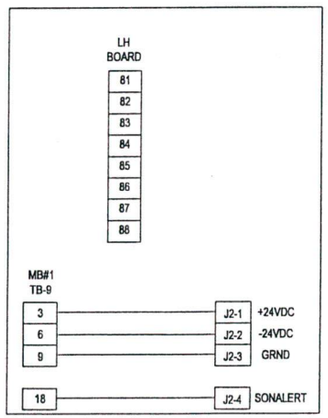


FIRE ALARM PANEL

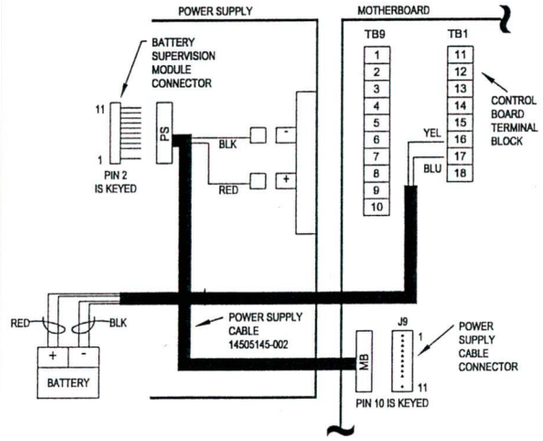
1 MOTHERBOARD

BILL OF MATERIALS

TOTAL	OS NUMBER	DESCRIPTION
		REMOTE DEVICES
3	S464A1144	MANUAL PULL STATION
1	TC806A1037	PHOTO-ELECTRIC SMOKE SENSOR
1	14506414-001	SENSOR MOUNTING BASE
2	TC809A1059	MONITOR MODULE (REMOTE DELUGE FOAM)
3	TC809A1059	MONITOR MODULE (TANK/ROOM TEMPERATURE)
3	TC809A1059	MONITOR MODULE (FIRE PUMP #1)
3	TC809A1059	MONITOR MODULE (FIRE PUMP #2)
3	TC809A1059	MONITOR MODULE (FIRE PUMP #3)
1	TC809A1059	MONITOR MODULE (WATERFLOW SWITCH)
20	TC809A1059	MONITOR MODULE (TAMPER SWITCH MONITOR)
1	TC810A1056	CONTROL MODULE (TO REMOTE STATION)
1	TC810A1056	CONTROL MODULE (WATER PMP FOAM SYSTEM)
3	TC810A1056	CONTROL MODULE (TO XMITTER)
7	14501600-027	END-OF-LINE RESISTOR
4	SC716B1027	HORN/STROBE
1	WBB-R	WEATHER-PROOF BACKBOX
		FIRE ALARM PANEL
1	14505102-004	MOTHERBOARD
1	14505151-005	CABINETS 2-UP
1	14505152-002	DOOR 2-UP
1	14505148-001	POWER SUPPLY
1	14506408-002	BATTERY SUPERVISORY MODULE
1	14505145-002	P.S. CABLE
1	14505146-001	CARD RETAINER
1	14505104-005	CA CARD
2	14506056-002	26AH BATTERY
1	14505377-001	BATTERY HARNESS
1	14505132-002	AE BOARD
1	14506788-004	LH BOARD
1	14506817-002	COMMAND CENTER
1	14506333-002	DEAD FRONT ASSEMBLY
1	14506344-001	LJ BOARD
1	14505110-003	BF BOARD
1	14506826-002	COMMAND CENTER CABLE



WIRING FOR COMMAND CENTER TO LH BOARD



BATTERY SUPERVISION MODULE WIRING DETAIL

NOTE: LEAVE RESISTOR ON BATTERY SUPERVISION MODULE CONNECTED TO MOTHERBOARD WITH CONTROL BOARD. REMOVE RESISTOR FROM ADDITIONAL BATTERY SUPERVISION MODULES, IF PRESENT.

LEGEND

- F — PULL STATION
- SD — SMOKE DETECTOR
- MM — MONITOR MODULE (STATUS)
- CM — CONTROL MODULE (ADDRESSABLE RELAY)
- W — WATERFLOW SWITCH
- T — TAMPER SWITCH
- F — HORN/STROBE UNIT (ADA)
- L — STROBE UNIT (ADA) *WP - WEATHER-PROOF*
- FACP — FIRE ALARM CONTROL PANEL

* NOT FURNISHED BY HONEYWELL

DRAWING NOTES

ARCHITECT: —
ENGINEER: —
CONTRACTOR: ENTERPRISE ELECTRIC
SYSTEMS ENGINEER: STEVE DOWNEY

FIRE ALARM CONTROL PANEL

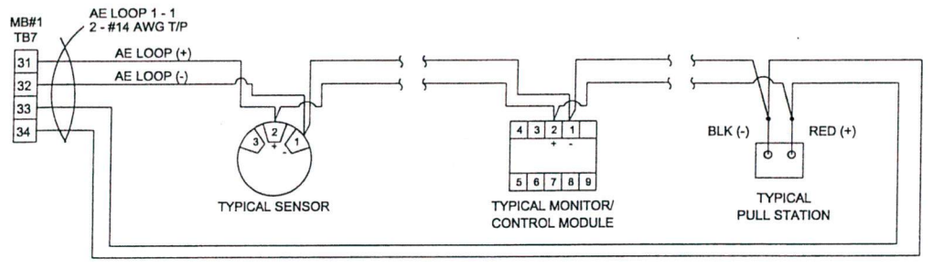
REVISIONS:		DATE	APPD.
G			
F			
E			
D			
C			
B	UPDATE BILL OF MATERIALS	10/29/99	JLC
A	FIRE MARSHALL ADDED DEVICES	7/20/99	SGD

Honeywell
217 International Circle
Hunt Valley, Maryland 21030

MARTIN STATE AIRPORT - PUMP HOUSE
GLENN L. MARTIN STATE AIRPORT
BALTIMORE, MARYLAND 21220

SUPERSEDES:	DRAWN BY: SGD	DATE 4/13/99	DRAWING NUMBER 494 - 28083 - 2DS	REV. B
SUPERSEDED BY:	APPROVED BY: SGD	SHEET 2 OF 5		

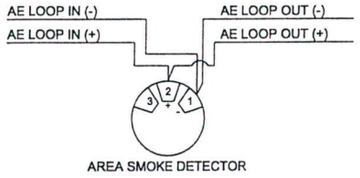
28282002.dwg



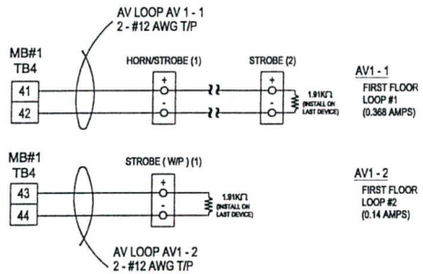
TYPICAL AE LOOP

AREA SERVED / DEVICE QUANTITY	AE LOOP	F	SD	W	T	F	L	L WP	MM	CM	FACP				
TOTAL DEVICES	1 - 1	2	1	1	19	1	2	1	22	6	1				
•															
•															
•															
•															
•															
•															

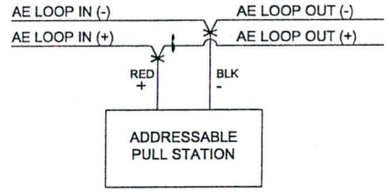
MARTIN STATE AIRPORT PUMP HOUSE DEVICE SCHEDULE



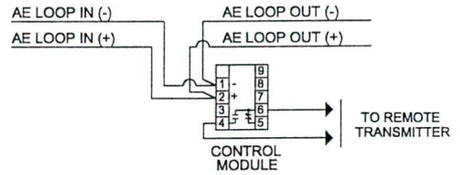
AREA SMOKE SENSOR



AUDIBLE/VISUAL CIRCUITS



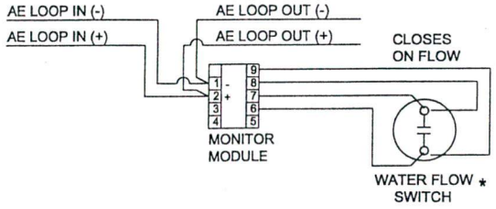
ADDRESSABLE PULL STATION



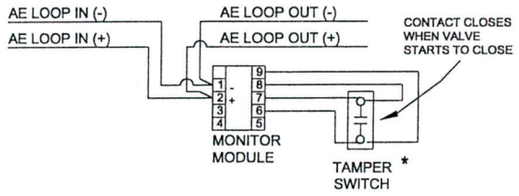
SYSTEM CONTROL OUTPUTS

- REMOTE STATION TRANSMITTER (1)
- MISCELLANEOUS HEATERS (3)

A

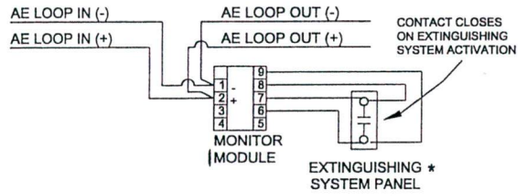


WATER FLOW SWITCH



VALVE TAMPER SWITCH

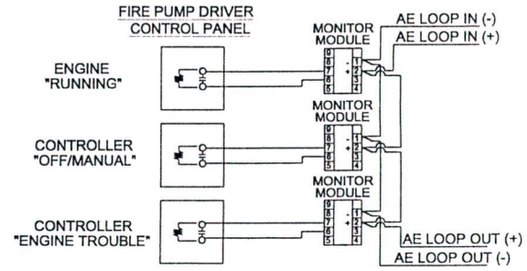
A



REMOTE SYSTEM MONITORING

- REMOTE DELUGE SYSTEM (2)
- TANK TEMPERATURE (2)
- ROOM TEMPERATURE (1)

A



FIRE PUMP CONTROLLER MONITORING

A

FIRE ALARM WIRING DETAILS

A *BREAK OFF TABS J1 AND J2 ON MODULES*

* *EQUIPMENT NOT PROVIDED BY HONEYWELL*

ARCHITECT: —
ENGINEER: —
CONTRACTOR: ENTERPRISE ELECTRIC
SYSTEMS ENGINEER: STEVE DOWNEY

28083003.dwg

FIRE ALARM WIRING DETAILS

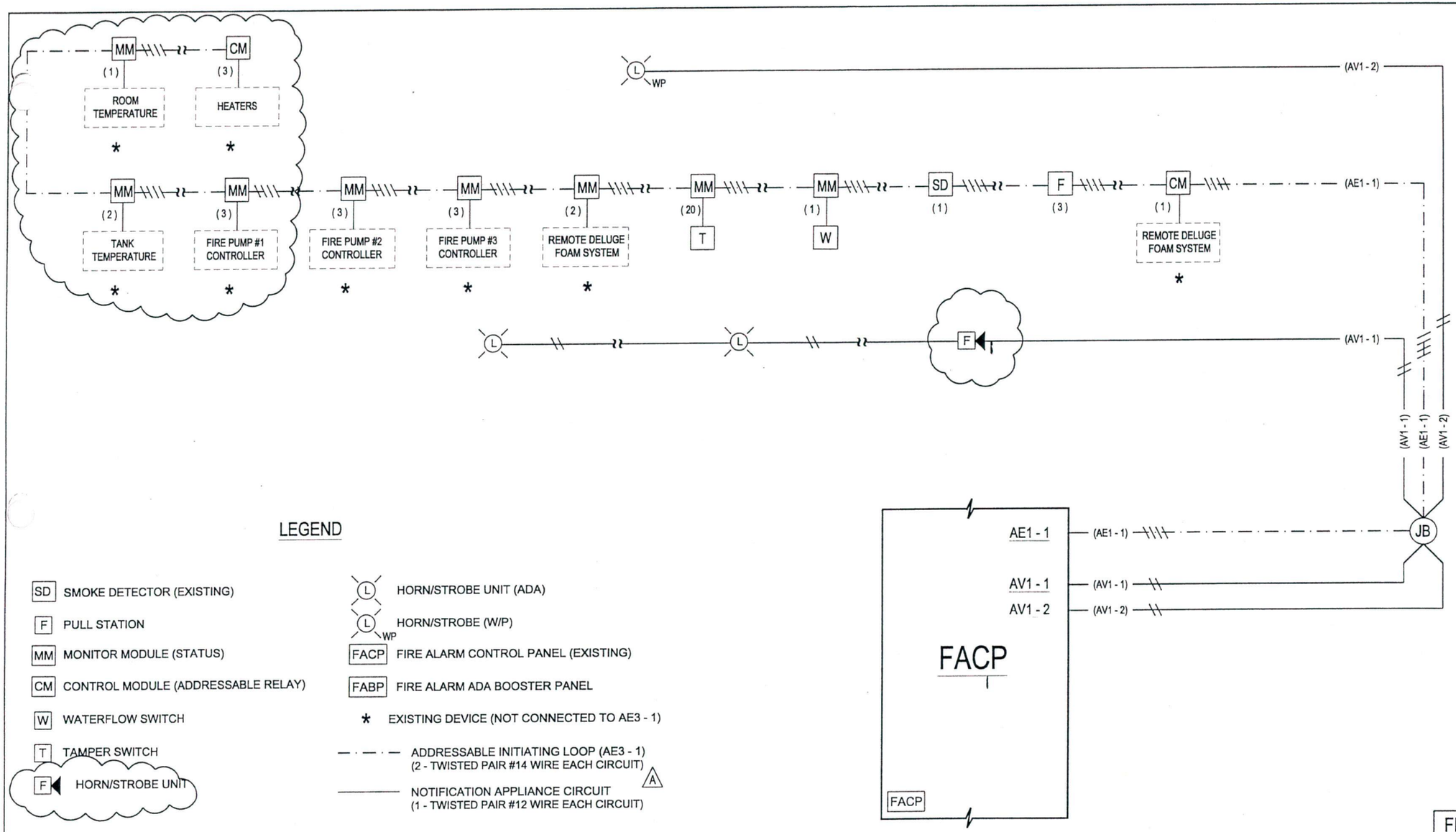
ControlCADD © Copyright, 1989
Patent #4885694

Honeywell
217 International Circle
Hunt Valley, Maryland 21030

MARTIN STATE AIRPORT - PUMP HOUSE
GLENN L. MARTIN STATE AIRPORT
BALTIMORE, MARYLAND 21220

REVISIONS:	DATE	APPD.
G		
F		
E		
D		
C		
B UPDATE DEVICE SCHEDULE	10/29/99	JLC
A FIRE MARSHALL ADDED DEVICES	7/20/99	SGD

SUPERSEDES:
SUPERSEDED BY:
DRAWN BY: SGD
APPROVED BY: SGD
DATE 4/15/99
SHEET 3 OF 5
DRAWING NUMBER 494 - 28083 - 3DS
REV. B



FIRE ALARM SYSTEM - ONE-LINE / RISER DIAGRAM

FIRE ALARM SYSTEM ARCHITECTURE AND RISER DIAGRAM

28083004.dwg

ARCHITECT: —
ENGINEER: —
CONTRACTOR: ENTERPRISE ELECTRIC
SYSTEMS ENGINEER: STEVE DOWNEY

REV.	REVISIONS:	DATE	APPD.
G			
F			
E			
D			
C			
B			
A	FIRE MARSHALL ADDED DEVICES	7/20/99	SGD

Honeywell
217 International Circle
Hunt Valley, Maryland 21030

MARTIN STATE AIRPORT - PUMP HOUSE
GLENN L. MARTIN STATE AIRPORT
BALTIMORE, MARYLAND 21220

SUPERSEDES:
SUPERSEDED BY:
DRAWN BY: SGD
APPROVED BY: SGD
DATE 4/15/99
SHEET 4 OF 5
DRAWING NUMBER 494 - 28083 - 4DS
REV. A

MARTIN STATE AIRPORT FIRE PUMP STATION
VALVE IDENTIFICATION SCHEDULE

VALVE I.D.	VALVE TYPE	DESCRIPTION	PROVISION	HONEYWELL EQUIPMENT
A	GATE VALVE	N.O. GATE VALVE: OUTER TANK SUPPLY ISOLATION	TAMPER SWITCH	MONITOR MODULE
B	GATE VALVE	N.O. GATE VALVE: INNER TANK SUPPLY ISOLATION	TAMPER SWITCH	MONITOR MODULE
C	GATE VALVE	N.O. GATE VALVE: INNER TANK OUTLET ISOLATION	TAMPER SWITCH	MONITOR MODULE
D	GATE VALVE	N.O. GATE VALVE: OUTER TANK OUTLET ISOLATION	TAMPER SWITCH	MONITOR MODULE
E	GATE VALVE	N.O. GATE VALVE: FP-1 SUCTION ISOLATION	TAMPER SWITCH	MONITOR MODULE
F	GATE VALVE	N.O. GATE VALVE: FP-2 SUCTION ISOLATION	TAMPER SWITCH	MONITOR MODULE
G	GATE VALVE	N.O. GATE VALVE: FP-3 SUCTION ISOLATION	TAMPER SWITCH	MONITOR MODULE
H	GATE VALVE	N.O. GATE VALVE: BACKFLOW PREVENTOR ISO.	TAMPER SWITCH	MONITOR MODULE
I	GATE VALVE	N.O. GATE VALVE: BACKFLOW PREVENTOR ISO.	TAMPER SWITCH	MONITOR MODULE
J	GATE VALVE	N.O. GATE VALVE: BACKFLOW PREVENTOR ISO.	TAMPER SWITCH	MONITOR MODULE
K	GATE VALVE	N.O. GATE VALVE: BACKFLOW PREVENTOR ISO.	TAMPER SWITCH	MONITOR MODULE
L	GATE VALVE	N.O. GATE VALVE: JOCKEY PUMP SUCTION ISO.		
M	GATE VALVE	N.O. GATE VALVE: JOCKEY PUMP DISCHARGE ISO.		
N	GATE VALVE	N.O. GATE VALVE: SPRINKLER SYSTEM ISO.	TAMPER SWITCH	MONITOR MODULE
O	BUTTERFLY	N.O. BUTTERFLY VLV: INLET MAIN ISOLATION	TAMPER SWITCH	MONITOR MODULE
P	BUTTERFLY	N.C. BUTTERFLY VLV: METER ISO. @ FP-1	CHAIN LOCK	
Q	BUTTERFLY	N.C. BUTTERFLY VLV: METER ISO. @ FP-2	CHAIN LOCK	
R	BUTTERFLY	N.C. BUTTERFLY VLV: METER ISO. @ FP-3	CHAIN LOCK	
S	BUTTERFLY	N.C. BUTTERFLY VLV: METER ISO. @ FP-1	CHAIN LOCK	
T	BUTTERFLY	N.C. BUTTERFLY VLV: METER ISO. @ FP-2	CHAIN LOCK	
U	BUTTERFLY	N.C. BUTTERFLY VLV: METER ISO. @ FP-3	CHAIN LOCK	
V	BUTTERFLY	N.O. BUTTERFLY VLV: FP-1 DISCHARGE ISO.	TAMPER SWITCH	MONITOR MODULE
W	BUTTERFLY	N.O. BUTTERFLY VLV: FP-2 DISCHARGE ISO.	TAMPER SWITCH	MONITOR MODULE
X	BUTTERFLY	N.O. BUTTERFLY VLV: FP-3 DISCHARGE ISO.	TAMPER SWITCH	MONITOR MODULE
Y	BUTTERFLY	N.O. BUTTERFLY VLV: HYDRANT ISOLATION	TAMPER SWITCH	MONITOR MODULE
Z	BUTTERFLY	N.O. BUTTERFLY VLV: FACILITY DISCHARGE ISO.	TAMPER SWITCH	MONITOR MODULE
AA	BUTTERFLY	N.O. BUTTERFLY VLV: DOMESTIC DISCHARGE ISO.	----------	
BB	BUTTERFLY	N.O. BUTTERFLY VLV: DOMESTIC SUPPLY ISO.	TAMPER SWITCH	MONITOR MODULE
CC	ALTITUDE	ALTITUDE VLV: OUTER TANK SUPPLY	----------	
DD	ALTITUDE	ALTITUDE VLV: INNER TANK SUPPLY	----------	
EE	CHECK VALVE	CHECK VLV: PUMP DISCHARGE FP-1,2&3	----------	
FF	CHECK VALVE	CHECK VLV: PUMP DISCHARGE HEADER	----------	
GG	CHECK VALVE	CHECK VLV: PUMP DISCHARGE @ JOCKEY PUMP	----------	
HH	CHECK VALVE	CHECK VLV: STORZ & SIAMESE CONNECTION	----------	
II	INDICATING VLV	N.O. OS&Y VALVE	----------	MONITOR MODULE
----------	----------	TENANT FOAM SYSTEM FLOWING	----------	MONITOR MODULE
----------	----------	LOW PUMPHOUSE ROOM TEMPERATURE	----------	MONITOR MODULE
----------	----------	LOW TANK WATER TEMPERATURE (OUTER TANK)	----------	MONITOR MODULE
----------	----------	LOW TANK WATER TEMPERATURE (INNER TANK)	----------	MONITOR MODULE
----------	----------	START PUMPHOUSE HEATER	----------	CONTROL MODULE
----------	----------	START WATER PUMP FOR FOAM SYSTEM	----------	CONTROL MODULE

FIRE ALARM SYSTEM VALVE IDENTIFICATION SCHEDULE

28083004.dwg

ARCHITECT: —
ENGINEER: —
CONTRACTOR: ENTERPRISE ELECTRIC
SYSTEMS ENGINEER: STEVE DOWNEY

FIRE ALARM SYSTEM - VALVE IDENTIFICATION SCHEDULE

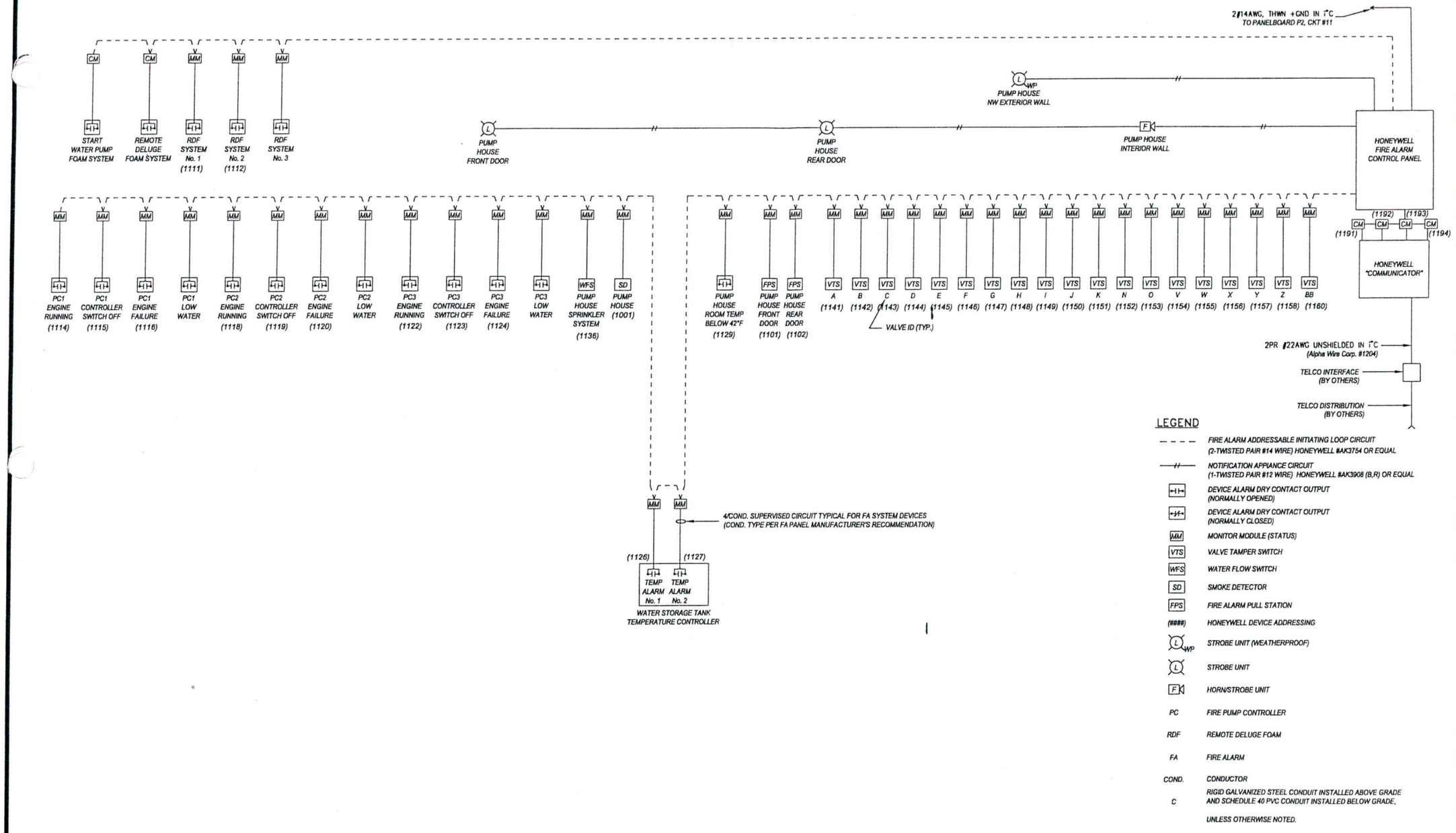
Honeywell
PULL DOWN
FIRE

REVISIONS:		DATE	APPD.
A	FIRE MARSHALL ADDED DEVICES	7/20/99	SGD

Honeywell
217 International Circle
Hunt Valley, Maryland 21030

MARTIN STATE AIRPORT - PUMP HOUSE
GLENN L. MARTIN STATE AIRPORT
BALTIMORE, MARYLAND 21220

SUPERSEDES:
SUPERSEDED BY:
DRAWN BY: SGD
APPROVED BY: SGD
DATE 7/26/99
SHEET 5 OF 5
DRAWING NUMBER 494 - 28083 - 5DS
REV. A



LEGEND

- - - -	FIRE ALARM ADDRESSABLE INITIATING LOOP CIRCUIT (2-TWISTED PAIR #14 WIRE) HONEYWELL #AK3754 OR EQUAL
——// ——	NOTIFICATION APPLIANCE CIRCUIT (1-TWISTED PAIR #12 WIRE) HONEYWELL #AK3908 (B,R) OR EQUAL
⊣⊢	DEVICE ALARM DRY CONTACT OUTPUT (NORMALLY OPENED)
⊣/⊢	DEVICE ALARM DRY CONTACT OUTPUT (NORMALLY CLOSED)
MM	MONITOR MODULE (STATUS)
VTS	VALVE TAMPER SWITCH
WFS	WATER FLOW SWITCH
SD	SMOKE DETECTOR
FPS	FIRE ALARM PULL STATION
(####)	HONEYWELL DEVICE ADDRESSING
L WP	STROBE UNIT (WEATHERPROOF)
L	STROBE UNIT
F	HORN/STROBE UNIT
PC	FIRE PUMP CONTROLLER
RDF	REMOTE DELUGE FOAM
FA	FIRE ALARM
COND.	CONDUCTOR
C	RIGID GALVANIZED STEEL CONDUIT INSTALLED ABOVE GRADE AND SCHEDULE 40 PVC CONDUIT INSTALLED BELOW GRADE, UNLESS OTHERWISE NOTED.

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	ME
DRAWN	ME
CHECKED	JM
APPROVED	TS

STATE OF MARYLAND — DEPARTMENT OF TRANSPORTATION — LICENSE NO. 21434 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	8/30/99	Added room temp monitoring & revised device alarm contacts.
2	9/10/99	ADD HONEYWELL ADDRESSING
3	10/28/99	REMOVED ITEMS NOT ON FIRE SYSTEM

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

PROJECT NO.: MAA-CO-97-019

SHEET TITLE: CONTROL INTERCONNECTIONS

SCALE: AS SHOWN

DATE: AUGUST 23, 1999

SHEET NO.: E-10A

THIS DOCUMENT HAS BEEN REVIEWED FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT ONLY.

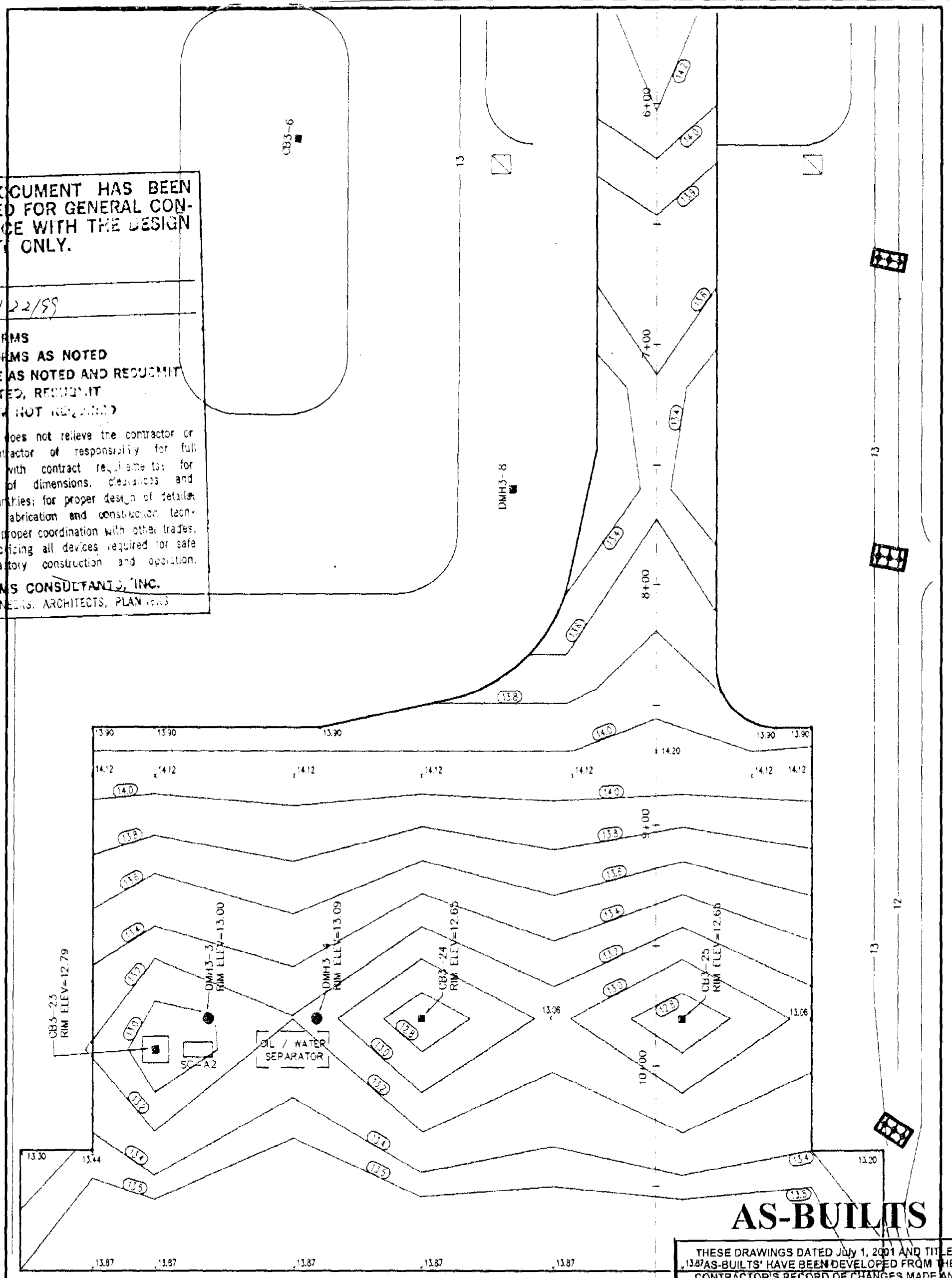
BY TS

DATE 6/22/99

- [x] CONFORMS
- [ ] CONFORMS AS NOTED
- [ ] REVISE AS NOTED AND RESUBMIT
- [ ] REJECTED, RESUBMIT
- [ ] REVIEW NOT REQUIRED

This review does not relieve the contractor or any subcontractor of responsibility for full compliance with contract requirements; for correctness of dimensions, clearances and material quantities; for proper design of details for proper fabrication and construction techniques; for proper coordination with other trades; and for providing all devices required for safe and satisfactory construction and operation.

TAMS CONSULTANTS, INC.
ENGINEERS, ARCHITECTS, PLANNERS



AS-BUILTS

THESE DRAWINGS DATED July 1, 2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

AS-BUILT

LOCKHEED MARTIN CORPORATION
HANGAR/OFFICES

SCALE: 1" = 40'	DATE 6/15/99
DR. BY JMA	CHK'D BY AEL
DWG. NO. APRON	PROJ. NO. MARTINS

ENGINEER
STATE OF THE ART CIVIL ENGINEERING, INC.
206 SOUTH HAYS STREET
BEL AIR, MARYLAND 21014
PHONE: 410-879-8055

APRON GRADING PLAN

MARTIN STATE AIRPORT

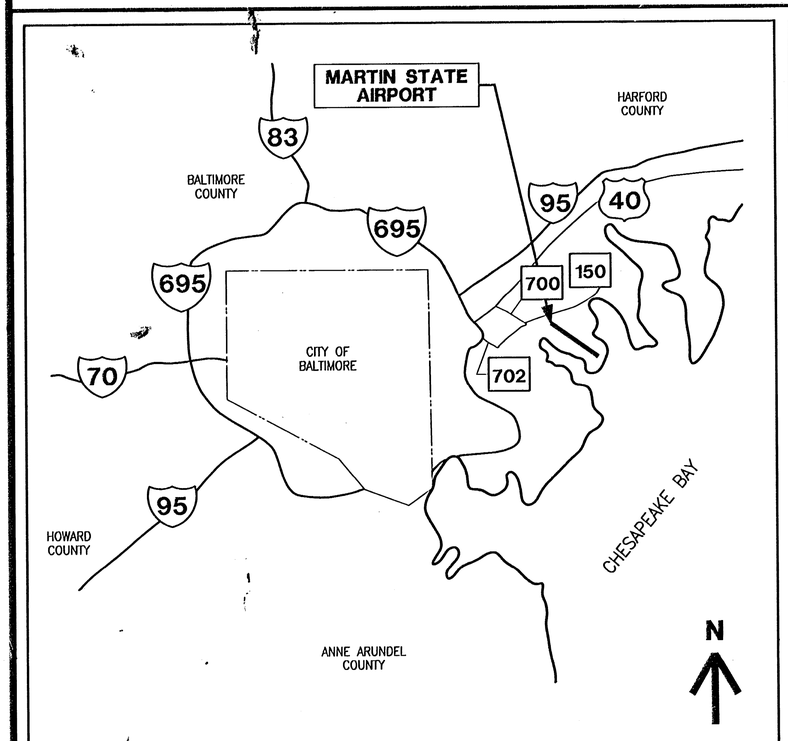
MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION

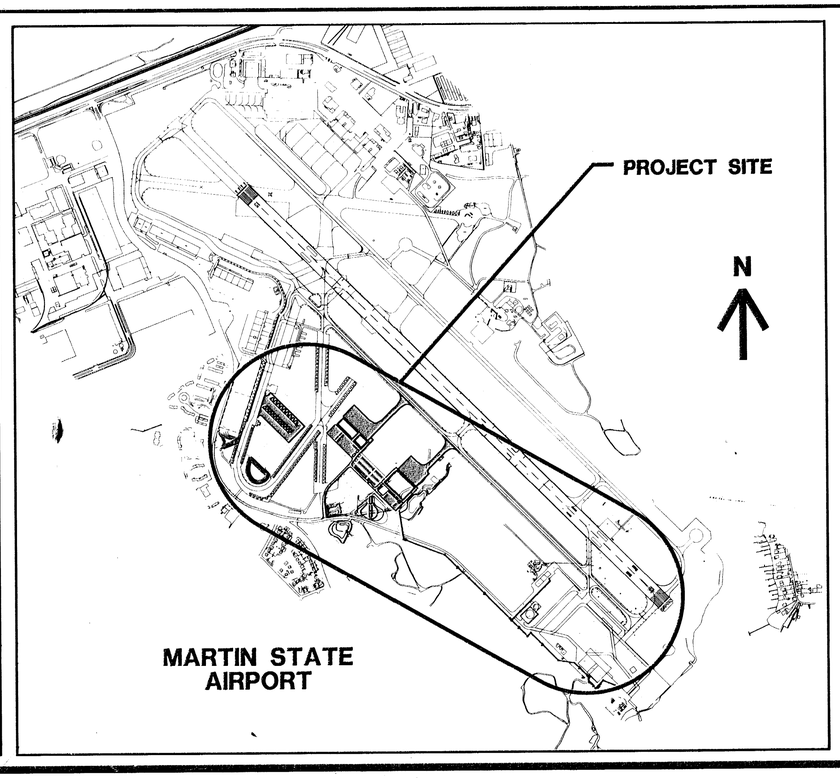
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT, PHASE 1

CONTRACT NO. MAA-CO-97-019
A.I.P. PROJECT NO. N/A

VICINITY MAP



SITE MAP



LIST OF DRAWINGS

FOR DRAWING INDEX SEE SHEET G-02.

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

MARTIN STATE AIRPORT

MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING
DIVISION OF ENGINEERING

APPROVED 9-3-98 DATE

GENERAL

G-01	TITLE SHEET
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THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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INFORMATION DRAWING

BGE SUPPLY ELEC. SERVICE - PROJ NO. WMS-292621

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REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: DRAWING INDEX

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: G-02

GENERAL NOTES

1. THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS AND ANY RULES, REGULATIONS, STANDARDS OR SPECIFICATIONS REFERENCED THEREIN. THE PROJECT IS SUBJECT TO INSPECTION BY REPRESENTATIVES OF THE MARYLAND AVIATION ADMINISTRATION (MAA) AND THE MARYLAND DEPARTMENT OF THE ENVIRONMENT (MDE).

2. MARTIN STATE (MTN) AIRPORT WILL BE IN OPERATION DURING THE CONSTRUCTION OF THE PROJECT. COORDINATION OF WORK WITH MAA IS MANDATORY TO MINIMIZE IMPACTS ON AIRPORT OPERATIONS.

3. CONSTRUCTION AND MAINTENANCE OPERATIONS BY OTHERS WILL OCCUR CONCURRENTLY, AND AT TIMES IN THE VICINITY OF CONSTRUCTION ASSOCIATED WITH THIS CONTRACT. THE CONTRACTOR SHALL COORDINATE HIS OPERATIONS AND COOPERATE WITH MAINTENANCE CREW AND OTHERS CONTRACTORS WORKING ON THE AIRPORT. COORDINATION WITH APPROPRIATE GOVERNMENT AND UTILITY AGENCIES IS ALSO REQUIRED.

4. ACCESS TO THE SITE – THE CONTRACTOR'S ACCESS POINTS TO THE SITE ARE SHOWN ON THE PLAN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION VEHICLES AND PERSONNEL WHO ENTER AT THESE POINTS.

5. HAUL ROUTES – LOCATION OF HAUL ROUTES ON THE AIRPORT SITE WILL BE SPECIFIED AT THE PRE-BID MEETING. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF-SITE HAUL ROUTES (STATE HIGHWAYS, COUNTY ROADS, OR CITY STREETS) WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE. ON-SITE HAUL ROUTES SHALL BE MAINTAINED BY THE CONTRACTOR AND SHALL BE RESTORED TO THE ORIGINAL CONDITION UPON COMPLETION OF BEING USED AS A HAUL ROUTE. THE BEFORE AND AFTER CONDITION OF ON-SITE HAUL ROUTES SHALL BE JOINTLY INSPECTED AND DETERMINED BY THE CONTRACTOR AND THE ENGINEER. CONSTRUCTION (FENCING, GRADING, DRAINAGE, ETC.)REQUIRED FOR TEMPORARY HAUL ROUTES OR ACCESS POINTS ON THE AIRPORT WILL BE THE CONTRACTOR'S TOTAL RESPONSIBILITY AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO COMMENCING THE WORK. ALL ON-SITE ACCESS ROADS TO THE T-HANGARS AND OTHER AIRPORT FACILITIES SHALL REMAIN OPEN AND MAINTAINED AT ALL TIME.

6. STAGING AREAS – CONTRACTOR'S STAGING AREA(S) WILL BE SPECIFIED AT THE PRE-BID MEETING. CONTRACTOR'S STAGING AREA(S) SHALL BE RETURNED TO ITS ORIGINAL CONDITION UPON COMPLETION.

7. WASTE MATERIALS (i.e. TREES, STUMPS, EXCESS SOIL, ETC.) SHALL BE DISPOSED OF OFF AIRPORT PROPERTY. TRASH (i.e. CUPS, CANS, ETC.) SHALL BE DISPOSED OF THROUGH PROPER SANITARY METHODS.

8. SAFETY – THE CONTRACTOR SHALL CONDUCT HIS ACTIVITIES IN A SAFE MANNER AS SPECIFIED IN THE "SAFETY REQUIREMENTS DURING CONSTRUCTION" SECTION.

9. PROTECTION AND REPAIR OF DAMAGE TO EXISTING CABLES AND UTILITIES – LOCATION OF KNOWN EXISTING AIRPORT UNDERGROUND CABLES AND UTILITIES ARE SHOWN ON THE PLANS FROM AVAILABLE RECORDS AND MUST BE VERIFIED BY THE CONTRACTOR. TEST PITS ARE REQUIRED TO VERIFY UTILITY LOCATIONS NOT SHOWN ON THE PLANS, BUT EVIDENT FROM ADJACENT FACILITIES (LIGHTING POSTS, MANHOLES, ETC.) REPAIR OF DAMAGED CABLE/PIPE MUST BE STARTED IMMEDIATELY AND CONTINUED UNTIL COMPLETED. ALL SUCH REPAIRS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS AND SHALL BE THE CONTRACTOR'S EXPENSE. IF FAA CABLES ARE DAMAGED, REPAIRS SHALL BE DONE IN ACCORDANCE WITH FAA REQUIREMENTS AND IN THE PRESENCE OF AN FAA REPRESENTATIVE. THE FAA MAY ELECT TO HAVE THE REPAIR PERFORMED BY OTHERS IN WHICH CASE THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING THE INCURRED COSTS OF REPAIRS.

10. EXISTING AIRFIELD LIGHTING SYSTEMS – INTERRUPTION TO EXISTING AIRFIELD LIGHTING SYSTEMS NOT INCLUDED IN THIS PROJECT SHALL NOT BE PERMITTED. ALL AIRFIELD LIGHTING CIRCUITS AFFECTED BY THIS PROJECT SHALL BE TEMPORARILY MAINTAINED BY THE CONTRACTOR DURING OPERATIONAL PERIODS IN ACCORDANCE WITH THE SPECIFICATIONS AND/OR AS DIRECTED BY THE ENGINEER.

11. PORTABLE FLOODLIGHTING – THE CONTRACTOR SHALL PROVIDE PORTABLE FLOODLIGHTING AS REQUIRED FOR CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL PROVIDE SUFFICIENT UNITS SO THAT ALL WORK AREAS ARE ILLUMINATED TO A LEVEL OF FIVE (5) HORIZONTAL FOOT CANDLES. THE LIGHTING LEVEL SHALL BE CALCULATED AND MEASURED IN ACCORDANCE WITH THE CURRENT STANDARD OF THE ILLUMINATION ENGINEERING SOCIETY. COORDINATE THE USE OF FLOODLIGHTING WITH THE CONTROL TOWER TO ENSURE LIGHT DOES NOT COMPROMISE THE CONTROL TOWER'S VISIBILITY, OR CREATE CONFUSION FOR THE PILOTS.

12. THE CONTRACTOR SHALL OBTAIN ALL PERMITS AND LICENSES REQUIRED FOR FOR THE PROJECT'S WORK AT HIS OWN EXPENSE.

13. EXISTING TOPOGRAPHIC FIELD SURVEYS FOR THIS PROJECT AREA WERE PERFORMED BY A. MORTON THOMAS AND ASSOCIATES, INC. IN 1997.

14. THE CONTROLS ON THIS PROJECT ARE TIED TO :
HORIZONTAL: MARYLAND COORDINATE SYSTEM.
VERTICAL: NATIONAL GEODETIC VERTICAL DATUM 1929.

15. FOR WETLAND MITIGATION PLANS AND SPECIFICATIONS, SEE WETLAND MITIGATION PLAN AND SPECIFICATION SETS BY URS GREINER, INC. UNDER SEPARATE COVER.

16. FOR LIMIT OF BASE PROJECT, AND EACH ALTERNATE, THE CONTRACTOR IS REQUIRED TO FOLLOW SHEETS G-08 THROUGH G-11, D-01 THROUGH D-06, ALL A-SERIES, AND ALL C-SERIES SHEETS.

CONSTRUCTION NOTES

1. THE FOLLOWING NOTES ALONG WITH THE GENERAL AND SAFETY REQUIREMENTS DURING CONSTRUCTION NOTES WILL ALERT THE CONTRACTOR TO AIRPORT OPERATING REQUIREMENTS AND PROCEDURES, AND WILL ENSURE THAT THE EFFECTS OF CONSTRUCTION ON AIRPORT OPERATIONS AND USERS WILL BE MINIMIZED.

2. THE WORK TO BE COMPLETED IN THIS PROJECT WILL DISRUPT AIRCRAFT OPERATIONS AT MTN AIRPORT. THEREFORE, THE LENGTH OF TIME THAT THE CONTRACTOR WILL BE ALLOWED TO PERFORM THE WORK IN OPERATIONAL AREAS MUST BE REDUCED TO THE MINIMUM PRACTICAL TIME.

3. THE PROJECT IS TO BE COMPLETED IN CLOSE CONFORMANCE WITH THE CONSTRUCTION PLANS AND SHALL BE CONSTRUCTED IN A TIMELY MANNER IN ACCORDANCE WITH THE CONTRACTOR'S APPROVED PROJECT SCHEDULE.

4. IT IS THE INTENT OF THIS CONTRACT THAT THE WORK WILL BE PERFORMED WITHIN THE CONSTRUCTION TIMES SPECIFIED AND THAT NO EXTENSION WILL BE GRANTED FOR INCLEMENT WEATHER. CONTRACTOR MUST ANTICIPATE INCLEMENT WEATHER AND TAKE NECESSARY ACTION TO COMPLETE THE WORK IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS DESPITE ANY INCLEMENT WEATHER.

5. THE MOST CRITICAL PORTION OF THE PROJECT AFFECTING AIRPORT OPERATIONS IS THE CONSTRUCTION OF NEW PAVEMENT AND DRAINAGE ITEMS WITHIN THE SAFETY AREA OF THE EXISTING TAXIWAY AND T-HANGARS. THE WORK WILL REQUIRE THE TEMPORARY DAILY CLOSURES OF THESE FACILITIES WHICH WILL SERIOUSLY CURTAIL THE GENERAL AVIATION TRAFFIC AT THE AIRPORT. THEREFORE, SPECIAL PHASING AND CONSTRUCTION TECHNIQUES (INCLUDING MULTI-SHIFT CONSTRUCTION) WILL BE REQUIRED TO LIMIT THE TIME OF DAILY CLOSURES TO THE MINIMUM POSSIBLE.

6. OTHER CONSTRUCTION CONTRACTS WITHIN THE AIRPORT, SOME IMMEDIATELY ADJACENT TO THIS CONTRACT, HAVE BEEN OR WILL BE UNDERTAKEN DURING THE TIME WHICH THIS PROJECT WILL BE CONSTRUCTED. THE CONTRACTOR SHALL COOPERATE AND COORDINATE WITH CONTRACTORS WORKING IN ADJACENT AREAS.

7. IT IS INTENDED THAT EQUIPMENT AND MATERIALS NEEDED FOR THE CONSTRUCTION WILL BE STORED IN THE DESIGNATED CONTRACTOR'S STAGING AREA. EQUIPMENT AND MATERIALS NECESSARY AT THE WORK AREAS SHALL BE TRANSPORTED TO THOSE AREAS ONLY AS NECESSARY TO MEET APPROVED SCHEDULES OR AS APPROVED BY THE ENGINEER.

8. THE CONTRACTOR SHALL PROVIDE TIMBER OR BARREL-TYPE CONSTRUCTION BARRICADES WITH FLASHING YELLOW LIGHTS TO DELINEATE THE WORK AREAS WHEN THESE AREAS ARE CLOSED TO AIRPORT TRAFFIC. THESE BARRICADES SHALL BE PLACED AS DIRECTED BY THE ENGINEER. THE BARRICADE TYPE USED SHALL BE AS DESIGNATED BY THE ENGINEER.

SAFETY REQUIREMENTS DURING CONSTRUCTION

(A) FEDERAL AVIATION ADMINISTRATION (FAA) ADVISORY CIRCULARS (AC) AND ORDERS AND FEDERAL AVIATION REGULATIONS (FAR)

THE FOLLOWING PUBLICATIONS CONTAIN DEFINITIONS/DESCRIPTIONS OF CRITICAL AIRPORT OPERATING AREAS. THE AREAS DEFINED BELOW PERTAIN TO AIRFIELD SAFETY REQUIREMENTS AND ARE REFERENCED THROUGHOUT THE CONTRACT DOCUMENTS. COPIES OF THESE PUBLICATIONS ARE AVAILABLE THROUGH THE FAA AND CAN BE REVIEWED AT MARYLAND AVIATION ADMINISTRATION OFFICES.

(1) ORDER EA 5210.1 "SAFETY REQUIREMENTS ON AIRPORT DURING AGENCY FUNDED CONSTRUCTION AND MAINTENANCE ACTIVITIES," CURRENT EDITION: ESTABLISHED EASTERN REGION AIRPORT SAFETY STANDARDS FOR FAA-FUNDED CONSTRUCTION. THE SAFETY REQUIREMENTS WHICH ARE CONTAINED IN THE FOLLOWING SECTIONS ARE DEVELOPED TO MEET THE NEEDS OF THIS CONTRACT AND ARE BASED ON THIS ORDER AND THE REMAINING PUBLICATIONS DESCRIBED. WHERE THE PUBLICATIONS ARE IN CONFLICT, THE MOST RESTRICTIVE REQUIREMENT SHALL BE MET.

(2) AC 150/5370-2, "OPERATIONAL SAFETY ON AIRPORTS DURING CURRENT EDITION: CONSTRUCTION," SETS FORTH GUIDELINES TO ASSIST OPERATIONS IN COMPLYING WITH FAR PART 139, "CERTIFICATION AND OPERATION/LAND AIRPORTS SERVING CERTAIN AIR CARRIERS" AND WITH FEDERALLY FUNDED REQUIREMENTS OF CONSTRUCTION PROJECTS.

(3) FAR PART 77, "OBJECTS AFFECTING NAVIGABLE AIRSPACE," CURRENT EDITION:

(a) ESTABLISHES STANDARDS FOR DETERMINING OBSTRUCTIONS TO NAVIGABLE AIRSPACE. CIVIL AIRPORT IMAGINARY SURFACES ARE DEFINED IN THE PUBLICATION.

(b) SETS FORTH REQUIREMENTS FOR NOTICE OF CERTAIN PROPOSED CONSTRUCTION OR ALTERATION. NOTICE OF CONSTRUCTION PROVIDES A BASIS FOR RECOMMENDATIONS FOR IDENTIFYING THE CONSTRUCTION IN ALTERATION IN ACCORDANCE WITH AS 70f7460-1, OBSTRUCTION "MARKING AND LIGHTING," CURRENT EDITION.

(4) AC 150/5300-12, "AIRPORT DESIGN STANDARDS-TRANSPORT AIRPORTS" AND AC 150/5300-4, "UTILITY AIRPORTS – AIR ACCESS TO NATIONAL TRANSPORTATION," CURRENT EDITION: ESTABLISH DESIGN, OPERATIONAL AND MAINTENANCE STANDARDS FOR TRANSPORT AND UTILITY AIRPORTS, STANDARD TERMS USED IN THE CONTRACT PLANS AND SPECIFICATIONS ARE DEFINED BELOW:

(a) OBSTACLE FREE ZONE (OFZ) – A VOLUME OF SPACE WHICH IS FREE OF ALL FIXED OBJECTS AND CLEAR OF VEHICLES IN THE PROXIMITY OF AN AIRPLANE CONDUCTING AN APPROACH, MISSED APPROACH, LANDING, TAKEOFF, OR DEPARTURE.

(b) SAFETY AREA – THE SURFACE ADJACENT TO RUNWAYS, TAXIWAYS, AND TAXILANES OVER WHICH AIRCRAFT SHOULD, IN DRY WEATHER, BE ABLE TO CROSS AT NORMAL OPERATING SPEEDS WITHOUT INCURRING SIGNIFICANT DAMAGE. A SAFETY AREA IS GRADED, DRAINED AND COMPACTED. IT IS FREE OF ANY HOLES, TRENCHES, HUMPS OR OTHER SIGNIFICANT SURFACE VARIATIONS OR OBJECTS, OTHER THAN THOSE WHICH MUST BE THERE BECAUSE OF THEIR ESSENTIAL AERONAUTICAL FUNCTION. THE SAFETY AREA REQUIRES THE CAPABILITY OF SUPPORTING MAINTENANCE, FIRE FIGHTING, AND RESCUE VEHICLES UNDER NORMAL (DRY) CONDITIONS.

(B) GENERAL SAFETY REQUIREMENTS

(1) THE CONTRACTOR SHALL ACQUAINT HIS SUPERVISORS AND EMPLOYEES WITH THE AIRPORT ACTIVITY AND OPERATIONS THAT ARE INHERENT TO MTN AIRPORT AND SHALL CONDUCT HIS CONSTRUCTION ACTIVITIES TO CONFORM TO ALL ROUTINE AND EMERGENCY AIR TRAFFIC REQUIREMENTS AND GUIDELINES FOR SAFETY SPECIFIED HEREIN.

(2) DURING PERFORMANCE OF THIS CONTRACT, THE AIRPORT TAXIWAYS, TAXILANES, AND GENERAL AVIATION PARKING APRONS SHALL REMAIN IN USE BY AIRCRAFT TO THE MAXIMUM EXTENT POSSIBLE. ALL AIRCRAFT TRAFFIC ON THESE AREAS SHALL HAVE PRIORITY OVER THE CONTRACTOR TRAFFIC. MAA RESERVES THE RIGHT TO ORDER THE CONTRACTOR AT ANY TIME TO VACATE THE AREA NECESSARY TO MAINTAIN SAFE AIRCRAFT OPERATIONS. USE OF AREAS NEAR THE CONTRACTOR'S WORK WILL BE CONTROLLED TO MINIMIZE DISTURBANCE TO THE CONTRACTOR'S OPERATION. THE CONTRACTOR SHALL NOT ALLOW SUBCONTRACTORS, SUPPLIERS, OR ANY OTHER UNAUTHORIZED PERSON TO ENTER OR REMAIN IN ANY AIRPORT AREA WHICH WOULD BE HAZARDOUS TO PERSONS OR TO AIRCRAFT OPERATIONS.

(3) ALL WORK TO BE PERFORMED WHICH IS TOO CLOSE TO AN ACTIVE RUNWAY, TAXIWAY OR APRON UNDER OPERATIONAL CONDITIONS SHALL BE PERFORMED WHEN THE RUNWAY, TAXIWAY OR APRON IS NOT IN USE. SUCH WORK SHALL NOT BE ACCOMPLISHED WITHOUT PRIOR PERMISSION FROM THE ENGINEER. REQUESTED CLOSING SHALL BE DIRECTED TO THE ENGINEER AT LEAST 48 HOURS IN ADVANCE. WHEREVER POSSIBLE CLOSURE WILL BE SCHEDULED TO ALLOW DAY TIME WORK BY THE CONTRACTOR. HOWEVER, DUE TO AIR TRAFFIC CONSTRAINTS, CLOSURE OF ACTIVE AIRFIELD AREAS MAY BE LIMITED TO NIGHTTIME HOURS.

(C) CONSTRUCTION AND FACILITIES MAINTENANCE

(1) THE CONTRACTOR SHALL BE AWARE OF AND TAKE STEPS TO PREVENT THE FOLLOWING TYPES OF SAFETY PROBLEMS AND/OR HAZARDS:

(a) TRENCHES, HOLES, OR EXCAVATIONS ON OR ADJACENT TO ANY OPEN RUNWAY OR IN SAFETY AREAS.

(b) UNMARKED AND UNLIGHTED HOLES OR EXCAVATION IN ANY APRON, OPEN TAXIWAY, OPEN TAXILANE, OR RELATED SAFETY AREA.

(c) MOUNDS OR PILES OF EARTH, CONSTRUCTION MATERIALS, TEMPORARY STRUCTURES, OR OTHER OBJECTS IN THE VICINITY OF THE OPEN RUNWAY, TAXIWAYS, TAXILANES, OR IN A RELATED SAFETY APPROACH, OR DEPARTURE AREA.

(d) VEHICLES OR EQUIPMENT (WHETHER OPERATING OR IDLE) ON ANY OPEN RUNWAY, TAXIWAY, TAXILANE, OR IN ANY RELATED SAFETY, APPROACH, OR DEPARTURE AREA.

(e) VEHICLES, EQUIPMENT, EXCAVATIONS, STOCKPILES, OR OTHER MATERIALS WHICH COULD DEGRADE OR OTHERWISE INTERFERE WITH ELECTRONIC SIGNALS FROM RADIOS OR ELECTRONIC NAVIGATIONAL AIDS.

(f) PAVEMENT DROP-OFFS OR PAVEMENT TURF-LIPS (EITHER PERMANENT OR TEMPORARY) WHICH COULD CAUSE DAMAGE TO AIRCRAFT, IF CROSSED AT NORMAL OPERATING SPEED. THE NORMAL MAXIMUM IS 1-1/2 INCHES FOR EITHER.

(g) UNMARKED UTILITY, NAVAID, WEATHER SERVICES, LIGHTING, OR OTHER POWER OR SIGNAL CABLES THAT COULD BE DAMAGED DURING CONSTRUCTION.

(h) OBJECTS (WHETHER OR NOT MARKED OR FLAGGED) OR ACTIVITIES ANYWHERE ON OR IN THE VICINITY OF AIRPORT WHICH COULD BE DISTRACTING, CONFUSING, OR ALARMING TO PILOTS DURING AIRCRAFT OPERATIONS.

(i) UNFLAGGED/UNLIGHTED LOW VISIBILITY ITEMS (SUCH AS TALL CRANES, DRILLS, AND THE LIKE) ANYWHERE IN THE VICINITY OF ACTIVE RUNWAYS, OR IN ANY APPROACH OR DEPARTURE AREA.

(j) MISLEADING OR MALFUNCTIONING OBSTRUCTION LIGHTS, OR UNLIGHTED/UNMARKED OBSTRUCTIONS IN THE APPROACH TO ANY ACTIVE RUNWAY.

(k) INADEQUATE APPROACH/DEPARTURE SURFACES (NEEDED TO ASSURE ADEQUATE LANDING/TAKEOFF CLEARANCE OVER OBSTRUCTIONS, OR WORK OR STORAGE AREAS).

(l) INADEQUATE, CONFUSING OR MISLEADING (TO USER PILOTS) MARKING/LIGHTING OF RUNWAYS, TAXIWAYS, OR TAXILANES (INCLUDING DISPLACED OR THRESHOLD).

(m) WATER, SNOW, DIRT, DEBRIS, OR OTHER TRANSIENT ACCUMULATION WHICH TEMPORARILY OBSCURES PAVEMENT MARKING, PAVEMENT EDGES, OR DEGRADES VISIBILITY OF RUNWAY/TAXIWAY MARKING, OR LIGHTING, OR OF CONSTRUCTION AND MAINTENANCE AREAS.

(n) INADEQUATE OR IMPROPER METHODS OF MARKING, BARRICADING, AND LIGHTING OF TEMPORARILY CLOSED PORTIONS OF AIRPORT OPERATIONS AREA.

(o) TRASH OR OTHER MATERIALS WITH FOREIGN OBJECT DAMAGE (FOD) POTENTIAL, WHETHER ON RUNWAYS, TAXIWAYS, OR APRONS, OR IN RELATED SAFETY AREAS.

(p) INADEQUATE BARRICADING OR OTHER DELINEATION (MARKING, ETC.), TO SEPARATE CONSTRUCTION OR MAINTENANCE AREAS FROM OPEN AIRCRAFT OPERATING AREAS.

(q) FAILURE TO CONTROL VEHICLE AND HUMAN ACCESS TO, AND NONESSENTIAL NONAERONAUTICAL ACTIVITIES, IN ACTIVE AIRCRAFT OPERATING AREAS.

(r) FAILURE TO MAINTAIN RADIO COMMUNICATION BETWEEN CONSTRUCTION/MAINTENANCE VEHICLES AND AIR TRAFFIC CONTROL TOWER. GROUND CONTROL FREQUENCY OF 121.8 MHz IS TO BE UTILIZED.

(s) CONSTRUCTION/MAINTENANCE ACTIVITIES OR MATERIALS WHICH COULD HAMPER AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) VEHICLE ACCESS FROM ARFF STATIONS TO ALL PARTS OF THE RUNWAY/TAXIWAY SYSTEM, TO RUNWAY APPROACH AND DEPARTURE AREAS, AND TO AIRCRAFT PARKING LOCATIONS.

(t) BIRD ATTRACTANTS ON AIRPORT SUCH AS EDIBLES (FOOD SCRAPS ETC.) OR OTHER MISCELLANEOUS GARBAGE, OTHER TRASH, OR PONDED WATER ON AIRPORT.

(2) THE CONTRACTOR SHALL CONDUCT ACTIVITIES SO AS NOT TO VIOLATE ANY SAFETY STANDARDS CONTAINED HEREIN. THE CONTRACTOR SHALL INSPECT ALL CONSTRUCTION, STORAGE AND STAGING AREAS AS OFTEN AS NECESSARY TO BE AWARE OF CONDITIONS, AND PROMPTLY TAKE ALL STEPS NEEDED TO PREVENT/REMEDY ANY UNSAFE OR POTENTIALLY UNSAFE CONDITIONS OR ACTIVITIES DISCOVERED.

(3) BEFORE ACTUAL COMMENCEMENT OF CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL NOTIFY MAA, IN WRITING, AT LEAST 48 HOURS IN ADVANCE USING THE NOTICE TO AIRMEN (NOTAM) SYSTEM, OF PROPOSED TIME AND DATE OF COMMENCEMENT OF CONSTRUCTION IN SUCH AREAS.

UPON COMPLETION OF WORK, AND RETURN OF ALL SUCH AREAS TO STANDARD CONDITIONS, THE CONTRACTOR SHALL NOTIFY MAA, IN WRITING, USING THE NOTAM SYSTEM, OF COMPLETION OF CONSTRUCTION.

(D) MOTORIZED VEHICLE

ALL CONTRACTOR VEHICLES THAT ARE AUTHORIZED TO OPERATE ON THE AIRPORT OUTSIDE OF THE DESIGNATED CONSTRUCTION AREA LIMITS OR HAUL ROUTES AS SPECIFIED AND IN THE ACTIVE AIRCRAFT OPERATIONS AREA (AOA) SHALL DISPLAY IN FULL VIEW ABOVE THE VEHICLE A 3'X 3' OR LARGER , ORANGE AND WHITE CHECKERBOARD FLAG, EACH CHEKERBOARD COLOR BEING 1' SQUARE. ANY VEHICLE OPERATING IN THE ACTIVE AOA DURING THE HOURRS OF DARKNESS SHALL BE EQUIPPED WITH A FLASHING AMBER (YELLOW) DOME-TYPE LIGHT, MOUNTED ON TOP OF THE VEHICLE AND OF SUCH INTENSITY TO CONFORM TO LOCAL CODES FOR MAINTENANCE AND EMERGENCY VEHICLES. ALL CONTRACTOR VEHICLES SHALL HAVE THE FIRMS' NAME AND/OR LOGO PROMINENTLY DISPLAYED ON BOTH SIDES OF THE VEHICLE.

VEHICLES MAKING ONLY OCCASIONAL VISITS TO THE JOB SITE ARE EXEMPT FROM THE IDENTIFICATION REQUIREMENTS CONTAINED HEREIN ABOVE PROVIDED THAT THEY ARE ESCORTED INTO, THROUGH, AND OUT OF THE ACTIVE AOA AREAS BY A PROPERLY IDENTIFIED VEHICLE.

(E) RADIO COMMUNICATIONS

RADIO COMMUNICATIONS ARE REQUIRED BETWEEN THE CONTRACTOR'S REPRESENTATIVE AND THE AIR TRAFFIC CONTROL TOWER (ATCT). RADIO CONTACT IS REQUIRED AT ALL TIMES WHILE THEY ARE IN AN ACTIVE AIR OPERATIONS AREA (AOA) OF THE AIRPORT. RADIOS SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL BE CAPABLE OF TRANSMITTING AND RECEIVING AT A FREQUENCY OF 121.8 MHz. SUFFICIENT RADIOS SHALL BE ON SITE AND OPERATING AT ALL TIMES SO THAT INSTRUCTIONS OR COMMUNICATIONS MAY BE DISPATCHED TO ALL CREWS AND/OR EQUIPMENT WORKING IN AN ACTIVE AOA WITHIN ONE MINUTE RECEIPT FROM THE ATCT.

(F) DEBRIS

DEBRIS, WASTE AND LOOSE MATERIAL (INCLUDING DUST AND DIRT) CAPABLE OF CAUSING DAMAGE TO AIRCRAFT LANDING GEAR, PROPELLERS, OR BEING INGESTED IN JET ENGINES SHALL NOT BE ALLOWED ON ACTIVE AIRCRAFT AREAS OR ADJACENT GRASSED AREAS. MATERIALS OBSERVED TO BE WITHIN THESE AREAS SHALL BE REMOVED IMMEDIATELY AND/OR CONTINUOUSLY BY THE CONTRACTOR DURING CONSTRUCTION.

(G) FLAGMEN

(1) THE CONTRACTOR SHALL FURNISH, AT HIS OWN EXPENSE, FLAGMEN AS NECESSARY TO CONTROL HIS TRAFFIC IN ACCORDANCE WITH THESE SPECIFICATIONS UNLESS OTHERWISE DIRECTED BY THE ENGINEER, IN WHICH CASE THE DIRECTION OF THE ENGINEER SHALL BE FOLLOWED.

ALL CONTRACTOR VEHICLES THAT ARE REQUIRED TO CROSS ACTIVE RUNWAYS, RAMP AREAS, TAXIWAYS AND APRONS SHALL DO SO UNDER THE DIRECT CONTROL OF A COMPETENT FLAGMAN WHO IS IN DIRECT RADIO CONTACT WITH GROUND CONTROL. ALL AIRCRAFT TRAFFIC ON RUNWAYS, RAMP AREAS, TAXIWAYS AND APRONS SHALL HAVE PRIORITY OVER CONTRACTOR'S TRAFFIC. RADIOS SHALL BE SUPPLIED BY THE CONTRACTOR AND SHALL BE CAPABLE OF TRANSMITTING AND RECEIVING AT A FREQUENCY OF 121.8 MHz.

WHERE PROJECT ACCESS REQUIRES TRAVEL ON, ACROSS OR ADJACENT TO RUNWAYS, RAMP AREAS, TAXIWAYS, OR AIRCRAFT APRONS, THE CONTRACTOR SHALL PROVIDE ADEQUATE PERSONNEL AND EQUIPMENT TO KEEP SUCH SURFACES CLEAR OF DEBRIS. AT NO TIME SHALL THE CONTRACTOR'S VEHICLES OR PERSONNEL BE ALLOWED TO ENTER OR CROSS ACTIVE RUNWAYS OR CLEAR ZONES WITHOUT PROPER AUTHORIZATION OBTAINED THROUGH GROUND CONTROL.

(H) MISCELLANEOUS

(1) OPEN FLAME, WELDING OR TORCH CUTTING OPERATIONS ARE PROHIBITED UNLESS ADEQUATE FIRE AND SAFETY PRECAUTIONS HAVE BEEN TAKEN AND THE PROCEDURE APPROVED.

(2) EQUIPMENT AND STOCKPILED MATERIAL SHALL BE CONSTRAINED IN A MANNER TO PREVENT MOVEMENT RESULTING FROM AIRCRAFT JET/PROPELLER BLAST OR WIND CONDITIONS.

(3) THE CONTRACTOR SHALL PROVIDE TIMBER, OR BARREL TYPE CONSTRUCTION BARRICADES WITH FLASHING YELLOW LIGHTS TO DELINEATE THE WORK AREAS WHEN THESE AREAS ARE CLOSED TO AIRPORT TRAFFIC. OPEN TRENCHES, EXCAVATIONS AND STOCKPILED MATERIAL LOCATED IN THE AOA SHALL BE PROMINENTLY MARKED WITH RED-FLAGS AND LIGHTED BY APPROVED LIGHT UNITS DURING HOURS OF RESTRICTED VISIBILITY AND DARKNESS.

(4) ALL MATERIALS AND EQUIPMENT WHEN NOT IN USE SHALL BE PLACED IN APPROVED AREAS WHERE THEY WILL NOT CONSTITUTE A HAZARD TO AIRCRAFT OPERATIONS AND NOT PENETRATE CLEARANCE SURFACES DEFINED IN FEDERAL AVIATION REGULATION, PART 77 (14 CRF PART 77). THE CONTRACTOR SHALL ADHERE TO THE REQUIREMENTS OF ORDER EA 5210.1, "SAFETY REQUIREMENTS ON AIRPORTS DURING CONSTRUCTION," CURRENT EDITION AND ADVISORY CIRCULAR 150/5370-2, "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION", CURRENT EDITION. WHERE PART 77, EA 5210.1 AND AC 150/5370-2 ARE IN CONFLICT, THE MOST RESTRICTIVE REQUIREMENTS SHALL BE MET.

(5) MAXIMUM EQUIPMENT HEIGHT SHALL NOT EXCEED 20 FEET UNLESS PRIOR APPROVAL IS OBTAINED FROM THE ENGINEER.

(6) THE ENGINEER WILL ARRANGE WITH AIRPORT OPERATIONS FOR INSPECTIONS PRIOR TO OPENING FOR AIRCRAFT USE ANY RUNWAY, TAXIWAY, RAMP AREA OR AIRPORT ROADWAY THAT HAS BEEN CLOSED FOR WORK ON, OR ADJACENT TO, OR THAT HAS BEEN USED FOR A CROSSING POINT OR HAUL ROUTE BY THE CONTRACTOR.

(7) THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A CURRENT LIST OF ALL EMPLOYEES WORKING ON THE AIRPORT. THE LIST SHALL BE MAINTAINED CURRENT BY THE CONTRACTOR AND APPLIES TO BOTH CONTRACTOR AND SUBCONTRACTOR.

(8) THE CONTRACTOR SHALL FAMILIARIZE HIS PERSONNEL WITH CLEARANCES NEEDED TO PROVIDE FOR THE SAFE OPERATION OF RUNWAYS AND TAXIWAYS AS SHOWN IN THE PLAN.

(9) EXCEPT FOR EMERGENCIES, ALL CONTACT WITH AIRPORT PERSONNEL SHALL BE MADE THROUGH THE RESIDENT ENGINEER. FOR EMERGENCIES INVOLVING SAFETY (INJURIES, FIRES, ETC.) THE CONTRACTOR SHALL MAKE DIRECT CONTACT WITH AIRPORT OPERATIONS FOLLOWED BY NOTIFICATION TO THE RESIDENT ENGINEER AS SOON AS POSSIBLE.

(10) THE CONTRACTOR SHALL PROVIDE THE PHONE NUMBERS OF THREE PERSONNEL INCLUDING THE PROJECT SUPERINTENDENT, WHO MAY BE CONTACTED IN AN EMERGENCY. PERSONNEL SHALL BE ON CALL 24 HOURS PER DAY FOR MAINTAINING AIRPORT HAZARD LIGHTING AND BARRICADES.

UTILITIES

(1) UNDERGROUND UTILITIES: THE LOCATION OF THE UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE CONSIDERED TO BE ONLY ESTIMATED LOCATIONS. ALL UTILITY LOCATIONS SHALL BE FIELD VERIFIED BE THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. IN THE EVENT ANY UTILITY IS DAMAGED THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING FOR INCURRED COST OF REPAIRS.

(2) UTILITIES NOTIFICATION: AT LEAST TWO WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS IN AN AREA WHICH MAY INVOLVE UNDERGROUND UTILITY FACILITIES, THE CONTRACTOR SHALL NOTIFY THE RESIDENT ENGINEER, AND THE OWNER OF EACH UNDERGROUND UTILITY AFFECTED.

(3) THE FOLLOWING IS A LIST OF THE COMPANIES WITH POSSIBLE UTILITIES WITHIN THE CONSTRUCTION LIMITS.

UTILITY OWNERSHIP:

MISS UTILITY CENTER 1-800-257-7777

BALTIMORE GAS AND ELECTRIC COMPANY 1-410-234-5000

BELL ATLANTIC TELEPHONE

BELL ATLANTIC BURIED CABLE 800-254-2222

BELL ATLANTIC CABLE 800-257-7777

* FOR FIRE PROTECTION SYSTEM INSTALLATION CRITERIA SEE SHEET G-07.

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED. IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	FA
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — THOMAS SUMMERFIELD — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEV

SEQ.	CONTRACT ITEM NO.	DESCRIPTION	UNIT	AS BID BASE PROJECT	AS BID ADD ALT. 1	AS BID ADD ALT. 2	AS BID ADD ALT. 3	AS BUILT TOTAL
1	100.1	DEMOLISH/REMOVE EXISTING CONCRETE SLAB	SY	7,230	0	0	0	
2	100.2	REMOVE EXISTING CHAIN LINK FENCE	LF	2,340	0	0	0	
3	100.3	REMOVE EXISTING UNDERDRAIN PIPE	LF	0	200	200	400	
4	100.4	DEMOLISH/REMOVE EXISTING UTILITIES STRUCTURES	EA	5	1	0	1	
5	100.5	REMOVE EXISTING DUCT BANK	LF	60	0	0	0	
6	100.6	REMOVE EXISTING CONDUIT AND CABLE	LF	500	400	400	800	
7	100.7	DEMOLISH/REMOVE EXISTING BUILDINGS	LS	1	0	0	0	
8	100.8	REMOVE EXISTING PIPE SMALLER THAN 12" DIAMETER	LF	1,200	0	0	0	
9	100.9	REMOVE EXISTING PIPE 12" TO 24" DIAMETER	LF	415	0	0	0	
10	100.10	REMOVE EXISTING PIPE 54" DIAMETER	LF	310	0	0	0	
11	101.1	CLEARING AND GRUBBING	ACRE	12	0	0	0	
12	101.2	CLEARING ISOLATED TREES	EA	50	0	0	0	
13	108.1	MOBILIZATION/DEMOBILIZATION	LS	1	1	1	1	
14	108.2	MISCELLANEOUS CONSTRUCTION ITEMS ALLOWANCE	LS	1	1	1	1	
15	109.1	TEMPORARY CONSTRUCTION ITEMS	LS	1	1	1	1	
16	206.1	PAVEMENT REMOVAL	SY	3,735	210	420	630	
17	308.1	STABILIZED CONSTRUCTION ENTRANCE	SY	160	70	70	140	
18	308.2	SILT FENCE	LF	13,000	4,000	3,400	7,400	
19	308.3	SUPER SILT FENCE	LF	1,000	960	640	1,600	
20	308.4	STONE CHECK DAM	EA	6	0	0	0	
21	308.5	REMOVABLE PUMPING STATION	EA	1	1	1	1	
22	308.6	SEDIMENT BASIN RISER DISCHARGE STRUCTURE	LS	1	1	1	1	
23	308.7	CLASS I RIP RAP SPILLWAY PROTECTION	SY	50	50	50	50	
24	308.8	SUMP PIT	EA	4	6	6	6	
25	308.9	PORTABLE SEDIMENT TANK	LS	1	0	0	0	
26	308.10	AT-GRADE INLET PROTECTION	EA	4	26	8	26	
27	308.11	CURB INLET PROTECTION	EA	2	1	0	1	
28	308.12	TEMPORARY SEEDING AND MULCHING	ACRE	4	12	16	25	
29	427.1	OIL/WATER SEPARATOR	EA	0	1	1	2	
30	813.1	ROADWAY SIGNS	SF	24	20	15	30	
31	1000.1	PRE-ENGINEERED METAL BUILDING	LS	1	0	0	0	
32	1200.1	WATER TANK	LS	1	0	0	0	
33	1300.1	WATER PIPE (4" DIAMETER)	LF	205	0	0	0	
34	1300.2	WATER PIPE (8" DIAMETER)	LF	3,620	0	0	0	
35	1300.3	WATER PIPE (14" DIAMETER)	LF	3,825	0	0	0	
36	1300.4	FIRE HYDRANT	EA	1	0	0	0	
37	1300.5	SANITARY SEWER PIPE (1-1/4" DIAMETER)	LF	160	0	0	0	
38	1300.6	SANITARY SEWER PIPE (4" DIAMETER)	LF	2,075	0	0	0	
39	1300.7	SANITARY SEWER PIPE (6" DIAMETER)	LF	695	0	0	0	
40	1300.8	SANITARY SEWER PIPE (8" DIAMETER)	LF	3,975	0	0	0	
41	1300.9.1	SANITARY SEWER PUMP STATION (100 GPM)	EA	1	0	0	0	
42	1300.9.2	SANITARY SEWER PUMP STATION (130 GPM)	EA	2	0	0	0	
43	1300.9.3	SANITARY SEWER PUMP STATION (225 GPM)	EA	1	0	0	0	
44	1300.10	SANITARY SEWER MANHOLE	EA	17	0	0	0	
45	1300.11	SANITARY SEWER AIR RELEASE VALVE AND VAULT	EA	4	0	0	0	
46	1300.12	WILSON POINT ROAD SANITARY SEWER CROSSING	LS	1	0	0	0	
47	2080.1	ASBESTOS REMOVAL	LS	1	0	0	0	
48	15000.1	PUMPHOUSE EQUIPMENT, PIPE, AND FITTINGS	LS	1	0	0	0	
49	16000.1	UTILITY COST ALLOWANCE	LS	1	0	0	0	
50	16010.1	BASIC ELECTRICAL REQUIREMENTS	LS	1	0	0	0	
51	16050.1	BASIC ELECTRICAL MATERIALS AND METHODS	LS	1	0	0	0	
52	16100.1	RACEWAYS, BOXES, AND CABINETS	LS	1	0	0	0	
53	16110.1	ELECTRICAL HANDHOLE	EA	46	3	5	8	
54	16110.2	ELECTRICAL MANHOLE	EA	14	0	0	0	
55	16110.3	POLE FOUNDATION IN GRASSY AREA	EA	7	0	8	8	
56	16110.4	POLE FOUNDATION IN PAVED AREA	EA	0	3	3	8	
57	16110.5	4W-6" CONCRETE ENCASED DUCT	LF	1,600	0	0	0	
58	16110.6	4W-4" CONCRETE ENCASED DUCT	LF	3,100	175	175	350	
59	16110.7	4W-3" CONCRETE ENCASED DUCT	LF	1,500	0	0	0	
60	16110.8	2W-6" CONCRETE ENCASED DUCT	LF	1,400	0	0	0	
61	16110.9	2W-4" CONCRETE ENCASED DUCT	LF	360	0	0	0	
62	16110.10	2W-3" CONCRETE ENCASED DUCT	LF	5,500	0	0	0	
63	16110.11	2W-2" CONCRETE ENCASED DUCT	LF	2,700	0	250	250	
64	16110.12	1W-4" CONCRETE ENCASED DUCT	LF	0	0	0	0	
65	16110.13	1W-2" CONCRETE ENCASED DUCT	LF	1,900	800	700	1500	
66	16110.14	ELECTRICAL EQUIPMENT PAD	EA	1	2	1	3	
67	16110.15	ELECTRICAL VAULT	EA	1	0	0	0	
68	16120.1	WIRES AND CABLES	LS	1	1	1	1	
69	16141.1	WIRING DEVICES	LS	1	0	0	0	
70	16170.1	MOTOR AND CIRCUIT DISCONNECTS	LS	1	0	0	0	
71	16195.1	LABELING AND IDENTIFICATION	LS	1	0	0	0	
72	16321.1	POLE MOUNT TRANSFORMER	EA	2	0	0	0	
73	16470.1	POWER DISTRIBUTION EQUIPMENT	LS	1	0	0	0	
74	16510.1	POLE MOUNT LUMINAIRE	EA	7	6	12	18	
75	16510.2	EXTERIOR WALL LUMINAIRE	EA	1	0	0	0	
76	16510.3	INTERIOR FLUORESCENT LUMINAIRE	EA	9	0	0	0	
77	16510.4	EMERGENCY LIGHTING UNIT	EA	2	0	0	0	
78	16510.5	LIGHTED EXIT SIGN	EA	1	0	0	0	
79	16510.6	3.5 EPA LIGHT POLE	EA	0	3	9	12	
80	16510.7	10 EPA LIGHT POLE	EA	7	0	0	0	
81	16900.1	GENERAL INSTRUMENTATION	LS	1	1	1	1	
82	P-152.1	STRIPPING	CY	50	3,000	7,900	10,900	
83	P-152.2	UNCLASSIFIED EXCAVATION	CY	11,800	21,700	17,400	30,970	
84	P-152.3	UNSUITABLE EXCAVATION	CY	1,000	450	360	640	
85	P-152.4	REMOVE EXISTING SOIL STOCKPILE	CY	7,500	0	0	0	
86	P-152.7	BORROW	CY	0	200	300	500	
87	P-209.1	CRUSHED AGGREGATE BASE COURSE	CY	370	3,350	2,680	6,030	
88	P-209.2	MSHA #2 STONE BASE COURSE	CY	750	6,700	5,350	12,050	
89	P-209.3	GEOTEXTILE FABRIC	SY	2,200	20,100	18,100	38,200	
90	P-401.1	AIRFIELD BITUMINOUS SURFACE COURSE	TON	0	2,620	2,500	5,120	
91	P-401.2	AIRFIELD BITUMINOUS BASE COURSE	TON	0	3,950	3,750	7,700	
92	P-401.3	MSHA HOT MIX ASPHALT SURFACE COURSE (SC)	TON	500	1,750	1,000	2,750	
93	P-401.4	MSHA HOT MIX ASPHALT BASE COURSE (BC)	TON	500	1,750	1,000	2,750	
94	P-602.1	BITUMINOUS PRIME COAT	GAL	770	7,040	5,640	12,680	
95	P-610.1	CONCRETE CURB	LF	0	250	1,610	1,860	
96	P-610.2	CONCRETE CURB AND GUTTER	LF	1,580	1,650	390	2,040	
97	P-610.3	CONCRETE UTILITY ENCASEMENT	CY	20	0	0	0	
98	P-610.4	PORTLAND CEMENT CONCRETE PAVEMENT	SY	0	50	50	100	
99	P-620.1	PAVEMENT MARKING	SF	840	1,680	2,220	3,900	
100	P-620.2	PAVEMENT MARKING REMOVAL	SF	0	100	100	200	
101	D-701.1	12-INCH RCP CLASS IV	LF	70	187	245	398	
102	D-701.2	15-INCH RCP CLASS IV	LF	0	679	684	1,129	
103	D-701.3	18-INCH RCP CLASS IV	LF	110	570	360	698	
104	D-701.4	24-INCH RCP CLASS IV	LF	0	420	0	418	
105	D-701.5	27-INCH RCP CLASS A-25	LF	0	475	477	478	
106	D-701.6	30-INCH RCP CLASS A-25	LF	61	367	275	405	
107	D-701.7	36-INCH RCP CLASS A-25	LF	326	941	651	941	
108	D-701.8	42-INCH RCP CLASS A-25	LF	0	186	186	186	
109	D-701.9	CONCRETE FOR PIPE CRADLES	CY	0	3	10	10	
110	D-701.10	SEEPAGE PIPE	LF	80	80	80	80	
111	D-705.1	GEOCOMPOSITE UNDERDRAIN	LF	0	1,308	1,331	2,639	
112	D-705.2	4-INCH POLYETHYLENE PIPE	LF	0	500	483	979	
113	D-705.3	4-INCH PERFORATED POLYETHYLENE PIPE	LF	0	48	390	438	
114	D-705.4	6-INCH POLYETHYLENE PIPE	LF	0	340	175	523	
115	D-751.1	STORM DRAINAGE MANHOLE	EA	3	3	3	4	
116	D-751.2	STORM DRAINAGE INLET TYPE 1	EA	1	18	9	19	
117	D-751.3	STORM DRAINAGE INLET TYPE 2	EA	1	6	9	10	
118	D-751.4	STORM DRAINAGE INLET TYPE 3	EA	4	1	2	3	
119	D-751.6	ADJUST STRUCTURES TO GRADE	EA	0	3	0	3	
120	D-752.1	SEDIMENTATION CHAMBER	CY	17	58	58	66	
121	D-752.2	ENDWALL	CY	55	115	115	115	
122	D-752.3	CLASS I RIP-RAP	SY	40	200	200	200	
123	D-752.4	GROUTED RIP-RAP	SY	90	75	75	75	
124	L-108.1	NO. 8 AWG 5 KV UNDERGROUND CABLE INSTALLED IN DUCT OR CONDUIT	LF	0	1,150	1,150	2,300	
125	L-108.2	NO. 8 AWG BARE COUNTERPOISE WIRE INSTALLED IN TRENCH	LF	0	1,100	1,100	2,200	
126	L-108.3	GROUND ROD	EA	0	26	26	52	
127	L-108.4	CONCRETE CABLE MARKER	EA	0	4	4	8	
128	L-110.5	2" PVC SCHED. 80 CONDUIT	LF	0	1,000	1,000	2,000	
129	L-125.1	MEDIUM INTENSITY TAXIWAY LIGHT BASE MOUNTED	EA	0	13	8	21	
130	L-125.2	RELOCATE EXISTING TAXIWAY EDGE LIGHT	EA	0	2	5	7	
131	L-125.3	TWO-PANEL TAXIWAY GUIDANCE SIGN	EA	0	2	1	3	
132	L-125.4	THREE-PANEL TAXIWAY GUIDANCE SIGN	EA	0	1	1	2	
133	L-125.5	MODIFY EXISTING TAXIWAY GUIDANCE SIGN	EA	0	0	2	2	
134	L-125.6	REPLACE EXISTING TAXIWAY GUIDANCE SIGN PANEL	EA	0	0	0	0	
135	T-901.1	PERMANENT SEEDING	ACRE	15	15	15	30	
136	T-901.2	WETLANDS VEGETATION	MSF	100	56	56	56	
137	T-905.1	TOPSOILING	CY	2,000	750	750	750	
138	T-905.2	EROSION CONTROL NETTING	SY	8200	5100	5100	5100	
139	T-908.1	MULCHING	ACRE	15	15	15	30	
		WETLAND MITIGATION						
140	101.3	Clearing and Grubbing, Wetland Mitigation Area	ACRE	3.8	0	0	0	
141	101.4	Clearing Isolated Trees, Wetland Mitigation Area	EA	3	0	0	0	
142	108.3	Mobilization/ Demobilization, Wetland Mitigation Area	LS	1	0	0	0	
143	109.2	Temporary Construction items, Wetland Mitigation Area	LS	1	0	0	0	
144	308.13	Class I Rip Rap Spillway Protection, Wetland Mitigation Area	SY	185	0	0	0	
145	308.14	Stabilized Construction Entrance, Wetland Mitigation Area	SY	150	0	0	0	
146	308.15	Super Silt Fence, Wetland Mitigation Area	LF	40	0	0	0	
147	308.16	Temporary Seeding and Mulching, Wetland Mitigation Area	ACRE	3	0	0	0	
148	308.17	Turbidity Curtain, Wetland Mitigation Area	LF	625	0	0	0	
149	705.1	Permanent Seeding and Mulching, Wetland Mitigation Area	SY	8,335	0	0	0	
150	710.1	Amelanchier canadensis, 5 Gallon	EA	65	0	0	0	
151	710.2	Aronia arbutifolia "Brilliantissima", 3 Gallon	EA	30	0	0	0	
152	710.3	Cephalanthus occidentalis, 3 Gallon	EA	50	0	0	0	
153	710.4	Ilex glabra, 3 Gallon	EA	35	0	0	0	
154	710.5	Lindera benzoin, 3 Gallon	EA	25	0	0	0	
155	710.6	Myrica pensylvanica, 2 Gallon	EA	65	0	0	0	
156	710.7	Quercus borealis, 2 Inch Caliper	EA	14	0	0	0	
157	710.8	Rhus aromatica, 2 Gallon	EA	100	0	0	0	
158	710.9	Viburnum prunifolium, 5 Gallon	EA	60	0	0	0	
159	710.10	Viburnum dentatum, 3 Gallon	EA	35	0	0	0	
160	710.11	Shredded Hardwood Mulch, 3 Inch Depth	SY	480	0	0	0	
161	711.1	Panicum virgatum, 1-3/4 Inch Peat Pot	EA	9,800	0	0	0	
162	711.2	Peltandra virginica, 1 Quart Pot	EA	4,450	0	0	0	
163	711.3	Pontederia cordata, 1 Quart Pot	EA	4,450	0	0	0	
164	711.4	Scirpus pungens, 1-3/4 Inch Peat Pot	EA	4,450	0	0	0	
165	711.5	Scirpus robustus, 1 Quart Pot	EA	2,000	0	0	0	
166	711.6	Scirpus validus, 1 Quart Pot	EA	2,550	0	0	0	
167	711.7	Goose Exclosure Fence	LF	625	0	0	0	
168	P-152.5	Stripping, Wetland Mitigation Area	CY	2,895	0	0	0	
169	P-152.6	Unclassified Excavation, Wetland Mitigation Area	CY	13,500	0	0	0	
170	T-905.3	Topsoiling, Six Inch Depth, Wetland Mitigation Area	CY	2,895	0	0	0	

AS BUILT

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

REFER TO PROGRESS PAYMENT ESTIMATE NO. 17 FOR FINAL QUANTITIES

TAMS

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ENGINEERS, ARCHITECTS AND PLANNERS
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DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TIMOTHY SCHMATTMAN — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

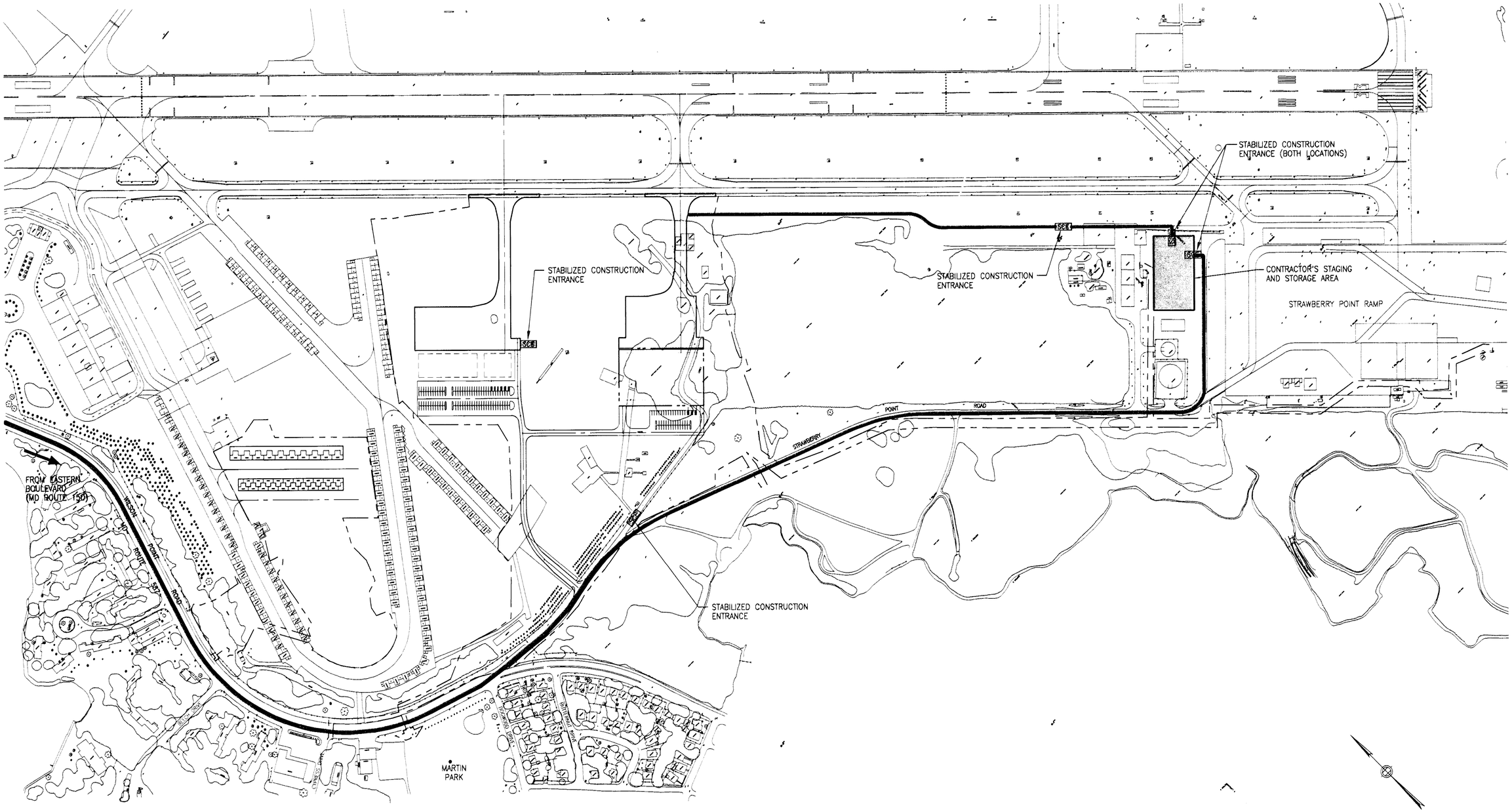
SHEET TITLE: SUMMARY OF ESTIMATED QUANTITIES

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: G-04



AS-BUILTS

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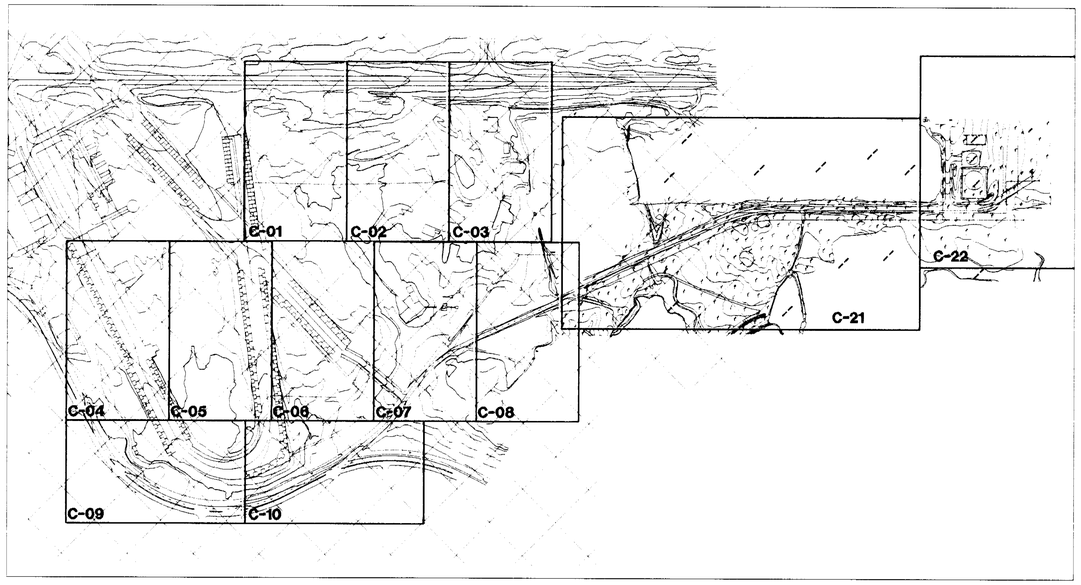
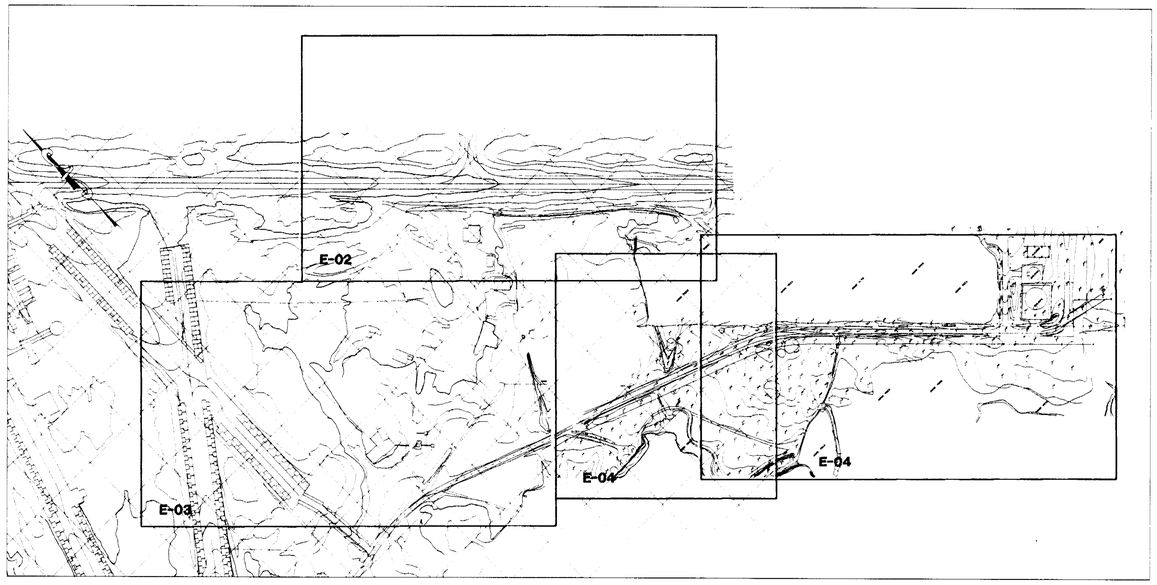
TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED GPP DRAWN GPP CHECKED TS APPROVED TS	STATE OF MARYLAND TEXAPOJ SOMBATPIUM LICENSE NO. 12488 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: CONTRACTOR ACCESS AND STAGING PLAN SCALE: 1" = 200' DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

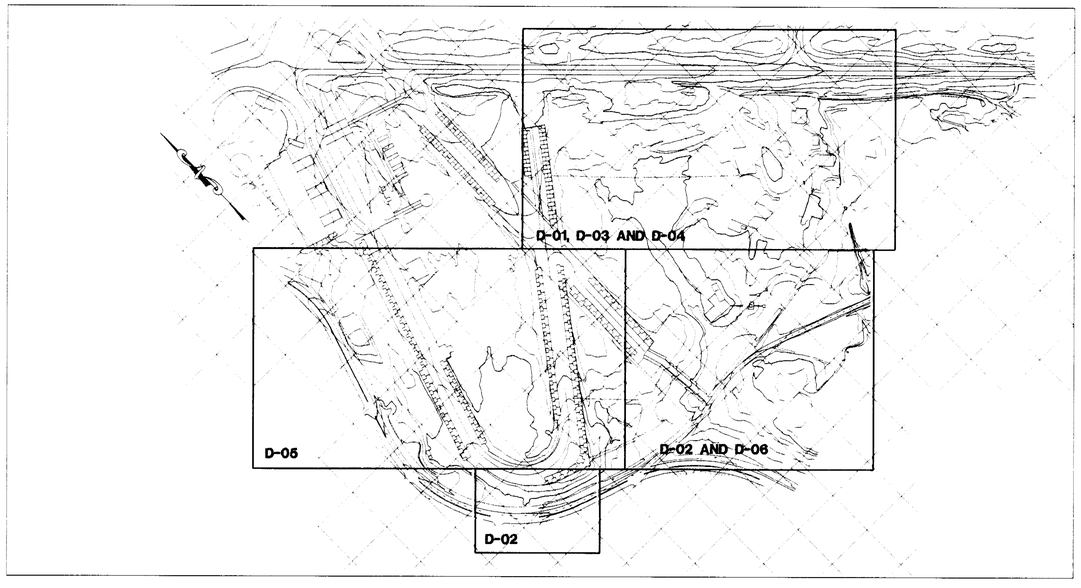
SHEET NO. G-05



KEY PLAN
"C" DRAWINGS



KEY PLAN
"E" DRAWINGS



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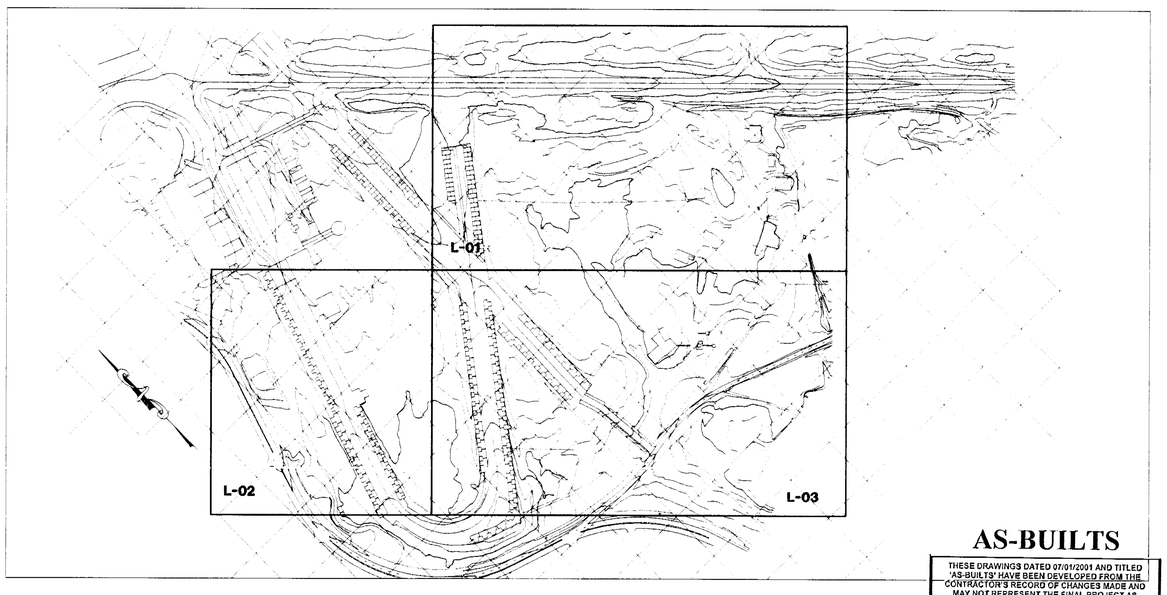
"D" DRAWINGS



KEY PLAN
"L" DRAWINGS

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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DESIGNED	FA
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMERVILLE — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE	KEY PLAN
SCALE	NO SCALE
DATE	September 08, 1998
PROJECT NO.	MAA-CO-97-019
SHEET NO.	G-06

LEGEND

PROPOSED	EXISTING	DESCRIPTION
ADJ		ADJUST STRUCTURE TO GRADE
		BOLLARD
DI	DI	CATCH BASIN/DRAIN INLET
		CHAIN LINK FENCE
18	21	CONTOUR
		CURB OR EDGING
D	D	DRAIN LINE
DMH	DMH	DRAIN MANHOLE
	E	ELECTRIC HANDHOLE
E	E	ELECTRIC LINE
	EMH	ELECTRIC MANHOLE
	FB	FIBER OPTIC CONDUIT
F	F	FIRE WATER DISTRIBUTION LINE
		FLARED END SECTION
		GAS GATE
	G	GAS LINE
		HANDICAPPED PARKING
		HEADWALL
		HYDRANT
	MB	MAIL BOX
	MW	MONITORING WELL
	OW	OVERHEAD WIRES
		PROPERTY LINE or LIMIT OF WORK
S	S	SANITARY SEWER LINE
	SMH	SEWER MANHOLE
		SIGN
		SIGN & POST
		SIGN & FOUNDATION
		SHRUBS
		SOIL BORING
× 12.65	× 8.47	SPOT ELEVATION
	T	TELEPHONE LINE
	TMH	TELEPHONE MANHOLE
		TEMP CONSTRUCTION EASEMENT
		TEST PIT
		TREE
		UTILITY POLE
		UTILITY POLE W/ LIGHT
	W	WATER GATE VALVE
W	W	WATER LINE
		WATER METER
		WATER VALVE
		DELINEATED WETLAND BOUNDARY AND 25' BUFFER
		WHEELCHAIR RAMP

ABBREVIATIONS

AC	ACRES
ACCMP	ASPHALT COATED CORRUGATED METAL PIPE
ADJ	ADJUST
APPROX.	APPROXIMATE
ASPH.	ASPHALT
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ATCT	AIR TRAFFIC CONTROL TOWER
BIT.	BITUMINOUS
℄	BASE LINE
BLDG.	BUILDING
BOC	BOTTOM OF CURB
BP	BITUMINOUS PAVEMENT
C. or CEN.	CENTER
C/C	CENTER TO CENTER
CB	CATCH BASIN
CEM.	CEMENT
C.I.	CAST IRON
CL.	CLEAR
℄	CENTERLINE
CLF	CHAIN LINK FENCE
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNG.	COMPRESSED NATURAL GAS
CONC.	CONCRETE
CONSTR.	CONSTRUCTION
COORD.	COORDINATE
C.P.V.C.	CORRUGATED POLYVINYL CHLORIDE (PIPE)
C.Y.	CUBIC YARD
DEG.	DEGREE
DIA.	DIAMETER
DIP	DUCTILE IRON PIPE
DIST.	DISTANCE
DMH	DRAIN MANHOLE
DWG	DRAWING
E	EAST
E	ELECTRIC
EA.	EACH
E.F.	EACH FACE
EW	ENDWALL
EL./ELEV.	ELEVATION
E. BOX	ELECTRIC BOX
EMH	ELECTRIC MANHOLE
ENC.	ENCASED
EQ	EQUAL
E.W.	EACH WAY
EXIST./EX.	EXISTING
EXP.	EXPANSION
EXT.	EXTERIOR/EXTERNAL
F	FIRE
F.A.A.	FEDERAL AVIATION ADMINISTRATION
F.D.	FLOOR DRAIN
FE	FLARED END
F.E.S.	FLARED END SECTION
FIN.	FINISH FLOOR
F.L.	FLOOD LIGHT
F.P.	FIRE PUMP
FB	FIBER OPTIC
FLG.	FLANGE
FT.	FOOT
GAL.	GALLONS
GALV.	GALVANIZED
H/C	HANDICAPPED
HP	HANDICAP PARKING
HP	HIGH POINT
HP	HIGH PRESSURE
HORIZ.	HORIZONTAL
HR	HOUR
HW.	HEADWALL
HYD	HYDRANT
I.D.	INSIDE DIAMETER
IN.	INCHES
INC	INCIDENTAL (INCLUDED UNDER)
INV	INVERT
J.B.	JUNCTION BOX
J.P.	JOCKEY PUMP
LB/FT.	POUNDS PER FOOT
L	LENGTH OF CURVE
LT./L	LEFT
L.F.	LINEAR FEET
LG.	LONG
LP	LIGHT POLE
L.P.	LOW POINT
L.S.	LUMP SUM
MAA	MARYLAND AVIATION ADMINISTRATION
MAX.	MAXIMUM
MB	MAILBOX
MD.	MARYLAND
MDE	MARYLAND DEPARTMENT OF THE ENVIRONMENT
MFR'S	MANUFACTURER'S
MH	MANHOLE
MIN.	MINIMUM
MITL	MEDIUM-INTENSITY TAXIWAY EDGE LIGHT
N/A	NOT APPLICABLE
N	NORTH
N.E.	NORTHEAST
N.I.C.	NOT IN CONTRACT
No.	NUMBER
NTS	NOT TO SCALE
N.W.	NORTHWEST
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O/W	OIL/WATER
OW	OVERHEAD WIRE
PC	POINT ON CURVE
PCC	POINT OF COMPOUND CURVATURE
PCPVC	PERFORATED CORRUGATED POLYVINYL CHLORIDE (PIPE)
P.E.	PROFESSIONAL ENGINEER
PI	POINT OF INTERSECTION
PT	POINT ON TANGENT
PL	PLATE
PROP.	PROPOSED
PSI	POUNDS PER SQUARE INCH
PWW	PAVED WATERWAY
PVC	POLYVINYL CHLORIDE
P.V.C.	POINT ON VERTICAL CURVE
P.V.I.	POINT OF VERTICAL INTERSECTION
P.V.T.	POINT ON VERTICAL TANGENT
R/RAD.	RADIUS
R.L.S.	REGISTERED LAND SURVEYOR
RC	REINFORCED CONCRETE
REQ'D.	REQUIRED
RCP	REINFORCED CONCRETE PIPE
RET	RETAIN/RETAINING
R-O-W	RIGHT-OF-WAY
R.P.M.	REVOLUTIONS PER MINUTE
RT.	RIGHT
S	SOUTH
SC	SEDIMENT CHAMBER
SCH	SCHEDULE
S.F.	SQUARE FEET
SMH	SEWER MANHOLE
SQ.	SQUARE
STA	STATION
S.Y.	SQUARE YARDS
T	TELEPHONE
T	TANGENT
TEMP	TEMPORARY
TMH	TELEPHONE MANHOLE
TOC/TC	TOP OF CURB
TOP	TOP ELEVATION
TRANS.	TRANSFORMER
TYP.	TYPICAL
UD	UNDER DRAIN
U.G.E.	UNDERGROUND ELECTRICAL LINE
U.G.T.	UNDERGROUND TELEPHONE LINE
UMH	UTILITY MANHOLE
UP	UTILITY POLE
VERT.	VERTICAL
W	WATER
W	WEST
W/	WITH
WMH	WATER MANHOLE
WWF	WELDED WIRE FABRIC

FIRE PROTECTION SYSTEM INSTALLATION GENERAL NOTES:

1. All fire protection system work and installation shall conform with the following codes and standards:

   Maryland Fire Laws, 1996 Edition;
   BOCA Fire Prevention Codes, 1993 Edition;
   1997 NF7A 13, 14, 20, 24, 25, 70, 72, 101, 111, and 170.

2. Prior to doing any "HOT WORK" at the site, a WELDING & BURNING PERMIT shall be obtained and complied with! This permit is acquired from the MAN office of Martin State Airport Operations (410-628-8831).

3. BOCA F-110.0, "Unsafe Conditions", and the MARYLAND FIRE LAWS shall be followed. Any UNSAFE acts or conditions observed or reported to FRS will be investigated, and where conditions are assessed unsafe a correction order will be executed (outlining requirements).

4. Safety and Security issues are separate. All issues relevant to security shall be discussed with a representative from the Airport Security Center on the upper level in the central main corridor or contact them Monday – Friday on 401-859-7124 or 410-682-8831.

5. The permit process begins by filing your submittals at the Maryland Aviation Administration office of CONSTRUCTION INSPECTIONS at BWI Airport on the ground level of A Pier, and they may be reached on 410.859.7637.

6. ALL INSPECTING, TESTING & MAINTENANCE appointments will be accomplished "via" the appropriate MAA Construction Inspector at 410-859-7637, Maintenance representative (410-682-8814), or the Parsons inspections team on 410-859-7484.

A. NEC 70, Article 700 Emergency Systems & 701 Standby Systems have been met in the past by the MAA facility practice; which is the use of the B.G.&E. Secondary power source grid NEC-70, 700.12(d) & NEC-70, 701.11(d), and/or by other code allowed Uninterruptible Power Supplies & Emergency Power Generator.

B. Conduit connectors shall be of the all-steel, corrosion-resistant, compression type, and or threaded in rigid steel conduit applications. The use of running threads and or set screw connectors shall not be permitted in exposed applications.

C. To ensure reliable and trouble-free service continuity in Facilities, the FM-AHJ considers that all spaces which are "Fire Sprinklered" are locations which shall be reviewed and inspected as potential "Wet Locations" (NEC-70, 73-2) and "Rain Tight Connectors" (NEC-70, 348.8) are required as well, for all exposed top entries. To assist in this compliance effort to ensure the safeguarding of Dependable Power and Emergency/Standby Power Sources (NEC 110,5.11 & 111, 5.1) details shall be followed. Seek written approval for the variance review of all other alternate considerations from the FM-AHJ & the Electrical Engineer at MAA Engineering.

MARTIN STATE AIRPORT EMERGENCY TELEPHONE CONTACTS

Fire/Rescue/Medical	911
Police	911
Airport Maintenance	410-682-8814
Airport Operations	Day 410-682-8831 Night 410-682-8819
Maryland Air National Guard Fire Department	410-682-8832
MAA Fire Prevention Division	410-859-7478
MAA Division of Engineering	410-859-7086

AS-BUILTS

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APPROVED	TS

STATE OF MARYLAND — THERESA SUNDAFFER — LICENSE NO. 12486 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

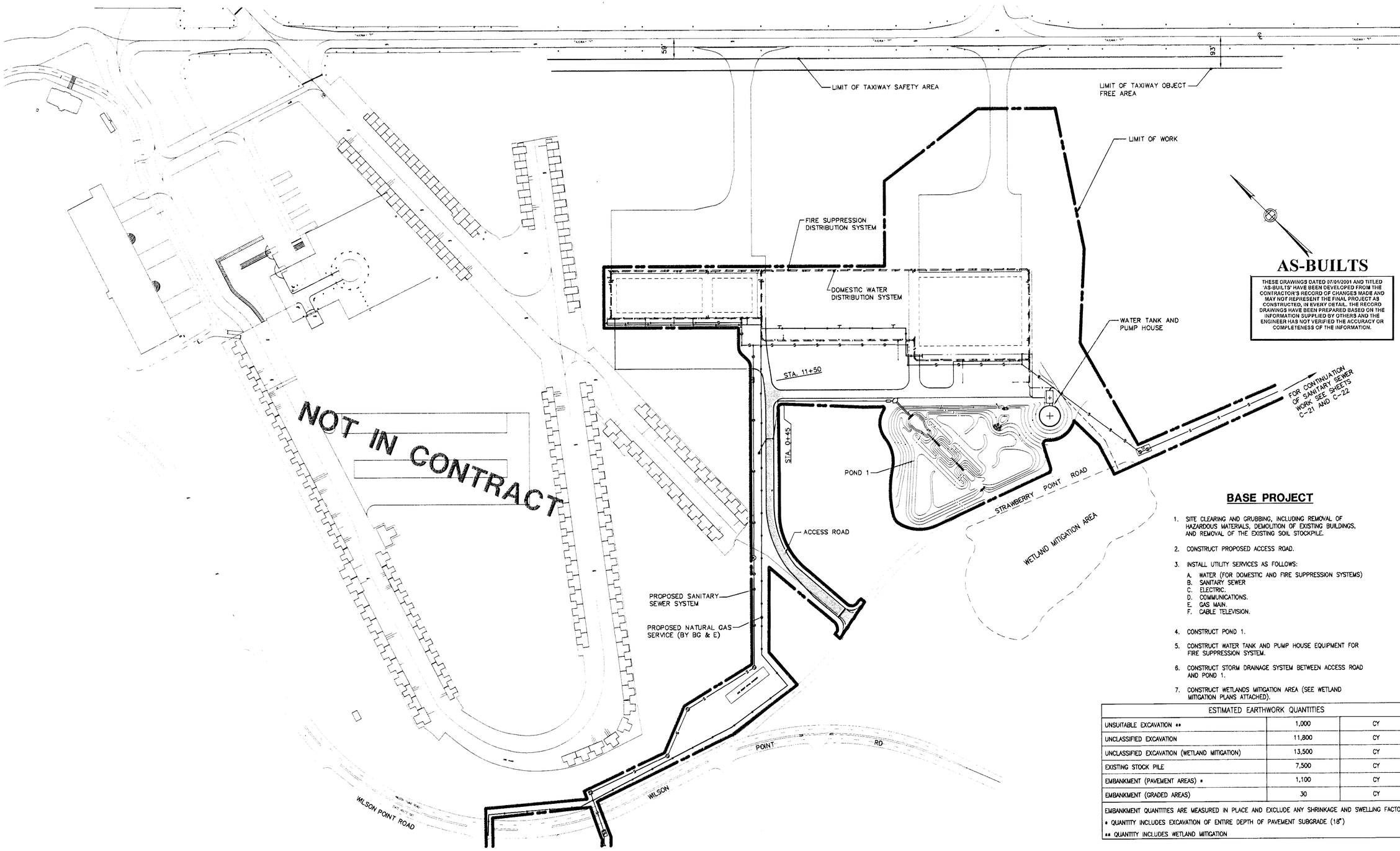
SHEET TITLE: ABBREVIATIONS, LEGEND AND NOTES

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: G-07



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BASE PROJECT

1. SITE CLEARING AND GRUBBING, INCLUDING REMOVAL OF HAZARDOUS MATERIALS, DEMOLITION OF EXISTING BUILDINGS, AND REMOVAL OF THE EXISTING SOIL STOCKPILE.
2. CONSTRUCT PROPOSED ACCESS ROAD.
3. INSTALL UTILITY SERVICES AS FOLLOWS:
   - A. WATER (FOR DOMESTIC AND FIRE SUPPRESSION SYSTEMS)
   - B. SANITARY SEWER
   - C. ELECTRIC.
   - D. COMMUNICATIONS.
   - E. GAS MAIN.
   - F. CABLE TELEVISION.
4. CONSTRUCT POND 1.
5. CONSTRUCT WATER TANK AND PUMP HOUSE EQUIPMENT FOR FIRE SUPPRESSION SYSTEM.
6. CONSTRUCT STORM DRAINAGE SYSTEM BETWEEN ACCESS ROAD AND POND 1.
7. CONSTRUCT WETLANDS MITIGATION AREA (SEE WETLAND MITIGATION PLANS ATTACHED).

ESTIMATED EARTHWORK QUANTITIES		
UNSUITABLE EXCAVATION **	1,000	CY
UNCLASSIFIED EXCAVATION	11,800	CY
UNCLASSIFIED EXCAVATION (WETLAND MITIGATION)	13,500	CY
EXISTING STOCK PILE	7,500	CY
EMBANKMENT (PAVEMENT AREAS) *	1,100	CY
EMBANKMENT (GRADED AREAS)	30	CY

EMBANKMENT QUANTITIES ARE MEASURED IN PLACE AND EXCLUDE ANY SHRINKAGE AND SWELLING FACTORS.
* QUANTITY INCLUDES EXCAVATION OF ENTIRE DEPTH OF PAVEMENT SUBGRADE (18")
** QUANTITY INCLUDES WETLAND MITIGATION

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APPROVED	TS

STATE OF MARYLAND — TERRENCE DONNELLY — LICENSE NO. 17498 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

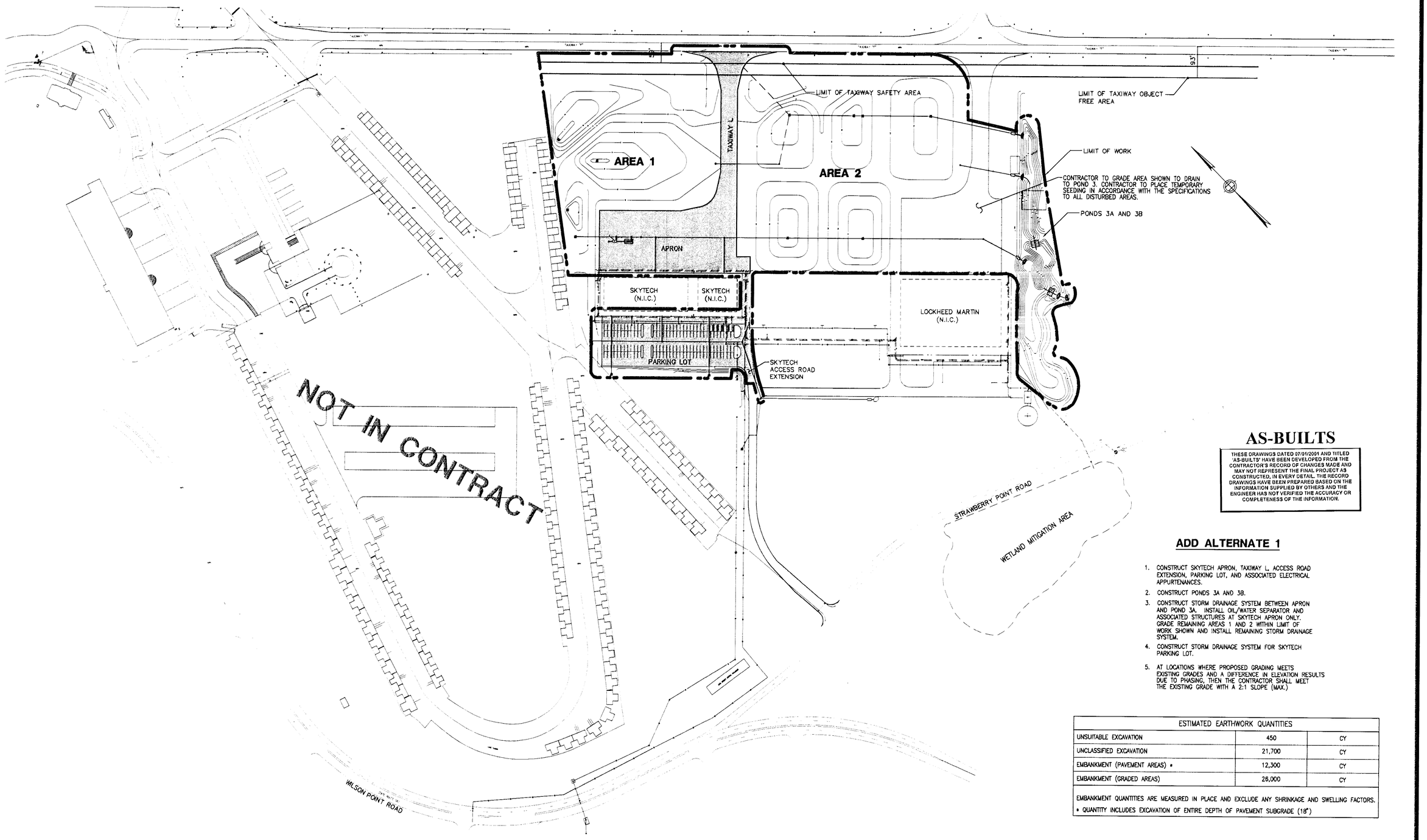
SHEET TITLE: BASE PROJECT

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: G-08



AS-BUILTS

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ADD ALTERNATE 1

1. CONSTRUCT SKYTECH APRON, TAXIWAY L, ACCESS ROAD EXTENSION, PARKING LOT, AND ASSOCIATED ELECTRICAL APPURTENANCES.
2. CONSTRUCT PONDS 3A AND 3B.
3. CONSTRUCT STORM DRAINAGE SYSTEM BETWEEN APRON AND POND 3A. INSTALL OIL/WATER SEPARATOR AND ASSOCIATED STRUCTURES AT SKYTECH APRON ONLY. GRADE REMAINING AREAS 1 AND 2 WITHIN LIMIT OF WORK SHOWN AND INSTALL REMAINING STORM DRAINAGE SYSTEM.
4. CONSTRUCT STORM DRAINAGE SYSTEM FOR SKYTECH PARKING LOT.
5. AT LOCATIONS WHERE PROPOSED GRADING MEETS EXISTING GRADES AND A DIFFERENCE IN ELEVATION RESULTS DUE TO PHASING, THEN THE CONTRACTOR SHALL MEET THE EXISTING GRADE WITH A 2:1 SLOPE (MAX.)

ESTIMATED EARTHWORK QUANTITIES		
UNSUITABLE EXCAVATION	450	CY
UNCLASSIFIED EXCAVATION	21,700	CY
EMBANKMENT (PAVEMENT AREAS) *	12,300	CY
EMBANKMENT (GRADED AREAS)	26,000	CY

EMBANKMENT QUANTITIES ARE MEASURED IN PLACE AND EXCLUDE ANY SHRINKAGE AND SWELLING FACTORS.
* QUANTITY INCLUDES EXCAVATION OF ENTIRE DEPTH OF PAVEMENT SUBGRADE (18")

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DESIGNED	GPP
DRAWN	GPP/PW
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND — TEERAPOL SOMBATPHON — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: **MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I**

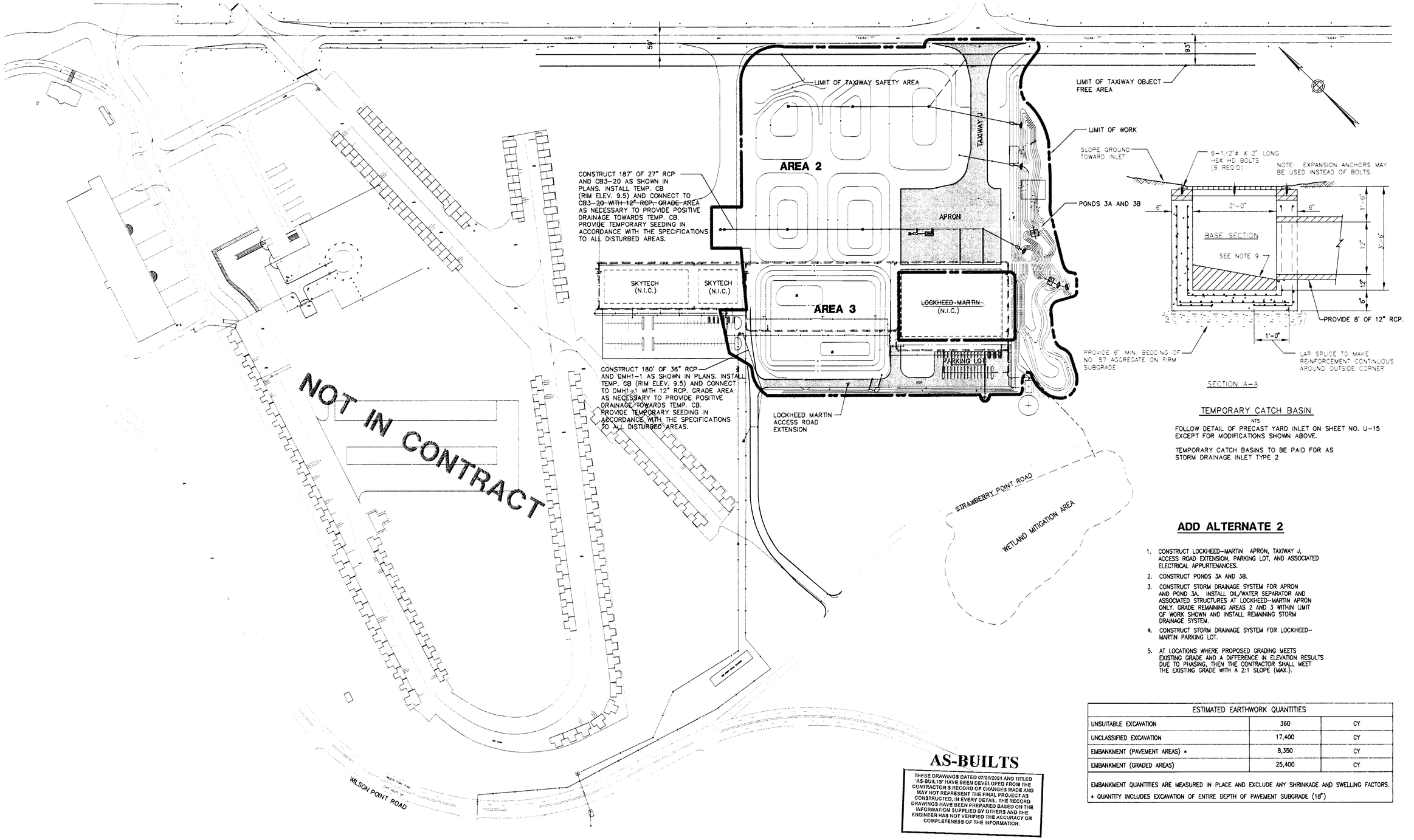
SHEET TITLE: **ADD ALTERNATE 1**

SCALE: **NO SCALE**

DATE: **September 08, 1998**

PROJECT NO.: **MAA-CO-97-019**

SHEET NO.: **G-09**



SECTION A-A

TEMPORARY CATCH BASIN

NTS

FOLLOW DETAIL OF PRECAST YARD INLET ON SHEET NO. U-15 EXCEPT FOR MODIFICATIONS SHOWN ABOVE.

TEMPORARY CATCH BASINS TO BE PAID FOR AS STORM DRAINAGE INLET TYPE 2

ADD ALTERNATE 2

1. CONSTRUCT LOCKHEED-MARTIN APRON, TAXIWAY J, ACCESS ROAD EXTENSION, PARKING LOT, AND ASSOCIATED ELECTRICAL APPURTENANCES.
2. CONSTRUCT PONDS 3A AND 3B.
3. CONSTRUCT STORM DRAINAGE SYSTEM FOR APRON AND POND 3A. INSTALL OIL/WATER SEPARATOR AND ASSOCIATED STRUCTURES AT LOCKHEED-MARTIN APRON ONLY. GRADE REMAINING AREAS 2 AND 3 WITHIN LIMIT OF WORK SHOWN AND INSTALL REMAINING STORM DRAINAGE SYSTEM.
4. CONSTRUCT STORM DRAINAGE SYSTEM FOR LOCKHEED-MARTIN PARKING LOT.
5. AT LOCATIONS WHERE PROPOSED GRADING MEETS EXISTING GRADE AND A DIFFERENCE IN ELEVATION RESULTS DUE TO PHASING, THEN THE CONTRACTOR SHALL MEET THE EXISTING GRADE WITH A 2:1 SLOPE (MAX.).

ESTIMATED EARTHWORK QUANTITIES		
UNSUITABLE EXCAVATION	360	CY
UNCLASSIFIED EXCAVATION	17,400	CY
EMBANKMENT (PAVEMENT AREAS) *	8,350	CY
EMBANKMENT (GRADED AREAS)	25,400	CY
EMBANKMENT QUANTITIES ARE MEASURED IN PLACE AND EXCLUDE ANY SHRINKAGE AND SWELLING FACTORS. * QUANTITY INCLUDES EXCAVATION OF ENTIRE DEPTH OF PAVEMENT SUBGRADE (18")		

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP/PW
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMERVILLE — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

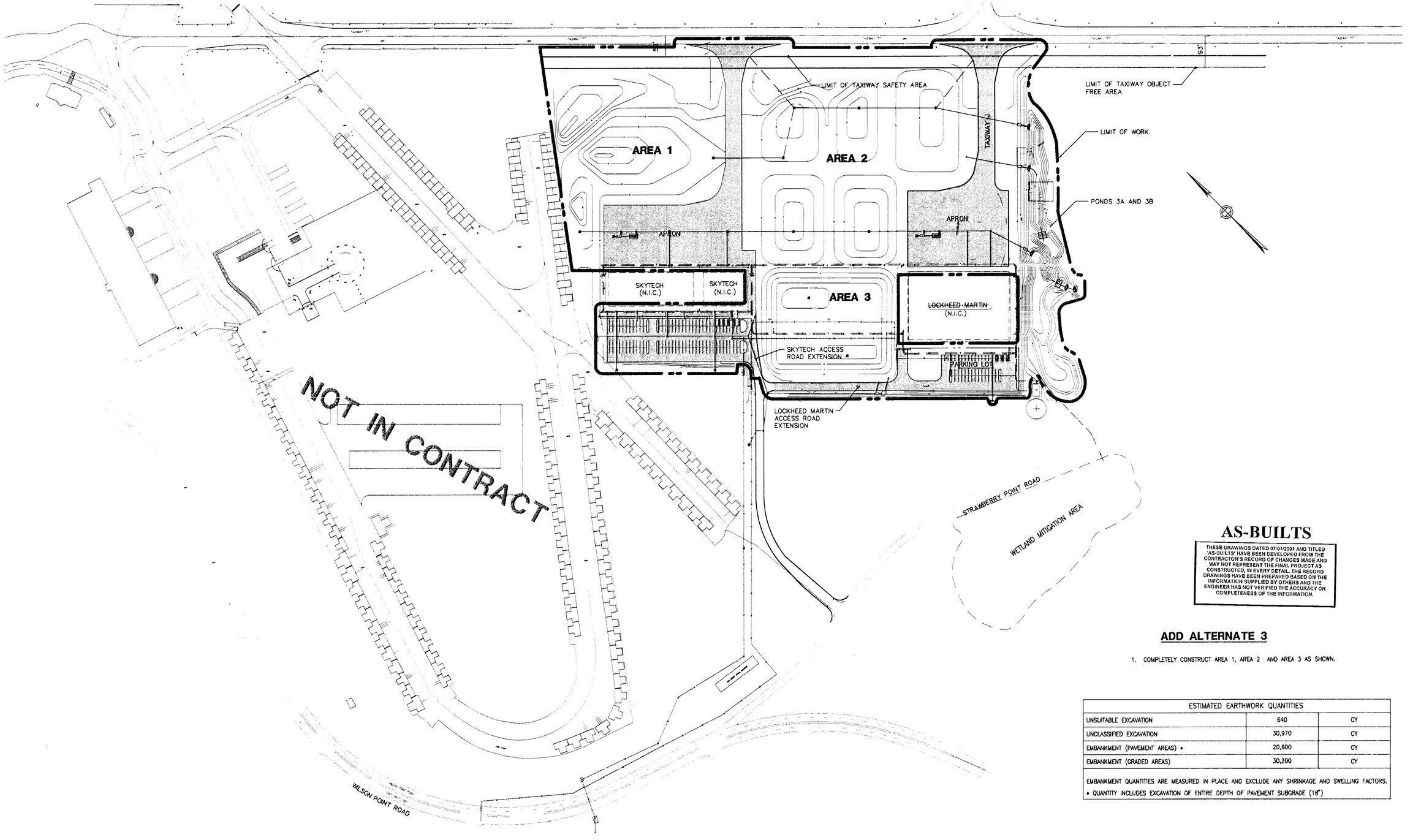
SHEET TITLE: ADD ALTERNATE 2

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: G-10



AS-BUILTS

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ADD ALTERNATE 3

1. COMPLETELY CONSTRUCT AREA 1, AREA 2 AND AREA 3 AS SHOWN.

ESTIMATED EARTHWORK QUANTITIES		
UNSUITABLE EXCAVATION	640	CY
UNCLASSIFIED EXCAVATION	30,970	CY
EMBANKMENT (PAVEMENT AREAS) *	20,600	CY
EMBANKMENT (GRADED AREAS)	30,200	CY

EMBANKMENT QUANTITIES ARE MEASURED IN PLACE AND EXCLUDE ANY SHRINKAGE AND SWELLING FACTORS.
* QUANTITY INCLUDES EXCAVATION OF ENTIRE DEPTH OF PAVEMENT SUBGRADE (18")

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DESIGNED
DRAWN
CHECKED
APPROVED

STATE OF MARYLAND
TECHNOLOGY SOMBATPIWM
LICENSE NO. 12400
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	08/04/98	REBID

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: ADD ALTERNATE 3

SCALE: NO SCALE

DATE: AUGUST 04, 1998

PROJECT NO.: MAA-CO-97-019

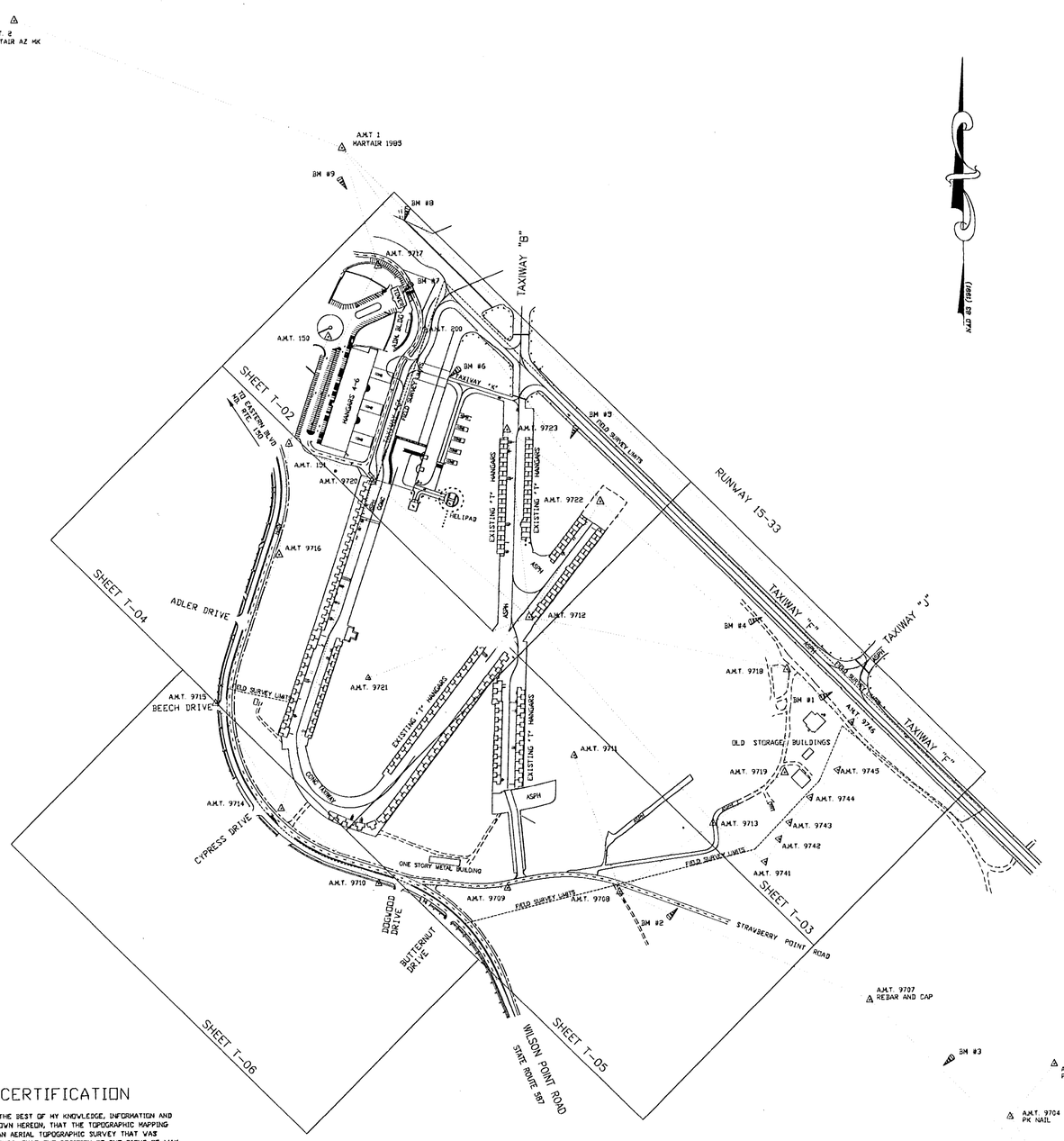
SHEET NO.: G-11

GENERAL NOTES:

1. THE TOPOGRAPHIC MAPPING SHOWN HEREON WAS COMPILED BY THE AIR SURVEY CORPORATION, 45180 BUSINESS COURT, STERLING VIRGINIA FROM AERIAL PHOTOGRAPHS OBTAINED ON 12/03/96.
2. THIS MAPPING WAS ENHANCED WITH FIELD MEASURED DATA AND ANNOTATED WITH TEXT LABELS AND SYMBOLS BY A. MORTON THOMAS AND ASSOCIATES, INC., REGISTERED PROFESSIONAL ENGINEERS AND LAND SURVEYORS, 12750 TWINBROOK PARKWAY, ROCKVILLE MD, 20852, TELEPHONE 301-881-2545, FAX 301-881-0814, PROJECT NO. 95036.03.
3. THE LIMITS OF THE AERIAL AND GROUND SURVEY PROPOSED ON DECEMBER 4, 1996 ARE SHOWN HEREON.
4. THE HORIZONTAL DATUM FOR THIS PROJECT IS NAD 83/91 BASED ON NGS MONUMENTS "MARTAIR", "MARTAIR AZ MK" AND "MTN A".
5. THE VERTICAL DATUM FOR THIS PROJECT IS NGVD 29 AND IS RELATED TO NGS MONUMENTS "MARTAIR", "MARTAIR AZ MK" AND "MTN A".
6. THE POSITION OF THE SUB-SURFACE UTILITIES SHOWN HEREON HAVE BEEN RELATED TO THE FOLLOWING
   A. AIR OR FIELD SURVEYED UTILITY FEATURES;
   B. FIELD SURVEYED DESIGNATED UTILITIES (PAINTED MARKS), WHEN AND IF FOUND.
   C. UTILITY LINES SHOWN ON COMPOSITE PLANS PROVIDED BY MAA, BGE, SHA, BALTIMORE COUNTY DEPARTMENT OF PUBLIC WORKS, TAMS, OTHER ENGINEERS, AND OTHER VARIOUS SOURCES.
   D. APPROXIMATE UTILITY LOCATIONS THAT WERE POINTED OUT IN THE FIELD BY THE MAA'S SENIOR MAINTENANCE STAFF MEMBER, GLENN PERIGORY.
7. THE FOLLOWING IS A PARTIAL LIST OF PLANS THAT WERE USED TO SHOW THE APPROXIMATE LOCATION OF SUB-SURFACE UTILITIES.
   - BGE GAS DISTRIBUTION PLANS ALONG WILSON POINT AND STRAWBERRY POINT ROADS NUMBERED BF-2-49, BF-2-59, BF-2-69 AND BF-2-73.
   - MAA ELECTRIC DISTRIBUTION PLANS ALONG WILSON POINT ROAD ENTITLED MARTIN BGE DRAWING DATED 2/01/91.
   - ELECTRIC PLANS ENTITLED OVERHEAD DISTRIBUTION, PREPARED BY GIPE ASSOCIATES, INC.
   - DUCTBANK PLANS ENTITLED SITEPLAN AND LEGEND PREPARED BY GIPE ASSOCIATES, INC., DATED 5/19/97 AND NUMBERED SAA-CO-95-009.
   - BALTIMORE COUNTY DPW WATER PLANS NUMBERED 90-1295 AND 90-1296.
   - BALTIMORE COUNTY DPW FORCE MAIN PLANS, SHEET 2 OF 3 JOB I-46-11 57-721.
8. THE POSITION OF THE FEW PROPERTY LINES SHOWN HEREON ARE RELATED TO SEVERAL BOUNDARY MARKERS FOUND. THE CORRECT POSITION OF THESE PROPERTY LINES CAN ONLY BE DETERMINED BY A COMPLETE EXAMINATION OF THE DOCUMENTS LISTED IN A TITLE REPORT (NOT SUPPLIED) AND A COMPLETE BOUNDARY SURVEY. THE WILSON POINT ROAD RIGHT OF WAY SHOWN HEREON IS BASED ON MD. SRC PLATS 1274, 3690 THRU 3693, 20343 THRU 20348 AND 24729 THRU 24736.
9. BEFORE CONSTRUCTION OR BEFORE A FINAL DESIGN OF IMPROVEMENTS HAS BEEN COMPLETED, OBTAIN THE SERVICES OF MISS UTILITY OR A SUB-SURFACE UTILITY ENGINEERING CONSULTANT TO VERIFY THE LOCATIONS AND DEPTHS OF THE TELEPHONE, ELECTRIC, GAS, WATER, FORCE SEWER, ETC. LINES AND PIPES SHOWN ON THIS PLAN. OTHER UTILITIES MAY EXIST THAT ARE NOT SHOWN HEREON.

LEGEND

- CLEAN-OUT
- STORM DRAIN MANHOLE
- ELECTRIC MANHOLE
- SANITARY MANHOLE
- WATER VALVE
- WATER METER
- GAS VALVE
- EXISTING HEADWALL
- STORM DRAIN GRATE
- BOLLARD
- TAXIWAY LIGHTS
- TYPICAL "T" HANGAR
- EDGE OF WOODS LINE
- x — x EXISTING FENCE
- TELEPHONE MANHOLE
- SIGN
- WATER VALVE
- x15.7 SPOT ELEVATION
- —UGT— UNDERGROUND TELEPHONE
- —T— UNDERGROUND TELEPHONE PER PLAN
- APPROXIMATE FORCE MAIN PER PLAN
- APPROXIMATE WATERLINE
- ----UGE---- APPROXIMATE ELECTRIC LINE
- ---- E ---- APPROXIMATE ELECTRIC LINE PER PLAN
- A.M.T. TRAVERSE
- TYPICAL SILO
- EVERGREEN TREES
- TELEPHONE PEDESTAL
- —14— INTERMEDIATE CONTOUR
- —15— INDEX CONTOUR
- POWER POLE
- FIRE HYDRANT



A. MORTON THOMAS AND ASSOCIATES, INC. (AMT) CONTROL NETWORK
AT GLENN L. MARTIN STATE AIRPORT
TRAVERSE CONTROL POINTS

POINT	NORTH	EAST	ELEVATION	DESCRIPTION
1	606686.8400	1473826.9400	19.970	NGS DISK "MARTAIR 95"
2	607895.0900	1474311.9500	.000	NGS DISK "MARTAIR AZ MK"
69	602209.3800	1480310.3000	6.320	NGS DISK "MTN A"
150	605810.6106	1475759.9966	9.140	REBAR AND CAP
151	605314.6738	1475577.1136	6.910	REBAR AND CAP
200	605841.0603	1476208.4884	18.880	PK NAIL
9701	602366.8134	1479463.3566	11.010	PK NAIL
9702	602140.8069	1479240.3198	10.050	PK NAIL
9703	601793.8895	1479037.5637	9.170	REBAR AND CAP
9704	602170.5120	1478898.9620	9.570	PK NAIL
9705	602413.3978	1479107.2937	13.880	PK NAIL
9706	602563.4430	1479289.9998	18.000	PK NAIL
9707	602716.6823	1478852.1787	11.430	REBAR AND CAP
9708	603226.3640	1477094.3591	6.680	REBAR AND CAP
9709	603247.4356	1476379.3177	9.180	REBAR AND CAP
9710	603271.7921	1475983.9811	12.650	REBAR AND CAP
9711	603861.9261	1476990.0680	10.820	REBAR AND CAP
9712	604503.3605	1476693.8771	13.330	PK NAIL
9713	603543.1784	1477527.2753	10.340	REBAR AND CAP
9714	603622.2893	1475325.0056	14.720	REBAR AND CAP
9715	604111.9995	1475834.6728	8.750	REBAR AND CAP
9716	604803.1890	1475358.6301	19.950	REBAR AND CAP
9717	605139.6584	1475991.6338	20.510	REBAR AND CAP
9718	604254.2703	1477872.8433	13.070	REBAR AND CAP
9719	603777.9202	1477861.6140	10.460	REBAR AND CAP
9720	605136.6443	1475961.0844	16.660	"X-CUT"
9721	604224.4110	1475939.4986	15.040	REBAR AND CAP
9722	605038.6840	1477011.8310	15.380	REBAR AND CAP
9723	605375.2370	1476585.7827	17.370	REBAR AND CAP
9741	602362.2076	1477767.0931	6.320	REBAR AND CAP
9742	603466.5791	1477833.3871	7.380	REBAR AND CAP
9743	603543.4091	1477882.0918	7.530	REBAR AND CAP
9744	603659.6079	1477980.4198	7.820	REBAR AND CAP
9745	603787.5371	1478108.0007	8.220	REBAR AND CAP
9746	604008.5352	1478172.7161	11.550	REBAR AND CAP

A. MORTON THOMAS AND ASSOCIATES
(" BENCHMARK - TABULATION")

BM #1	N.E. CORNER INLET 500' NORTH OF THE MAINTENANCE BUILDING. (ELEV. 8.59')
BM #2	N.E. CORNER HEADWALL AT WEST SIDE STRAWBERRY POINT ROAD 1500' SOUTH OF WILSON POINT ROAD. (ELEV. 9.49')
BM #3	SQUARE CUT ON CENTER OF HEADWALL AT EAST SIDE OF STRAWBERRY POINT ROAD 300' N. OF SALT DOMES. (ELEV. 8.44')
BM #4	100' NORTH OF N.E CORNER OF MAINTENANCE BLDG AT N.W CORNER STORM DRAIN GRATE AT LOW POINT. (ELEV. 8.28')
BM #5	N.W. CORNER OF STORM DRAIN GRATE 500' SOUTH OF TAXIWAY "F" AND TAXIWAY "J". (ELEV. 11.89')
BM #6	TOP OF CONCRETE JOINT 2.0' EAST OF TAXIWAY "K" AND TAXIWAY "G" 10' EAST OF HANGAR #4. (ELEV. 16.62')
BM #7	SQUARE CUT ON BOTTOM STEP OF TOWER AND ADMINISTRATION BUILDING. (ELEV. 20.59')
BM #8	NORTHWEST CORNER OF 15-33 SIGN ACROSS TAXIWAY "F" FROM TOWER. (ELEV. 18.65')
BM #9	NORTHEAST CORNER OF STORM DRAIN GRATE ACROSS TAXIWAY "F" FROM HANGAR #2 (ELEV. 17.79')

SURVEYOR'S CERTIFICATION

I, GERARD J. LONG, HEREBY CERTIFY, TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF, AND AS OF THE LATEST DATE SHOWN HEREON, THAT THE TOPOGRAPHIC MAPPING SHOWN HEREON IS CORRECT, THAT IT IS AN AERIAL TOPOGRAPHIC SURVEY THAT WAS ENHANCED WITH FIELD SURVEY MEASUREMENTS, THAT THE POSITION OF THE RIGHT OF WAY LINES SHOWN ALONG WILSON POINT ROAD ARE RELATED TO BOUNDARY AND RIGHT OF WAY MONUMENTS FOUND AND THAT THE LOCATIONS OF THE SUBSURFACE UTILITIES ARE RELATED TO THOSE ITEMS LISTED IN THE GENERAL NOTES SHOWN ON THIS PLAN.

THIS IS NOT A BOUNDARY SURVEY, SEE GENERAL NOTES. ONLY A LIMITED NUMBER OF PROPERTY AND EASEMENT LINES ARE SHOWN. A CURRENT TITLE REPORT WAS NOT FURNISHED. THIS PLAN IS SUBJECT TO ALL RIGHTS OF WAY AND EASEMENTS OF RECORD.

DATE _____ BY: _____

GERARD J. LONG
PROPERTY LINE SURVEYOR
MD. REGISTRATION NO. 90

AS-BUILTS

THESE DRAWINGS DATED July 1, 2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

AS-BUILT

AMT
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Email: AMTENG@GTEI.NET

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Arlington, VA 22201

DESIGNED	
DRAWN	ME
CHECKED	DBS
APPROVED	GJLONG

STATE OF MARYLAND — GERARD JOSEPH LONG — No. 90 — PROPERTY LINE SURVEYOR

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

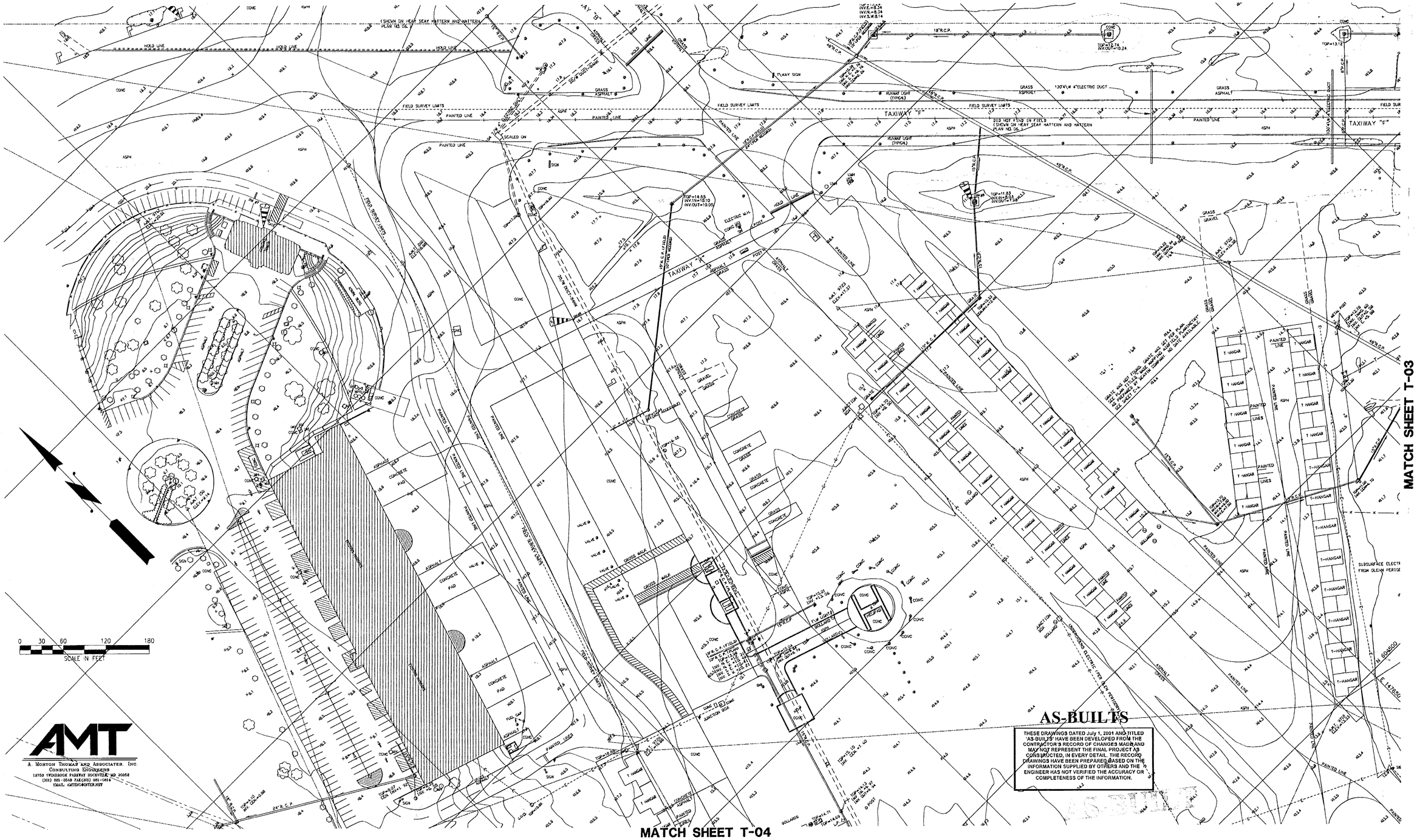
SHEET TITLE: SURVEY CONTROL AND EXISTING CONDITIONS PLAN IV

SCALE: 1" = 60'

DATE: OCTOBER 31, 1997

PROJECT NO.: MAA-CO-97-019

SHEET NO.: T-01



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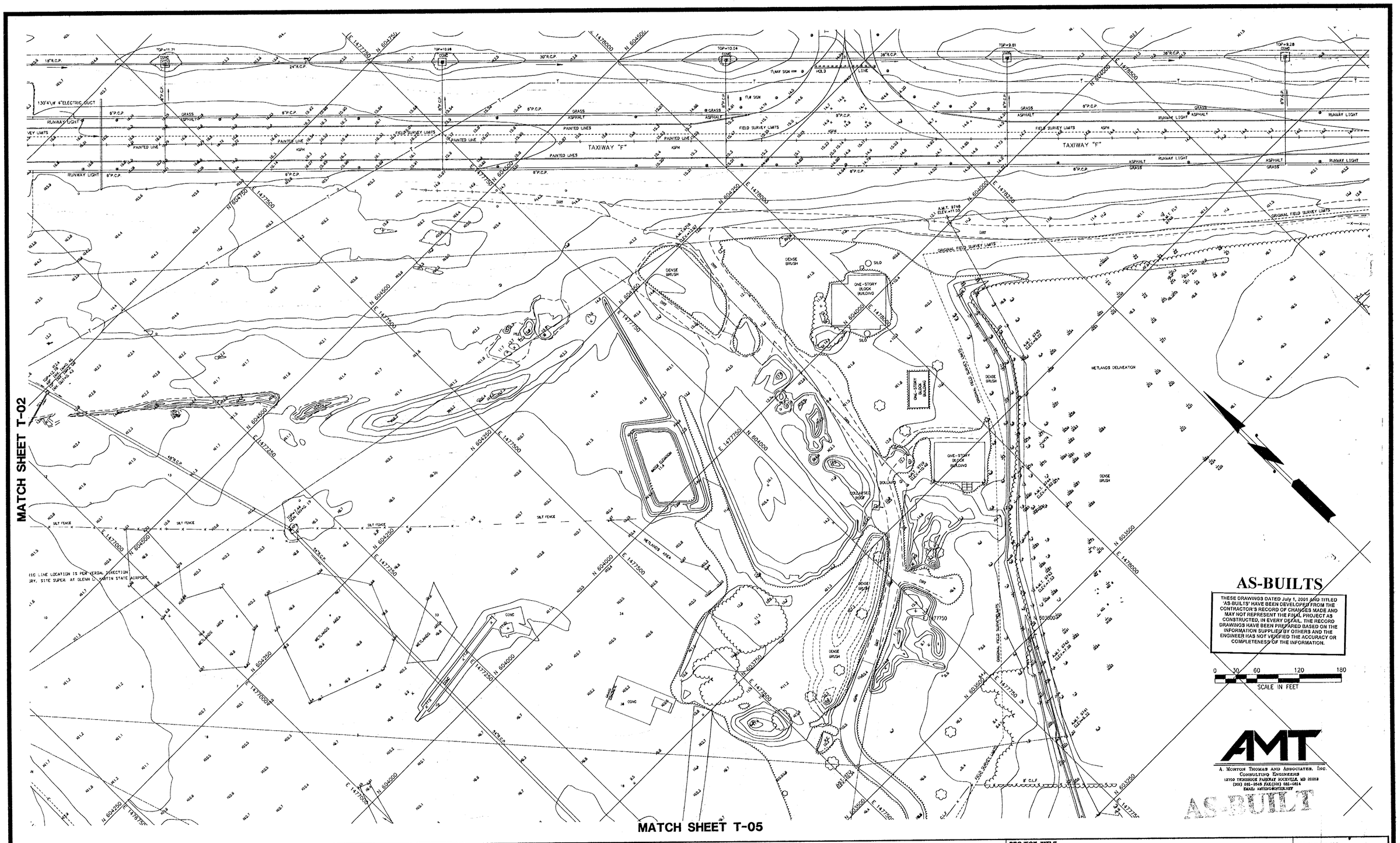
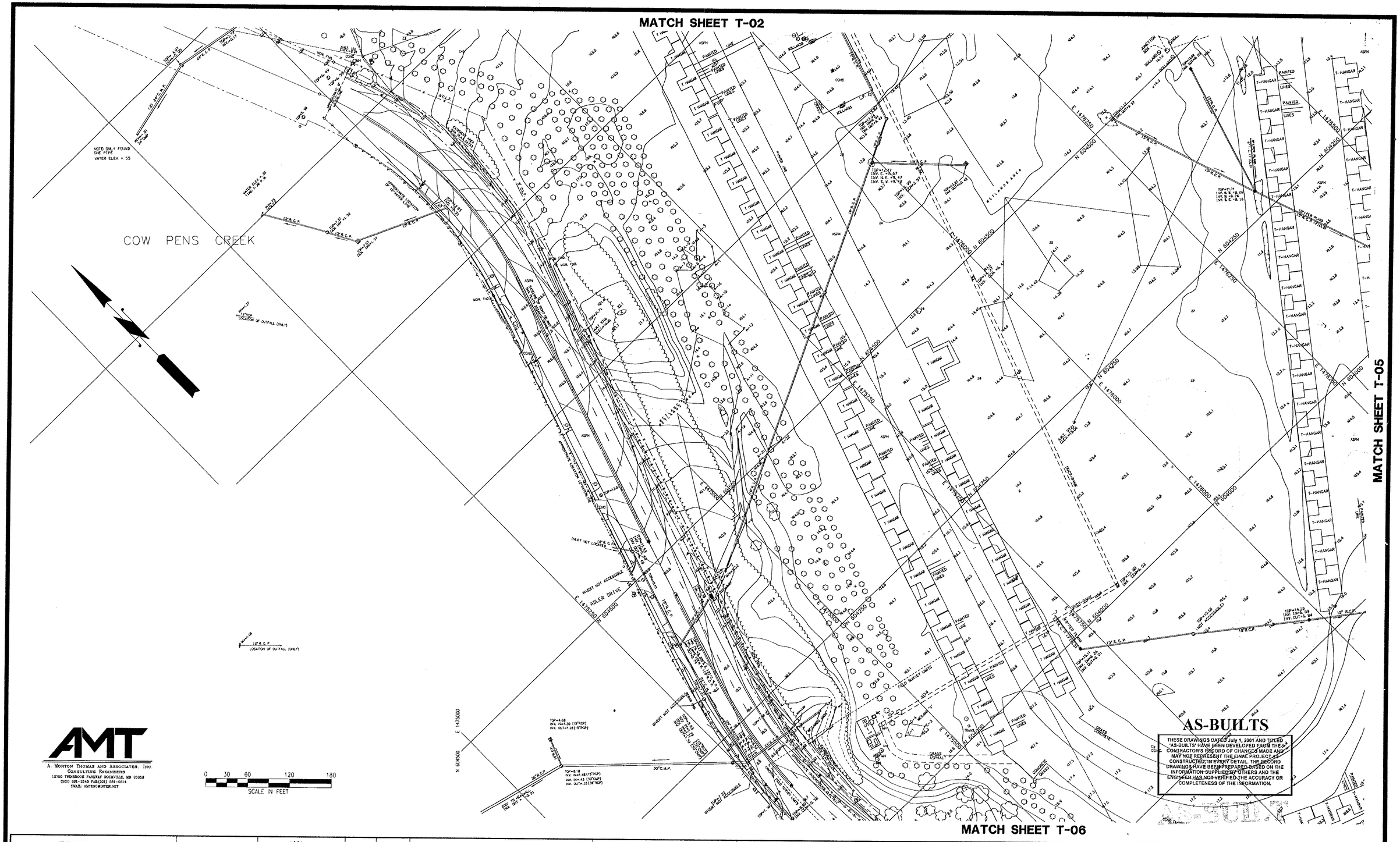
TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED N/A DRAWN ME/GS CHECKED DBS APPROVED GJLONG	REV.	DATE	REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO. MAA-CO-97-019
SHEET TITLE: SURVEY CONTROL AND EXISTING CONDITIONS PLAN IV	SHEET NO. T-02
SCALE 1" = 60' / DATE OCTOBER 31, 1997	



TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED N/A DRAWN ME/GS CHECKED DBS APPROVED GJLONG	REV.	DATE	REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE SURVEY CONTROL AND EXISTING CONDITIONS PLAN IV SCALE 1" = 60' DATE OCTOBER 31, 1997	PROJECT NO. MAA-CO-97-019 SHEET NO. T-03



AMT
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CHECKED	DBS
APPROVED	GJLONG

STATE OF MARYLAND
CHARLES J. LONG
No. 90
REGISTERED
PROPERTY LINE SURVEYOR

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
SURVEY CONTROL AND EXISTING CONDITIONS PLAN IV

SCALE 1" = 60'

DATE OCTOBER 31, 1997

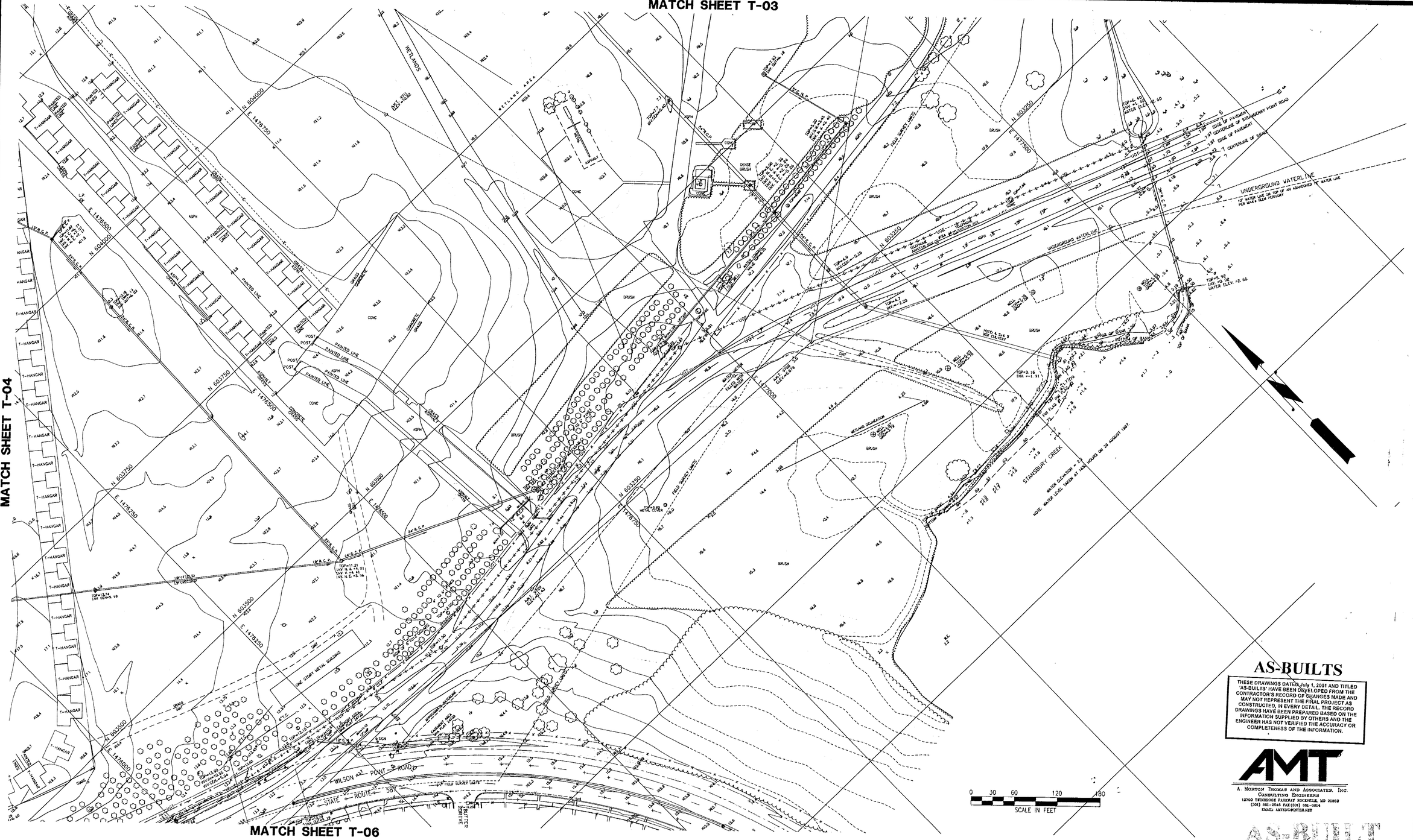
PROJECT NO. MAA-CO-97-019

SHEET NO. T-04

MATCH SHEET T-03

MATCH SHEET T-04

MATCH SHEET T-06



AS-BUILTS

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AS-BUILT

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DRAWN	ME/GS
CHECKED	DBS
APPROVED	GJLONG

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
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MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
SURVEY CONTROL AND EXISTING CONDITIONS PLAN IV

SCALE 1" = 60'

DATE OCTOBER 31, 1997

PROJECT NO. MAA-CO-97-019

SHEET NO. T-05

MATCH SHEET T-04

MATCH SHEET T-05



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CHECKED	DBS
APPROVED	GJLONG

STATE OF MARYLAND — GREGORY J. LONG — No. 90 — REGISTERED PROPERTY LINE SURVEYOR

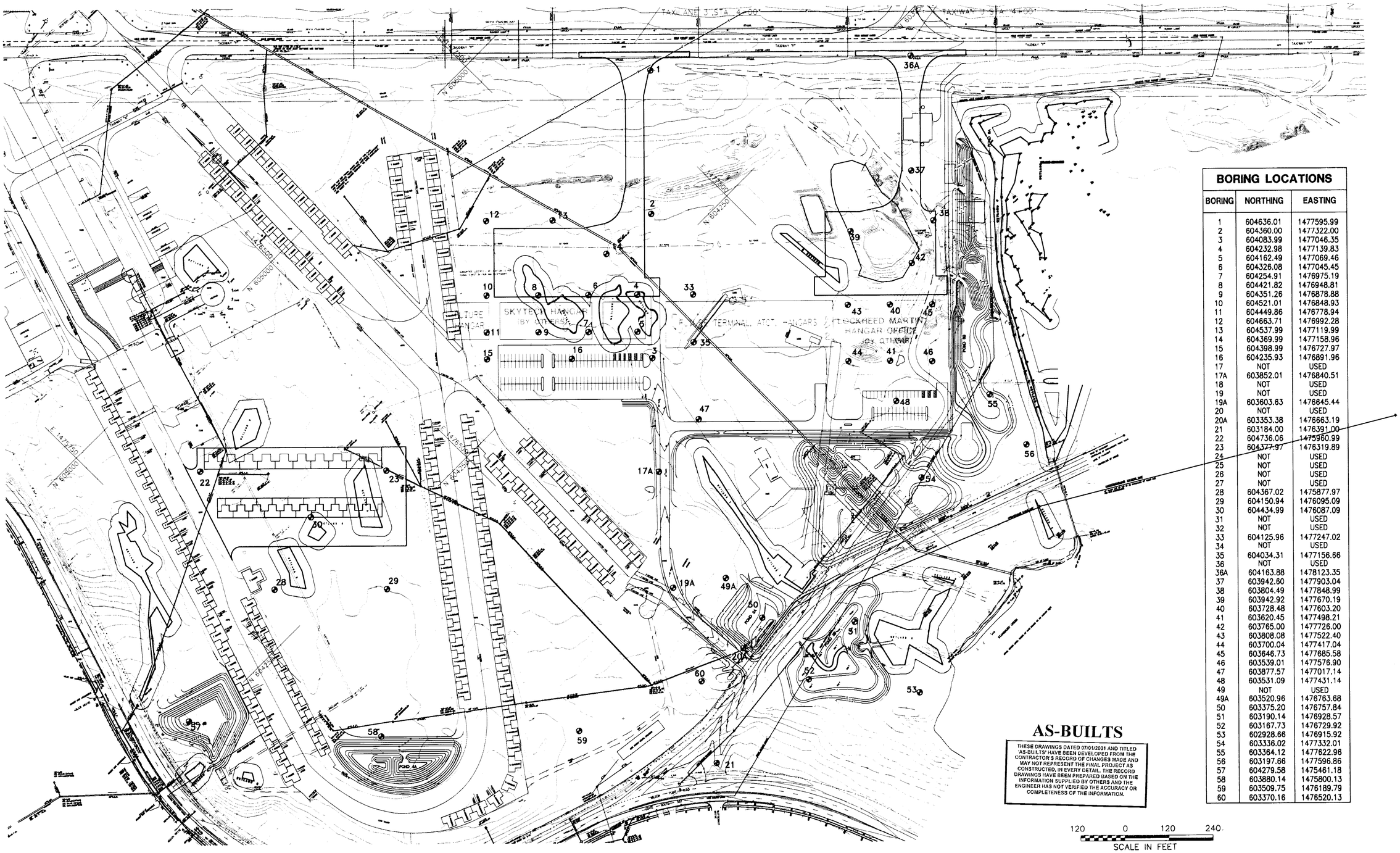
REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE 1
SHEET TITLE	SURVEY CONTROL AND EXISTING CONDITIONS PLAN IV
SCALE	1" = 60'
DATE	OCTOBER 31, 1997
PROJECT NO.	MAA-CO-97-019
SHEET NO.	T-06



BORING LOCATIONS

BORING	NORTHING	EASTING
1	604636.01	1477595.99
2	604360.00	1477322.00
3	604083.99	1477046.35
4	604232.98	1477139.83
5	604162.49	1477069.46
6	604326.08	1477045.45
7	604254.91	1476975.19
8	604421.82	1476948.81
9	604351.26	1476878.88
10	604521.01	1476848.93
11	604449.86	1476778.94
12	604663.71	1476992.28
13	604537.99	1477119.99
14	604369.99	1477158.96
15	604398.99	1476727.97
16	604235.93	1476891.96
17	NOT	USED
17A	603852.01	1476840.51
18	NOT	USED
19	NOT	USED
19A	603603.63	1476645.44
20	NOT	USED
20A	603353.38	1476663.19
21	603184.00	1476391.00
22	604736.06	1475960.99
23	604377.97	1476319.89
24	NOT	USED
25	NOT	USED
26	NOT	USED
27	NOT	USED
28	604367.02	1475877.97
29	604150.94	1476095.09
30	604434.99	1476087.09
31	NOT	USED
32	NOT	USED
33	604125.96	1477247.02
34	NOT	USED
35	604034.31	1477156.66
36	NOT	USED
36A	604163.88	1478123.35
37	603942.60	1477903.04
38	603804.49	1477848.99
39	603942.92	1477670.19
40	603728.48	1477603.20
41	603620.45	1477498.21
42	603765.00	1477726.00
43	603808.08	1477522.40
44	603700.04	1477417.04
45	603646.73	1477685.58
46	603539.01	1477576.90
47	603877.57	1477017.14
48	603531.09	1477431.14
49	NOT	USED
49A	603520.96	1476763.68
50	603375.20	1476757.84
51	603190.14	1476928.57
52	603167.73	1476729.92
53	602928.66	1476915.92
54	603336.02	1477332.01
55	603364.12	1477622.96
56	603197.66	1477596.86
57	604279.58	1475461.18
58	603880.14	1475800.13
59	603509.75	1476189.79
60	603370.16	1476520.13

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

120 0 120 240
SCALE IN FEET

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	FA
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TERRANCE SUNDSTROM
LICENSE NO. 12488
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
BORING LOCATION PLAN

SCALE 1" = 120'

DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. B-01

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 6.6 Feet

BORING NO.: B-1
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/20/97
SURFACE ELEVATION: 15.37 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 Inches
WATER LEVEL AFTER 24 HR: 7.1 Feet, Caved @ 7.5 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium dense, brown, grey, silty mf SAND, little rock fragments, trace roots. (FILL)			S-1	5-8-9	DS	12	Graded area.
11.4	Moist, medium dense, red, grey, brown, silty mf SAND.	5		S-2	12-14-9	DS	18	
	Moist, medium dense, gray, silty f SAND, lense of clay.			S-3	6-4-5	DS	18	Bag sample @ 5.0-8.5 feet.
6.4	Moist, medium dense, grey, light brown, silty f SAND.	10		S-4	9-9-11	DS	18	
	Bottom of boring at 10 feet.							
1.4		15						
-3.6		20						
-8.6		25						
-13.6		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 4.9 Feet

BORING NO.: B-2
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/20/97
SURFACE ELEVATION: 9.93 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 3.6 Feet, Caved @ 4.1 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium dense, light brown, gray silty mf SAND. (FILL)			S-1	3-6-6	DS	12	3.5" top soil.
4.9	Moist, stiff, gray CLAY, little sand.	5		S-2	4-5-9	DS	18	
	Moist, medium stiff, grey, red CLAY, little sand.			S-3	3-3-4	DS	18	
-1	Wet, medium dense, grey, light brown, silty mf SAND.	10		S-4	4-6-7	DS	18	
	Bottom of boring at 10 feet.							
-5.1		15						
-10.1		20						
-15.1		25						
-20.1		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 Inches
WATER LEVEL AT COMPLETION: 3.3 Feet, Caved @ 5.3 Feet

BORING NO.: B-3
DRILLING COMPANY: F&R
DRILLER: Ron
DATE DRILLED: 2/17/97
SURFACE ELEVATION: 10.06 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 Inches
WATER LEVEL AFTER 24 HR: At Surface, Caved @ 3.3 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, stiff, grey-brown, sandy CLAY, little rock fragments. (FILL)			S-1	4-4-5	DS	9	3" top soil.
5.1	Wet, loose, brown, silty f SAND.	5		S-2	2-2-3	DS	18	
	Wet, very loose, brown, silty f SAND.			S-3	2-1-2	DS	18	Water on rods.
0.1	Wet, loose, brown silty f SAND.	10		S-4	1-2-3	DS	12	Bag sample.
	Bottom of boring at 10 feet.							
-4.9		15						
-9.9		20						
-14.9		25						
-19.9		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 4.8 Feet, Caved @ 5.6 Feet.

BORING NO.: B-4
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/19/97
SURFACE ELEVATION: 9.92 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 Inches
WATER LEVEL AFTER 24 HR: At Surface, Caved @ 4.9 Feet.

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Wet,loose, brown, grey, Silty mf SAND.(FILL)			S-1	1-2-2	DS	13	3" top soil. Area under shallow standing water.
4.9	wet, medium stiff, brown clay, some sand.(FILL)	5		S-2	3-2-2	DS	4	
	Wet, medium stiff, brown CLAY, little sand.(FILL)			S-3	1-2-2	DS	8	
-1	Wet, medium stiff, grey, tan CLAY.(FILL)	10		-	2-2-4	DS	0	no recovery, got sample @10.0-11.5'
				S-4	2-2-3	DS	18	
-5.1	Wet, very stiff, grey, brown CLAY.	15		S-5	5-10-15	DS	15	
-10.1	Wet, very stiff, dark grey, CLAY.	20		S-6	5-7-8	DS	15	
-15.1	Wet, very stiff, dark grey CLAY.	25		S-7	4-7-10	DS	18	
	Bottom of boring at 25 feet.							
-20.1		30						

ABBREVIATIONS:

DS = Driven Split Spoons
PT = Pushed Shelby Tube
RC = Rock Core

AS-BUILTS

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TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	EBA
DRAWN	JPD
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRANCE JOSEPH SHEEHY — LICENSE NO. 12408 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE: BORING LOGS I
SCALE: NO SCALE
DATE: September 08, 1998
PROJECT NO.: MAA-CO-97-019
SHEET NO.: B-02

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: 7.2 Feet, Caved @ 9.3 Feet

BORING NO.: B-5
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/19/97
SURFACE ELEVATION: 9.88 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: At Surface, Caved @ 5.3 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium stiff, brown sandy CLAY, trace rock fragments and roots.(FILL)			S-1	3-3-4	DS	5	3" top soil. Area under shallow satanding water.
4.9	Wet, soft, brown, sandy SILT, clay lense, trace roots. (FILL)	5		S-2	2-2-2	DS	16	
	Wet, loose, brown, silty f SAND. (FILL)			S-3	2-3-4	DS	16	
1	Wet, loose, brown, silty f SAND. (FILL)	1.0		S-4	1-2-2	DS	6	
-5.1	Wet, soft, dark grey SILT, little sand, trace organics.	1.5		S-5	1-2-2	DS	14	
-10.1	Wet, stiff, dark grey sandy SILT, some organics, trace roots.	2.0		S-6	2-2-11	DS	18	
	Moist, hard, grey, tan CLAY.							
-15.1		2.5		S-7	8-16-16	DS	14	
	Bottom of boring at 25 feet.							
-20.1		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: 19.3 Feet, Caved @ 12.2 Feet.

BORING NO.: B-6
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/19/97
SURFACE ELEVATION: 9.89 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: At Surface, Caved @ 17.9 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Wet, soft,red-brown, grey CLAY, little roots. (FILL)			S-1	2-1-2	DS	15	3" top soil. Area under water.
4.9	Wet, medium stiff, grey-brown CLAY, trace roots. (FILL)	5		S-2	1-2-3	DS	18	
	Wet, soft, brown CLAY. (FILL)			S-3	woh/18"	DS	18	
-1	Wet, soft, brown CLAY, little mica.(FILL)	1.0		S-4	woh/18"	DS	18	
-5.1	Wet, soft, dark grey SILT, some organics.	1.5		S-5	1-1-2	DS	18	
	Wet, dark grey SILT, some organics.			PT-1	PUSH	PT	22	
-10.1	Wet, very stiff, light grey CLAY, little mica and sand.	2.0		S-6	5-8-9	DS	18	
-15.1	Wet, very stiff, grey-brown CLAY.	2.5		S-7	10-9-11	DS	18	
	Bottom of boring at 25 feet.							
-20.1		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 37.0 Feet

BORING NO.: B-7
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/18/97
SURFACE ELEVATION: 10.2 Feet
HAMMER WEIGHT/DROP: 140lbs/30 inches
WATER LEVEL AFTER 24 HR: 11.9 Feet, Caved @ 12.1 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium, dense, brown silty f SAND, trace gravel. (FILL)			S-1	3-6-7	DS	15	4.5 " top soil
5.2	Moist, loose, reddish brown, grey, silty f SAND, trace gravel and rock fragments, organic odor. (FILL)	5		S-2	3-3-4	DS	16	
	Wet, soft, brown CLAY, trace sand. (FILL)			S-3	2-2-2	DS	18	
1	Wet, very soft, reddish brown CLAY. (FILL)	1.0		S-4	1-1-1	DS	7	
				PT-1	PUSH	PT	8	Pushed shelby tube @10.0'-12.0'.
-4.8	Wet, soft, grey, brown, sandy SILT, lenses of clay. (FILL)	1.5		S-5	1-1-2	DS	16	
-9.8	Moist, very stiff, brown, tan, light grey CLAY, trace sand.	2.0		S-6	3-6-9	DS	0	Sample lost @ 18.5'-20.0'. 3 attempts, auger down 1.0', tried again.
	Moist, very stiff, brown, tan, light grey CLAY, trace sand.			S-7	9-10-16	DS	8	
-14.8	Moist, very stiff, reddish brown, light grey CLAY, trace sand.	2.5		S-8	7-13-16	DS	4	
-19.8	Moist, hard, reddish brown fat CLAY, trace sand.	3.0		S-9	7-11-20	DS	-	
-24.8	Moist, hard, reddish brown, tan, light grey CLAY, trace sand.	3.5		S-10	9-12-20	DS	18	
-29.8	Moist, hard, light grey, brown CLAY, trace sand.	4.0		S-11	10-14-20	DS	20	
	Bottom of boring at 40.0 Feet.							
-34.8		4.5						

DS = Driven Split Spoons, PT = Pushed Shelby Tube, RC = Rock Core

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION:

BORING NO.: B-8
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/18/97
SURFACE ELEVATION: 10.65 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR: Dry, Caved @ 31.2 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium stiff, brown, sandy SILT, trace roots. (FILL)			S-1	2-3-4	DS	14	
5.2	Moist, Medium stiff, brown, sandy SILT, lenses of clay, trace roots, decomposed wood pieces.(FILL)	5		S-2	3-4-3	DS	12	
	Moist, medium stiff, brown, grey, sandy CLAY. (FILL)			S-3	1-1-3	DS	14	Attempted to collect shelby tube sample @ 7.5' No Sample obtained.
6		1.0		PT-1	PUSH	PT	0	Attempted to collect shelby tube sample @ 8.5' No Sample obtained.
	Wet, very soft, red-brown, CLAY. (FILL)			S-4	1-1-1	DS	0	
-4.3	Wet, soft, grey, red-brown, CLAY, trace sand, decomposed wood, organic. (FILL)	1.5		S-5	2-2-2	DS	5	
-9.8	Moist, very stiff, tan-brown, pink CLAY.	2.0		S-6	6-10-13	DS	16	Encountered grey, pink & red clay at 18.5'.
-14.8	Moist, very stiff, red-brown, light grey, CLAY	2.5		S-7	8-12-15	DS	10	
-19.8	Moist, hard, red-brown, light grey, CLAY.	3.0		S-8	12-17-24	DS	7	
	Moist, hard, red-brown CLAY.			S-9	48-50/6"	DS	3	Hit rock at 33.5'.
-24.8	Bottom of boring at 34.5 feet.	3.5						

DS = Driven Split Spoons, PT = Pushed Shelby Tube, RC = Rock Core

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: 2 Feet, Caved @ 6.5 Feet

BORING NO.: B-9
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/18/97
SURFACE ELEVATION: 11.25 Feet
HAMMER WEIGHT/DROP: 140 lbs/ 30 inches
WATER LEVEL AFTER 24 HR: At Surface, Caved @ 4.6 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium dense, brown, silty mf SAND, little rock fragments, trace roots. (FILL)			S-1	5-6-11	DS	18	4.25" top soil.
5.2	Wet, loose, light brown, silty mf SAND.	5		S-2	4-4-4	DS	16	
	Wet, medium dense, brown silty mf SAND, little rock fragments.			S-3	6-9-8	DS	12	running sand
1.2	Moist, very stiff, grey, brown CLAY.	1.0		S-4	8-9-13	DS	12	running sand
-3.7	Moist, very stiff, grey, brown CLAY.	1.5		S-5	8-9-14	DS	9	running sand
-8.7	Moist, hard, grey CLAY, lense of silty f sand @ 17.5 to 19.0 feet.	2.0		S-6	16-20-32	DS	12	
-13.8	Moist, hard, grey, reddish brown CLAY.	2.5		S-7	17-23-36	DS	10	running sand
	Bottom of boring at 25 feet.							
-18.7		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: 18 Feet, Caved @ 21.2 Feet

BORING NO.: B-10
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/18/97
SURFACE ELEVATION: 11.49 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 2.5 Feet, Caved @ 16.3 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium stiff, reddish-brown, grey CLAY, little Sand. (FILL)			S-1	2-2-4	DS	14	3.5" top soil
6.5	Wet, soft, grey, brown CLAY, trace roots. (FILL)	5		S-2	2-2-2	DS	15	water at 2.5'
	Wet, soft, grey, brown silty CLAY with sand. (FILL)			S-3	woh/6"-1-1	DS	10	
1.5	Wet, soft, grey, brown, sandy CLAY, some organics.	1.0		S-4	woh/12"-2	DS	18	
-3.5	Moist, stiff, grey CLAY.	1.5		S-5	5-6-9	DS	12	gravel at 12.0'
-8.5	Moist, very stiff, light grey CLAY.	2.0		S-8	5-9-13	DS	18	
-13.5	Moist, hard, reddish brown CLAY.	2.5		S-7	10-14-23	DS	12	
	Bottom of boring at 25 feet.							
-18.5		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 15.9 Feet

BORING NO.: B-11
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/18/97
SURFACE ELEVATION: 11.38 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 8.7 Feet, Caved @ 12.2 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, stiff, grey-brown, CLAY, little sand. (FILL)			S-1	3-4-8	DS	14	4" top soil
5.4	Moist, very stiff, grey-brown CLAY.	5		S-2	9-10-12	DS	18	
	Moist, very stiff, grey-brown CLAY.			S-3	8-9-16	DS	15	
1.4	Moist, very stiff, grey-brown CLAY.	1.0		S-4	8-9-14	DS	15	
-3.6	Moist, very stiff, light grey, brown CLAY.	1.5		S-5	5-7-11	DS	18	
-8.6	Moist, very stiff, grey-brown CLAY.	2.0		S-6	5-7-12	DS	18	
-13.6	Moist, very stiff, reddish brown CLAY.	2.5		S-7	9-12-17	DS	18	
	Bottom of boring at 25 feet.							
-18.6		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 8 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 3.2 Feet

BORING NO.: B-12
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/20/97
SURFACE ELEVATION: 11.46 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: Dry, Caved @ 3.5 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, stiff, brown CLAY, little sand and roots. (FILL)			S-1	3-4-5	DS	9	4" top soil
5.5	Moist, medium stiff, brown CLAY.(FILL)	5		S-2	3-3-4	DS	16	
	Moist, soft, grey-brown CLAY.(FILL)			S-3	1-1-2	DS	18	
1.5	Moist, soft, brown CLAY.(FILL)	1.0		S-4	woh/12"-1	DS	18	
	Bottom of boring at 10 feet.							
-3.5		1.5						
-8.5		2.0						
-13.5		2.5						
-18.5		3.0						

AS-BUILTS

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DESIGNED	EBA
DRAWN	JPD
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TECHNICAL EXAMINERS — LICENSE NO. 12408 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE: BORING LOGS II
SCALE: NO SCALE
DATE: September 08, 1998
PROJECT NO.: MAA-CO-97-019
SHEET NO.: B-03

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: 7.8 Feet, Caved @ 8 Feet

BORING NO.: B-13
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/20/97
SURFACE ELEVATION: 10.99 Feet
HAMMER WEIGHT/DROP: 140 lbs/ 30 Inches
WATER LEVEL AFTER 24 HR: 2.5 Feet, Caved @ 4.8 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
								4.5" top soil.
	Moist, medium stiff, brown, sandy CLAY, trace roots and rock fragments. (FILL)			S-1	4-3-3	DS	14	
6.0	Moist, medium stiff, dark grey, CLAY, little organics.(FILL)	5		S-2	2-2-2	DS	16	
	Wet, medium stiff, brown, grey CLAY, little organics and sand.(FILL)			S-3	1-2-3	DS	14	
1.0	Moist, loose, gray, brown, clayey SAND, little organics and trace rock fragments.(FILL)	10		S-4	woh/8"-2-2	DS	18	
	Bottom of boring at 10 feet.							
-4.0		15						
-9.0		20						
-14.0		25						
-19.0		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: 5.9 Feet, Caved @ 7.1 Feet

BORING NO.: B-14
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/20/97
SURFACE ELEVATION: 10.10 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 2 Feet, Caved @ 4.9 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium stiff, brown, grey CLAY, little sand, rock fragments and roots. (FILL)			S-1	2-3-4	DS	14	3" top soil
5.1	Wet, medium dense, brown, silty mf SAND.	5		S-2	3-5-5	DS	18	Water on rods
	Wet, medium dense, tan, brown, silty mf SAND.			S-3	4-5-9	DS	18	
-1.0	Wet, stiff, grey, tan CLAY.	10		S-4	5-5-8	DS	16	
	Bottom of boring at 10 feet.							
-4.9		15						
-9.9		20						
-14.9		25						
-19.9		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: 5.9 Feet, Caved @ 7.1 Feet

BORING NO.: B-14
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/20/97
SURFACE ELEVATION: 10.10 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 2 Feet, Caved @ 4.9 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium stiff, brown, gray CLAY, little sand, rock fragments and roots. (FILL)			S-1	2-3-4	DS	14	3" top soil
5.1	Wet, medium dense, brown, silty mf SAND.	5		S-2	3-5-5	DS	18	Water on rods
	Wet, medium dense, tan, brown, silty mf SAND.			S-3	4-5-9	DS	18	
-1.0	Wet, stiff, grey, tan CLAY.	10		S-4	5-5-8	DS	16	
	Bottom of boring at 10 feet.							
-4.9		15						
-9.9		20						
-14.9		25						
-19.9		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: 2.2 Feet, Caved @ 5.3 Feet

BORING NO.: B-15
DRILLING COMPANY: F&R
DRILLER: Ron
DATE DRILLED: 2/17/97
SURFACE ELEVATION: 10.83 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: At Surface, Caved @ 3.2 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, loose, grey-brown, red, silty f SAND. (FILL)			S-1	3-4-4	DS	12	3.5" top soil
5.8	Wet, medium dense, light brown, silty mf SAND.	5		S-2	4-6-6	DS	18	
	Wet, medium dense, brown, silty mf SAND, some rock fragments.			S-3	6-11-15	DS	18	
0.8	Wet, dense, brown, grey silty mf SAND, some rock fragments.	10		S-4	14-18-16	DS	18	Bag sample.
	Bottom of boring at 10 feet.							
-4.2		15						
-9.2		20						
-14.2		25						
-19.2		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: 4.4 Feet, Caved 2 7.5 Feet

BORING NO.: B-17A
DRILLING COMPANY: F&R
DRILLER: Ron
DATE DRILLED: 2/17/97
SURFACE ELEVATION: 11.48 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 0.5 Feet, Caved @ 5.9 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, loose, grey-brown, silty mf SAND, little clay, trace rock fragments. (FILL)			S-1	2-4-5	DS	18	3" top soil.
6.5	Wet, medium stiff, grey-brown, sandy CLAY, some organics, trace rock fragments.	5		S-2	3-3-3	DS	18	
	Moist, stiff, red-brown CLAY, trace sand.			S-3	4-6-8	DS	15	
1.5	Moist, very stiff, red-brown CLAY, trace sand.	10		S-4	6-11-14	DS	18	
	Bottom of boring at 10 feet.							
-3.5		15						
-8.5		20						
-13.5		25						
-18.5		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 8.6 Feet

BORING NO.: B-19A
DRILLING COMPANY: F&R
DRILLER: Ron
DATE DRILLED: 2/17/97
SURFACE ELEVATION: 13.82 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 7.2 Feet, Caved @ 8.5 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, stiff, brown, gray CLAY, some sand. (FILL)			S-1	4-6-8	DS	14	4" top soil
8.8	Moist, medium dense, brown, silty mf SAND, little rock fragments and clay. (FILL)	5		S-2	6-6-7	DS	15	
	Wet, medium stiff, grey-brown SILT, trace sand and roots.			S-3	2-3-3	DS	10	
3.8	Wet, medium stiff, light brown, sandy SILT.	10		S-4	3-5-2	DS	18	Bag sample
	Bottom of boring at 10 feet.							
-1.2		15						
-6.2		20						
-11.2		25						
-16.2		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 7.5 Feet

BORING NO.: B-20A
DRILLING COMPANY: F&R
DRILLER: Ron
DATE DRILLED: 2/17/97
SURFACE ELEVATION: 7.92 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 6.5 Feet, Caved @ 7.1 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium stiff, grey, light brown CLAY, trace rock fragments and sand. (FILL)			S-1	2-4-4	DS	10	4" top soil.
2.3	Moist, soft, dark brown CLAY, trace mica.	5		S-2	2-1-1	DS	15	
	Wet, very soft, dark brown CLAY, trace mica.			S-3	woh/18"	DS	8	
-2.7	Wet, stiff, light grey CLAY.	10		S-4	3-4-7	DS	12	
	Bottom of boring at 10 feet.							
-7.7		15						
-12.7		20						
-17.7		25						
-22.7		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: 6.2 Feet, Caved @ 6.6 Feet

BORING NO.: B-21
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/21/97
SURFACE ELEVATION: 14.56 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 2.7 Feet, Caved @ 4.1 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC (in)	REMARKS
	Moist, medium dense, light brown, silty f SAND. (FILL)			S-1	2-2-8	DS	18	5" top soil
9.6	Moist, dense, light brown, tan silty f SAND. (FILL)	5		S-2	19-18-12	DS	18	Bag sample.
	Moist, medium dense, brown, silty mf SAND, clay lense with roots.			S-3	9-9-8	DS	18	
4.6	Moist, medium dense, tan, silty mf SAND.	10		S-4	7-9-12	DS	18	
	Bottom of boring at 10 feet.							
-4.4		15						
-5.4		20						
-10.4		25						
-15.4		30						

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED. IN EVERY DETAIL, THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	EBA
DRAWN	JPD
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOBKOWICZ — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: BORING LOGS III

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: B-04

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin state Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 7.6 Feet, Caved @ 8.2 Feet

BORING NO.: B-22
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/21/97
SURFACE ELEVATION: 14.22 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 2.7 Feet, Caved @ 5.2 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								5.5" top soil
	Moist, stiff, dark grey CLAY, little sand. (FILL)			S-1	5-6-8	DS	16	
9.2	Moist, stiff, grey CLAY, little sand.	5		S-2	4-6-6	DS	18	
	Moist, stiff, light grey CLAY.			S-3	5-6-8	DS	18	
4.2	Moist, stiff, grey, reddish brown CLAY.	10		S-4	3-6-7	DS	18	
-1.8	Moist, hard, light brown, grey CLAY.	15		S-5	8-13-25	DS	4	
	Bottom of boring at 10 feet.							
-5.8		20						
-10.8		25						
-15.8		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 7.4 Feet

BORING NO.: B-23
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/21/97
SURFACE ELEVATION: 14.06 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: Dry, Caved @ 7.4 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC. (in)	REMARKS
								4.5" top soil.
	Moist, stiff, red-brown CLAY, little sand, trace roots. (FILL)			S-1	3-5-7	DS	10	
9.1	Moist, very stiff, red-brown CLAY.	5		S-2	10-15-14	DS	13	
	Moist, hard, red-brown CLAY.			S-3	10-17-22	DS	4	
4.1	Moist, very stiff, grey brown CLAY.	10		S-4	10-11-14	DS	15	
-1.9	Moist, very stiff, light brown, grey, red CLAY.	15		S-5	8-8-13	DS	18	
	Bottom of boring at 15 feet.							
-5.9		20						
-10.9		25						
-15.9		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 214240239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 8.1 Feet

BORING NO.: B-28
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/21/97
SURFACE ELEVATION: 14.04 Feet
HAMMER WEIGHT/DROP: 140 lbs/ 30 inches
WATER LEVEL AFTER 24 HR: 5.4 Feet, Caved @ 5.8 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC. (in)	REMARKS
								3.5" top soil.
	Moist, medium dense, grey, red-brown, silty f SAND, trace rock fragments and clay. (FILL)			S-1	5-10-11	DS	18	
9.0	Moist, stiff, dark grey CLAY, little sand and organics.	5		S-2	5-7-8	DS	18	Bag sample @ 3.5-7.5 feet.
	Moist, very stiff, grey, white CLAY, little organics.			S-3	9-12-14	DS	2	
4.0	Moist, very stiff CLAY, sand lense.	10		S-4	7-11-11	DS	18	
-1.0	Moist, stiff, light brown, grey CLAY.	15		S-5	5-6-8	DS	14	
	Bottom of boring at 15 feet.							
-6.0		20						
-11.0		25						
-16.0		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 214140239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 8.2 Feet

BORING NO.: B-29
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/21/97
SURFACE ELEVATION: 14.60 Feet
HAMMER WEIGHT/DROP: 140 lbs/ 30 inches
WATER LEVEL AFTER 24 HR: 2.3 Feet, Caved @ 5.1 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC. (in)	REMARKS
								4" top soil
	Moist, dense, reddish brown silty mf SAND, trace rock fragments. (FILL)			S-1	9-14-19	DS	18	
9.6	Moist dense, reddish brown, silty mf SAND, trace rock fragments. (FILL)	5		S-3	18-16-18	DS	15	
	Moist very stiff, reddish brown, tan CLAY, trace roots and sand.			S-3	11-12-16	DS	12	
4.6	Moist, very stiff brown CLAY.	10		S-4	9-11-14	DS	15	
-1.4	Moist, very stiff, light brown, tan CLAY, trace sand.	15		S-5	5-8-12	DS	17	
	Bottom of boring at 15 feet.							
-5.4		20						
-10.4		25						
-15.4		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 7.4 Feet, Caved @ 5.9 Feet

BORING NO.: B-30
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/21/97
SURFACE ELEVATION: 14.68 Feet
HAMMER WEIGHT/DROP: 140 lbs/ 30 inches
WATER LEVEL AFTER 24 HR: 5.5 Feet, Caved @ 5.9 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC. (in)	REMARKS
								3.5" top soil
	Moist, very stiff, reddish-brown CLAY.			S-1	4-9-13	DS	13	
9.7	Moist, hard, brown, grey CLAY.	5		S-2	10-13-18	DS	18	
	Moist, hard, red-brown, grey CLAY.			S-3	12-15-21	DS	12	Bag sample @ 8.0-8.5
4.7	Moist, hard, red-brown, grey CLAY.	10		S-4	10-13-21	DS	14	
-1.3	Moist, very stiff, light grey, brown CLAY.	15		S-5	7-11-18	DS	14	
	Bottom of boring at 15 feet.							
-5.3		20						
-10.3		25						
-15.3		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 4.1 Feet, Caved @ 8.2 Feet

BORING NO.: B-33
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/19/97
SURFACE ELEVATION: 9.90 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: At Surface, Caved @ 3 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, medium dense, brown silty f SAND.(FILL)			S-1	3-6-5	DS	13	Area under shallow standing water. 3" top soil
4.9	Moist, medium stiff, brown, grey, sandy CLAY, trace roots.(FILL)	5		S-2	1-2-4	DS	12	
	Wet, medium dense, tan, brown, silty f SAND.			S-3	3-5-12	DS	15	
-0.1	Wet, medium dense, light brown, silty mf SAND.	10		S-4	3-6-10	DS	12	Running sand
-5.1	Wet, very stiff, grey, tan CLAY.	15		S-5	8-8-11	DS	14	Running sand
-10.1	Wet, very stiff, tan, brown CLAY.	20		S-6	5-7-12	DS	13	
-15.1	Wet, loose, tan, gray silty mf SAND.	25		S-7	3-3-2	DS	12	
-20.1	Bottom of boring at 25 feet.	30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0239
INSPECTOR: Bimal Devkota
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 3.7 Feet, Caved @ 8.3 Feet

BORING NO.: B-35
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 2/20/97
SURFACE ELEVATION: 11.22 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR: 0.5 Feet, Caved @ 4.6 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, loose, brown silty mf SAND, little clay, glass piece. (FILL)			S-1	3-3-4	DS	14	Offset 30' east towards B-3 @ the edge of concrete structure because of storm drain. 4" top soil.
6.2	Moist, medium dense, brown, grey silty f SAND, trace clay. (FILL)	5		S-2	4-7-4	DS	12	
	Wet, medium dense, brown silty mf SAND. (FILL)			S-3	6-3-5	DS	12	Water on rods
1.2	Wet,loose, brown, grey SAND, little clay.(FILL)	10		S-4	4-3-1	DS	10	
-3.8	Wet, soft, grey, brown, sandy CLAY.(FILL)	15		S-5	2-1-1	DS	9	Running sand
-8.8	Wet, stiff, tan, brown, sandy SILT.	20		S-6	5-7-8	DS	18	
-13.8	Wet, very stiff, reddish brown, sandy SIL.	25		S-7	7-16-13	DS	10	
-18.8	Bottom of boring at 25 feet.	30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 6.6 Feet

BORING NO.: B-36A
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/21/97
SURFACE ELEVATION: 14.84 Feet
HAMMER WEIGHT/DROP: 140lbs / 30 inches
WATER LEVEL AFTER 24 HR: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in	SAMPLE TYPE	REC. (in)	REMARKS
								4" top soil.
	Moist, very stiff, brown, red, sandy CLAY, little rock fragments. (FILL)			S-1	2-7-12	DS	12	
9.8	Moist, medium dense, brown, red, grey, silty mf SAND, trace rock fragments, lense of clay. (FILL)	5		S-2	7-10-14	DS	18	
	Moist, loose, brown silty f SAND. (FILL)			S-3	2-4-3	DS	18	
4.8	Very wet, very loose, brown, dark grey, silty f SAND And GRAVEL, organic odor, trace clay.(FILL)	10		S-4	1-2-1	DS	3	Water @ 8.5 Feet.
	Bottom of boring at 10 feet.							
-0.2		15						
-5.2		20						
-10.2		25						
-15.2		30						

AS-BUILTS

THESE DRAWINGS DATED April 13, 2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAMS

TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	EBA
DRAWN	JPD
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — THOMAS SOMERVILLE — LICENSE NO. 12498 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT. PHASE I

SHEET TITLE: BORING LOGS IV

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: B-05

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 21420339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 3.2 Feet, Caved @ 6.1 Feet

BORING NO.: B-37
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/21/97
SURFACE ELEVATION: 10.82 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: 2.5 Feet, Caved @ 3.2 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, loose, brown, gray, silty mf SAND,little gravel. (FILL)			S-1	4-4-6	DS	12	Lost, resampled.
5.8	Moist, loose, brown, light grey, silty f SAND. (FILL)	5		S-2	5-3-7	DS	15	
	Wet, medium dense, light brown, silty f SAND, trace gravel.			S-3	6-7-7	DS	12	
0.8	Wet, medium dense, light brown, silty f SAND.	10		S-4	6-6-7	DS	12	
	Bottom of boring at 10 feet.							
-4.2		15						
-9.2		20						
-14.2		25						
-19.2		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport.
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 3.8 Feet, Caved @ 8.1 Feet

BORING NO.: B-38
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/21/97
SURFACE ELEVATION: 10.45 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR.: 2.3 Feet, Caved @ 4.0 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, medium dense, brown, grey, silty mf SAND, little gravel. (FILL)			S-1	8-16-11	DS	8	
5.4	Moist, medium dense, brown, light grey, silty f SAND, lense of clay, trace gravel. (FILL)	5		S-2	8-8-9	DS	16	
	Moist, medium dense, light grey silty f SAND, trace clay.			S-3	7-10-16	DS	12	Water on rods.
0.4	Moist, medium dense, brown, silty mf SAND.	10		S-4	4-5-9	DS	14	
	Bottom of boring at 10 feet.							
-4.6		15						
-9.6		20						
-14.6		25						
-19.6		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 5.3 Feet, Caved @ 5.4 Feet

BORING NO.: B-39
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/21/97
SURFACE ELEVATION: 13.01 Feet
HAMMER WEIGHT/DROP: 140 lb/ 30 inches
WATER LEVEL AFTER 24 HR.: 5.3 Feet, Caved @ 5.7 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, loose, dark brown, silty f SAND, little clay, few roots , organics (FILL)			S-1	1-2-4	DS	6	2" top soil.
8.0	Moist, medium dense, brown, gray, silty f SAND, trace roots, organics. (FILL)	5		S-2	6-7-7	DS	12	
	Moist, very loose, dark brown, gray, silty f SAND, little clay, organics. (FILL)			S-3	2-1-1	DS	18	
3.0	Moist, medium dense, brown, silty f SAND, lense of clay.	10		S-4	4-6-6	DS	12	Water on rods.
	Bottom of boring at 10 feet.							
-2.0		15						
-7.0		20						
-12.0		25						
-17.0		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 21420339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 5.1 Feet, Caved @ 5.8 Feet

BORING NO.: B-40
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/22/97
SURFACE ELEVATION: 10.39 Feet
HAMMER WEIGHT/DROP: 140lbs / 30 inches
WATER LEVEL AFTER 24 HR.: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, medium stiff, reddish brown, light grey, sandy CLAY, trace rock fragments and roots. (FILL)			S-1	2-3-3	DS	9	Soft, low, heavily brushed area.
5.4	Moist, very soft, redish-brown sandy CLAY, trace roots. (FILL)	5		S-2	1-1-1	DS	6	wet sand. Running sand @4.5'
	Moist, stiff, tan, light grey sandy CLAY			S-3	3-7-8	DS	18	Running Sand @6.5'
0.4	Moist, stiff, light grey, tan CLAY.	10		S-4	3-5-8	DS	12	
	Moist, medium dense, light brown, silty f SAND.	15		S-5	5-11-18	DS	18	
-4.6								
	Moist, dense, light brown, tan, silty f SAND.	20		S-6	8-17-21	DS	18	
-9.6								
	Moist, very dense, light brown, tan silty f SAND.	25		S-7	21-31-58	DS	18	
-14.6	Bottom of boring at 25 feet.							
-19.6		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 6.7 Feet, Caved @ 21.5 Feet

BORING NO.: B-41
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/18/97
SURFACE ELEVATION: 10.24 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: 3.8 Feet, Caved @ 13.0 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, medium dense, brown, grey silty f SAND little gravel, trace rock fragments. (FILL)			S-1	10-14-10	DS	14	4.5" top soil.
5.2	Wet, loose, brown, silty f SAND, lense of clay. (FILL)	5		S-2	1-2-5	DS	18	
	Moist, loose, red-brown silty f SAND, lense of clay. (FILL)			S-3	7-5-4	DS	11	
2	Moist, stiff, light grey, brown, sandy SILT.	10		S-4	3-5-6	DS	16	
								Running Sand @12.0'
-4.8	Moist, medium stiff, light grey, brown, sandy SILT.	15		S-5	3-3-3	DS	13	
	Moist, very stiff, grey, CLAY.	20		S-6	6-8-10	DS	14	
-9.8								
-14.8	Moist, very stiff, light grey, sandy SILT.	25		S-7	9-9-14	DA	15	
	Bottom of boring at 25 feet.							
-19.8		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 4.4 Feet, Caved @ 7.9 Feet

BORING NO.: B-42
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/22/97
SURFACE ELEVATION: 11.5 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, medium dense, gray, silty mf SAND, some gravel. (FILL)			S-1	10-17-5	DS	8	Water @ 1.75'
5.5	Wet, medium stiff, reddish brown, grey CLAY, trace sand. (FILL)	5		S-2	2-3-3	DS	12	
	Wet, soft, grey CLAY, trace sand. (FILL)			S-3	1-1-2	DS	12	Running Sand @7.0'
1.4	Wet, medium stiff, gray, brown sandy SILT, lense of clay.	10		S-4	2-4-4	DS	8	
	Bottom of Boring @ 10.0 Feet.							
-3.5		15						
-8.5		20						
-13.5		25						
-18.5		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 3.4 Feet, Caved @ 6.5 Feet

BORING NO.: B-43
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/22/97
SURFACE ELEVATION: 10.57 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, medium dense, reddish brown silty f SAND.			S-1	6-7-9	DS	12	4.75" top soil
5.6	Moist, loose, light grey, brown silty f SAND.	5		S-2	4-4-3	DS	12	
	Wet, medium dense, light gray, silty f SAND.			S-3	6-7-9	DS	12	Water @5.0'
0.6	Wet, medium stiff, reddidish brown, sandy SILT, lense of clay.	10		S-4	2-2-3	DS	18	
	Wet, very stiff, reddish brown, tan sandy SILT, lense of clay.	15		S-5	6-7-9	DS	18	
-4.4								
	Wet, loose, brown, silty f SAND.	20		S-6	4-4-5	DS	18	Running Sand/Silt @ 18'
-9.4								
	Wet, loose, tan, brown, silty f SAND.	25		S-7	4-5-3	DS	18	
-14.4	Bottom of boring at 25 feet.							
-19.4		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 4.8 Feet, Caved @ 21.9 Feet

BORING NO.: B-44
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/18/97
SURFACE ELEVATION: 10.02 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: 2.7 Feet, Caved @ 12.6 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
	Moist, medium dense, brown, silty f SAND.			S-1	4-6-7	DS	14	4.25" top soil
				S-2	4-3-5	DS	13	
5.0	Moist, medium stiff, light grey, brown, sandy SILT, lense of clay.	5		S-3	4-6-7	DS	13	
	Moist, stiff, light grey, brown CLAY, trace sand.							
0	Moist, stiff, light brown, light grey, CLAY, little sand.	10		S-4	4-6-4	DS	18	
	Moist, stiff, light brown CLAY, trace sand.	15		S-5	4-6-9	DS	18	Running sand @ 14.0 Feet.
-5.0								
	Moist, very stiff, light brown, sandy SILT.	20		S-6	7-9-14	DS	16	Running sand @ 18.5 Feet.
-10.0								
	Moist, hard, light brown, sandy SILT.	25		S-7	15-18-27	DS	14	
-15.0	Bottom of Boring @ 25 feet.							
-20.0		30						

AS-BUILTS

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TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	EBA
DRAWN	JPD
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TECUMSEH SOMBATHUA — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: BORING LOGS V

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: B-06

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 Inches
WATER LEVEL AT COMPLETION: —

BORING NO.: B-45
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/18/97
SURFACE ELEVATION: 10.05 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR: 2.8 Feet, Caved @ 11.2 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
10.0	Moist, dense, brown, silty mf SAND And GRAVEL, little rock fragments. (FILL)	0		S-1	27-18-12	DS	11	
5.1	Moist, very stiff, light grey, sandy SILT.	5		S-2	5-6-10	DS	13	
	Moist, very stiff, light grey CLAY.			S-3	9-9-9	DS	14	
1.0	Moist, very stiff, light grey, reddish brown CLAY.	10		S-4	6-10-13	DS	12	
-4.9	Moist, very stiff, light brown CLAY.	15		S-5	8-9-13	DS	18	
-9.9	Moist, stiff, light brown, sandy SILT.	20		S-6	4-5-7	DS	18	
-14.9	Moist, dense, light brown, silty f SAND.	25		S-7	17-10-30	DS	18	
	Bottom of boring at 25 feet.							
-20.0		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: —

BORING NO.: B-46
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/18/97
SURFACE ELEVATION: 9.42 Feet
HAMMER WEIGHT/DROP: 140lbs / 30 inches
WATER LEVEL AFTER 24 HR: 2.6 Feet, Caved 12.2 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
9.4	Moist, medium dense, gray, brown silty mf SAND, little gravel. (FILL)	0		S-1	3-5-6	DS	12	4.5" top soil
4.4	Wet, medium stiff, gray, brown CLAY, trace sand and gravel.	5		S-2	2-3-4	DS	13	
	Moist, medium dense, brown, grey, silty f SAND, trace gravel.			S-3	7-9-9	DS	17	
-0.6	Wet, stiff, grey CLAY, trace sand.	10		S-4	4-4-5	DS	15	
-5.6	Moist, stiff, light grey, sandy SILT.	15		S-5	4-6-7	DS	18	
-10.6	Moist, stiff, light grey CLAY.	20		S-6	2-4-5	DS	16	
-15.6	Moist, stiff, light grey CLAY.	25		S-7	7-7-9	DS	–	
	Bottom of boring at 25 feet.							
-20.6		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: 4.3 Feet, Caved @ 6.4 Feet

BORING NO.: B-47
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/21/97
SURFACE ELEVATION: 9.92 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR: —

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
9.9	Moist, very stiff, reddish brown, Sandy SILT, lenses of clay, trace gravel. (FILL)	0		S-1	4-6-10	DS	14	4" top soil
4.9	Moist, loose, reddish brown, silty f SAND, lense of clay, trace gravel. (FILL)	5		S-2	3-3-6	DS	6	
	Wet, stiff, redddish brown CLAY.			S-3	2-2-8	DS	5	
-0.1	Wet, medium stiff, grey CLAY. organic odor.	10		S-4	1-1-4	DS	9	Water on rods @ 7.5 Feet.
	Bottom of boring at 10.0 feet							
-5.1		15						
-10.1		20						
-15.1		25						
-20.1		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: 4.1 Feet, Caved @ 6.2 Feet

BORING NO.: B-48
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/22/97
SURFACE ELEVATION: 9.03 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR: —

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
9.0	Moist, stiff, brown sandy SILT.	0		S-1	2-5-8	DS	18	4" top soil.
4.0	Moist, very stiff, brown, red sandy SILT, lense of clay.	5		S-2	8-10-16	DS	18	
	Moist, stiff, brown, light grey, sandy SILT, lense of clay.			S-3	3-3-5	DS	18	
-1.0	Moist, stiff, light grey, CLAY.	10		S-4	2-8-3	DS	13	
-6.0	Bottom of boring at 10 feet.	15						
-11.0		20						
-16.0		25						
-21.0		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: —

BORING NO.: B-49A
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/15/97
SURFACE ELEVATION: 10.96 Feet
HAMMER WEIGHT/DROP: 140lbs / 30 inches
WATER LEVEL AFTER 24 HR: 3.5 Feet, Caved @ 12.6 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
10.9	Moist, medium stiff, light brown, light grey, sandy SILT, lense of clay, trace gravel. (FILL)	0		S-1	2-2-4	DS	12	4" top soil.
5.9	Moist, medium stiff, light gray, light brown, CLAY, trace sand. (FILL)	5		S-2	2-3-4	DS	12	
	Wet, very soft, reddish brown, grey sandy CLAY. (FILL)			S-3	2-WOH/12"	DS	12	Running Sand @ 6.5'
1.9	Wet, very soft, grey, reddish brown, sandy CLAY, decomposed woods. (FILL)	10		S-4	1-1/12"	DS	13	
				S-5	–	DS	0	sample lost, but wood peices were there, drilled beyond 10 feet due to soft materials encountered.
-4.0	Wet, stiff, grey, sandy CLAY.	15		S-6	7-4-5	DS	–	
-9.0	Wet, very stiff, dark brown, sandy CLAY.	20		S-7	8-8-8	DS	2	
	Bottom of boring 20 feet.							
-14.0		25						
-19.0		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: 1.5 Feet, Caved 7.9 Feet

BORING NO.: B-50
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/15/97
SURFACE ELEVATION: 7.13 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR: 1.3 Feet, Caved @ 7.3 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
7.1	Moist, loose, reddish brown, silty f SAND, lense of clay. (FILL)	0		S-1	2-5-4	DS	12	4" top soil
2.1	Moist, medium stiff, reddish brown, sandy, SILT, lense of clay. (FILL)	5		S-2	2-3-5	DS	12	
	Wet, very stiff, dark-grey, sandy CLAY, organic odor. (FILL)			S-3	6-11-6	DS	6	Running sand @ 6.0 Feet.
-2.9	Wet, very stiff, dark-grey, sandy CLAY, wood pieces (organics). (FILL)	10		S-4	2-47-6	DS	4	Hit Wood @ 9 feet.
	Wet, loose, dark grey, silty mf SAND, decomposed wood pieces (organic). (FILL)			S-5	3-2-4	DS	0	Made 3 unsuccessful efforts to collect spoon sample @ 10' Some wood, Couldn't auger thru.
-7.9	Bottom of boring at 11.5 feet.	15		S-5	1-6-3	DS	4	
-12.9		20						
-17.9		25						
-22.9		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: 1.2 Feet, Caved @ 5.2 Feet

BORING NO.: B-51
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/14/97
SURFACE ELEVATION: 4.25 Feet
HAMMER WEIGHT/DROP: 140 lbs/ 30 inches
WATER LEVEL AFTER 24 HR: —

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
4.2	Moist, loose, brown, light grey, silty f SAND, lense of clay. (FILL)	0		S-1	3-5-4	DS	18	4" top soil
-0.8	Moist, medium stiff, light grey, brown, sandy SILT, lense of clay (organics). (FILL)	5		S-2	2-3-3	DS	16	
	Wet, medium stiff, grey, brown, sandy SILT, lense of clay, decomposed wood.(organics) (FILL)			S-3	3-2-3	DS	14	wood @ 5.8 feet.
-5.8	Wet, medium stiff, grey sandy SILT, decomposed wood pieces (organics) (FILL)	10		S-4	50/4"	DS	12	wood caught in auger.
	Bottom of Boring at 10 feet.							
-10.8		15						
-15.8		20						
-20.8		25						
-25.8		30						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM: 6 inches
WATER LEVEL AT COMPLETION: 6.6 Feet, Caved @ 6.8 Feet

BORING NO.: B-52
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/14/97
SURFACE ELEVATION: 5.57 Feet
HAMMER WEIGHT/DROP: 140lbs / 30 inches
WATER LEVEL AFTER 24 HR: —

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
5.6	Moist, medium stiff, brown, grey, sandy CLAY. (FILL)	0		S-1	3-3-3	DS	18	4.1" top soil
0.6	Wet, soft, brown, grey, CLAY, trace sand. (FILL)	5		S-2	2-2-2	DS	16	Wet at tip of spoon.
	Wet, medium stiff, brown, grey, CLAY, trace sand, decomposed wood (organics)			S-3	4-4-4	DS	16	Water @ 6.0 feet.
-4.4	Moist, very stiff, tan-brown CLAY.	10		S-4	5-8-10	DS	12	
	Bottom of boring @ 10.0 Feet.							
-9.4		15						
-14.4		20						
-19.4		25						
-24.4		30						

AS-BUILTS

THESE DRAWINGS DATED April 13, 2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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DESIGNED	EBA
DRAWN	JPD
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRENCE SUNDARAPPAN — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: BORING LOGS VI

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: B-07

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 7 Feet, caved @ 7 Feet

BORING NO.: B-53
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/14/97
SURFACE ELEVATION: 4.52 Feet
HAMMER WEIGHT/DROP: 140 lbs/30 inches
WATER LEVEL AFTER 24 HR.: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								3.5" top soil.
	Moist, loose, brown, red, silty f SAND, trace rock fragments. (FILL)			S-1	4-3-4	DS	18	
	Moist, medium dense, brown, grey silty f SAND, lense of clay, trace rock fragments, decomposed wood piece. (FILL)	5		S-2	3-6-6	DS	18	
	Moist, medium stiff, dark brown, grey sandy SILT, lense of clay, decomposed wood piece (organics)			S-3	2-3-4	DS	18	
-5.5	Wet, soft, dark grey CLAY, trace f SAND.	1.0		S-4	3-1-1	DS	18	
	Bottom of boring at 10 feet.							
10.5		1.5						
-15.5		2.0						
-20.5		2.5						
-25.5		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: –

BORING NO.: B-54
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/14/97
SURFACE ELEVATION: 6.07 Feet
HAMMER WEIGHT/DROP: 140lbs / 30 inches
WATER LEVEL AFTER 24 HR.: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								5" top soil
	Moist, loose, dark brown, silty f SAND, trace gravel. (FILL)			S-1	4-4-3	DS	12	
	Moist, loose, brown, silty f SAND.	5		S-2	3-5-4	DS	18	Water @ 4.0'
1.1	Wet, loose, brown, silty f SAND.			S-3	7-5-4	DS	18	Running Sand @ 4.5'
	Wet, loose, dark brown, silty f SAND.	1.0		S-4	3-4-5	DS	16	
-3.9	Moist, stiff, light grey, tan CLAY.	1.5		S-5	3-4-6	DS	18	Running Sand.
-8.9	Moist, medium stiff, light grey, sandy SILT, lense of clay	2.0		S-6	2-3-5	DS	17	running sand @ 17"
-13.9	Moist, stiff, light grey, sandy SILT, lense of clay.	2.5		S-7	4-5-9	DS	15	
-18.9	Bottom of boring 25 feet.							
-23.9		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 6.6 Feet, Caved @ 7.7 Feet

BORING NO.: B-55
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/15/97
SURFACE ELEVATION: 8.35 Feet
HAMMER WEIGHT/DROP: 140 lbs/ 30 inches
WATER LEVEL AFTER 24 HR.: 3.3 Feet, Caved @ 6.6 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								4.25" top soil
	Moist, medium dense, grey brown, silty f SAND, little rock fragments, pieces of concrete. (FILL)			S-1	6-7-5	DS	18	
3.1	Moist, stiff, light grey, brown sandy CLAY, pieces of wood, organic odor.	5		S-2	2-4-6	DS	18	Rig angled slightly towards link fence.
	Moist, medium dense, brown, silty f SAND.			S-3	7-9-9	DS	12	
-1.5	Wet, dense, tan, brown, silty mf SAND.	1.0		S-4	5-14-17	DS	18	Running Sand @ 11'
-6.6	Wet, medium dense, tan, brown, silty mf SAND	1.5		S-5	5-6-7	DS	18	Running Sand @ 17'
-11.6	Moist, hard, light grey CLAY.	2.0		S-6	9-17-26	DS	18	Running Sand @ 21'
-16.6	Moist, hard, grey CLAY.	2.5		S-7	7-16-24	DS	7	
	Bottom of boring at 25 feet.							
-21.6		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: 2.5 Feet, Caved 2.19.8 Feet

BORING NO.: B-56
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/15/97
SURFACE ELEVATION: 5.44 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: 0.9 Feet, Caved @ 13.8 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								4.75" top soil
	Moist, loose, redddish brown, silty f SAND, lense of clay. (FILL)			S-1	2-3-3	DS	18	
	Moist, stiff, light grey SILT, little sand.	5		S-2	2-4-7	DS	14	
	Wet, stiff, light grey, sandy SILT, lense of clay.			S-3	2-4-5	DS	12	Water @ 5.5'
-4.5	Moist, stiff, light grey CLAY, trace sand.	1.0		S-4	3-5-8	DS	10	Running Sand @ 9.5'
-9.5	Moist, vert stiff, grey-brown, CLAY.	1.5		S-5	5-7-11	DS	15	
-14.5	Moist, very stiff, brown, sandy SILT, lense of clay.	2.0		S-6	7-20-26	DS	18	
-19.5	Moist, dense, brown silty f SAND.	2.5		S-7	6-11-30	DS	17	
	Bottom of boring @ 25.0 feet.							
-24.5		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved 2.7 Feet

BORING NO.: B-57
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/22/97
SURFACE ELEVATION: 12.61 Feet
HAMMER WEIGHT/DROP: 140lbs / 30 inches
WATER LEVEL AFTER 24 HR.: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								3.75" top soil
	Moist, medium stiff, brown sandy SILT, trace roots. (FILL)			S-1	3-3-3	DS	18	
7.6	Moist, stiff, reddish brown, light grey, sandy SILT, lenses of clay. (FILL)	5		S-2	6-7-8	DS	18	
	Moist, very stiff, reddish brown, grey CLAY trace sand and roots.			S-3	8-10-12	DS	18	
2.6	Moist, very stiff, reddish brown CLAY, trace sand	1.0		S-4	7-10-13	DS	18	
	Bottom of boring at 10 feet.							
-2.4		1.5						
-7.4		2.0						
-12.4		2.5						
-17.4		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 7.9 Feet

BORING NO.: B-58
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/22/97
SURFACE ELEVATION: 15.59 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								2.75" top soil
	Moist, medium dense, reddish brown, grey, silty f SAND. (FILL)			S-1	4-8-11	DS	12	
10.6	Wet, soft, grey, fat CLAY.	5		S-2	1-2-2	DS	12	
	Wet, medium stiff, grey, redddish brown CLAY.			S-3	1-3-4	DS	18	
5.6	Moist, very stiff, reddish brown CLAY.	1.0		S-4	3-7-11	DS	18	
	Bottom of boring at 10 feet.							
0.6		1.5						
-4.4		2.0						
-9.4		2.5						
-14.4		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: Dry, Caved @ 8 Feet

BORING NO.: B-59
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/22/97
SURFACE ELEVATION: 14.11 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: –

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								2.5" top soil.
	Moist , medium dense, grey, brown silty f SAND, trace gravel, rock fragments and roots. (FILL).			S-1	9-8-8	DS	12	
9.1	Moist, stiff, grey, brown, CLAY, trace sand and roots, pieces of concrete. (FILL)	5		S-2 S-2	3-3-7 3-3-7	DS DS	0 4	Resampeled.
	Moist, stiff, dark brown, grey silty CLAY.			S-3	1-6-5	DS	18	
4.1	Moist, stiff, grey, silty CLAY.	1.0		S-4	3-6-8	DS	10	
	Bottom of boring at 10 feet.							
-3.9		1.5						
-5.9		2.0						
-10.9		2.5						
-15.9		3.0						

EBA, Engineering, Inc. — Baltimore, Maryland

RECORD OF SOIL EXPLORATION

PROJECT: Midfield Complex, Martin State Airport
LOCATION: Baltimore, Maryland
JOB NUMBER: 2142A0339
INSPECTOR: Todd Robinson
BORING METHOD: Hollow Stem Auger
HOLE DIAM.: 6 inches
WATER LEVEL AT COMPLETION: –

BORING NO.: B-60
DRILLING COMPANY: F&R
DRILLER: Nate
DATE DRILLED: 4/21/97
SURFACE ELEVATION: 10.02 Feet
HAMMER WEIGHT/DROP: 140 lbs / 30 inches
WATER LEVEL AFTER 24 HR.: 2.8 Feet, Caved @ 4.2 Feet

ELEV (feet)	SOIL DESCRIPTION	DEPTH (feet)	SAMPLE	SAMPLE NUMBER	BLOWS/6 in.	SAMPLE TYPE	REC. (in)	REMARKS
								4" top soil.
	Moist, medium dense, brown silty f SAND. (FILL)			S-1	1-7-7	DS	14	
				S-2	8-8-11	DS	18	
5.0	Moist, very stiff, light grey, sandy SILT	5		S-3	8-11-16	DS	18	
	Moist, very stiff, light grey, sandy SILT.							
0	Moist, medium dense, reddish brown, silty f SAND.	1.0		S-4	7-10-15	DS	12	
	Bottom of boring at 10 feet.							
-5.0		1.5						
-10.0		2.0						
-15.0		2.5						
-20.0		3.0						

AS-BUILTS

THESE DRAWINGS DATED April 13, 2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED. IN EVERY DETAIL, THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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DRAWN	JPD
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TECHNICAL EVALUATION LICENSE NO. 12400 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

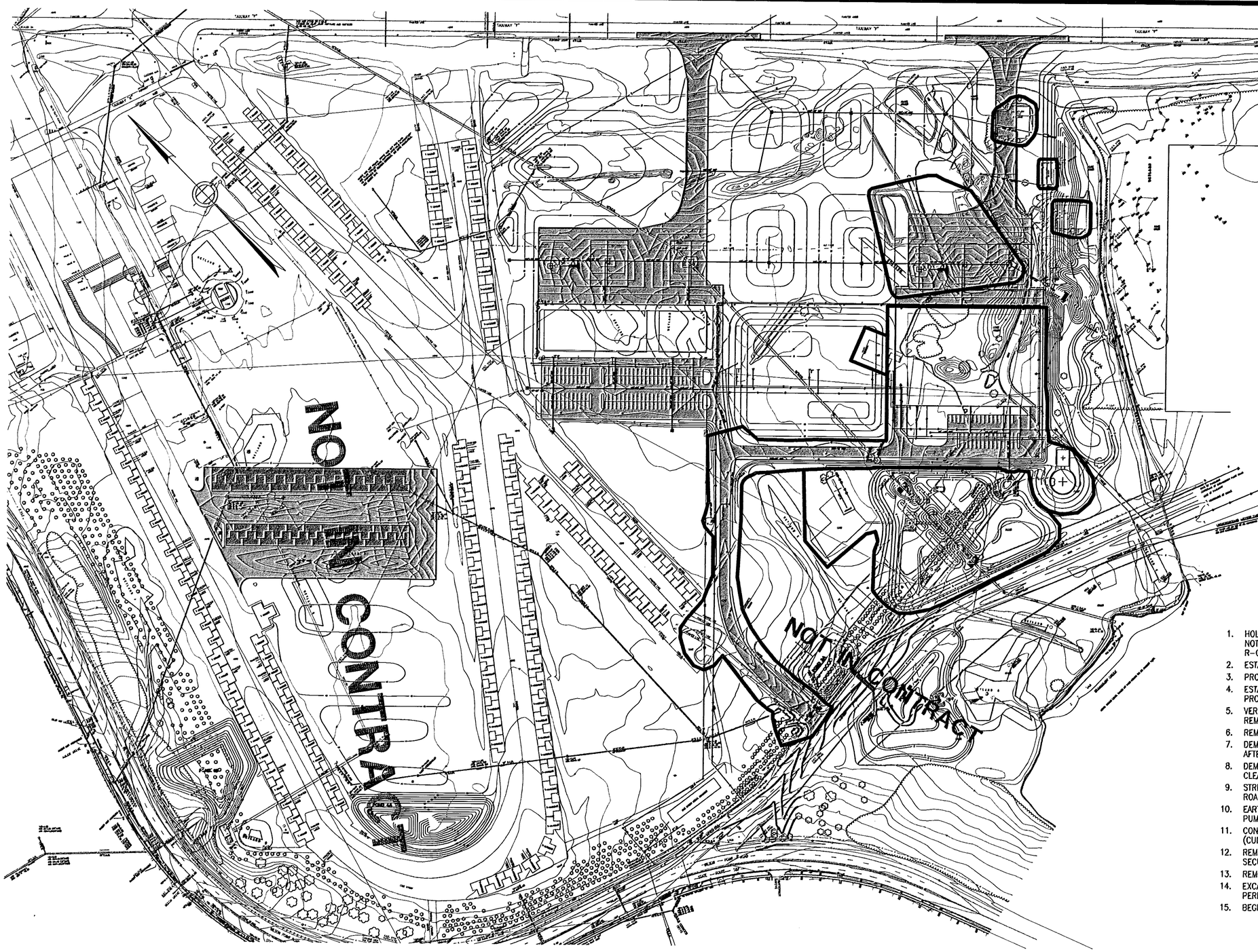
SHEET TITLE: BORING LOGS VII

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: B-08



NOTE: THE WORK SHOWN ON THIS SHEET MUST BE COMLETED WITHIN 60 DAYS OF NOTICE TO PROCEED. SEE PART 1 OF THE SPECIFICATIONS FOR SPECIAL REQUIREMENTS.

AS BUILT

THESE DRAWINGS DATED 07/06/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

STAGE 1 CONSTRUCTION

1. HOLD PRECONSTRUCTION CONFERENCE, NOTIFY MDE IN ACCORDANCE WITH NOTE 1 OF THE STANDARD EROSION AND SEDIMENT CONTROL NOTES (SHEET R-01).
2. ESTABLISH STAGING AND STORAGE AREA.
3. PROJECT STAKE-OUT.
4. ESTABLISH PERIMETER EROSION AND SEDIMENT CONTROLS FOR BASE PROJECT AREA.
5. VERIFY LOCATIONS OF EXISTING UTILITIES, AND LOCATE UTILITIES TO BE REMOVED AND/OR ABANDONED.
6. REMOVE HAZARDOUS MATERIALS FROM ABANDONED BUILDINGS.
7. DEMOLISH AND REMOVE EXISTING BUILDINGS AND FOUNDATIONS (ONLY AFTER HAZMAT REMOVAL IS CERTIFIED COMPLETE).
8. DEMOLISH AND REMOVE ASPHALT AND CONCRETE PAVEMENT IN AREAS SHOWN CLEAR AND GRUB IN AREA OF ACCESS ROAD, PARKING LOT AND HANGAR SITE.
9. STRIP AND STOCKPILE TOPSOIL FROM EMBANKMENT AREAS ALONG ACCESS ROAD, PARKING LOT, HANGAR SITE, TANK AND PUMP HOUSE AREAS.
10. EARTHWORK FOR ACCESS ROAD, PARKING LOTS, HANGAR SITE, TANK AND PUMP HOUSE FOUNDATIONS.
11. CONSTRUCT ACCESS ROAD AND PARKING LOT TO TOP OF ASPHALT BASE (CURB, CURB AND GUTTER, SUBBASE, BASE, AND ASPHALT BASE).
12. REMOVE FENCE BETWEEN WILSON POINT ROAD AND FOREST (MAINTAIN SECURE AIRPORT PERIMETER).
13. REMOVE EXISTING STRUCTURES AND PIPE IN VICINITY OF POND 1.
14. EXCAVATE POND 1 AND CONSTRUCT STRUCTURES AND STABILIZE WITH PERMANENT VEGETATION AND GROUND COVER.
15. BEGIN REMOVAL AND DISPOSAL OF SOIL STOCKPILE.

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DRAWN	GPP/FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TEEKAPOJ SOMBATPIYIN
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

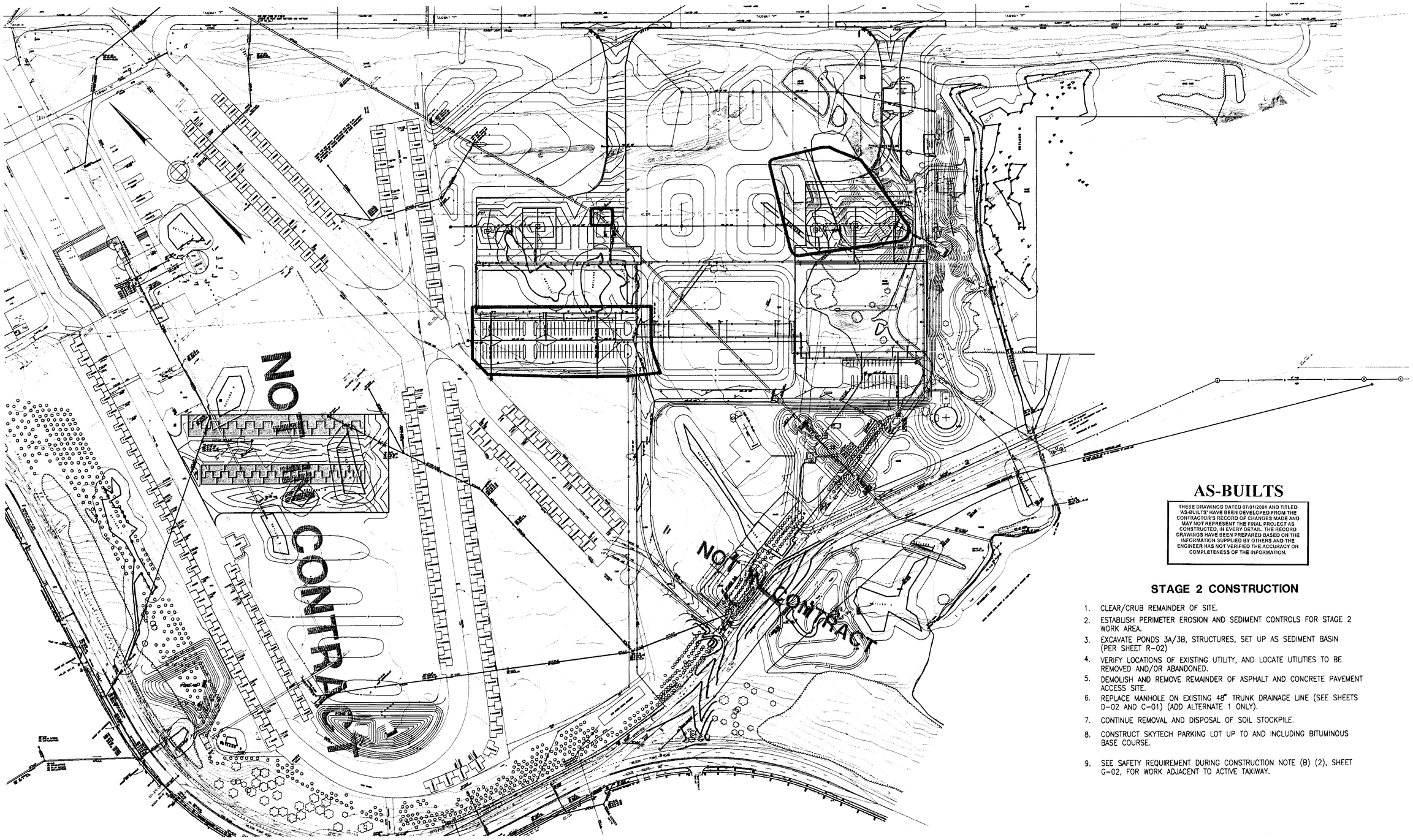
SHEET TITLE: CONSTRUCTION SEQUENCING PLAN -- STAGE 1

SCALE: 1" = 150'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: A-01



AS-BUILTS

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STAGE 2 CONSTRUCTION

1. CLEAR/CRUB REMAINDER OF SITE.
2. ESTABLISH PERIMETER EROSION AND SEDIMENT CONTROLS FOR STAGE 2 WORK AREA.
3. EXCAVATE PONDS 3A/3B, STRUCTURES, SET UP AS SEDIMENT BASIN (PER SHEET R-02)
4. VERIFY LOCATIONS OF EXISTING UTILITY, AND LOCATE UTILITIES TO BE REMOVED AND/OR ABANDONED.
5. DEMOLISH AND REMOVE REMAINDER OF ASPHALT AND CONCRETE PAVEMENT ACCESS SITE.
6. REPLACE MANHOLE ON EXISTING 48" TRUNK DRAINAGE LINE (SEE SHEETS D-02 AND C-01) (ADD ALTERNATE 1 ONLY).
7. CONTINUE REMOVAL AND DISPOSAL OF SOIL STOCKPILE.
8. CONSTRUCT SKYTECH PARKING LOT UP TO AND INCLUDING BITUMINOUS BASE COURSE.
9. SEE SAFETY REQUIREMENT DURING CONSTRUCTION NOTE (B) (2), SHEET G-02, FOR WORK ADJACENT TO ACTIVE TAXIWAY.

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DESIGNED	GPP
DRAWN	GPP/FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — THERESA SOMMATINO — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

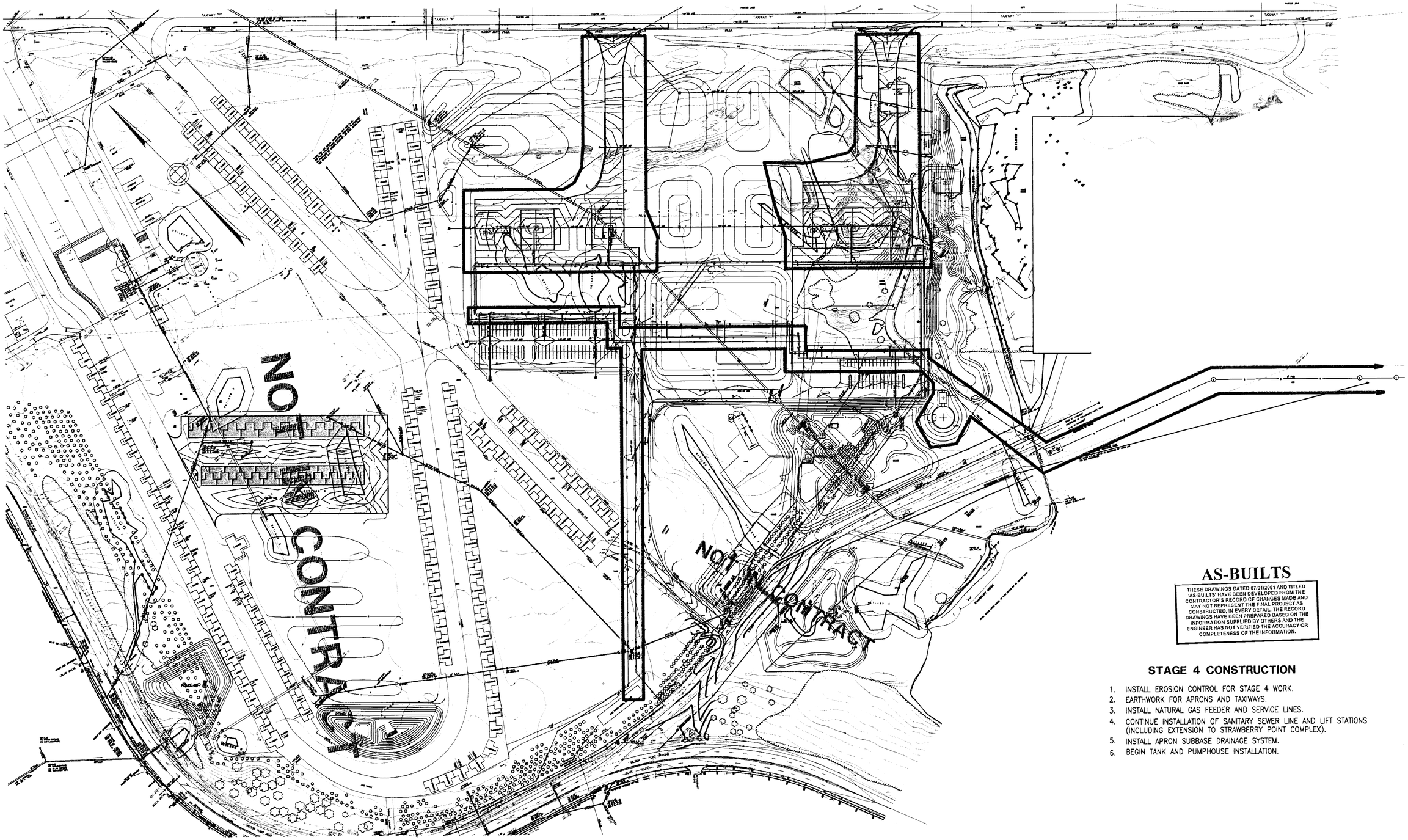
SHEET TITLE: CONSTRUCTION SEQUENCING PLAN -- STAGE 2

SCALE: 1" = 150'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: A-02



AS-BUILTS

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STAGE 4 CONSTRUCTION

1. INSTALL EROSION CONTROL FOR STAGE 4 WORK.
2. EARTHWORK FOR APRONS AND TAXIWAYS.
3. INSTALL NATURAL GAS FEEDER AND SERVICE LINES.
4. CONTINUE INSTALLATION OF SANITARY SEWER LINE AND LIFT STATIONS (INCLUDING EXTENSION TO STRAWBERRY POINT COMPLEX).
5. INSTALL APRON SUBBASE DRAINAGE SYSTEM.
6. BEGIN TANK AND PUMPHOUSE INSTALLATION.

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ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

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DRAWN	GPP/FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — THOMAS SCHRATWIEB — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

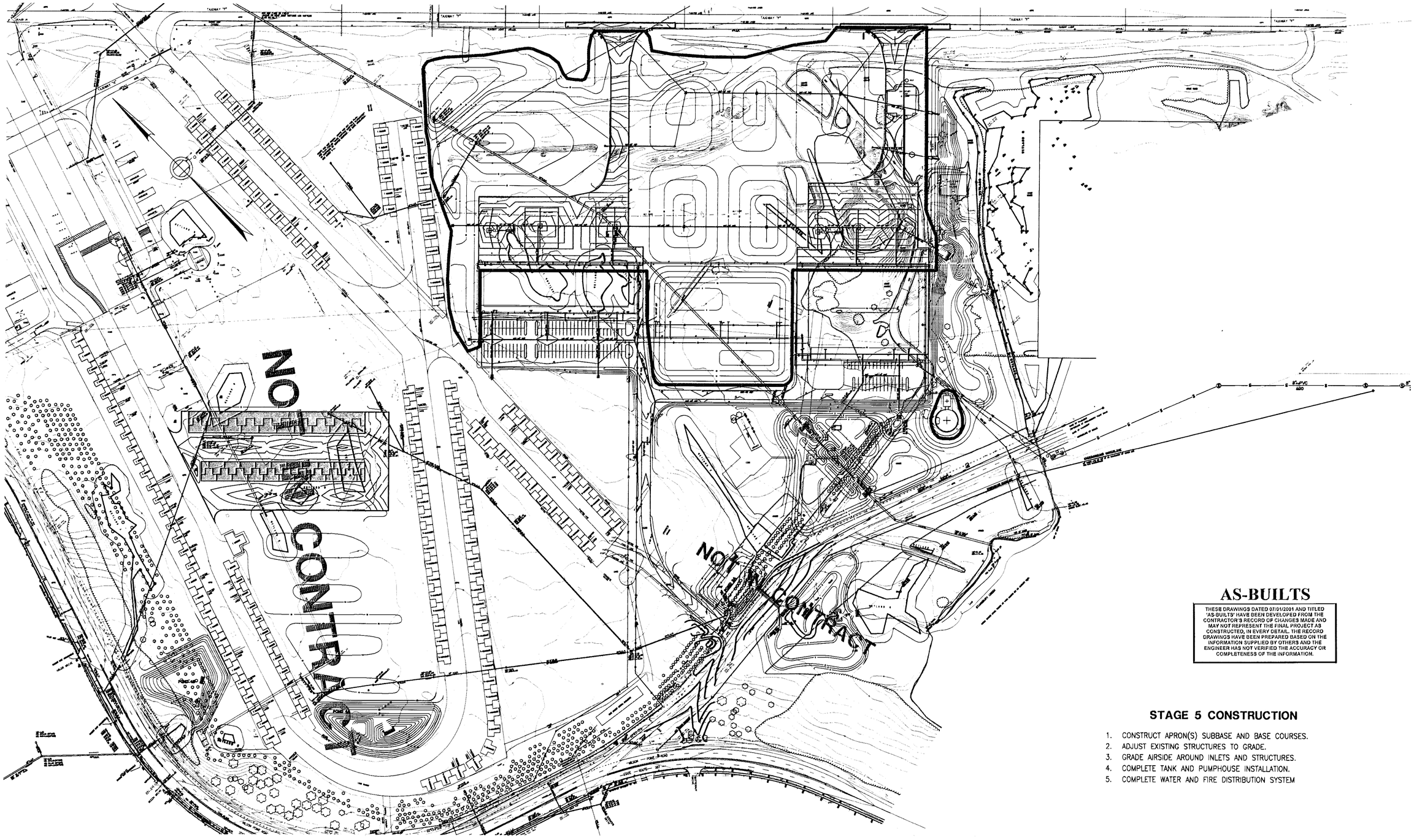
SHEET TITLE
CONSTRUCTION SEQUENCING PLAN -- STAGE 4

SCALE: 1" = 150'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: A-04



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STAGE 5 CONSTRUCTION

1. CONSTRUCT APRON(S) SUBBASE AND BASE COURSES.
2. ADJUST EXISTING STRUCTURES TO GRADE.
3. GRADE AIRSIDE AROUND INLETS AND STRUCTURES.
4. COMPLETE TANK AND PUMPHOUSE INSTALLATION.
5. COMPLETE WATER AND FIRE DISTRIBUTION SYSTEM

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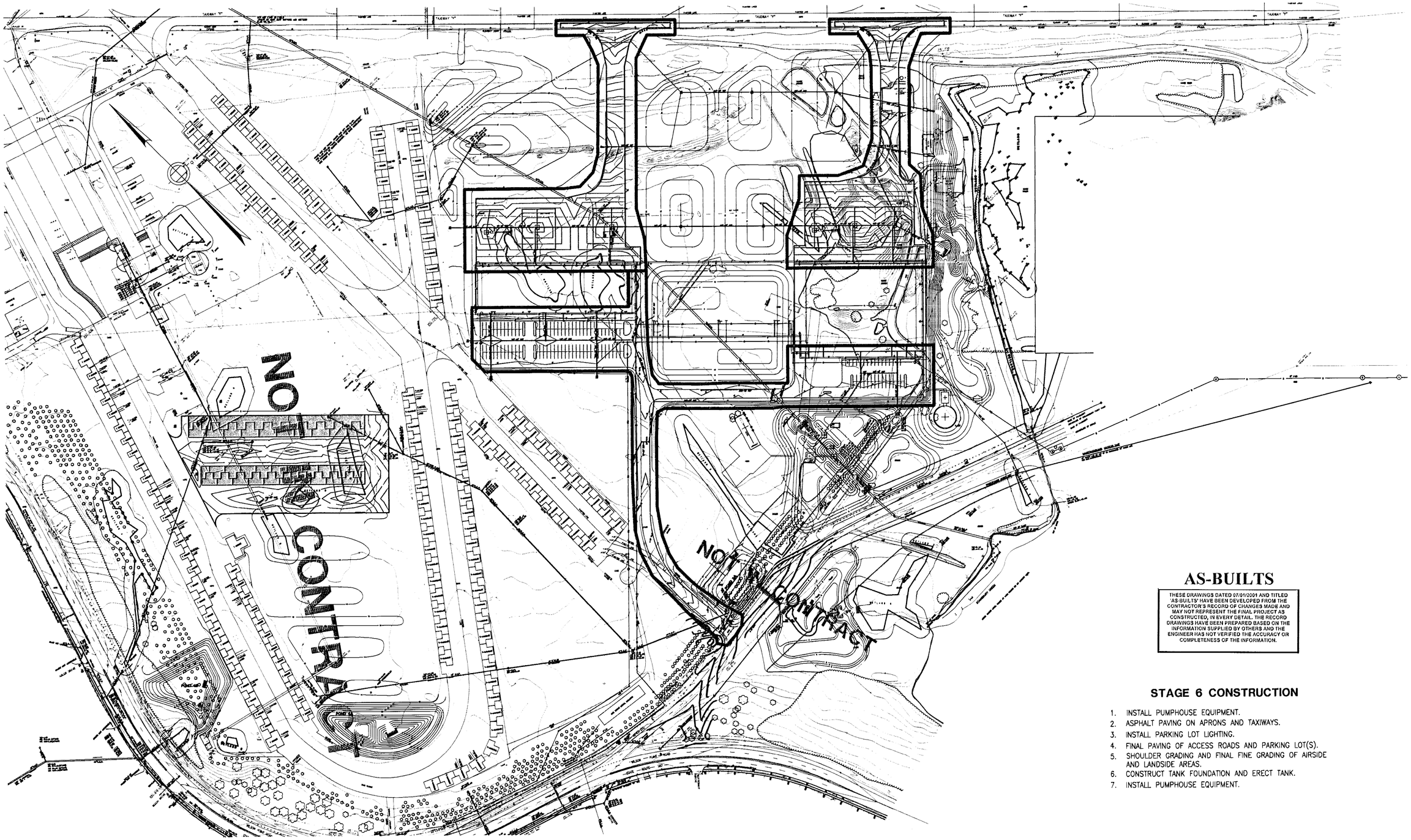
PROJECT NO. MAA-CO-97-019

SHEET NO. A-05



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STAGE 6 CONSTRUCTION

1. INSTALL PUMPHOUSE EQUIPMENT.
2. ASPHALT PAVING ON APRONS AND TAXIWAYS.
3. INSTALL PARKING LOT LIGHTING.
4. FINAL PAVING OF ACCESS ROADS AND PARKING LOT(S).
5. SHOULDER GRADING AND FINAL FINE GRADING OF AIRSIDE AND LANDSIDE AREAS.
6. CONSTRUCT TANK FOUNDATION AND ERECT TANK.
7. INSTALL PUMPHOUSE EQUIPMENT.

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APPROVED	TS

STATE OF MARYLAND
TEERAPOJ SOMRATPIRIN
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

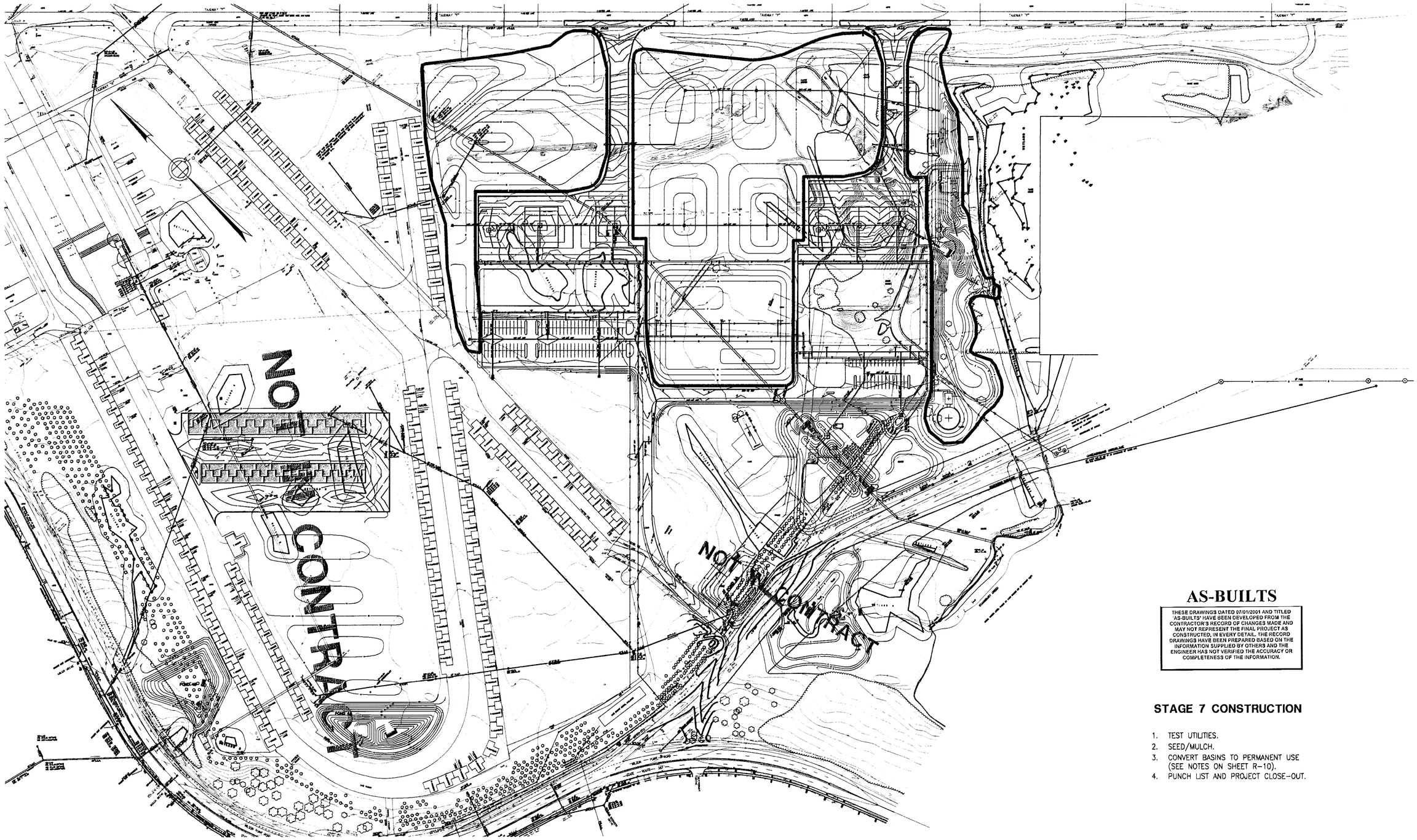
SHEET TITLE: CONSTRUCTION SEQUENCING PLAN -- STAGE 6

SCALE: 1" = 150'

DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. A-06



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STAGE 7 CONSTRUCTION

1. TEST UTILITIES.
2. SEED/MULCH.
3. CONVERT BASINS TO PERMANENT USE (SEE NOTES ON SHEET R-10).
4. PUNCH LIST AND PROJECT CLOSE-OUT.

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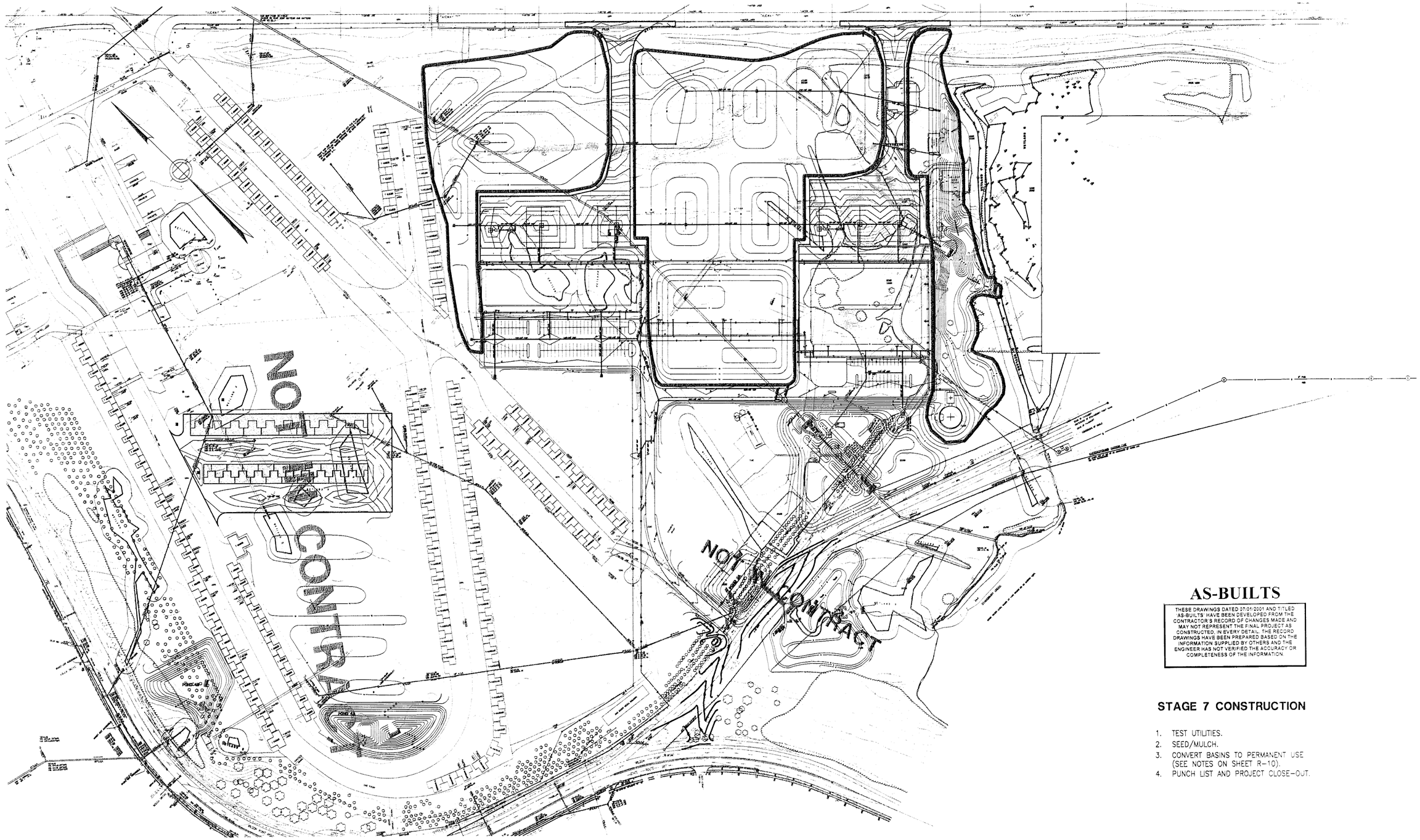

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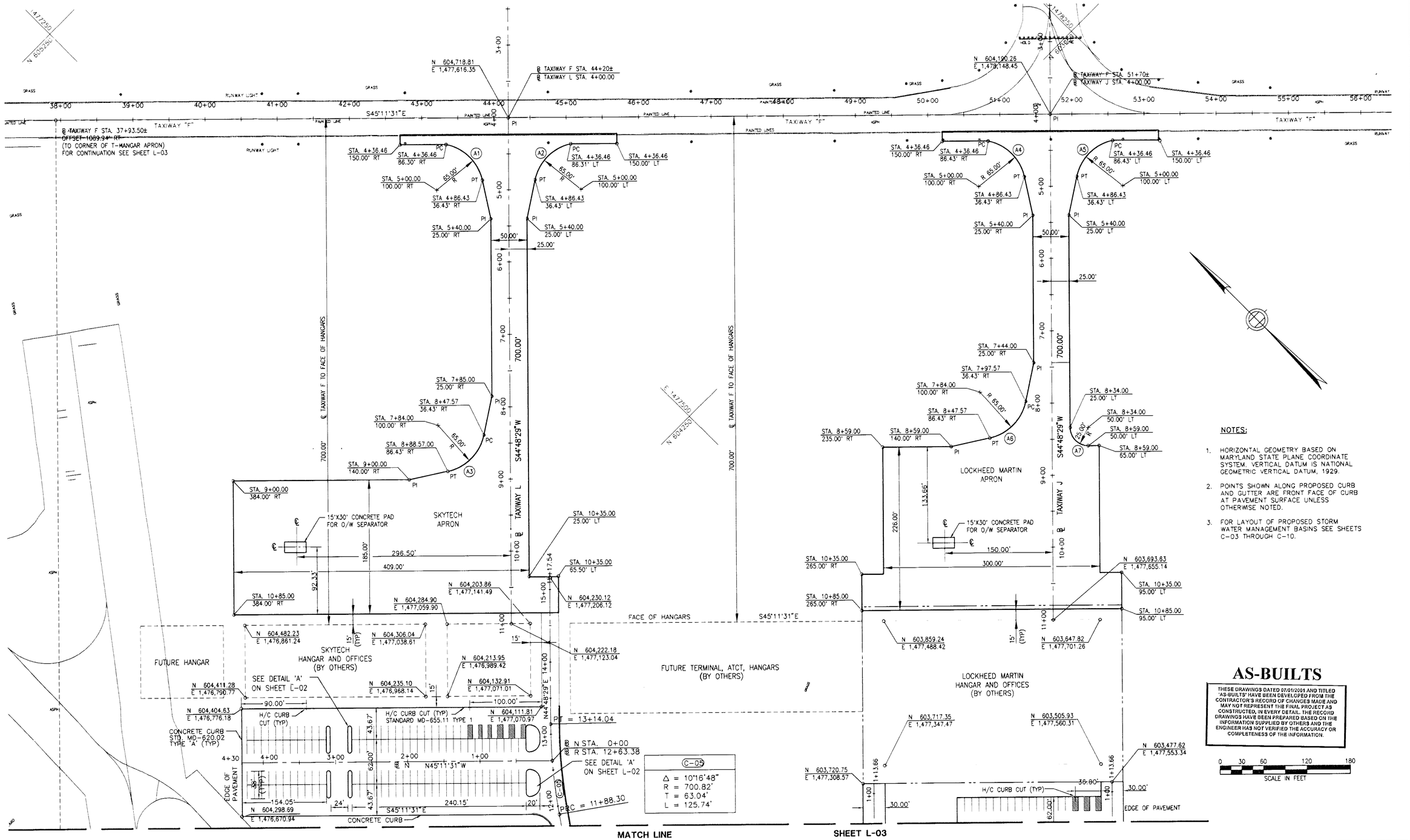
STAGE 7 CONSTRUCTION

1. TEST UTILITIES.
2. SEED/MULCH.
3. CONVERT BASINS TO PERMANENT USE (SEE NOTES ON SHEET R-10).
4. PUNCH LIST AND PROJECT CLOSE-OUT.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED GPP DRAWN GPP/FA CHECKED TS APPROVED TS	STATE OF MARYLAND TEEKAPOJ SOMMATPIWM LICENSE NO. 12480 REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS	MARTIN STATE AIRPORT	MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE CONSTRUCTION SEQUENCING PLAN -- STAGE 7 SCALE 1" = 150' DATE September 08, 1998	PROJECT NO. MAA-CO-97-019 SHEET NO. A-07



NOTES:

1. HORIZONTAL GEOMETRY BASED ON MARYLAND STATE PLANE COORDINATE SYSTEM. VERTICAL DATUM IS NATIONAL GEOMETRIC VERTICAL DATUM, 1929.
2. POINTS SHOWN ALONG PROPOSED CURB AND GUTTER ARE FRONT FACE OF CURB AT PAVEMENT SURFACE UNLESS OTHERWISE NOTED.
3. FOR LAYOUT OF PROPOSED STORM WATER MANAGEMENT BASINS SEE SHEETS C-03 THROUGH C-10.

AS-BUILTS

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0 30 60 120 180
SCALE IN FEET

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Arlington, VA 22201

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DRAWN	FA/GPP
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND
TERRANCE SOMERVILLE
LICENSE NO. 12488
REGISTERED
PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

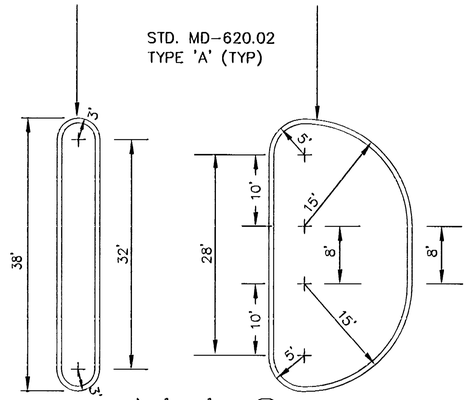
SHEET TITLE
PROJECT LAYOUT AND CONTROL PLAN I

SCALE **1" = 60'**

DATE **September 08, 1998**

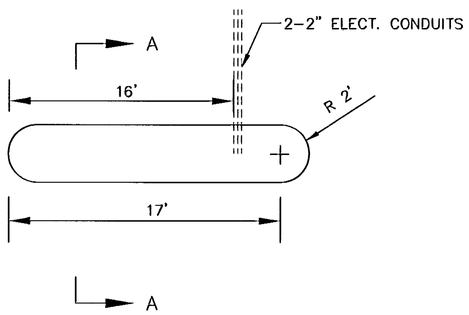
PROJECT NO. **MAA-CO-97-019**

SHEET NO. **L-01**

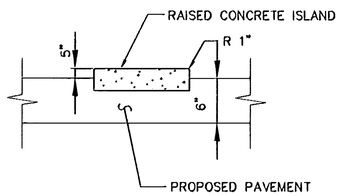


N.I.C.

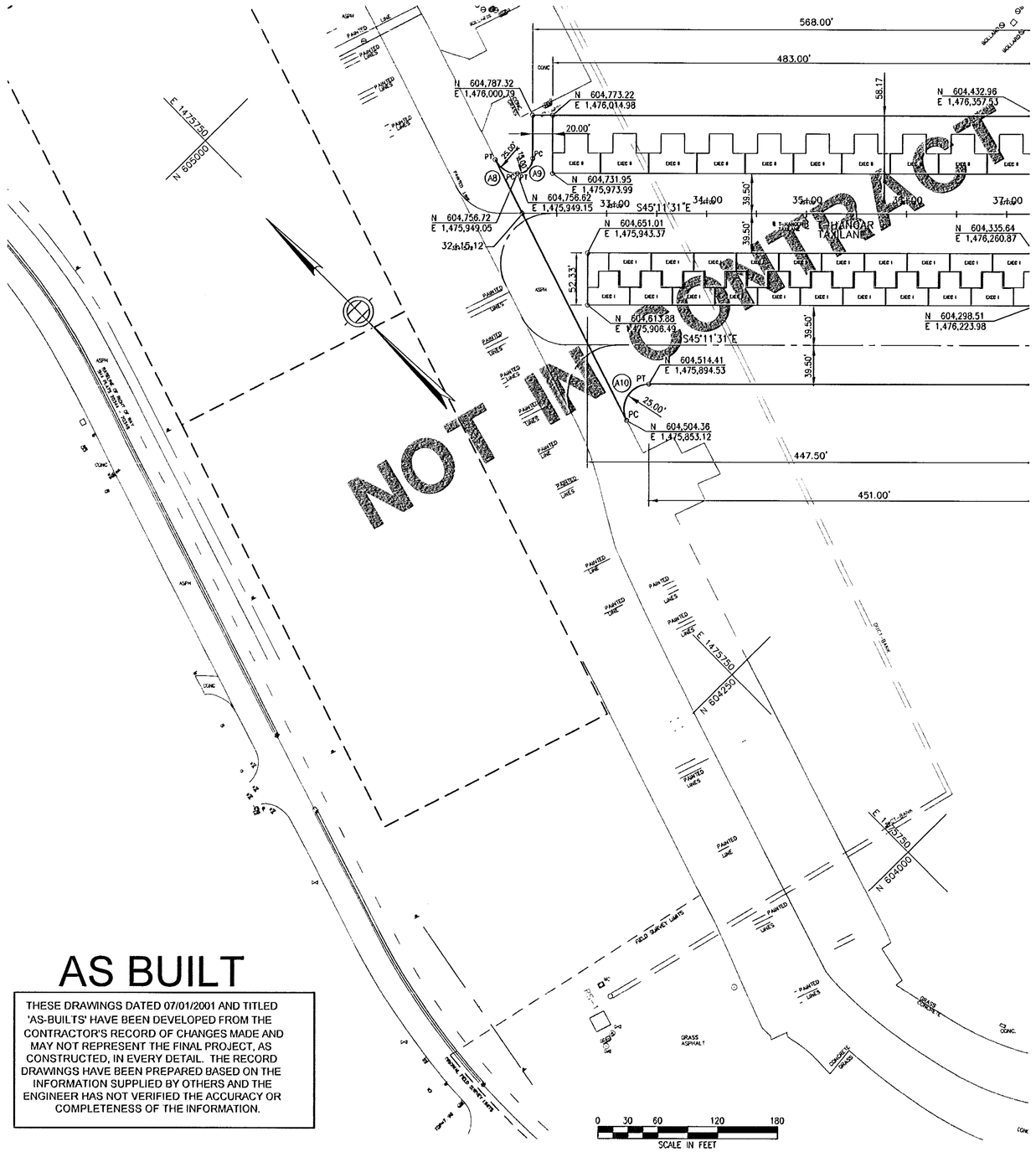
DETAIL – A
SCALE 1" : 10'



DETAIL – B
SCALE 1" : 5'



SECTION A–A
SCALE 1" : 3'



AS BUILT

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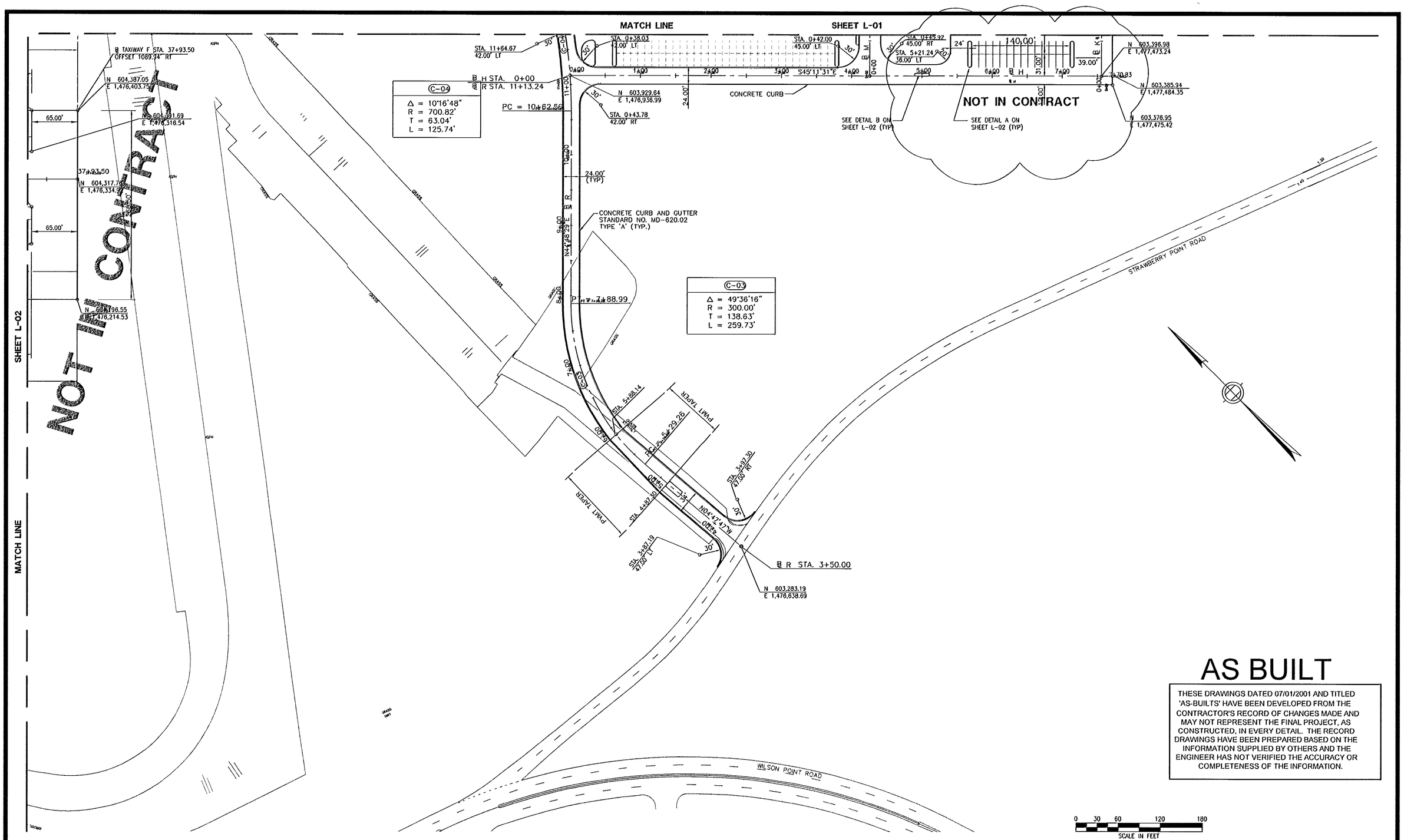
PROJECT NO. MAA-CO-97-019

SHEET NO. L-02



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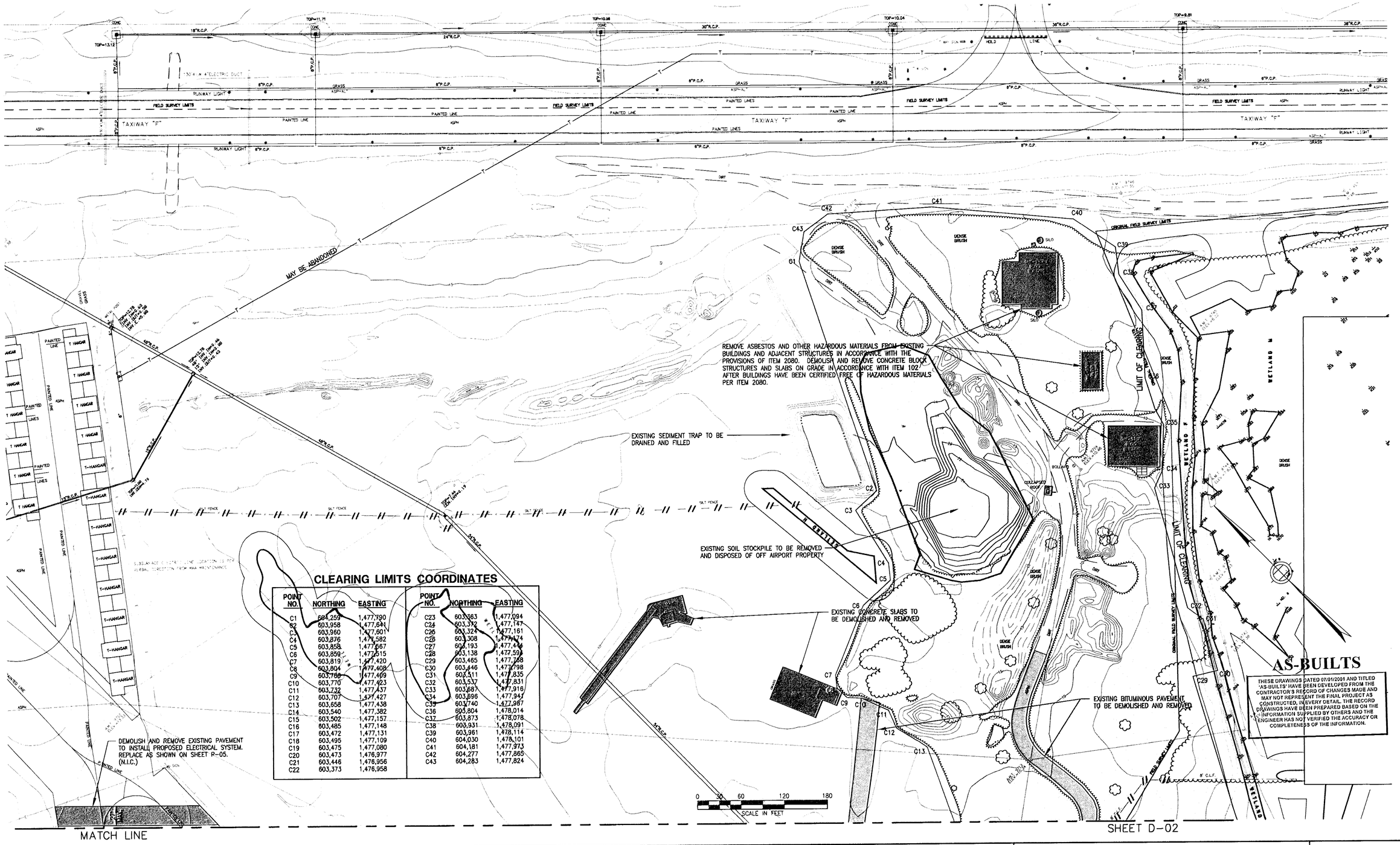
				07/01/2001	AS-BUILT		PROJECT NO. MAA-CO-97-019 SHEET NO. L-03



CLEARING LIMITS COORDINATES

POINT NO.	NORTHING	EASTING	POINT NO.	NORTHING	EASTING
C1	604,259	1,477,790	C23	603,383	1,477,094
C2	603,958	1,477,641	C24	603,392	1,477,147
C3	603,960	1,477,601	C25	603,324	1,477,161
C4	603,876	1,477,582	C26	603,308	1,477,174
C5	603,858	1,477,567	C27	603,193	1,477,444
C6	603,859	1,477,515	C28	603,138	1,477,593
C7	603,819	1,477,420	C29	603,465	1,477,268
C8	603,804	1,477,409	C30	603,446	1,477,298
C9	603,769	1,477,409	C31	603,511	1,477,835
C10	603,770	1,477,423	C32	603,537	1,477,831
C11	603,732	1,477,437	C33	603,687	1,477,916
C12	603,707	1,477,427	C34	603,896	1,477,941
C13	603,658	1,477,438	C35	603,740	1,477,987
C14	603,540	1,477,382	C36	603,804	1,478,014
C15	603,502	1,477,157	C37	603,873	1,478,078
C16	603,485	1,477,148	C38	603,931	1,478,091
C17	603,472	1,477,131	C39	603,961	1,478,114
C18	603,495	1,477,109	C40	604,030	1,478,101
C19	603,475	1,477,080	C41	604,181	1,477,973
C20	603,473	1,476,977	C42	604,277	1,477,865
C21	603,446	1,476,956	C43	604,283	1,477,824
C22	603,373	1,476,958			

AS-BUILTS

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2101 Wilson Boulevard, Suite 300
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DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMMATTINO — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE
DEMOLITION AND SITE PREPARATION PLAN BASE PROJECT, SHEET 1

SCALE: 1" = 60'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: D-01

MATCH LINE

SHEET D-01

EXISTING BITUMINOUS PAVEMENT TO BE DEMOLISHED AND REMOVED

EXISTING CONCRETE SLAB TO BE DEMOLISHED AND REMOVED

EXISTING CONCRETE PAVEMENT TO BE DEMOLISHED AND REMOVED

REMOVE EXISTING INLET

REMOVE EXISTING 54" DIAMETER PIPE AS SHOWN ON SHEET C-11

REMOVE EXISTING INLET

EXISTING CONCRETE SLAB TO BE DEMOLISHED AND REMOVED

EXISTING BITUMINOUS PAVEMENT TO BE DEMOLISHED AND REMOVED

REMOVE EXISTING WATER SYSTEM PIPE AND STRUCTURES (SEE NOTE 3 THIS SHEET)

REMOVE EXISTING CONCRETE STRUCTURES

REMOVE EXISTING CONCRETE HEADWALL

DEMOLISH AND REMOVE EXISTING PAVEMENT FOR INSTALLATION OF PROPOSED WATER LINE AS SHOWN ON SHEET C-08. REPLACE WITH PAVEMENT SECTION SHOWN ON ON SHEET P-05.

DEMOLISH AND REMOVE EXISTING PAVEMENT FOR INSTALLATION OF PROPOSED SEWER LINE AS SHOWN ON SHEET C-21. REPLACE WITH PAVEMENT SECTION SHOWN ON SHEET P-05.

REMOVE EXISTING 8' CHAIN LINK FENCE AND GATES

WETLAND C

WETLAND D

WETLAND E

STANSBURY CREEK

NOTE: WATER LEVEL TAKEN AT LOW HOURS ON 29 AUGUST 1997

WILSON POINT ROAD

STATE ROUTE 589

FIELD SURVEY LIMITS

BRUSH

ASPHALT

CONCRETE PAVEMENT

BITUMINOUS OVERLAY

ONE STORY METAL BUILDING

7-HANGAR

PAINTED LINE

GRASS

DEMOLITION LEGEND

- ISOLATED TREES TO BE REMOVED
- EXISTING FENCE TO BE REMOVED
- EXISTING PIPE AND STRUCTURE TO BE REMOVED
- AREA TO BE CLEARED AND/OR CLEARED AND GRUBBED
- BITUMINOUS PAVEMENT TO BE DEMOLISHED AND REMOVED
- CONCRETE PAVEMENT TO BE DEMOLISHED AND REMOVED

DEMOLITION NOTES

1. THE SIZE AND LOCATION OF THE EXISTING PIPE AND STRUCTURES SHOWN IS APPROXIMATE ONLY. THE CONTRACTOR SHALL LOCATE THE EXISTING PIPE AND STRUCTURES BETWEEN THE INLET AND OUTFALL SHOWN ON SHEET D-04. THESE LOCATIONS SHALL BE MADE KNOWN TO THE ENGINEER BEFORE WORK IN THE VICINITY MAY BEGIN.
2. EXISTING BITUMINOUS SURFACE MAY BE REMOVED BY COLD MILLING OR OTHER MEANS APPROVED BY THE ENGINEER. DEMOLITION OF AIRFIELD PAVEMENTS SHALL BE CLOSELY COORDINATED WITH FINAL PAVING TO FOLLOW.
3. THE EXTENT OF THE EXISTING WATER SYSTEM SHOWN ON SHEET D-02 IS NOT KNOWN. THIS SYSTEM IS ASSUMED TO BE ABANDONED AND WILL BE REMOVED. COSTS FOR PIPE AND STRUCTURE REMOVAL WILL BE PAID FOR ON A UNIT PRICE BASIS AS SPECIFIED IN ITEM 100.
4. EXISTING FACILITIES WITHIN THE LIMITS OF WORK WHICH ARE NOT SPECIFICALLY SHOWN TO BE ALTERED OR REMOVED SHALL REMAIN IN SERVICE AND UNDAMAGED THROUGH THE DURATION OF THE CONTRACT. WHERE THE DISPOSITION OF EXISTING FACILITIES IS UNCLEAR, OR FACILITIES ARE NOT SHOWN ON THESE PLANS ARE ENCOUNTERED, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND OBTAIN DIRECTION BEFORE PROCEEDING WITH WORK AFFECTING THE FACILITIES.

AS-BUILTS

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REMOVE EXISTING TREES (TYPICAL)

FOR SANITARY SEWER CROSSING OF WILSON POINT ROAD SEE SHEETS U-01 AND U-05

GAS LINE CROSSING OF WILSON POINT ROAD BY BALTIMORE GAS AND ELECTRIC

1-Story Block w/ Fieldstone Face

1-Story Brick

CYPRESS DRIVE

10' MAX

CONC SLAND

Shown Parking Lot

0 30 60 120 180

SCALE IN FEET

TAMS

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Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRANCE JOSEPH SHEAFFER — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: DEMOLITION AND SITE PREPARATION PLAN BASE PROJECT, SHEET 2

SCALE: 1" = 60'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: D-02

RELOCATE EXISTING TAXIWAY EDGE LIGHT FIXTURES AND ISOLATION TRANSFORMERS AS SHOWN ON SHEET E-04. REMOVE CONDUIT AND CABLE BETWEEN EDGE LIGHTS TO REMAIN.

REMOVE EXISTING BITUMINOUS SHOULDER PAVEMENT. PREPARE EXISTING TAXIWAY PAVEMENT TO REMAIN AS SHOWN IN DETAIL ON SHEET P-04.

EXISTING TAXIWAY EDGE LIGHT TO REMAIN

REMOVE EXISTING 6" POROUS CONCRETE PIPE UNDERDRAIN BETWEEN LOCATIONS SHOWN (OR TO NEAREST PIPE SECTION). CAP ENDS OF EXISTING PIPE TO REMAIN.

EXISTING TAXIWAY EDGE LIGHT TO REMAIN

LOWER EXISTING STRUCTURE TOPS AND RESET FRAMES AND GRATES TO PROPOSED ELEVATIONS (SEE SHEET C-01)

REMOVE EXISTING INLET AND REPLACE AS SHOWN ON SHEET C-01

AS-BUILTS

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SCALE IN FEET

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ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TERRANCE SOMERVILLE
LICENSE NO. 12488
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

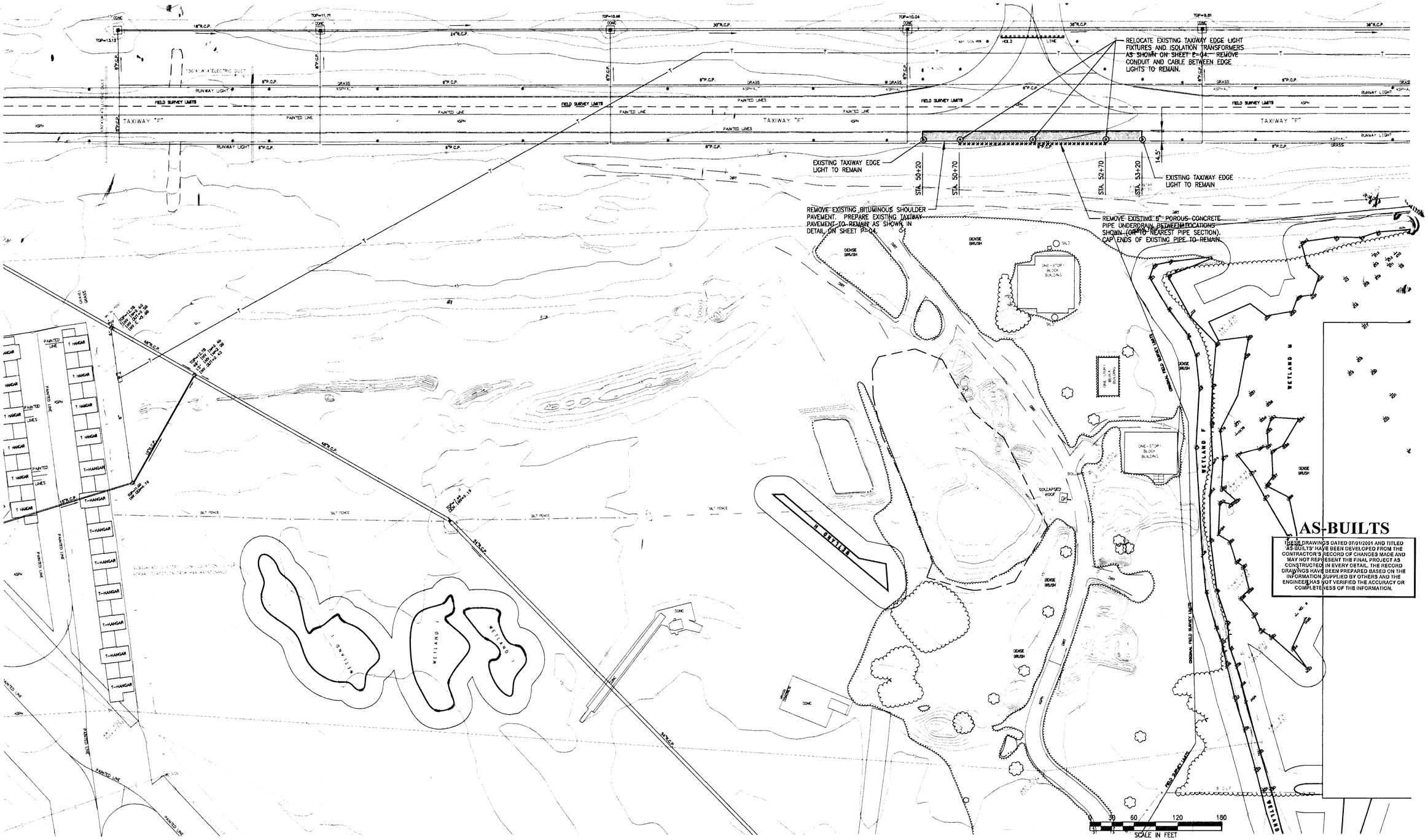
SHEET TITLE
DEMOLITION AND SITE PREPARATION PLAN
ADD ALTERNATE 1

SCALE 1" = 60'

DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. D-03



AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAMS

TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TECHNICAL DOMINATION
LICENSE NO. 12488
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

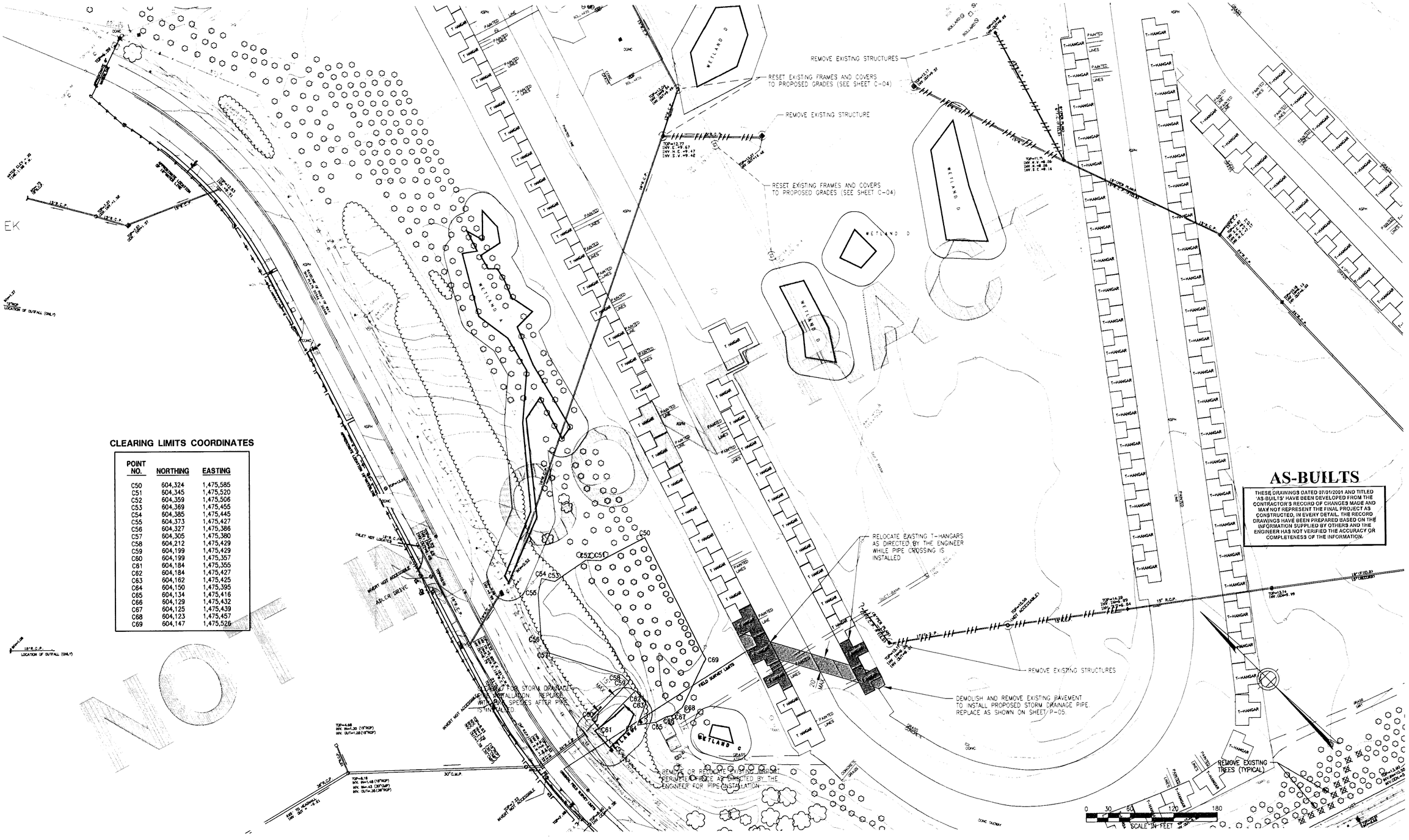
SHEET TITLE
DEMOLITION AND SITE PREPARATION PLAN ADD ALTERNATE 2

SCALE: 1" = 60'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: **D-04**



CLEARING LIMITS COORDINATES

POINT NO.	NORTHING	EASTING
C50	604,324	1,475,585
C51	604,345	1,475,520
C52	604,359	1,475,506
C53	604,369	1,475,455
C54	604,385	1,475,445
C55	604,373	1,475,427
C56	604,327	1,475,386
C57	604,305	1,475,380
C58	604,212	1,475,429
C59	604,199	1,475,429
C60	604,199	1,475,357
C61	604,184	1,475,355
C62	604,184	1,475,427
C63	604,162	1,475,425
C64	604,150	1,475,395
C65	604,134	1,475,416
C66	604,129	1,475,432
C67	604,125	1,475,439
C68	604,123	1,475,457
C69	604,147	1,475,526

AS-BUILTS

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ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TEXAPOMI SOMBATPIRIM
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

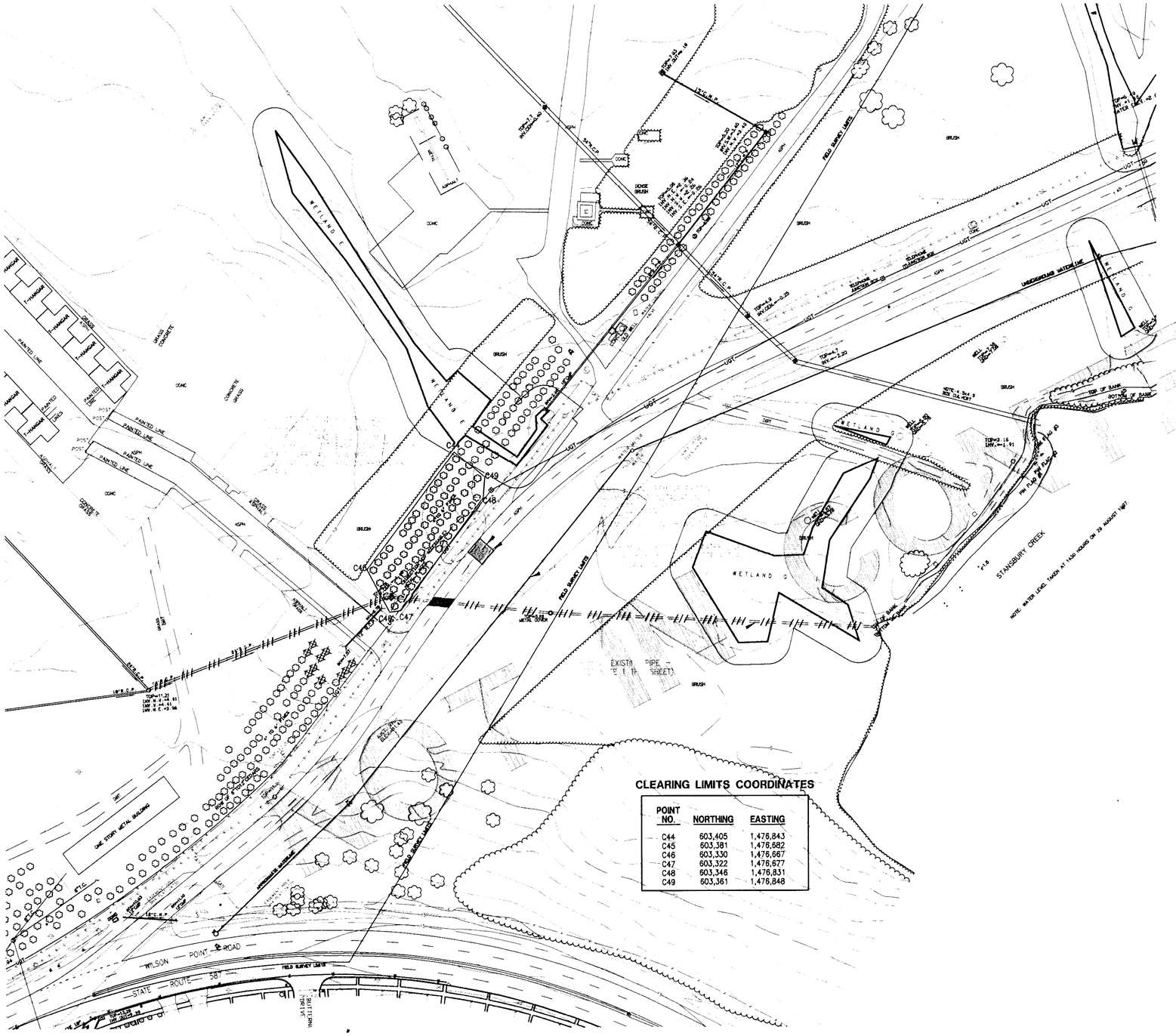
SHEET TITLE
DEMOLITION AND SITE PREPARATION PLAN
WORK NOT IN CONTRACT-SHEET 1

SCALE 1" = 60'

DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. D-05



CLEARING LIMITS COORDINATES

POINT NO.	NORTHING	EASTING
C44	603,405	1,476,843
C45	603,381	1,476,682
C46	603,330	1,476,667
C47	603,322	1,476,677
C48	603,346	1,476,831
C49	603,361	1,476,848

AS-BUILTS

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0 30 60 120 180
SCALE IN FEET

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TEXRAPOJ SOMRATPIRM
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

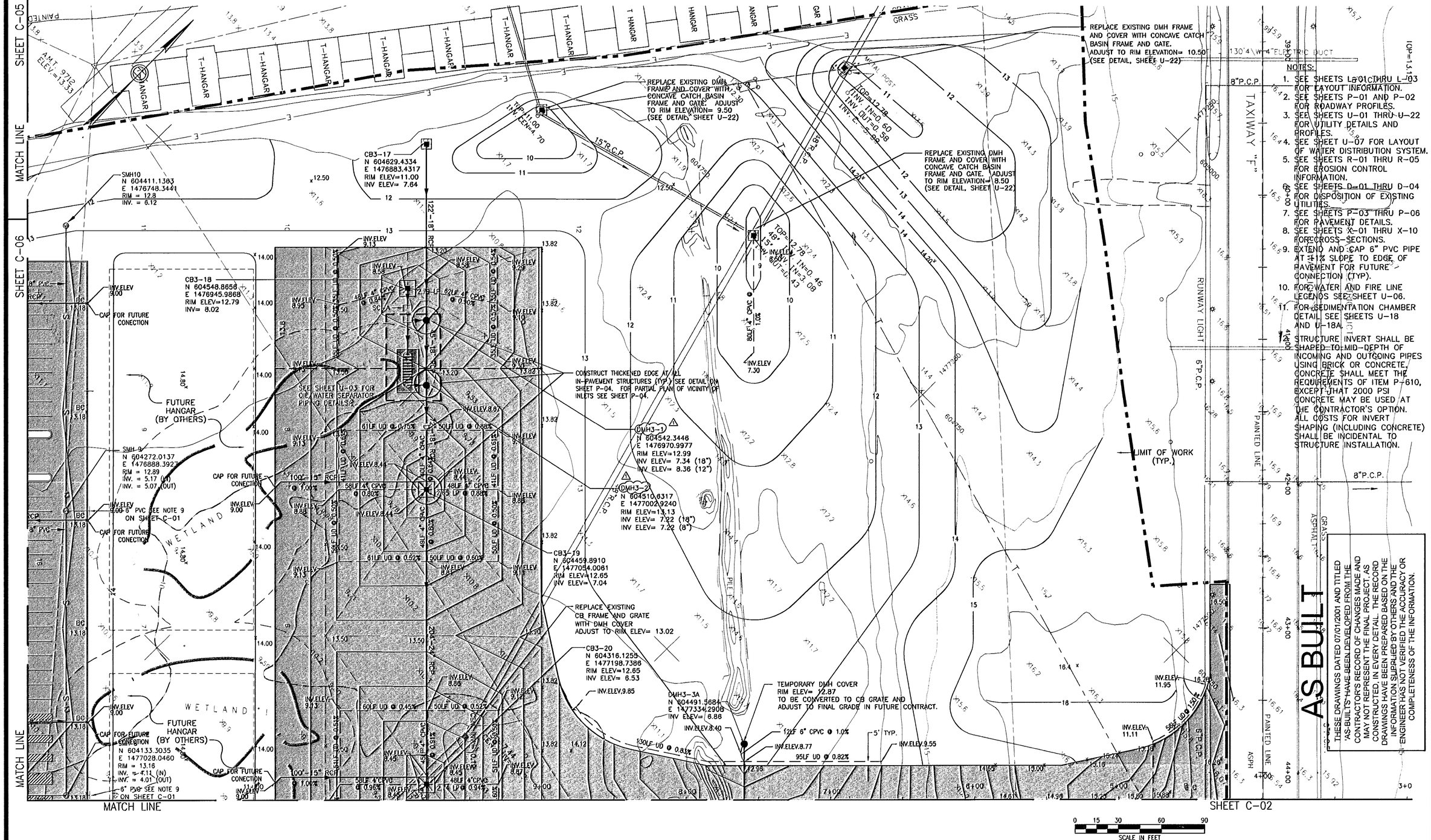
MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
DEMOLITION AND SITE PREPARATION PLAN
WORK NOT IN CONTRACT-SHEET 2

SCALE 1" = 60'
DATE September 08, 1998

PROJECT NO. MAA-CO-97-019
SHEET NO. D-06



NOTES:

1. SEE SHEETS L-01 THRU L-03 FOR LAYOUT INFORMATION.
2. SEE SHEETS P-01 AND P-02 FOR ROADWAY PROFILES.
3. SEE SHEETS U-01 THRU U-22 FOR UTILITY DETAILS AND PROFILES.
4. SEE SHEET U-07 FOR LAYOUT OF WATER DISTRIBUTION SYSTEM.
5. SEE SHEETS R-01 THRU R-05 FOR EROSION CONTROL INFORMATION.
6. SEE SHEETS D-01 THRU D-04 FOR DISPOSITION OF EXISTING UTILITIES.
7. SEE SHEETS P-03 THRU P-06 FOR PAVEMENT DETAILS.
8. SEE SHEETS X-01 THRU X-10 FOR CROSS-SECTIONS.
9. EXTEND AND CAP 6" PVC PIPE AT +1% SLOPE TO EDGE OF PAVEMENT FOR FUTURE CONNECTION (TYP).
10. FOR WATER AND FIRE LINE LEGENDS SEE SHEET U-06.
11. FOR SEDIMENTATION CHAMBER DETAIL SEE SHEETS U-18 AND U-18A.
12. STRUCTURE INVERT SHALL BE SHAPED TO MID-DEPTH OF INCOMING AND OUTGOING PIPES USING BRICK OR CONCRETE. CONCRETE SHALL MEET THE REQUIREMENTS OF ITEM P-610, EXCEPT THAT 2000 PSI CONCRETE MAY BE USED AT THE CONTRACTOR'S OPTION. ALL COSTS FOR INVERT SHAPING (INCLUDING CONCRETE) SHALL BE INCIDENTAL TO STRUCTURE INSTALLATION.

SCALE IN FEET: 0 15 30 60 90

DESIGNED	TDB/GPP	REV.	DATE	REMARKS
DRAWN	JJN/PW	⚠	1/13/99	REVISED STRUCTURE NUMBER
CHECKED	KS/GPP		07/01/2001	AS-BUILT
APPROVED	TS			

TAMS
TAMS Consultants, Inc.
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2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

STATE OF MARYLAND — THEODORE DOMANTAY — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: PAVING, GRADING, DRAINAGE, AND UTILITY PLAN I

SCALE: 1" = 30'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: C-01

MATCH LINE

SHEET C-06

MATCH LINE

SHEET C-07

SHEET C-01

CB1-13A
N 604082.7333
E 1477074.2968
RIM ELEV=13.31
INV ELEV= 7.50

CB1-12A
N 604043.75
E 1477190.33
RIM ELEV= 9.00
FRAME AND GRATE
OVER EXISTING PIPE
(SEE DETAIL SHEET U-22)

CB3-21
N 604184.3277
E 1477331.4231
RIM ELEV= 10.32
INV ELEV= 8.07

CB3-22
N 604024.6800
E 1477492.1448
RIM ELEV= 10.00
INV ELEV= 5.50

CB3-23
N 603916.7192
E 1477582.3878
RIM ELEV=12.79
INV/ELEV= 7.89

CB3-3A
N 604357.6906
E 1477469.0692
INV ELEV= 6.39
PROVIDE OPINING AND CAP
FOR FUTURE 36" PIPE

CB3-4
N 604441.5045
E 1477592.3918
RIM ELEV=11.00
(FUTURE RIM= 12.06)
INV ELEV= 7.31

CB3-5
N 604305.0324
E 1477729.2089
RIM ELEV= 11.00
(FUTURE RIM= 11.83)
INV ELEV = 8.83

CONSTRUCT THICKENED EDGE AT ALL
IN-PAVEMENT STRUCTURES (TYP.) SEE DETAIL ON
SHEET P-04. FOR PARTIAL PLAN OF VICINITY OF
INLETS SEE SHEET P-04.

10LF 4"CPVC @ 1.0%
40LF 4"CPVC @ 1.0%
60LF 4"CPVC @ 1.0%
70LF 4"CPVC @ 1.0%
45LF 4"CPVC @ 0.80%
61LF 4"CPVC @ 1.00%
10LF 4"CPVC @ 1.02%
146LF 6"CPVC @ 0.5%
192LF 6"CPVC @ 1.00%
38LF HD @ 1.89%

187'-27" RCP
227'-30" RCP
190'-36" RCP
193'-15" RCP
231'-18" RCP

INV.ELEV. 9.15
INV.ELEV. 8.79
INV.ELEV. 9.13
INV.ELEV. 9.12
INV.ELEV. 8.87
INV.ELEV. 8.04
INV.ELEV. 7.31
INV.ELEV. 8.77
INV.ELEV. 10.69
INV.ELEV. 11.68
INV.ELEV. 7.67
INV.ELEV. 7.57
INV.ELEV. 8.17
INV.ELEV. 7.40
INV.ELEV. 7.00
INV.ELEV. 9.03
INV.ELEV. 8.33
INV.ELEV. 8.43
INV.ELEV. 9.15
INV.ELEV. 8.90
INV.ELEV. 8.54
INV.ELEV. 9.55
INV.ELEV. 9.12

15+17.54
STA. 44+76.00
STA. 45+00
STA. 46+00
STA. 47+00
STA. 1477+00

WETLAND

PILE

DIRT

GRASS

CONCRETE

ASPHALT

BRUSH

DENSE

PAINTED LINE

PAINTED LINES

TAXIWAY "F"

6"P.C.P.

8"P.C.P.

A.M.T.9718
ELEV=13.07

AS BUILT

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MATCH LINE

SHEET C-03

NOTE:
SEE SHEET C-01 FOR NOTES.

SCALE IN FEET
0 15 30 60 90

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	TDB/GPP
DRAWN	JJN/PW
CHECKED	KS/GPP
APPROVED	TS

STATE OF MARYLAND
TERRANCE SOMMATTINO
LICENSE NO. 12468
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	1/13/99	REVISED RIM AND INV. ELEVATIONS; REVISED CB3-3A
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

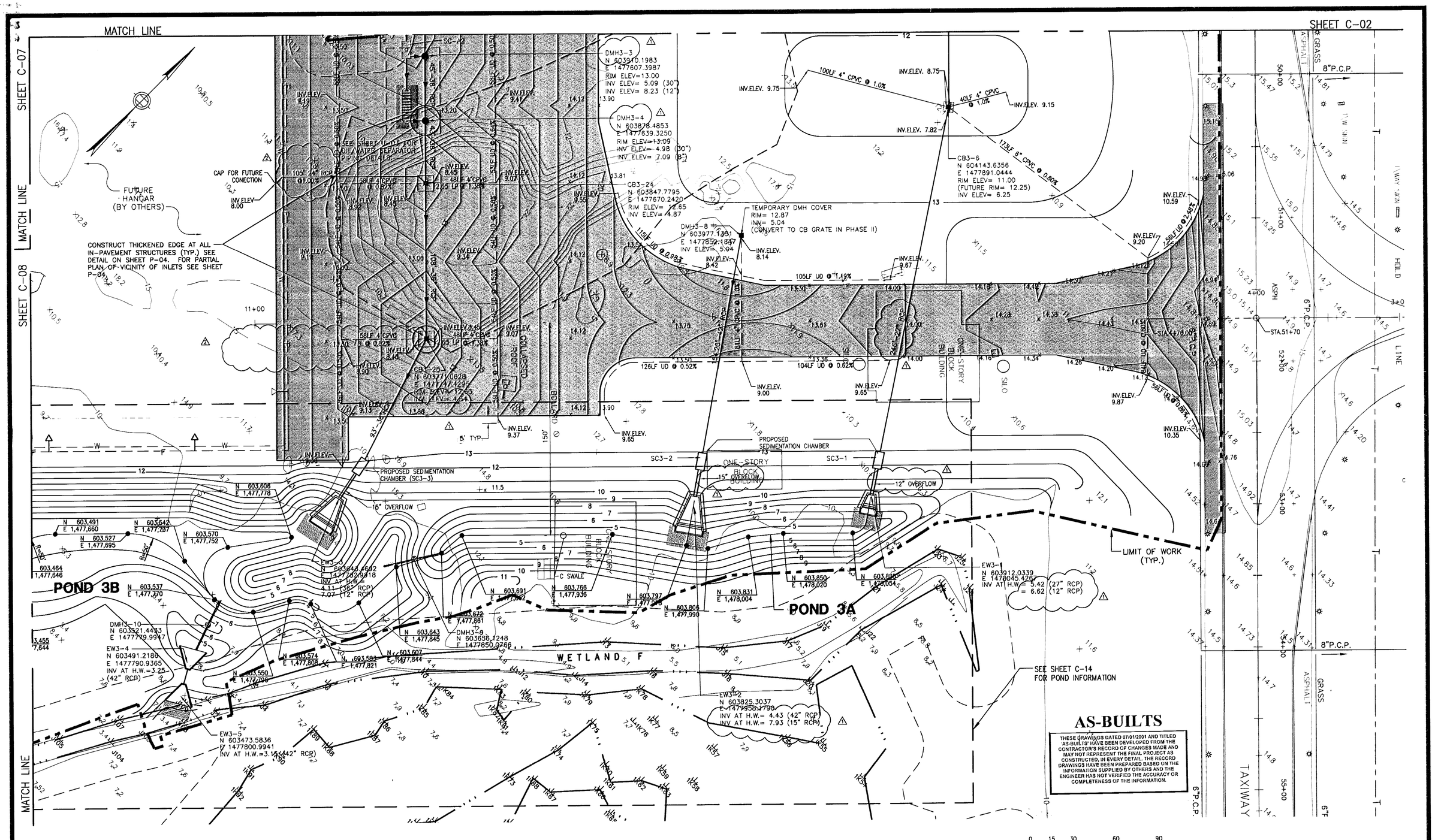
SHEET TITLE
PAVING, GRADING, DRAINAGE, AND UTILITY
PLAN II

SCALE 1" = 30'

DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-02

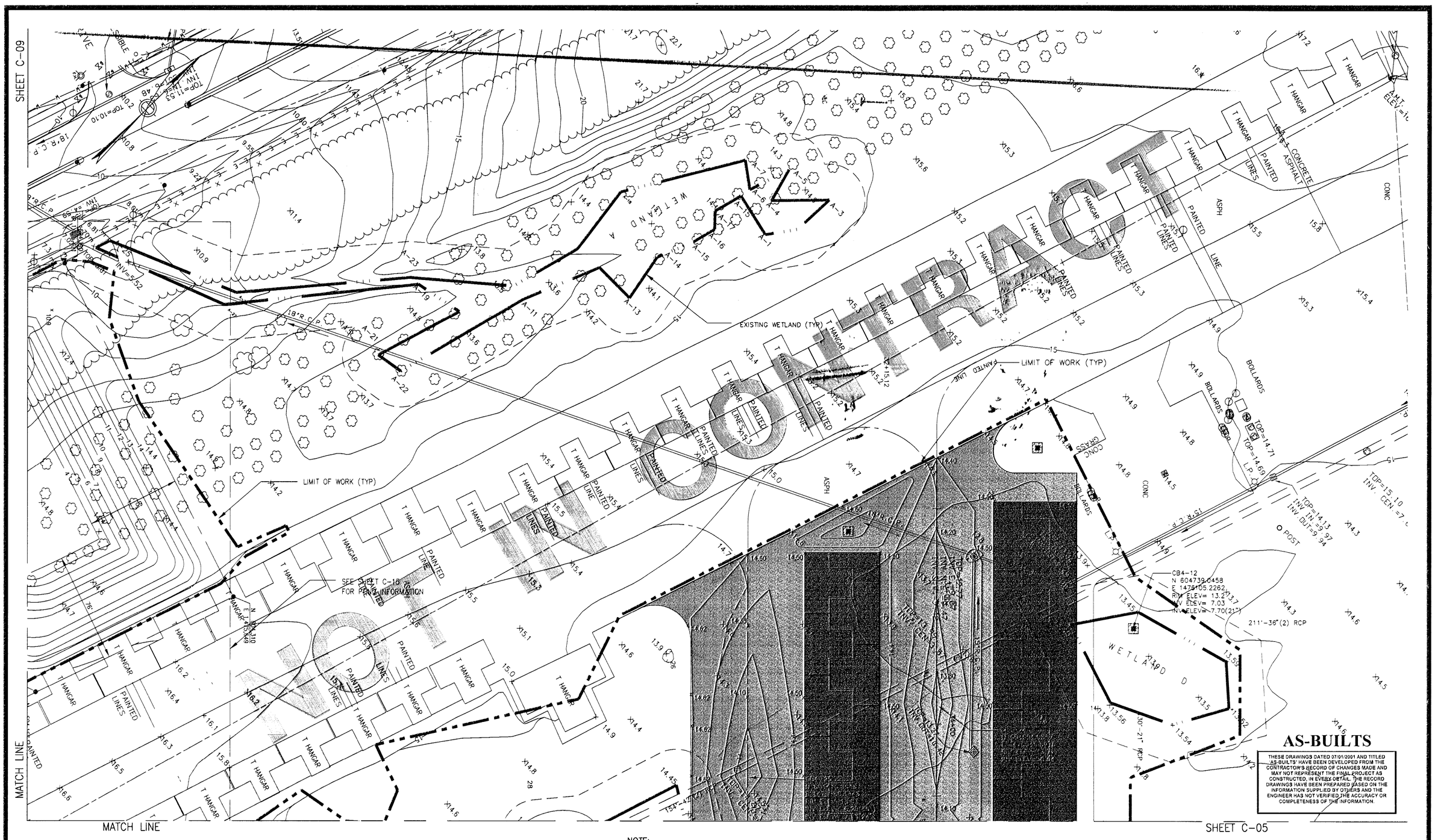


NOTE:
SEE SHEET C-01 FOR NOTES.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED TDB/GPP DRAWN JJN/FA CHECKED KS/GPP APPROVED TS	STATE OF MARYLAND TEXAPOJ SOMSATPIWM LICENSE NO. 12489 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS 1 / 1/13/99 / REVISED STRUCTURE NUMBER, ELEV., PIPE LENGTH AND SIZE 2 / 2/03/99 / REVISED AND DELETED PIPE	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: PAVING, GRADING, DRAINAGE AND UTILITY PLAN III SCALE 1" = 30' DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-03



NOTE:
SEE SHEET C-01 FOR NOTES.

0 15 30 60 90
SCALE IN FEET

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED TDB/GPP DRAWN JJN/FA CHECKED KS/TS APPROVED TS	STATE OF MARYLAND TEERAPOJ SOMBATPIVM LICENSE NO. 12489 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: PAVING, GRADING, DRAINAGE AND UTILITY PLAN IV SCALE 1" = 30' DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-04

MATCH LINE

SHEET C-09

SHEET C-04

T HANGAR

T HANGAR

T HANGAR

EXISTING WETLANDS

CB4-37
N 604329.1387
E 1475939.4473
RIM ELEV=13.58
INV ELEV= 5.90
INV ELEV= 8.58(18")

174'-12" RCP

DUCT-BANK

DUCT-BANK

149'-18" RCP

167'-18" RCP

CB4-30
N 604146.2911
E 1475938.5991
RIM ELEV= 13.58
INV ELEV= 5.38
INV ELEV= 8.82(15")

CB4-33
N 604021.4854
E 1475874.4293
RIM ELEV= 13.58
INV ELEV= 4.95
INV ELEV= 8.92(15")

131'-15" RCP

174'-15" RCP

TOP=15.58
(ACCESSABLE)

T-HANGER TAXILANE

TAXILANE G

(AND 24')

(AND 21')

TOP=12.17
INV. OUT=9.57

BOLLARD

BOLLARD

BOLLARD

TOP=12.89
INV. OUT=9.09

15° R.C.P.

CB4-39
N 604220.0982
E 1476246.8749
RIM ELEV= 13.52
INV ELEV= 8.44

CB4-38
N 604313.2775
E 1476339.4316
RIM ELEV=13.87
INV ELEV=8.77

188'-18" RCP

SHEET C-10

MATCH LINE

TOP=14.29
INV. IN=6.89
INV. OUT=6.84

15" R.C.P.

TAXILANE G

18" (ECP PAVN) (TYP)

15" R.C.P.

PAINTED LINE

PAINTED LINE

PAINTED LINES

PAINTED LINES

PAINTED LINE

52'

80'

38'-18" RCP

CB1-1 (IN CONTRACT)
N 604375.6759
E 1476699.3810
RIM ELEV=11.0
INV ELEV= 8.01

ASPH

ASPH

ASPH

MATCH LINE

SHEET C-01

MATCH LINE

SHEET C-06

T-HANGAR

AS-BUILTS

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NOTE:
SEE SHEET C-01 FOR NOTES.

0 15 30 60 90
SCALE IN FEET

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	TDB/GPP
DRAWN	JJN/FA
CHECKED	KS/GPP
APPROVED	TS

STATE OF MARYLAND — TECHNICAL CONSULTATION — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

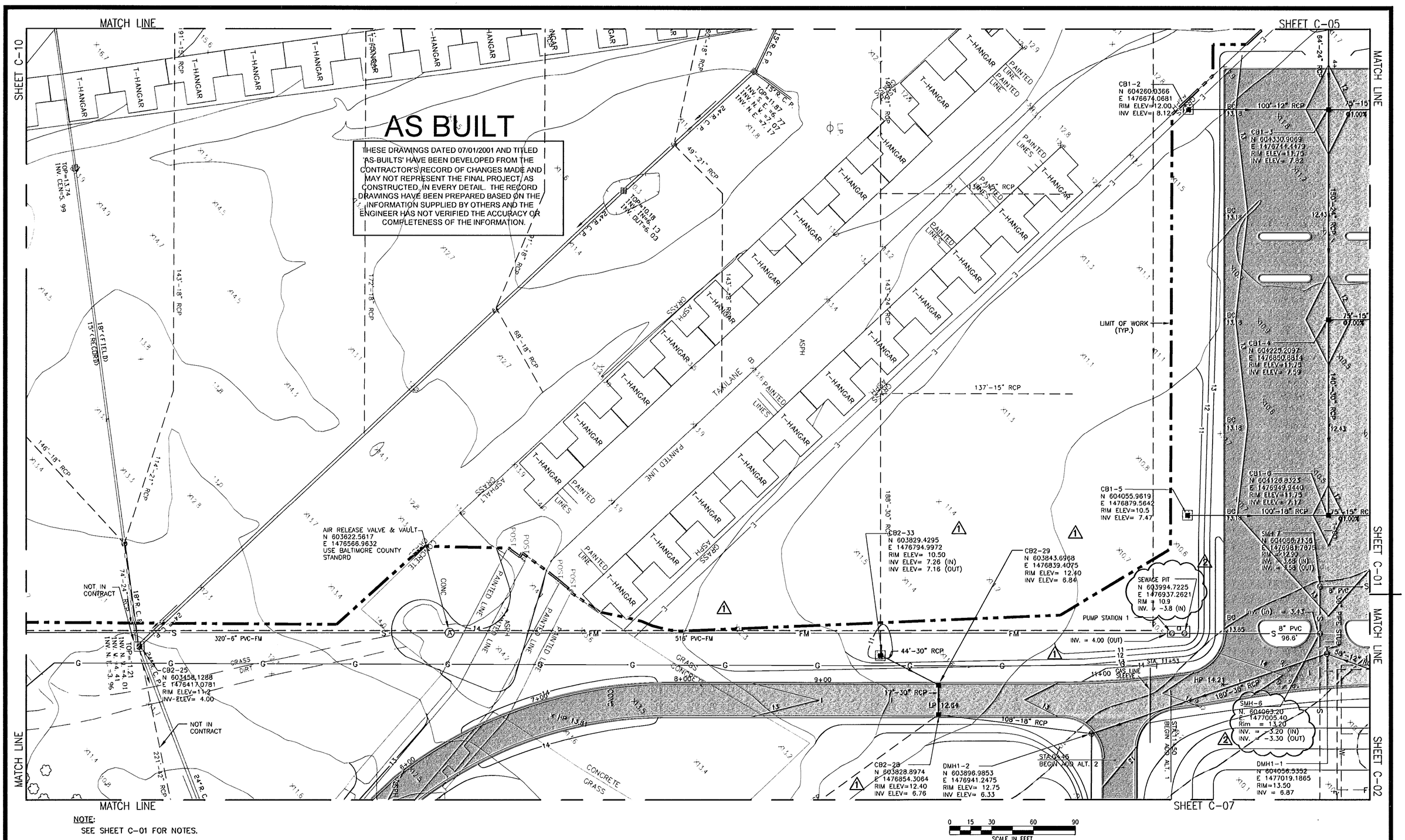
SHEET TITLE
PAVING, GRADING, DRAINAGE AND UTILITY PLAN V

SCALE 1"= 30'

DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-05



NOTE:
SEE SHEET C-01 FOR NOTES.

0 15 30 60 90
SCALE IN FEET

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED TDB/GPP DRAWN JJN/FA CHECKED KS/GPP APPROVED TS	STATE OF MARYLAND TEEKAPOM SOMBATPIWM LICENSE NO. 12480 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS 1 / 10/21/98 / SANITARY SEWERS LINE RELOCATION 2 / 11/02/98 / REVISED SANITARY SEWERS LINE INVERT ELEVATIONS. 07/01/2001 / AS-BUILT	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: PAVING, GRADING, DRAINAGE AND UTILITY PLAN VI SCALE: 1" = 30' DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-06

AS BUILT

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MATCH LINE — SHEET C-10

MATCH LINE — SHEET C-06

MATCH LINE — SHEET C-02

MATCH LINE — SHEET C-03

MATCH LINE — SHEET C-08

SEE SHEET C-12 FOR POND INFORMATION

SEE SHEET C-11 FOR POND INFORMATION

SEE SHEET C-13 FOR POND INFORMATION

PROP. ACCESS ROAD

EXISTING WETLANDS (TYP)

POND 1

CB1-8
N 603827.1940
E 1477055.0317
RIM ELEV= 11.75
INV ELEV= 6.68

CB1-7A
RIM ELEV= 9.00
INSTALL CATCH BASIN FRAME AND GRATE OVER EXISTING PIPE (SEE DETAIL, SHEET U-22)

CB1-9
N 603687.4489
E 1477197.8430
RIM ELEV= 11.75
INV ELEV= 5.68

SMH-11
N. 603873.33
E. 1477196.23
Rim = 13.00
INV. = -1.85 (OUT)
INV. = 2.35 (IN)

DMH1-3
N 603676.2745
E 1477258996
RIM ELEV= 12.50
INV ELEV= 5.25

SMH-12
N. 603684.06
E. 1477266.23
Rim = 12.00
INV. = 3.8 (OUT)
INV. = 3.9 (IN)

PUMPS STATION 2A
N. 603744.13
E. 1477325.95
Rim = 13.00
INV. = 3.27 (OUT)
INV. = 3.37 (IN)

DMH1-4
(OVER EXIST. PIPE)
N 603654.8778
E 1477185.1046
RIM ELEV= 12.50
INV.(IN)ELEV= 5.00(36"RCP)
INV.(IN)ELEV= 7.25(12"RCP)

EW1-1
N 603592.8755
E 1477184.0330
INV AT H.W.= 0.38

DMH1-5
N 603393.7445
E 1477182.9355

DMH1-6
N 603392.1179
E 1477181.4018

EW1-2
N 603287.5406
E 1477181.1583
INV AT H.W.= -0.2

DMH1-2
N 603344.0914
E 1478733.6463
INV.= 5.00

N 603340.3802
E 1476883.2016
INV.= 7.25

E 603259.2977
N 1476954.4916
INV.=2.80

TOP=5.82
METAL COVER

TOP=5.20
INV.S.W.=3.45
INV.N.W.=3.45

INV.ELEV 9.00
CAP FOR FUTURE CONECTION

SEE NOTE 1

NOTE 1
SIZE AND LOCATION TO BE CONFIRM BY LOCKHEED MARTIN HANGAR DESIGNER.

NOTE:
SEE SHEET C-01 FOR NOTES.

0 15 30 60 90
SCALE IN FEET

TAMS
TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	TDB/GPP
DRAWN	JJN/FA
CHECKED	KS/GPP
APPROVED	TS

STATE OF MARYLAND — STEPHEN SOMMATTINO — LICENSE NO. 12469 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	10/21/98	SANITARY SEWERS LINE RELOCATION
2	11/05/98	REVISE SANITARY SEWERS LINE INVERT ELEVATIONS.
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

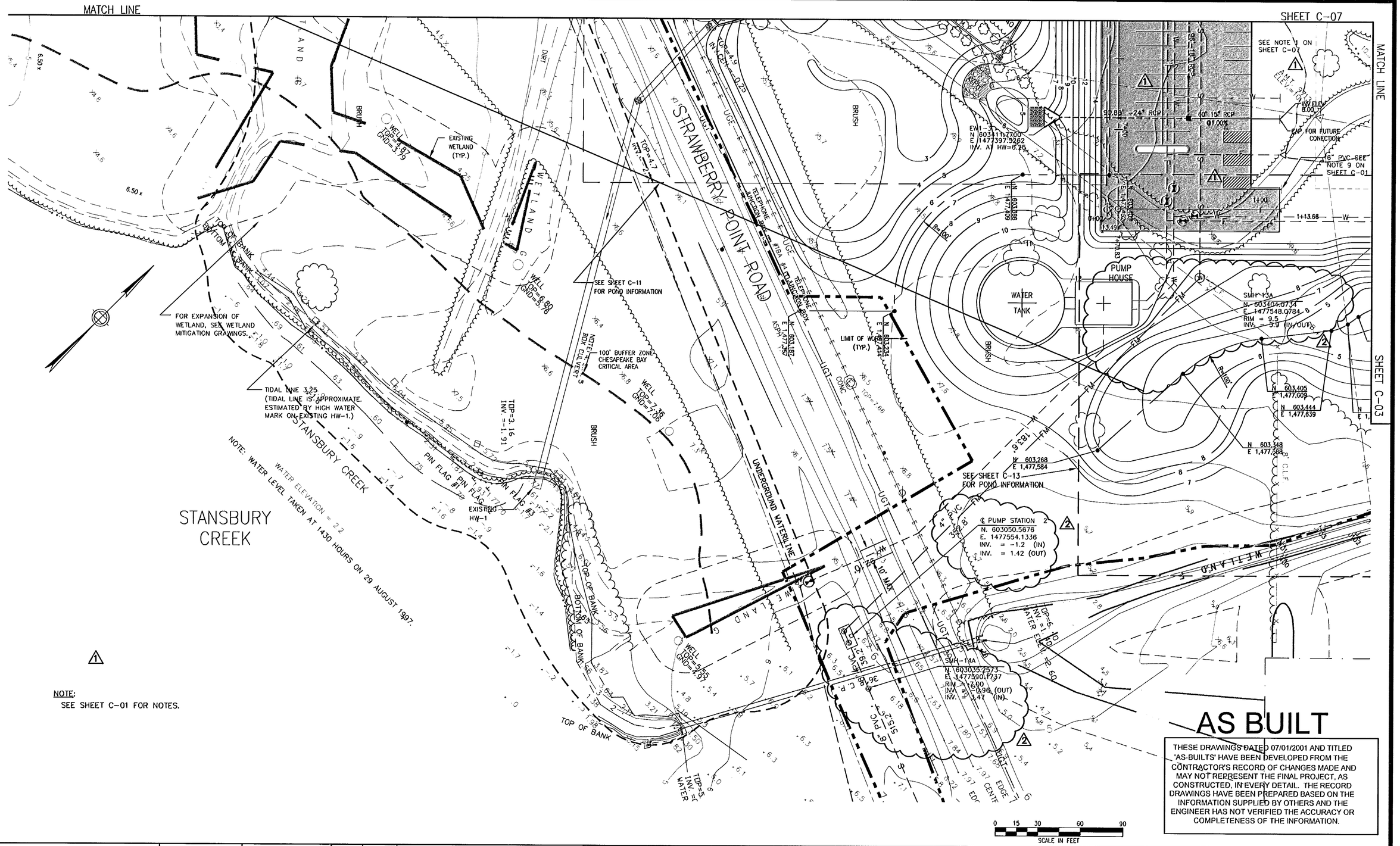
SHEET TITLE
PAVING, GRADING, DRAINAGE AND UTILITY PLAN VII

SCALE 1" = 30'

DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-07



NOTE:
SEE SHEET C-01 FOR NOTES.

AS BUILT

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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DRAWN	JJN/FA
CHECKED	KS/GPP
APPROVED	TS

STATE OF MARYLAND — TEERAPOJ SOMBATPIYIN — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	10/21/98	SANITARY SEWERS LINE RELOCATION
2	11/05/98	REVISE SANITARY SEWERS LINE INVERT ELEVATIONS; REVISE GRADING AROUND PUMP HOUSE
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

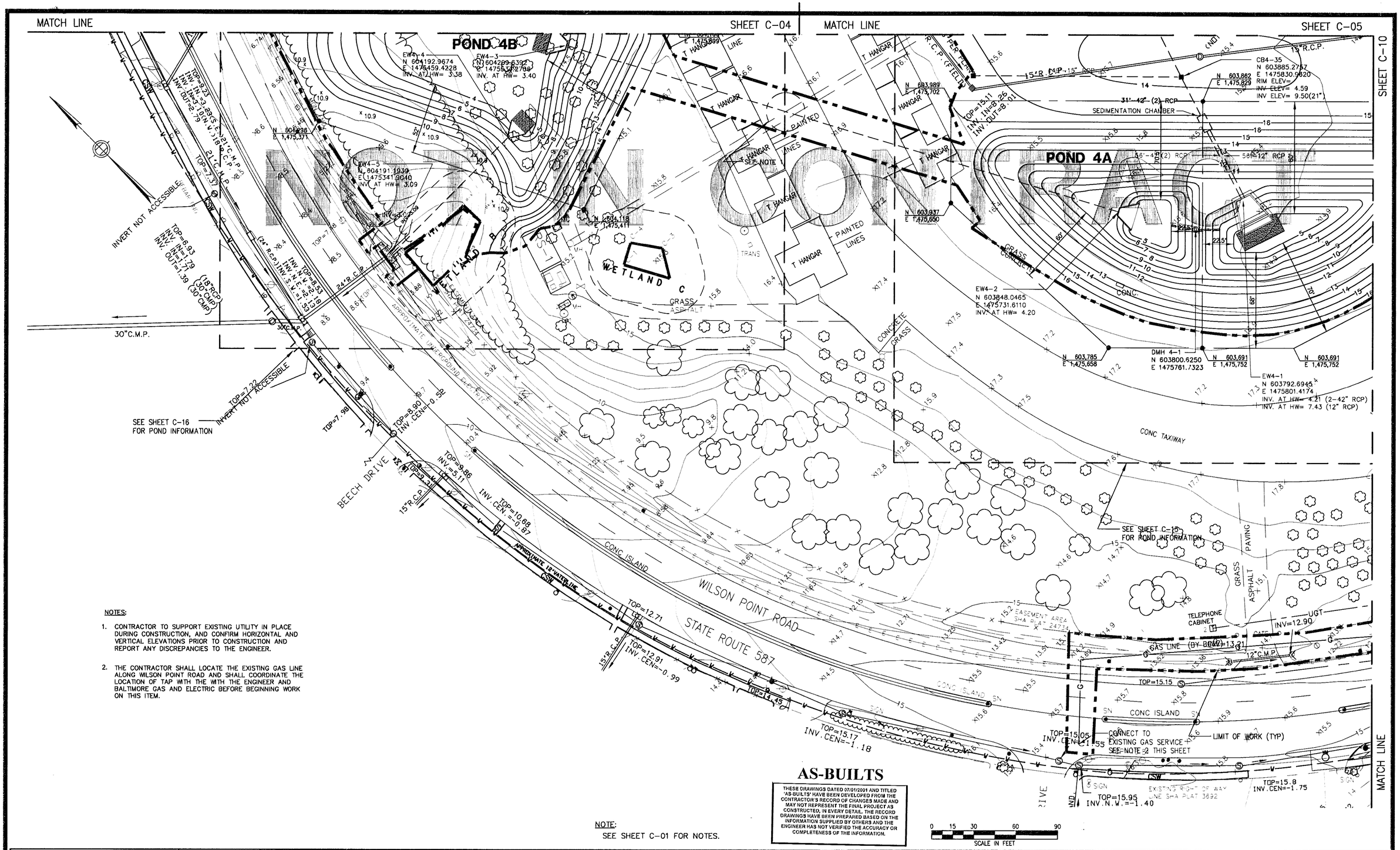
SHEET TITLE: PAVING, GRADING, DRAINAGE AND UTILITY PLAN VIII

SCALE: 1" = 30'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: C-08



NOTES:

1. CONTRACTOR TO SUPPORT EXISTING UTILITY IN PLACE DURING CONSTRUCTION, AND CONFIRM HORIZONTAL AND VERTICAL ELEVATIONS PRIOR TO CONSTRUCTION AND REPORT ANY DISCREPANCIES TO THE ENGINEER.

2. THE CONTRACTOR SHALL LOCATE THE EXISTING GAS LINE ALONG WILSON POINT ROAD AND SHALL COORDINATE THE LOCATION OF TAP WITH THE WITH THE ENGINEER AND BALTIMORE GAS AND ELECTRIC BEFORE BEGINNING WORK ON THIS ITEM.

NOTE:
SEE SHEET C-01 FOR NOTES.

AS-BUILTS

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0 15 30 60 90
SCALE IN FEET

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APPROVED	TS

STATE OF MARYLAND
TEERAPOJ SOMSATPIWM
LICENSE NO. 12400
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

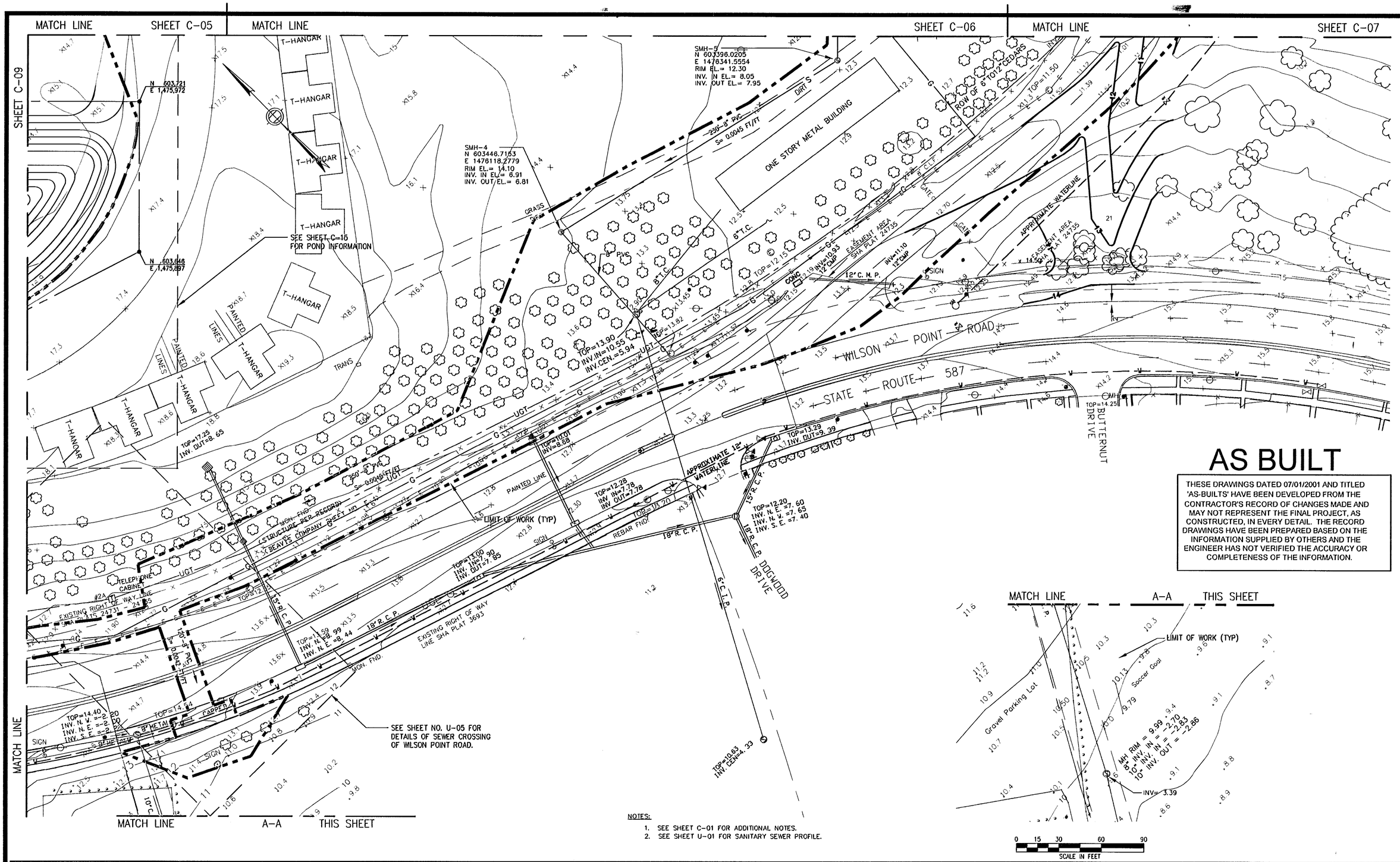
SHEET TITLE: PAVING, GRADING, DRAINAGE AND UTILITY PLAN IX

SCALE: 1" = 30'

DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-09



AS BUILT

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

NOTES:

1. SEE SHEET C-01 FOR ADDITIONAL NOTES.
2. SEE SHEET U-01 FOR SANITARY SEWER PROFILE.

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APPROVED	TS

STATE OF MARYLAND — TEXAPOSA SOMBATPIUM — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

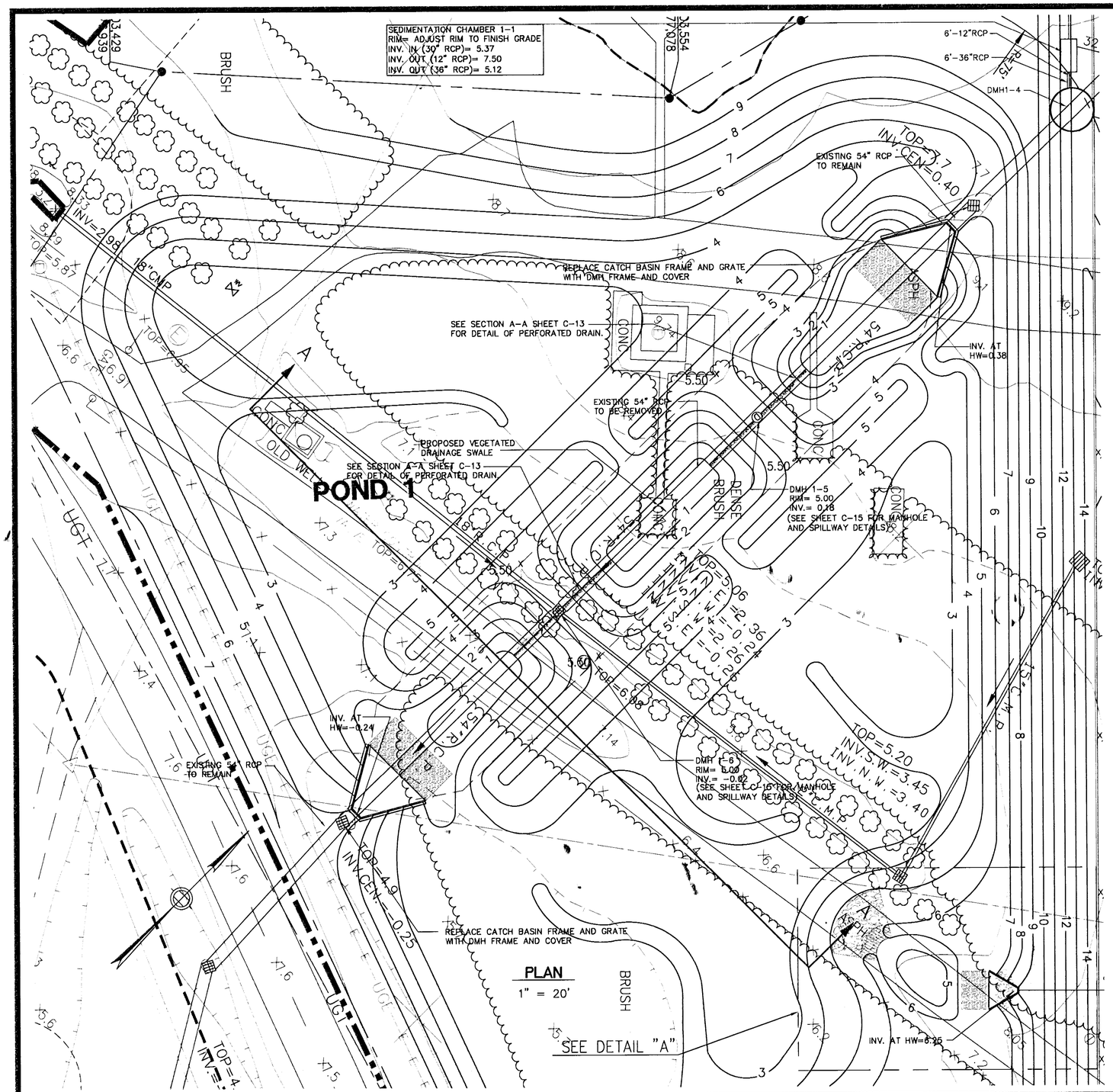
SHEET TITLE: PAVING, DRAINAGE, GRADING AND UTILITY PLAN X

SCALE: 1" = 30'

DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

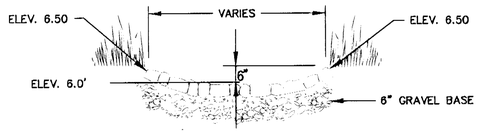
SHEET NO. C-10



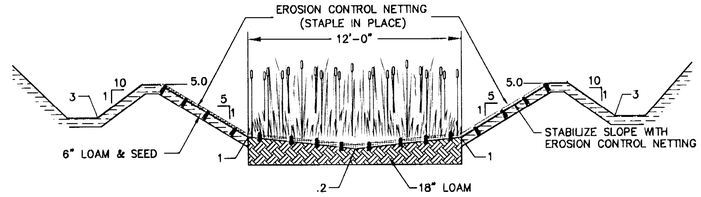
POND CLASSIFICATION: SHALLOW MARSH EXTENDED DETENTION

NOTES:

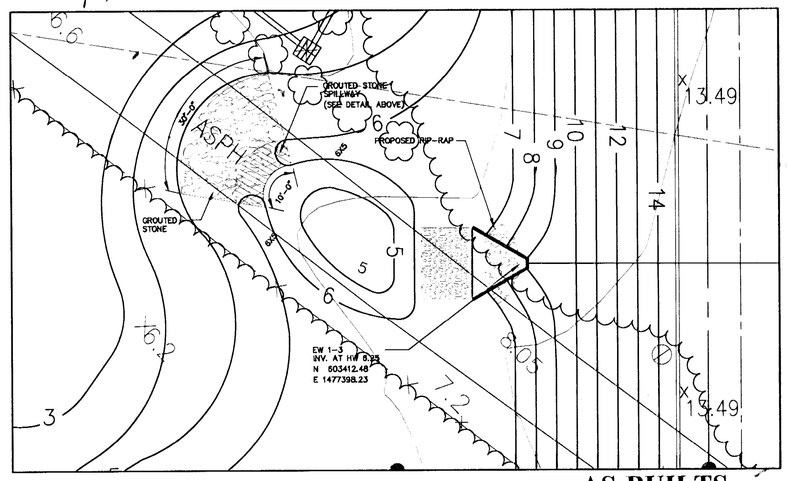
1. CONTRACTOR SHALL VERIFY THE VERTICAL AND HORIZONTAL LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF WORK. REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO PRECEDING WITH WORK.
2. SEE SHEET C-20 FOR POND SECTION.
3. SEE SHEET V-01 FOR POND PLANTINGS.
4. SEE SHEETS C-17 THROUGH C-19 FOR CONSTRUCTION PHASING.
5. SEE SHEET U-18 THROUGH U-18C FOR SEDIMENT CHAMBER, END WALL AND WING WALL DETAILS.
6. SEE SHEET C-07 FOR COORDINATE INFORMATION FOR DRAIN MANHOLES AND HEADWALLS.
7. EXISTING UNSUITABLE FILL MATERIALS AT POND SIDE SLOPES LOCATIONS MUST BE REMOVED AND REPLACED WITH SUITABLE COMPACTED BACKFILL TO PROVIDE SUITABLE SLOPES.



GROUTED STONE SPILLWAY DETAIL
NTS



SECTION A-A
NTS



DETAIL "A"
SCALE 1" = 10'

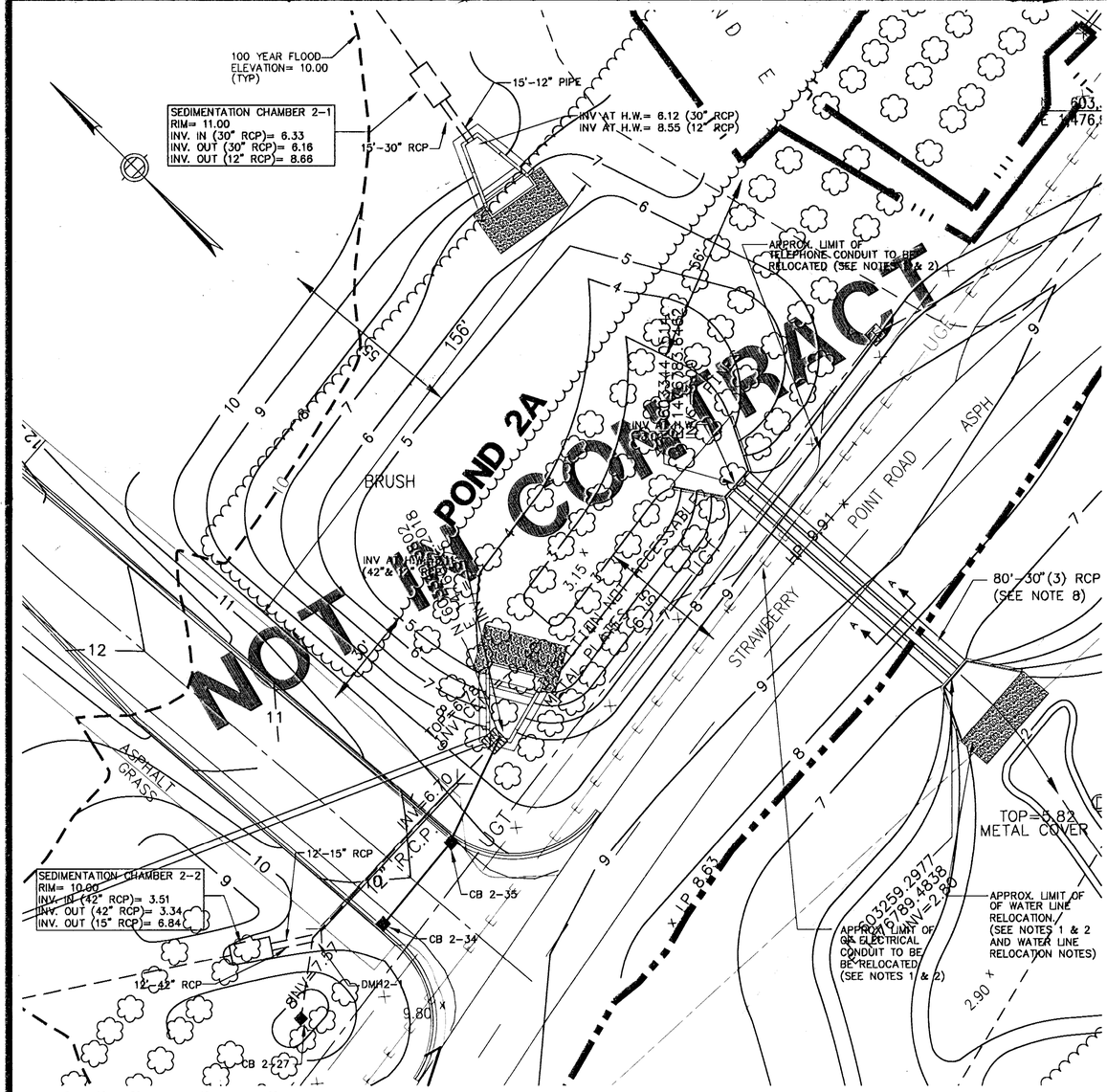
0 10 20 40 60
SCALE IN FEET

NOTE:
SEE SHEET C-01 FOR NOTES.

AS-BUILTS

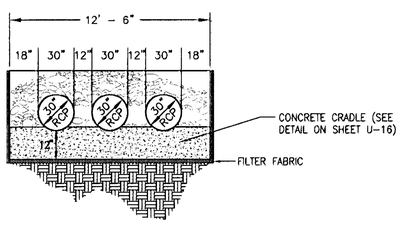
THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED TDB DRAWN POE CHECKED KS APPROVED TS	STATE OF MARYLAND TECHNICAL SUBMITTAL LICENSE NO. 12480 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: POND 1 ENLARGEMENT & DETAIL PLAN SCALE: AS NOTED DATE: September 08, 1998 PROJECT NO. MAA-CO-97-019 SHEET NO. C-11



PLAN

1" = 20'



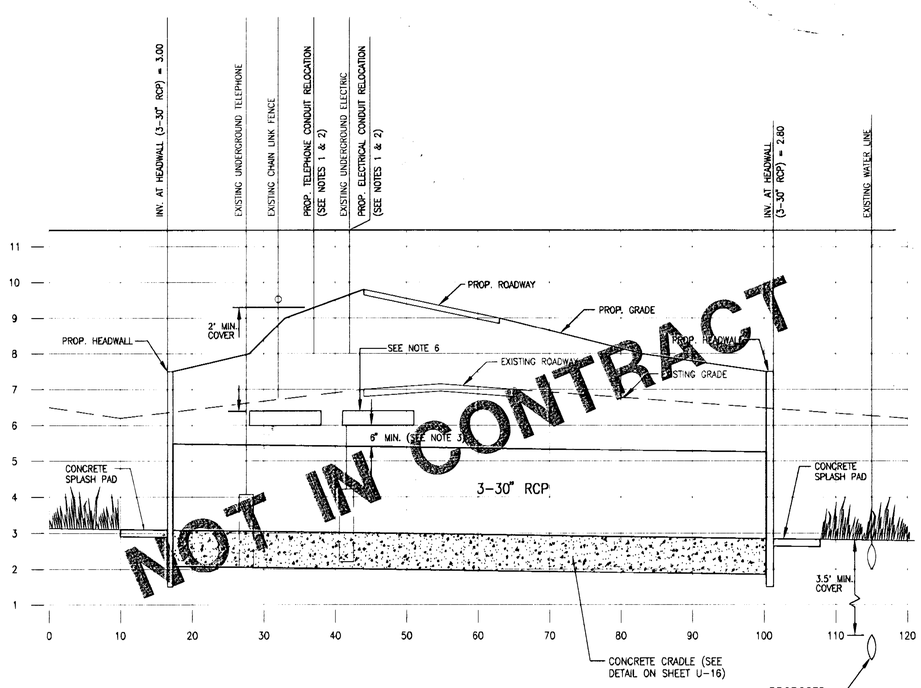
SECTION A-A

NTS

NOTE:
SEE SHEET C-01 FOR NOTES.

NOTES:

1. THE CONTRACTOR SHALL VERIFY IN THE FIELD THE HORIZONTAL AND VERTICAL LOCATION OF TELEPHONE, ELECTRICAL AND WATER LINES AND ANY DISCREPANCIES TO THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK.
2. THE CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES BEFORE BEGINNING WORK. CONTRACTOR SHALL COORDINATE ALL NECESSARY UTILITY DOWN TIME AS REQUIRED. AS BUILT DRAWINGS OF RELOCATED UTILITIES WITH HORIZONTAL AND VERTICAL LOCATIONS SHALL BE PROVIDED TO BOTH THE UTILITY COMPANIES AND M.A.C..
3. COMPACTED CLEAN GRAVEL SHALL BE PLACED ABOVE THE PROPOSED 3-30" RCP TO THE PROPOSED ROADWAY SUBBASE. IN ALL OTHER AREAS, GRAVEL WILL EXTEND TO WITHIN 6" OF FINAL GRADE. PLACE 6" OF LOAM AND SEED ON ALL UNPAVED AREAS.
4. SEE SHEET V-01 FOR POND PLANTINGS.
5. SEE SHEETS R-01 THRU R-10 FOR EROSION CONTROL MEASURES.
6. FORM DUCTBANK SPACING AS REQUIRED TO MAINTAIN 2' OF COVER.
7. SEE SHEET C-07 FOR COORDINATE INFORMATION FOR DRAIN MANHOLES AND HEADWALLS.
8. SEE NOTE 5, SHEET C-11.



PROFILE

SCALE: 1"=2' (VERT)
1"=10' (HORIZ.)

WATER LINE RELOCATION NOTES:

1. THE LENGTH OF EXISTING WATER LINE TO BE RELOCATED IS APPROXIMATE. THE CONTRACTOR SHALL CONFIRM THE DEPTH OF THE WATER LINE TO DETERMINE THE LENGTH OF WATER LINE TO BE RELOCATED IN ORDER TO MAINTAIN A MINIMUM COVER OF 3.5' OVER THE WATER LINE.
2. PRIOR TO SHUTTING DOWN THE EXISTING WATER LINE, THE CONTRACTOR SHALL COORDINATE WITH THE UTILITY PROVIDER TEMPORARY WATER SERVICES, IF REQUIRED.
3. SAW CUT THE EXISTING WATER LINE, OR BREAK LINE AT AN EXISTING JOINT.
4. NEW CONNECTIONS TO THE EXISTING WATER LINE SHALL BE MADE WITH MECHANICAL JOINT FITTINGS.
5. AT COMPLETION OF RELOCATION, THE CONTRACTOR SHALL FLUSH THE EXISTING LINE (SEE SPECIFICATIONS FOR ADDITIONAL TESTING REQUIRED).
6. CONTRACTOR SHALL SUBMIT AS-BUILT DRAWINGS SHOWING BOTH HORIZONTAL AND VERTICAL LOCATIONS OF THE NEW WATER LINE.
7. SEE SHEETS U-19 THRU U-22 FOR UTILITY DETAILS.

0 5 10 20 30 HORIZONTAL
0 1 2 4 6 VERTICAL
SCALE IN FEET

AS-BUILTS

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CHECKED	KS
APPROVED	TS

STATE OF MARYLAND — TERRENCE DOUGHERTY — LICENSE NO. 12468 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

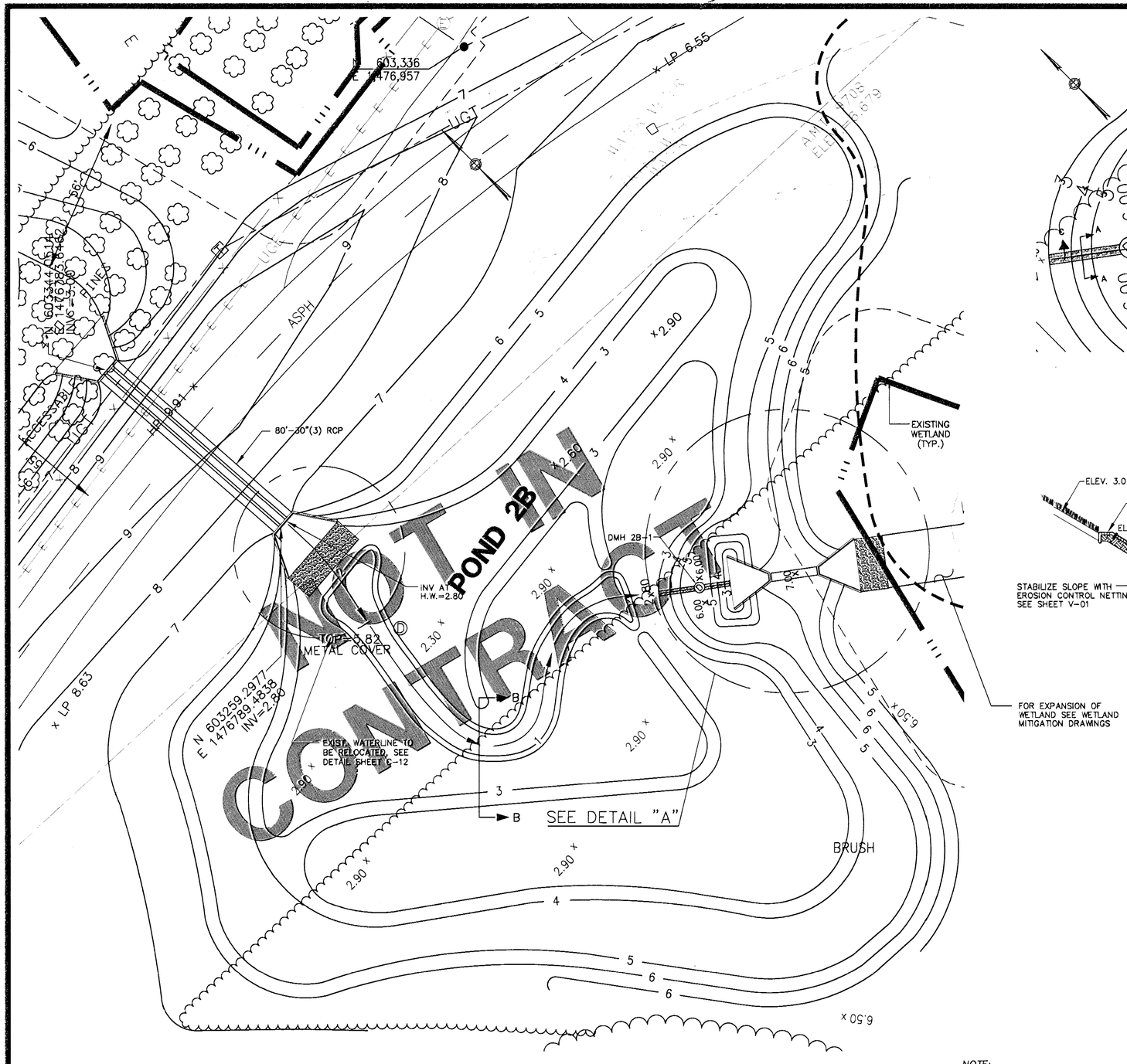
SHEET TITLE: POND 2A ENLARGEMENT & DETAIL PLAN

SCALE: AS NOTED

DATE: September 08, 1998

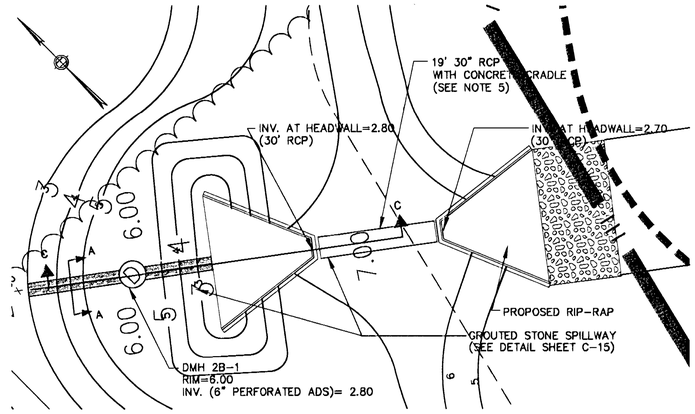
PROJECT NO.: MAA-CO-97-019

SHEET NO.: C-12



PLAN

1"=20'



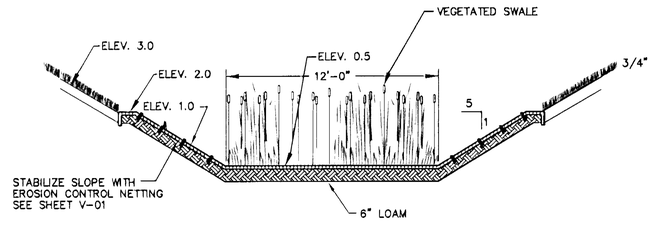
DETAIL "A"

1"=10'

SCALE IN FEET

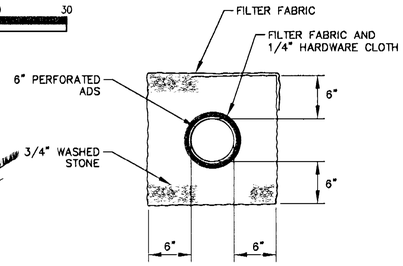
NOTES:

1. SEE SHEET V-01 FOR POND PLANTINGS.
2. SEE SHEETS R-01 THRU R-10 FOR LOCATIONS OF EROSION CONTROL MEASURES.
3. SEE NOTE 5, SHEET C-11.
4. SEE SHEET C-07 FOR COORDINATE INFORMATION FOR DRAIN MANHOLES AND HEADWALLS.
5. PROVIDE CONCRETE CRADLE TRENCH BEDDING. SEE SHEET U-16 FOR DETAILS.



SECTION B-B

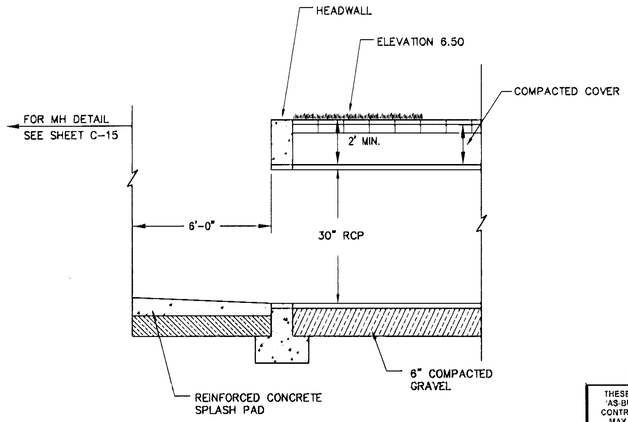
NTS



PERFORATED DRAINLINE

SECTION A-A

NTS



SECTION C-C

NTS

NOTE:

SEE SHEET C-01 FOR NOTES.

AS-BUILTS

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SCALE IN FEET

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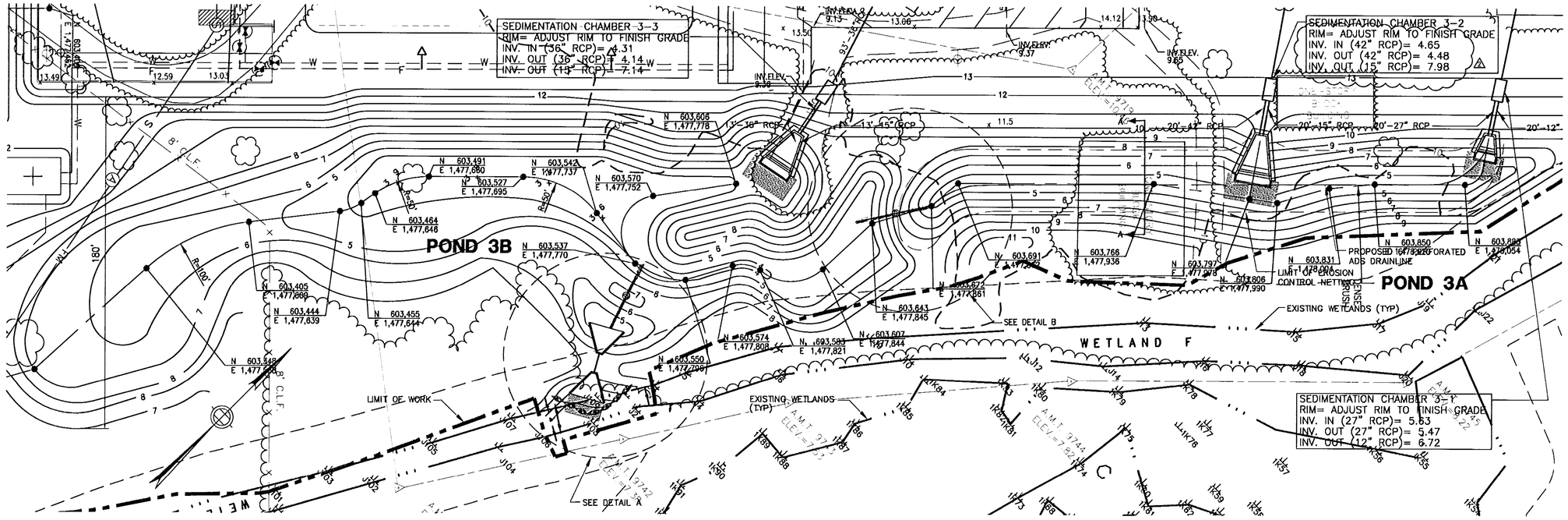
PROJECT NO. MAA-CO-97-019

SHEET NO. C-13

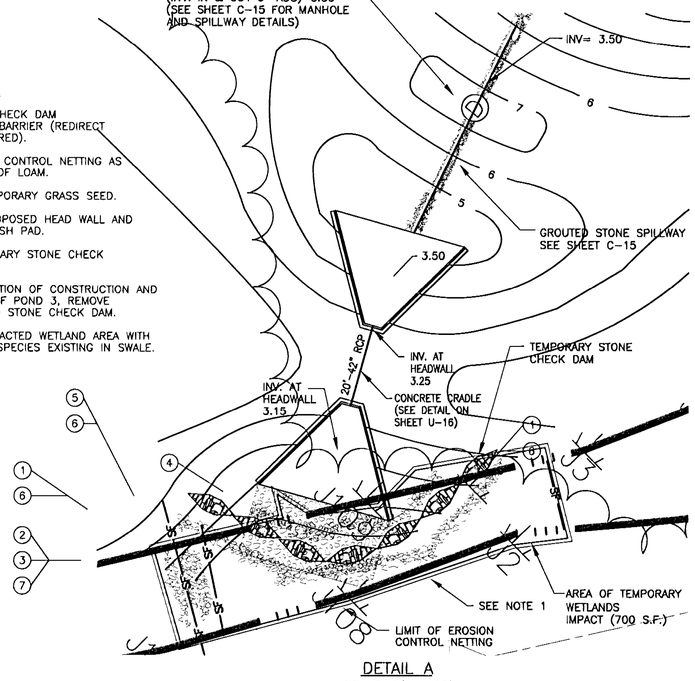


PLAN
1"=30'

NOTES:

1. SEE SHEET V-02 FOR POND PLANTINGS.
2. SEE SHEETS R-01 THRU R-10 FOR LOCATIONS OF EROSION CONTROL MEASURES.
3. SEE NOTE 5, SHEET C-11.
4. SEE SHEET C-03 FOR COORDINATE INFORMATION FOR DRAIN MANHOLES AND HEADWALLS.
7. EXISTING UNSUITABLE FILL MATERIALS AT POND SIDE SLOPES LOCATIONS MUST BE REMOVED AND REPLACED WITH SUITABLE COMPACTED BACKFILL TO PROVIDE SUITABLE SLOPES.

△1



DETAIL A NOTES:

1.) PLACE STONE CHECK DAM SEDIMENTATION BARRIER (REDIRECT FLOW AS REQUIRED).

2.) PLACE EROSION CONTROL NETTING AS SHOWN ON 6" OF LOAM.

3.) SEED WITH TEMPORARY GRASS SEED.

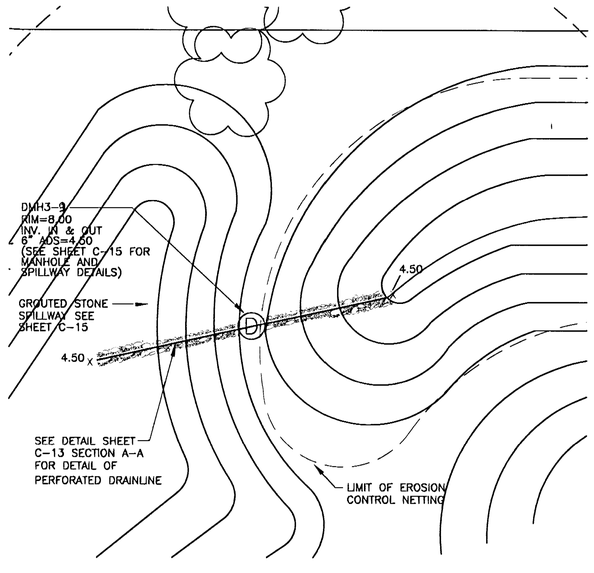
4.) CONSTRUCT PROPOSED HEAD WALL AND CONCRETE SPLASH PAD.

5.) INSTALL TEMPORARY STONE CHECK DAM.

6.) AT THE COMPLETION OF CONSTRUCTION AND REVEGETATION OF POND 3, REMOVE SILT FENCE AND STONE CHECK DAM.

7.) REVEGETATE IMPACTED WETLAND AREA WITH SIMILAR PLANT SPECIES EXISTING IN SWALE.

DETAIL A
SCALE 1" = 10'

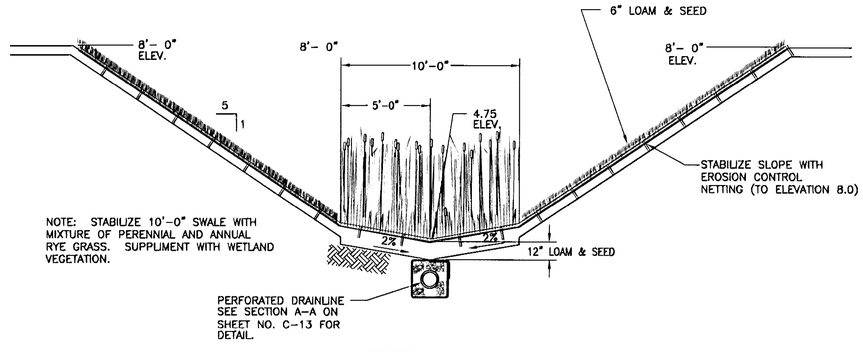


DETAIL B
SCALE 1" = 10'

0 5 10 20 30
SCALE IN FEET

0 15 30 60 90
SCALE IN FEET

POND CLASSIFICATION:
SHALLOW MARSH EXTENDED DETENTION



SECTION A-A
DRAINAGE DETAIL
NTS

NOTE:
SEE SHEET C-01 FOR NOTES.

AS-BUILTS

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DRAWN	POE
CHECKED	KS
APPROVED	TS

STATE OF MARYLAND — THERESA SOMERVILLE — LICENSE NO. 17488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
△1	1/13/99	REVISED INV. ELEVATIONS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

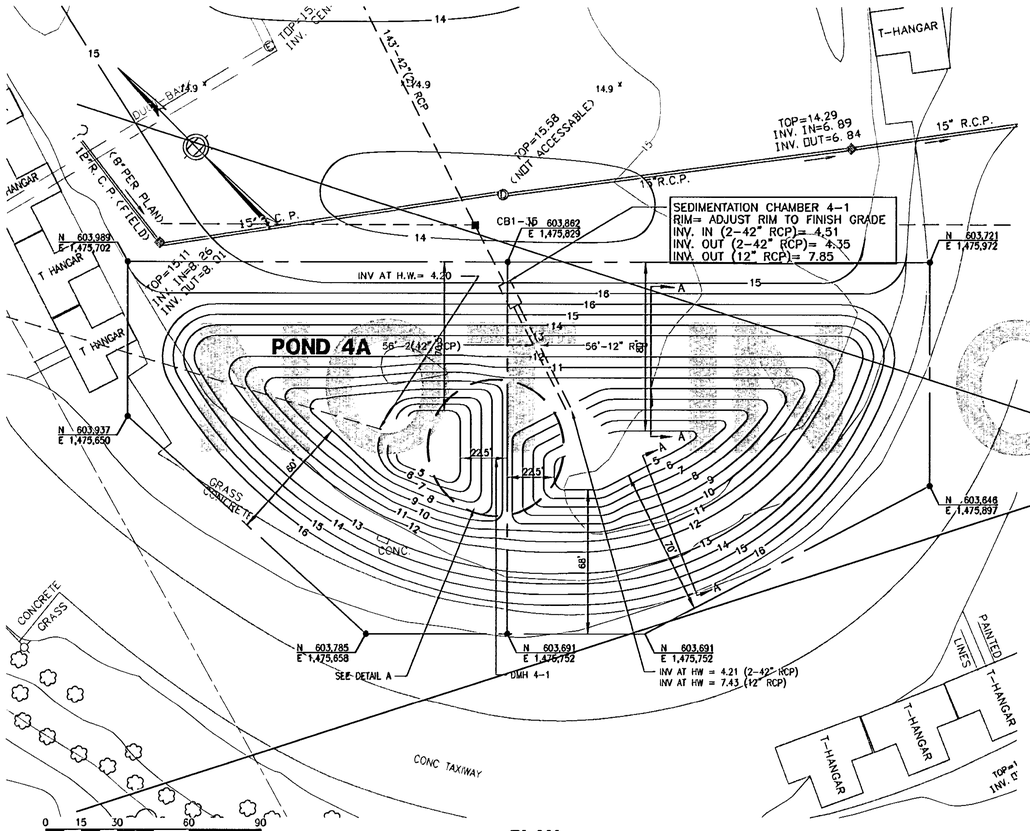
PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
POND 3
ENLARGEMENT & DETAIL PLAN

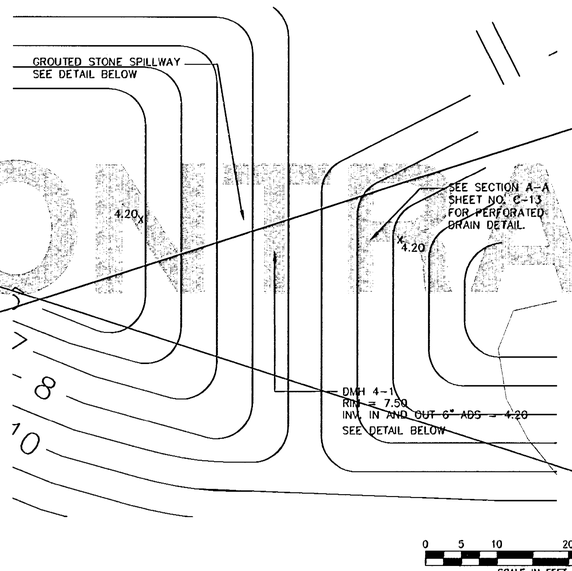
SCALE: AS NOTED
DATE: September 08, 1998

PROJECT NO.
MAA-CO-97-019

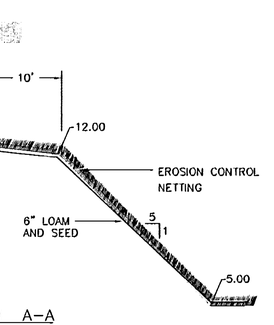
SHEET NO.
C-14



PLAN
1"=30'



DETAIL A
1"=10'

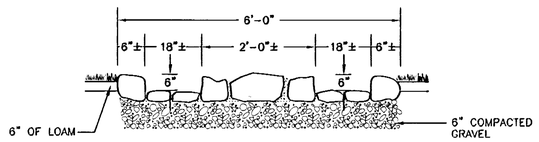


SECTION A-A
NTS

NOTES:

1. SEE SHEET V-03 FOR POND PLANTINGS.
2. SEE SHEETS R-01 THRU R-10 FOR LOCATIONS OF EROSION CONTROL MEASURES.
3. SEE NOTE 5, SHEET C-11.
4. SEE SHEET C-09 FOR COORDINATE INFORMATION FOR DRAIN MANHOLES AND HEADWALLS.

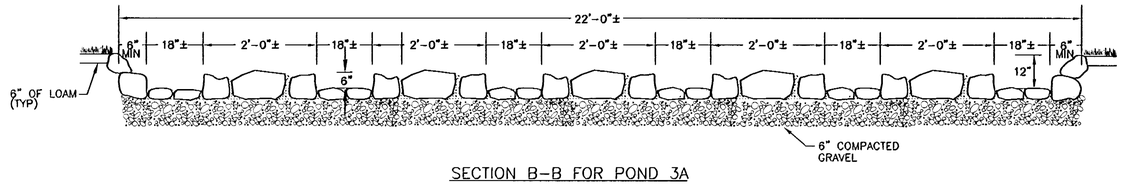
CONTRACT



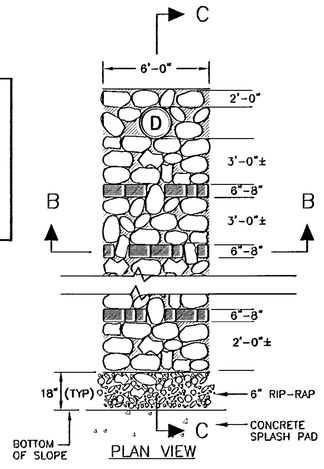
SECTION B-B FOR PONDS 1, 2B, & 4A

AS BUILT

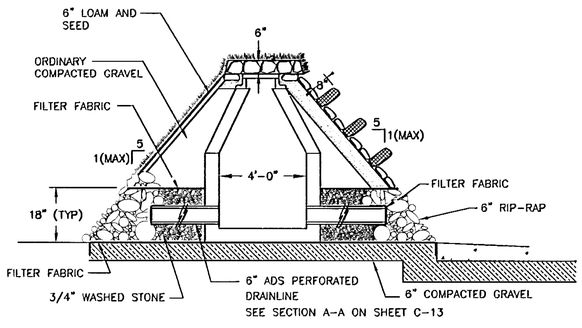
THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.



SECTION B-B FOR POND 3A



PLAN VIEW



SECTION C-C

NOTE:
SEE SHEET C-01 FOR NOTES.

MANHOLE AND GROUTED STONE SPILLWAY DETAIL
NTS

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CHECKED	KS
APPROVED	TS

STATE OF MARYLAND
THEAPOS SOMRATPHIM
LICENSE NO. 12480
REGISTERED
PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

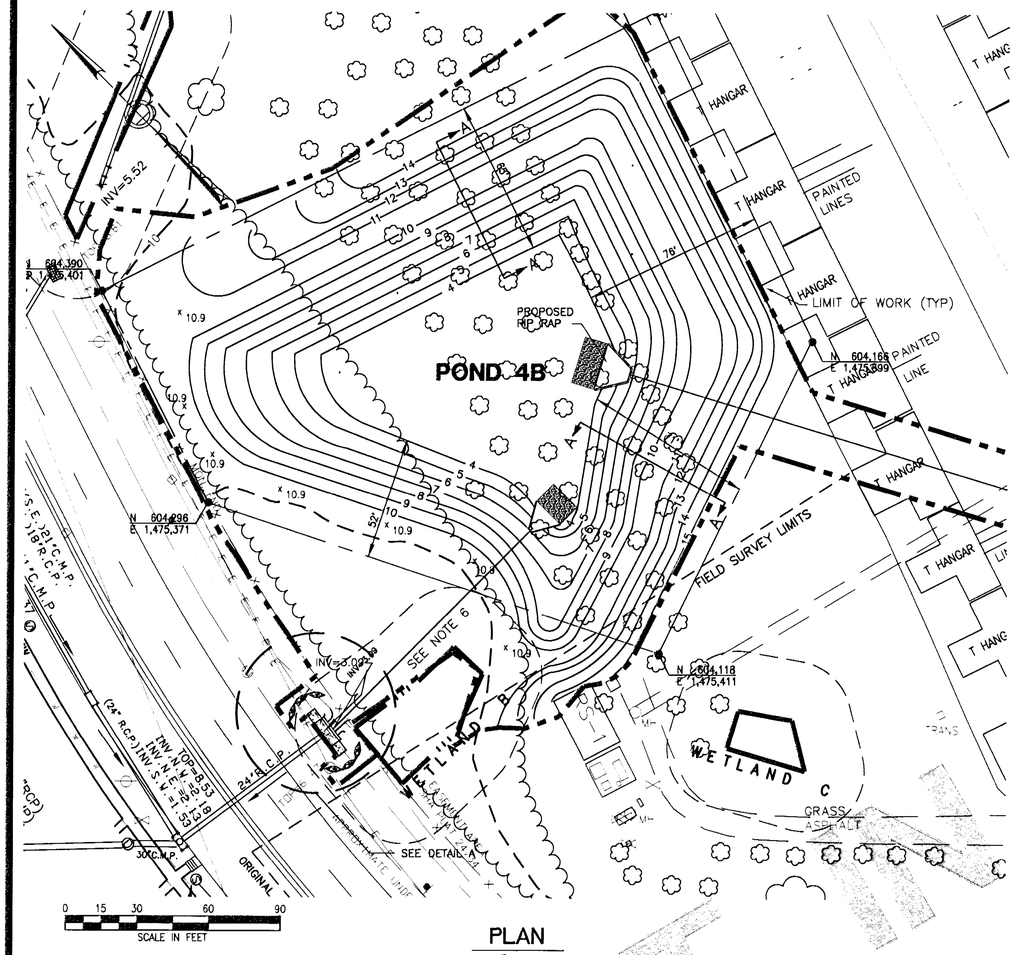
PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
POND 4A
ENLARGEMENT & DETAIL PLAN

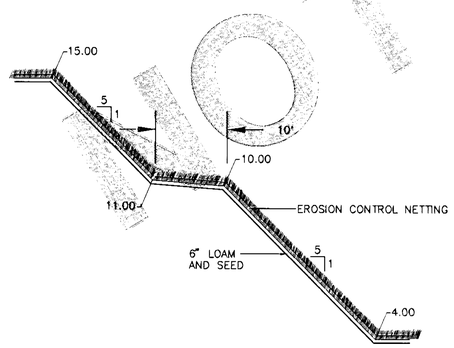
SCALE: AS NOTED
DATE: September 08, 1998

PROJECT NO.
MAA-CO-97-019

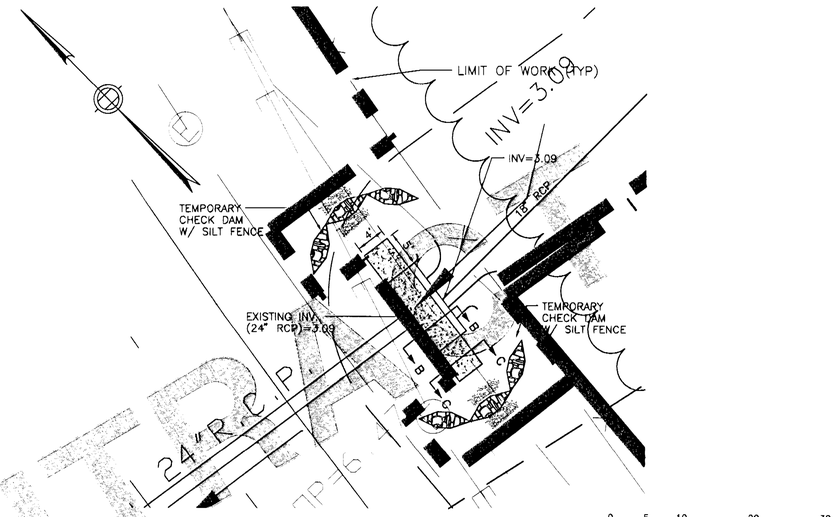
SHEET NO.
C-15



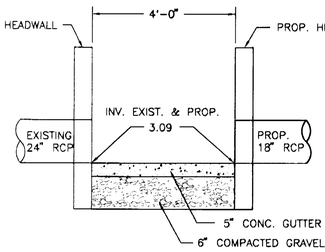
PLAN
1"=30'



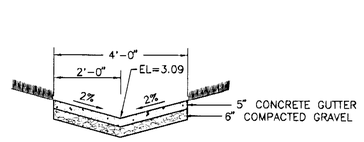
SECTION A–A
NTS



DETAIL A
1"=10'



SECTION B–B
NTS



SECTION C–C
NTS

NOTES:

1. ALL EROSION CONTROL DEVICES SHALL BE IN PLACE PRIOR TO BEGINNING CONSTRUCTION. MAINTAIN ALL EXISTING DRAINAGE SWALES AS REQUIRED DURING CONSTRUCTION. FOR EROSION CONTROL MEASURES SEE SHEETS R–01 TO R–10.
2. CONTRACTOR SHALL VERIFY ALL EXISTING UTILITIES BOTH HORIZONTALLY AND VERTICALLY AND REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO CONSTRUCTION.
3. CONTRACTOR SHALL NOTIFY THE STATE OF MARYLAND HIGHWAY ADMINISTRATION PRIOR TO COMMENCEMENT OF WORK.
4. SEE NOTE 5, SHEET C–11.
5. SEE SHEET C–09 FOR COORDINATE INFORMATION FOR HEADWALLS.
6. PROVIDE CONCRETE CRADLE UNDER OUTFALL PIPE (SEE DETAIL ON SHEET U–16).

AS-BUILTS

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CONTRACT PLANS NOT FOR CONSTRUCTION

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DRAWN	POE
CHECKED	KS
APPROVED	TS

STATE OF MARYLAND — TERRANCE DONALDSON — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

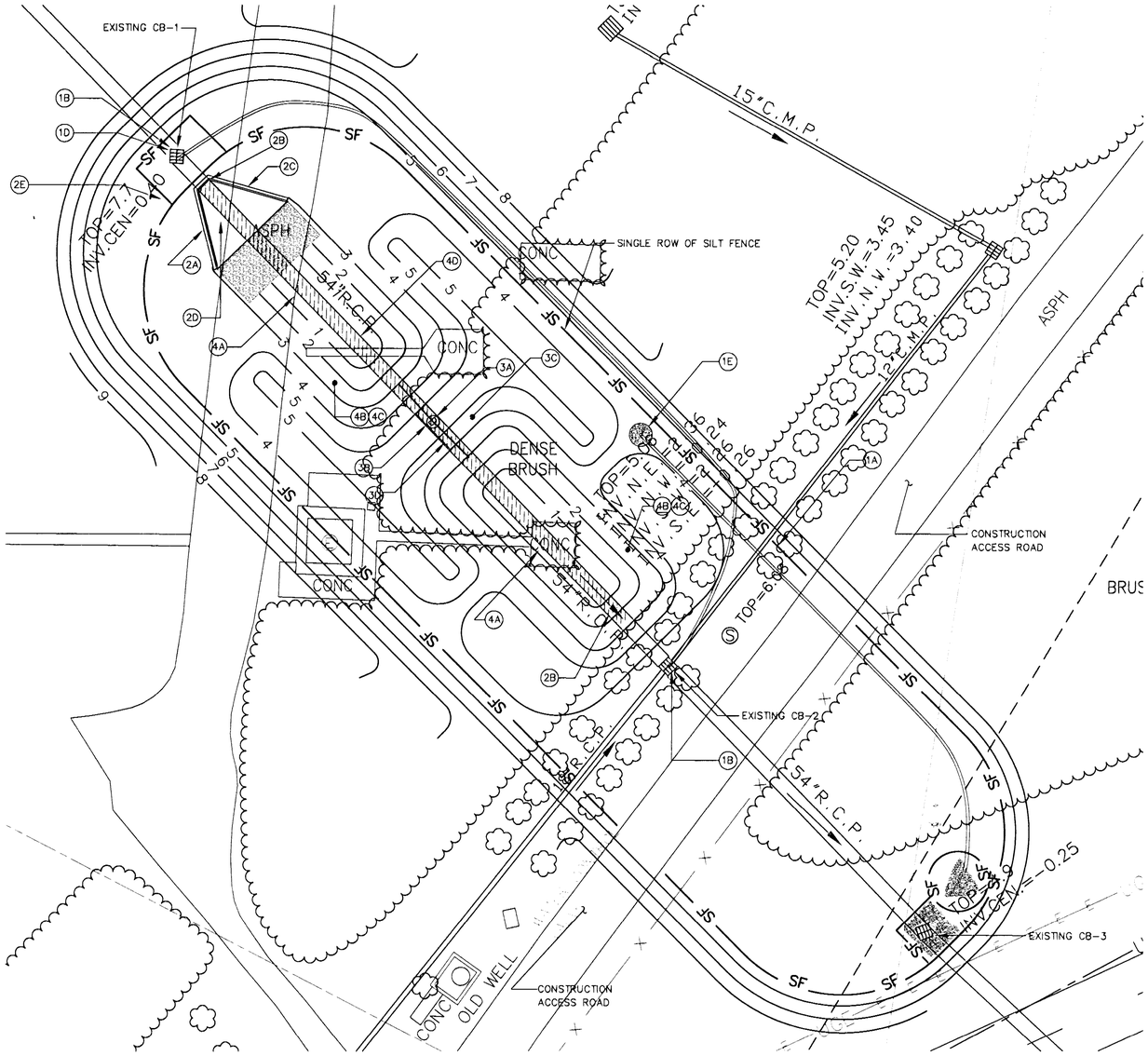
SHEET TITLE: POND 4B ENLARGEMENT & DETAIL PLAN

SCALE: AS NOTED

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: C-16



PLAN
1"=20'

0 10 20 40 60
SCALE IN FEET

CONSTRUCTION PHASING FOR POND 1:

GENERAL NOTES

1. SEE DEMOLITION PLAN, SHEET NO. D-01 THROUGH D-06 FOR INITIAL MATERIAL REMOVAL.
2. SEE EROSION AND SEDIMENT CONTROL PLANS, SHEET NO. R-01 THROUGH R-10.
3. SEE SHEET NO. C-20 FOR POND 1 SECTION.
4. SEE SHEET V-01 FOR PLANTING DETAILS.

PHASE 1 – SWALE CONSTRUCTION

1 SILT FENCE & PUMP

A. SILT FENCE SHALL BE SET AROUND CONSTRUCTION AREAS, AS SHOWN TO PREVENT RUNOFF AND SILT FROM ENTERING THE AREA.

B. BLOCK UPSTREAM INVERT OF EXISTING CATCH BASIN TO PREVENT FLOW THROUGH THE EXISTING 54" RCP PIPE.

C. BLOCK DOWNSTREAM INVERT TO PREVENT FLOW BACK INTO THE EXISTING 54" RCP.

D. PLACE A PUMP IN THE EXISTING CB-1 AND PUMP FLOW TO DOWNSTREAM CATCH BASIN. (SEE DETAIL ON THIS SHEET).

E. CONSTRUCT DEWATERING PIT AND PUMP FLOW TO EROSION CONTROL BASIN.

2 HEADWALL

A. EXCAVATE AREA IMMEDIATELY ADJACENT TO THE PROPOSED HEADWALL AND THE EXISTING 54" PIPE. DEWATER AS NEEDED.

B. SAW CUT AND REMOVE THE EXISTING PIPE FROM FACE OF PROPOSED HEADWALL (APPROXIMATE INVERT IS 0.34) TO THE END OF PHASE 1 EXCAVATION.

C. CONSTRUCT HEADWALL. (SEE SHEET U-18B AND U-18C)

D. CONSTRUCT CONCRETE SPLASH PAD.

E. AFTER HEADWALL AND SPLASH PAD HAVE BEEN CONSTRUCTED, STABILIZE THE BACKSIDE EARTH WITH EROSION CONTROL NETTING TO PREVENT EROSION INTO THE PROPOSED SWALE.

3 PROPOSED MANHOLE

A. EXCAVATE AREA IMMEDIATELY ADJACENT TO THE PROPOSED MANHOLE STRUCTURE.

B. CONSTRUCT PROPOSED MANHOLE, AND SPILLWAY AS SHOWN ON SHEET C-15.

C. STABILIZE SLOPES WITH EROSION CONTROL NETTING UNTIL FINAL COMPLETION OF POND.

D. CONSTRUCTED GROUT STONE OVERFLOW (SEE DETAIL SHEET C-15).

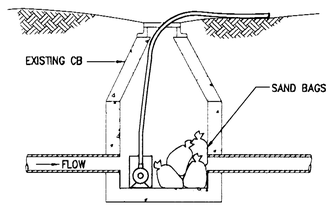
4 SWALE

A. EXCAVATE PROPOSED SWALE AS SHOWN.

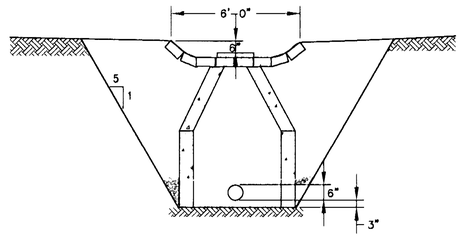
B. GRADE SIDE SLOPES AND BASE OF PROPOSED SWALE AS SHOWN.

C. STABILIZE SIDE SLOPES AND SWALE BASE WITH EROSION CONTROL NETTING UNTIL POND CONSTRUCTION IS COMPLETE.

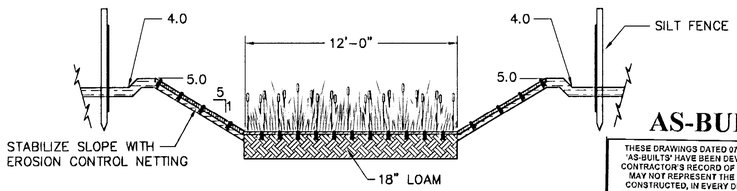
D. REMOVE EXISTING RCP TO LIMITS SHOWN AND STORE PIPE ON SITE.



PLACEMENT OF SUBMERSIBLE PUMP
NTS



PROPOSED MANHOLE
NTS



DETENTION POND SWALE
NTS

AS-BUILTS

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APPROVED	TS

STATE OF MARYLAND — TECHNICAL DEMARTINO — LICENSE NO. 12498 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

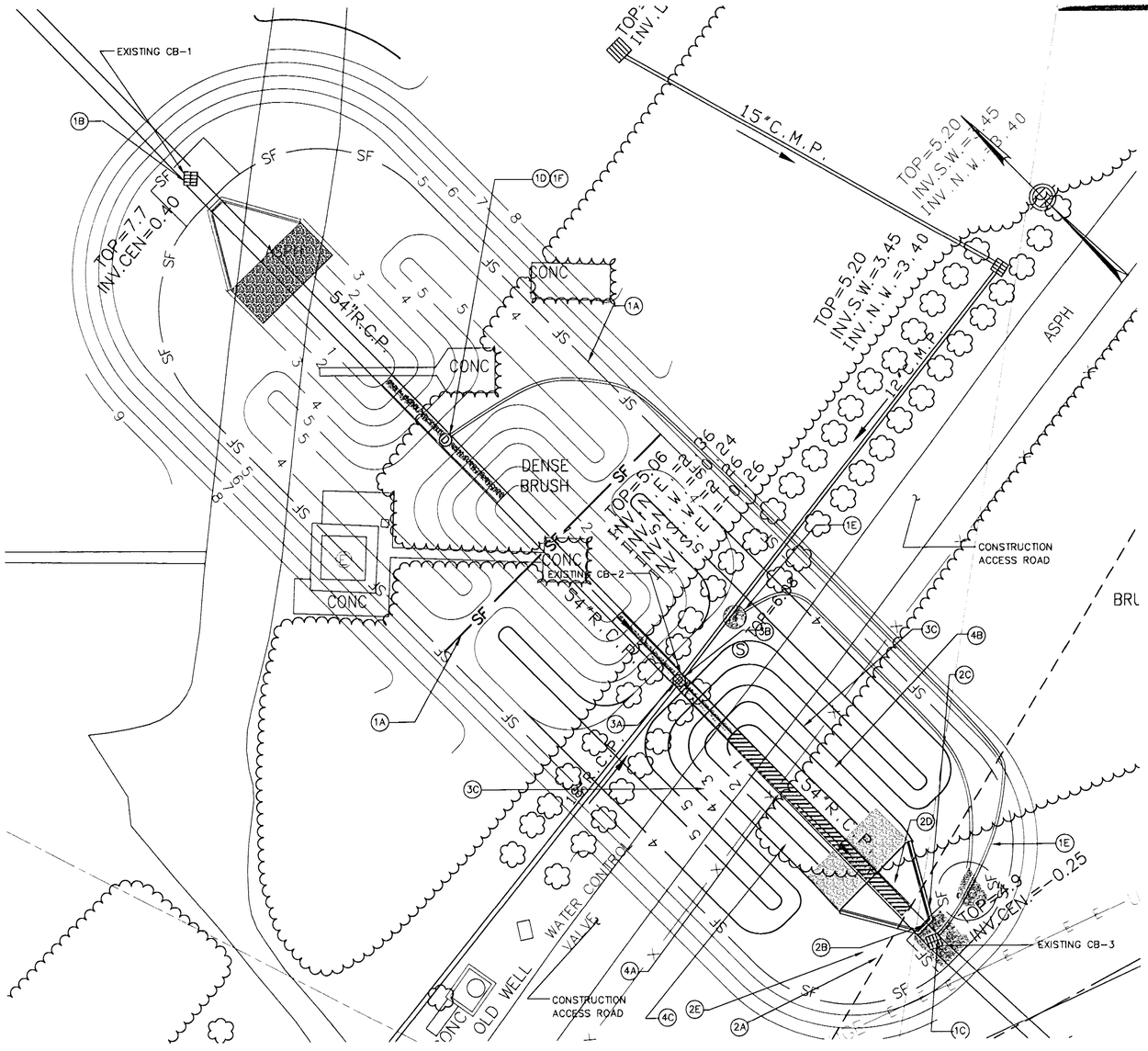
SHEET TITLE: POND 1 CONSTRUCTION PLAN PHASE 1

SCALE: AS NOTED

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: C-17



PLAN
1"=20'

CONSTRUCTION PHASING FOR POND 1:

GENERAL NOTES

1. SEE DEMOLITION PLAN, SHEET NO. D-01 THROUGH D-06 FOR INITIAL MATERIAL REMOVAL.
2. SEE EROSION AND SEDIMENT CONTROL PLANS, SHEET NO. R-01 THROUGH R-10.
3. SEE SHEET NO. C-20 FOR POND 1 SECTION.
4. SEE SHEET V-01 FOR PLANTING DETAILS.

PHASE 2 - COMPLETE SWALE CONSTRUCTION

1 SILT FENCE & PUMP

A. LEAVE PREVIOUSLY PLACED SILT FENCE TO PREVENT RUNOFF FROM ENTERING THE AREA, AND PLACE NEW SILT FENCE WITHIN SWALE AREA AS SHOWN.

B. REMOVE PUMP AND PLUG FROM EXISTING CB-1. ALL FLOW TO PASS THROUGH THE PROPOSED FILTER DRAIN.

C. PLUG UPSTREAM INVERT OF 54" RCP IN EXISTING CB-3.

D. PLACE PUMP IN FILTER DRAIN MANHOLE AND PUMP FLOW TO EXISTING CB-3.

E. CONSTRUCT DEWATERING PIT AND PUMP FLOW TO EROSION CONTROL BASIN.

F. BLOCK UPSTREAM INVERT OF PROPOSED DMH-1 TO PREVENT FLOW INTO PHASE 1 POND SECTION.

2 HEADWALL

A. EXCAVATE AREA IMMEDIATELY ADJACENT TO THE PROPOSED HEADWALL AND THE EXISTING 54" PIPE (SEE PLAN). DEWATER AS NEEDED.

B. SAW CUT AND REMOVE THE EXISTING PIPE FROM FACE OF PROPOSED HEADWALL (APPROXIMATE INVERT IS -0.21) TO THE END OF PHASE 2 EXCAVATION. STORE PIPE ON SITE.

C. CONSTRUCT HEADWALL (SEE SHEET U-18B AND U-18C).

D. CONSTRUCT CONCRETE SPLASH PAD.

E. AFTER HEADWALL AND SPLASH PAD HAVE BEEN PLACED, STABILIZE THE BACKSIDE EARTH WITH EROSION CONTROL NETTING TO PREVENT EROSION INTO THE PROPOSED SWALE UNTIL FINAL GRADING OF POND.

3 PROPOSED MANHOLE

A. EXCAVATE AREA IMMEDIATELY ADJACENT TO THE PROPOSED MANHOLE. (EXISTING CB-2)

B. CONSTRUCT PROPOSED MANHOLE, AND SPILLWAY AS SHOWN ON SHEET C-15.

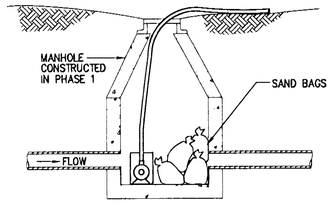
C. STABILIZE SLOPES WITH EROSION CONTROL NETTING UNTIL FINAL COMPLETION OF POND.

4 SWALE

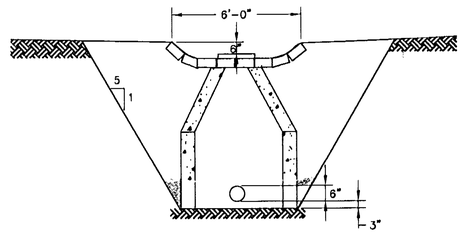
A. EXCAVATE PROPOSED SWALE TO LIMIT AS SHOWN.

B. GRADE SIDE SLOPES AND BASE OF PROPOSED SWALE AS SHOWN.

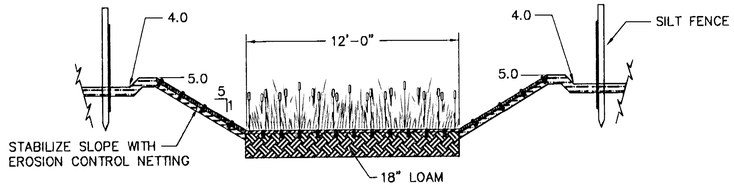
C. STABILIZE SIDE SLOPES AND SWALE BASE WITH EROSION CONTROL NETTING UNTIL POND CONSTRUCTION IS COMPLETE.



PLACEMENT OF SUBMERSIBLE PUMP
NTS



PROPOSED MANHOLE
NTS



DETENTION POND SWALE
NTS

AS-BUILTS

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DRAWN	POE
CHECKED	TDB
APPROVED	TS

STATE OF MARYLAND — TERRANCE DONNATHSON — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

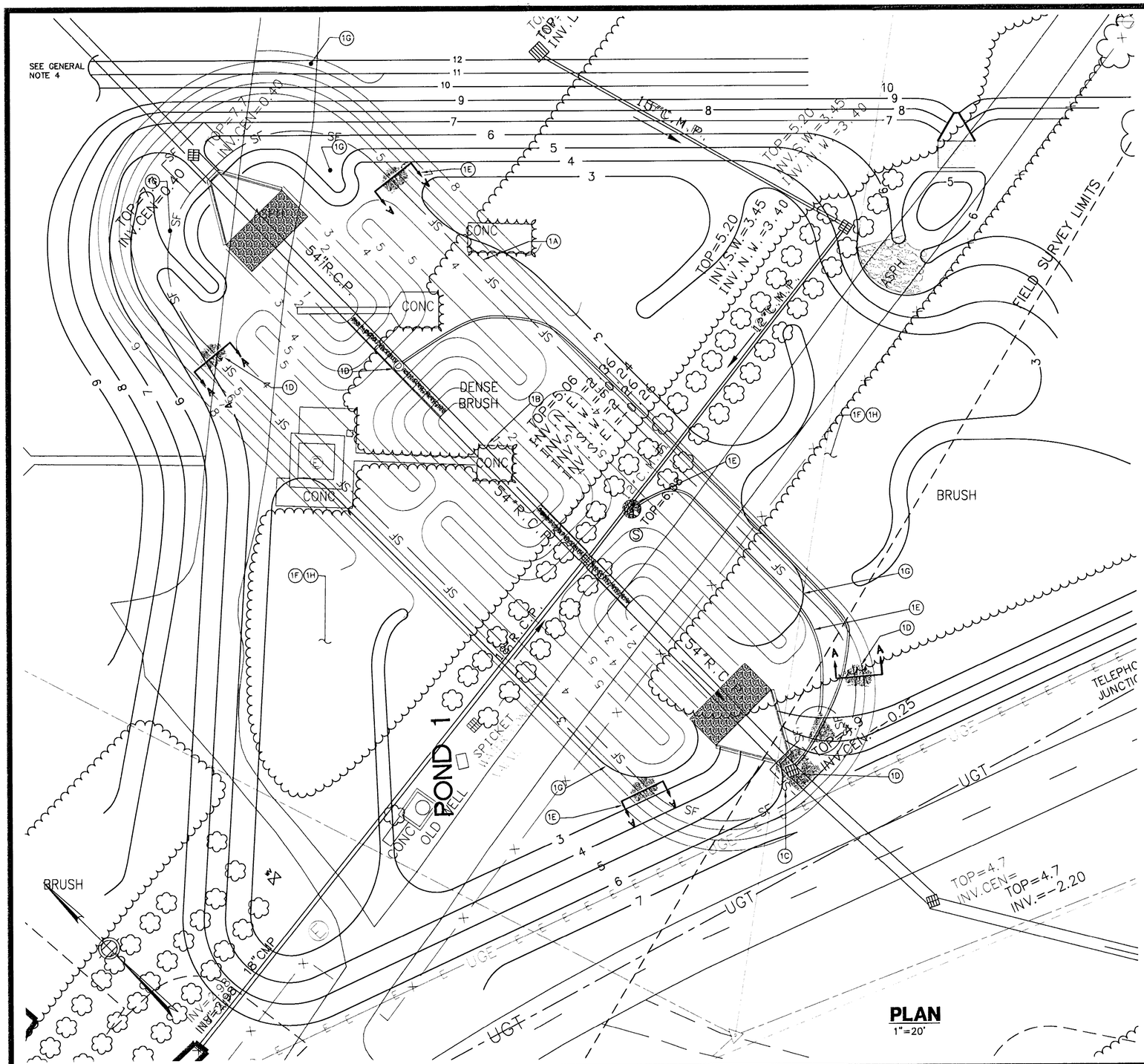
REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE	POND 1 CONSTRUCTION PLAN PHASE 2
SCALE	AS NOTED
DATE	September 08, 1998
PROJECT NO.	MAA-CO-97-019
SHEET NO.	C-18



PLAN
1"=20'

CONSTRUCTION PHASING FOR POND 1:

GENERAL NOTES

1. SEE DEMOLITION PLAN, SHEET NO. D-01 THROUGH D-06 INITIAL MATERIAL REMOVAL.
2. SEE EROSION AND SEDIMENT CONTROL PLANS, SHEET NO. R-01 THROUGH R-10.
3. SEE SHEET NO. C-20 FOR POND 1 SECTION.
4. TIE GRADING AS REQUIRED TO EXISTING GRADES AND STABILIZE SLOPES WITH EROSION CONTROL NETTING. IF WORK HAS ADVANCED ON SITE AROUND PROPOSED PARKING AREA AND ROADWAY THEN TIE IN TO FINAL GRADES.

PHASE 3 – FINAL GRADING FOR POND 1

1 POND

A. LEAVE PREVIOUSLY PLACED SILT FENCE TO PREVENT RUNOFF FROM ENTERING THE AREA.

B. REMOVE SILT FENCE AS SHOWN IN PHASE 2 WITHIN SWALE AREA.

C. PLACE SILT FENCE AROUND EXISTING CATCH BASIN

D. PLACE SILT FENCE AND SEDIMENT BARRIERS WHERE INDICATED ON PLAN.

E. REMOVE PIPE BLOCKS, PUMP, AND HOSE TO ALLOW FLOW TO RUN THROUGH THE SWALE.

F. COMPLETE POND 1 GRADING AS SHOWN (SEE SHEET NO. C-01 THROUGH C-10 FOR OVERALL GRADING).

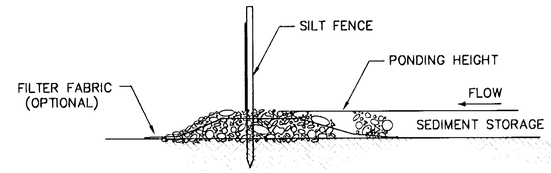
G. TIE GRADING TO COMPLETED SWALE CONSTRUCTED IN PHASE 1 AND 2 AS NEEDED. MOVE AND REPLACE SILT FENCE AS REQUIRED.

H. ON COMPLETION OF GRADING, PLACE 6" OF LOAM AND HYDROSEED (SEE SHEET R-06).

PHASE 4 – POND 1 COMPLETION

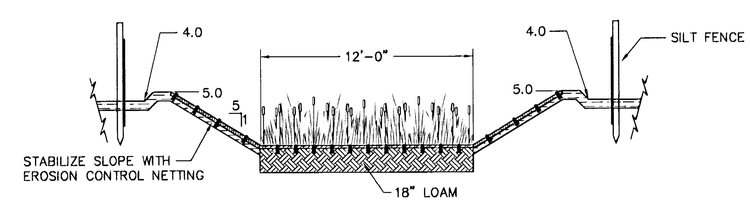
4 FINAL POND GRADING

A. AT COMPLETION OF CONSTRUCTION, REMOVE A ALL TRAPPED SILT FROM PROPOSED DRAINAGE SWALE AND EROSION CONTROL DEVICES AND PLANT SWALE BASE WITH APPROPRIATE VEGETATION ON SHEETS V-01, V-04, AND V-05.



SECTION A-A

SILT FENCE SEDIMENT BARRIER
NTS



DETENTION POND SWALE
NTS

0 10 20 40 60
SCALE IN FEET

AS-BUILTS

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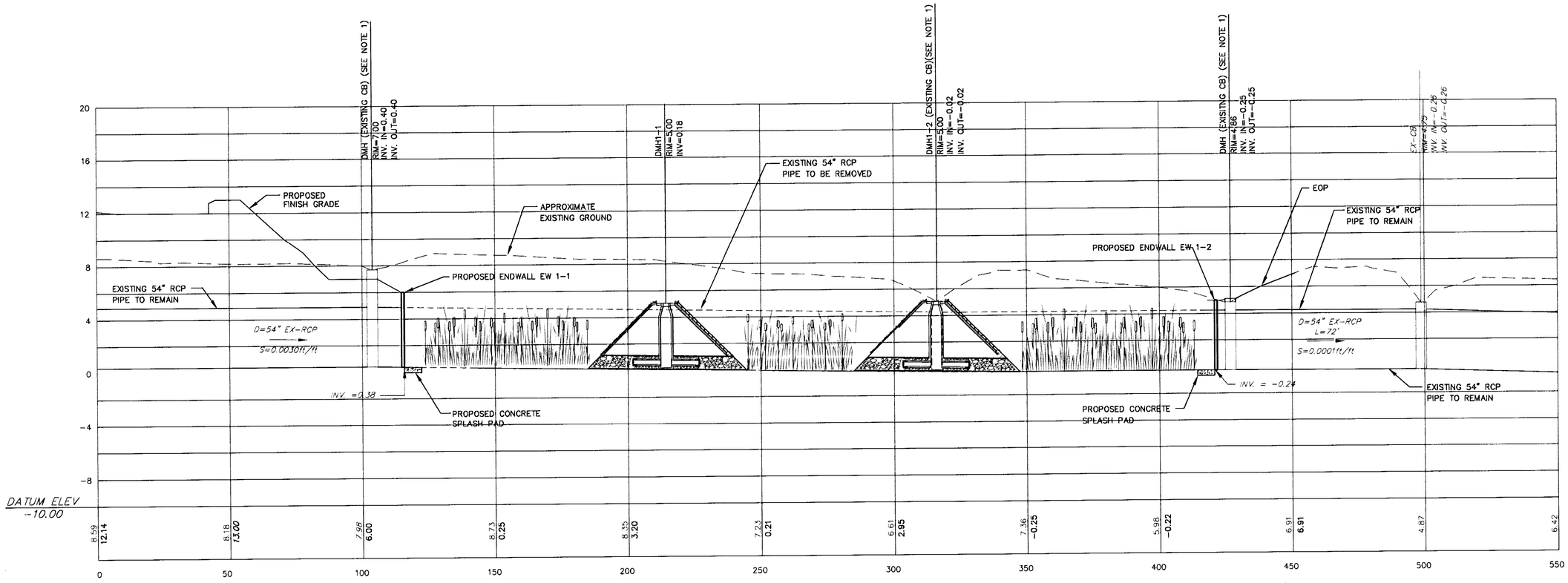
TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED JJN DRAWN POE CHECKED TDB APPROVED TS	STATE OF MARYLAND TEERAPOJ SOMBATPIWM LICENSE NO. 12489 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: POND 1 CONSTRUCTION PLAN PHASES 3 AND 4 SCALE: AS NOTED DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-19



POND 1 SECTION

VERTICAL 1" = 4'
HORIZONTAL 1" = 20'

NOTES:

1. ADJUST EXISTING CB TO FINAL RIM ELEVATION INDICATED, AND REPLACE CB FRAME AND GRATE WITH PROPOSED DMH FRAME AND COVER.
2. SEE SHEET C-17 THROUGH C-19 FOR CONSTRUCTION PHASING.
3. SEE SHEET V-01 FOR PLANTING DETAILS.
4. SEE SHEET C-11 FOR POND 1 ENLARGEMENT PLAN.
5. FOR MANHOLE AND SPILLWAY DETAILS SEE SHEET C-15.

0 10 20 40 60 HORIZONTAL
0 2 4 8 12 VERTICAL
SCALE IN FEET

AS-BUILTS

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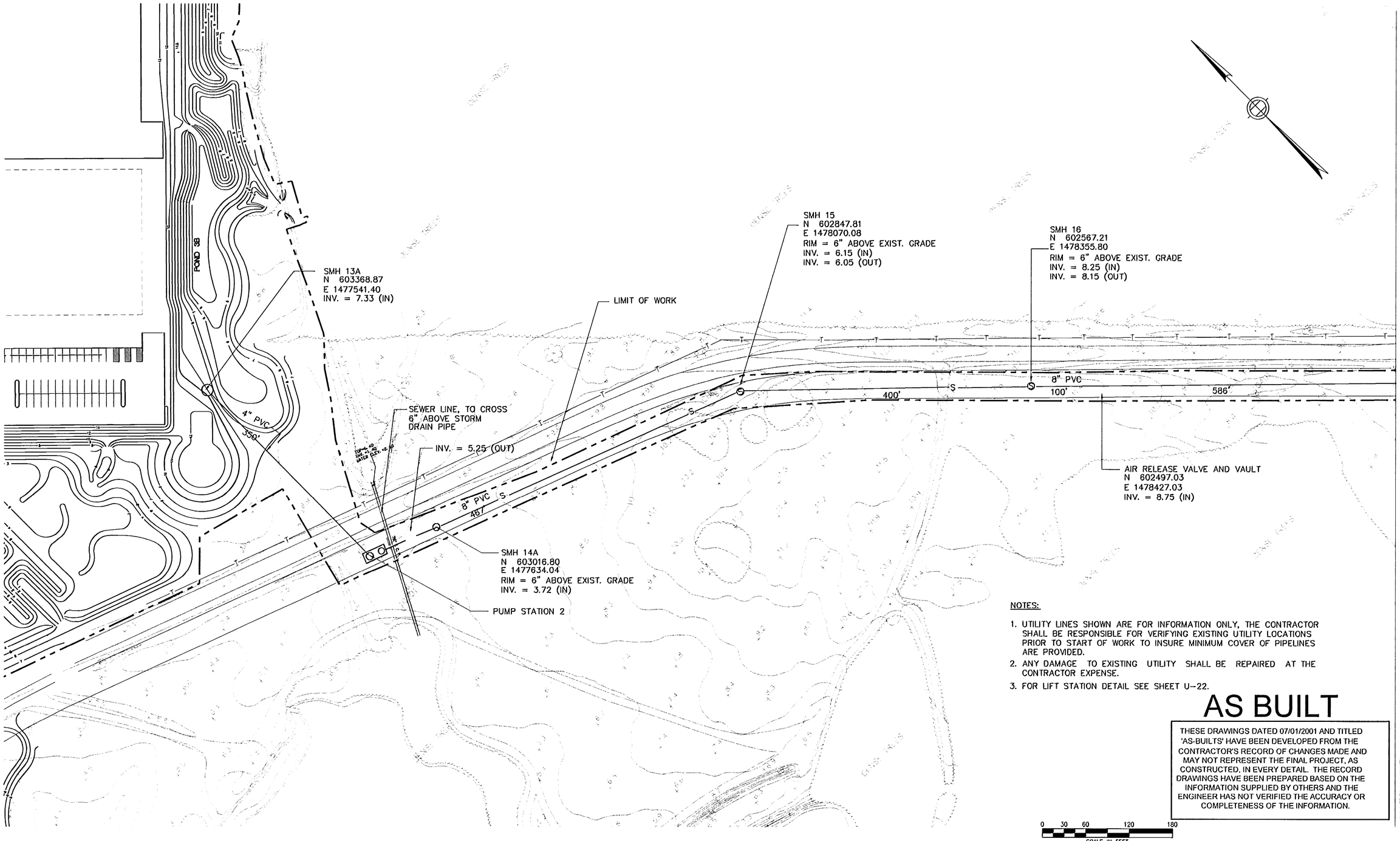

NOTES:

1. UTILITY LINES SHOWN ARE FOR INFORMATION ONLY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXISTING UTILITY LOCATIONS PRIOR TO START OF WORK TO INSURE MINIMUM COVER OF PIPELINES ARE PROVIDED.
2. ANY DAMAGE TO EXISTING UTILITY SHALL BE REPAIRED AT THE CONTRACTOR EXPENSE.
3. FOR LIFT STATION DETAIL SEE SHEET U-22.

AS BUILT

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

0 30 60 120 180
SCALE IN FEET

TAMS
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2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	FA
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
THEODOS SOMIADYON
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
STRAWBERRY POINT ROAD SEWER LINE
PLAN I

SCALE 1" = 60'
DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. C-21

SHEET C-21

EXIST. LIFT STATION AND PIPES TO REMAIN

EXIST. SEWER LINE TO BE CUT, CAPPED AND ABANDONED, 5FT BEYOND NEW CONNECTION

CONNECT NEW 4" PVC PIPE TO EXIST. 4" PIPE INVERT = 11.5

INVERT 10.09

OVER EXISTING WATERLINE

UNDER ELECTRIC

500' FROM P.S. #3 INVERT 10.13

400' FROM P.S. #3 INVERT 10.64

CROSSOVER EXISTING WATER LINE

500' 4" PVC

UNDER EXISTING DRAIN

UNDER EXISTING DUCT BANK

250' FROM P.S. #3 INVERT 7.95

100' FROM P.S. #3 INVERT 6.35

4" PVC

INV. = 3.91 (IN)

INVERT UNDER WATER LINE 3.20

INV. = 2.00 (IN)

162'

6" PVC 55'

268'

2 VERTICAL BENDS TO CLEAR WATER

INV. = 4.30 (OUT)

P.S. #3 WELL

PUMP STATION NO. 3

SEWAGE PIT
N 602066.53
E 1478858.17
RIM = 6" ABOVE EXIST. GRADE

SMH
N 601876.32
E 1479047.79
RIM = 6" ABOVE EXIST. GRADE
INV. = 3.44 (IN)
INV. = 3.34 (OUT)

SMH
N 601914.81
E 1479086.39
RIM = 6" ABOVE EXIST. GRADE
INV. = 3.82 (IN)
INV. = 3.72 (OUT)

SMH 18A
N 601623.69
E 1479376.70
INV. = 5.84 (IN/OUT)

INV. = 5.50 (OUT)

4" PVC 225'

4" PVC 190'

6" PVC 400'

50'

EXIST. SEWER LINE TO BE CUT, CAPPED AND ABANDONED

EXIST. MANHOLE TO BE REMOVED AND REPLACED WITH NEW MANHOLE SMH 20

EXIST. PUMP STATION TO BE REMOVED AND REPLACED WITH NEW PUMP STATION

EXIST. SEWER LINE TO BE CUT, CAPPED AND ABANDONED

6" PVC 114'

PUMP STATION NO. 4

SEWAGE PIT
RIM = TO MATCH EXIST.
INV. = 3.43 (IN)

EXIST. SEWER LINE TO BE CUT, CAPPED AND ABANDONED

EXIST. MANHOLE TO BE REMOVED

CONNECT NEW 1 1/4" PVC TO EXIST. 1 1/4" SANITARY FORCE MAIN

INV. = 4.84 (IN)
INV. = 4.74 (OUT)

6" PVC 128'

SMH 19
N 601252.51
E 1479852.79
RIM = 2" ABOVE EXIST. GRADE
INV. = 4.16 (IN)
INV. = 4.06 (OUT)

FOR SANITARY SEWER DETAILS EAST OF SMH 18A REFER TO MARKED-UP DRAWING NO. C-2 OF PROJECT NO. 89195 DATED 7.31.89

MATCH LINE

AS BUILT

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0 30 60 120 180
SCALE IN FEET

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DESIGNED	FA
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMBATHIEM — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

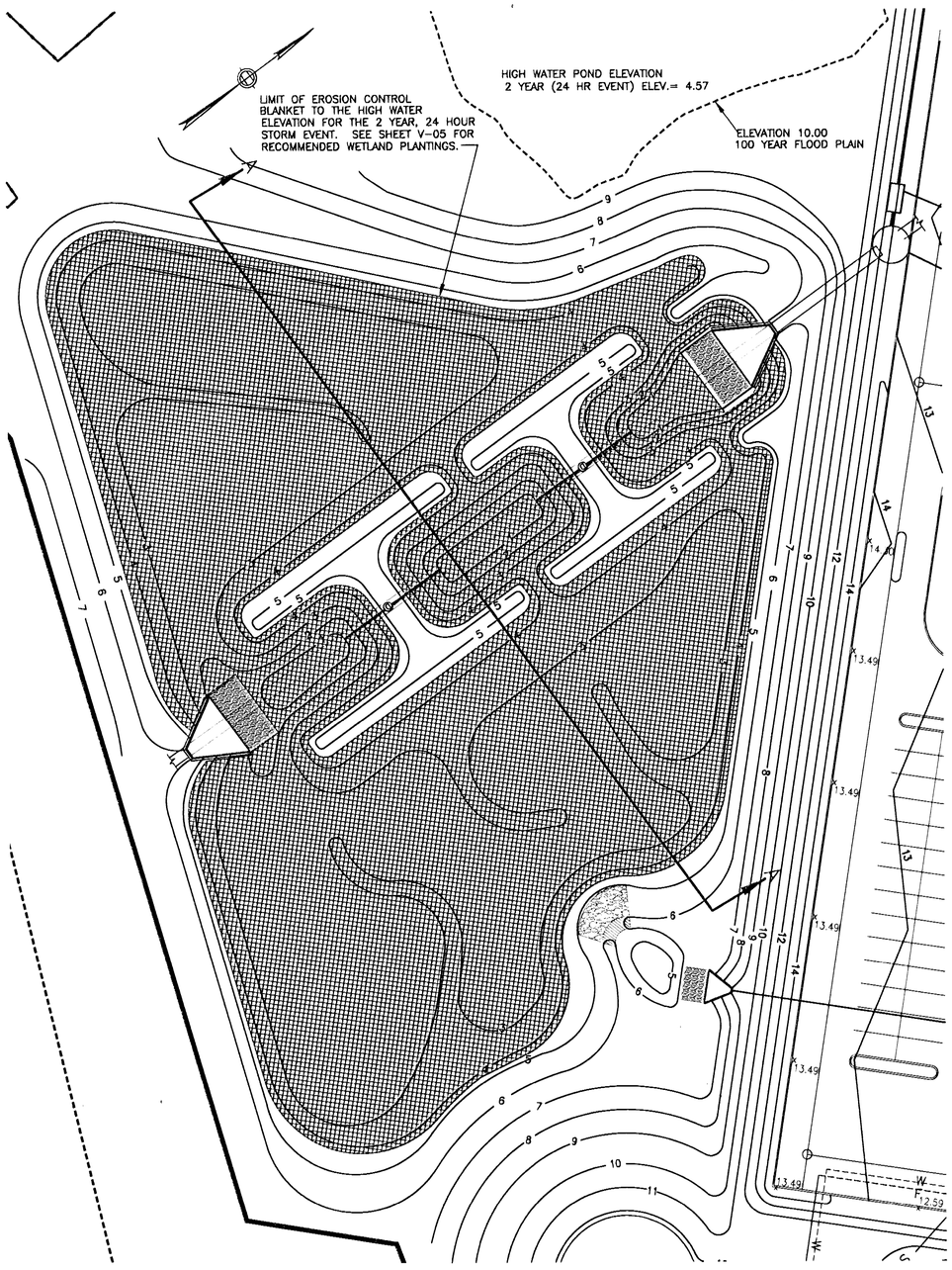
SHEET TITLE
STRAWBERRY POINT ROAD SEWER LINE PLAN II

SCALE: 1" = 60'

DATE: September 08, 1998

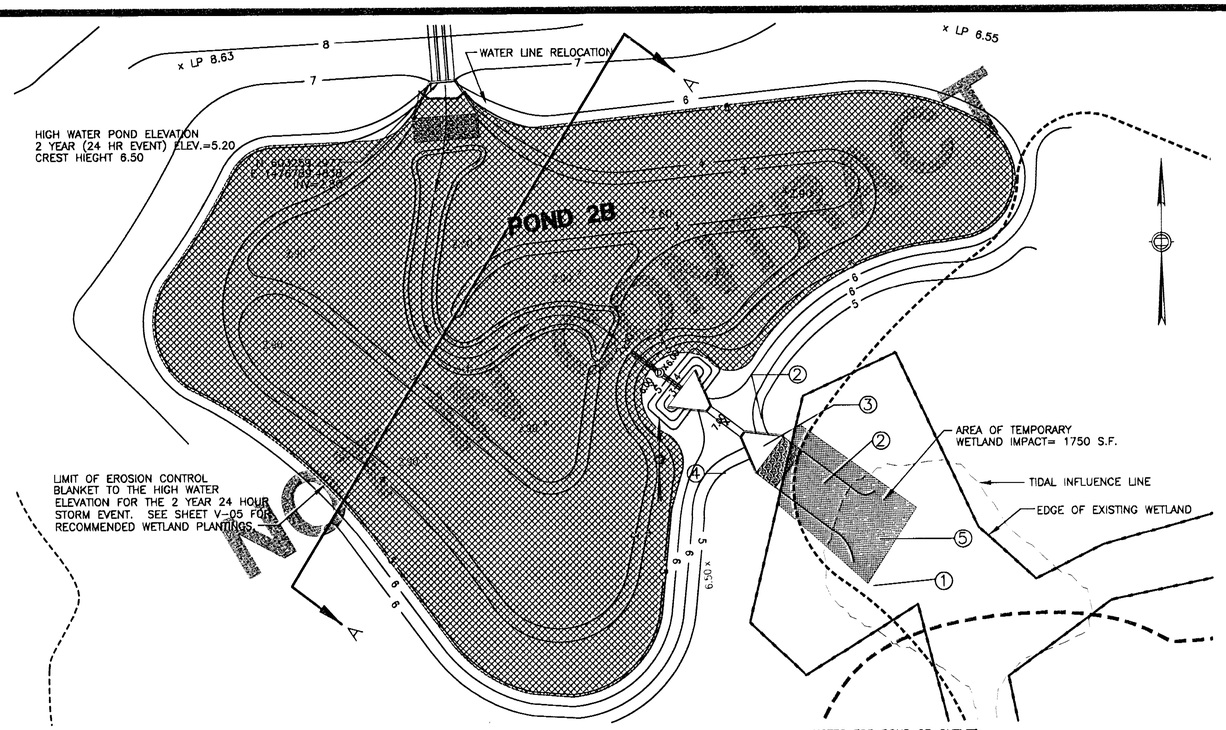
PROJECT NO.: MAA-CO-97-019

SHEET NO.: C-22



POND 1

1"=30'



POND 2B

1"=30'

NOTES FOR POND 2B OUTLET:

① INSTALL EROSION CONTROL AS SHOWN ON SHEET R-04.

② EXCAVATE AND REGRADE OUTLET AREA AND PLACE PROPOSED HEADWALL.

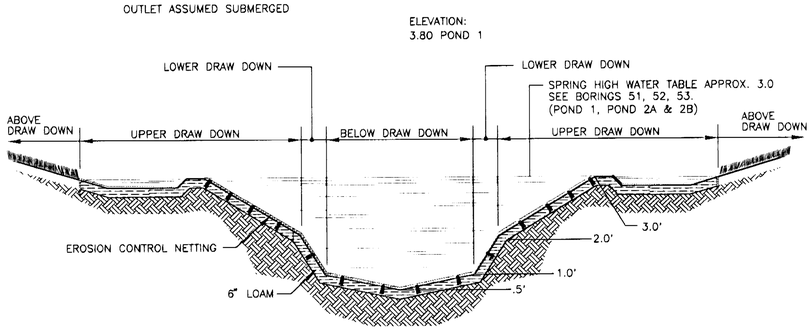
③ INSTALL PROPOSED RIP-RAP AS SHOWN.

④ INSTALL TEMPORARY STRAW BALE CHECK DAM.

⑤ PLACE EROSION CONTROL NETTING ON 6" OF LOAM. SEED ALL DISTURBED AREAS. ALLOW NATURAL WETLAND VEGETATION TO RE-ESTABLISH IN DISTURBED AREA. MAINTAIN STRAW BALE CHECK DAM TO KEEP ADJACENT WETLAND FREE OF SILT. IF NATURAL VEGETATION DOES NOT RE-ESTABLISH WITHIN 24 MONTHS, SUPPLEMENT DISTURBED AREA WITH SIMILAR VEGETATION.

WATER SURFACE ELEVATIONS (POND 1)

2-YEAR STORM	4.57
1-YEAR STORM	3.80
OUTLET ASSUMED SUBMERGED	



SECTION A-A

PONDS 1 AND 2B SUBJECT TO SALT WATER INTRUSION

ELEVATION: 5.20 POND 2

NOTES (PONDS 1 & 2B)

1. SEE SHEET V-04 FOR PLANT SPACING, LOCATION AND METHOD.
2. SEE SHEET V-05 FOR PLANT SELECTION AND DETAILS. ANY PROPOSED SUBSTITUTION OF WETLAND SPECIES FROM THE DESCRIBED LIST MUST BE APPROVED BY THE ENGINEER.
3. ALL EXCAVATION, GRADING, LOAM AND SEEDING SHALL BE DONE BETWEEN JUNE 15 AND SEPTEMBER 30. WETLAND PLANTS SHALL BE PLANTED BETWEEN SEPTEMBER 30 AND OCTOBER 15.
4. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING FINAL LOCATION OF PIPES AND GRADING FOR ALL PONDS.
5. THE CONTRACTOR SHALL MAINTAIN PONDS FREE FROM EROSION AND SILT UNTIL VEGETATION HAS STABILIZED ALL DISTURBED AREAS.
6. ALL OTHER AREAS ABUTTING THE PROPOSED PONDS SHALL BE LOAMED AND SEEDED. (SEE SHEET R-06 FOR DETAILS)
7. PONDS 1, 2A, 2B, 3A AND 3B ARE DESIGNED FOR WATER QUALITY CONTROL. THEY ARE NOT DESIGNED TO MITIGATE THE INCREASE IN RUNOFF DUE TO THE PROPOSED CONSTRUCTION. PONDS 4A AND 4B ARE DESIGNED TO MITIGATE THE INCREASE IN RUNOFF FOR THE 2, 10 AND 100 YEAR STORM EVENTS AS WELL AS WATER QUALITY.

AS-BUILTS

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DESIGNED	TDB
DRAWN	OCO
CHECKED	KS
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMMATTINO — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

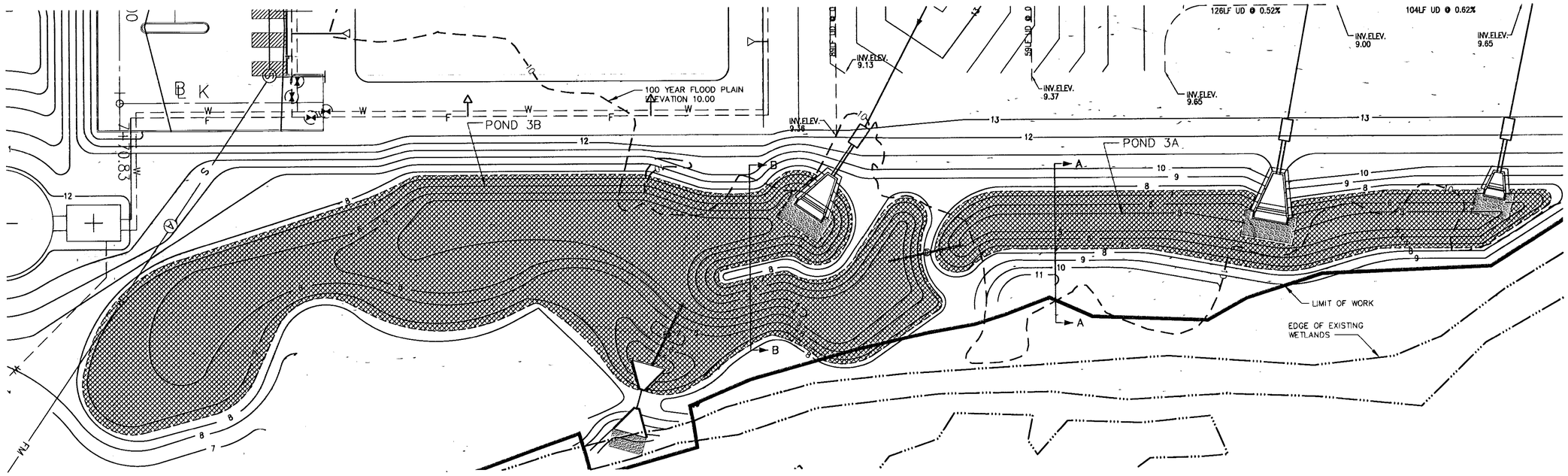
SHEET TITLE: POND VEGETATION ENLARGEMENTS PLAN I

SCALE: AS NOTED

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: V-01



PLAN
PONDS 3A AND 3B

1"=30'

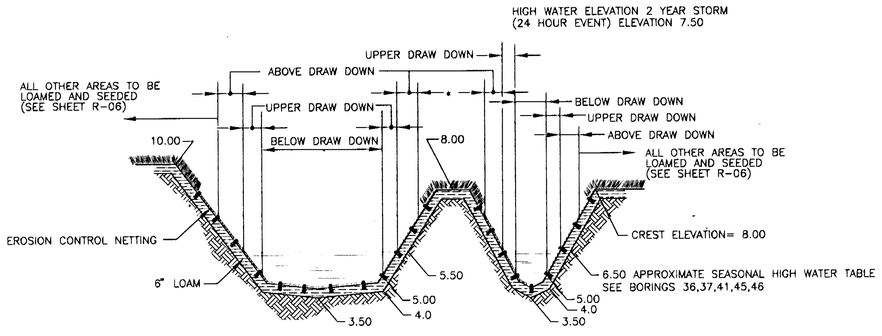
WATER SURFACE ELEVATIONS (PONDS 3A/3B)

	3A	3B
2-YEAR STORM	7.6	7.5
1-YEAR STORM	7.6	7.4

NO TIDAL INFLUENCE ON OUTLET

NOTES

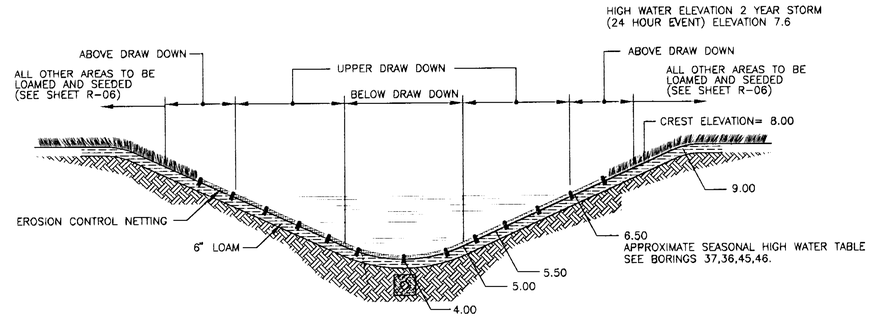
1. PONDS 3A AND 3B WILL ACT AS TEMPORARY SEDIMENTATION PONDS AS REQUIRED DURING CONSTRUCTIN. PRIOR TO PLACEMENT OF FINAL LOAM AND NETTING, ALL SILT SHALL BE CLEANED AND REMOVED.
2. SEE SHEET V-04 FOR PLANT SPACING, LOCATION AND METHOD.
3. SEE SHEET V-05 FOR PLANT SELECTION AND DETAILS. ANY PROPOSED SUBSTITUTION OF WETLAND SPECIES FROM THE DESCRIBED LIST MUST BE APPROVED BY THE ENGINEER.
4. ALL OTHER AREAS ABUTTING THE PROPOSED PONDS SHALL BE LOAMED AND SEEDED. (SEE SHEET R-06 FOR DETAILS)
5. ALL EXCAVATION, GRADING, LOAM AND SEEDING SHALL BE DONE BETWEEN JUNE 15 AND SEPTEMBER 30. WETLAND PLANTS SHALL BE PLANTED BETWEEN SEPTEMBER 30 AND OCTOBER 15.
6. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING FINAL LOCATION OF PIPES AND GRADING FOR ALL BMP PONDS.
7. THE CONTRACTOR SHALL MAINTAIN PONDS FREE FROM EROSION AND SILT UNTIL VEGETATION HAS STABILIZED ALL DISTURBED AREAS.
8. PONDS 1, 2A, 2B, 3A AND 3B ARE DESIGNED FOR WATER QUALITY CONTROL. THEY ARE NOT DESIGNED TO MITIGATE THE INCREASE IN RUNOFF DUE TO THE PROPOSED CONSTRUCTION. PONDS 4A AND 4B ARE DESIGNED TO MITIGATE THE INCREASE IN RUNOFF FOR THE 2, 10 AND 100 YEAR STORM AS WELL AS WATER QUALITY.



SECTION B-B
FRESH WATER POND 3B

NOT TO SCALE

* AREA TO BE LOAMED AND SEEDED (SEE SHEET R-06)



SECTION A-A
FRESH WATER POND 3A

NOT TO SCALE

AS-BUILTS

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TAMS

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DRAWN	OCO
CHECKED	KS
APPROVED	TS

STATE OF MARYLAND — TERRANCE DONNATHEN — LICENSE NO. 12448 — REGISTERED PROFESSIONAL ENGINEER

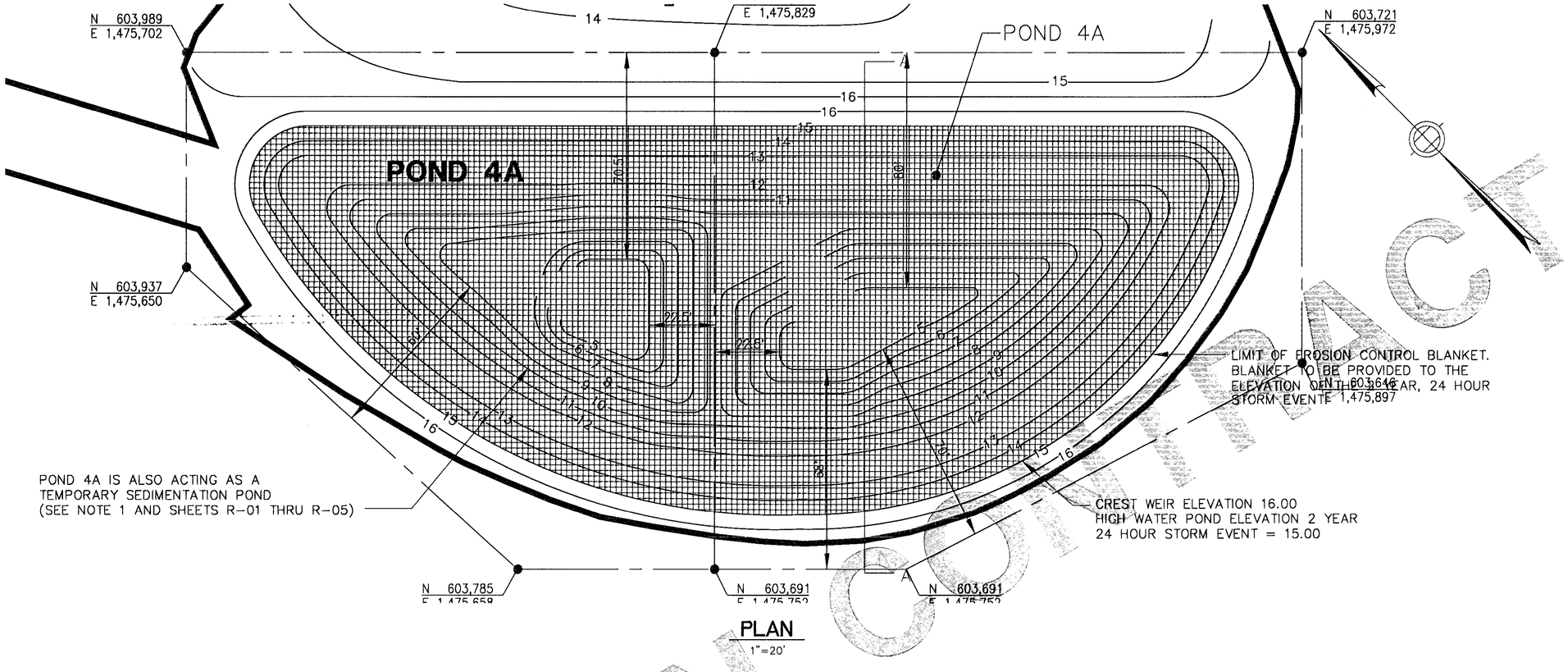
REV.	DATE	REMARKS

MARTIN STATE AIRPORT

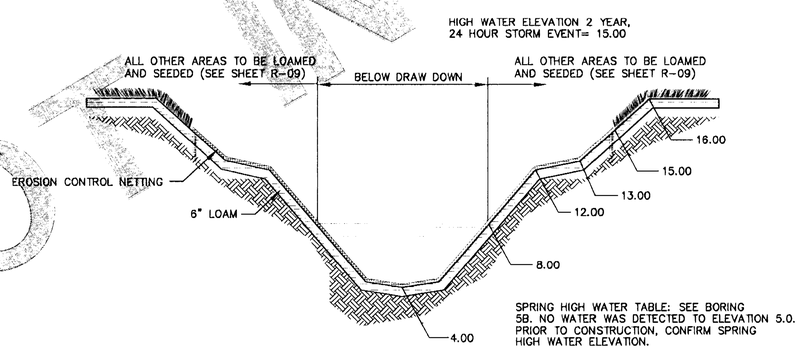
MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE	POND VEGETATION ENLARGEMENTS PLAN II
SCALE	AS NOTED
DATE	September 08, 1998
PROJECT NO.	MAA-CO-97-019
SHEET NO.	V-02



PLAN
1"=20'



SECTION A-A
NOT TO SCALE

FRESH WATER POND 4A

NOTES

1. POND 4A WILL ACT AS TEMPORARY SEDIMENTATION POND AS REQUIRED DURING CONSTRUCTION. PRIOR TO PLACEMENT OF FINAL LOAM AND NETTING, ALL SILT SHALL BE CLEANED AND REMOVED.
2. SEE SHEET V-04 FOR PLANT SPACING, LOCATION AND METHOD.
3. SEE SHEET V-05 FOR PLANT SELECTION AND DETAILS. ANY PROPOSED SUBSTITUTION OF WETLAND SPECIES FROM THE DESCRIBED LIST MUST BE APPROVED BY THE ENGINEER.
4. ALL OTHER AREAS ABUTTING THE PROPOSED PONDS SHALL BE LOAMED AND SEEDED (SEE SHEET R-06 FOR DETAILS).
5. ALL EXCAVATION, GRADING, LOAM AND SEEDING SHALL BE DONE BETWEEN JUNE 15 AND SEPTEMBER 30. WETLAND PLANTS SHALL BE PLANTED BETWEEN SEPTEMBER 30 AND OCTOBER 15.
6. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING FINAL LOCATION OF PIPES AND GRADING FOR ALL BMP PONDS.
7. THE CONTRACTOR SHALL MAINTAIN PONDS FREE FROM EROSION AND SILT UNTIL VEGETATION HAS STABILIZED ALL DISTURBED AREAS.
8. PONDS 1, 2A, 2B, 3A, AND 3B ARE DESIGNED FOR WATER QUALITY CONTROL. THEY ARE NOT DESIGNED TO MITIGATE THE INCREASE IN RUNOFF DUE TO THE PROPOSED CONSTRUCTION. PONDS 4A AND 4B ARE DESIGNED TO MITIGATE THE INCREASE IN RUNOFF FOR THE 2, 10 AND 100 YEAR STORM EVENTS AS WELL AS WATER QUALITY.

NOT IN CONTRACT

AS-BUILTS

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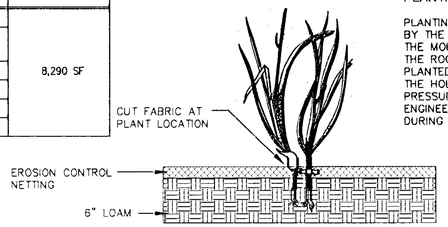
TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED TDB DRAWN JJN CHECKED KS APPROVED TS	STATE OF MARYLAND TEKKAPOJ SOMBATPUTH LICENSE NO. 12489 REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: POND 4A VEGETATION ENLARGEMENTS PLAN III SCALE: AS NOTED DATE: September 08, 1998	PROJECT NO. MAA-CO-97-019 SHEET NO. V-03

CANDIDATE PLANT SPECIES – FRESHWATER PONDS

ZONE	COMMON NAME	SCIENTIFIC NAME	PLANTING SPECIFICATIONS	APPROXIMATE SF
ABOVE DRAW DOWN UPPER LIMIT: 18 INCHES ABOVE SEASONAL HIGH WATER (SHW) ELEVATION LOWER LIMIT: SHW ELEVATION	HERBACEOUS EMERGENT			18,820 SF
	REDTOP CHUFA WOOL GRASS	AGROSTIS ALBA (A. STOLONIFERA) CYPERUS ESCULENTUS SCIRPUS CYPERINUS	PURE LIVE SEED 5 LBS/AC TUBERS 50 LBS/AC 1 FT OC	
UPPER DRAW DOWN UPPER LIMIT: SHW ELEVATION LOWER LIMIT: MID-POINT BETWEEN SHW AND SEASONAL LOW WATER (SLW) ELEVATIONS	HERBACEOUS EMERGENT			13,190 SF
	REDTOP PORCUPINE SEDGE CHUFA MARSH SPIKE RUSH COMMON THREE SQUARE BROAD-LEAVED CATTAIL	AGROSTIS ALBA (A. STOLONIFERA) CAREX HYSTRICINA CYPERUS ESCULENTUS ELEOCHARIS PALUSTRIS SCIRPUS PUNGENS (S. AMERICANUS) TYPHA LATIFOLIA	PURE LIVE SEED 5 LBS/AC 1 FT OC TUBERS 50 LBS/AC 1 FT OC 2 FT OC 2 FT OC	
	FLOATING-STEMMED AQUATIC			
	RICE CUTGRASS	LEERSIA ORYZOIDES	1 FT OC	
LOWER DRAW DOWN UPPER LIMIT: MID-POINT BETWEEN SHW AND SLW ELEVATIONS LOWER LIMIT: SLW ELEVATION	HERBACEOUS EMERGENT			7,335 SF
	PORCUPINE SEDGE CHUFA MARSH SPIKE RUSH COMMON THREE SQUARE BROAD-LEAVED CATTAIL	CAREX HYSTRICINA CYPERUS ESCULENTUS ELEOCHARIS PALUSTRIS SCIRPUS PUNGENS (S. AMERICANUS) TYPHA LATIFOLIA	2 FT OC TUBERS 50 LBS/AC 1 FT OC 2 FT OC 2 FT OC	
	FLOATING-STEMMED AQUATIC			
	RICE CUTGRASS	LEERSIA ORYZOIDES	1 FT OC	
BELOW DRAW DOWN – UPPER UPPER LIMIT: SLW ELEVATION LOWER LIMIT: 1 FT BELOW SLW	HERBACEOUS EMERGENT			8,290 SF
	LAKE SEDGE DUCK POTATO SOFT STEM BULRUSH BROAD-LEAVED CATTAIL	CAREX LACUSTRIS SAGITTARIA LATIFOLIA SCIRPUS VALIDUS TYPHA LATIFOLIA	2 FT OC 2 FT OC 2 FT OC 2 FT OC	
	FLOATING-LEAVED AQUATIC			
	SPATTERDOCK	NUPHAR LUTEUM (N. ADVENA)	0.5 FT OC	
BELOW DRAW DOWN – LOWER UPPER LIMIT: 1 FT BELOW SLW LOWER LIMIT: POND BOTTOM	HERBACEOUS EMERGENT			8,290 SF
	LAKE SEDGE DUCK POTATO	CAREX LACUSTRIS SAGITTARIA LATIFOLIA	2 FT OC 2 FT OC	
	FLOATING-LEAVED AQUATIC			
	SPATTERDOCK	NUPHAR LUTEUM (N. ADVENA)	0.5 FT OC	
	SUBMERGED AQUATIC			
	LONG-LEAVED POND PLANT	POTAMOGETON NODOSUS (P. AMERICANUS)	2 FT OC	

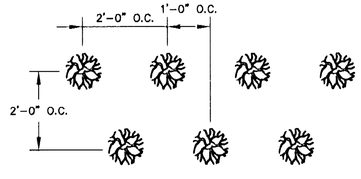
CANDIDATE PLANT SPECIES – PONDS SUBJECT TO SALTWATER INTRUSION

ZONE	COMMON NAME	SCIENTIFIC NAME	PLANTING SPECIFICATIONS	APPROXIMATE SF
ABOVE DRAW DOWN UPPER LIMIT: 18 INCHES ABOVE SEASONAL HIGH WATER (SHW) ELEVATION LOWER LIMIT: SHW ELEVATION	HERBACEOUS EMERGENT			5,760 SF
	REDTOP SWITCHGRASS COMMON THREE SQUARE	AGROSTIS ALBA (A. STOLONIFERA) PANICUM VIRGATUM SCIRPUS PUNGENS (S. AMERICANUS)	PURE LIVE SEED 5 LBS/AC 0.5 FT OC 2 FT OC	
UPPER DRAW DOWN UPPER LIMIT: SHW ELEVATION LOWER LIMIT: MID-POINT BETWEEN SHW AND SEASONAL LOW WATER (SLW) ELEVATIONS	HERBACEOUS EMERGENT			82,690 SF
	SWEET FLAG REDTOP MARSH SPIKE RUSH OLNEY'S BULRUSH COMMON THREE SQUARE NARROW-LEAVED CATTAIL	ACORUS CALAMUS AGROSTIS ALBA (A. STOLONIFERA) ELEOCHARIS PALUSTRIS SCIRPUS AMERICANUS (S. OLNEYI) SCIRPUS PUNGENS (S. AMERICANUS) TYPHA ANGUSTIFOLIA	1 FT OC PURE LIVE SEED 5 LBS/AC 1 FT OC 2 FT OC 2 FT OC 2 FT OC	
LOWER DRAW DOWN UPPER LIMIT: MID-POINT BETWEEN SHW AND SLW ELEVATIONS LOWER LIMIT: SLW ELEVATION	HERBACEOUS EMERGENT			3,990 SF
	SWEET FLAG MARSH SPIKE RUSH OLNEY'S BULRUSH COMMON THREE SQUARE NARROW-LEAVED CATTAIL	ACORUS CALAMUS ELEOCHARIS PALUSTRIS SCIRPUS AMERICANUS (S. OLNEYI) SCIRPUS PUNGENS (S. AMERICANUS) TYPHA ANGUSTIFOLIA	1 FT OC 1 FT OC 2 FT OC 2 FT OC 2 FT OC	
BELOW DRAW DOWN UPPER LIMIT: SLW ELEVATION LOWER LIMIT: POND BOTTOM	HERBACEOUS EMERGENT			1,780 SF
	SWEET FLAG OLNEY'S BULRUSH COMMON THREE SQUARE NARROW-LEAVED CATTAIL	ACORUS CALAMUS SCIRPUS AMERICANUS (S. OLNEYI) SCIRPUS PUNGENS (S. AMERICANUS) TYPHA ANGUSTIFOLIA	1 FT OC 2 FT OC 2 FT OC 2 FT OC	
	SUBMERGED AQUATIC			
	WILD CELERY	VALLISNERIA AMERICANA	2 FT OC	

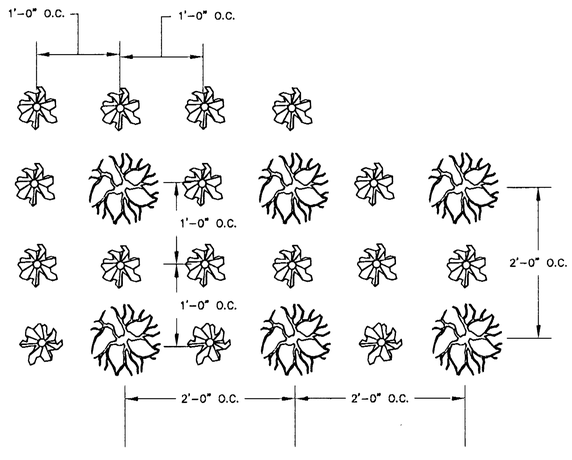


PLANTING METHOD

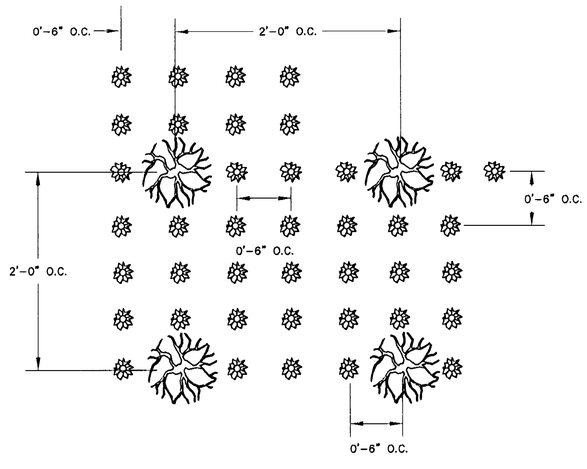
PLANTING SHALL BE DONE BY HAND USING A DIBBLE, PLANTING SPADE, OR OTHER METHOD APPROVED BY THE ENGINEER. THE DIBBLE OR SPADE SHALL BE USED TO CREATE A SHALLOW HOLE IN THE MOIST TOPSOIL FOR PLANTING. THE HOLE SHALL BE OF SUFFICIENT DEPTH AND WIDTH TO ALLOW THE ROOT TO BE INSERTED WITHOUT BREAKAGE OR OTHER DAMAGE. THE PLANTS SHALL BE PLANTED SO THAT THE LEAF BASES ARE AT THE SOIL SURFACE. AFTER PLACEMENT OF THE PLANT IN THE HOLE, THE HOLE SHALL BE CAREFULLY CLOSED AROUND THE PLANT ROOT BY GENTLY APPLYING PRESSURE TO THE EDGE OF THE HOLE WITH ONE'S FOOT OR OTHER METHOD APPROVED BE THE ENGINEER. PLANTS WHICH HAVE BEEN JUDGED BY THE ENGINEER TO BE DAMAGED BY MISHANDLING DURING THE PLANTING PROCESS SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.



GROUND COVER SPACING DETAIL
2'-0" ON CENTER ONLY
NTS



GROUND COVER SPACING DETAIL
MIXED PLANTINGS: 2'-0" ON CENTER WITH 1'-0" ON CENTER
NTS



GROUND COVER SPACING DETAIL
MIXED PLANTINGS: 2'-0" ON CENTER WITH 6" ON CENTER
NTS

ALL PONDS

AFTER COMPLETION OF EXCAVATION, MONITOR AREAL EXTENT OF INUNDATION AND STANDING WATER LEVELS IN POND THREE TIMES, AT THE BEGINNING, MID-POINT AND END OF A TWO-WEEK PERIOD. SIMULTANEOUSLY MONITOR DEPTH TO WATER TABLE IN ADJACENT WELLS, AT SAME FREQUENCY AND ON SAME DATES. THE ENGINEER WILL CORRELATE STANDING WATER ELEVATIONS TO DEPTH TO WATER TABLE AND, BASED ON PREVIOUS WELL MONITORING RECORD, WILL ESTIMATE SEASONAL HIGH WATER (SHW) AND SEASONAL LOW WATER (SLW) ELEVATIONS.

IMMEDIATELY PRIOR TO PLANTING, INUNDATE POND TO ESTIMATED SHW ELEVATION, HOLDING THE STANDING WATER LEVEL AT THE SHW ELEVATION FOR 48 HOURS AND SUBSEQUENTLY DEWATERING.

PONDS READY FOR PLANTING DURING EARLY SPRING 1998

EARLY SPRING 1998 –

WITHIN 24 HOURS OF DEWATERING THE POND, BEGIN PLANTING THE POND TO THE SELECTED VEGETATION SPECIES.

KEEP THE POND DEWATERED UNTIL THE VEGETATION PLANTED ON THE BOTTOM OF THE POND REACHES HEIGHTS RANGING BETWEEN ONE AND TWO AND ONE-HALF FEET TALL; AT WHICH TIME, ALLOW POND WATER TO REACH NORMAL LEVELS.

THE ENGINEER WILL PERIODICALLY INSPECT THE POND AFTER PLANTING TO RECOMMEND AS APPROPRIATE, REVISIONS TO THE INUNDATION AND DEWATERING PROGRAM.

EARLY SPRING 1999 –

PRIOR TO MAINTENANCE PLANTING, MONITOR AREAL EXTENT OF INUNDATION AND STANDING WATER LEVELS IN POND ONCE A WEEK FOR FOUR WEEKS. SIMULTANEOUSLY MONITOR DEPTH TO WATER TABLE IN ADJACENT WELLS, AT SAME FREQUENCY AND ON SAME DATES. THE ENGINEER WILL CORRELATE STANDING WATER ELEVATIONS TO DEPTH TO WATER TABLE. BASED ON PREVIOUS WELL MONITORING RECORD AND SUCCESS OF PRIOR PLANTINGS, AS APPROPRIATE, THE ENGINEER WILL MODIFY ESTIMATE OF SEASONAL HIGH WATER (SHW) AND SEASONAL LOW WATER (SLW) ELEVATIONS AND WILL PREPARE A MAINTENANCE PLANTING PLAN.

IMMEDIATELY PRIOR TO PLANTING, INUNDATE POND TO ESTIMATED SHW ELEVATION, HOLDING THE STANDING WATER LEVEL AT THE SHW ELEVATION FOR 48 HOURS AND SUBSEQUENTLY DEWATERING.

WITHIN 24 HOURS OF DEWATERING THE POND, BEGIN PLANTING THE POND TO THE SELECTED VEGETATION SPECIES.

KEEP THE POND DEWATERED UNTIL THE VEGETATION PLANTED ON THE BOTTOM OF THE POND REACHES HEIGHTS RANGING BETWEEN ONE AND TWO AND ONE-HALF FEET TALL; AT WHICH TIME, ALLOW POND WATER TO REACH NORMAL LEVELS.

THE ENGINEER WILL PERIODICALLY INSPECT THE POND AFTER PLANTING TO RECOMMEND AS APPROPRIATE, REVISIONS TO THE INUNDATION AND DEWATERING PROGRAM.

PONDS NOT READY FOR PLANTING DURING EARLY SPRING 1998

LATE SPRING, SUMMER OR FALL 1998 –

WITHIN 24 HOURS OF DEWATERING THE POND, SEED ALL POND AREAS 18 INCHES ABOVE THE SHW ELEVATION TO THE POND BOTTOM, INCLUSIVE, TO REDTOP (AGROSTIS ALBA).

EARLY SPRING 1999 –

PRIOR TO PLANTING, MONITOR AREAL EXTENT OF INUNDATION AND STANDING WATER LEVELS IN POND ONCE A WEEK FOR FOUR WEEKS. SIMULTANEOUSLY MONITOR DEPTH TO WATER TABLE IN ADJACENT WELLS, AT SAME FREQUENCY AND ON SAME DATES. THE ENGINEER WILL CORRELATE STANDING WATER ELEVATIONS TO DEPTH TO WATER TABLE. BASED ON PREVIOUS WELL MONITORING RECORD, AS APPROPRIATE, THE ENGINEER WILL MODIFY ESTIMATE OF SEASONAL HIGH WATER (SHW) AND SEASONAL LOW WATER (SLW) ELEVATIONS AND WILL REVISE THE PLANTING PLAN.

IMMEDIATELY PRIOR TO PLANTING, INUNDATE POND TO ESTIMATED SHW ELEVATION, HOLDING THE STANDING WATER LEVEL AT THE SHW ELEVATION FOR 48 HOURS AND SUBSEQUENTLY DEWATERING.

WITHIN 24 HOURS OF DEWATERING THE POND, BEGIN PLANTING THE POND TO THE SELECTED VEGETATION SPECIES.

KEEP THE POND DEWATERED UNTIL THE VEGETATION PLANTED ON THE BOTTOM OF THE POND REACHES HEIGHTS RANGING BETWEEN ONE AND TWO AND ONE-HALF FEET TALL; AT WHICH TIME, ALLOW POND WATER TO REACH NORMAL LEVELS.

THE ENGINEER WILL PERIODICALLY INSPECT THE POND AFTER PLANTING TO RECOMMEND AS APPROPRIATE, REVISIONS TO THE INUNDATION AND DEWATERING PROGRAM.

NOTES:

1. FOR PLANTING LOCATIONS SEE SHEETS V-01 TO V-03.
2. FOR POND DETAILS SEE SHEETS C-11 TO C-16.

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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2101 Wilson Boulevard, Suite 300
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DESIGNED	TDB
DRAWN	OCO
CHECKED	KS
APPROVED	TS

STATE OF MARYLAND — TERRANCE SCHRADTMAN — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: POND VEGETATION NOTES AND DETAILS I

SCALE: AS NOTED

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: V-04



DESCRIPTION:
PERENNIAL
RAPID RATE OF SPREAD AND GROWTH
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
FRESH AND BRACKISH TIDAL MARSHES
NONTIDAL MARSHES
POND AND STREAM EDGES
REQUIRES FULL SUN
SALINITY UP TO 15PPT

PLANTING:
SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	2 FT. OC
IN 2 YRS.	4 FT. OC
IN 3 YRS.	6 FT. OC

FORMS AVAILABLE: DORMANT RHIZOME, BARE ROOT PLANT, PEAT POT, CONTAINER

TYPHA ANGUSTIFOLIA
(Narrow Leaved Cattail)



DESCRIPTION:
PERENNIAL
RAPID RATE OF SPREAD AND GROWTH
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
FRESH AND BRACKISH TIDAL MARSHES
NONTIDAL MARSHES
WET SANDY SHORES
COASTAL DUNES
REQUIRES FULL SUN
TOLERATES DROUGHT
SALINITY UP TO 15PPT

PLANTING:
SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	2 FT. OC
IN 2 YRS.	4 FT. OC
IN 3 YRS.	6 FT. OC

FORMS AVAILABLE: RHIZOME, BARE ROOT PLANT, CONTAINER

SCIRPUS PUNGENS
(Sword Grass)



DESCRIPTION:
PERENNIAL
RAPID RATE OF SPREAD AND GROWTH
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
FRESH AND BRACKISH TIDAL MARSHES
PONDS AND STREAMS
SALINITY UP TO 5PPT

PLANTING:
SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	2 FT. OC
IN 2 YRS.	4 FT. OC
IN 3 YRS.	6 FT. OC

FORMS AVAILABLE: SEED, BARE ROOT PLANT

POTAMOGETON PERFOLIATUS
(Redhead Grass)



DISCRIPTION:
PERENNIAL
RAPID RATE OF SPREAD AND GROWTH
METHOD OF VEGETATIVE REPRODUCTION: RUNNERS, TUBERS

HABITAT:
FRESH AND BRACKISH TIDAL MARSHES
NONTIDAL MARSHES
SWAMPS
PONDS
SALINITY UP TO 2PPT

PLANTING:
SUGGESTED SPACING:
(SEE SHEET V-04)
FORMS AVAILABLE: TUBER, BARE ROOT PLANT

SAGITTARIA RIGIDA
(Deep Water Duck Potato)



DESCRIPTION:
PERENNIAL
MODERATE RATE OF SPREAD AND GROWTH
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
DAMP THICKETS AND SWALES
PREFERS FULL SUN
SALINITY FRESH WATER; LESS THAN .5PPT

PLANTING:
5LBS PURE LIVE SEED PER ACRE
TOLERATES DROUGHT
STABILIZES SEDIMENT

FORMS AVAILABLE: SEED

AGROTIS ALBA
(Redtop)



DESCRIPTION:
PERENNIAL
RAPID RATE OF SPREAD AND GROWTH (OVER 1FT PER YEAR IN UNCONSOLIDATED SEDIMENT)
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
NONTIDAL MARSHES
NONTIDAL SWAMPS
LAKE MARGINS
REQUIRES FULL SUN
FRESH WATER; LESS THAN 0.5 PPT

PLANTING:
SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	2 FT. OC
IN 2 YRS.	4 FT. OC
IN 3 YRS.	6 FT. OC

FORMS AVAILABLE: SEED, BARE ROOT PLANT, PEAT OR FIBER POT

COREX LACUSTRIS
(Lake Sedge, Ripgut)



DESCRIPTION:
PERENNIAL
MODERATE; APPROXIMATELY .05FT PER YEAR IN UNCONSOLIDATED SEDIMENT
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
FRESH AND BRACKISH TIDAL MARSHES
NONTIDAL MARSHES
SWAMPS AND FORESTED SEASONAL WETLANDS
WET MEADOWS
SWALES AND DITCHES
SLOUGHS, PONDS, BOGS
REQUIRES FULL SUN
SALINITY UP TO .5PPT

PLANTING:
SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	1 FT. OC
IN 2 YRS.	2 FT. OC
IN 3 YRS.	3 FT. OC

FORMS AVAILABLE: SEED, BARE ROOT PLANT, RHIZOME CONTAINER

SCIRPUS CYPERINUS
(Wool Grass)



DISCRIPTION:
PERENNIAL
RAPID RATE OF SPREAD AND GROWTH
OVER 1FT PER YEAR IN UNCONSOLIDATED SEDIMENT

METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
FRESH TIDAL MARSHES
NONTIDAL MARSHES
PONDS AND STREAM EDGES
DITCHES
REQUIRES FULL SUN
SOIL STABILIZER
TOLERATES DROUGHT
SALINITY UP TO .5PPT

SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	2 FT. OC
IN 2 YRS.	4 FT. OC
IN 3 YRS.	6 FT. OC

FORMS AVAILABLE: DORMANT RHIZOME, BARE ROOT PLANT PEAT POT, CONTAINER

TYPHA LATIFOLIA
(Broad-Leaved Cattail)



DESCRIPTION:
PERENNIAL
RAPID RATE OF SPREAD AND GROWTH; OVER 1 FT PER YEAR
IN UNCONSOLIDATED SEDIMENT
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
FRESH AND BRACKISH TIDAL MARSHES
NONTIDAL MARSHES
SHORES
REQUIRES FULL SUN
SALINITY UP TO 5PPT

PLANTING:
SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	2 FT. OC
IN 2 YRS.	4 FT. OC
IN 3 YRS.	6 FT. OC

FORMS AVAILABLE: DORMANT RHIZOME, BARE ROOT PLANT, CONTAINER, SEED

SCIRPUS VALIDUS
(Soft Stem Bulrush)



DISCRIPTION:
PERENNIAL
MODERATE; APPROXIMATELY .05 FT PER YEAR
IN UNCONSOLIDATED SEDIMENT
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
FRESH AND BRACKISH TIDAL MARSHES
NONTIDAL MARSHES
WET MEADOWS
SHALLOW WATERS
SALINITY UP TO 10PPT
TOLERATES PARTIAL SHADE

PLANTING:
SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	1 FT. OC
IN 2 YRS.	2 FT. OC
IN 3 YRS.	3 FT. OC

FORMS AVAILABLE: DORMANT RHIZOME, BARE ROOT PLANT, PEAT POT

ACORUS CALAMUS
(Sweet Flag, Sweet Myrtle, Sea Sedge)



DISCRIPTION:
PERENNIAL
SLOW RATE OF SPREAD AND GROWTH; LESS THAN .2 FT PER YEAR
IN UNCONSOLIDATED SEDIMENT
METHOD OF VEGETATIVE REPRODUCTION: RHIZOME

HABITAT:
FRESH AND BRACKISH TIDAL MARSHES
NONTIDAL MARSHES
WET MEADOWS
OPEN WOODS, PRAIRIES, DUNES
PREFERS FULL SUN, TOLERATES SOME SHADE
TOLERATES DROUGHT
SALINITY UP TO 10PPT

PLANTING:
SUGGESTED SPACING:

FOR UNIFORN GROUND COVER	PLANT AT
IN 1 YR.	.5 FT. OC
IN 2 YRS.	1 FT. OC
IN 3 YRS.	2 FT. OC

FORMS AVAILABLE: SEED, BARE ROOT PLANT, PEAT OR FIBER POT

PANICUM VIRGATUM
(Switch Grass)

AS-BUILTS

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TAMS
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DESIGNED	TDB
DRAWN	CPH
CHECKED	BJL
APPROVED	TS

STATE OF MARYLAND — THOMAS DONNATHEW — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

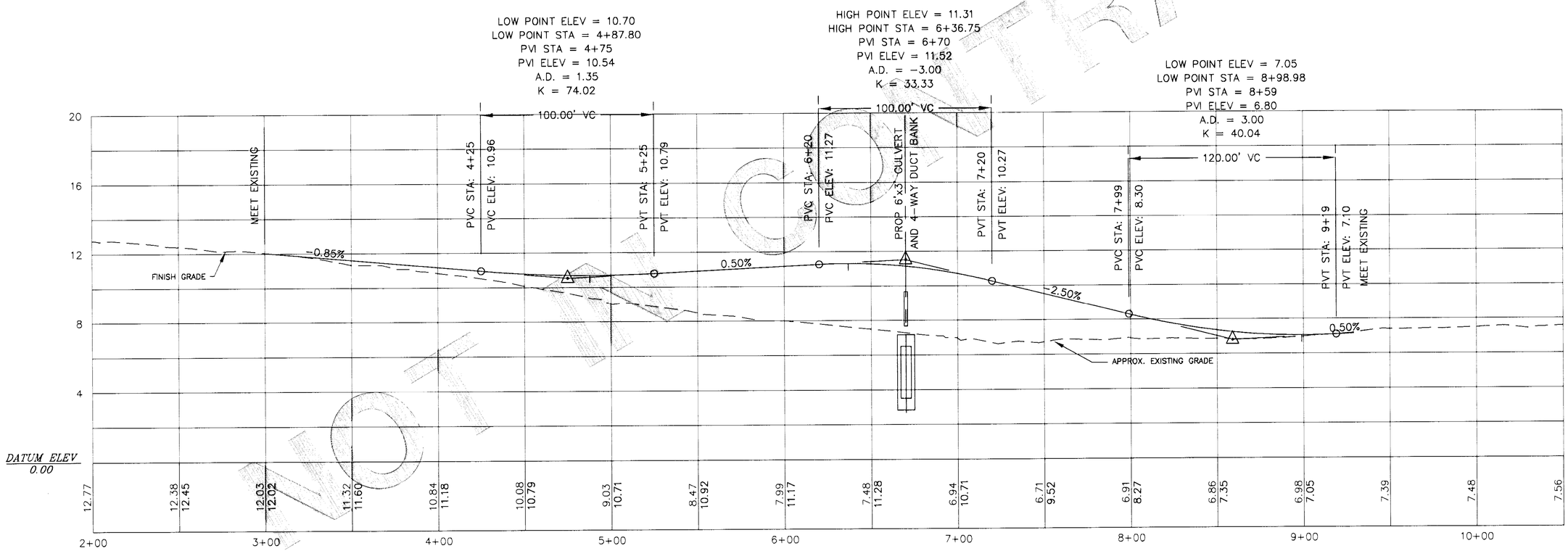
SHEET TITLE
POND VEGETATION DETAILS AND NOTES II

SCALE: NTS
DATE: September 08, 1998

PROJECT NO.
MAA-CO-97-019

SHEET NO.
V-05

NOTE:
SEE DRAWING L-01 - L-03 FOR BASELINE INFORMATION.



PROFILE

SCALE: 1"=3' (VERT)
1"=30' (HORIZ.)

NOT IN CONTRACT

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

0 15 30 60 90 HORIZONTAL
0 3 6 9 VERTICAL
SCALE IN FEET

TAMS
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DESIGNED	DMP
DRAWN	DMP
CHECKED	TDB
APPROVED	TS

STATE OF MARYLAND
TEXAPOLI SOMBATPIRIN
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: PROFILE STRAWBERRY POINT ROAD

SCALE: AS NOTED

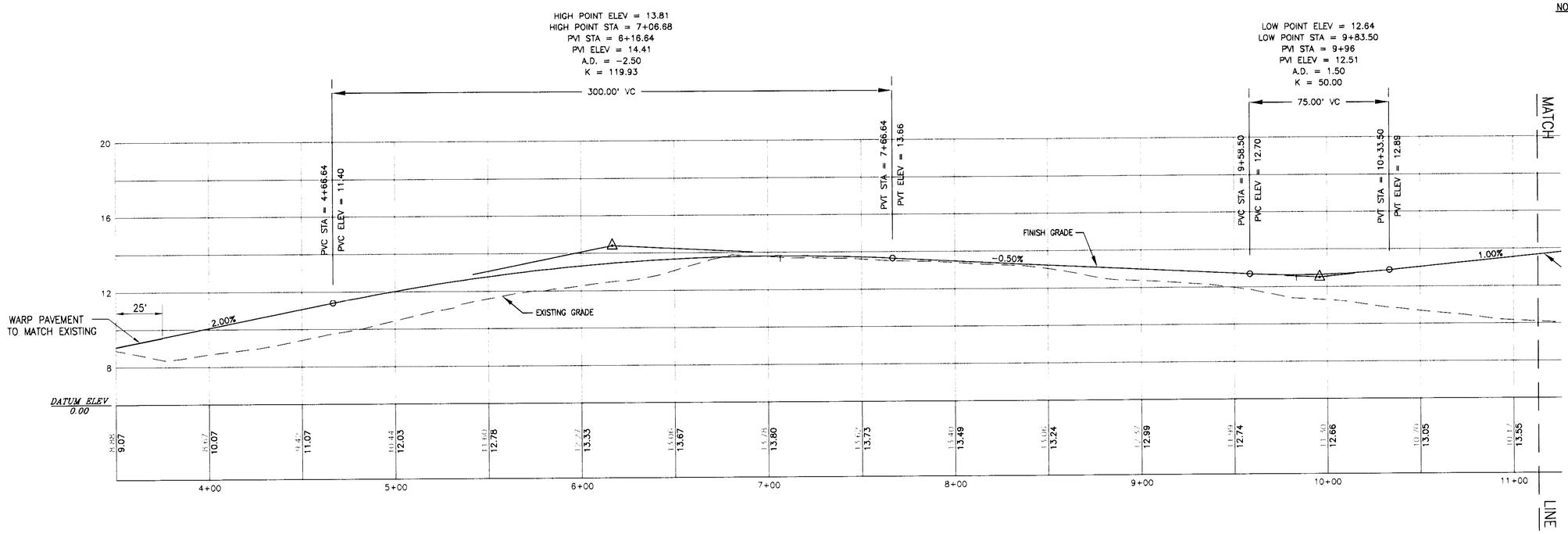
DATE: September 08, 1998

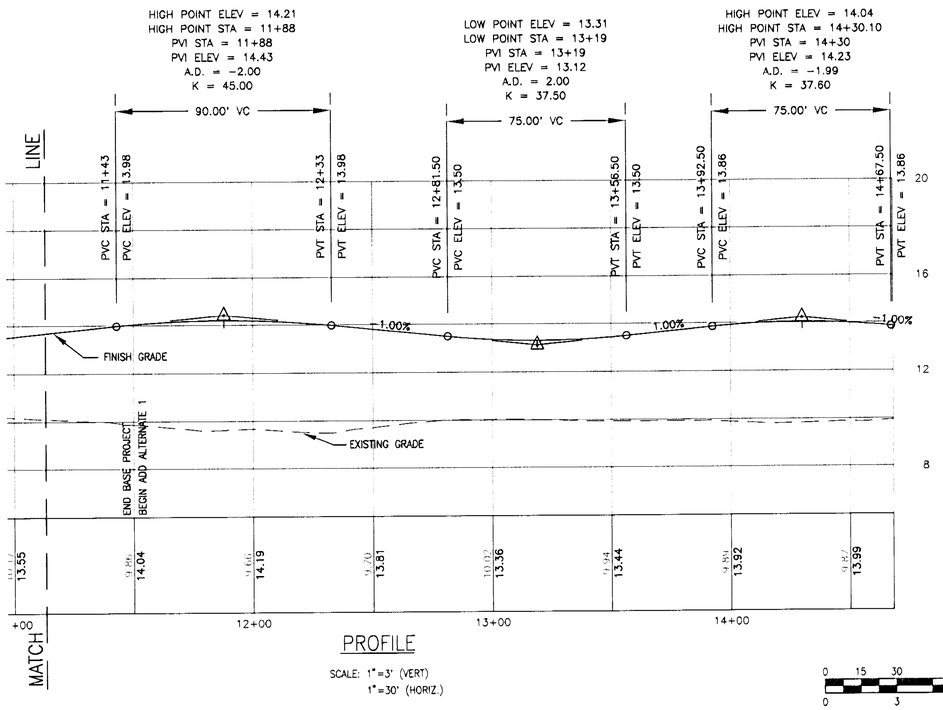
PROJECT NO. MAA-CO-97-019

SHEET NO. P-01

NOTE:

SEE DRAWING L-01 – L-03 FOR BASELINE INFORMATION.





PROFILE

SCALE: 1"=3' (VERT)
1"=30' (HORIZ.)

0 15 30 60 90 HORIZONTAL
0 3 6 9 VERTICAL
SCALE IN FEET

AS-BUILTS

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DRAWN	DMP
CHECKED	TDB
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMBATHEM — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

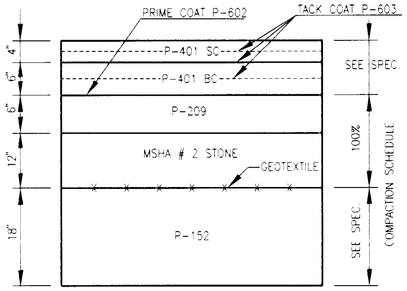
SHEET TITLE: PROFILE ACCESS ROAD

SCALE: AS NOTED

DATE: September 08, 1998

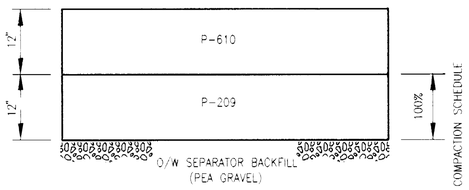
PROJECT NO.: MAA-CO-97-019

SHEET NO.: P-02



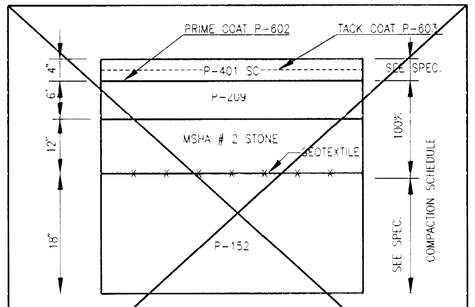
TYPICAL APRON PAVEMENT SECTION

NOT TO SCALE



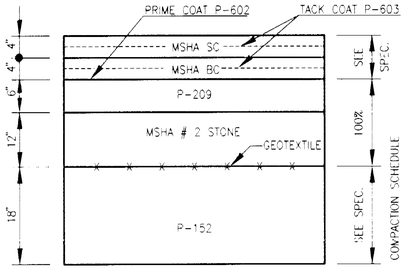
PCC PAVEMENT @ OIL / WATER SEPARATORS

NOT TO SCALE



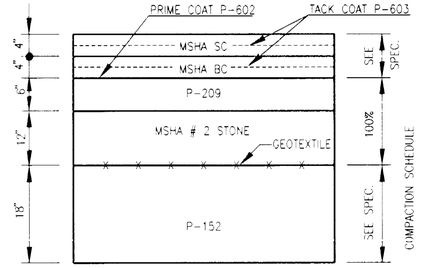
TYPICAL T-HANGAR COMPLEX PAVEMENT SECTION (N.I.C.)

NOT TO SCALE



ACCESS ROAD EXTENSIONS AND PARKING LOTS

NOT TO SCALE



TYPICAL ACCESS ROAD PAVEMENT SECTION

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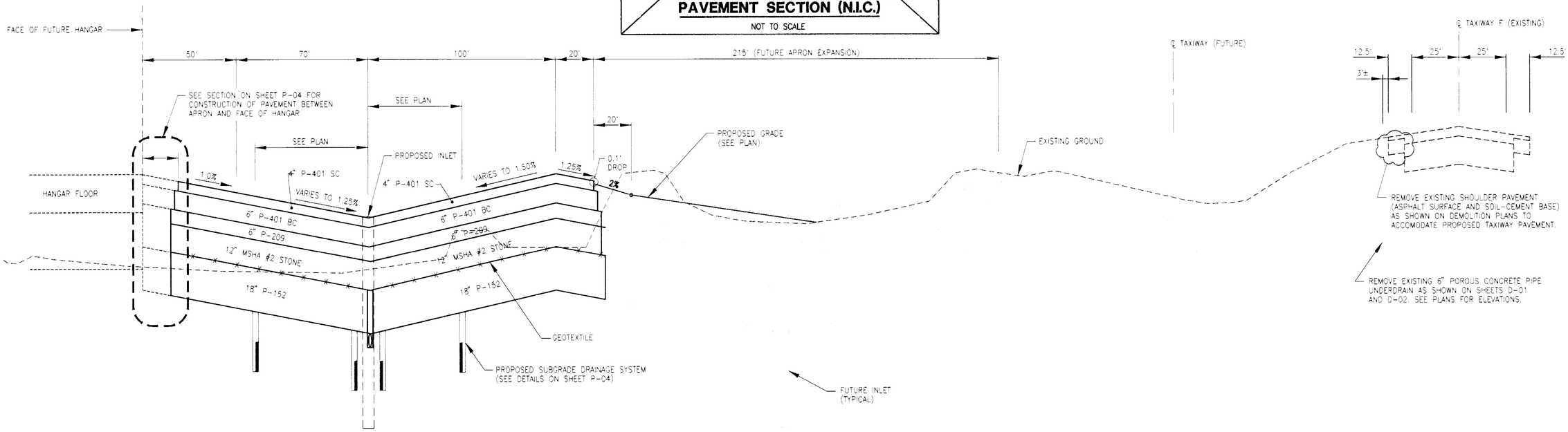


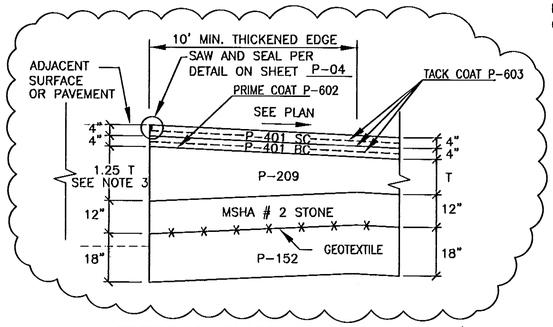
TYPICAL APRON SECTION

NOT TO SCALE

AS-BUILTS

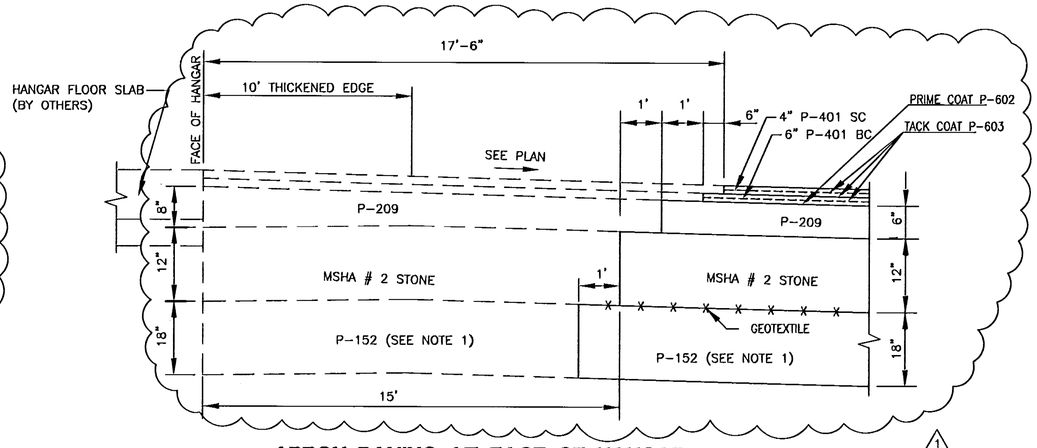
THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED GPP DRAWN GPP CHECKED TS APPROVED TS	STATE OF MARYLAND TEKRAMJI SOMBATPIUM LICENSE NO. 12480 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: PAVEMENT DETAILS I SCALE: NO SCALE DATE: September 08, 1998	PROJECT NO. MAA-CO-97-019 SHEET NO. P-03



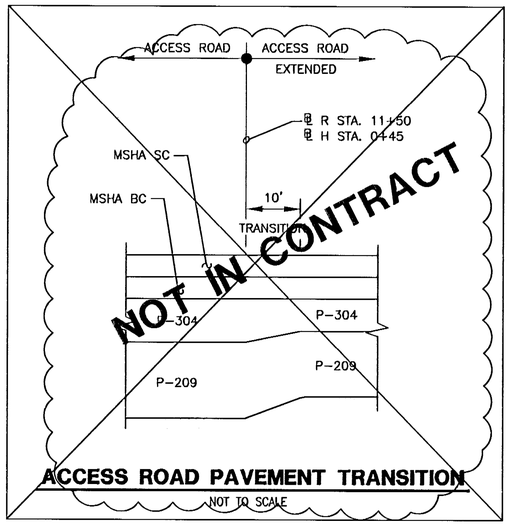
TYPICAL THICKENED EDGE 1

NOT TO SCALE



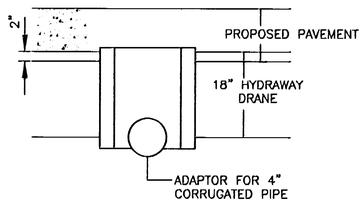
APRON PAVING AT FACE OF HANGAR 1

NOT TO SCALE



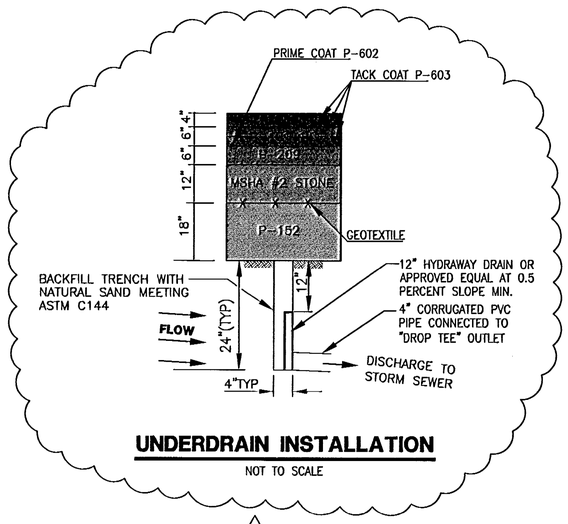
ACCESS ROAD PAVEMENT TRANSITION 1

NOT TO SCALE



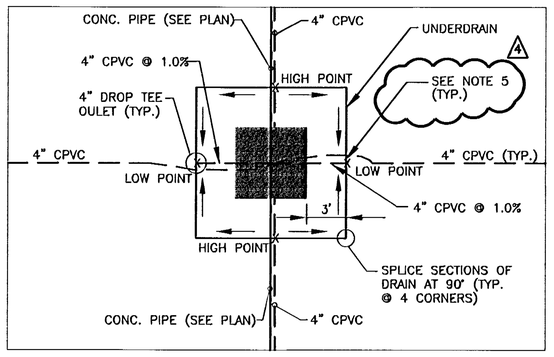
DROP TEE OUTLET DETAIL

NOT TO SCALE



UNDERDRAIN INSTALLATION 1

NOT TO SCALE



PARTIAL PLAN UNDERDRAIN @ INLETS

SCALE: 1"=5'

NOTES :

1. COMPACTION REQUIREMENTS FOR SUBGRADE SOILS VARY. REFER TO ITEM P-152.
2. LOCATIONS SHOWN MAY BE REVISED AT THE ENGINEER'S DISCRETION WHERE DAMAGE TO PREVIOUSLY PLACED PAVEMENT COURSES IS EVIDENT. IN NO CASE WILL ADJOINING PAVEMENT COURSES BE PLACED AGAINST DAMAGED COURSES WITHOUT THE APPROVAL OF THE ENGINEER. SHOULD DAMAGE OR WEAKENING OF THE SUBGRADE BE EVIDENT, FROM WHATEVER CAUSE, THE PAVEMENT STRUCTURE SHALL BE REMOVED, THE SUBGRADE REWORKED AND COMPACTED IN ACCORDANCE WITH ITEM P-152, AND THE PAVEMENT COURSES REPLACED TO THE LIMITS REQUIRED BY THE ENGINEER.
3. USE THICKNESS DETERMINED BY 1.25 T RAISED TO THE NEXT FULL INCH, E.G. T =7" : 1.25 T =1.25(7) = 8.75", USE 9". 1
4. SAW PREVIOUSLY PLACED PAVEMENT COURSES AT THE LOCATIONS SHOWN, EXPOSING NEAT VERTICAL FACES. IN UNDAMAGED MATERIAL, PAINT EXPOSED FACES OF ASPHALT WITH TACK COAT AT 0.15 GAL/SY, AND MOISTEN EXPOSED FACES OF P-304 AND P-209 WITH WATER BEFORE PLACING ADJACENT COURSES.
5. 4" CPVC LINES (FOUR SIDES) TO CROSS UNDER THE UNDERDRAIN LINE.

AS-BUILTS

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TAMS
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2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP/FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMBATHYAN — LICENSE NO. 12408 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	6/21/99	Revised Pavement Details

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

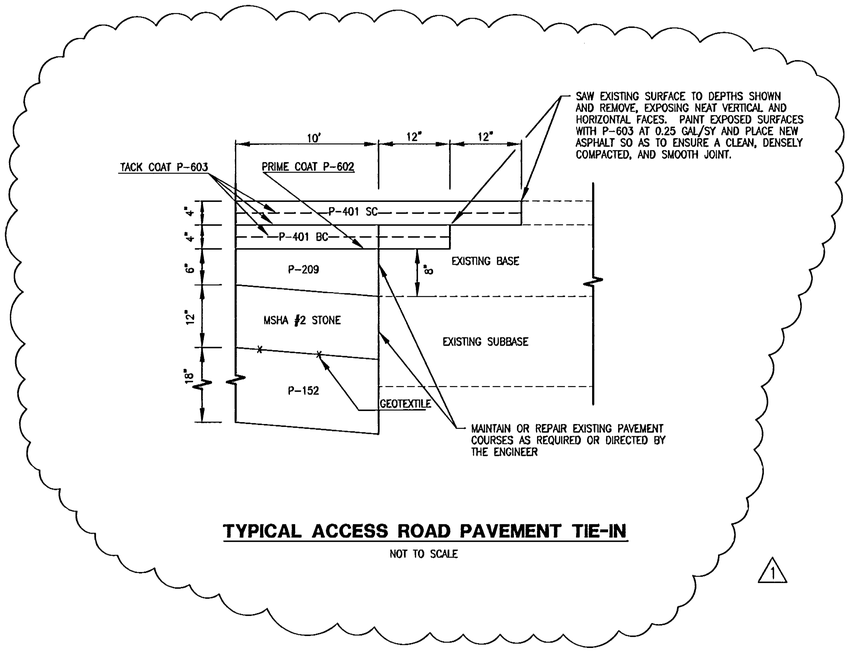
SHEET TITLE: PAVEMENT DETAILS II

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

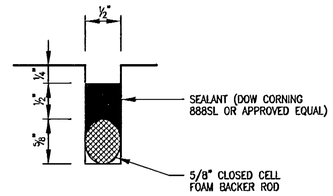
SHEET NO.: P-04



TYPICAL ACCESS ROAD PAVEMENT TIE-IN

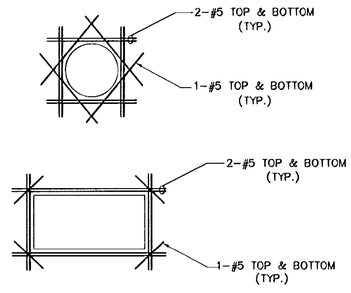
NOT TO SCALE

1



TYPICAL JOINT SEALANT DETAIL

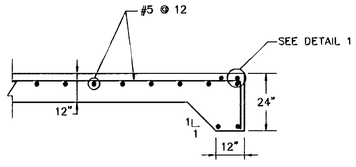
NOT TO SCALE



DETAIL 1

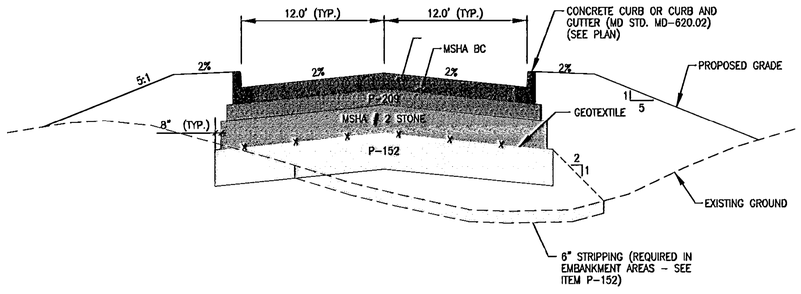
REINFORCEMENT @ SLAB OPENING

NOT TO SCALE



TYPICAL CONC. PAD DETAIL @ OPENING

NOT TO SCALE



TYPICAL ACCESS ROAD SECTION

NOT TO SCALE

AS-BUILTS

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DESIGNED	GPP
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMMATTINO — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	6/21/99	Revised Pavement Details

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

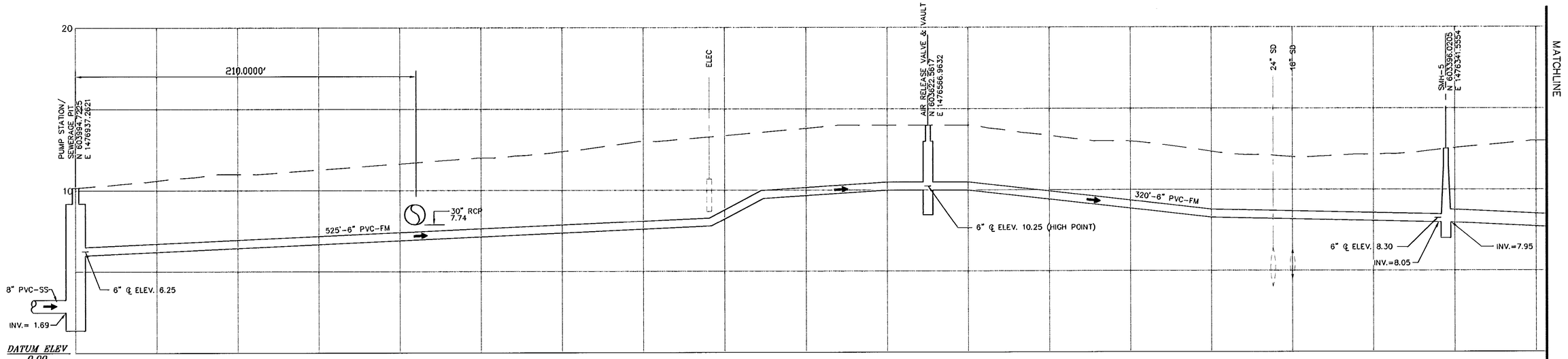
SHEET TITLE: PAVEMENT DETAILS III

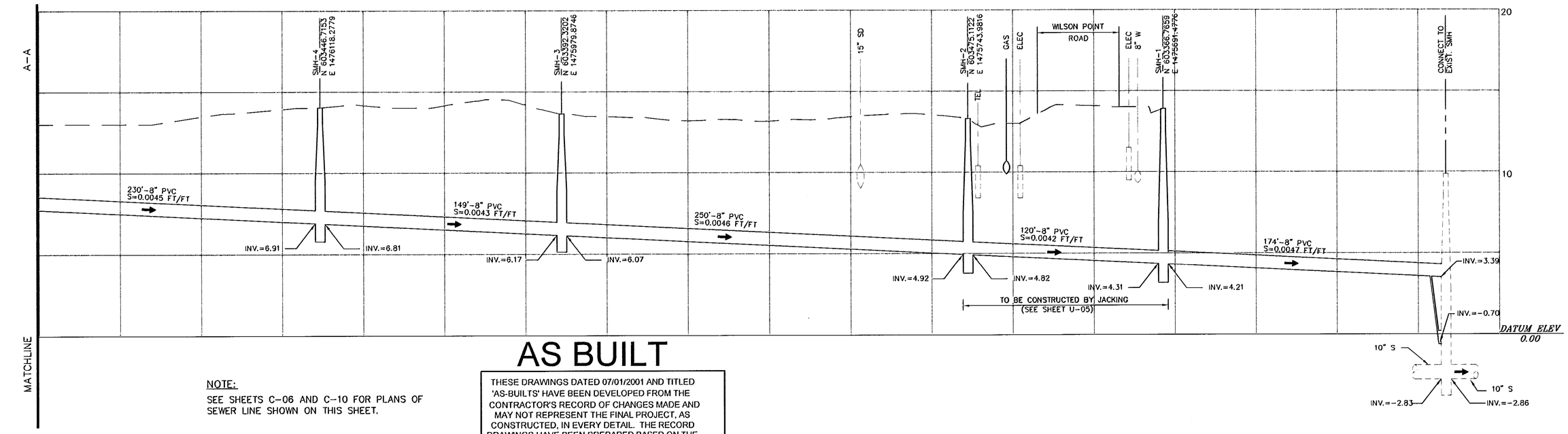
SCALE: AS SHOWN

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: P-05





AS BUILT

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NOTE:

SEE SHEETS C-06 AND C-10 FOR PLANS OF SEWER LINE SHOWN ON THIS SHEET.

SCALE:
VERTICAL: 1"=3'
HORIZONTAL: 1"=30'

0 15 30 60 90 HORIZONTAL
0 3 6 9 VERTICAL
SCALE IN FEET

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Arlington, VA 22201

DESIGNED	GMF
DRAWN	JJN
CHECKED	KS
APPROVED	TS

TEERAPOL SOMBATPHUM
LICENSE NO. 12480
STATE OF MARYLAND
REGISTERED
PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
UTILITY PROFILE 1
SANITARY SEWER LINE

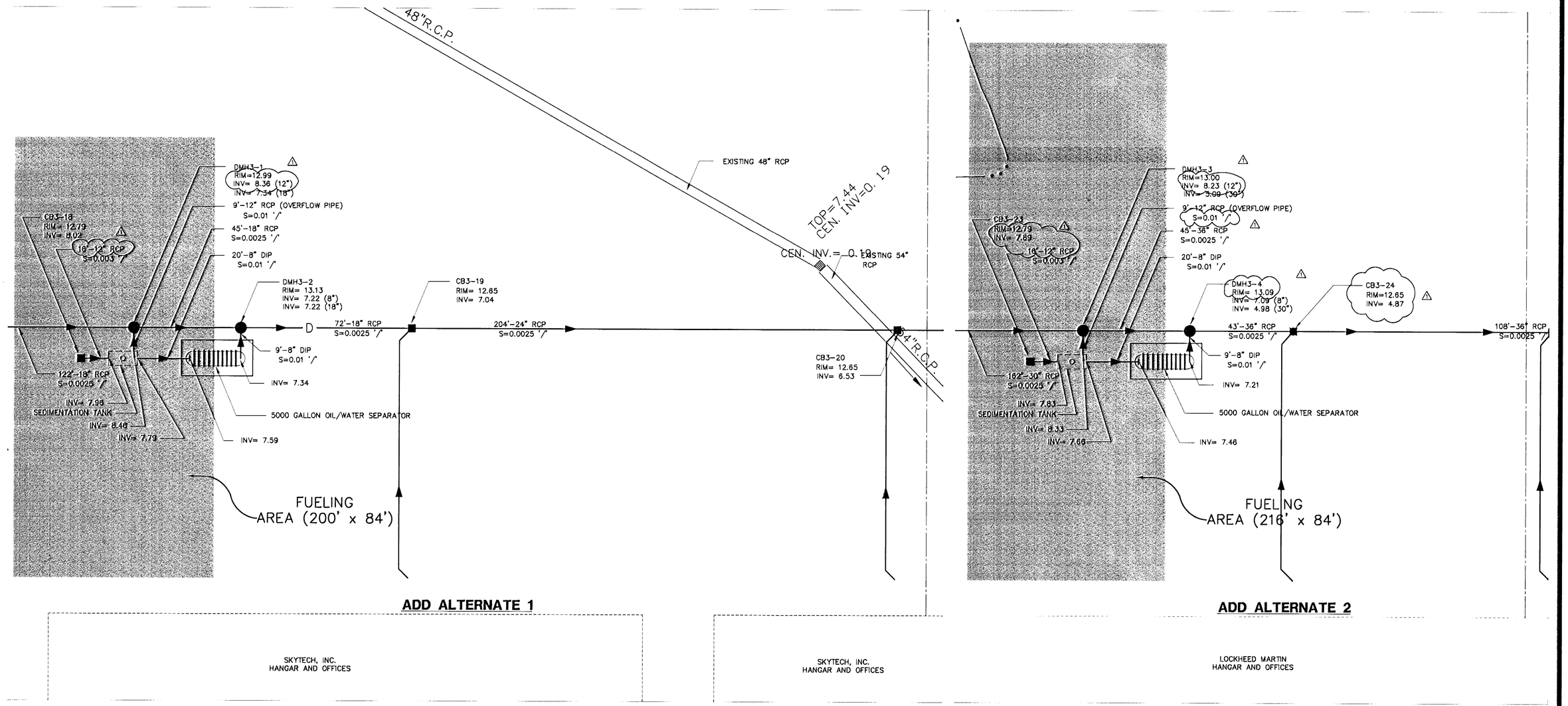
SCALE: AS NOTED
DATE: September 08, 1998

PROJECT NO.
MAA-CO-97-019

SHEET NO.
U-01

NOTES:

1. FOR GRADING AND ADDITIONAL DRAINAGE INFORMATION SEE DRAWING NUMBERS C-01 THROUGH C-03.
2. FOR DETAILS OF SEDIMENTATION CHAMBERS SEE DRAWING NUMBER U-18.
3. FOR DETAILS OF OIL / WATER SEPARATORS SEE DRAWING NUMBERS U-04.



ADD ALTERNATE 1

SKYTECH, INC.
HANGAR AND OFFICES

SKYTECH, INC.
HANGAR AND OFFICES

ADD ALTERNATE 2

LOCKHEED MARTIN
HANGAR AND OFFICES

LIMITS OF DRAINAGE AREA TO BE COVERED BY OIL / WATER SEPARATOR.

0 10 20 40 60
SCALE IN FEET

AS-BUILTS

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DESIGNED	DMP
DRAWN	DMP
CHECKED	TDB
APPROVED	TS

STATE OF MARYLAND — THOMAS DONALDSON — LICENSE NO. 17918 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	1/13/99	REVISED RIM AND INV. ELEVATIONS, PIPE LENGTH AND SLOPE

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

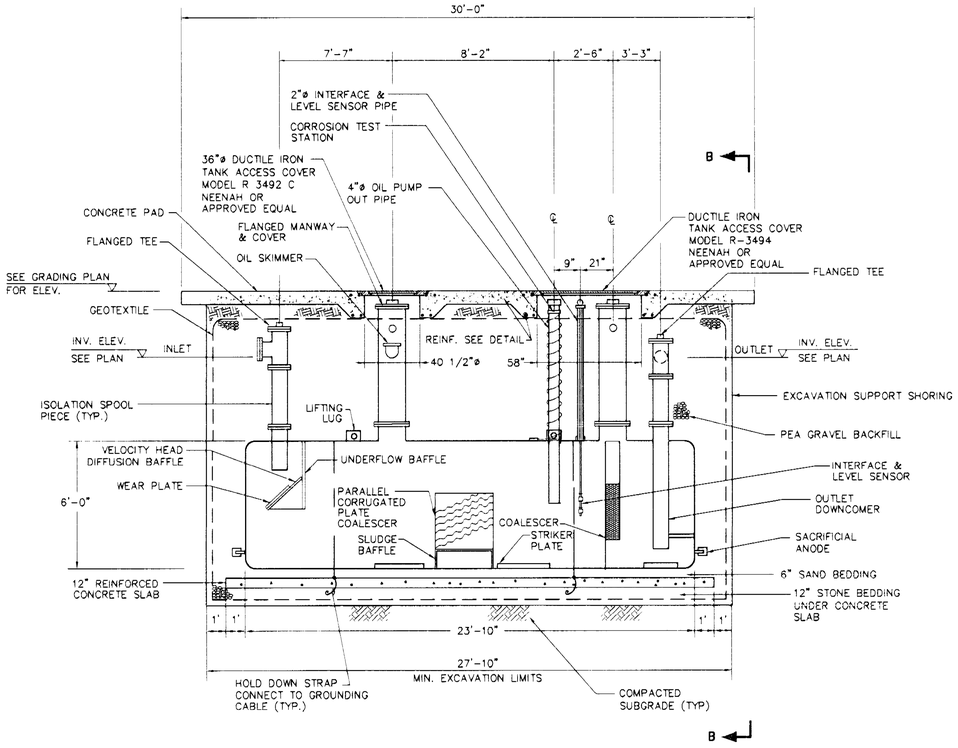
SHEET TITLE: ENLARGEMENT PLAN OIL/WATER SEPARATORS

SCALE: 1" = 20'

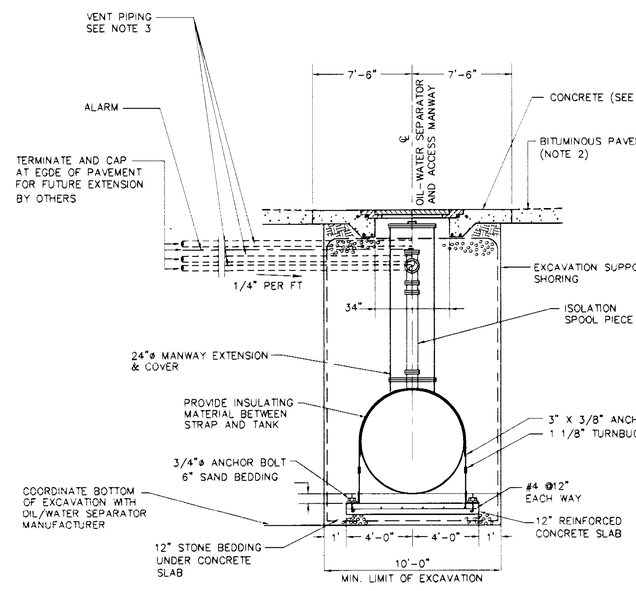
DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-03



ELEVATION
NOT TO SCALE



SECTION B-B
NOT TO SCALE

NOTES:

1. SEE GRADING PLANS FOR FINISH ELEVATIONS.
2. SEE SHEET P-03 FOR AIRSIDE PAVEMENT DETAIL.
3. INLET AND OUTLET PIPES MUST BE VENTED SEPARATELY, MANWAY PIPES MAY BE MANIFOLDED TOGETHER.
4. FOR DETAIL OF PAVING OVER THE OIL-WATER SEPARATORS SEE SHEET P-05.
5. MANWAY AND TANK ACCESS COVER SHALL HAVE THE NAME "MARTIN STATE AIRPORT" AND THE TYPE OF UTILITY "OIL-WATER SEPARATOR".

ADD ALTERNATE 1 AND 2

AS-BUILTS

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DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TEERAPOL SOMBATPHON — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

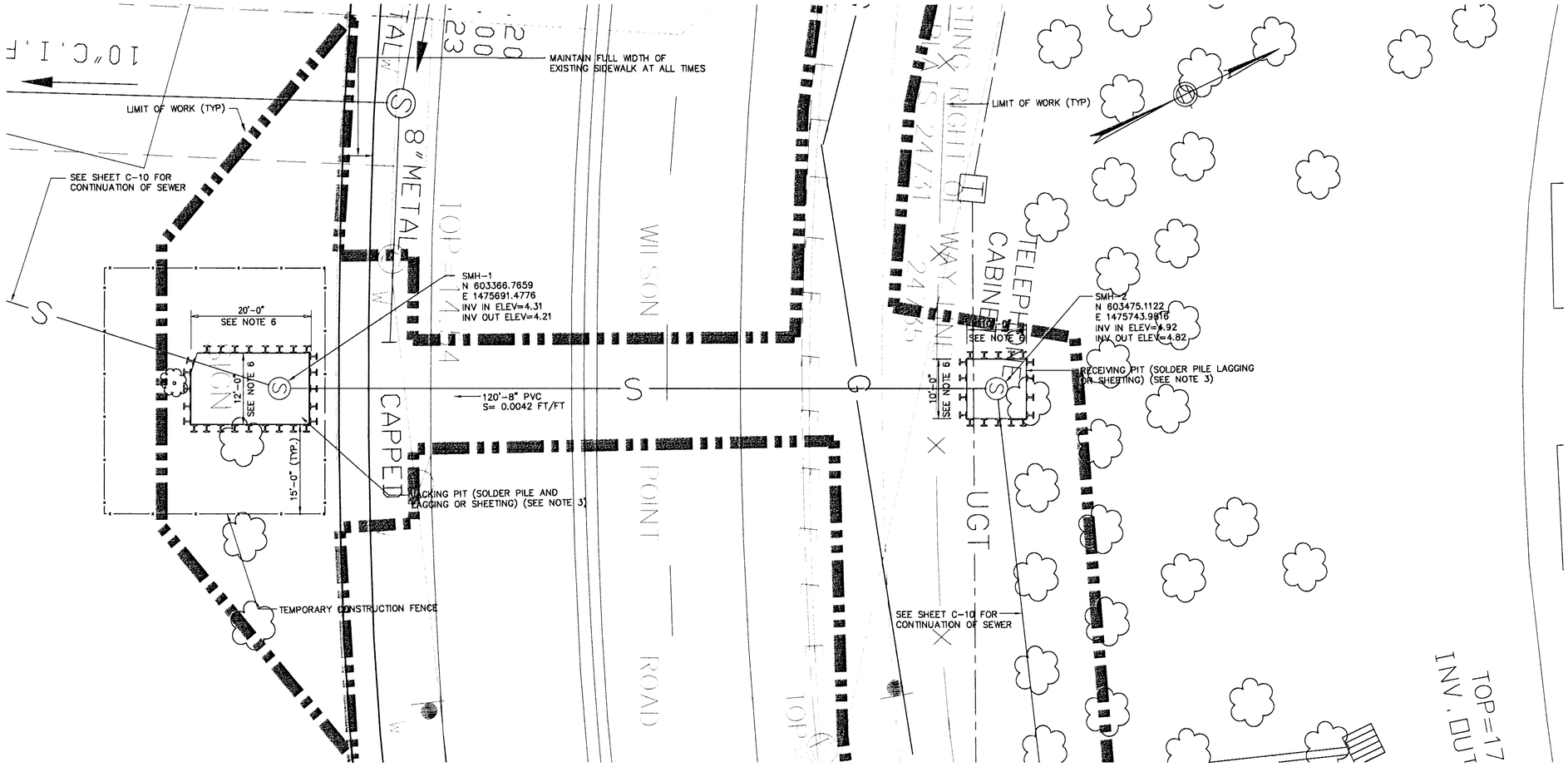
SHEET TITLE: OIL/WATER SEPARATOR DETAILS

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-04



NOTES:

1. CONTRACTOR SHALL CONFIRM ALL LOCATIONS OF EXISTING UTILITIES IN THE FIELD PRIOR TO CONSTRUCTION.
2. CONTRACTOR SHALL SECURE WORKING EASEMENT FOR JACKING PIT PRIOR TO CONSTRUCTION.
3. CONTRACTOR TO CONFIRM SOIL CONDITIONS AND WATER TABLE PRIOR TO EXCAVATION OF JACKING AND RECEIVING PITS.
4. CONSTRUCTION WORKING HOURS WILL BE DEFINED BY THE STATE OF MARYLAND HIGHWAY DEPARTMENT.
5. ALL WORK AREAS SHALL BE PROPERLY SECURED FROM PEDESTRIAN AND VEHICLE TRAFFIC.
6. SUGGESTED MAXIMUM DIMENSIONS ARE SHOWN FOR JACKING AND RECEIVING PITS. CONTRACTOR SHALL SUBMIT COMPLETE JACKING PROCEDURE AND PIT DESIGNS TO THE ENGINEER FOR REVIEW AND APPROVAL BEFORE TO THE BEGINNING WORK.
7. FOR SEWER PROFILE SEE SHEET U-01.
8. SEWER MANHOLE SHALL CONFORM TO BALTIMORE COUNTY STANDARD "48 INCH STANDARD PRECAST MANHOLE TYPE A-2".

AS-BUILTS

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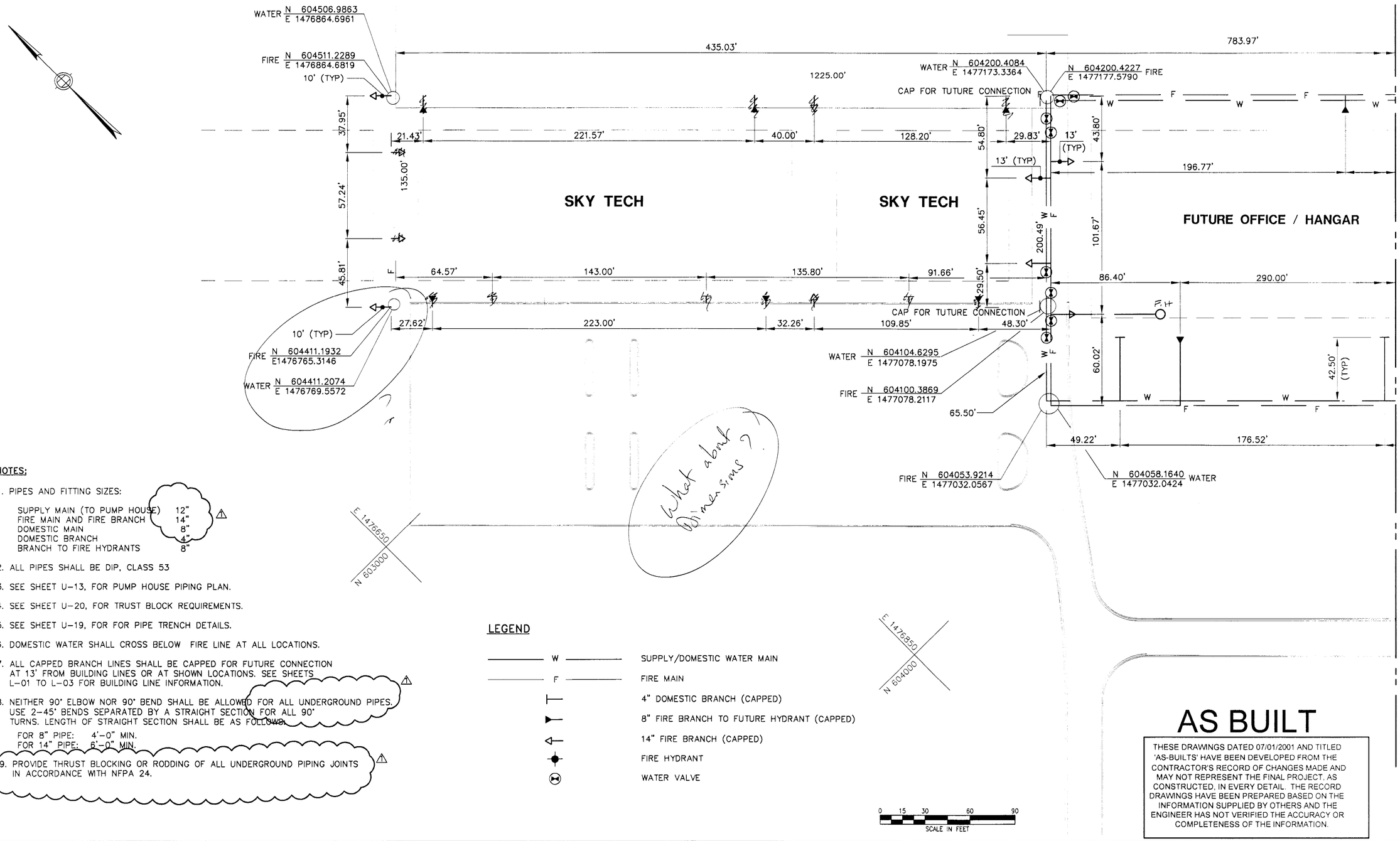
0 5 10 20 30
SCALE IN FEET

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED DMP DRAWN JJN CHECKED TDB APPROVED TS	STATE OF MARYLAND TEERAPOJ SOMBATPIWM LICENSE NO. 12400 REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS	MARTIN STATE AIRPORT	MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE SEWER CROSSING WILSON POINT ROAD SCALE 1" = 10' DATE September 08, 1998	PROJECT NO. MAA-CO-97-019 SHEET NO. U-05



NOTES:

1. PIPES AND FITTING SIZES:

SUPPLY MAIN (TO PUMP HOUSE)	12"
FIRE MAIN AND FIRE BRANCH	14"
DOMESTIC MAIN	8"
DOMESTIC BRANCH	4"
BRANCH TO FIRE HYDRANTS	8"

2. ALL PIPES SHALL BE DIP, CLASS 53
3. SEE SHEET U-13, FOR PUMP HOUSE PIPING PLAN.
4. SEE SHEET U-20, FOR TRUST BLOCK REQUIREMENTS.
5. SEE SHEET U-19, FOR FOR PIPE TRENCH DETAILS.
6. DOMESTIC WATER SHALL CROSS BELOW FIRE LINE AT ALL LOCATIONS.
7. ALL CAPPED BRANCH LINES SHALL BE CAPPED FOR FUTURE CONNECTION AT 13' FROM BUILDING LINES OR AT SHOWN LOCATIONS. SEE SHEETS L-01 TO L-03 FOR BUILDING LINE INFORMATION.
8. NEITHER 90° ELBOW NOR 90° BEND SHALL BE ALLOWED FOR ALL UNDERGROUND PIPES. USE 2-45° BENDS SEPARATED BY A STRAIGHT SECTION FOR ALL 90° TURNS. LENGTH OF STRAIGHT SECTION SHALL BE AS FOLLOWS:
   FOR 8" PIPE: 4'-0" MIN.
   FOR 14" PIPE: 6'-0" MIN.
9. PROVIDE THRUST BLOCKING OR RODDING OF ALL UNDERGROUND PIPING JOINTS IN ACCORDANCE WITH NFPA 24.

LEGEND

W	SUPPLY/DOMESTIC WATER MAIN
F	FIRE MAIN
	4" DOMESTIC BRANCH (CAPPED)
	8" FIRE BRANCH TO FUTURE HYDRANT (CAPPED)
	14" FIRE BRANCH (CAPPED)
	FIRE HYDRANT
	WATER VALVE

0 15 30 60 90
SCALE IN FEET

AS BUILT

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TAMS
TAMS Consultants, Inc.
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2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

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DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TEEKAPOJ SOMBATPIWM — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	11/05/98	REVISED AND ADDED NOTES
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

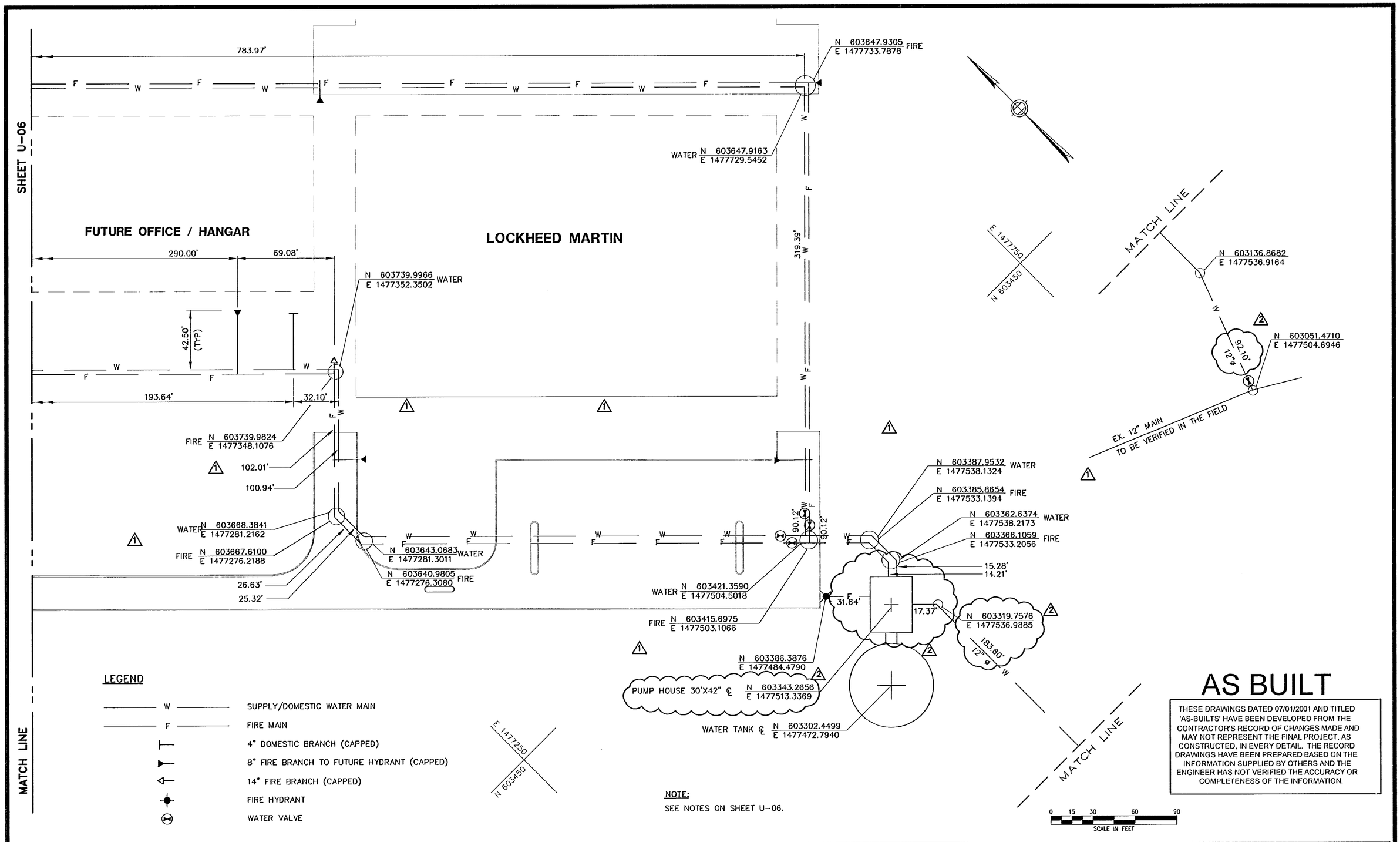
SHEET TITLE: WATER DISTRIBUTION COMPOSITE PLAN I

SCALE: 1" = 30'

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-06



LEGEND

- W — SUPPLY/DOMESTIC WATER MAIN
- F — FIRE MAIN
- 4" DOMESTIC BRANCH (CAPPED)
- 8" FIRE BRANCH TO FUTURE HYDRANT (CAPPED)
- 14" FIRE BRANCH (CAPPED)
- FIRE HYDRANT
- WATER VALVE

NOTE:
SEE NOTES ON SHEET U-06.

AS BUILT

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DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TEKSAPOA SOMBATPIVIM — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	10/21/98	WATER AND FIRE LINE RELOCATION
2	11/05/98	REVISED MAIN SUPPLY AND PUMP HOUSE SIZES
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

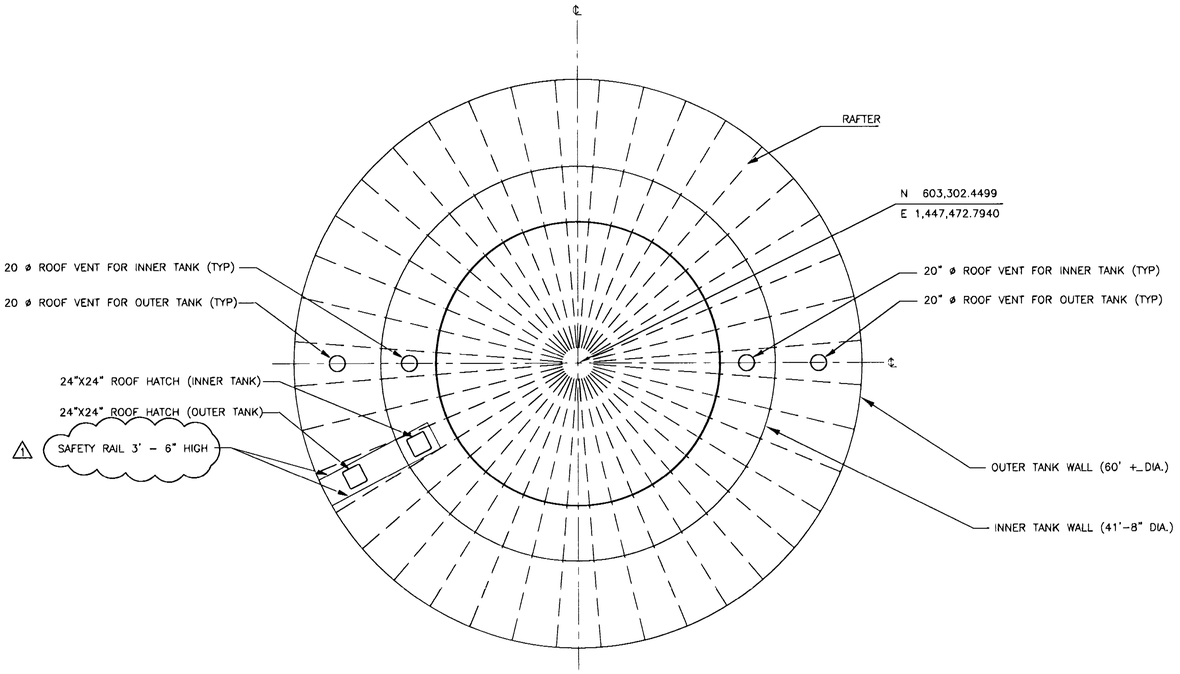
SHEET TITLE: WATER DISTRIBUTION COMPOSITE PLAN II

SCALE: 1" = 30'

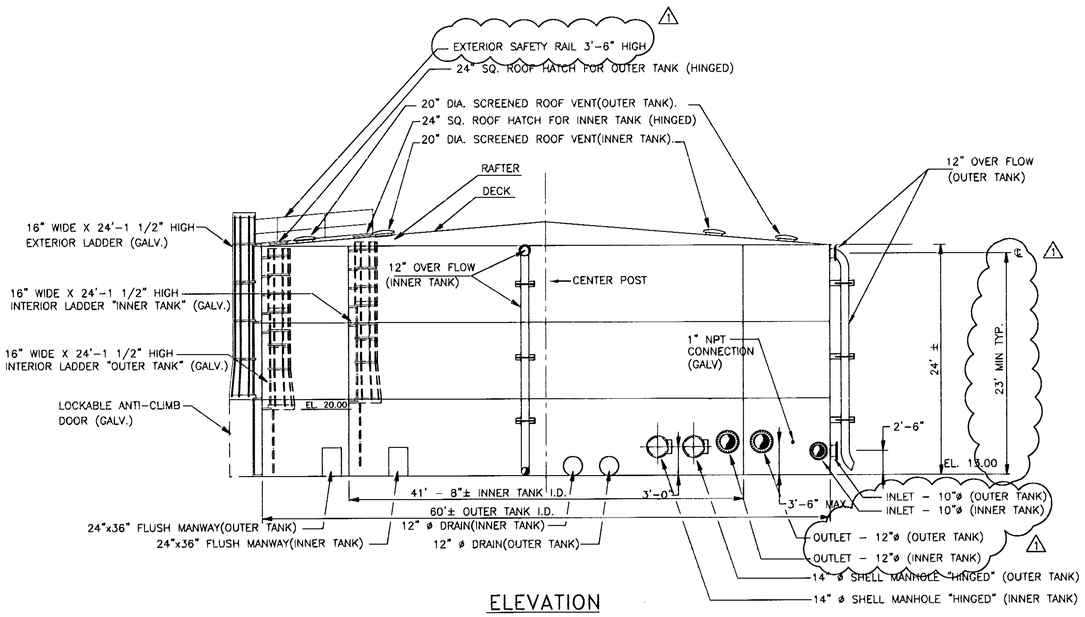
DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

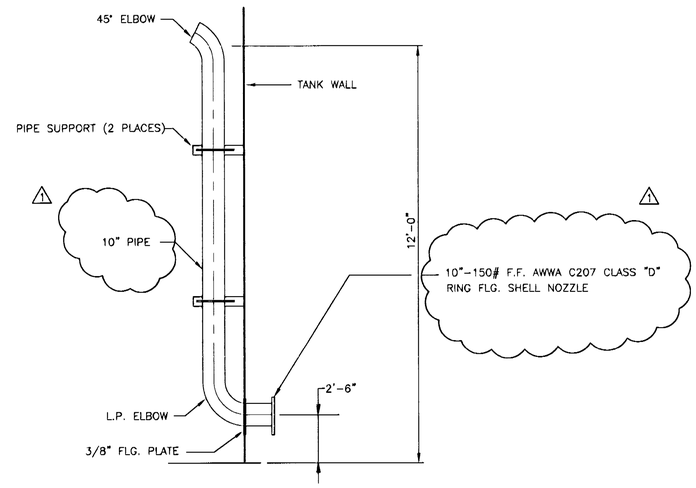
SHEET NO. U-07



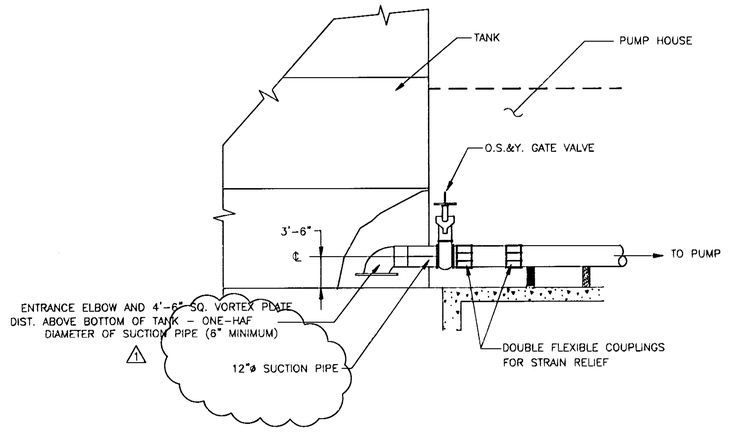
ROOF PLAN



ELEVATION



INLET DETAIL
TYP. FOR BOTH INNER AND OUTER TANK



OUTLET DETAIL
TYP. FOR BOTH INNER AND OUTER TANK

NOTES:

1. TANK SHALL BE FABRICATED, ERECTED AND TESTED IN ACCORDANCE WITH AWWA D103-87 AND THE LATEST EDITION OF BOCA BUILDING CODE.
2. ALL BOLTS & NUTS SHALL BE HOT DIP GALV., GR. 5.
3. TANK BOTTOM SHALL BE VACUUM TESTED PRIOR TO WATER TEST.
4. EXTERIOR COATING COLOR WILL BE SELECTED BY MAA.
5. LOCATIONS OF TANK ACCESSORIES ARE SHOWN FOR GRAPHICAL INFORMATION ONLY. COORDINATE WITH FIRE PUMP AND PUMP HOUSE CONTRACTORS FOR LOCATIONS OF THESE ACCESSORIES.
6. OTHER TANK ACCESSORIES SHALL BE LOCATED OPPOSITE TO PUMP HOUSE OR AS DIRECTED BY THE ENGINEER.

AS-BUILTS

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DESIGNED	FA
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — LICENSED PROFESSIONAL ENGINEER — LICENSE NO. 12488 — TERRANCE SUNKAVALLY

REV.	DATE	REMARKS
1	11/05/98	REVISED PIPE SIZES; REVISED SAFETY RAIL; REVISED DIMENSIONS.

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

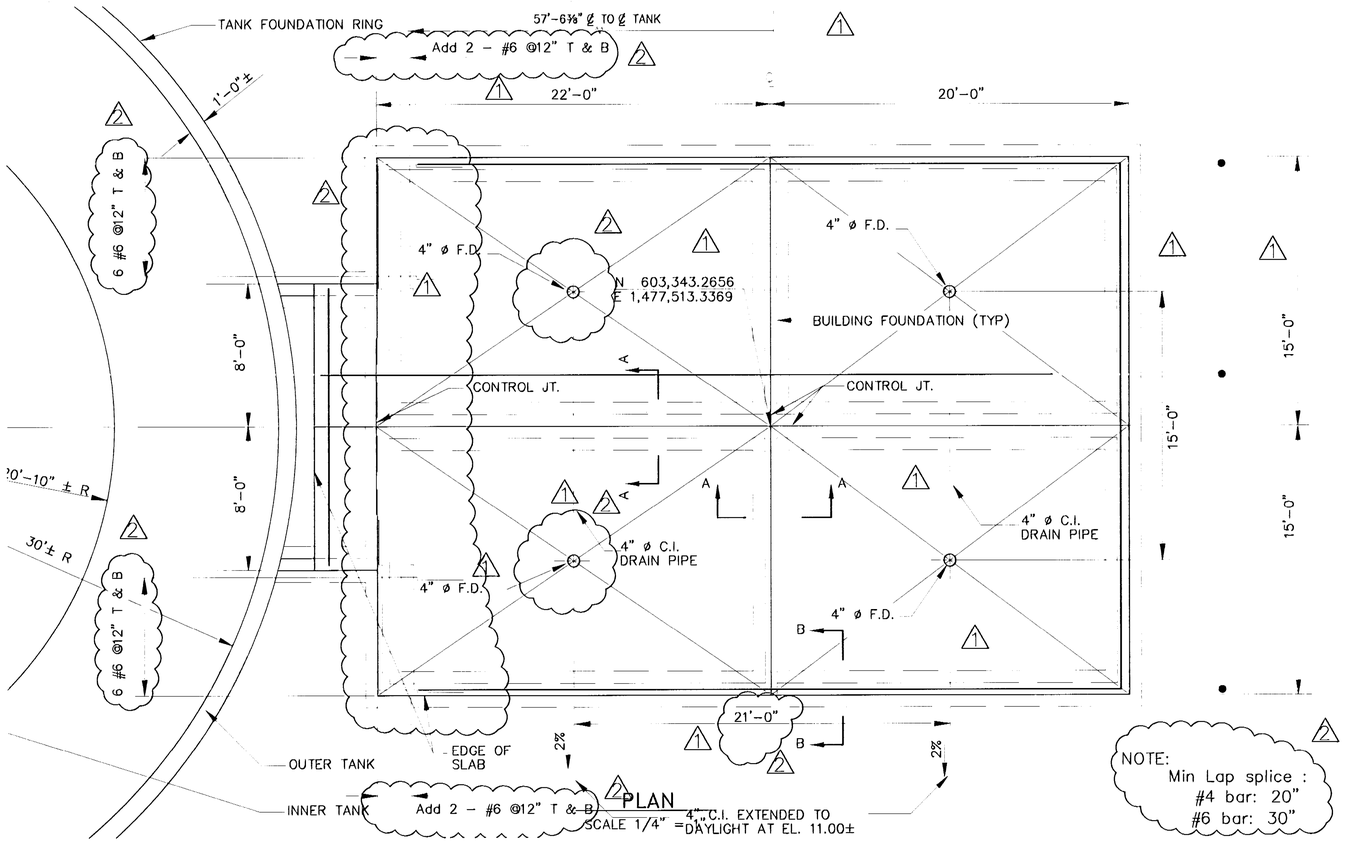
SHEET TITLE: WATER TANK DETAILS

SCALE: NOT TO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

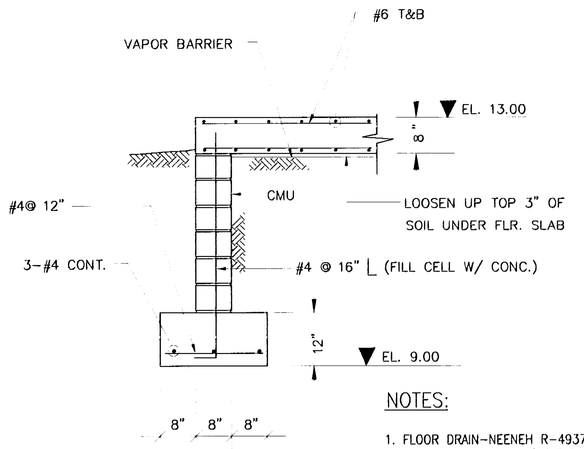
SHEET NO.: U-09



PLAN

SCALE 1/4" = 1'

NOTE:
Min Lap splice :
#4 bar: 20"
#6 bar: 30"

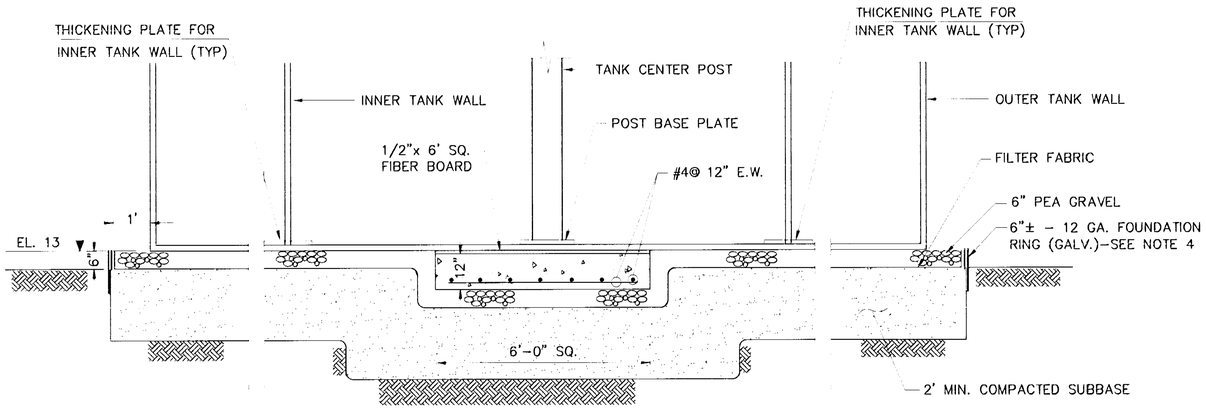


SECTION B–B

SCALE 3/4" = 1'

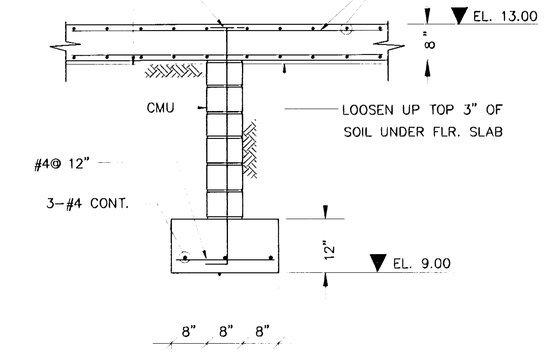
NOTES:

1. FLOOR DRAIN–NEENEH R–4937–B OR APPROVED EQUAL. COORDINATE WITH FIRE PUMP SUPPLIER FOR LOCATIONS.
2. FILL SPACE WITH COMPACTED SOIL, FLUSH WITH FLOOR SLAB.
3. RAISE CMU TO EL. 13.00 FOR BUILDING FRAME.
4. FOUNDATION RING SHALL CONFORM TO SECT. 11.4 OF AWWA D103–87, TYPE 5 FOUNDATION. SECURE RING WITH 16 GA. x 12" BOLTED GALVANIZED CHANNEL STAKES AT 5' O.C.–2–1/2" x 1 1/4" GALV. BOLTS AND NUTS.
5. CONCRETE MASONRY UNIT (CMU): GRADE N–11, ASTM C–90.
6. MORTAR FOR MASONRY: TYPE M, ASTM C–270.
7. BUILDING FLOOR SHELL BE PITCHED TO DRAIN AND AWAY FROM PUMPS, CONTROLLERS, TANKS, AND OTHER EQUIPMENT



TANK FOUNDATION DETAIL

SCALE 1/2" = 1'



SECTION A–A

SCALE 3/4" = 1'

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TEXARKA BOHLAYEVSKI — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	11/05/98	PUMP HOUSE SIZE INCREASED; ADDED FLOOR DRAINS, NOTE 7.
2	04/08/99	PUMP HOUSE SIZE INCREASED, ADDED REBARS SPLICES

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

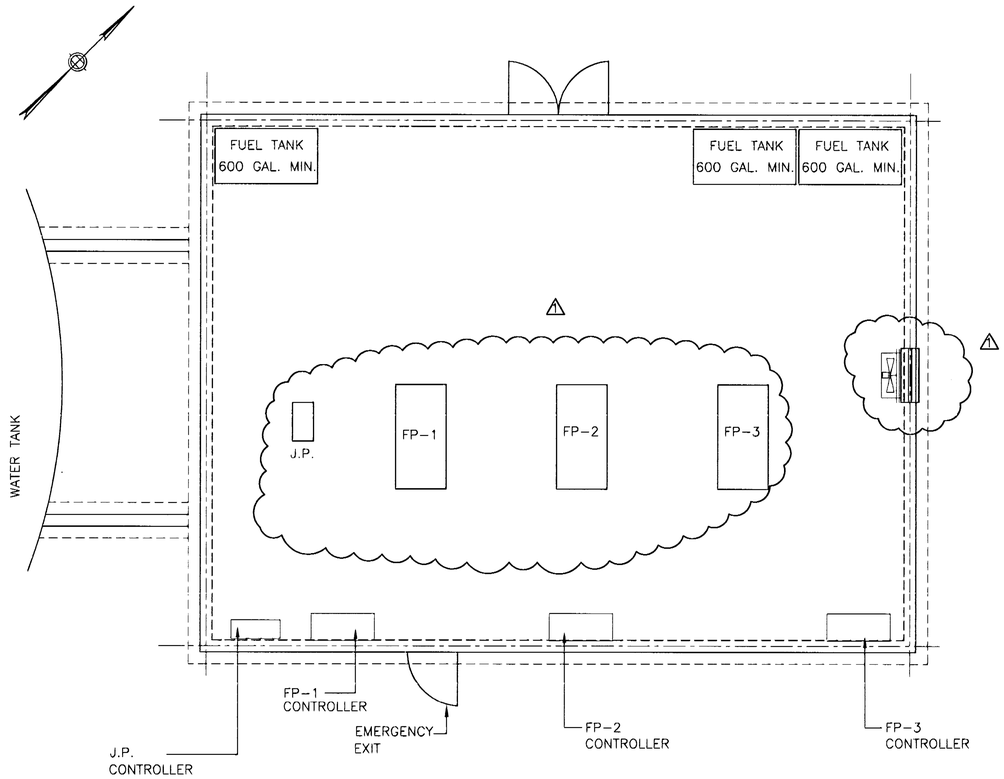
PROJECT NO.: MAA-CO-97-019

SHEET TITLE: TANK AND PUMP HOUSE FOUNDATION PLAN AND DETAILS

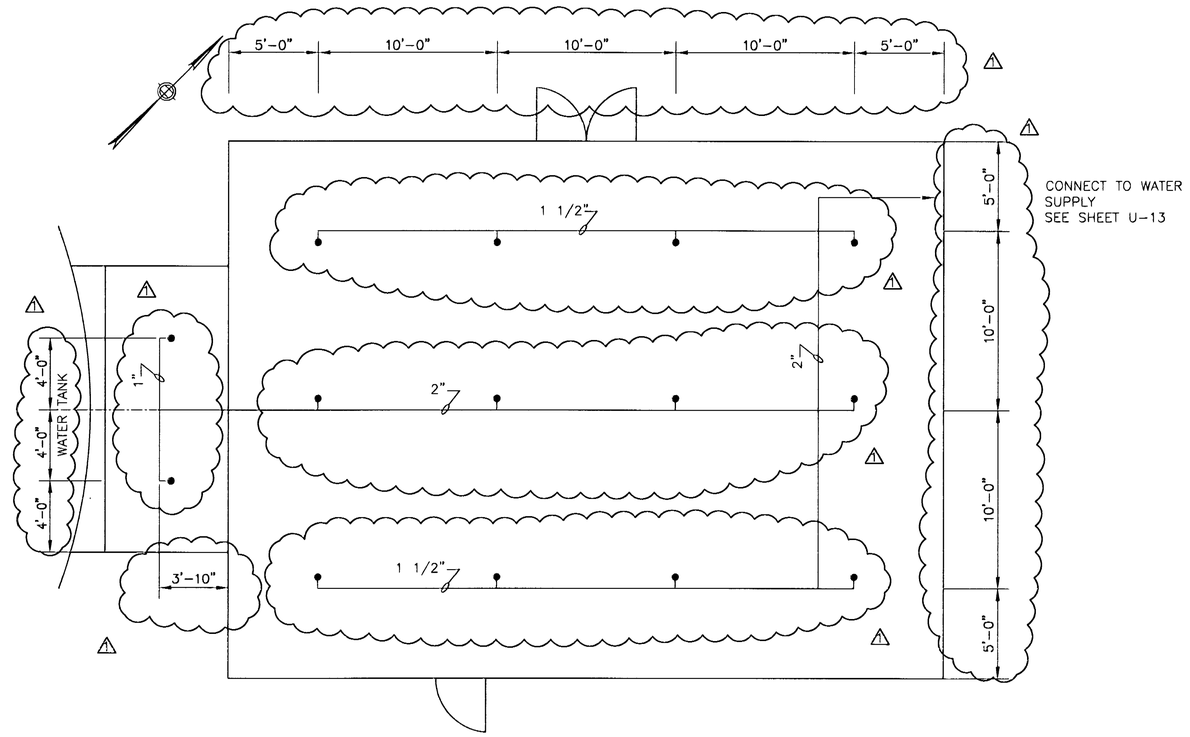
SHEET NO.: U-10

SCALE: AS SHOWN

DATE: September 08, 1998



EQUIPMENT PLAN



SPRINKLER PLAN

NOTES:

1. EQUIPMENT PLAN SHOWN MAY BE REVISED BY THE CONTRACTOR TO IMPROVE THE SYSTEM LAYOUT, CIRCULATION, AND MAINTENANCE SPACE UPON APPROVAL BY THE ENGINEER.
2. SEE SHEET NO. U-13 AND U-14 FOR PIPING, ALARM AND DIESEL FUEL SYSTEM SCHEMATIC DIAGRAMS.

NOTES:

1. SPRINKLER SHALL BE A COMPLETE WET-PIPE, HYDRAULICALLY CALCULATED, AUTOMATIC SPRINKLER SYSTEM FOR THE FIRE PUMP HOUSE INCLUDING: ALARM CHECK VALVE AND ASSOCIATED TRIM, CHECK VALVES, PIPING AND ASSOCIATED EQUIPMENT, AND SPRINKLER HEADS. SYSTEM SHALL BE CONNECTED TO WATER SUPPLY AS INDICATED.
2. INSTALLATION SHALL CONFORM TO NFPA STANDARD NOS. 13, 14 AND 70 AND BOCA-NATIONAL BUILDING CODE, LATEST EDITION.

AS-BUILTS

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STATE OF MARYLAND
TEXAPOJ SOMSATPIWM
LICENSE NO. 12480
REGISTERED
PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	11/05/98	REVISED SPRINKLER AND EQUIPMENT PLANS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

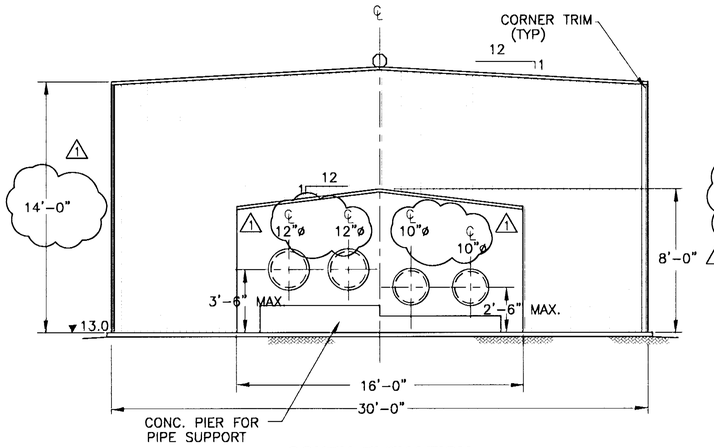
SHEET TITLE: PUMP HOUSE EQUIPMENT AND SPRINKLER PLAN

SCALE: NO SCALE

DATE: September 08, 1998

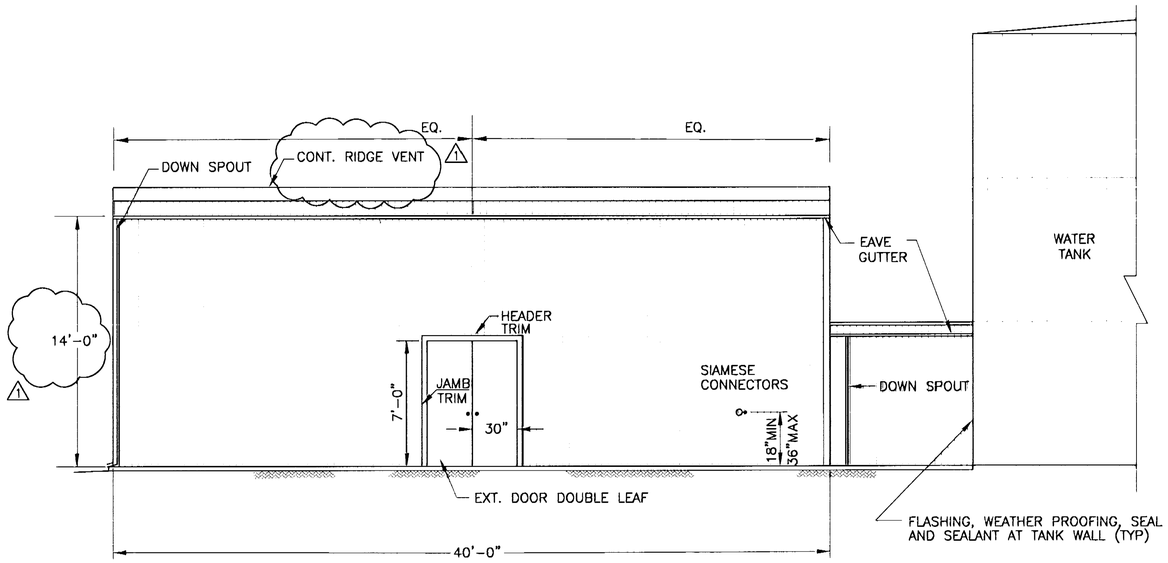
PROJECT NO. MAA-CO-97-019

SHEET NO. U-11



SOUTH ELEVATION

SCALE: 1/4" = 1'-0"

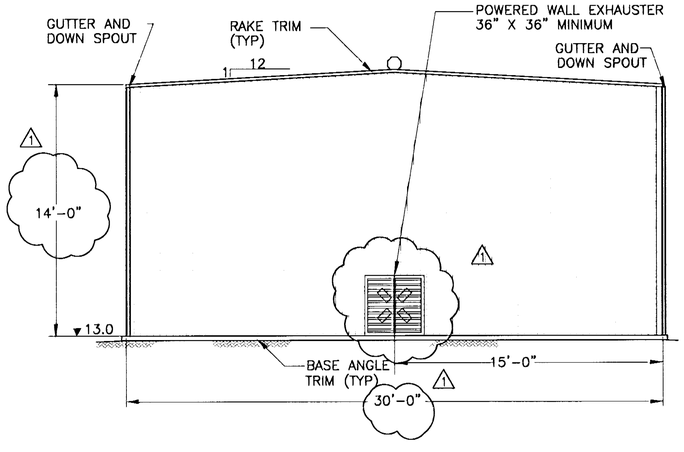


WEST ELEVATION

SCALE: 1/4" = 1'-0"

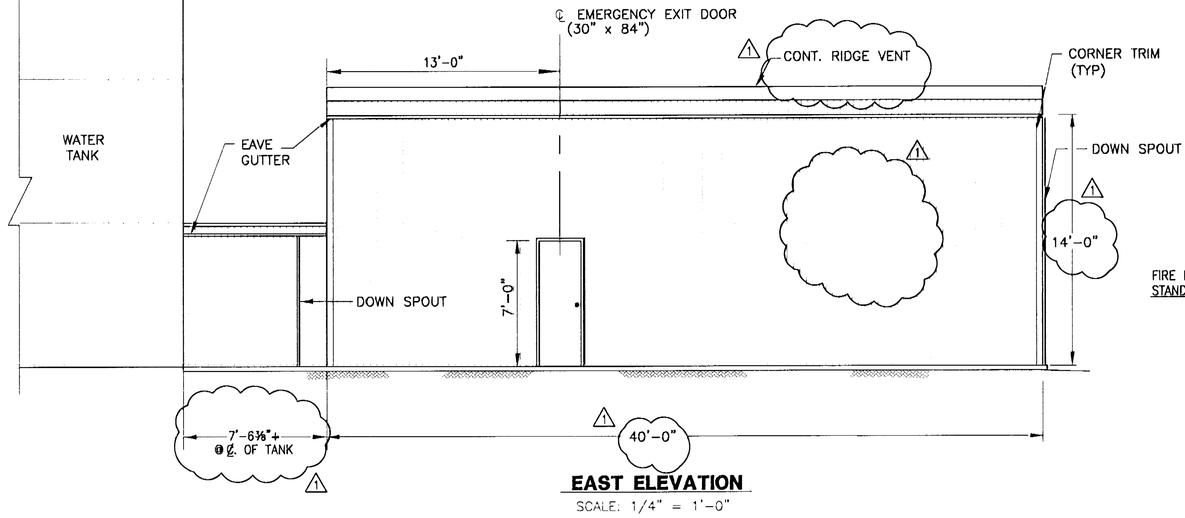
NOTES:

1. PROVIDE OPENINGS AND/OR SUPPORTS AT WALLS AND ROOF FOR FUEL VENTS AND FILL LINES, MUFFLER AND EXHAUST SYSTEM FOR DIESEL WATER PUMP, SIAMESE AND TEST MANIFOLD CONNECTORS. COORDINATE WITH FIRE PUMP CONTRACTOR FOR QUANTITIES, SIZES AND LOCATIONS.
2. PROVIDE 18"x24"x4" CONCRETE SPLASH BLOCK AT EACH DOWN SPOUT.
3. PROVIDE EMERGENCY LIGHTS AND INTERIOR EXIT SIGN ABOVE EACH DOOR
4. PROVIDE AND INSTALL ONE (1) FIRE EXTINGUISHER INSIDE THE BUILDING ON APPROVED BRACKETS AT 5'± FROM EMERGENCY EXIT DOOR COMPLETE WITH 9"x12" GLOW-IN-THE-DARK, 20-GA. STEEL SIGN.
5. FIRE EXTINGUISHER SHALL BE PORTABLE, RECHARGEABLE, CLASS B/C RATING, 20 LB. CAPACITY, MEETING OR EXCEEDING ANSI/UL299, ULC-S504.
6. ALL DOORS SHALL HAVE STAINLESS STEEL KICK PLATE.
7. PROVIDE FIRE DEPARTMENT COMBINED AUTOMATIC SPRINKLER/ STANDPIPE CONNECTION SIGNS WHERE APPLICABLE.



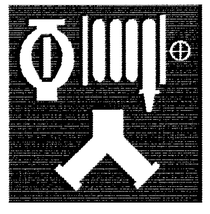
NORTH ELEVATION

SCALE: 1/4" = 1'-0"



EAST ELEVATION

SCALE: 1/4" = 1'-0"



FIRE DEPARTMENT COMBINED AUTOMATIC SPRINKLER/ STANDPIPE CONNECTION SIGNS WHERE APPLICABLE.

AS-BUILTS

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0 1 2 4 6
SCALE IN FEET

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STATE OF MARYLAND — TERESA'S SIGNATURE — LICENSE NO. 12400 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	11/05/98	REVISE PUMP HOUSE SIZES; AND ACCESSORIES

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

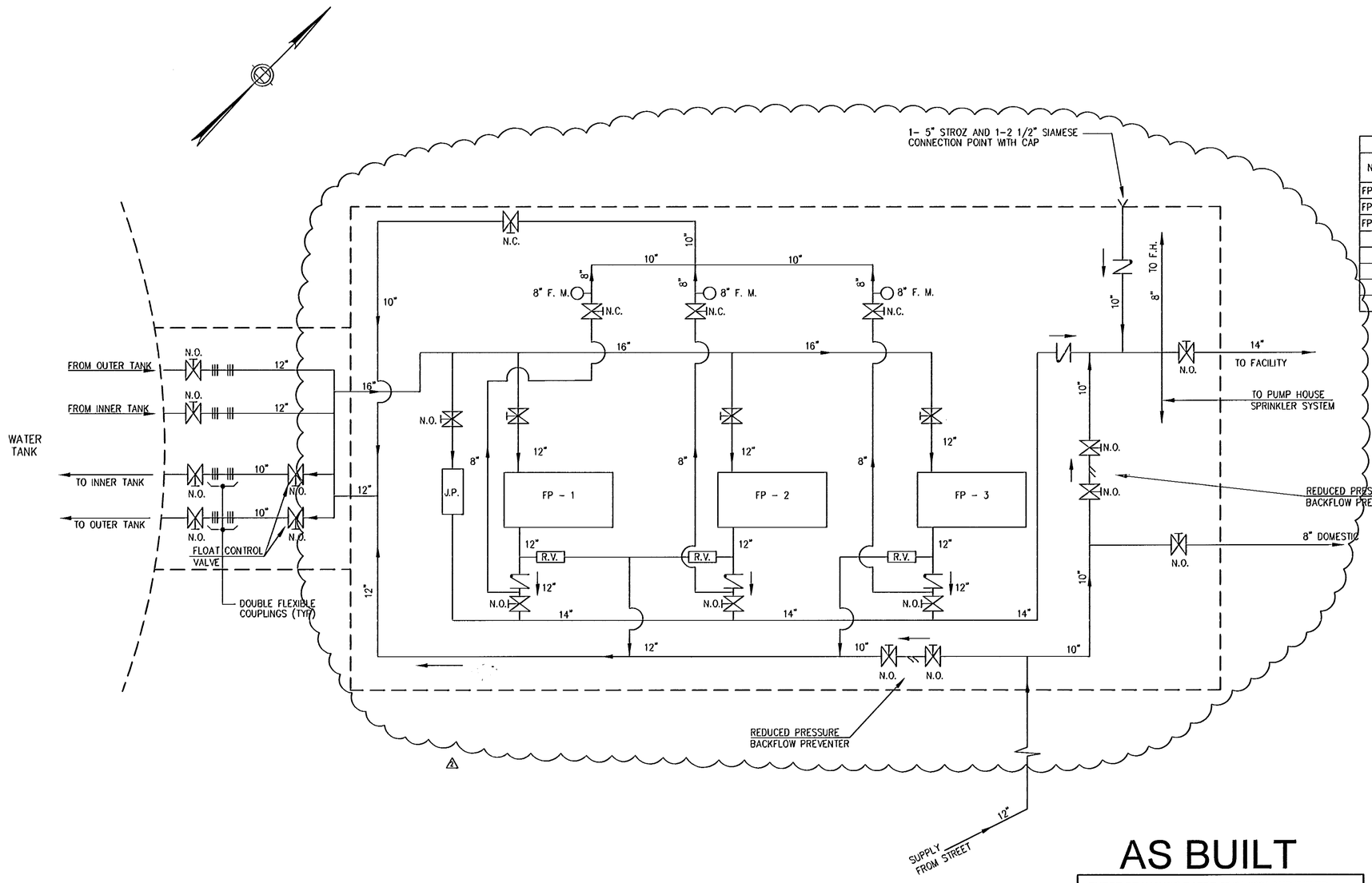
PROJECT NO.: MAA-CO-97-019

SHEET TITLE: PUMP STATION BUILDING ELEVATIONS

SCALE: 1/4" = 1'

DATE: September 08, 1998

SHEET NO.: U-12



SCHEMATIC DIAGRAM

PUMP SCHEDULE					
NO.	G.P.M.	HEAD (IN FEET)	BHP	ELECTRICAL CHARACTERISTICS	REMARKS
FP-1	3000	300	363	N/A	DIESEL DRIVEN PUMP
FP-2	3000	300	363	N/A	DIESEL DRIVEN PUMP
FP-3	3000	300	363	N/A	DIESEL DRIVEN PUMP
			⚠1		

NOTES:

1. PROVIDE A COMPLETE FIRE PUMP SYSTEM AS SHOWN INCLUDING (3) HORIZONTAL SPLIT-CASE CENTRIFUGAL-TYPE FIRE PUMPS INCLUDING DIESEL-ENGINE DRIVER, FUEL STORAGE AND TRANSFER EQUIPMENT AND ASSOCIATED TRIM, CHECK VALVES, SIAMESE CONNECTIONS, FLOW METER, CONTROL VALVES, PIPING AND ASSOCIATED EQUIPMENT, LISTED FIRE PUMP CONTROLLERS, JOCKEY PUMPS AND JOCKEY PUMP CONTROLLERS. SYSTEM SHALL BE CONNECTED TO WATER SUPPLY AS INDICATED.
2. ALL FIRE PROTECTION SYSTEM WORK AND INSTALLATION SHALL CONFORM WITH ALL APPLICABLE CODES, RULES AND REGULATION OF THE STATE OF MARYLAND, INCLUDING NFPA STANDARD NUMBERS: 13, 14, 20, 24, 37, 70, 72A, 101 AND 409, AND BOCA - NATIONAL BUILDING CODE , LATEST APPLICABLE EDITION.
3. ALL FIRE PROTECTION SYSTEM CONTROL VALVES SHALL BE EQUIPPED WITH APPROVED VALVE TAMPER SWITCHES AND SHALL BE SUPERVISED PER NFPA 20,2-11.
4. ALL ELECTRICAL DEVICES FOR FIRE PROTECTION SYSTEM SUPERVISION AND/OR MONITORY SHALL BE COMPATIBLE WITH THE FIRE ALARM SYSTEM.
5. ALL COMPONENTS SHALL BE APPROVED AND LISTED BY RECOGNIZED TESTING LABORATORY FOR INTENDED USE.
6. PERFORMANCE AND ACCEPTANCE TESTS ON ALL SYSTEM COMPONENTS SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR, SUBCONTRACTOR AND FIRE PUMP MANUFACTURER'S REPRESENTATIVE. ALL TESTS SHALL BE WITNESSED BY A REPRESENTATIVE OF THE OFFICE OF THE FIRE MARSHALL (410-859-7815).

   THE FOLLOWING TESTS ARE REQUIRED

   (i) UNDERGROUND
   a. 200 PSI HYDROSTATIC
   b. FLUSH

   ⚠1 FIRE PUMP - NFPA 20-11
   a. 130% OF RATED CAPACITY
   b. STANDPIPE FLOW AS LISTED UNDER NFPA 14, BOCA BUILDING AND MECHANICAL CODE

   (ii) FIRE ALARM - NFPA 72.

7. THE TERM "PROVIDE" SHALL MEAN THE CONTRACTOR SHALL FURNISH NEW, INSTALL AND CONNECT FOR A COMPLETE AND OPERATIONAL SYSTEM FOR ITS INTENDED PURPOSE.
8. N.O. = NORMALLY OPEN VALVE
   N.C. = NORMALLY CLOSE VALVE

⚠1

AS BUILT

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REV.	DATE	REMARKS
⚠1	11/05/98	REVISED SCHEMATIC DIAGRAM; NOTE AND PUMP SCHEDULE; ADDED NOTE 8.
⚠2	05/13/99	REVISED PIPE SIZES; REARRANGED DIAGRAM FOR CLARITY; CHANGE LOCATION OF FLOW METERS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: WATER PUMP AND PIPE DIAGRAM

SCALE: NOT TO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-13

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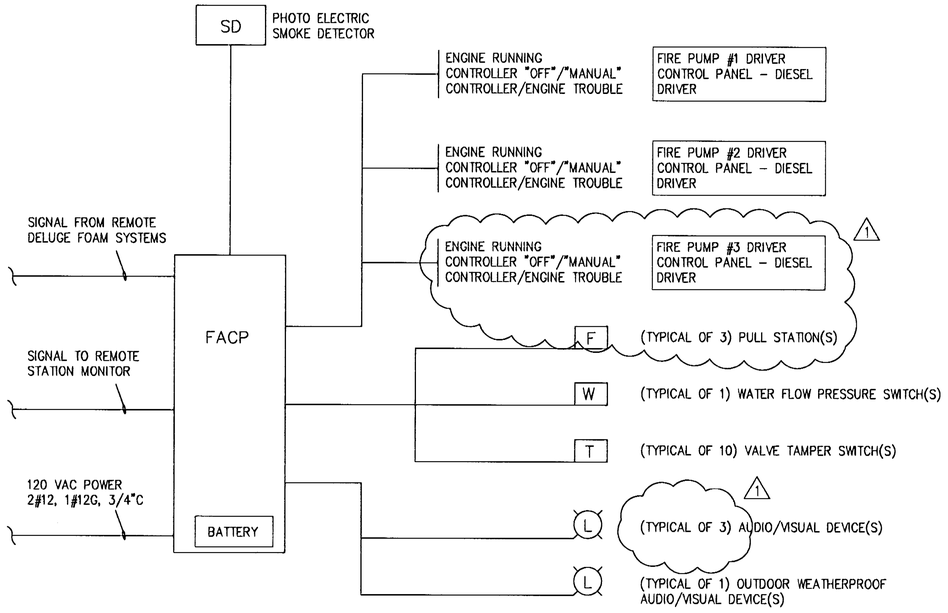
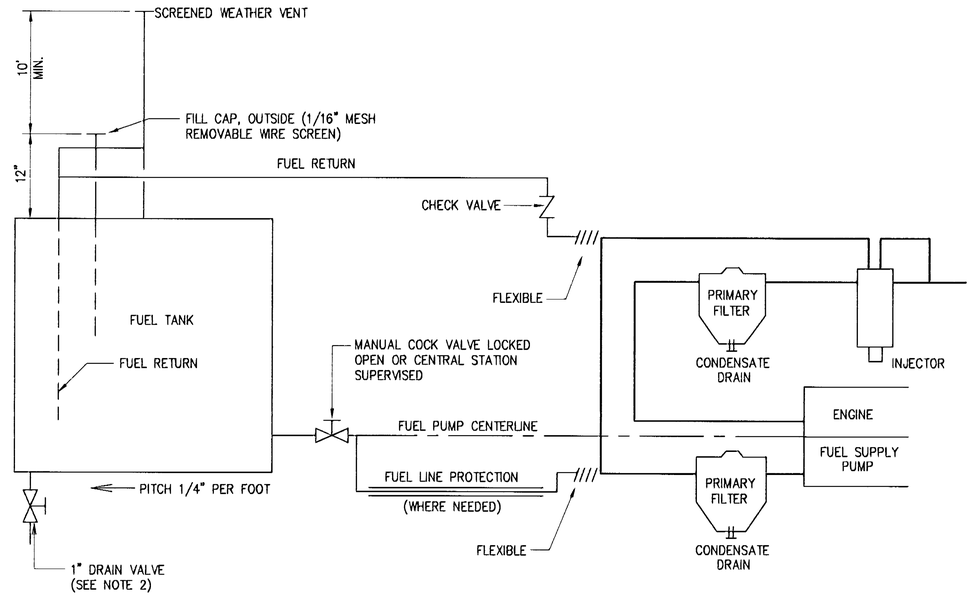


FIRE ALARM RISER DIAGRAM



FIRE PUMP FUEL SYSTEM DIAGRAM

FIRE ALARM SYSTEM NOTES:

1. PROVIDE A COMPLETE FIRE ALARM FOR THE FIRE PUMP HOUSE INCLUDING: ELECTRICALLY/ELECTRONICALLY NON-CODED FIRE ALARM CONTROL PANEL, CONDUIT, PULL BOXES, OUTLET AND MOUNTING BOXES, WIRING, SPRINKLER SYSTEM SUPERVISION AND/OR MONITORING, WATER FLOW ALARMS, TANK LEVEL SUPERVISION AND/OR MONITORING, FIRE PUMP SUPERVISION AND/OR MONITORING, MANUAL PULL STATIONS VISUAL AND AUDIBLE DEVICES, REMOTE FIRE PUMP RUN CONTROL AS WELL AS, ALL OTHER ACCESSORIES AND MISCELLANEOUS ITEMS REQUIRED FOR AN OPERATING SYSTEM EVEN THOUGH EACH ITEM IS NOT SPECIFICALLY MENTIONED, SHOWN, OR DESCRIBED. ALL EQUIPMENT AND DEVICES SHALL BE PROVIDED AS SHOWN ON THE DRAWINGS, DESCRIBED IN THE SPECIFICATIONS AND BE CONNECTED PER SPECIFICATIONS.
2. UNLESS OTHERWISE NOTED OR RECOMMENDED BY THE MANUFACTURER AS PART OF THE WRITTEN AND DOCUMENTED SYSTEM APPROVAL AND LISTING BY A RECOGNIZED TESTING LABORATORY, ALL INDICATING CIRCUIT CONDUCTORS SHALL BE SOLID COPPER, NUMBER 14 AWG, THHN/THWN 600 VAC INSULATED AT A MINIMUM. WIRING CIRCUITS CONNECTING THE 120 VAC POWER SUPPLY SHALL BE NUMBER 12 AWG MINIMUM.
3. MINIMUM CONDUIT SIZE FOR ALL FIRE ALARM RELATED WORK SHALL BE 3/4-INCH TRADE SIZE ELECTRIC METALLIC TUBING (EMT) WITH COMPRESSION TYPE FITTINGS. SET SCREW TYPE FITTINGS ARE NOT PERMITTED. PROVIDE LIQUID-TIGHT FLEXIBLE METAL CONDUIT WITH LISTED COMPATIBLE FITTINGS FOR EQUIPMENT CONNECTIONS OF FIRE PUMP RELATED EQUIPMENT, TAMPER SWITCHES, AND FLOW SWITCHES OR WHERE REQUIRED BY NFPA 70.
4. ALL FIRE ALARM SYSTEM WORK AND INSTALLATION SHALL CONFORM WITH ALL APPLICABLE CODES, RULES AND REGULATIONS OF THE STATE OF MARYLAND, NFPA STANDARDS NUMBERS: 70 AND 72A AND BOCA-NATIONAL BUILDING CODE, LATEST APPLICABLE EDITIONS.
5. ALL COMPONENTS SHALL BE APPROVED AND LISTED BY RECOGNIZED TESTING LABORATORY FOR INTENDED USE.
6. PERFORMANCE AND ACCEPTANCE TESTS ON THE SYSTEM SHALL BE THE CONTRACTOR'S RESPONSIBILITY. ALL TESTS SHALL BE WITNESSED BY A REPRESENTATIVE OF THE OFFICE OF THE FIRE MARSHALL (410-859-7815).
7. THE TERM "PROVIDE" SHALL MEAN THE CONTRACTOR SHALL FURNISH NEW, INSTALL AND CONNECT FOR A COMPLETE AND OPERATIONAL SYSTEM FOR ITS INTENDED PURPOSE.
8. ENGINE STARTING SEQUENSE SHALL BE AS FOLLOWS:
   a. FP-1
   b. FP-2
   c. FP-3 (STANDBY PUMP TO START IN THE EVENT OF ANY OF THE ABOVE PUMPS FAILS TO START)

1

FUEL SYSTEM NOTES:

1. COORDINATE WITH PUMP MANUFACTURER FOR SIZE OF FUEL PIPING, OTHER ACCESSORIES AND/OR REQUIREMENTS.
2. IF SUBJECTED TO FREEZING, PROVIDE 1" DRAIN PLUG INSTEAD.
3. FUEL SYSTEM AND INSTALLATION SHALL CONFORM WITH ALL APPLICABLE CODES, RULES AND REGULATIONS OF THE STATE OF MARYLAND, NFPA STANDARD NOS. 20, 30 AND 37 AND BOCA NATIONAL BUILDING CODE, LATEST EDITION.
4. OIL TANK SHALL CONFORM WITH UL 80 STANDARD.

1

1

AS-BUILTS

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REV.	DATE	REMARKS
1	11/05/98	REVISED FIRE ALARM RISER DIAGRAM; ADDED NOTES

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

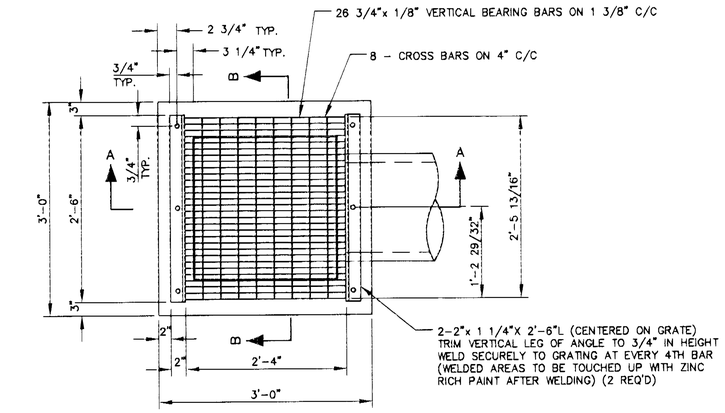
SHEET TITLE: PUMP HOUSE FIRE ALARM AND DIESEL FUEL SYSTEM DIAGRAMS

SCALE: NO SCALE

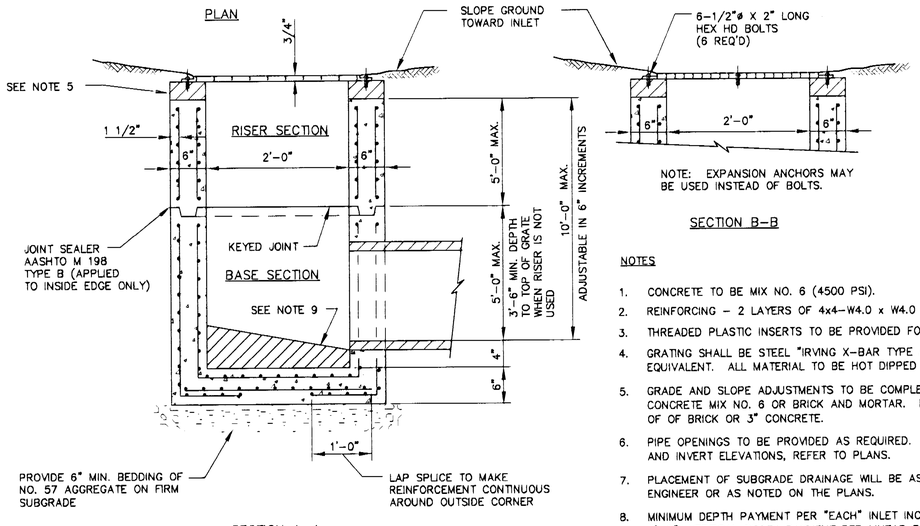
DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-14



PLAN



SECTION A-A

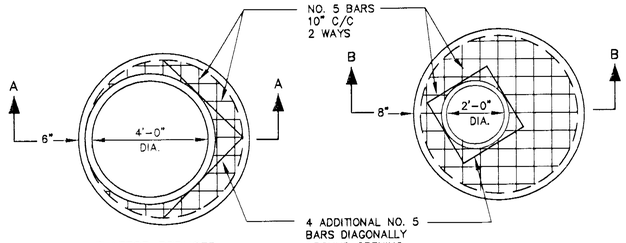
NOTE: EXPANSION ANCHORS MAY BE USED INSTEAD OF BOLTS.

SECTION B-B

NOTES

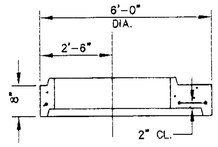
1. CONCRETE TO BE MIX NO. 6 (4500 PSI).
2. REINFORCING - 2 LAYERS OF 4x4-W4.0 x W4.0 WELDED WIRE FABRIC.
3. THREADED PLASTIC INSERTS TO BE PROVIDED FOR HANDLING.
4. GRATING SHALL BE STEEL "IRVING X-BAR TYPE AA" OR APPROVED EQUIVALENT. ALL MATERIAL TO BE HOT DIPPED GALVANIZED STEEL.
5. GRADE AND SLOPE ADJUSTMENTS TO BE COMPLETED IN THE FIELD USING CONCRETE MIX NO. 6 OR BRICK AND MORTAR. MINIMUM ONE LAYER OF OF BRICK OR 3" CONCRETE.
6. PIPE OPENINGS TO BE PROVIDED AS REQUIRED. FOR SIZE, LOCATION AND INVERT ELEVATIONS, REFER TO PLANS.
7. PLACEMENT OF SUBGRADE DRAINAGE WILL BE AS DIRECTED BY THE ENGINEER OR AS NOTED ON THE PLANS.
8. MINIMUM DEPTH PAYMENT PER "EACH" INLET INCLUDES DEPTHS UP TO 3'-6". VERTICAL DEPTH PAYMENT PER LINEAR FOOT FOR DEPTHS IN EXCESS OF 3'-6".
9. INVERT TO BE CONCRETE OR BRICK AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER. (INVERT PROVIDED IN THE FIELD)

PRECAST YARD INLET
NTS

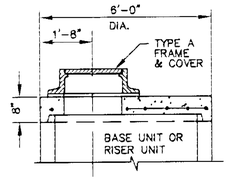


FLATTOP REDUCER

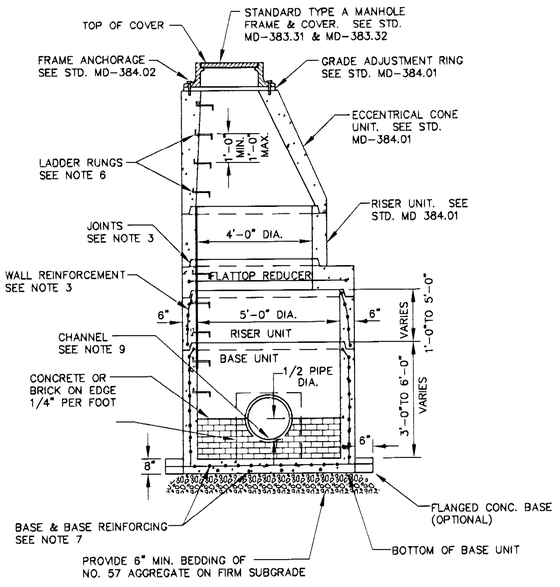
FLAT SLAB TOP



SECTION A-A



SECTION B-B



PRECAST CONCRETE MANHOLE
NTS

NOTES

1. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASSHTO M 199.
2. CONCRETE SHALL BE MIX NO. 6 (4500 PSI)
3. WALL REINFORCEMENT FOR BASE UNITS, RISER UNITS AND ECCENTRICAL CONE UNITS SHALL BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.15 IN./2 FT. FOR THE 60" DIAMETER MANHOLES. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185 AND A82. REINFORCEMENT BARS SHALL MEET ASTM A615 GRADE 60.
4. BASE REINFORCEMENT TO BE REINFORCEMENT BARS OR WELDED WIRE FABRIC WITH A MINIMUM AREA OF 0.17 IN/2 FT. THE BASE SHALL BE CAST MONOLITHIC WITH THE BASE UNIT OR JOINTED PER MANUFACTURER'S DESIGN.
5. THE MANUFACTURER SHALL FORM MALE AND FEMALE ENDS OF JOINTS USING THEIR OWN DESIGN. THE JOINTS SHALL BE SEALED BY THE CONTRACTOR AND MADE WATERTIGHT USING (WHERE APPLICABLE) MORTAR, RUBBER O-RING GASKETS MEETING ASTM C361 AND C443 OR FLEXIBLE PLASTIC GASKETS MEETING AASHTO M 198 TYPE B.
6. LADDER RUNGS SHALL BE INSTALLED IN VERTICAL ALIGNMENT AT 1'-4" MAXIMUM C/C. RUNG TYPES SHALL BE IN ACCORDANCE WITH STANDARDS MD-383.91 OR MD-383.92. LADDER RUNGS SHALL BE INCIDENTAL TO THE COST OF THE MANHOLE.
7. WHEN THE DISTANCE BETWEEN MULTIPLE OPENINGS IN THE BASE UNIT OR ANY RISER UNIT IS LESS THAN 6", ADDITIONAL NO. 3 BARS ARE REQUIRED AROUND OPENINGS.
8. LIFT HOLES OR LIFT EYES SHALL BE PROVIDED IN EACH SECTION FOR HANDLING.
9. MIX NO. 2 CONCRETE OR BRICK CHANNEL SHALL BE PROVIDED IN THE FIELD AND SHALL SLOPE 2" PER FOOT TOWARD OUTLET OR AS DIRECTED BY THE ENGINEER.
10. THE DRIP STONE LANDING SHALL BE USED ONLY WHEN THERE ARE PIPES CONNECTED TO THE RISER UNITS. SEE STD. MD-384.13 FOR DETAILS.
11. MINIMUM DEPTH PAVEMENT PER EACH SHALL BE 5'-1" MEASURED FROM THE BOTTOM OF THE BASE UNIT TO THE TOP OF THE MANHOLE COVER. VERTICAL DEPTH PAVEMENT PER LINEAR FOOT SHALL INCLUDE ALL DEPTHS IN EXCESS OF 5'-1". THE COST OF THE DRIP STONE LANDING, NO. 57 AGGREGATE, GROUT, SEALANT AND ALL NECESSARY APPURTENANCES SHALL BE INCIDENTAL TO THE PRICE BID.

AS-BUILTS

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DRAWN	POE
CHECKED	TDB
APPROVED	TS

STATE OF MARYLAND
THERESA DOMBATHIAN
LICENSE NO. 12488
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: DRAINAGE DETAILS I

SCALE: NOT TO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-15

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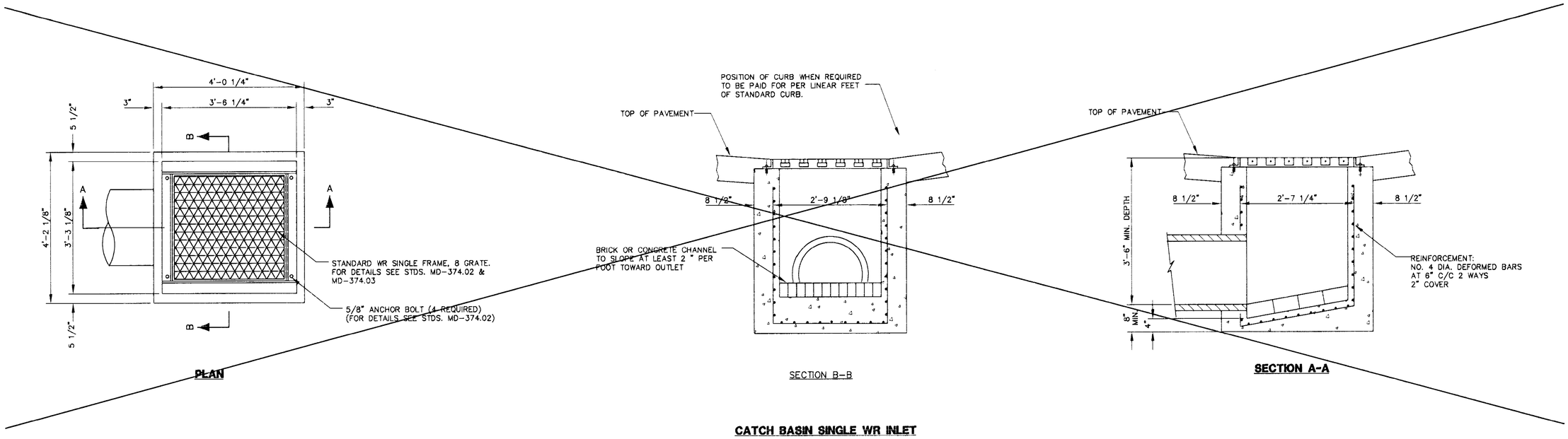
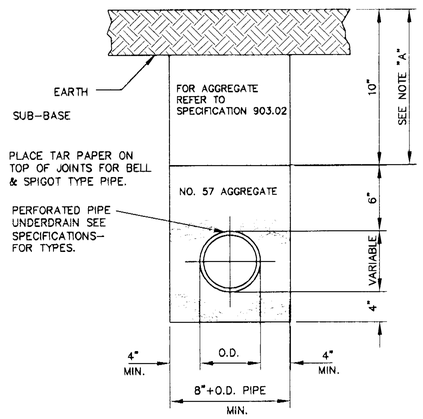


CATCH BASIN SINGLE WR INLET

NTS

NOTES

1. INLET SHALL BE CONSTRUCTED OF P-610 CONCRETE.
2. SIZE, TYPE AND DIRECTION OF OUTLET PIPE WILL VARY TO SUIT EACH CASE AND THE INVERT WILL BE ALTERED ACCORDINGLY.
3. BRICK FOR MASONRY TO COMPLY WITH THE LATEST S.H.A. SPECIFICATIONS. ALL MATERIAL TO BE HOT DIPPED GALVANIZED STEEL.
4. IF LADDER RUNGS ARE REQUIRED, SEE STANDARD MD-383.91 OR MD-383.92.

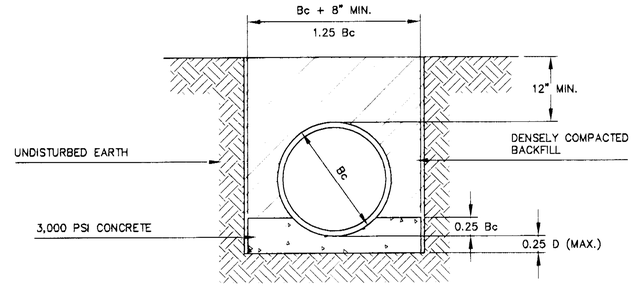


NOTE:

"A". WHERE UNDERDRAIN IS OUTLETTED INTO AN INLET, OR WHERE ANY OTHER UNUSUAL CONDITIONS PREVAIL, THESE DIMENSIONS MAY BE VARIED AS DIRECTED.

SUB-SURFACE DRAINAGE DITCH SECTION

NTS



CONCRETE CRADLE TRENCH BEDDING

NTS

Bc = PIPE OUTSIDE DIAMETER
D = PIPE INSIDE DIAMETER

AS-BUILTS

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TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED TDB DRAWN POE CHECKED TDB APPROVED TS	STATE OF MARYLAND TEERAPOJ SOMBATPIRIN LICENSE NO. 12400 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: DRAINAGE DETAILS II SCALE: NOT TO SCALE DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. U-16

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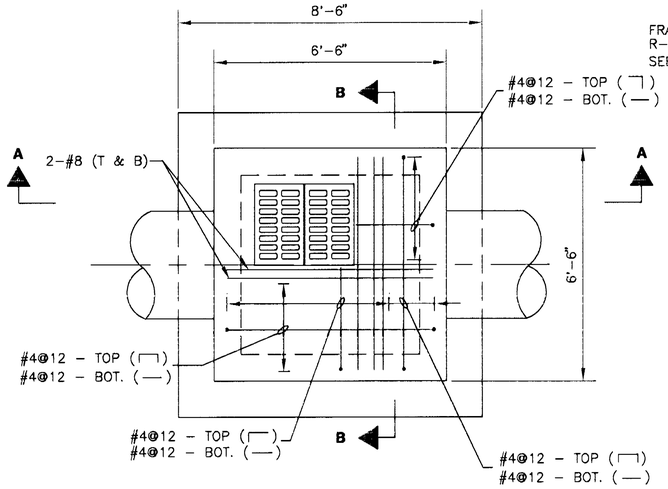
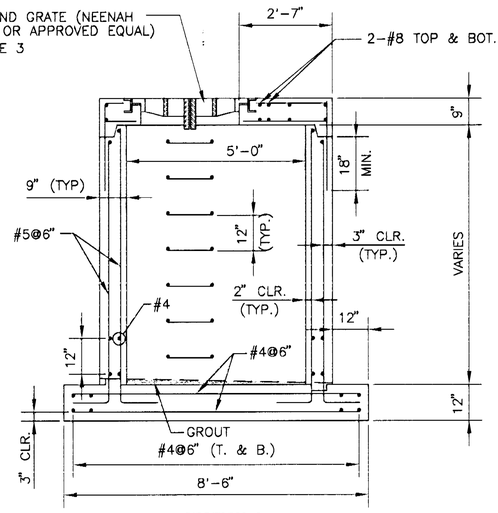
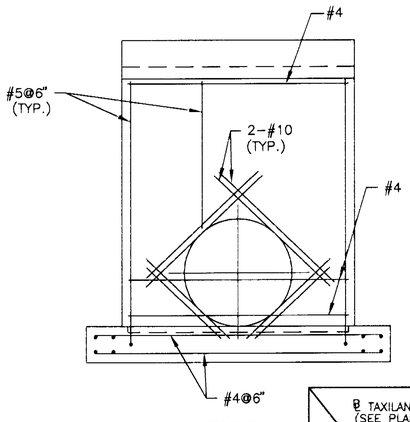


PLAN VIEW



SECTION A

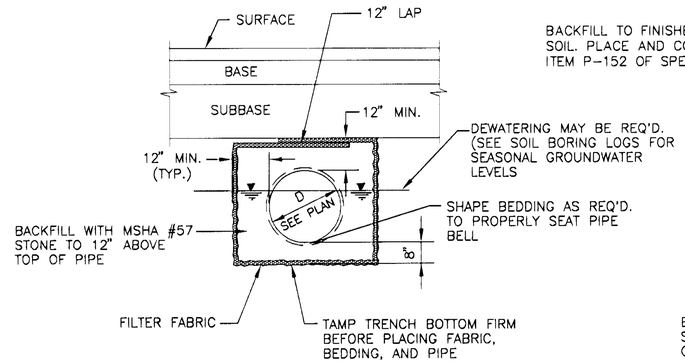


SECTION B

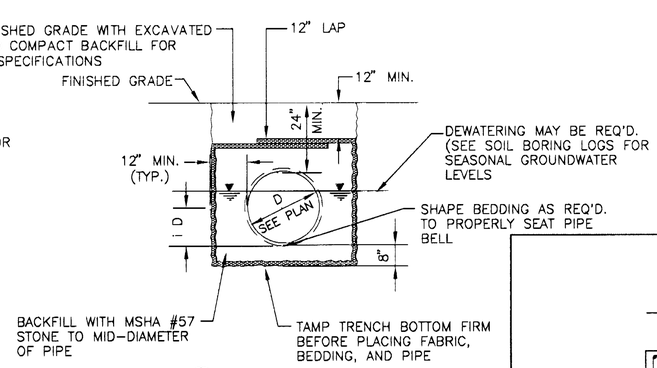
DRAINAGE STRUCTURE TYPE 1 AND AIRSIDE MANHOLE
NOT TO SCALE

NOTES:

1. PIPE INSTALLED UNDER THIS CONTRACT WILL BE INSTALLED AS SHOWN IN DETAIL (A) THIS SHEET, EXCEPT AS NOTED ON THE PLANS.
2. TEMPORARY SHEETING, SHORING, DEWATERING, AND OTHER METHODS OF PREVENTING OR PROTECTING AGAINST CAVE IN OR OTHER HAZARDS SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY AND SHALL BE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL LAWS.
3. DEWATERING SHALL BE MAINTAINED THROUGH THE INSTALLATION OF THE DRAINAGE SYSTEM AS REQUIRED.
4. PIPE UP TO AND INCLUDING 24" DIAMETER SHALL BE C-WALL CLASS IV PIPE MEETING THE REQUIREMENTS OF ASTM C 76. PIPE 27" IN DIAMETER AND LARGER SHALL BE THIKEST-WALL CLASS B-25 PIPE MEETING THE REQUIREMENTS OF ASTM C 361.



(A) **UNDER PAVEMENT**

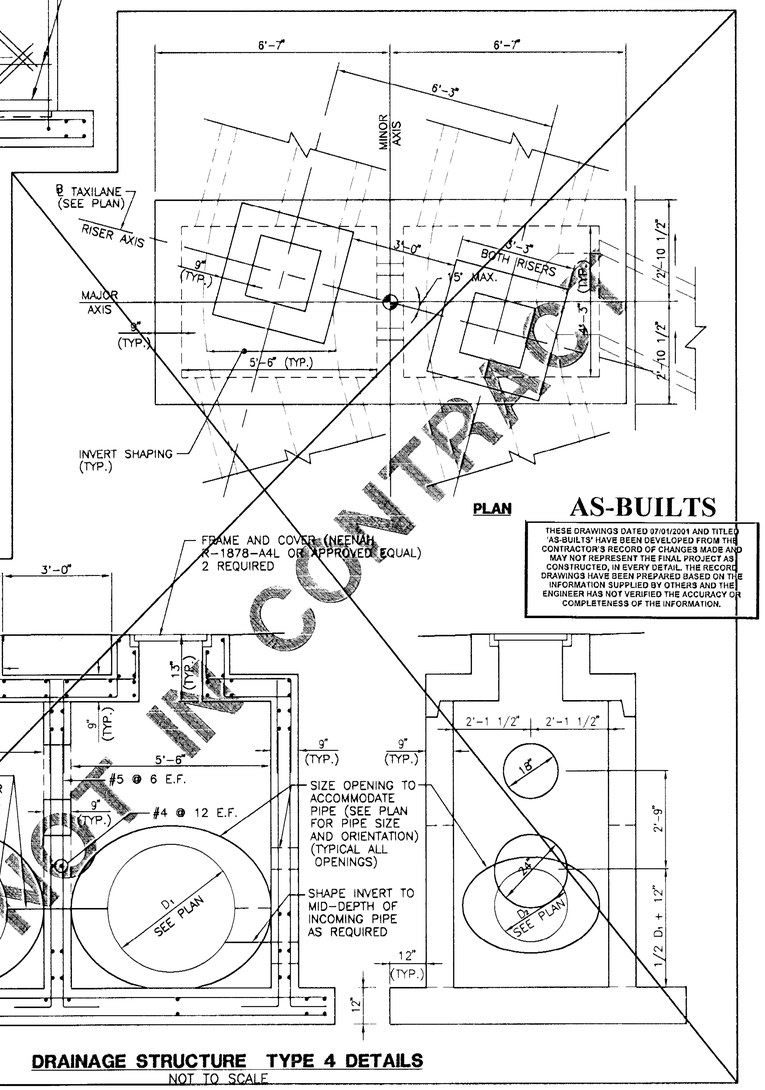


(B) **UNDER TURFED AREAS**

TYPICAL STORMDRAIN PIPE BEDDING DETAILS
NOT TO SCALE

NOTES:

1. CONCRETE SHALL MEET THE REQUIREMENTS OF ITEM P-610. CONCRETE USED FOR INVERT SHAPING ONLY MAY BE 3000 PSI AT CONTRACTOR'S OPTION.
2. STRUCTURE LOCATIONS AND APPROXIMATE ORIENTATIONS ARE SHOWN ON SHEETS C-04 AND C-05. STRUCTURES SHALL BE ORIENTED TO MINIMIZE THE ANGLES BETWEEN THE STRUCTURE AND INCOMING PIPE. THE MAXIMUM SKEW BETWEEN THE RISER AXIS AND MAJOR AXIS SHALL BE 15°.
3. FOR MH OPENING, SIZE SHALL BE 24" x 24". MH FRAME AND COVER (NEENAH R-6662-HR OR APPROVED EQUAL).
4. PROVIDE OPENINGS OR KNOCK-OUT PANELS FOR FUTURE PIPE AS SHOWN ON PLANS.



DRAINAGE STRUCTURE TYPE 4 DETAILS
NOT TO SCALE

AS-BUILTS

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NOT IN CONTRACT

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CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — THEODORE SOMMATINO — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

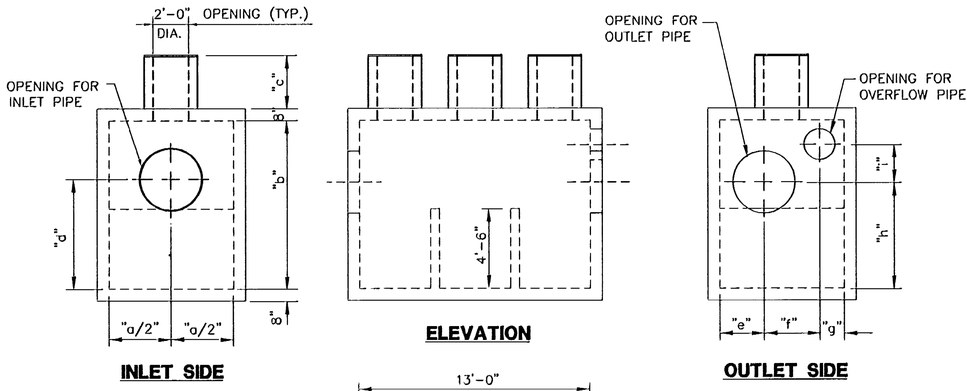
SHEET TITLE: DRAINAGE DETAILS III

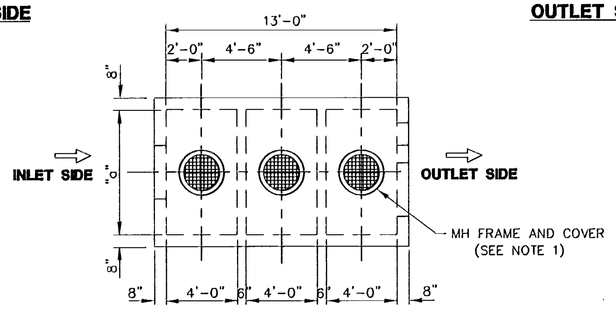
SCALE: NONE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-17

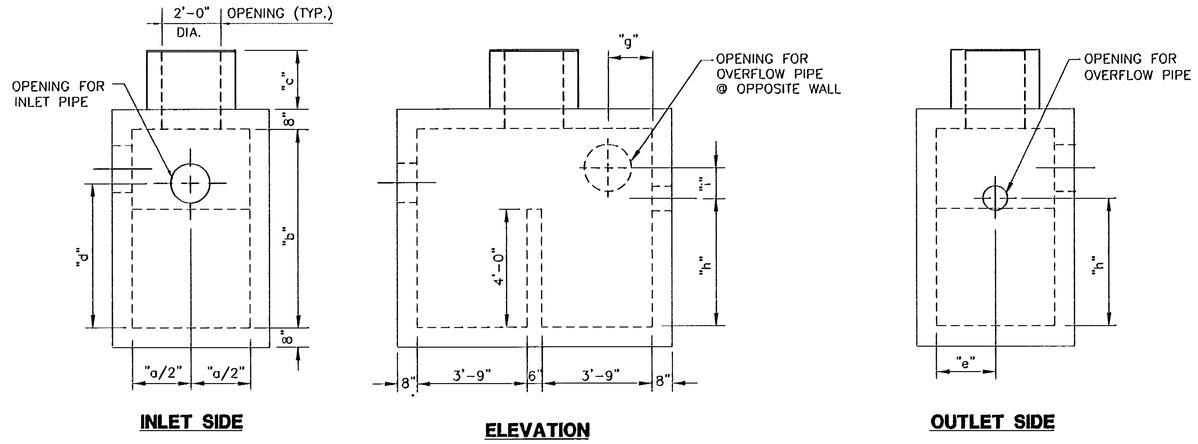


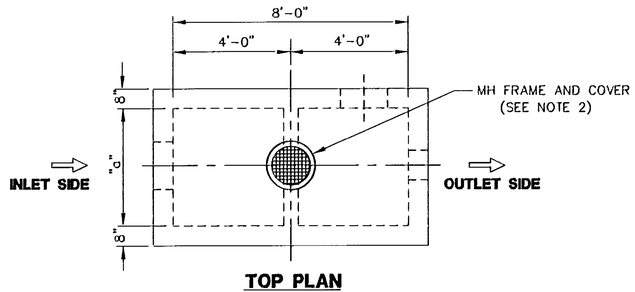


TOP PLAN

SEDIMENT CHAMBER TYPE I DETAIL

NOT TO SCALE





TOP PLAN

SEDIMENT CHAMBER TYPE II DETAIL

NOT TO SCALE

SED. CHAMBER NO.	STRUCT. TYPE	INLET PIPE DIA.	OUTLET PIPE DIA.	OVERFLOW PIPE DIA.	DIMENSIONS									REMARKS
					a	b	c	d	e	f	g	h	i	
1-1	I	1-36" 1-18"	1-36"	1-12"	6'-6"	8'-9"	3'-0"	6'-3"	2'-3"	3'-0"	1'-3"	6'-0"	1'-7i"	BASE PROJECT
~~2-1~~	~~I~~	~~1-30"~~	~~1-30"~~	~~1-12"~~	~~6'-6"~~	~~8'-9"~~	~~–~~	~~5'-11"~~	~~2'-3"~~	~~3'-0"~~	~~1'-3"~~	~~5'-9"~~	~~1'-9"~~	N.I.C.
~~2-2~~	~~I~~	~~1-42"~~	~~1-42"~~	~~1-15"~~	~~7'-9"~~	~~10'-0"~~	~~1'-0"~~	~~6'-5"~~	~~2'-9"~~	~~3'-7i"~~	~~1'-4i"~~	~~6'-3"~~	~~2'-4i"~~	N.I.C.
3-1	I	1-27"	1-27"	1-12"	6'-0"	~~7'-8"~~ ⚠	~~3'-10i"~~	5'-9i"	2'-1i"	2'-7i"	1'-3"	5'-7i"	0'-7i"	ADD ALT. 1 OR 2
3-2	I	1-42"	1-42"	1-15"	7'-9"	10'-0"	2'-4"	6'-5"	2'-9"	3'-7i"	1'-4i"	6'-3"	2'-4i"	ADD ALT. 1 OR 2
3-3	I	1-36"	1-36"	1-15"	7'-0"	9'-6"	2'-2"	6'-2"	2'-6"	3'-1i"	1'-4i"	6'-0"	2'-1i"	⚠ ADD ALT. 1 OR 2
A-1	II	1-12"	1-8"	1-12"	4'-0"	6'-9"	2'-0"	4'-8"	2'-0"	–	1'-6"	4'-4"	0'-10"	ADD ALT. 1
A-2	II	1-12"	1-8"	1-12"	4'-0"	6'-9"	1'-11"	4'-8"	⚠ 2'-0"	–	1'-6"	4'-4"	0'-10"	ADD ALT. 2

NOTES:

1. DUCTILE IRON, NEENAH MODEL R-1736 OR APPROVED EQUAL.
2. DUCTILE IRON, NEENAH MODEL R-3492 OR APPROVED EQUAL.
3. SEE SHEET U-18A FOR REINFORCEMENT DETAILS.

AS BUILT

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CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TESSARYA SOMBATPHON — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
⚠	TBD	REVISED DIMENSIONS c, d and i
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

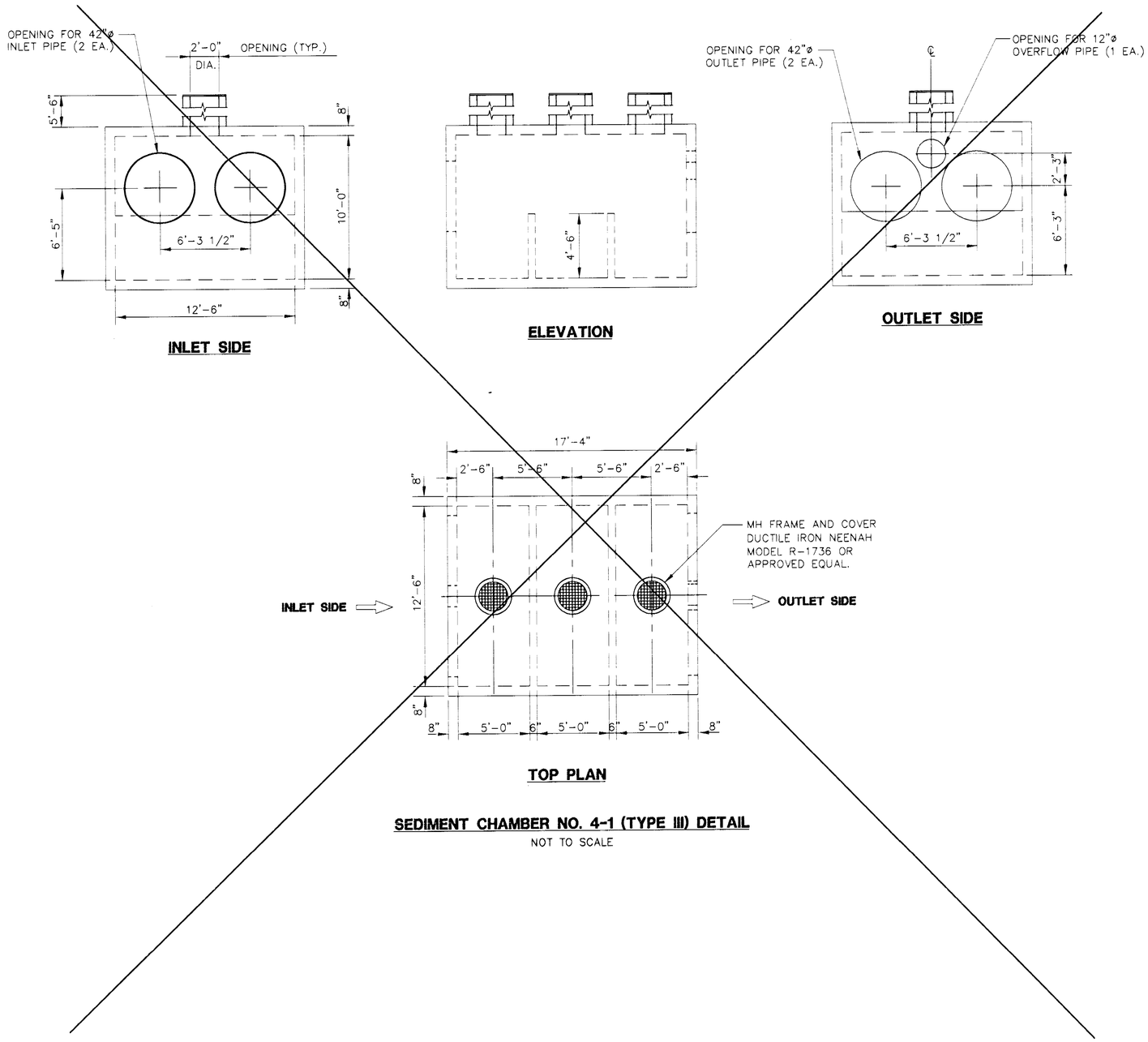
SHEET TITLE: SEDIMENT CHAMBER DETAILS I

SCALE: NONE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-18



INLET SIDE

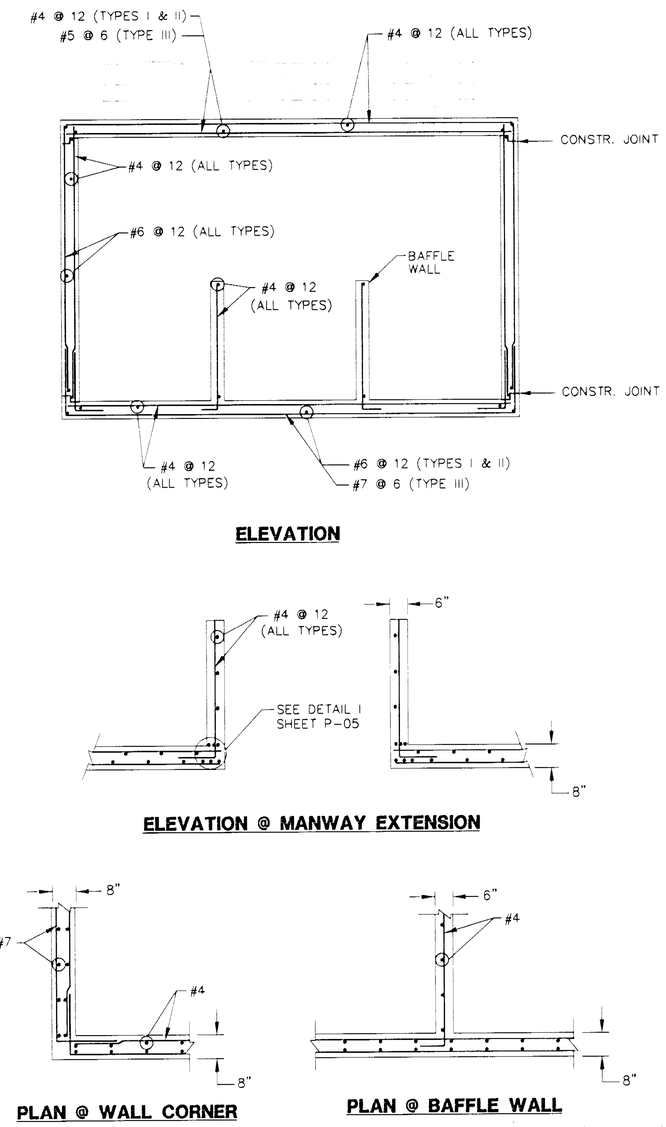
ELEVATION

OUTLET SIDE

TOP PLAN

SEDIMENT CHAMBER NO. 4-1 (TYPE III) DETAIL

NOT TO SCALE



ELEVATION

ELEVATION @ MANWAY EXTENSION

PLAN @ WALL CORNER

PLAN @ BAFFLE WALL

REINFORCEMENT DETAILS

NOT TO SCALE

AS-BUILTS

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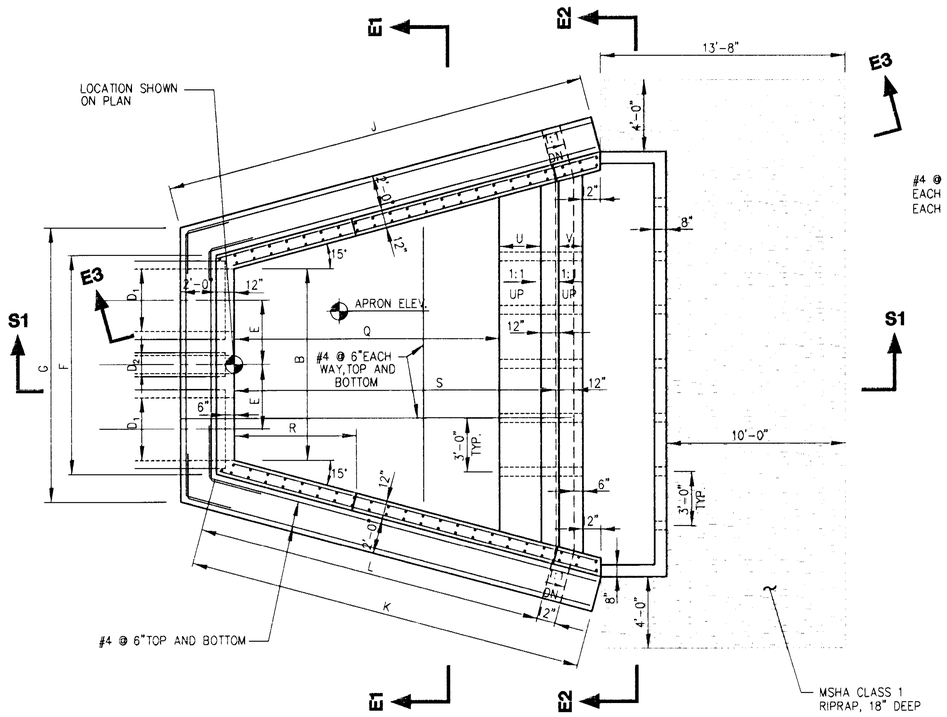
PROJECT NO. MAA-CO-97-019

SHEET NO. U-18A

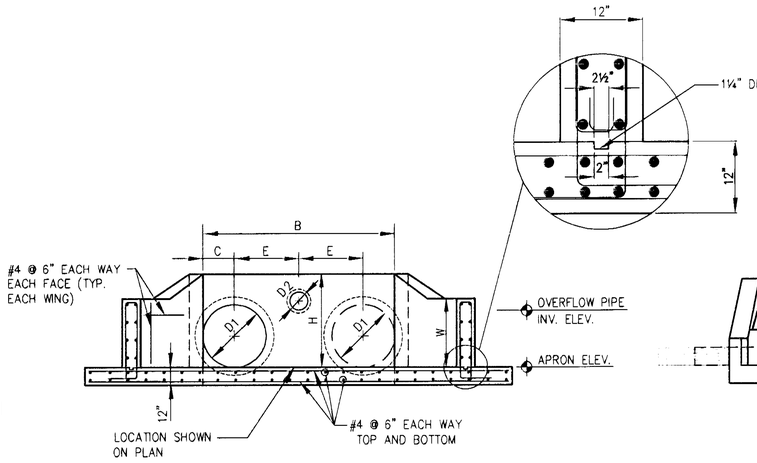
ENDWALL DIMENSION SCHEDULE

	ENDWALL NO.	MAIN DISCHARGE D	MAIN DISCHARGE NO. OF PIPES	MAIN DISCHARGE INVERT ELEV.	OVERFLOW D	OVERFLOW INVERT ELEV.	APRON ELEV.	B	C	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	Z
*	2-1	30"	1	6.16	15"	8.66	6.16	4'-5¼"	1'-3"	2'-6¾"	6'-0"	9'-0¼"	4'-9"	21'-0½"	19'-6"	16'-11"	8'-2½"	8'-9½"	1'-8¾"	13'-9"	7'-11"	15'-7"	1'-8"	1'-8"	0"-8"	3'-2"	14'-9¼"
*	2-2	42"	1	3.11	12"	3.11	3.25	5'-9"	1'-9"	3'-6"	7'-3½"	10'-4¼"	4'-6"	19'-9"	18'-2½"	15'-7¼"	3'-5½"	11'-6¾"	2'-5"	11'-2"	3'-4"	14'-4"	2'-4"	2'-4"	1'-4"	3'-10"	15'-4½"
	3-1	27"	1	5.42	12"	6.62	5.42	4'-5¼"	1'-1½"	2'-9¾"	5'-11¾"	9'-0½"	3'-3"	13'-3"	11'-8¾"	9'-1¾"	1'-3½"	7'-8¾"	1'-6¾"	6'-7"	1'-3"	8'-1"	1'-6"	1'-6"	0'-6"	3'-0"	10'-8½"
	3-2	42"	1	5.21	15"	8.66	5.21	5'-5"	1'-9"	2'-11½"	6'-11½"	10'-0¼"	5'-9"	26'-2½"	24'-8"	22'-1"	9'-11"	10'-10"	2'-5"	17'-5"	9'-7"	20'-7"	2'-4"	2'-4"	1'-4"	3'-10"	18'-4¾"
	3-3	36"	1	4.11	15"	7.07	4.11	4'-11½"	1'-6"	2'-10"	6'-6"	9'-6¾"	5'-3"	23'-7½"	22'-1"	19'-6"	9'-0¾"	9'-5½"	2'-0¾"	15'-7"	8'-9"	18'-1"	2'-0"	2'-0"	1'-0"	3'-6"	16'-7¼"
*	4-1	42"	2	4.23	12"	7.43	4.23	10'-8"	1'-9"	3'-1¾"	12'-2½"	15'-3¼"	5'-3"	23'-6½"	22'-0"	19'-4¾"	7'-4"	10'-9"	2'-5"	14'-10"	7'-1"	18'-0"	2'-4"	2'-4"	1'-4"	3'-10"	22'-3¼"

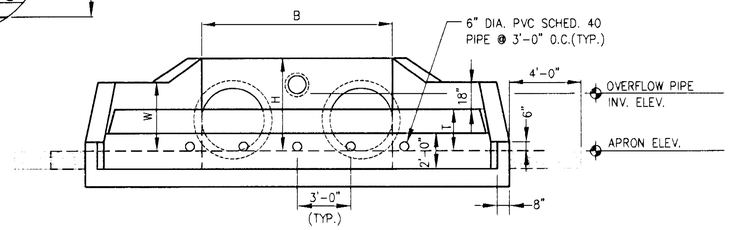
* NOT IN CONTRACT



PLAN



ELEVATION 1



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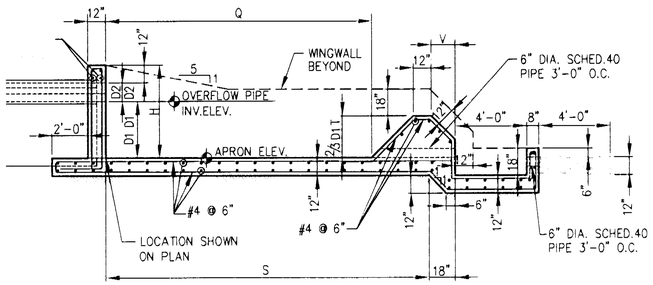
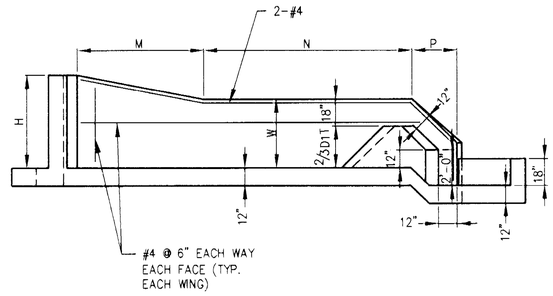


LONGITUDINAL SECTION



ELEVATION 3

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAMS

TAMS Consultants, Inc.
ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP/PW
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND — THERESA PHILLIPS SOMMERVILLE — LICENSE NO. 12486 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: ENDWALL DETAILS

SCALE: NO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

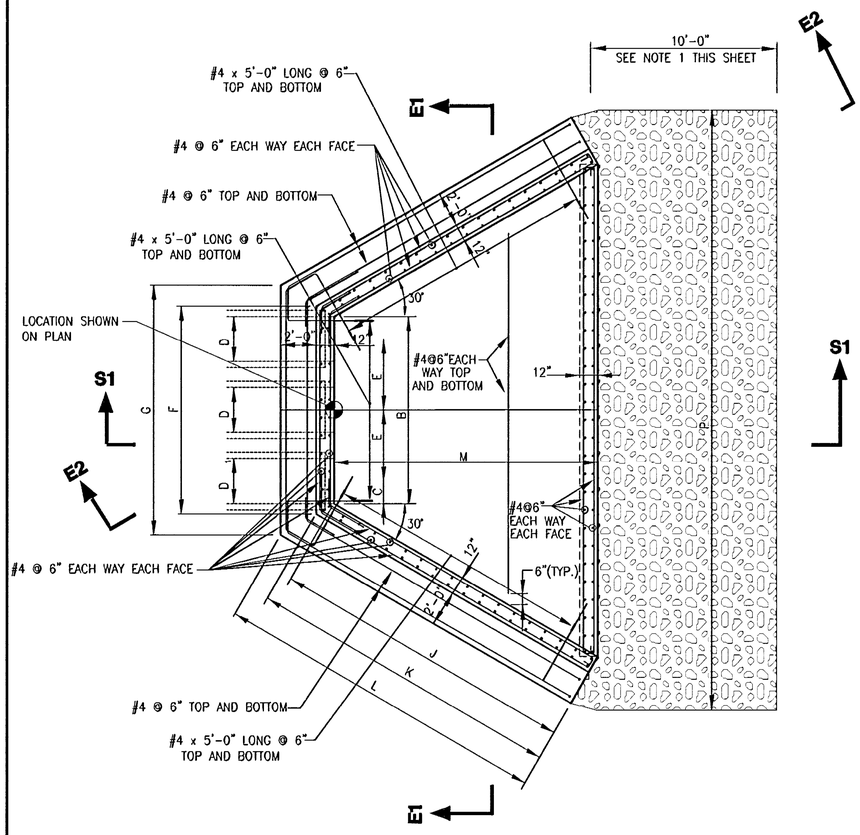
SHEET NO.: U-18B

WINGWALL DIMENSIONS AND DATA

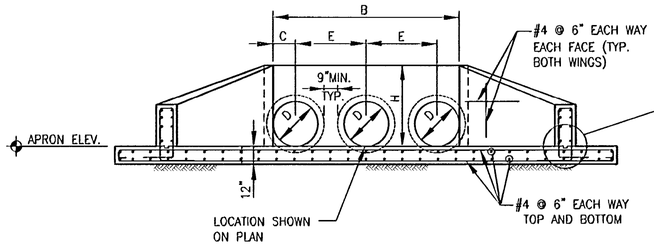
	MARK NO.	D	NO. OF PIPES	INVERT ELEV.	APRON ELEV.	B	C	E	F	G	H	J	K	L	M	N	P
	1-1	54"	1	0.34	0.34	4'-6"	2'-3"	–	5'-7f"	7'-11o"	6'-0"	24'-3"	24'-10"	25'-11s"	21'-0"	1'-6"	34'-9"
	1-2	54"	1	-0.21	-0.21	4'-6"	2'-3"	–	5'-7f"	7'-11o"	6'-0"	24'-3"	24'-10"	25'-11s"	21'-0"	1'-6"	+
	1-3	24"	1	6.25	6.25	2'-0"	1'-0"	–	2'-7f"	4'-11o"	3'-0"	12'-1i"	12'-8u"	13'-10r"	10'-6"	1'-6"	
*	2-3	30"	3	3.00	3.00	10'-2 1/2"	1'-3"	3'-10r"	11'-4y"	13'-8q"	4'-0"	16'-2"	16'-8t"	17'-10s"	14'-0"	1'-6"	+
*	2-4	30"	3	2.80	2.80	10'-2 1/2"	1'-3"	3'-10r"	11'-4y"	13'-8q"	4'-0"	16'-2"	16'-8t"	17'-10s"	14'-0"	1'-6"	32'-4 1/2"
*	2-5	30"	1	2.80	2.80	2'-6"	1'-3"	–	3'-7f"	5'-11o"	4'-0"	16'-2"	16'-8t"	17'-10s"	14'-0"	1'-6"	+
*	2-6	30"	1	2.70	2.70	2'-6"	1'-3"	–	3'-7f"	5'-11o"	4'-0"	16'-2"	16'-8t"	17'-10s"	14'-0"	1'-6"	24'-8"
	3-4	42"	1	3.25	3.25	3'-6"	1'-0"	–	4'-7f"	6'-11o"	4'-0"	16'-2"	16'-8t"	17'-10s"	14'-0"	1'-6"	+
	3-5	42"	1	3.15	3.15	2'-6"	1'-3"	–	4'-7f"	6'-11o"	4'-0"	16'-2"	16'-8t"	17'-10s"	14'-0"	1'-6"	25'-8"
*	4-2	42"	2	4.20	4.20	8'-4"	1'-0"	3'-4i"	9'-5f"	11'-9o"	4'-0"	14'-1s"	14'-8a	15'-10i	12'-3"	1'-6"	+
*	4-3	42"	2	3.40	3.40	8'-4"	1'-0"	3'-4i"	9'-5f"	11'-9o"	4'-0"	14'-1s"	14'-8a	15'-10i	12'-3"	1'-6"	28'-5 3/4"
*	4-4	18"	1	3.38	3.38	1'-6"	0'-9"	–	2'-7f"	4'-11o"	3'-0"	12'-1i"	12'-8u"	13'-10r"	10'-6"	1'-6"	+

* NOT IN CONTRACT

+ SEE NOTE 1 BELOW

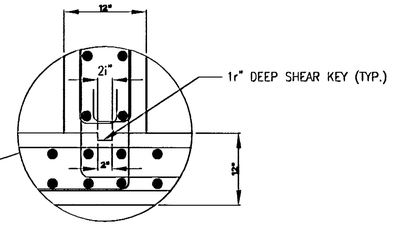


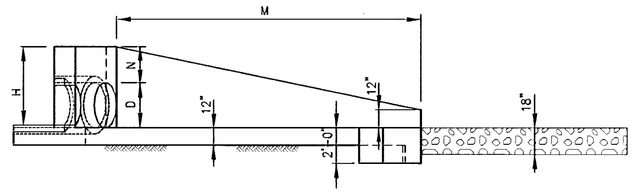
PLAN



E1 - ELEVATION

S1 - LONGITUDINAL SECTION





E2 - ELEVATION

AS BUILT

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

NOTES

1. RIP RAP NOT REQUIRED AT APRONS FOR WHICH NO "P" DIMENSION IS GIVEN IN TABLE ABOVE.

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DESIGNED	GPP
DRAWN	GPP/PW
CHECKED	GPP
APPROVED	TS

STATE OF MARYLAND — TESSERA SOMNIATRUM — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

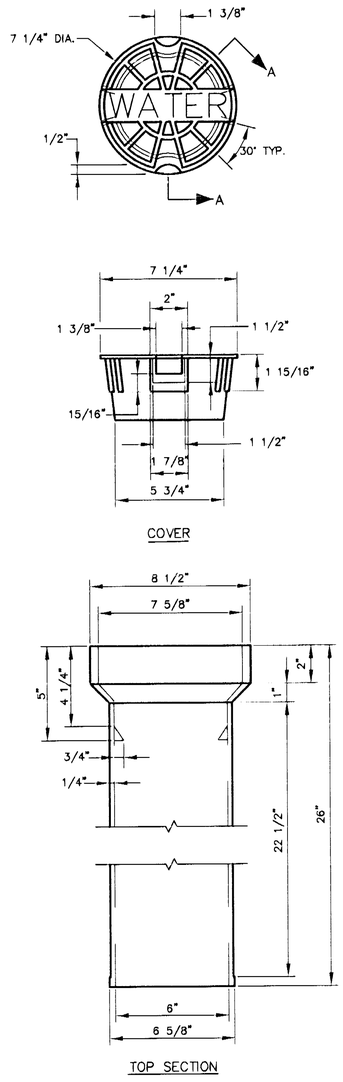
SHEET TITLE: WINGWALL DETAILS

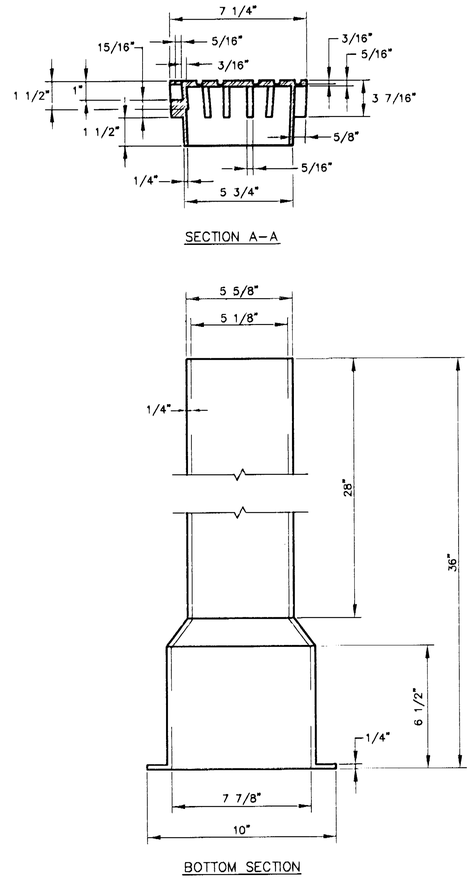
SCALE: NO SCALE

DATE: September 08, 1998

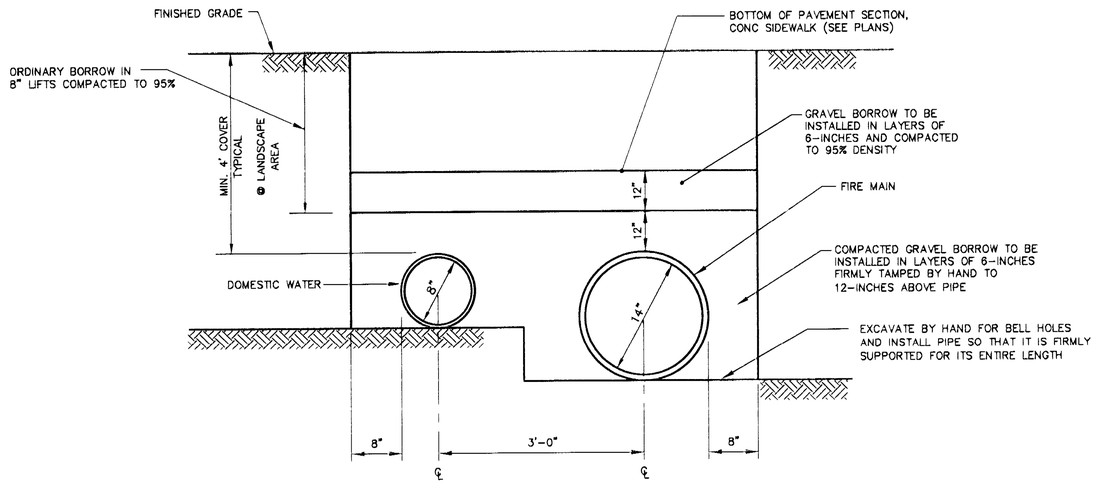
PROJECT NO.: MAA-CO-97-019

SHEET NO.: U-18C

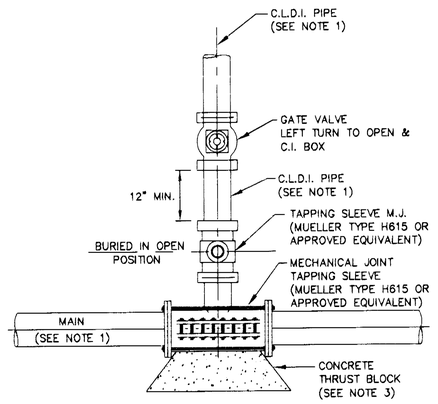




BUFFALO TYPE VALVE BOX
FOR 4" GATE VALVE
NTS



TYPICAL TRENCH DETAIL OF
OF WATER AND FIRE MAIN IN FIRM GROUND
NTS



TAPPING SLEEVE DETAIL
NTS

NOTES:

1. FOR PIPE SIZES, SEE SHEET U-06 AND U-07.
2. ALL WORK WITHIN A PUBLIC WAY SHALL COMPLY WITH BALTIMORE COUNTY DEPARTMENT OF PUBLIC WORKS; WATER AND WASTE WATER FACILITIES DIVISION REQUIREMENTS.
3. CONCRETE THRUST BLOCK TO BE USED WHERE IT WILL BEAR ON UNDISTURBED EARTH. USE OTHER ACCEPTABLE METHOD OF RESTRAINT WHERE CONCRETE THRUST BLOCK IS UNACCEPTABLE: SIZE OF BLOCK OR LENGTH OF RESTRAINT TO BE DESIGNED FOR SPECIAL CONDITIONS. SEE SHEET U-20 FOR TRUST BLOCK DETAILS.

AS-BUILTS

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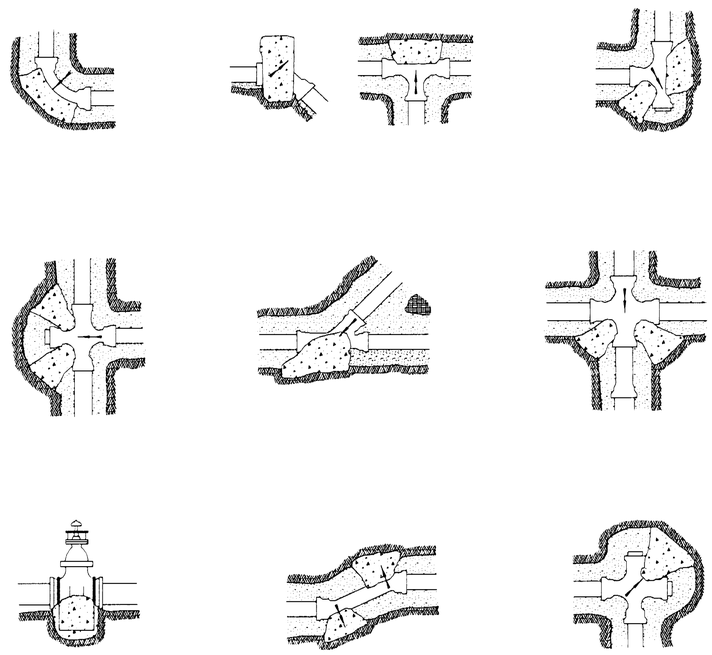
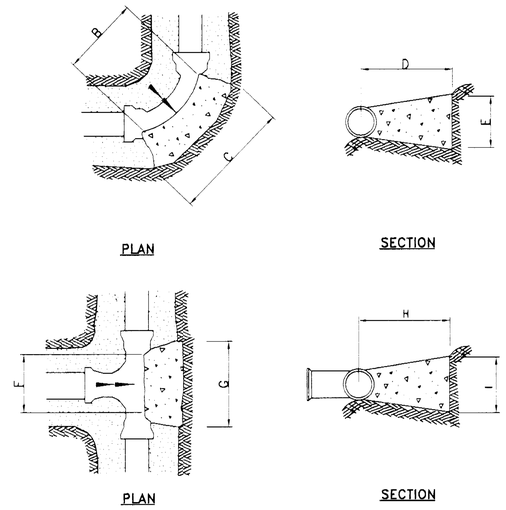
TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED TDB DRAWN AAG CHECKED TS APPROVED TS	STATE OF MARYLAND TERRAPIN SOMBATPIRIN LICENSE NO. 12400 REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS	MARTIN STATE AIRPORT	MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: UTILITY DETAILS I SCALE: NOT TO SCALE DATE: September 08, 1998	PROJECT NO. MAA-CO-97-019 SHEET NO. U-19

q:\projects\5859\task962\dwg\U-19



LOCATION OF THRUST BLOCKS

NOT TO SCALE



PLAN

SECTION

PLAN

SECTION

TABLE OF DIMENSIONS

BENDS	B	C	D	E
8"– 11 1/4°	8"	20"	18"	12"
8"– 22 1/2°	8"	22"	18"	18"
8"– 45°	8"	30"	18"	24"
8"– 90°	8"	38"	18"	36"
14"– 11 1/4°	12"	24"	24"	24"
14"– 22 1/2°	12"	36"	24"	26"
14"– 45°	12"	48"	24"	38"
14"– 90°	12"	66"	24"	50"

TEES	F	G	H	I
8"	12"	30"	18"	30"
14"	14"	60"	24"	40"

NOTES:

1. CONC. THRUST BLOCK SHALL BE POURED AGAINST UNDISTURBED TRENCH MATERIAL.
2. SEE SHEET U–19 FOR ADDITIONAL NOTES.

AS-BUILTS

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DESIGNED	FA
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TEXAPOJ SOMBATPIUM
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

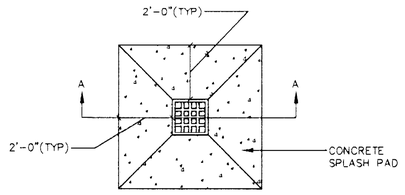
SHEET TITLE: UTILITY DETAILS II

SCALE: NOT TO SCALE

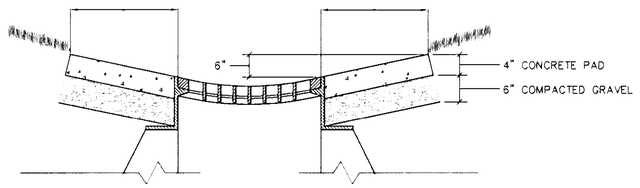
DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

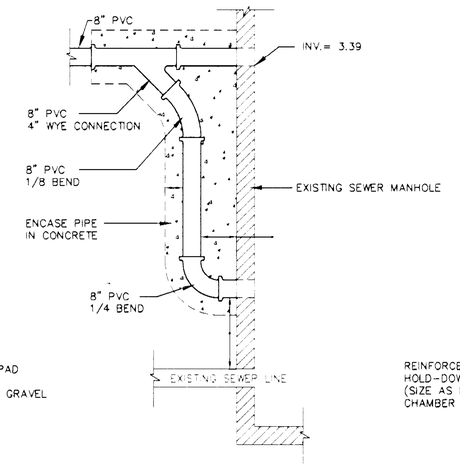
SHEET NO. U-20



PLAN
NTS

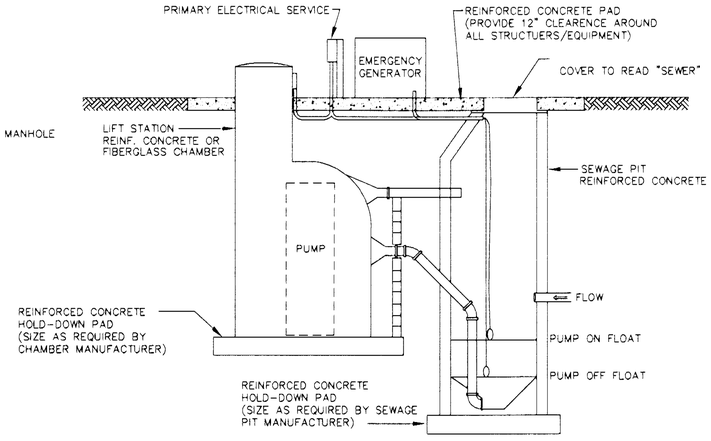


SECTION A–A AT CATCH BASIN
NTS



CONNECTION TO EXISTING SEWER MANHOLE
NTS

CAST IRON FRAME AND COVER

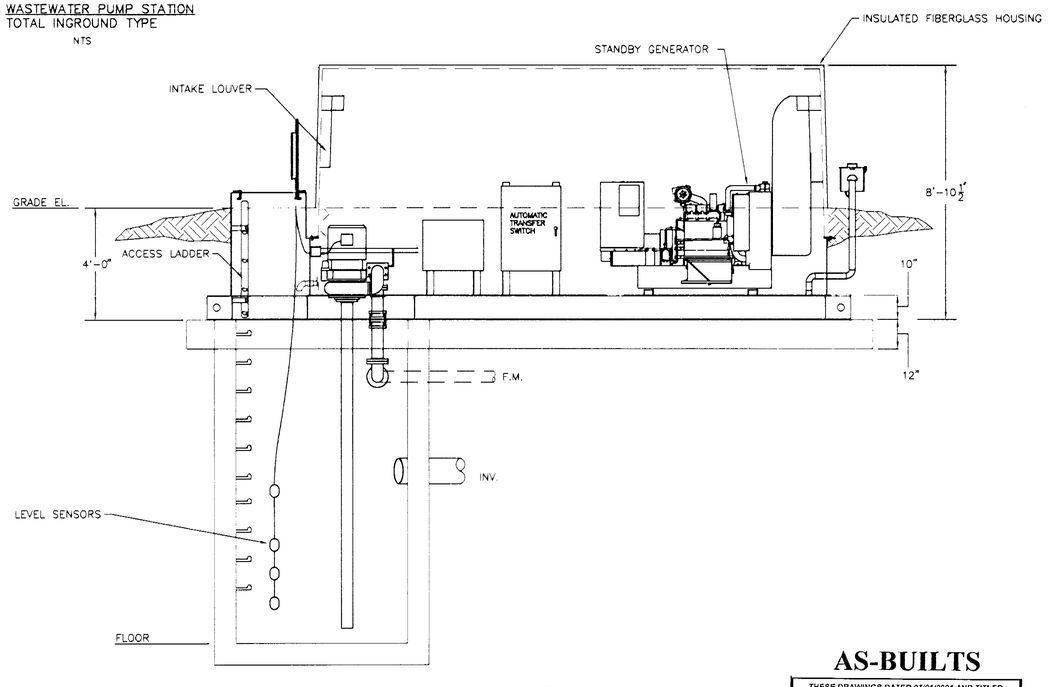


WASTEWATER PUMP STATION
TOTAL INGROUND TYPE
NTS

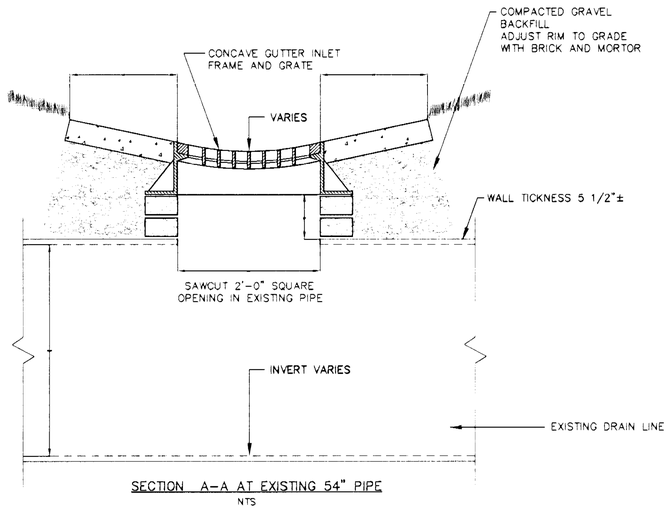
PUMP STATIONS (P.S.) OPERATING REQUIREMENTS:

	* P.S. #4	P.S. #3	P.S. #2	P.S. #1
Electrical Requirements:				
Voltage	120/240	120/240	120/240	120/240
Phase	1	1	1	1
Amperage	80	40	40	40
Pumping Equipment				
Design Flow (GPM)	100	130	130	225
Design Head (FT)	20	23	17	17
Horsepower	1.5	2.0	2.0	3.0
Voltage	1/120/240	1/120/240	1/120/240	1/120/240
Discharge Size (IN)	4"	4"	4"	6"
Standby Power Equipment				
KW	25	20	20	20
BHP	42	42	42	42
Rating (Amps)	80	80	80	80

* P.S. # 4 SHALL BE TOTAL INGROUND



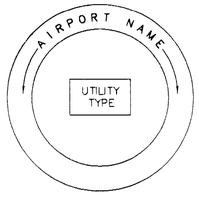
WASTEWATER PUMP STATION
PARTIAL INGROUND TYPE
NTS



SECTION A–A AT EXISTING 54" PIPE
NTS

ALL NEW REPLACEMENT AIRPORT MANHOLE/HANDHOLE COVERS/LIDS SHALL INCLUDE THE NAME "MARTIN STATE AIRPORT" AND THE TYPE OF THE UTILITY–

"ELECTRIC"
"STORMWATER"
"SANITARY SEWER"
"GAS"
"TELEPHONE"
"FIRE"
"WATER"
"OIL–WATER SEPARATOR"
"SEDIMENT CHAMBER"



LETTERING SHALL BE HELVITICA MEDIUM, CAPITALIZED AND 1 1/8 INCHES IN HEIGHT.

STANDARD UTILITY COVER DETAIL
N.T.S.

AS-BUILTS

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2101 Wilson Boulevard, Suite 300
Arlington, VA 22201

DESIGNED	TDB
DRAWN	OCO
CHECKED	TDB
APPROVED	IMB

STATE OF MARYLAND — THERESA DOMENICHINI — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

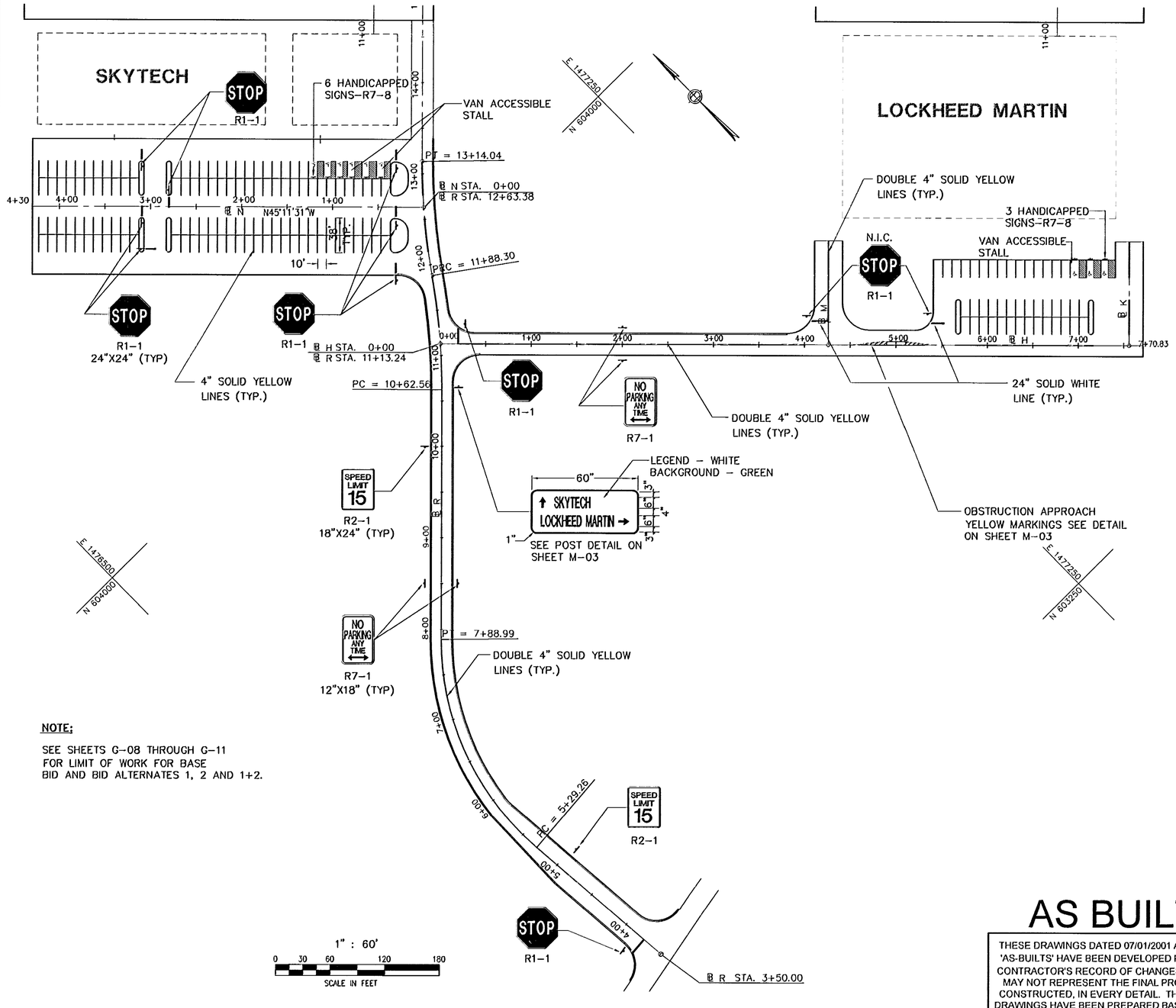
REV.	DATE	REMARKS

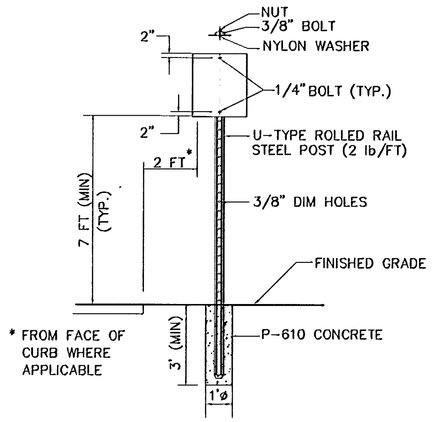
MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

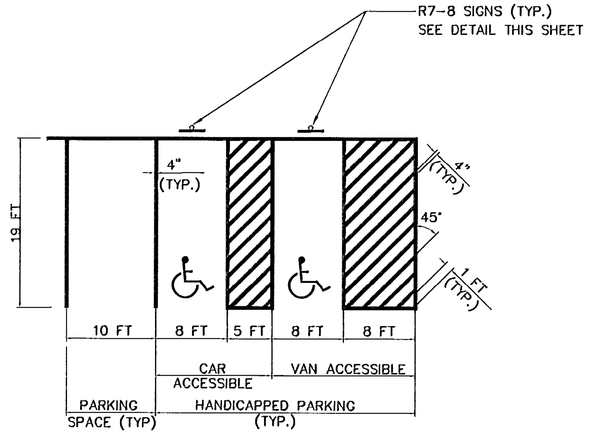
MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I	PROJECT NO.: MAA-CO-97-019
SHEET TITLE: UTILITY DETAILS III	SHEET NO.: U-22
SCALE: NOT TO SCALE	DATE: September 08, 1998





SINGLE POST SIGN DETAIL
SCALE 3/8":1'-0"



PAVEMENT MARKINGS DETAIL
SCALE 1/8":1'-0"

NOTE:

SEE SHEETS G-08 THROUGH G-11 FOR LIMIT OF WORK FOR BASE BID AND BID ALTERNATES 1, 2 AND 1+2.

AS BUILT

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PAVEMENT MARKINGS THIS SHEET N.I.C.

TAMS
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ENGINEERS, ARCHITECTS AND PLANNERS
2101 Wilson Boulevard, Suite 300
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DESIGNED	FA
DRAWN	FA
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TEERAPOJ SOMBATPIVIM — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

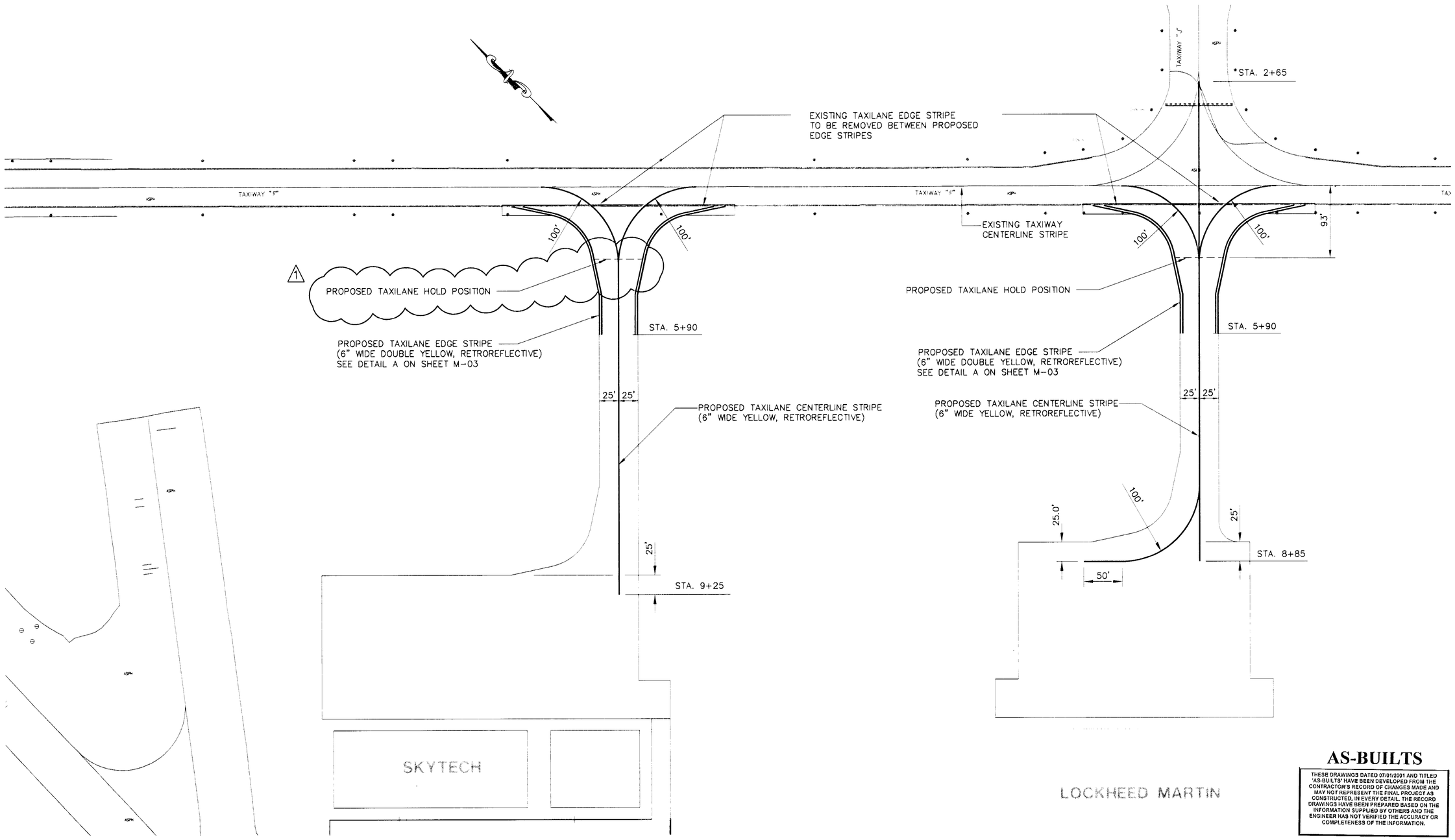
SHEET TITLE: LAND SIDE PAVEMENT MARKING AND SIGNAGE PLAN AND DETAILS

SCALE: AS SHOWN

DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. M-01



AIRSIDE PAVEMENT MARKINGS DETAIL
ALTERNATE 1

AIRSIDE PAVEMENT MARKINGS DETAIL
ALTERNATE 2

AS-BUILTS

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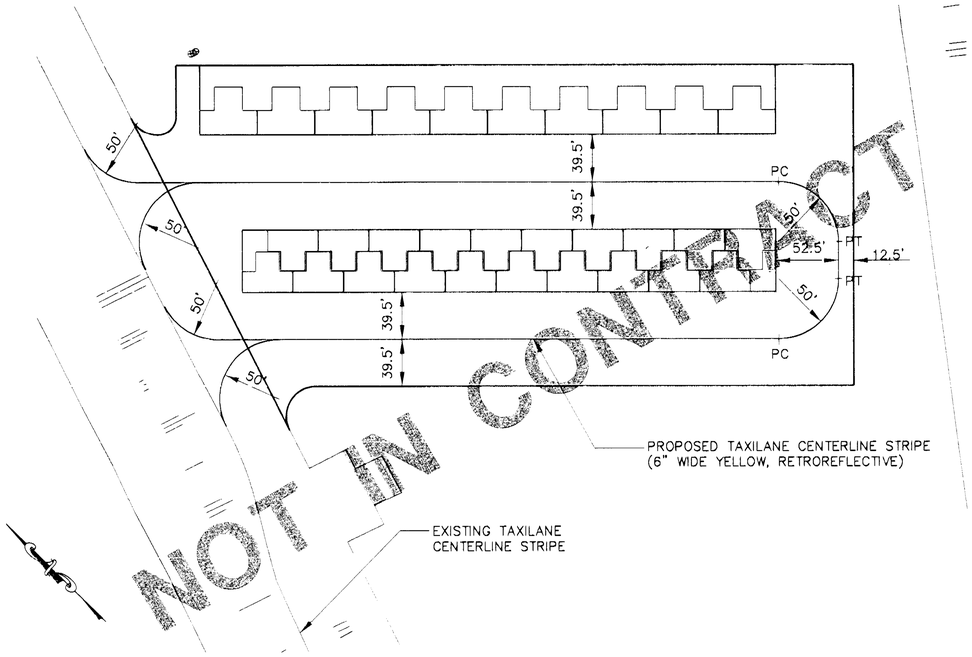
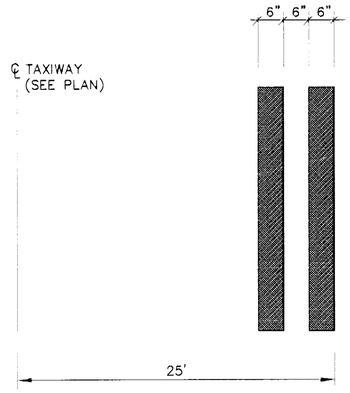
TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED GPP DRAWN FA CHECKED TS APPROVED TS	STATE OF MARYLAND TEXAPOJ SOMBATPIRIM LICENSE NO. 12488 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: AIRSIDE PAVEMENT MARKING PLAN SCALE: 1" = 60' DATE: September 08, 1998 PROJECT NO. MAA-CO-97-019 SHEET NO. M-02



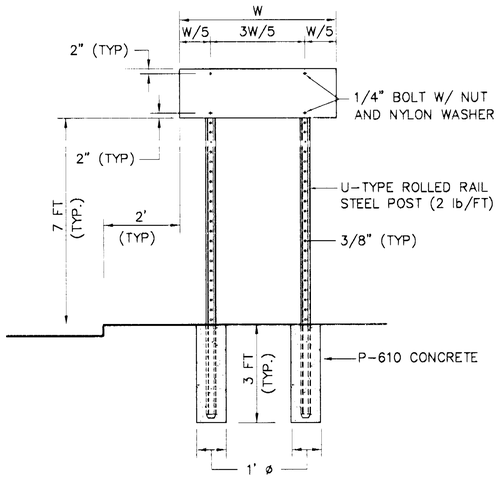
T-HANGAR MARKINGS DETAIL

SCALE 1" : 60'



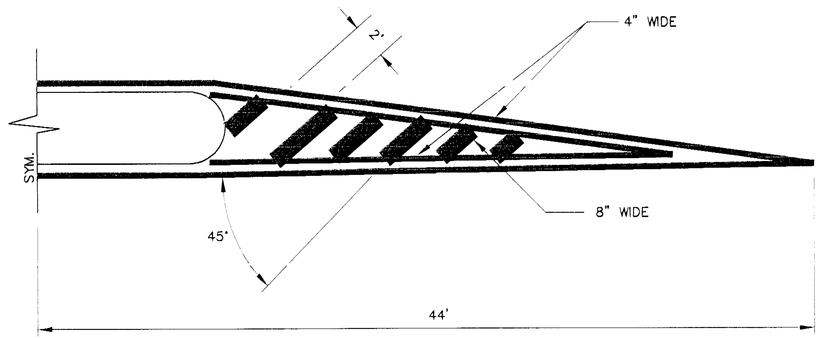
DETAIL A-TAXIWAY EDGE STRIPE

SCALE 1/4" : 1'



DOUBLE POST SIGN DETAIL

N.T.S.



OBSTRUCTION APPROACH MARKINGS DETAIL (N.I.C.)

SCALE 1/4" : 1'

AS-BUILTS

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TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED FA/GPP DRAWN FA CHECKED TS APPROVED TS	STATE OF MARYLAND TERRAPOJ SOMBATPIRIN LICENSE NO. 12480 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: AIRSIDE PAVEMENT MARKING PLAN AND MISCELLANEOUS DETAILS SCALE: AS SHOWN DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. M-03

STANDARD EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR SHALL NOTIFY THE MDE WATER MANAGEMENT ADMINISTRATION (MDE) AT (410) 631-3510 SEVEN (7) DAYS BEFORE COMMENCING ANY LAND DISTURBING ACTIVITY AND, UNLESS WAIVED BY THE ADMINISTRATION, SHALL BE REQUIRED TO HOLD A PRE-CONSTRUCTION MEETING BETWEEN PROJECT REPRESENTATIVES AND A REPRESENTATIVE OF THE MDE.

2. THE CONTRACTOR MUST NOTIFY THE MDE IN WRITING AND BY TELEPHONE AT THE FOLLOWING TIMES DURING THE PROJECT:

   A. THE REQUIRED PRE-CONSTRUCTION MEETING;
   B. FOLLOWING INSTALLATION OF SEDIMENT CONTROL MEASURES;
   C. DURING THE INSTALLATION OF SEDIMENT BASINS (TO BE CONVERTED INTO PERMANENT STORMWATER MANAGEMENT STRUCTURES) AT THE REQUIRED INSPECTION POINTS (SEE INSPECTION CHECKLIST ON PLAN). NOTIFICATION PRIOR TO COMMENCING CONSTRUCTION OF EACH STEP IS MANDATORY;
   D. PRIOR TO REMOVAL OR MODIFICATION OF ANY SEDIMENT CONTROL STRUCTURE(S);
   E. PRIOR TO REMOVAL OF ALL SEDIMENT CONTROL DEVICES; AND
   F. PRIOR TO FINAL ACCEPTANCE OF THE PROJECT.

3. THE CONTRACTOR SHALL CONSTRUCT ALL EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE APPROVED PLAN AND CONSTRUCTION SEQUENCE AND SHALL HAVE SUCH INSTALLATIONS INSPECTED AND APPROVED BY THE AGENCY OR SSA INSPECTOR PRIOR TO BEGINNING ANY OTHER LAND DISTURBANCES. MINOR SEDIMENT CONTROL DEVICE LOCATION ADJUSTMENTS MAY BE MADE IN THE FIELD WITH THE APPROVAL OF THE SSA INSPECTOR. THE CONTRACTOR SHALL ENSURE THAT ALL RUNOFF FROM DISTURBED AREAS IS DIRECTED TO THE SEDIMENT CONTROL DEVICES AND SHALL NOT REMOVE ANY EROSION OR SEDIMENT CONTROL MEASURE WITHOUT PRIOR PERMISSION FROM THE AGENCY OR MDE INSPECTOR. THE CONTRACTOR MUST OBTAIN PRIOR AGENCY AND SSA APPROVAL FOR CHANGES TO THE SEDIMENT CONTROL PLAN AND/OR SEQUENCE OF CONSTRUCTION.

4. THE CONTRACTOR SHALL PROTECT ALL POINTS OF CONSTRUCTION VEHICLE ACCESS TO THE SITE TO PREVENT THE DEPOSITION OF MATERIALS ONTO PUBLIC ROADS. ALL MATERIALS DEPOSITED ONTO PUBLIC ROADS SHALL BE REMOVED IMMEDIATELY.

5. THE CONTRACTOR SHALL INSPECT DAILY AND MAINTAIN CONTINUOUSLY IN AN EFFECTIVE OPERATING CONDITION ALL EROSION AND SEDIMENT CONTROL MEASURES UNTIL SUCH TIME AS PERMISSION FOR THEIR REMOVAL IS OBTAINED FROM THE AGENCY AND MDE INSPECTORS.

6. ALL SEDIMENT BASINS, TRAP EMBANKMENTS AND SLOPES, PERIMETER DIKES, SWALES, AND ALL DISTURBED SLOPES 3:1 OR STEEPER SHALL BE STABILIZED WITH SOD OR SEED AND ANCHORED STRAW MULCH OR OTHER APPROVED STABILIZATION MEASURES AS SOON AS POSSIBLE BUT NO LATER THAN SEVEN (7) CALENDAR DAYS AFTER ESTABLISHMENT. ALL AREAS DISTURBED OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM MUST BE MINIMIZED. MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. IN SENSITIVE AREAS STABILIZATION MAY BE REQUIRED WITHIN THREE (3) DAYS, AS DIRECTED BY THE ENGINEER.

7. THE CONTRACTOR SHALL APPLY SOD OR SEED AND ANCHORED STRAW MULCH OR OTHER APPROVED STABILIZATION MEASURES TO ALL DISTURBED AREAS AND MATERIAL STOCKPILES WITHIN FOURTEEN (14) CALENDAR DAYS AFTER STRIPPING AND GRADING ACTIVITIES HAVE CEASED IN THE AREA. MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. IN SENSITIVE AREAS STABILIZATION MAY BE REQUIRED WITHIN SEVEN (7) DAYS, AS DIRECTED BY THE ENGINEER.

8. PRIOR TO REMOVAL OF SEDIMENT CONTROL MEASURES, THE CONTRACTOR SHALL STABILIZE AND HAVE ESTABLISHED PERMANENT STABILIZATION FOR ALL CONTRIBUTORY DISTURBED AREAS USING SOD OR AN APPROVED PERMANENT SEED MIXTURE WITH REQUIRED SOIL AMENDMENTS AND AN APPROVED ANCHOR MULCH. WOOD FIBER MULCH MAY BE USED ONLY IN SEEDING SEASON (AS DEFINED IN THE SPECIFICATIONS) WHERE THE SLOPE DOES NOT EXCEED TEN (10) PER CENT AND GRADING HAS BEEN DONE TO PROMOTE SHEET FLOW DRAINAGE. AREAS BROUGHT TO FINISHED GRADE DURING THE SEEDING SEASON SHALL BE PERMANENTLY STABILIZED AS SOON AS POSSIBLE BUT NO LATER THAN FOURTEEN (14) CALENDAR DAYS AFTER ESTABLISHMENT. WHEN GRADING IS COMPLETED DURING THE MONTHS OF NOVEMBER THROUGH FEBRUARY, AND PERMANENT STABILIZATION IS FOUND TO BE IMPRACTICAL, TEMPORARY SEEDING AND ANCHORED STRAW MULCH SHALL BE APPLIED TO DISTURBED AREAS. THE FINAL PERMANENT STABILIZATION OF SUCH AREAS SHALL BE APPLIED BY MARCH 15 OR EARLIER AS GROUND AND WEATHER CONDITIONS PERMIT.

9. THE SITE'S APPROVAL CERTIFICATION, APPROVED EROSION AND SEDIMENT CONTROL PLANS, DAILY LOG BOOKS, AND TEST REPORTS SHALL BE KEPT ON THE SITE AND SHALL BE AVAILABLE FOR INSPECTION BY AUTHORIZED AGENTS OF WMA AND THE OWNER.

10. SURFACE DRAINAGE FLOWS OVER UNSTABILIZED CUT AND FILL SLOPES SHALL BE CONTROLLED BY EITHER PREVENTING DRAINAGE FLOWS FROM TRAVERSING THE SLOPES OR BY INSTALLING PROTECTIVE DEVICES TO CONTROL THE VELOCITY OF SUCH FLOWS TO NON-EROSIVE. DIVERSION DIKES SHALL BE INSTALLED AND MAINTAINED AT THE TOPS OF CUT AND EMBANKMENT SECTIONS (AND AT BENCHES AS DIRECTED BY THE ENGINEER) UNTIL THE SLOPES AND AREAS DRAINING TO THEM ARE FULLY STABILIZED, AT WHICH TIME THEY SHALL BE REMOVED AND REGRADED TO PROMOTE SHEET FLOW DRAINAGE. PROTECTIVE METHODS SHALL BE INSTALLED AT POINTS OF CONCENTRATED FLOW WHERE EROSION IS LIKELY TO OCCUR.

11. PERMANENT SWALES OR OTHER POINTS OF CONCENTRATED WATER FLOW SHALL BE STABILIZED WITH SOD OR SEEDING WITH AN APPROVED EROSION CONTROL MATTING, RIP RAP, OR OTHER APPROVED STABILIZATION MEASURES.

12. TEMPORARY SEDIMENT CONTROL DEVICES MAY BE REMOVED WITH THE PERMISSION OF THE MDE AND OWNER'S INSPECTORS WITHIN THIRTY (30) CALENDAR DAYS FOLLOWING ESTABLISHMENT OF PERMANENT STABILIZATION IN ALL CONTRIBUTORY DRAINAGE AREAS. STORMWATER MANAGEMENT STRUCTURES USED FOR TEMPORARY SEDIMENT CONTROL SHALL BE CONVERTED TO THEIR PERMANENT CONFIGURATIONS WITHIN THIS THIRTY (30) DAY PERIOD.

13. NO PERMANENT CUT OR FILL SLOPES STEEPER THAN 3:1 WILL BE PERMITTED IN LAWN MAINTENANCE AREAS. SLOPES OF 2:1 AND FLATTER WILL BE PERMITTED IN NON-MAINTENANCE AREAS PROVIDED THOSE AREAS ARE SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN TO BE TREATED WITH A LOW-MAINTENANCE GROUND COVER SPECIFIED FOR PERMANENT STABILIZATION. VEGETATIVE COVER WILL NOT BE PERMITTED ON SLOPES STEEPER THAN 2:1.

14. ALL COMPLETED AREAS SHALL BE GRADED IN ACCORDANCE WITH THE CONTRACT GRADING AND DRAINAGE PLANS. IN NO CASE SHALL FINISHED GRADING PERMIT WATER TO STAND ON THE SURFACE FOR MORE THAN TWENTY-FOUR (24) HOURS FOLLOWING A RAINFALL EVENT, EXCEPT THAT DESIGNATED DRAINAGE COURSES AND SWALES MAY CARRY WATER UP TO FORTY-EIGHT (48) HOURS FOLLOWING A RAINFALL EVENT. AREAS SHOWN ON THE PLANS TO HOLD STANDING WATER, SUCH AS STORMWATER DETENTION BASINS, SHALL BE EXEMPT FROM THIS REQUIREMENT.

15. SEDIMENT TRAPS AND BASINS SHALL NOT BE CONSTRUCTED WITHIN TWENTY (20) FEET OF AN EXISTING OR PROPOSED FOUNDATION. NO STRUCTURE MAY BE CONSTRUCTED WITHIN TWENTY (20) FEET OF AN ACTIVE SEDIMENT TRAP OR BASIN.

16. THE SSA INSPECTOR SHALL HAVE THE AUTHORITY TO ORDER THE INSTALLATION OF ADDITIONAL SAFETY OR SEDIMENT CONTROL MEASURES AS HE DEEMS NECESSARY. SUCH ADDITIONAL MEASURES SHALL BE CONSTRUCTED AND PAID FOR AS PROVIDED BY THE CONTRACT DOCUMENTS.

17. ALL TRAP DEPTH DIMENSIONS SHOWN ARE RELATIVE TO THE OUTLET ELEVATION. THE CONTRACTOR SHALL MAINTAIN THE STABILITY OF ALL INFLOW AND OUTFALL POINTS.

18. VEGETATIVE STABILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL. REFER TO THE APPROPRIATE SPECIFICATIONS FOR TEMPORARY SEEDING, PERMANENT SEEDING, MULCHING, SODDING, AND GROUND COVERS.

19. TEMPORARY SEDIMENT TRAPS SHALL BE CLEANED OUT AND RESTORED TO THE CONFIGURATIONS SHOWN ON THE PLANS WHEN SEDIMENT HAS ACCUMULATED TO HALF THE TRAP DEPTH (TRAP BOTTOM TO OUTLET CREST). SEDIMENT BASINS SHALL BE CLEANED OUT AND RESTORED TO PLAN CONFIGURATIONS WHEN SEDIMENT HAS ACCUMULATED TO HALF THE BASIN DEPTH (BASIN BOTTOM TO DEWATERING ELEVATION).

20. SEDIMENT REMOVED FROM TRAPS AND BASINS SHALL BE PLACED AND STABILIZED IN APPROVED AREAS, BUT NOT WITHIN A DESIGNATED FLOOD PLAIN, WETLAND, OR TREE-SAVE AREA. WHEN PUMPING SEDIMENT-LADEN WATER THE DISCHARGE MUST BE DIRECTED TO A SEDIMENT TRAPPING DEVICE PRIOR TO RELEASE FROM THE SITE.

21. WHERE SHOWN ON THE PLANS OR REQUIRED BY THE ENGINEER OR MDE INSPECTOR, SEDIMENT BASINS AND/OR TRAPS MAY REQUIRE ENCLOSURE WITH AN APPROVED SAFETY FENCE WHICH SHALL CONFORM WITH LOCAL ORDINANCES AND REGULATIONS. WHERE LOCAL ORDINANCES AND REGULATIONS DO NOT SPECIFY FENCING TYPES AND SIZES, FENCES SHALL BE AT LEAST FORTY-TWO (42) INCHES TALL WITH POSTS SPACED AT EIGHT (8) FEET, WITH FOURTEEN (14) GAUGE WELDED WIRE FABRIC WITH OPENINGS OF TWO (2) INCHES BY FOUR (4) INCHES. SAFETY FENCE SHALL BE MAINTAINED IN GOOD CONDITION AT ALL TIMES.

22. SEDIMENT CONTROL FOR UTILITY CONSTRUCTION IN AREAS OUTSIDE OF DESIGNATED CONTROLS SHALL BE ACCOMPLISHED AS FOLLOWS OR AS DIRECTED BY THE ENGINEER OR MDE INSPECTOR: MATERIAL EXCAVATED FROM TRENCHES SHALL BE PLACED ON THE HIGH SIDE OF THE TRENCH AND SHALL BE BACKFILLED, COMPACTED, AND STABILIZED AT THE END OF EACH WORK DAY. UNLESS OTHERWISE AUTHORIZED BY THE ENGINEER, NO MORE TRENCH SHALL BE OPENED THAN CAN BE BACKFILLED THE SAME DAY. TEMPORARY SILT FENCE SHALL BE PLACED IMMEDIATELY DOWNSTREAM OF ANY DISTURBED AREA INTENDED TO REMAIN DISTURBED FOR MORE THAN ONE (1) DAY.

23. OFF-SITE SPOIL OR BORROW AREAS ON STATE OR FEDERAL PROPERTY SHALL BE APPROVED PRIOR TO THEIR USE BY THE SSA AND/OR LOCAL AUTHORITIES, AS APPLICABLE. CONTRACT EROSION AND SEDIMENT CONTROL REQUIREMENTS SHALL APPLY TO ALL THE CONTRACTOR'S ACTIVITIES IN OFF-SITE BORROW AND WASTE AREAS, AND SHALL BE FOLLOWED AS DIRECTED BY THE ENGINEER AND/OR THE MDE INSPECTOR.

24. WHERE INFILTRATION DEVICES ARE USED FOR THE CONTROL AND MANAGEMENT OF STORMWATER, EXTREME CARE SHALL BE TAKEN TO PREVENT RUNOFF FROM UNSTABILIZED AREAS FROM ENTERING SUCH STRUCTURES. SEDIMENT CONTROL MEASURES INSTALLED IN INFILTRATION DEVICES MUST HAVE BOTTOM ELEVATIONS AT LEAST TWO (2) FEET HIGHER THAN THE FINISHED GRADE BOTTOM ELEVATION OF THE DEVICES. WHEN CONVERTING A SEDIMENT TRAP TO AN INFILTRATION DEVICE ALL ACCUMULATED SEDIMENT SHALL BE REMOVED AND DISPOSED OF BEFORE FINAL GRADING OF THE DEVICE.

25. WHERE RUNOFF FROM A STORM DRAINAGE SYSTEM OUTFALL IS DIRECTED TO A SEDIMENT TRAP OR BASIN AND THE SYSTEM IS TO BE USED FOR TEMPORARILY CONVEYING SEDIMENT-LADEN RUNOFF, TEMPORARY ASPHALT BERMS SHALL BE CONSTRUCTED AROUND ALL STORM DRAINAGE INLETS IN NON-SUMP AREAS. THESE BERMS SHALL BE INSTALLED AT THE TIME OF BASE PAVING TO DIRECT GUTTER FLOW INTO THE INLETS TO AVOID SURCHARGING AND OVERFLOW OF INLETS IN SUMP AREAS.

26. SITE INFORMATION:

TOTAL SITE AREA	43.10 ACRES
DISTURBED AREA	29.85 ACRES
PAVED OR ROOFED AREA	13.25 ACRES
TOTAL EXCAVATION	43,750 CUBIC YARDS
TOTAL EMBANKMENT	10,000 CUBIC YARDS
OFFSITE WASTE/BORROW AREA	TO BE DETERMINED PRIOR TO START OF CONSTRUCTION

27. MDE INSPECTORS SHALL BE NOTIFIED PRIOR TO THE BEGINNING OF ANY LAND DISTURBANCE.

28. EROSION AND SEDIMENT CONTROL MEASURES SHALL NOT BE REMOVED UNTIL FINAL LAND STABILIZATION AND APPROVAL OF THE MDE INSPECTOR.

STANDARD STABILIZATION NOTE

FOLLOWING INITIAL SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITHIN SEVEN (7) CALENDAR DAYS AS TO THE SURFACE OF ALL PERIMETER CONTROLS, DIKES, SWALES, DITCHES, PERIMETER SLOPES, AND ALL SLOPES GREATER THAN THREE HORIZONTAL TO ONE VERTICAL; AND FOURTEEN (14) DAYS AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE.

ADDITIONAL NOTES

1. PONDS 1, 2A, AND/OR 2B SHALL NOT BE USED AS TEMPORARY SEDIMENT BASINS DURING CONSTRUCTION. ALL RUNOFF ENTERING THESE PONDS SHALL BE CLEAN AND FREE OF SEDIMENT AT ALL TIMES.
2. MAINTENANCE SCHEDULES FOR PERMANENT STORMWATER MANAGEMENT PONDS, SEDIMENTATION CHAMBERS, ENDWALLS, AND OTHER STRUCTURES ARE SHOWN ON SHEET R-10.
3. FOR CONSTRUCTION SEQUENCING SEE SHEETS A-01 THROUGH A-07.
4. FOR EROSION AND SEDIMENT CONTROL MEASURES REQUIRED FOR POND CONSTRUCTION SEE SHEETS C-11 THROUGH C-20.

DESIGN CERTIFICATION

"I hereby certify that this plan has been designed in accordance with the 1994 Standards and Specifications for Soil Erosion and Sediment Control or current revisions thereto, and the Maryland Department of the Environment Stormwater Management Regulations."

MARCH 24, 1998
Date

Designer's Signature

TEERAPOJ SOMBATPIUM
Designer's Printed Name

OWNER'S CERTIFICATION

"I/We hereby certify that all clearing, grading, construction, and/or development will be done pursuant to this plan and that any responsible personnel involved in the construction project will have a certificate or attendance at a Maryland Department of the Environment approved training program for the control of sediment and erosion before beginning the project. I/We hereby authorize the right of entry for periodic on-site evaluation by Maryland Department of the Environment compliance inspectors."

3-25-98
Date

Owner's/Developer's Signature

1906
Card Number

BENJAMIN CHIN, MANAGER DESIGN SERVICES
Printed Name and Title

AS-BUILT CERTIFICATION

"I/We hereby certify that permanent stormwater management facilities shown on these plans were constructed as shown on the "As Built" plans and meet the approved plans and specifications.

Date

Signature

Md PE Registration No. _____

Printed Name and Title

"Certify" means to state or declear a professional opinion based on sufficient and appropriate onsite inspections and material tests conducted during construction.

ABBREVIATIONS

AGIP	AT GRADE INLET PROTECTION
CD	STONE CHECK DAM
CIP	CURB INLET PROTECTION
PST	PORTABLE SEDIMENT TANK
RPS	REMOVABLE PUMPING STATION
SCE	STABILIZED CONSTRUCTION ENTRANCE
SP	SUMP PIT
SF	SILT FENCE
SSF	SUPER SILT FENCE
—·—·—	LIMIT OF DISTURBANCE

AS-BUILTS

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TAMS
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DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — TERRENCE SCARBOROUGH — LICENSE NO. 15469 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

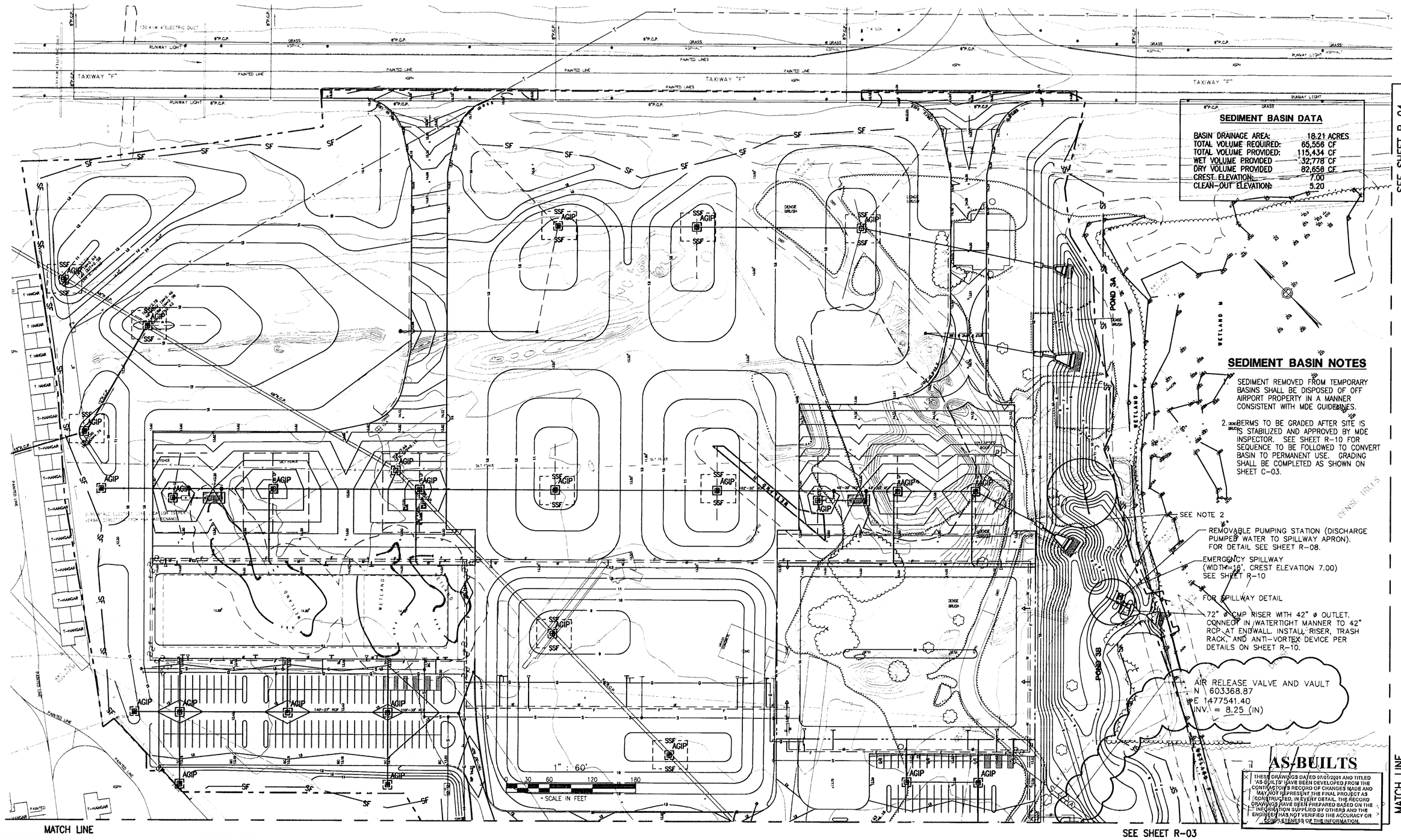
SHEET TITLE: EROSION AND SEDIMENT CONTROL NOTES

SCALE: AS SHOWN

DATE: MARCH 24, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: R-01



SEDIMENT BASIN DATA

BASIN DRAINAGE AREA:	18.21 ACRES
TOTAL VOLUME REQUIRED:	65,556 CF
TOTAL VOLUME PROVIDED:	115,434 CF
WET VOLUME PROVIDED	32,778 CF
DRY VOLUME PROVIDED	82,656 CF
CREST ELEVATION:	7.00
CLEAN-OUT ELEVATION:	5.20

SEDIMENT BASIN NOTES

1. SEDIMENT REMOVED FROM TEMPORARY BASINS SHALL BE DISPOSED OF OFF AIRPORT PROPERTY IN A MANNER CONSISTENT WITH MDE GUIDELINES.
2. BERMS TO BE GRADED AFTER SITE IS STABILIZED AND APPROVED BY MDE INSPECTOR. SEE SHEET R-10 FOR SEQUENCE TO BE FOLLOWED TO CONVERT BASIN TO PERMANENT USE. GRADING SHALL BE COMPLETED AS SHOWN ON SHEET C-03.

SEE NOTE 2

REMOVABLE PUMPING STATION (DISCHARGE PUMPED WATER TO SPILLWAY APRON). FOR DETAIL SEE SHEET R-08.

EMERGENCY SPILLWAY (WIDTH=16', CREST ELEVATION 7.00) SEE SHEET R-10

FOR SPILLWAY DETAIL

72" ø CMP RISER WITH 42" ø OUTLET. CONNECT IN WATERTIGHT MANNER TO 42" RCP AT ENDWALL. INSTALL RISER, TRASH RACK, AND ANTI-VORTEX DEVICE PER DETAILS ON SHEET R-10.

AIR RELEASE VALVE AND VAULT
N 603368.87
E 1477541.40
INV. = 8.25 (IN)

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DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND
TEXAPOL SOMNATPINI
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

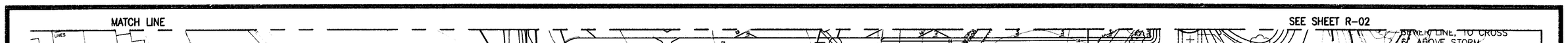
SHEET TITLE: EROSION AND SEDIMENT CONTROL PLAN I

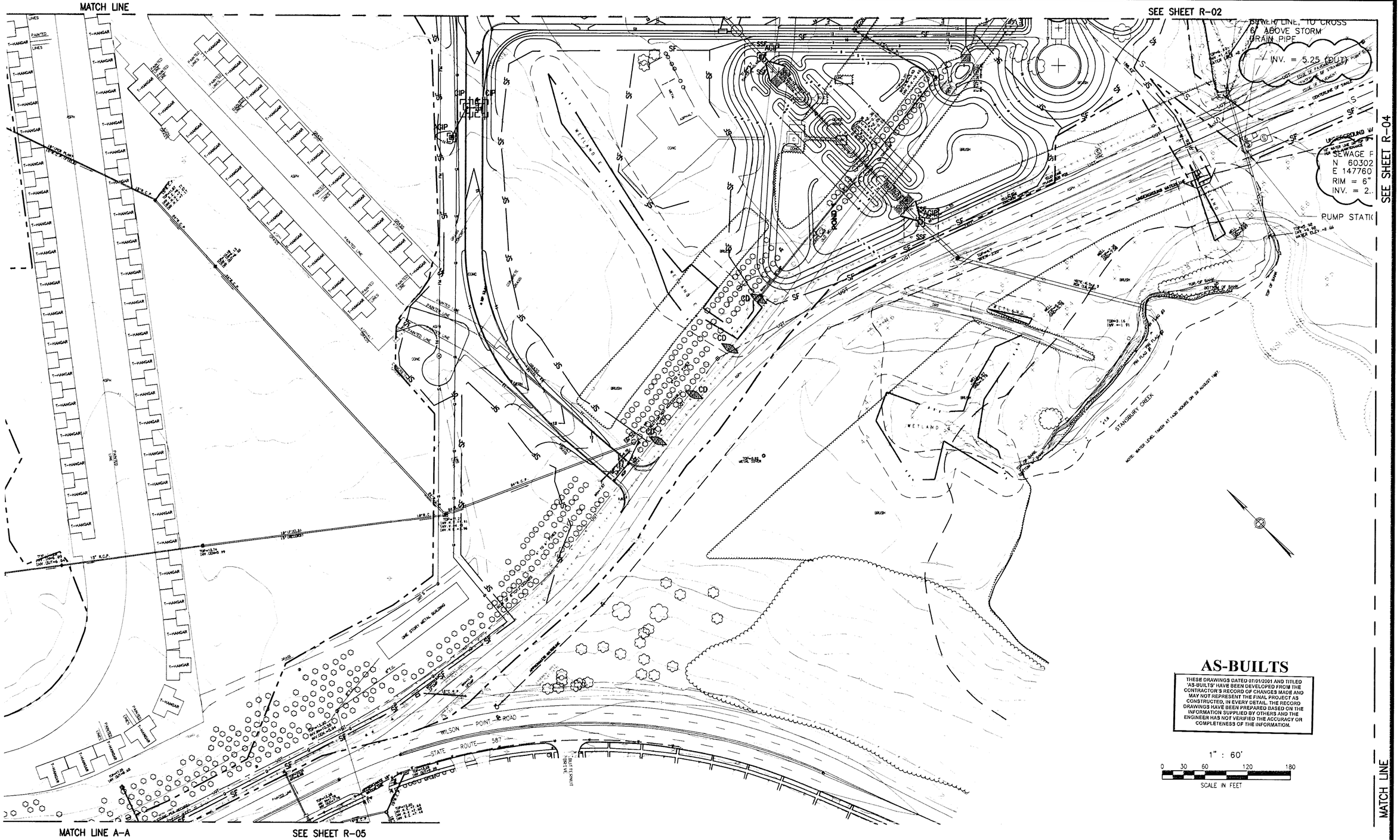
SCALE: 1" = 60'

DATE: September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. R-02





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1" : 60'

0 30 60 120 180

SCALE IN FEET

TAMS

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Arlington, VA 22201

DESIGNED	GPP
DRAWN	GPP
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — THERESA SOMMATINO — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

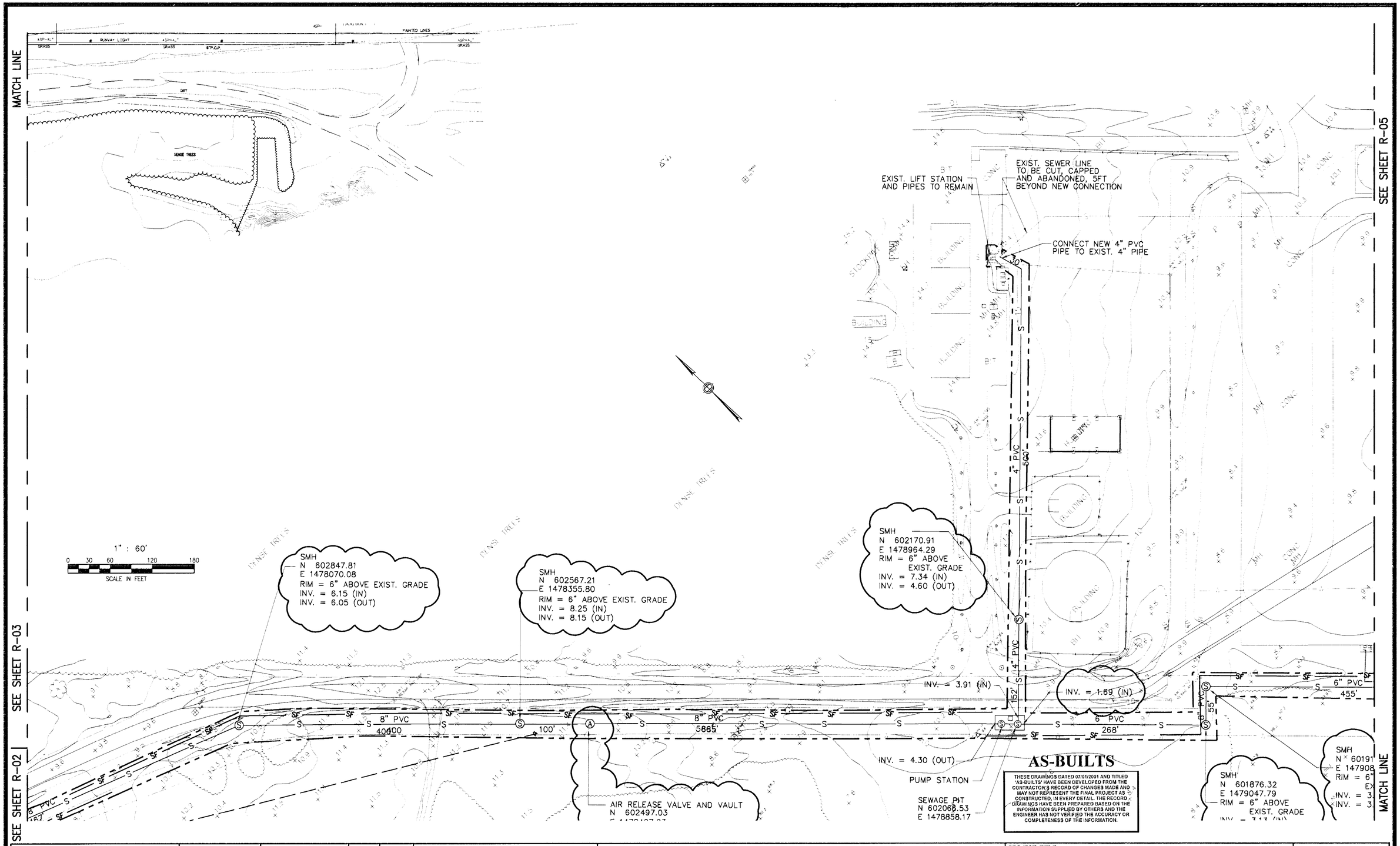
SHEET TITLE
EROSION AND SEDIMENT CONTROL PLAN II

SCALE: 1" = 60'

DATE: September 08, 1998

PROJECT NO.
MAA-CO-97-019

SHEET NO.
R-03



AS-BUILTS

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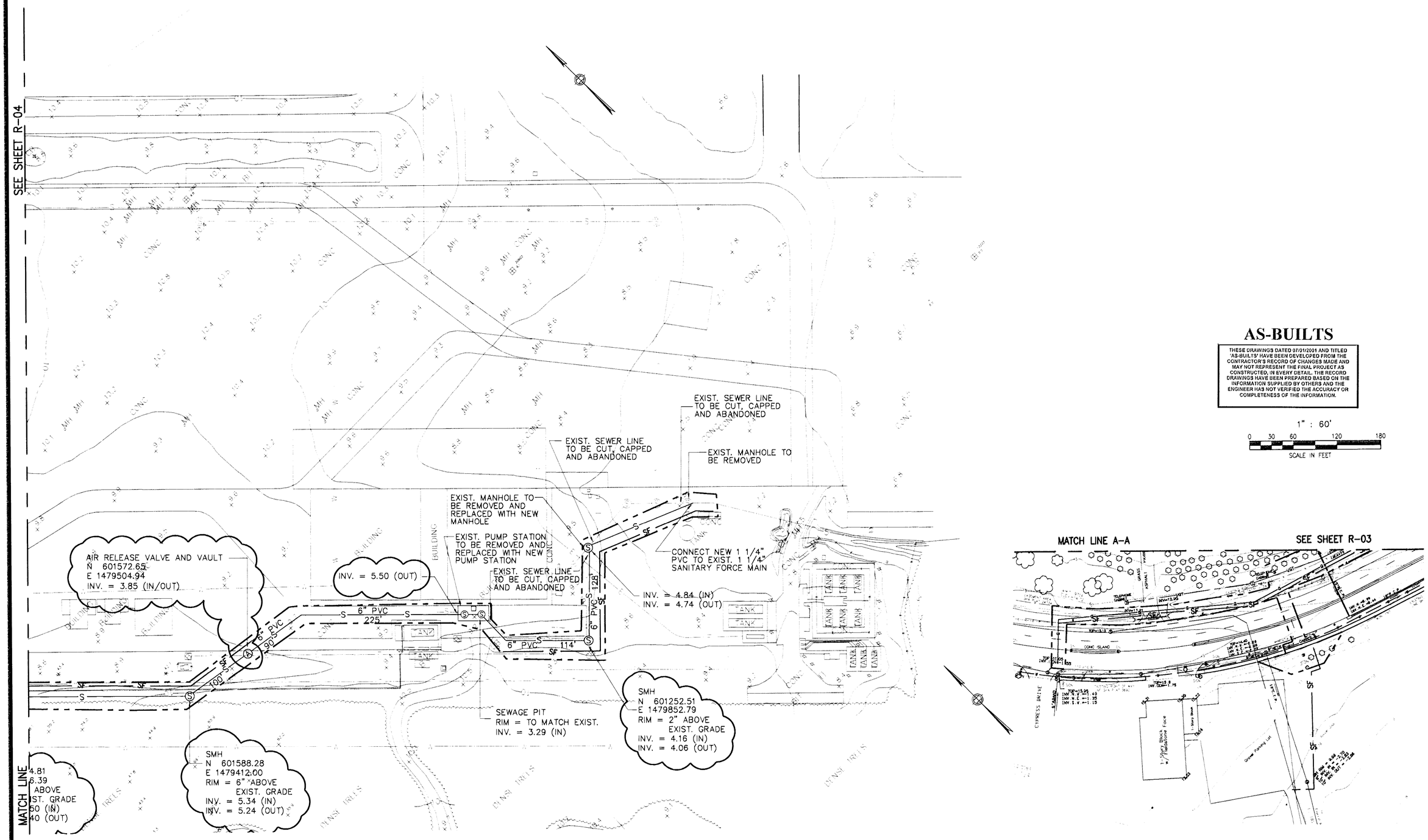
TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED FAA DRAWN FA CHECKED TS APPROVED TS	STATE OF MARYLAND TEXAPOJ SOMBATPIRIN LICENSE NO. 12400 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: EROSION AND SEDIMENT CONTROL PLAN III SCALE: 1" = 60' DATE: September 08, 1998 PROJECT NO. MAA-CO-97-019 SHEET NO. R-04



AS-BUILTS

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1" : 60'

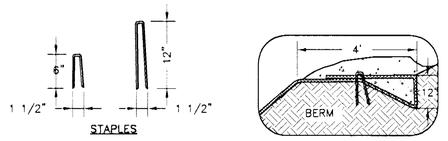
0 30 60 120 180

SCALE IN FEET

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED FA DRAWN FA CHECKED TS APPROVED TS	STATE OF MARYLAND TEKKAPOL SOMARTHINA LICENSE NO. 12400 REGISTERED PROFESSIONAL ENGINEER	REV. / DATE / REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: EROSION AND SEDIMENT CONTROL PLAN IV SCALE: 1" = 60' DATE: September 08, 1998

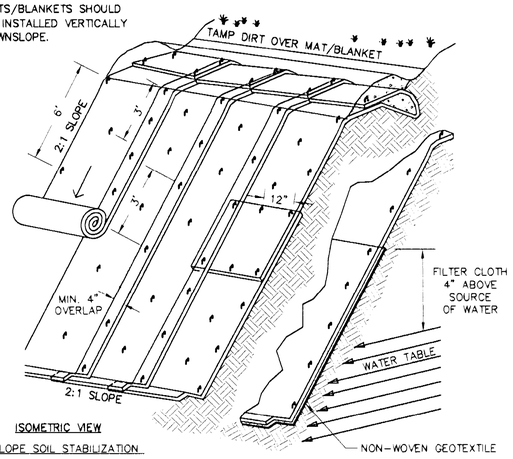
PROJECT NO. MAA-CO-97-019

SHEET NO. R-05



STAPLES

MATS/BLANKETS SHOULD BE INSTALLED VERTICALLY DOWNSLOPE.



ISOMETRIC VIEW

TYPICAL SLOPE SOIL STABILIZATION

WET SLOPE LINING

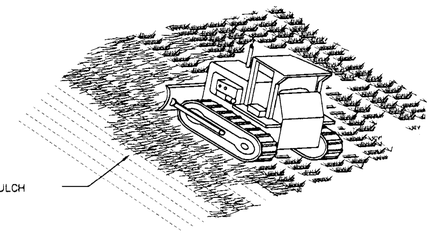
NOTES:

1. SEE SHEETS FOR ALL AREAS REQUIRING EROSION BLANKETS. FOR SEEDING SEE THIS SHEET.
2. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS AND GRASS. MATS/BLANKETS SHALL HAVE GOOD SOIL CONTACT.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

EROSION BLANKETS & TURF REINFORCEMENT MATS

SLOPE INSTALLATION

NTS



SPREAD STRAW MULCH (TYPICAL)

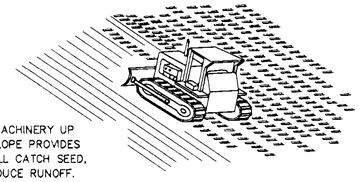
'TRACKING' WITH MACHINERY ON SANDY SOIL PROVIDES ROUGHENING WITHOUT UNDUE COMPACTION.

NOTES:

1. ROUGHEN SLOPE WITH BULLDOZER
2. BROADCAST SEED AND FERTILIZER.
3. SPREAD STRAW MULCH 3" THICK. (2 1/2 TONS PER ACRE)
4. PUNCH STRAW MULCH INTO SLOPE BY RUNNING BULLDOZER UP AND

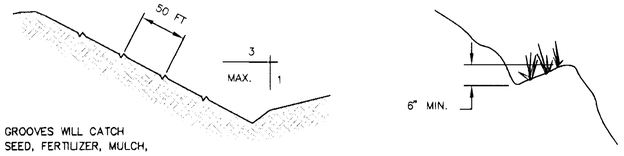
STRAW ANCHORING

NTS



'TRACKING' WITH MACHINERY UP AND DOWN THE SLOPE PROVIDES GROOVES THAT WILL CATCH SEED, RAINFALL AND REDUCE RUNOFF.

TRACKING



GROOVES WILL CATCH SEED, FERTILIZER, MULCH, RAINFALL AND DECREASE RUNOFF.

CONTOUR FURROWS

SURFACE ROUGHENING

NTS

LOAMING, SEEDING AND FERTILIZING

1.) If required the contractor shall furnish all topsoil or additional topsoil needed to complete the job. If the existing topsoil is sufficient to complete the job, any excess topsoil will remain on site. An area will be provided on site for final storage.

2.) The topsoil shall be uniformly distributed on the designated areas and it shall be a minimum depth of six inches after firming. Spreading shall be performed in such a manner that seeding can proceed with a minimum of additional soil preparation and tillage. Any irregularities in the surface resulting from topsoiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets. Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading or proposed seeding.

3.) After loam has been placed, lime and fertilizer shall be uniformly mixed into the top four inches of soil by discing, harrowing or using other approved methods.

4.) Any undulations or irregularities in the surface resulting from fertilizing, liming, surface roughening or other causes shall be leveled prior to seeding. Flooded, washed-out or otherwise damaged areas shall be reconstructed and all grades re-established by the contractor in accordance with the drawings and/or other applicable specifications.

5.) Prior to seeding, the surface shall be cleared of all trash, debris and stones larger than one and one-half inches in diameter, and of all roots, brush, wire, grade stakes and other objects that would interfere with planting or maintenance operations.

6.) Broadcast seed and mulch. Place straw and anchor it to topsoil. If soil moisture is deficient, supply new seedings with adequate water for plant growth (1/2"-1" every 3-4 days depending on soil texture) until they are firmly established.

REPAIRS AND MAINTENANCE

Inspect all seeded areas for failures and make necessary repairs, replacements, and reseedings within the planting season.

1.) Once the vegetation is established, the site shall have 95% groundcover to be considered adequately stabilized.

2.) if the stand provides less than 40% ground coverage, reestablish following original lime, fertilizer, seedbed preparation and seeding recommendations.

3.) If the stand provides between 40% and 94% ground coverage, overseeding and fertilizing using half of the rates originally applied may be necessary.

SURFACE PREPARATION

1.) Strip and stockpile all existing loam from proposed work areas. Protect loam from erosion. All loam will remain on site unless the owner approves of off site removal.

2.) Set field grades in accordance with the contract documents. Provide proper survey control and maintain throughout construction. Provide engineer with copies of all survey notes and locations of both vertical and horizontal control.

3.) Bring base material to finish grade. Provide engineer with as-built drawings showing finish elevations and contours prior to placement of loam.

4.) Soil test shall be made to determine the exact requirements for both lime and fertilizer. Soil tests shall be conducted by a state laboratory or recognized commercial laboratory. Provide engineer with copy of test results and recomendations for liming and fertilizing.

5.) After the areas to be topsoiled have been approved by the owner or engineer, and immediately prior to dumping and spreading the topsoil, the subgrade shall be loosened by roughening to a depth of at least two inches to permit bonding of the topsoil to the subsoil and to incorporate lime.

6.) Acceptance shall be given by the owner or engineer upon satisfactory completion of each section or area as indicated on the drawings or as otherwise specified before placement of topsoil.

AS-BUILTS

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DRAWN	POE
CHECKED	TDB
APPROVED	TS

STATE OF MARYLAND — THOMAS DONNATHEN — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

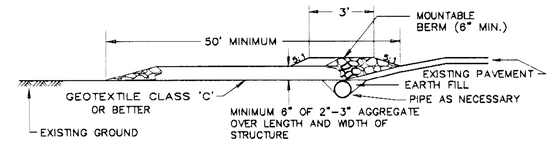
SHEET TITLE
EROSION AND SEDIMENT CONTROL NOTES AND DETAILS I

SCALE: NOT TO SCALE
DATE: September 08, 1998

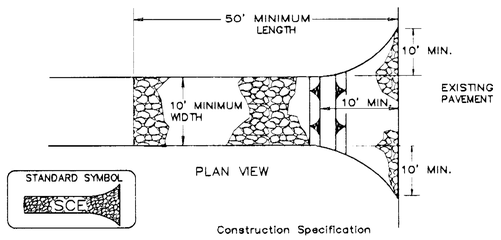
PROJECT NO.
MAA-CO-97-019

SHEET NO.
R-06

DETAIL 24 – STABILIZED CONSTRUCTION ENTRANCE



PROFILE



PLAN VIEW

Construction Specification

1. Length – minimum of 50' (*30' for single residence lot).

2. Width – 10' minimum, should be flared at the existing road to provide a turning radius.

3. Geotextile fabric (filter cloth) shall be placed over the existing ground prior to placing stone. **The plan approval authority may not require single family residences to use geotextile.

4. Stone – crushed aggregate (2" to 3") or reclaimed or recycled concrete equivalent shall be placed at least 6" deep over the length and width of the entrance.

5. Surface Water – all surface water flowing to or diverted toward construction entrances shall be piped through the entrance, maintaining positive drainage. Pipe installed through the stabilized construction entrance shall be protected with a mountable berm with 5:1 slopes and a minimum of 6" of stone over the pipe. Pipe has to be sized according to the drainage. When the SCE is located at a high spot and has no drainage to convey a pipe will not be necessary. Pipe should be sized according to the amount of runoff to be conveyed. A 6" minimum will be required.

6. Location – A stabilized construction entrance shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must travel over the entire length of the stabilized construction entrance.

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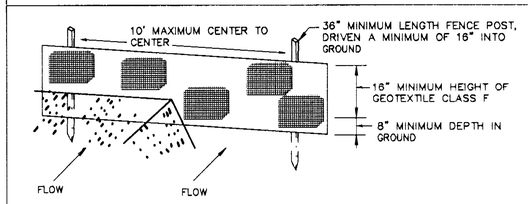
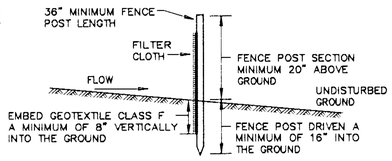
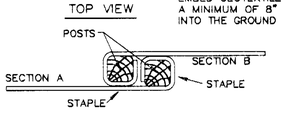
DETAIL 22 – SILT FENCE



PERSPECTIVE VIEW



CROSS SECTION



JOINING TWO ADJACENT SILT FENCE SECTIONS

STANDARD SYMBOL
SF

Construction Specifications

1. Fence posts shall be a minimum of 36" long driven 16" minimum into the ground. Wood posts shall be 11/2" x 11/2" square (minimum) cut, or 13/4" diameter (minimum) round and shall be of sound quality hardwood. Steel posts will be standard T or U section weighting not less than 1.00 pond per linear foot.

2. Geotextile shall be fastened securely to each fence post with wire ties or staples at top and mid–section and shall meet the following requirements for Geotextile Class F:

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal ft ⁄ minute (max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322

3. Where ends of geotextile fabric come together, they shall be overlapped, folded and stapled to prevent sediment bypass.

4. Silt Fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reached 50% of the fabric height.

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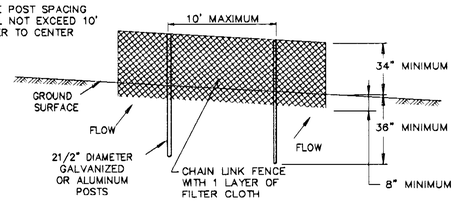
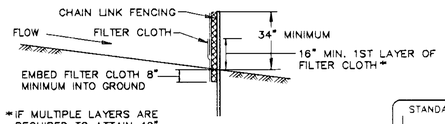
DETAIL 33 – SUPER SILT FENCE

NOTE: FENCE POST SPACING SHALL NOT EXCEED 10' CENTER TO CENTER





*IF MULTIPLE LAYERS ARE REQUIRED TO ATTAIN 42"

STANDARD SYMBOL
SSF

Construction Specifications

1. Fencing shall be 42" in height and constructed in accordance with the latest Maryland State Highway Details for Chain Link Fencing. The specification for a 6' fence shall be used, substituting 42" fabric and 6' length posts.

2. Chain link fence shall be fastened securely to the fence posts with wire ties. The lower tension wire, brace and truss rods, drive anchors and post caps are not required except on the ends of the fence.

3. Filter cloth shall be fastened securely to the chain link fence with ties spaced every 24" at the top and mid section.

4. Filter cloth shall be embedded a minimum of 8" into the ground.

5. When two sections of filter cloth adjoin each other, they shall be overlapped by 6" and folded.

6. Maintenance shall be performed as needed and silt buildups removed when "bulges" develop in the silt fence, or when silt reaches 50% of fence height

7. Filter cloth shall be fastened securely to each fence post with wire ties or staples at top and mid section and shall meet the following requirements for Geotextile Class F:

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal/ft ⁄minute (max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322

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PERMANENT SEEDING SUMMARY *

SEED MIXTURE (FOR HARDINESS ZONE 7A)					FERTILIZER RATE (10–20–20)			LIME RATE
No.	SPECIES	APPLICATION RATE (lb/ac)	SEEDING DATES	SEEDING DEPTHS	N	P205	K20	
3	TALL FESCUE (85%) PERENNIAL RYEGRASS (10%) KENTUCKY BLUEGRASS (5%)	125 15 10	3/1 – 5/15 8/15 – 11/15	1"– 2"	90 lb/ac (2.0 lb/ 1000 sf)	175 lb/ac (4 lb/ 1000 sf)	175 lb/ac (4 lb/ 1000 sf)	2 tons/ac (100 lb/ 1000 sf)

*FROM TABLE 25, MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, 1994.

TEMPORARY SEEDING SUMMARY *

SEED MIXTURE (FOR HARDINESS ZONE 7A)					FERTILIZER RATE (10–10–10)	LIME RATE
No.	SPECIES	APPLICATION RATE (lb/ac)	SEEDING DATES	SEEDING DEPTHS		
	BARLEY OR RYE PLUS FOXTAIL MILLET	150	2/1 – 10/15 2/1 – 11/30	1"	600 lb/ac (15 lb/1000SF)	2 tons/ac (100 lb/ 1000 sf)

*FROM TABLE 26, MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL, 1994.

AS-BUILTS

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CHECKED	TS
APPROVED	TS

STATE OF MARYLAND – TERRANCE SOMBATHEM – LICENSE NO. 12488 – REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS II

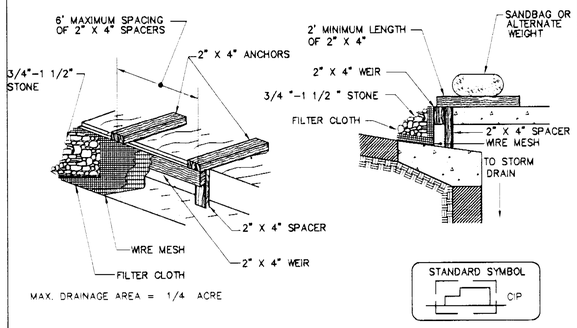
SCALE: NOT TO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: R-07

DETAIL 23C – CURB INLET PROTECTION (COG OR COS INLETS)



Construction Specifications

1. Attach a continuous piece of wire mesh (30" minimum width by throat length plus 4') to the 2" x 4" weir (measuring throat length plus 2') as shown on the standard drawing.

2. Place a continuous piece of Geotextile Class E the same dimensions as the wire mesh over the wire mesh and securely attach it to the 2" x 4" weir.

3. Securely nail the 2" X 4" weir to a 9" long vertical spacer to be located between the weir and the inlet face (max. 4' apart).

4. Place the assembly against the inlet throat and nail (minimum 2' lengths of 2" x 4" to the top of the weir at spacer locations). These 2" x 4" anchors shall extend across the inlet top and be held in place by sandbags or alternate weight.

5. The assembly shall be placed so that the end spacers are a minimum 1' beyond both ends of the throat opening.

6. Form the 1/2 " x 1/2 " wire mesh and the geotextile fabric to the concrete gutter and against the face of the curb on both sides of the inlet. Place clean 3/4 " x 1 1/2 " stone over the wire mesh and geotextile in such a manner to prevent water from entering the inlet under or around the geotextile.

7. This type of protection must be inspected frequently and the filter cloth and stone replaced when clogged with sediment.

8. Assure that storm flow does not bypass the inlet by installing a temporary earth or asphalt dike to direct the flow to the inlet.

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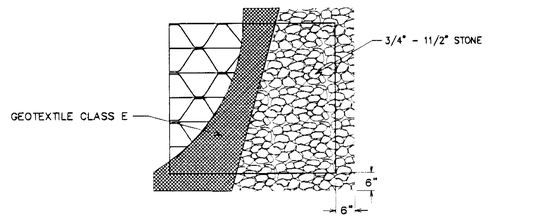
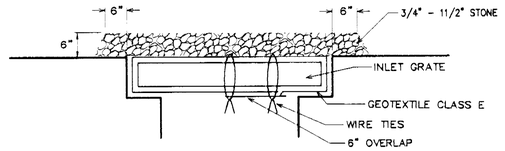
DETAIL 23B – AT GRADE INLET PROTECTION



PLAN/CUT AWAY VIEW



CROSS SECTION

MAX. DRAINAGE AREA = 1/4 ACRE

STANDARD SYMBOL
AGIP

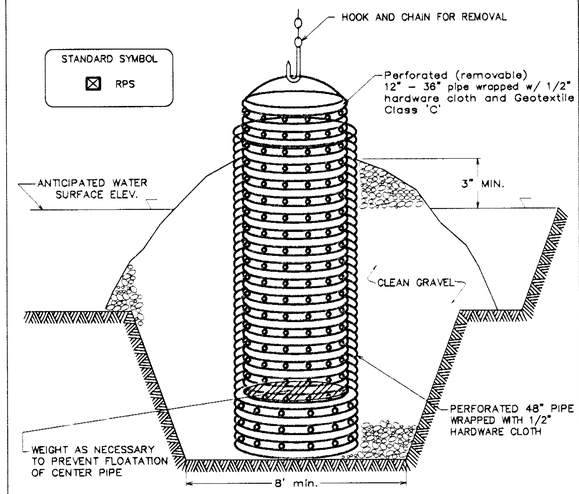
Construction Specifications

1. Lift grate and wrap with Geotextile Class E to completely cover all openings, then set grate back in place.

2. Place 3/4" to 11/2" stone, 4"–6" thick on the grate to secure the fabric and provide additional filtration.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PAGE E – 16 – 5A	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL 20A – REMOVABLE PUMPING STATION



ELEVATION

CONSTRUCTION SPECIFICATION

1. The outer pipe should be 48" dia. or shall, in any case, be at least 4" greater in diameter than the center pipe. The outer pipe shall be wrapped with 1/2" hardware cloth to prevent backfill material from entering the perforations.

2. After installing the outer pipe, backfill around outer pipe with 2" aggregate or clean gravel.

3. The inside stand pipe (center pipe) should be constructed by perforating a corrugated or PVC pipe between 12" and 36" in diameter. The perforations shall be 1/2" X 6" slits or 1" diameter holes 6" on center. The center pipe shall be wrapped with 1/2" hardware cloth first, then wrapped again with Geotextile Class C.

4. The center pipe should extend 12" to 18" above the anticipated water surface elevation or riser crest elevation when dewatering a basin.

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	PAGE D – 12 – 4	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

AS-BUILTS

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CHECKED	TS
APPROVED	TS

STATE OF MARYLAND – TERRANCE SUNDSTROM – LICENSE NO. 12488 – REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

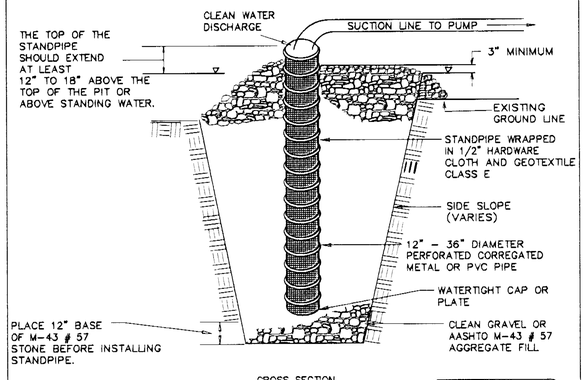
SHEET TITLE
EROSION AND SEDIMENT CONTROL DETAILS III

SCALE: **NOT TO SCALE**
DATE: **September 08, 1998**

PROJECT NO.
MAA-CO-97-019

SHEET NO.
R-08

DETAIL 20B – SUMP PIT



CROSS SECTION

STANDARD SYMBOL

⊠ SP

SUMP PIT

Construction Specifications

1. Pit dimensions are variable, with the minimum diameter being 2 times the standpipe diameter.

2. The standpipe should be constructed by perforating a 12" to 24" diameter corrugated or PVC pipe. Then wrapping with 1/2" hardware cloth and Geotextile Class E. The perforations shall be 1/2" x 6" slits or 1" diameter holes.

3. A base of filter material consisting of clean gravel or #57 stone should be placed in the pit to a depth of 12". After installing the standpipe, the pit surrounding the standpipe should then be backfilled with the same filter material.

4. The standpipe should extend 12" to 18" above the lip of the pit or the riser crest elevation (basin dewatering only) and the filter material should extend 3" minimum above the anticipated standing water elevation.

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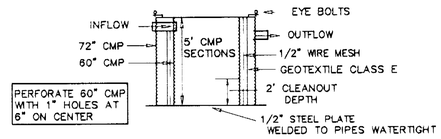
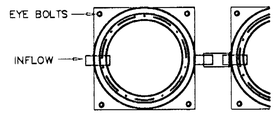
DETAIL 21 – PORTABLE SEDIMENT TANK



ELEVATION



PLAN VIEW

STANDARD SYMBOL

⊠ PST

PORTABLE SEDIMENT TANK

Construction Specifications

1. The following formula should be used in determining the storage volume of the sediment tank: 1 cubic foot of storage for each gallon per minute of pump discharge capacity.

2. An example of a typical sediment tank is shown above. Other container designs can be used if the storage volume is adequate and approval is obtained from the local approving agency.

3. Tanks may be connected in series.

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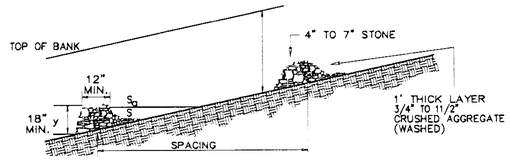
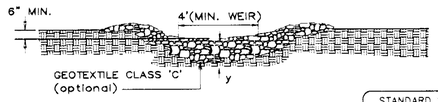
DETAIL 7 – STONE CHECK DAM



DITCH PROFILE



CROSS SECTION

STANDARD SYMBOL

STANDARD STONE CHECK DAM DESIGN

SLOPE	SPACING
2% or less	80'
2.1% to 4%	40'
4.1% to 7%	25'
7.1% to 10%	15'
over 10%	use lined waterway design

Construction Specifications

1. Swales and ditches shall be prepared in accordance with the construction specifications described in Section A–2, Standards and Specifications for Temporary Swale.

2. The check dam shall be constructed of 4"–7" stone. The stone shall be placed so that it completely covers the width of the channel and keyed into the channel banks.

3. The top of the check dam shall be constructed so the the center is approximately 6" lower than the outer edges, forming a weir that water can flow across.

4. The maximum height of the check dam at the center shall not exced 2".

5. The upstream sideof the check dam shall be lined with approximately 1" of 3/4" to 11/2" crushed aggregate.

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AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED. IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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DRAWN	ME
CHECKED	TS
APPROVED	TS

STATE OF MARYLAND — THERESA SOMMATINO — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE
EROSION AND SEDIMENT CONTROL DETAILS IV

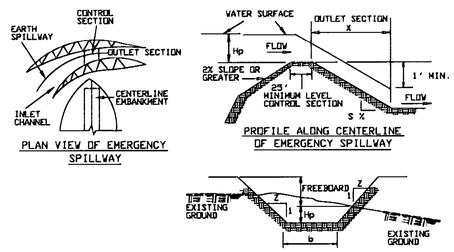
SCALE **NOT TO SCALE**

DATE **September 08, 1998**

PROJECT NO. **MAA-CO-97-019**

SHEET NO. **R-09**

DETAIL 12 - EMERGENCY SPILLWAY



LEGEND

n= manning's Coefficient of Roughness.
Hp= Difference in elevation between the crest of the emergency spillway and the control section and water surface of the reservoir, in Feet.
b= Bottom width of emergency spillway at the control section, in feet. (8' Minimum)
Q= Total discharge, in cfs.
V= Velocity, in feet per second, that will exist in the channel below the control section, at design Q, if constructed to slope (S) that is shown. (Vmax = 5 fps.)
S= Flattest slope (S), in %, allowable for the channel below the control section.
X= Minimum length of the channel below the control section, in feet.
Z= Side slope ratio.

Minimum Z = 2

NOTES

1. For a given Hp a decrease in the exit slope from S as given in the table decreases the spillway discharge but increasing the exit slope from S does not increase the discharge. If an exit slope (Se) steeper than S is used, then the velocity (Ve) in the exit channel will increase according to the following relationship:

$$Ve = V\left(\frac{Se}{S}\right)^{0.3}$$

2. Data to the right of the heavy vertical lines on Table 14 should be used with caution, as the resulting sections will be either poorly proportioned or have velocities in excess of 5 Ft./sec.

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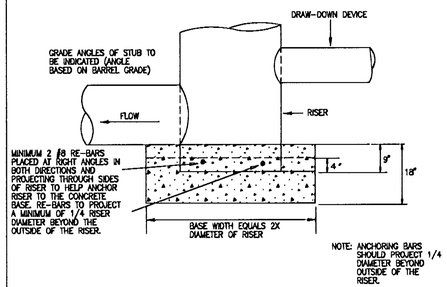
DETAIL 15 - RISER BASE DETAIL



Construction Specifications

The riser shall have a base attached with a watertight connection and shall have sufficient weight to prevent flotation of the riser. Two approved bases for risers 10' or less in height are:

1. A concrete base 18" thick with the riser embedded 9" in the base.

2. A 1/4" minimum thickness steel plate attached to the riser by a continuous weld around the circumference of the riser to form a watertight connection. The plate shall have 2' of stone, gravel, or compacted earth placed on it to prevent flotation. In either case, each side of the square base shall be twice the riser diameter.

The riser installation shall include the basin vertical draw-down device installed at the wet storage elevation shown in the table on Sheet R-02. Provide a water-tight connection between the riser and the draw-down pipe.

Note: For risers greater than ten feet high computations shall be made to design a base which will prevent floatation. The minimum factor of safety shall be 1.20 (downward forces = 1.20 x upward forces).

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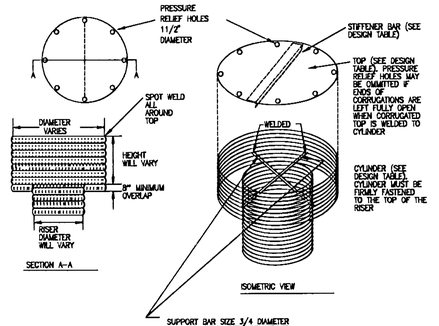
DETAIL 16 - CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE



Riser Diam., in.	Trash Rack Cylinder Diam., in.	Thick., gage	H, in.	Minimum Size Support Bar	Minimum Top Thickness Stiffener
72	102	10	36	2" pipe or 8 ga. 2x2x3/16 angle	2-1/2x2-1/2x1/4 w/stiffener angle

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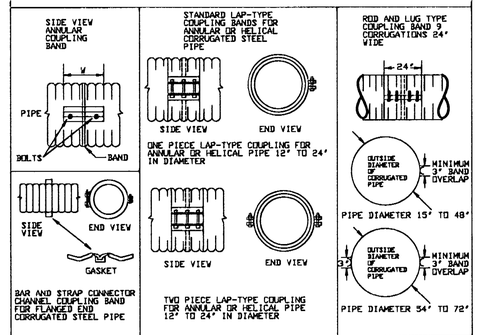
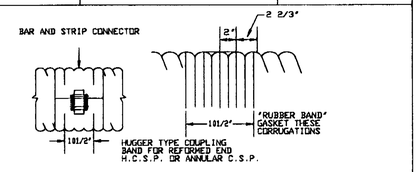
DETAIL 17 - TYPES OF COUPLERS FOR CORRUGATED STEEL PIPE

(ALL CONNECTOR BANDS REQUIRE NEOPRENE GASKETS)





NOTE: UNDER NO CIRCUMSTANCES WILL THE DIMPLE (UNIVERSAL) CONNECTOR BAND BE ACCEPTABLE FOR USE IN ANY SEDIMENT CONTROL OR STORMWATER MANAGEMENT STRUCTURE

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MAINTENANCE SCHEDULE FOR DRAINAGE AND STORMWATER MANAGEMENT FACILITIES

ROUTINE MAINTENANCE

1. THE FACILITIES SHALL BE INSPECTED AT LEAST ANNUALLY AND AFTER MAJOR STORMS (1" OR MORE RAINFALL IN 24 HOURS). INSPECTIONS OF EACH COMPONENT OF A FACILITY SHOULD BE PERFORMED DURING WET WEATHER WHEN POSSIBLE TO VERIFY THAT THE FACILITIES ARE FUNCTIONING PROPERLY.

2. TOP AND SIDE GRASSED SLOPES INSIDE PONDS SHALL BE MOWED AT LEAST TWICE ANNUALLY, IN JUNE AND SEPTEMBER. MAINTENANCE ACCESS AND OTHER ADJACENT AREAS SHOULD BE MOWED AS REQUIRED. PERMANENT WETLAND VEGETATION SHOULD BE DISTURBED ONLY WHEN ABSOLUTELY NECESSARY TO PERFORM OTHER MAINTENANCE AS REQUIRED.

3. DEBRIS AND LITTER WHICH ACCUMULATES IN THE PONDS, ESPECIALLY NEAR OUTLETS SHALL BE REMOVED AS REQUIRED, AND WITH EACH MOWING AT A MINIMUM.

4. VISIBLE SIGNS OF EROSION, EXCESSIVE SEDIMENT ACCUMULATION, OR OTHER IMPEDIMENTS PROPER FACILITY FUNCTION SHALL BE REPAIRED WITHOUT DELAY. THIS REQUIREMENT SHALL APPLY TO POND INTERIORS AND OUTLETS. VISIBLE EROSION OR SEDIMENT ACCUMULATION OF SEDIMENT IN DRAINAGEWAYS AND WETLANDS DOWNSTREAM OF POND OUTLETS SHALL BE REPAIRED OR REMOVED AS REQUIRED.

NON-ROUTINE MAINTENANCE

1. FACILITIES WHICH SUFFER STRUCTURAL DAMAGE SHALL BE REPAIRED IMMEDIATELY ON DETECTION OF THE DAMAGE.

2. ACCUMULATED SEDIMENT SHOULD BE REMOVED FROM A FACILITY WHEN IT SIGNIFICANTLY REDUCES ITS EFFICIENT FUNCTIONING CAPABILITY. SEDIMENT SHOULD BE REMOVED WHEN IT REACHES THE FOLLOWING DEPTH IN FACILITIES AND STRUCTURES AS FOLLOWS:

INLETS AND MANHOLES:	3"
SEDIMENTATION CHAMBERS:	12"
WINGWALLS AND ENDWALLS:	3"
STILLING BASINS (AT ENDWALLS):	6"

SEQUENCE FOR CONVERTING TEMPORARY SEDIMENT BASINS TO PERMANENT STORMWATER MANAGEMENT PONDS

1. DRAIN POND.
2. REMOVE ACCUMULATED SEDIMENT AND DISPOSE OF OFF AIRPORT PROPERTY IN ACCORDANCE WITH THE PROVISIONS OF SHEET R-01 AND ITEM P-152.
3. CLEAN SEDIMENT FROM ENDWALLS, SEDIMENTATION CHAMBERS, AND OTHER STRUCTURES, AND FLUSH THE STORM DRAINAGE SYSTEM AS DIRECTED BY THE ENGINEER.
4. REGRADE AND/OR FINE GRADE POND BOTTOM AND SLOPES TO PLAN GRADES (SEE SHEET C-03) AS REQUIRED. CONSTRUCT BERMS, SEEPAGE MECHANISMS, STRUCTURES, AND SPILLWAYS AS SHOWN ON THE CIVIL PLANS.
5. REPLACE TOPSOIL, EROSION CONTROL NETTING, AND OTHER DAMAGED ITEMS AS DIRECTED BY THE ENGINEER.
6. PERFORM THE AS-BUILT SURVEY IN ACCORDANCE WITH ITEM P-152 AND SUBMIT TO THE ENGINEER FOR APPROVAL. COMPLETE THE CERTIFICATION ON SHEET R-01.
7. PLANT PERMANENT POND VEGETATION AS SHOWN ON SHEETS V-01 THROUGH V-05. SEED AND MULCH UPPER POND SLOPES.
8. AFTER POND CONSTRUCTION IS APPROVED BY THE ENGINEER NOTIFY MDE INSPECTOR AND SCHEDULE FINAL INSPECTION. AFTER FINAL INSPECTION, COMPLETE PUNCH LIST ITEMS AS SOON AS POSSIBLE. ARRANGE FOR RE-INSPECTIONS AS REQUIRED.

AS-BUILTS

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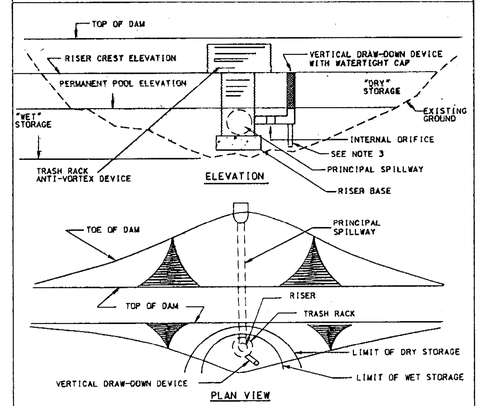
BASIN DRAWDOWN SCHEMATIC VERTICAL DRAW-DOWN DEVICE



CONSTRUCTION SPECIFICATIONS

1. PERFORATIONS IN THE DRAW-DOWN DEVICE MAY NO EXTEND INTO THE WET STORAGE.
2. THE TOTAL AREA OF THE PERFORATIONS MUST BE GREATER THAN 2 TIMES THE AREA OF THE INTERNAL ORIFICE.
3. THE PERFORATED PORTION OF THE DRAW-DOWN DEVICE SHALL BE WRAPPPED WITH 1/2" HARDWARE CLOTH AND GEOTEXTILE FABRIC. THE GEOTEXTILE FABRIC SHALL MEET SPECIFICATIONS FOR GEOTEXTILE CLASS E.
4. PROVIDE SUPPORT OF DRAW-DOWN DEVICE TO PREVENET SAGGING AND FLOTATION. AN ACCEPTABLE PREVENTATIVE MEASURE IS TO STAKE BOTH SIDES OF DRAW-DOWN DEVICE WITH 1" STEEL ANGLE, OR BY 1"X4" OR 2" ROUND WOODEN POSTS SET 3' MINIMUM INTO THE GROUND THEN JOINING THEM TO THE DEVICE BY WRAPPING WITH 12-GUAGE MINIMUM WIRE.

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REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: EROSION AND SEDIMENT CONTROL DETAILS V

SCALE: NOT TO SCALE

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: R-10

ELECTRICAL SYMBOLS AND ABBREVIATIONS

ASPH 4W-4"	PROPOSED ELECTRIC DUCT, 4 WAY, 4 INCH PVC CONDUITS, CONCRETE ENCASED INDICATES EXISTING ASPHALT PAVEMENT
	EXISTING UTILITY POLE
MH	PROPOSED PRECAST ELECTRIC MANHOLE
HH	PROPOSED PRECAST ELECTRIC HANDHOLE
	PROPOSED PAD-MOUNT DISTRIBUTION TRANSFORMER
1B	PROPOSED SINGLE MOUNTED AREA LIGHTING LUMINAIRE (GE "DECASHIELD III") ON 24 FT. FIBERGLASS POLE INDICATES BANNER POLE (10 EPA RATING) INDICATES POLE NUMBER (TYP.)
12	PROPOSED TWIN MOUNTED AREA LIGHTING LUMINAIRES (GE "DECASHIELD III") ON 24 FT. FIBERGLASS POLE
	PROPOSED TWIN MOUNTED 400W, 240V HPS FLOODLIGHT LUMINAIRES ON 2" CONDUIT STANCHION
CKT.	CIRCUIT
U.O.N.	UNLESS OTHERWISE NOTED
J J	JUNCTION BOX, WALL OR CEILING MOUNTED
	TOGGLE SWITCH, 1-POLE, 20 AMP, 120 VOLT, 48"AFF
	DUPLEX RECEPTACLE, NEMA 5-20R, 24"AFF
T H	THERMOSTAT OR HUMIDITY CONTROL
	POWER DISTRIBUTION PANELBOARD
	LIGHTED EXIT SIGN
###	BRANCH CIRCUIT WIRING, 2#12 THWN IN 1/2"C UNLESS OTHERWISE NOTED. HASH MARKS INDICATE NUMBER OF WIRES.
	CONDUIT TURNING UP
	CONDUIT TURNING DOWN
A	FLUORESCENT LUMINAIRE, LETTER INDICATES SCHEDULED TYPE
B	INCANDESCENT OR HID LUMINAIRE, LETTER INDICATES SCHEDULED TYPE
C	CONDUIT
AFF	ABOVE FINISHED FLOOR
kWhr	KILOWATTHOUR
GFI	GROUND FAULT INTERRUPTER
GND	GROUND
	SAFETY DISCONNECT SWITCH
	EMERGENCY LIGHTING UNIT
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
U/H	UNIT HEATER
VF	VENTILATION FAN
	EQUIPMENT GROUND
	ELECTRICAL CONTACT, NORMALLY OPEN
	ELECTRICAL CONTACT, NORMALLY CLOSED
	PUSH BUTTON, CIRCUIT CLOSING
	PUSH BUTTON, CIRCUIT OPENING, MUSHROOM HANDLE
	CIRCUIT BREAKER
	CONDUIT STUB-OUT AND CAP

	OVERLOAD COIL
	DISCONNECT SWITCH
	INDICATING LAMP
1i	MOTOR, NUMBER INDICATES HORSEPOWER
CB	CIRCUIT BREAKER
MS	MOTOR STARTER
FU (DE)	FUSE (DUAL ELEMENT)
TYP.	TYPICAL
MH	METAL HALIDE
HPS	HIGH PRESSURE SODIUM
	PROPOSED FAA TYPE L-861T ELEVATED TAXIWAY EDGE LIGHT (TANGENT - 30W, RADIUS - 45W)
4W-4"	CONCRETE ENCASED ELECTRICAL DUCT-SIZE AND NUMBER ARE INDICATED
	PROPOSED 2" SAND ENCASED CONDUIT WITH 1/C #8 5KV, L-824 CABLE AND #8 COUNTERPOISE ABOVE CONDUIT
kW	KILOWATT
FAA	FEDERAL AVIATION ADMINISTRATION
GRS	GALVANIZED RIGID STEEL ELECTRICAL CONDUIT
	AIR SIDE ELECTRICAL HANDHOLE
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
URD	UNDERGROUND
	SINGLE PHASE, OIL FILLED TRANSFOMER 13.2 kV - 240/120V, 10kVA POLE MOUNT
COND.	CONDUCTOR
OVH	EXISTING OVERHEAD ELECTRIC PRIMARY DISTRIBUTION (13.2kV, 3 PHASE)
XFR	TRANSFORMER
PMH	PAD MOUNTED HIGH VOLTAGE SWITCHGEAR
FO	FIBEROPTIC
FACP	FIRE ALARM CONTROL PANEL
SD	SMOKE DETECTOR

ELECTRICAL NOTES

1. FURNISH CONDUIT SYSTEMS FOR ELECTRIC POWER, TELEPHONE, AND CABLE TV UTILITY SERVICES, AND CONDUIT SYSTEMS FOR AIRPORT COMMUNICATION\CONTROL AND POWER WIRING. COORDINATE WITH UTILITY COMPANIES AND PROVIDE SERVICES AS OUTLINED UNDER SPECIFICATION ITEM 16000.
2. FURNISH ELECTRIC SERVICE TO SEWAGE PUMP STATION No. 1, STATION No. 2, AND STATION No. 3. THIS WORK TO INCLUDE COMPLETE INSTALLATION OF LOCAL AND REMOTE ALARM SYSTEM FOR THE SEWAGE LIFT STATIONS.
3. FURNISH COMPLETE ELECTRICAL SYSTEMS FOR THE FIRE PUMP HOUSE INCLUDING ELECTRIC POWER AND TELEPHONE SERVICES.
4. FURNISH AREA LIGHTING SYSTEM FOR PARKING LOTS AND ACCESS ROAD IN ACCORDANCE WITH BASE PROJECT, ADD ALTERNATE 1, AND ADD ALTERNATE 2 WORK.
5. FURNISH TAXIWAY EDGE LIGHTING & SIGNAGE IN ACCORDANCE ADD ALTERNATE 1 AND ADD ALTERNATE 2 WORK.
6. CONDUIT SYSTEMS SHALL INCLUDE EQUIPMENT PADS, GROUNDING COMPONENTS, CABLE RACKS, ETC., AS SHOWN ON THESE DRAWINGS AND AS REQUIRED BY THE UTILITY COMPANIES. FURNISH CONDUIT STUBS, CAPPED AT 15 FEET FORM THE EDGE OF PROPOSED HANGAR/OFFICE COMPLEXES AS SHOWN ON THESE DRAWINGS.
7. SHOP DRAWINGS FOR PRECAST MANHOLES AND HANDHOLES SHALL BE SUBMITTED FOR APPROVAL. MANHOLES AND HANDHOLES SHALL BE DESIGNED FOR H20 LOADING, UNLESS OTHERWISE NOTED. SHOP DRAWINGS SHALL BE SIGNED BY A REGISTERED PROFESSIONAL ENGINEER.
8. FURNISH SPARE (UNSPLICED) FIBEROPTIC CABLE AS SPECIFIED UNDER SPECIFICATION ITEM 16120 INSTALLED IN THE AIRPORT COMMUNICATION/CONTROL DUCTBANK BETWEEN HANDHOLES HH216 AND HH234. COIL 20 FEET OF SPARE CABLE AT EACH HANDHOLE. CAP EACH CABLE END WATERTIGHT.

ELECTRIC MANHOLE & HANDHOLE SCHEDULE

ID No.	N.	E.	DUCT CONFIGURATION	CONNECTING MH & HH, etc.	ELECTRIC DISTRIBUTION TYPE Airport Communication\Control	REMARKS
MH219	604068.7953	1476972.6482	2(4W-3") & 2(2W-3")	HH220, HH310, 2 STUB-OUTS, (NORTH & WEST) 1" URD TO PS#1		Change HH to MH
HH220	603733.9450	1477249.1813	3(4W-3")	HH219, HH221, H2A		
HH2A	603781.8400	1477297.1800	2(4W-3")& 1"URD conduit	HH220, HH312, PUMP Sta.2A		NEW. Furnish 1" URD COND. TO PS#2A
HH221	603471.9790	1477511.2789	3(4W-3")	HH220, HH222		
HH222	603434.7449	1477548.8599	3(4W-3")	HH221, FPH		
HH222A	603173.8068	1477544.8309	2(2W-4")	FPH, 223		NEW
HH223	603063.9565	1477565.2288	2(2W-3"), 1(2W-3")	HH222A, 224		Furnish 1w-1" conduit to pump station #2
HH224	602975.5824	1477784.0542	2(2W-3")	HH223, HH225		
HH225	602903.2444	1477970.3673	2(2W-3")	HH224, HH226		
HH226	602799.4452	1478159.2792	2(2W-3")	HH225, HH227		
HH227	602659.1122	1478282.3044	2(2W-3")	HH226, HH228		
HH228	602519.0560	1478424.5467	2(2W-3")	HH227, HH229		
HH229	602378.3905	1478568.7176	2(2W-3")	HH228, HH230		
HH230	602237.7250	1478708.8895	2(2W-3")	HH229, HH231		
HH231	602084.4174	1478863.8569	2(2W-3")	HH230, HH232		Furnish 1W-1" conduit to pump station #3
HH232	602227.8027	1479002.9318	2(2W-3")	HH231, HH233		
HH233	602369.7979	1479144.1539	2(2W-3")	HH232, HH234		
HH234	602511.6073	1479285.0257	2(2W-3")	HH233		
HH310	603735.4380	1476708.7970	2(2W-2")	HH219 & HH311		
HH311	603402.0118	1476599.1020	2(2W-2")	HH310 & GP1		GP1 = Guard post Island
HH312	603819.1100	1477334.5220	1(2W-3") & 1(4W-3")	HH313 & HH2A		
HH313	603990.4821	1477504.4845	2(2W-2") & 1(2W-3")	HH312, HH314, HH319		Stub-out (West) towards HH319
HH314	603889.9128	1477625.7103	2(2W-2") & 1(1W-2")	HH313 & O/W SEP, Hangar		O/W SEP = Oil water separator
HH242	604049.3099	1477087.4508	2(4W-4")	HH241, HH243	Telephone utility distribution	Stub-out (WEST) towards HH241
HH243	603791.0095	1477347.5277	3(4W-4")	HH242, HH244		Stub-out to future building (North)
HH244	603719.4310	1477475.9303	2(4W-4")	HH243, HH245		
HH245	603455.1430	1477530.3047	3(4W-4")	HH244, BA Pedestal #2 & LM		Stub-out to Lockheed/Martin hangar
BA Pedestal #2			1(4w-4") 1(2w-4") & 1(W-2"	HH245 & BA Pedestal #1 &FPH		Furnish 2" telco service duct to FPH
MH282	604093.4020	1477035.3070	3(2W-3")	HH283, HH285	Cable TV utility distribution	Changed HH to MH. Stub-out to HH281
HH283	603748.9923	1476711.9456	2(2W-3")	HH282, HH284		
HH284	603321.0481	1476697.8044	2(2W-3")	HH283		Proposed cable TV source handhole
HH285	603321.6087	1477308.9878	3(2W-3")	MH282, HH286		
HH286	603767.2700	1477561.9890	2(2W-3")	HH285, HH287		
HH287	603499.4000	1477518.8400	2(2W-3")	HH286		Stub-out to Lockheed/Martin hangar
HH291	603927.4699	1476912.3000	3(1W-2")	LP1B, LP1B, HH292	Parking lot lighting distribution	Stub-out from LP1B towards HH290
HH292	603977.8768	1477163.5721	2(1W-2") & 1(2W-2")	HH291, HH293, HH294, LP12		
HH293	603749.3983	1477251.4986	2(2W-2") & 1(1W-2")	HH292, 2 STUB-OUTS		Stub-out ducts for future connection (North)
HH294	603530.3611	1477311.0487	2(1W-2")	HH292, P1 in FPH		P1= 480V PANEL IN FIRE PUMP HOUSE
MH282A	603929.4800	1477028.4500	2(4W-6") & 1(6W-6")	MH283, PMH	Electric power utility distribution	MH282 IS RELOCATED. Stub-out (West) to MH 281
MH283	603704.3717	1477255.0715	3(4W-6")	MH282A, MH226		PMH = Pad mounted Utility switchgear
MH226	603427.5342	1477533.7713	1(4W-6") & 1(2W-6")	MH283, XFR		NEW
XFMR			1(2W-6") & 1(2W-3")	MH226, FPH METER		Electric service duct to fire pump house
MH322	603997.3455	1476970.0697	2(4W-4") & 1(2W-2")	MH321, MH323, HH318	Airport power distribution	Furnish 1W-2" conduit to pump station #1
MH323	603718.2278	1477253.0790	2(4W-4") & 1(W-2" cond	MH322, MH324, Pump Sta. 2A		Furnish 1W-2" conduit to PS#2A
MH324	603430.5422	1477540.5693	1(4W-4") & 1(2W-4")	MH323, FPH		Stub-up 1(2W-4") in fire pump house
HH318	603742.8070	1476728.7918	2(2W-2")	MH322 & HH315		
HH315	603406.9825	1476608.5808	2(2W-2")	HH316, GP1		Stub-up 1(2W-3") at guard post Island

2

AS BUILT

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DESIGNED	ME
DRAWN	ME
CHECKED	JM
APPROVED	TS

STATE OF MARYLAND — THOMAS JOHN PITTAS — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

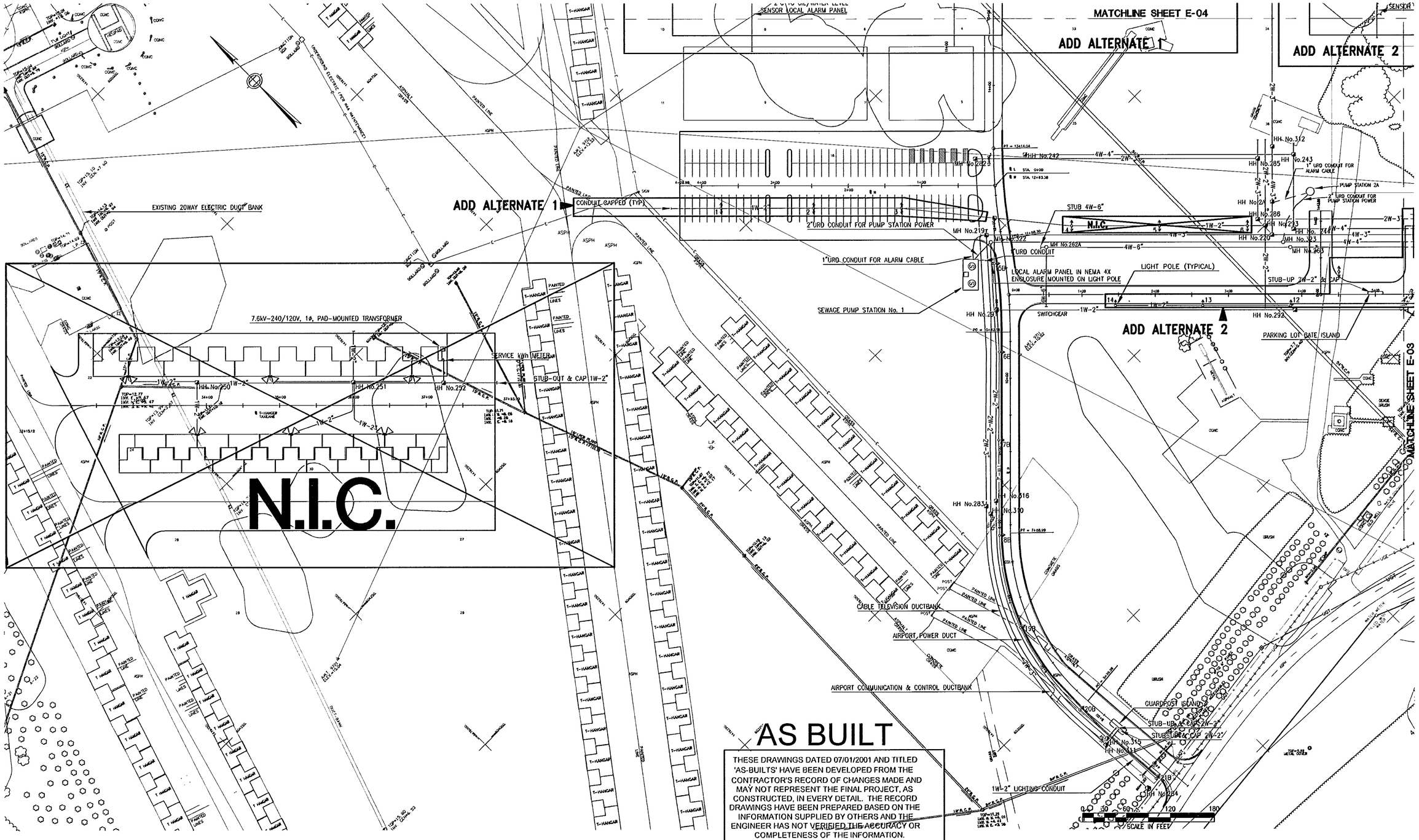
REV.	DATE	REMARKS
1	12/04/98	ADDED COORDINATE FOR ELECTRICAL MANHOLES AND HANDHOLES
2	12/15/98	REVISED LOCATION OF MANHOLES AND HANDHOLES
3	4/28/99	REVISED LOCATION OF MANHOLES AND HANDHOLES
4	6/11/99	REVISED SIZE OF DUCT AND ADDED HH222A
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE	MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE	ELECTRICAL GENERAL NOTES AND LEGEND
SCALE	NO SCALE
DATE	September 08, 1998
PROJECT NO.	MAA-CO-97-019
SHEET NO.	E-01



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APPROVED	TS

STATE OF MARYLAND
TEKKAPOJ SOMBATPIUM
LICENSE NO. 12480
REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

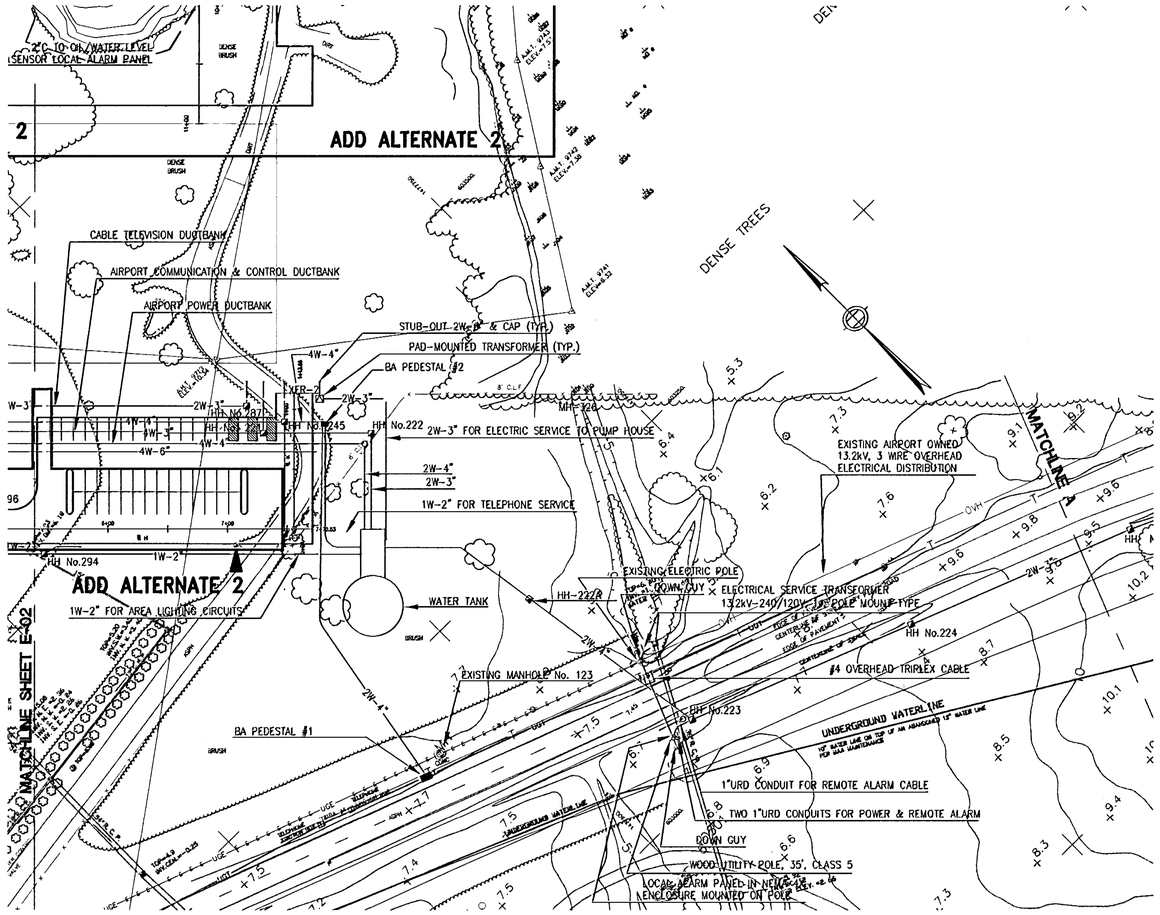
MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE
POWER, COMMUNICATION AND LIGHTING PLAN I

SCALE 1" = 60'
DATE September 08, 1998

PROJECT NO. MAA-CO-97-019
SHEET NO. E-02



AS BUILT

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CHECKED	JK
APPROVED	TS

STATE OF MARYLAND — TEERAPOL SOMBATPHON — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
POWER, COMMUNICATION AND LIGHTING PLAN II

SCALE 1" = 60'

DATE September 08, 1998

PROJECT NO. MAA-CO-97-019

SHEET NO. E-03

AS BUILT

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT, AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

TAXIWAY GUIDANCE SIGN SCHEDULE

SIGN NO.	LOCATION	NO's OF MODULES	SIDE 1 LEGEND	SIDE 1 COLOR	SIDE 2 LEGEND	REMARKS
①	TW F 43+27	2	F L→	Y/B B/Y	BLANK	NEW SIGN
②	TW L 15+93	2	L ←L→	Y/B B/Y	BLANK	NEW SIGN
③	TW F 45+13	2	←L F	B/Y Y/B	BLANK	NEW SIGN
④	TW J 4+93	2	J ←F→	Y/B B/Y	BLANK	NEW SIGN
⑤	TW F 43+27	1				ADD 1 MODULE, FURNISH NEW 2-PANEL LEGEND
⑥	TW F 43+27	1				ADD 1 MODULE, REUSE EXISTING LEGEND
⑦	TW F 43+27	1				ADD 1 MODULE, FURNISH NEW 2-PANEL LEGEND

ADD ALTERNATE 1

ADD ALTERNATE 2

MATCHLINE SHEET E-02

MATCHLINE SHEET E-03

DESIGNED	ME
DRAWN	ME
CHECKED	JK
APPROVED	TS

REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

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STATE OF MARYLAND — FREDERICK DOMBATHYM — LICENSE NO. 12480 — REGISTERED PROFESSIONAL ENGINEER

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

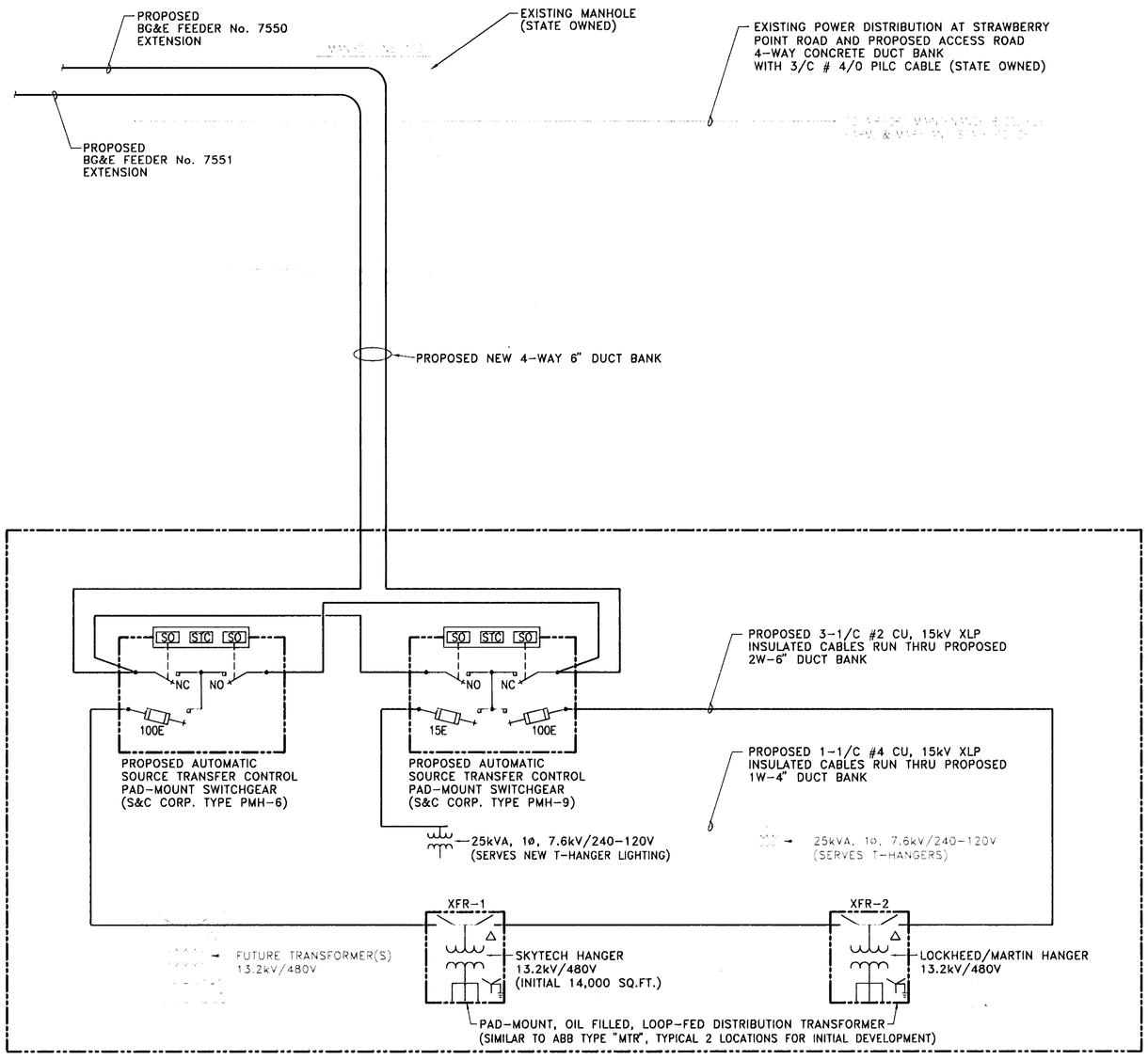
SHEET TITLE: POWER, COMMUNICATION AND LIGHTING PLAN III

SCALE: 1" = 60'

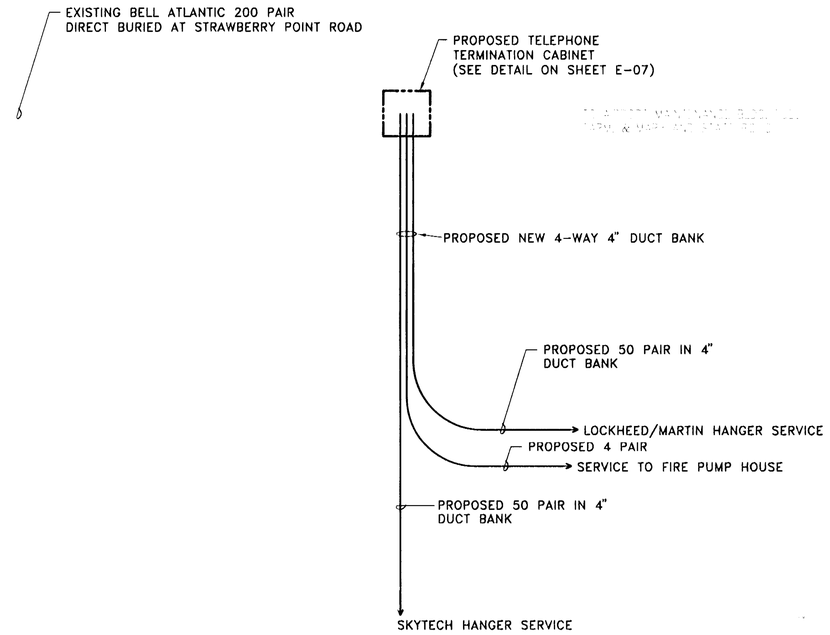
DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: E-04



PROPOSED MIDFIELD POWER DISTRIBUTION



PROPOSED TELEPHONE DISTRIBUTION

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

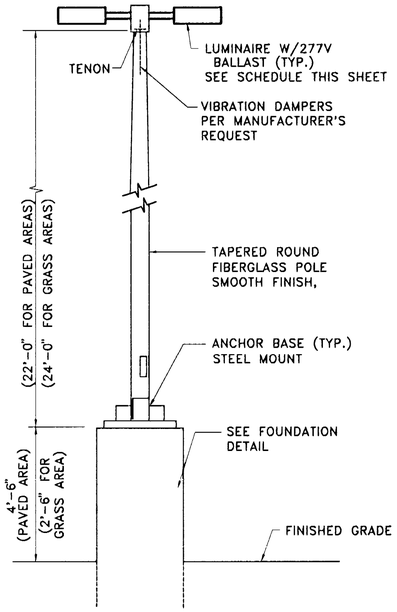
NOTES

1. THE CONTRACTOR SHALL FURNISH AND INSTALL ELECTRICAL SERVICES IN ACCORDANCE WITH THESE DRAWINGS AND UTILITY REQUIREMENTS.
2. THE CONTRACTOR SHALL COORDINATE WITH LOCAL CABLE TELEVISION UTILITY AND PROVIDE DISTRIBUTION INTO THE SITE.

REFERENCE DRAWINGS

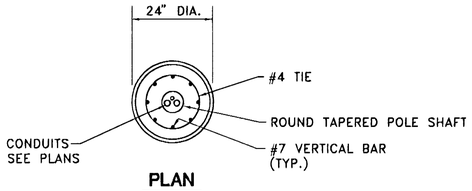
1. SITE PLAN AND LEGEND (SAA-CO-85-008), DATED 5/1/85.
2. DISTRIBUTION DIAGRAM - NEW WORK (SAA-CO-85-008), DATED 3/25/85.

TAMS TAMS Consultants, Inc. ENGINEERS, ARCHITECTS AND PLANNERS 2101 Wilson Boulevard, Suite 300 Arlington, VA 22201	DESIGNED ME DRAWN ME CHECKED JM APPROVED TS	STATE OF MARYLAND TEXAPOL SOMBATPIUM LICENSE NO. 12480 REGISTERED PROFESSIONAL ENGINEER	REV.	DATE	REMARKS	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION DIVISION OF ENGINEERING MARTIN STATE AIRPORT	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: ELECTRICAL DETAILS I SCALE: NONE DATE: September 08, 1998	PROJECT NO. MAA-CO-97-019 SHEET NO. E-05



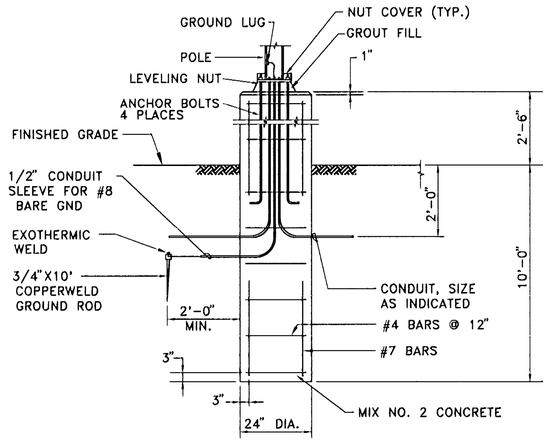
TYPICAL POLE-MOUNT LUMINAIRE DETAIL

NOT TO SCALE



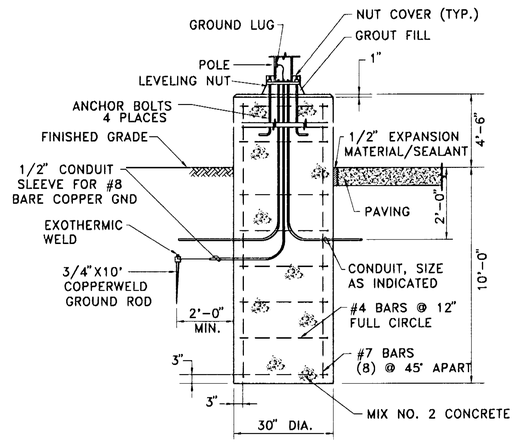
PLAN

NOT TO SCALE



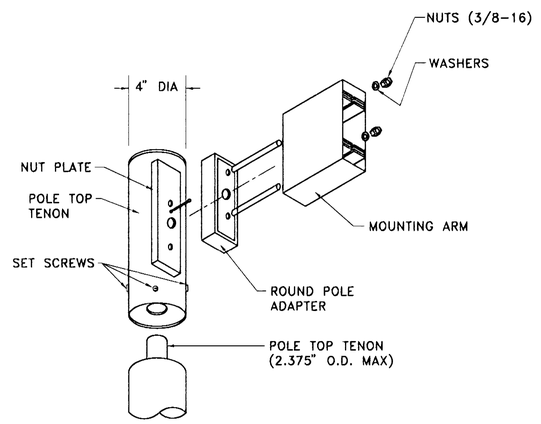
TYPICAL POLE FOUNDATION FOR GRASS AREAS

NOT TO SCALE



TYPICAL POLE FOUNDATION FOR PAVED AREAS

NOT TO SCALE

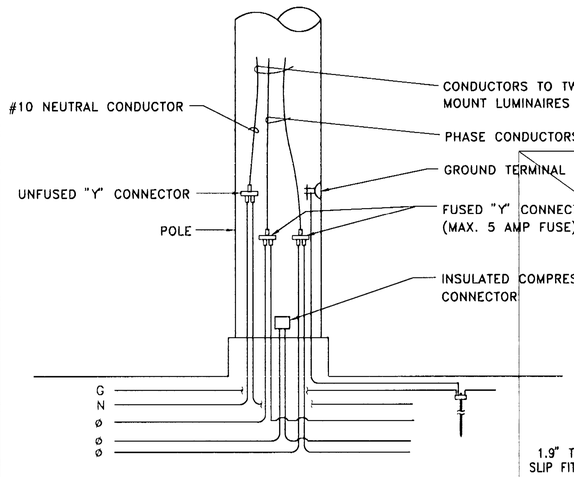


POLE MOUNTED LUMINAIRE MOUNTING ARM DETAIL

NOT TO SCALE

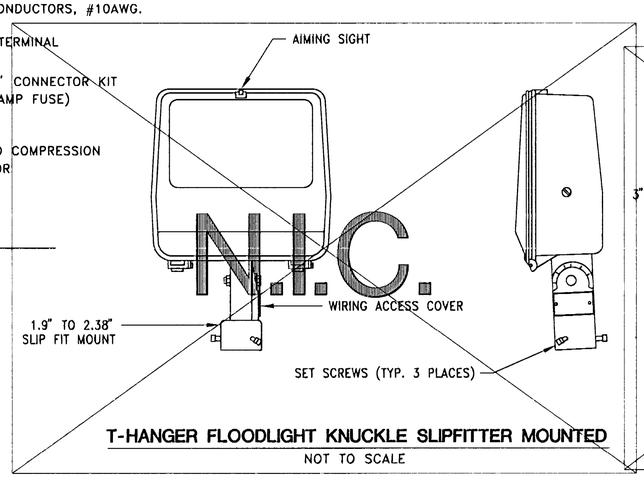
STATION	OFFSET	POLE No.	LUMINAIRE QUANTITY	LAMP TYPE	LAMP WATTS	PANEL No.	CIRCUIT No.	LIGHT DIST.	REMARKS
3+74	31.0	1	2	HPS	250	P1	2 & 4	M-C-III	
2+48	31.0	2	2	HPS	250	P1	6 & 8	M-C-III	
1+28	31.0	3	2	HPS	250	P1	10 & 12	M-C-III	
0+86	93.7	4	2	HPS	250	P1	2 & 4	M-C-III	N.I.C. (CAP CONDUIT 3' FROM HANDHOLE)
2+06	93.7	5	2	HPS	250	P1	6 & 8	M-C-III	N.I.C.
3+26	93.7	6	2	HPS	250	P1	10 & 12	M-C-III	N.I.C. (CAP CONDUIT 3' FROM HANDHOLE)
5+01	31.0	6A	2	MH	250			M-C-III	Energized from Lockheed/Martin Hangar (Note 1)
5+81	31.0	7	2	MH	250			M-C-III	Energized from Lockheed/Martin Hangar (Note 1)
6+91	31.0	8	2	MH	250			M-C-III	Energized from Lockheed/Martin Hangar (Note 1)
7.42	15.0	9	1	MH	250			M-C-II	Energized from Lockheed/Martin Hangar (Note 1)
6+25	15.0	10	1	MH	250			M-C-II	Energized form Lockheed/Martin Hangar (Note 1)
5+05	15.0	11	1	MH	250			M-C-II	Energized form Lockheed/Martin Hangar (Note 1)
3+85	15.0	12	1	HPS	250	P1	2	M-C-II	
2+65	15.0	13	1	HPS	250	P1	4	M-C-II	
1+46	15.0	14	1	HPS	250	P1	6	M-C-II	
11+58	15.0	15	1	HPS	250	P1	8	M-C-II	
10+35	15.0	16	1	HPS	250	P1	10	M-C-II	
9+16	15.0	17	1	HPS	250	P1	12	M-C-II	
7+86	15.0	18	1	HPS	250	P1	2	M-C-II	
6+62	15.0	19	1	HPS	250	P1	4	M-C-II	
5+29	15.5	20	1	HPS	250	P1	6	M-C-II	
3+90	20.0	21	1	HPS	250	P1	8	M-C-II	

PARKING & ACCESS ROAD AREA LIGHTING LUMINAIRE SCHEDULE



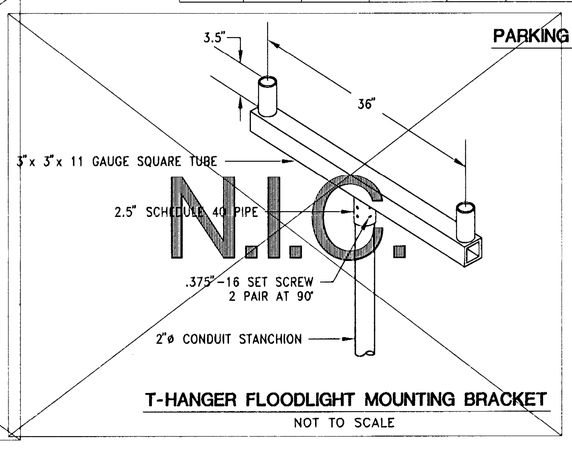
TYPICAL POLE CONNECTION DETAIL

NOT TO SCALE



T-HANGER FLOODLIGHT KNUCKLE SLIPFITTER MOUNTED

NOT TO SCALE



T-HANGER FLOODLIGHT MOUNTING BRACKET

NOT TO SCALE

NOTE

1. TERMINATE LUMINAIRE WIRING ON POLE No.'s 6A THRU 11 AT BASE OF POLE FOR FUTURE CONNECTION TO LOCKHEED/MARTIN HANGAR ELECTRICAL SOURCE.

AS-BUILTS

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APPROVED	TS

STATE OF MARYLAND — TERRANCE SOMMATTINO — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

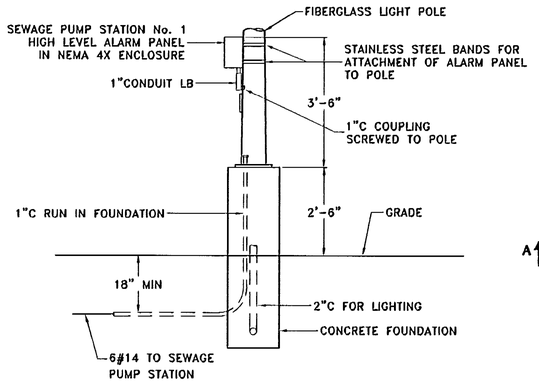
SHEET TITLE: ELECTRICAL DETAILS II

SCALE: AS SHOWN

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

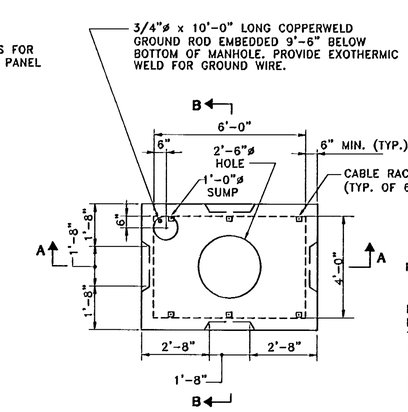
SHEET NO.: E-06



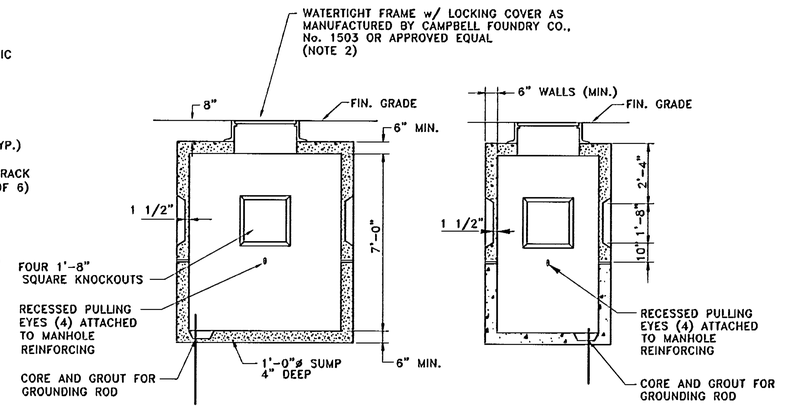
SEWAGE PUMP STATION LEVEL ALARM PANEL

MOUNTED AT LIGHT POLE

NOT TO SCALE

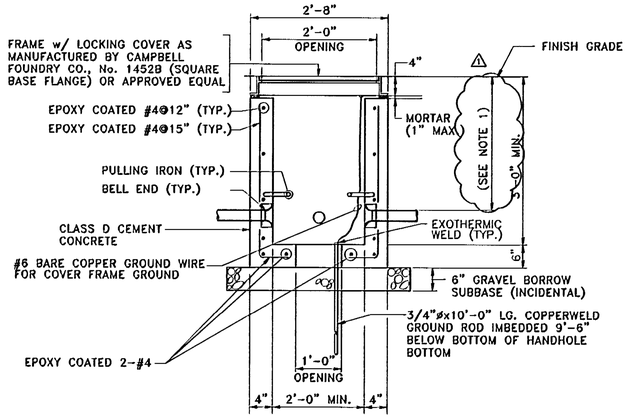


PLAN



SECTION A-A

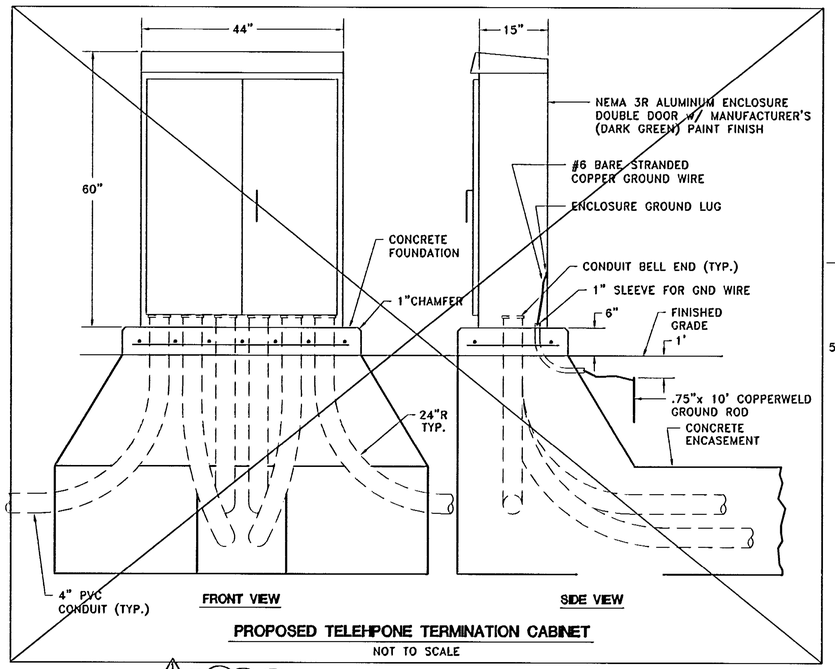
SECTION B-B



SECTION C-C

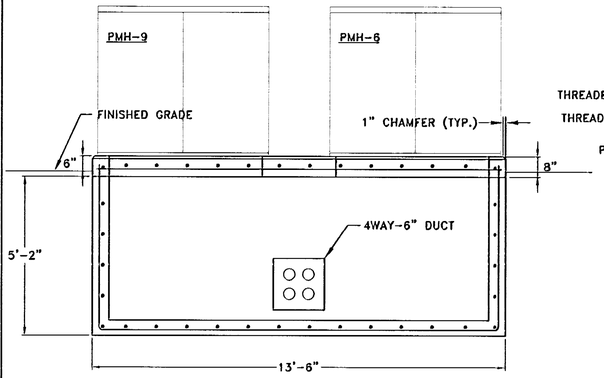
PROPOSED PRECAST ELECTRIC MANHOLE 4' x 6' x 7'

NOT TO SCALE

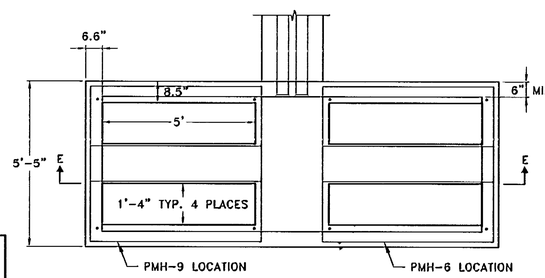


PROPOSED TELEHPONE TERMINATION CABINET

NOT TO SCALE



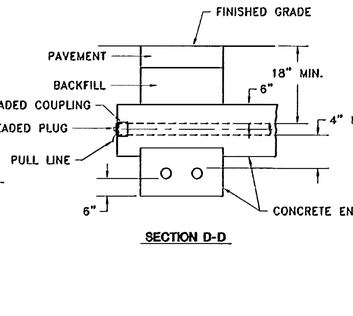
SECTION E-E



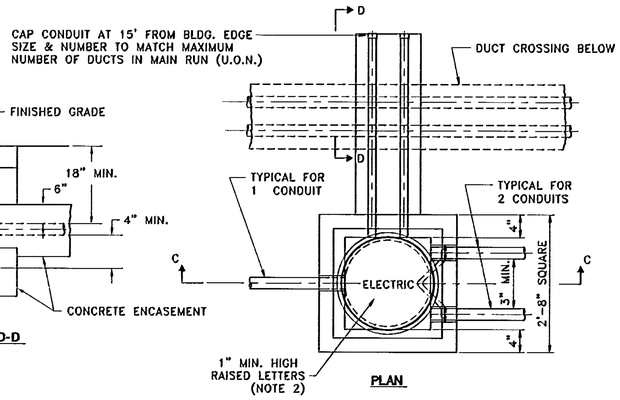
PLAN

PROPOSED PAD-MOUNT SWITCHGEAR ELECTRICAL VAULT

NOT TO SCALE



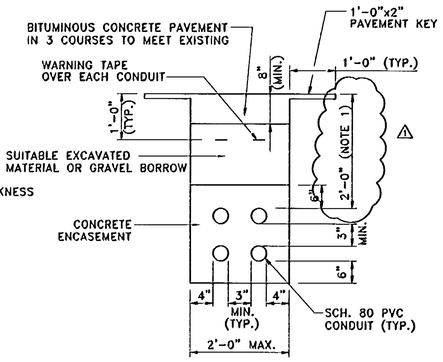
SECTION D-D



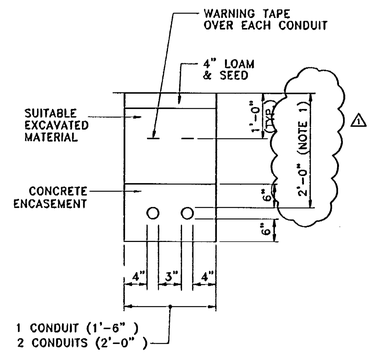
PLAN

PROPOSED PRECAST ELECTRIC HANDHOLE

NOT TO SCALE



IN EXISTING PAVEMENT



IN EARTH

TRENCH DETAILS

NOT TO SCALE

NOTE

1. MAINTAIN NOMINAL 24" BURIAL DEPTH FOR CONDUIT DUCTBANKS. SLOPE CONDUITS TOWARDS MANHOLES AND HANDHOLES TO ALLOW FOR WATER DRAINAGE. WHERE CONDUIT STUB-OUTS CROSS DUCTBANK MAINTAIN MINIMUM 18" BURIAL DEPTH FOR STUB-OUT.
2. ALL MANHOLE AND HANDHOLE COVERS SHALL BE ENGRAVED WITH "POWER", "COMMUNICATION", OR UTILITY, ALONG WITH DESIGNATED IDENTIFYING NUMBER AS NOTED ON PLAN.

AS BUILT

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APPROVED	TS

STATE OF MARYLAND — FREDERICK DONNATUCCI — LICENSE NO. 12488 — REGISTERED PROFESSIONAL ENGINEER

REV.	DATE	REMARKS
1	11/16/98	REVISED DEPTH ON TRENCH DETAILS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

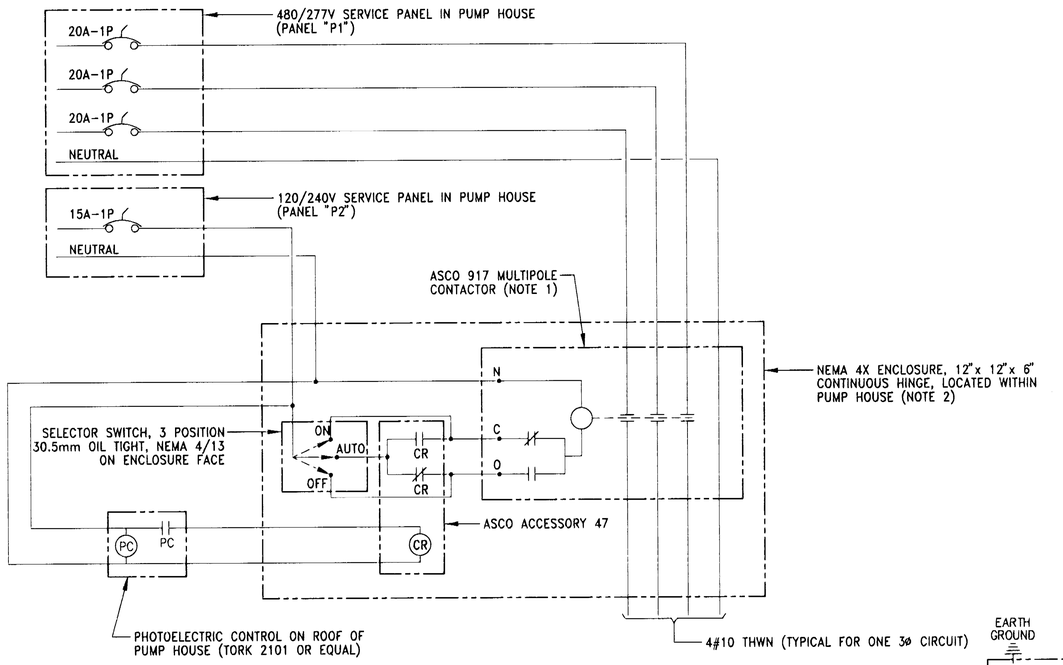
SHEET TITLE: ELECTRICAL DETAILS III

SCALE: AS SHOWN

DATE: September 08, 1998

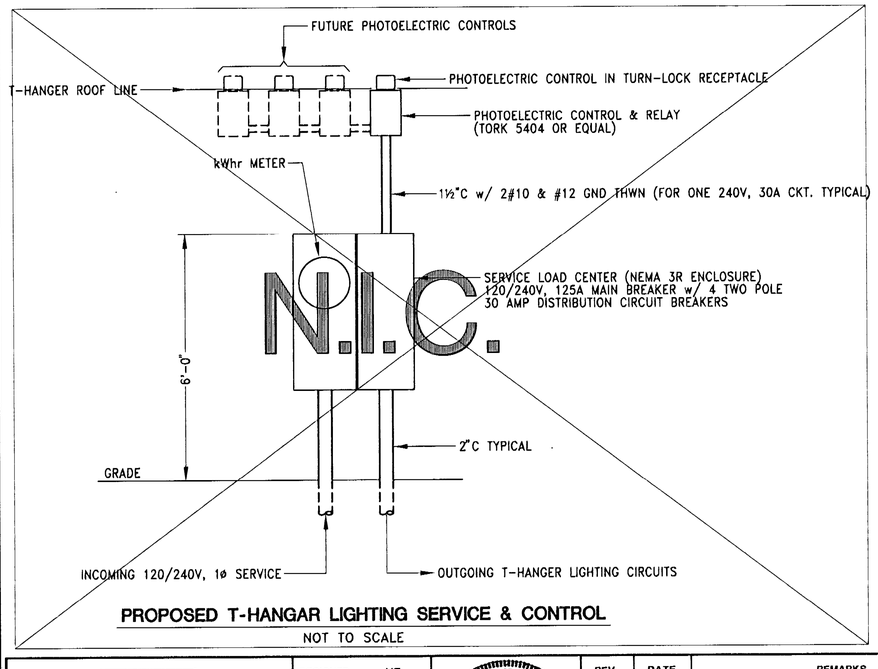
PROJECT NO.: MAA-CO-97-019

SHEET NO.: E-07



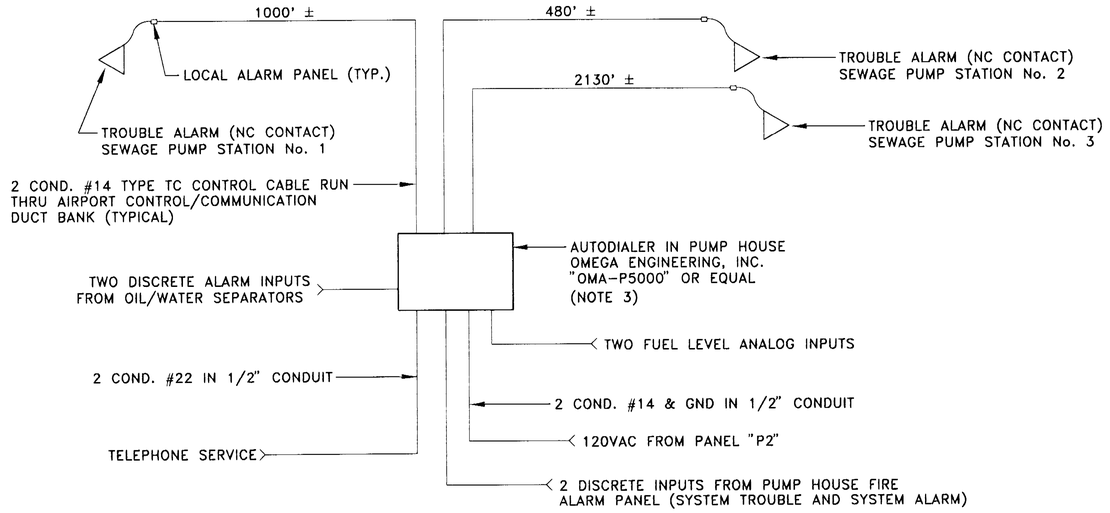
PROPOSED LIGHTING CONTROL TYPICAL WIRING

(FOR PARKING LOTS & ACCESS ROAD)

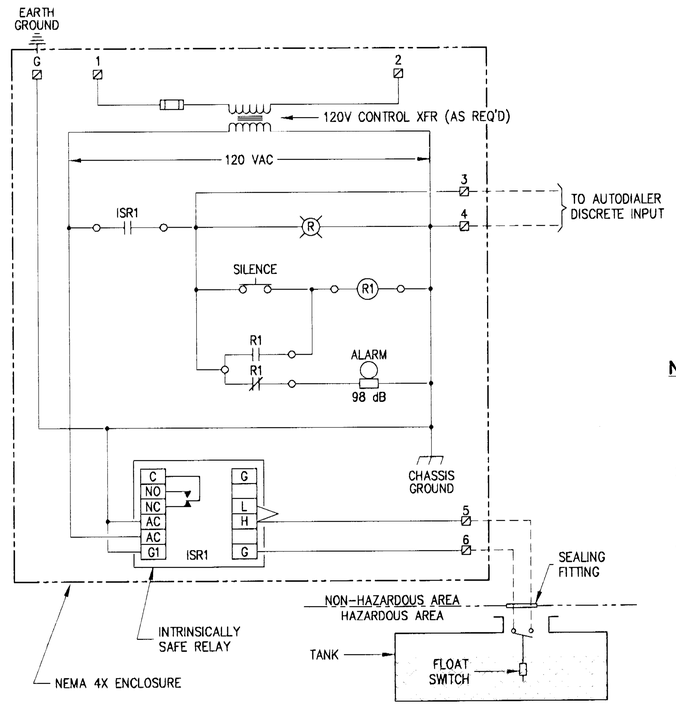


PROPOSED T-HANGAR LIGHTING SERVICE & CONTROL

NOT TO SCALE



PROPOSED TELEPHONE AUTODIALER SYSTEM AT FIRE PUMP HOUSE



PROPOSED TANK HIGH LEVEL ALARM PANELS

(FOR SEWAGE & OIL/WATER SEPARATOR TANKS)

NOTES

1. THE PARKING & ACCESS ROAD LIGHTING LOAD SHALL BE DISTRIBUTED AMONG SIX 20 AMP, 277 VOLT CIRCUITS. FURNISH (ASCO 917) SIX POLE CONTACTOR FOR LIGHTING CONTROL.
2. PROVIDE ENGRAVED PHENOLIC LABELING "MIDFIELD AREA LIGHTING" IN ACCORDANCE WITH SPECIFICATIONS. FURNISH SWITCH WITH LEGEND PLATE AND GLOVED HAND KNOB.
3. IN THE EVENT OF ANY ALARM SITUATIONS THE AUTODIALER SHALL BE PROGRAMMED TO NOTIFY MAA – CENTRAL DISPATCH CENTER FOR PRIMARY SIGNAL, AND REMOTE ANNUNCIATION AT THE OTHER CONSTANTLY ATTENDED EMERGENCY OPERATIONS LOCATIONS ASSOCIATED WITH THE FACILITY, AS DIRECTED BY THE ENGINEER.

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

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REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

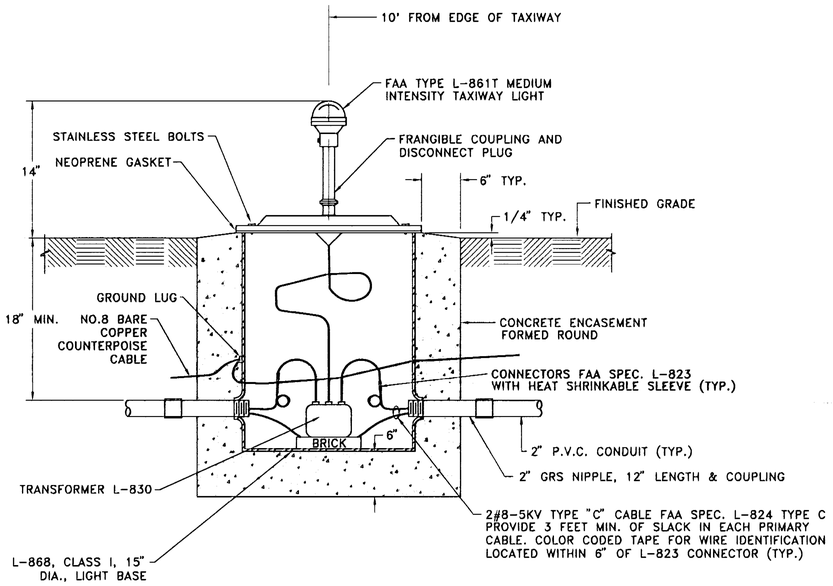
SHEET TITLE: ELECTRICAL DETAILS IV

SCALE: AS SHOWN

DATE: September 08, 1998

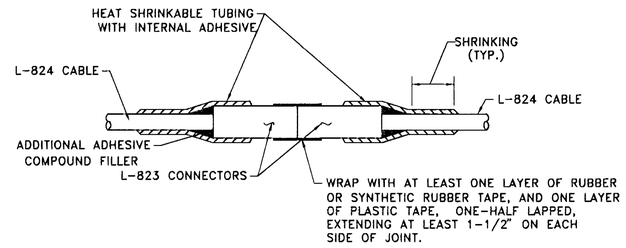
PROJECT NO.: MAA-CO-97-019

SHEET NO.: E-08



TYPICAL INSTALLATION OF ELEVATED TAXIWAY EDGE LIGHT

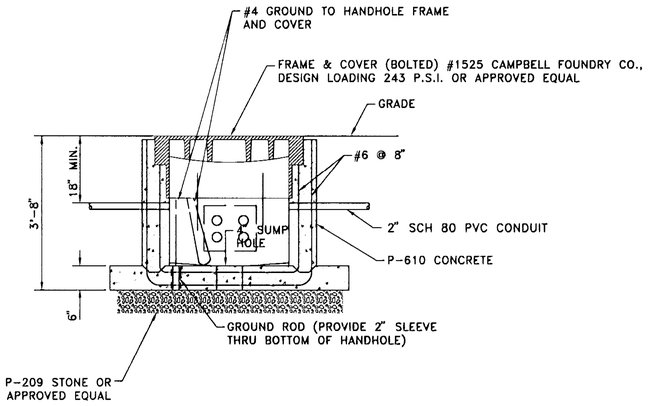
NOT TO SCALE



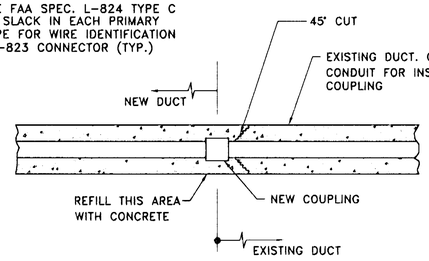
NOTE: INSIDE DIAMETER OF CONNECTOR SHALL PROPERLY MATCH THE OUTSIDE DIAMETER OF CABLE

CABLE SPLICES

NOT TO SCALE



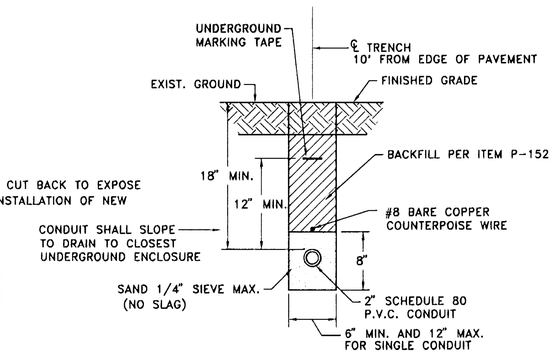
SECTION A - A



DETAIL

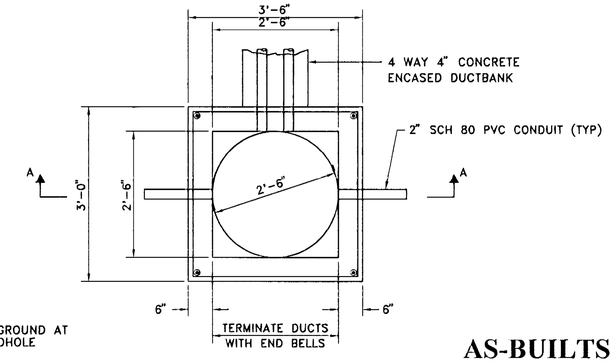
CONNECTION OF NEW TO EXISTING ENCASED DUCT

NOT TO SCALE

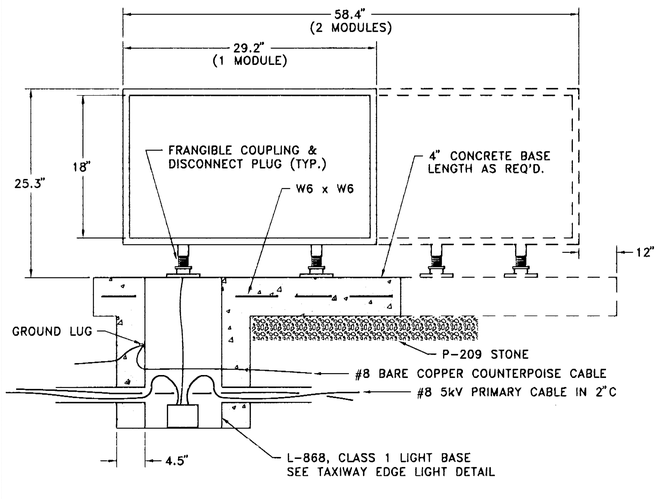


DIRECT BURIED CONDUIT TRENCH DETAIL

NOT TO SCALE

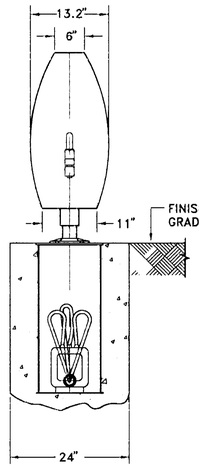


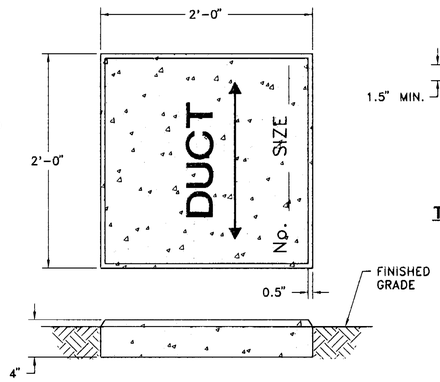
PLAN



L-858 LIGHTED RETROREFLECTIVE TAXIWAY GUIDANCE SIGN

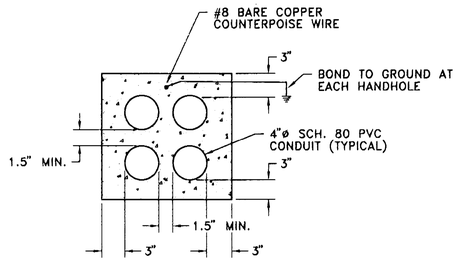
NOT TO SCALE





TYPICAL DUCT MARKER DETAIL

NOT TO SCALE



TYPICAL 4-WAY DUCT

NOT TO SCALE

AS-BUILTS

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NOTE:
DESIGN LOADING: B727-200 @ 190,000 POUNDS
CONCRETE - f'c = 5,000 psi
REINFORCING STEEL - ASTM A615, GRADE 60

ELECTRICAL HANDHOLE FOR TAXIWAY LIGHTING

NOT TO SCALE

NOTE

1. PROVIDE TEMPORARY ELECTRICAL CONNECTIONS TO MAINTAIN THE EXISTING TAXIWAY LIGHTING SYSTEM IN OPERATION DURING CONSTRUCTION.

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REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

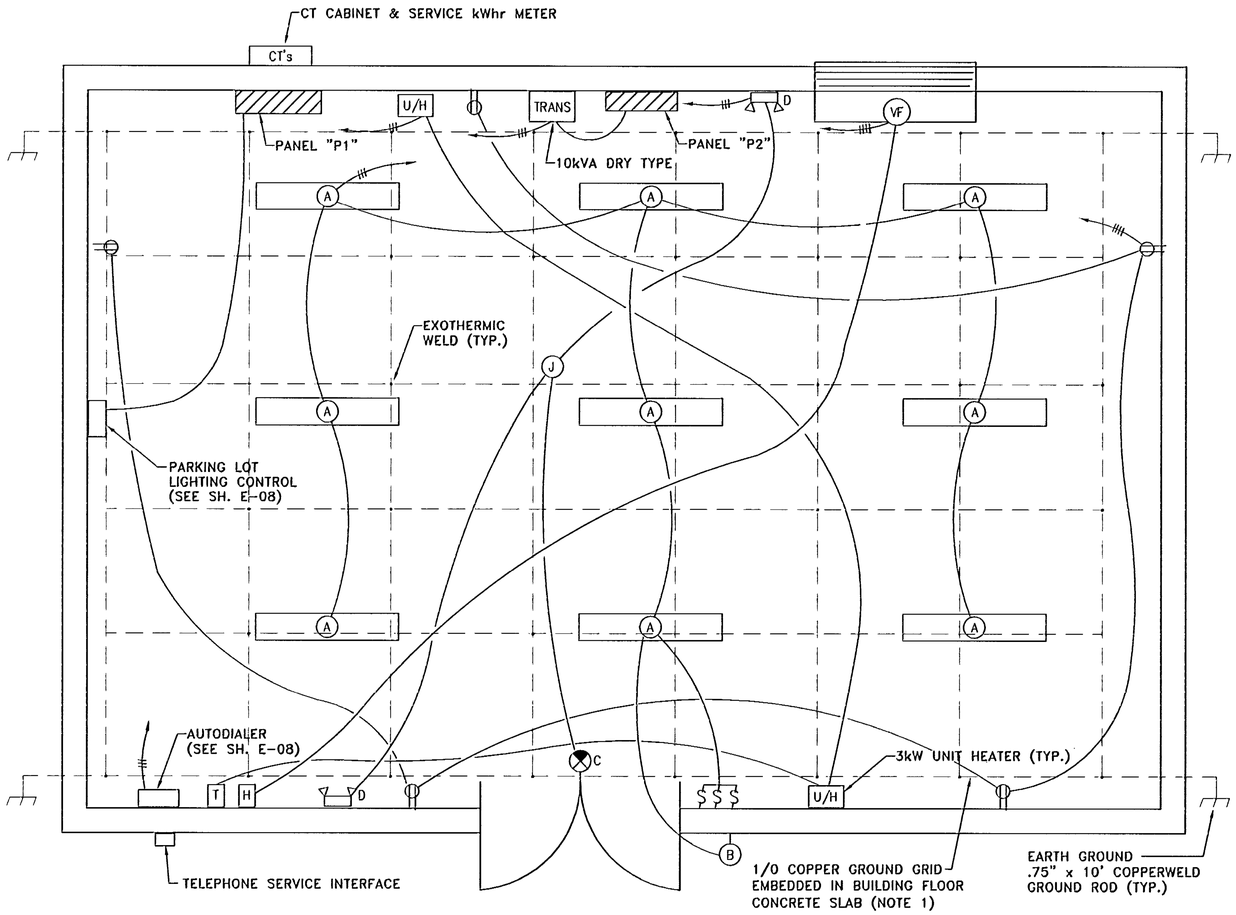
SHEET TITLE: TAXIWAY EDGE LIGHTING & SIGNING DETAILS

SCALE: AS SHOWN

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: E-09



ELECTRICAL EQUIPMENT LAYOUT PLAN

SCALE: 1/2" = 1'-0"

VOLTAGE: 480Y/277V, 3 PHASE, 4 WIRE
BUS: 225 AMP
MAIN BREAKER: 150 AMP

PANEL "P1"

ENCLOSURE: NEMA 12
MOUNTING: SURFACE
LOCATION: FIRE PUMP HOUSE

CKT. No.	SERVING	TRIP	WIRE SIZE	CONDUIT SIZE	LOAD (kVA) A	B	C	CB	CB	LOAD (kVA) A	B	C	CONDUIT SIZE	WIRE SIZE	TRIP	SERVING	CKT. No.
1	UNIT HEATERS				2.0					2.0			1 1/4"	10	20	PARKING LOT LIGHTING	2
3						2.0					1.5			10	20		4
5		20	12	1/2"			2.0					2.0		10	20		6
7	25kVA DRY TYPE				9.0					2.0				10	20		8
9	TRANSFORMER	90	2	1 1/4"		9.0					1.5			10	20		10
11	SEWAGE PUMP						2.0					2.0		10	20		12
13	STATION No. 1	30	2	2"	2.0					0.3						VENTILATION FAN	14
15	SEWAGE PUMP					2.0					0.3						16
17	STATION No. 2A	30	2	2"			2.0					0.3	1/2"	12	15		18
19	WATER TANK HTR No. 1				4.0					0.7						JOCKEY PUMP	20
21						4.0					0.7						22
23		30	10	3/4"			2.0					0.7	1/2"	12	20		24
25	WATER TANK HTR No. 2				4.0											SPARE	26
27						4.0										SPARE	28
29		30	10	3/4"			4.0									SPARE	30
31	SPARE															SPARE	32
33	SPARE															SPACE	34
35	SPACE															SPACE	36
	SUBTOTAL LOAD PER PHASE				25.0	21.0	14.0			5.0	4.0	5.0	SUBTOTAL LOAD PER PHASE				
	TOTAL LOAD PER PHASE				25.0	25.0	19.0										

CONTINUOUS LOAD = 7000 x 1.25 = 87500 VA
TOTAL LOAD = 32.1 kW = 105 AMPS; A.I.C. = 14 kAMPS

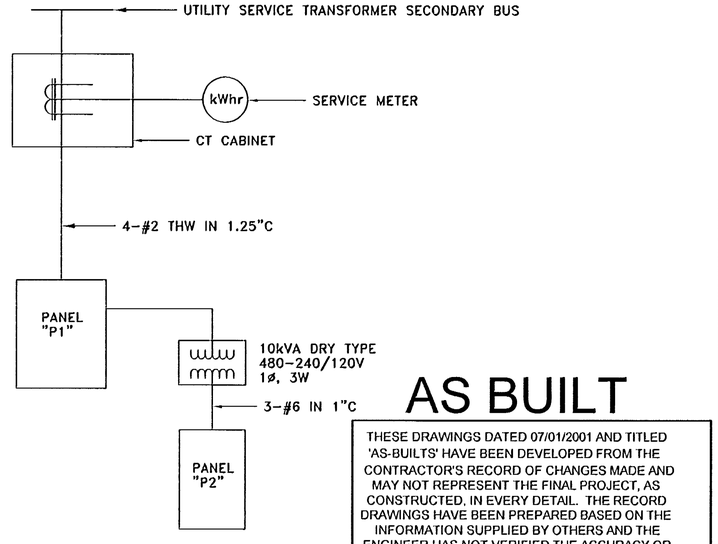
VOLTAGE: 120/240V, 1 PHASE, 3 WIRE
BUS: 125 AMP
MAIN BREAKER: 100 AMP

PANEL "P2"

ENCLOSURE: NEMA 12
MOUNTING: SURFACE
LOCATION: FIRE PUMP HOUSE

CKT. No.	SERVING	TRIP	WIRE SIZE	CONDUIT SIZE	LOAD (kVA) L1	L2	CB	CB	LOAD (kVA) L1	L2	CONDUIT SIZE	WIRE SIZE	TRIP	SERVING	CKT. No.
1	INTERIOR LIGHTS	20	12	1/2"	1.0				1.0		1/2"	12	20	RECEPTACLES (GFI)	2
3	EXTERIOR LIGHTS	20	12	1/2"		1.0				1.0	1/2"	12	20	RECEPTACLES (GFI)	4
5	EMERGENCY LIGHTS	20	12	1/2"	0.7				0.1		1/2"	12	20	UNIT HTR CONTROL	6
7	VENT CONTROL	15	14	1/2"		0.5				0.1	1/2"	14	15	LIGHTING CONTROL	8
9	AUTODIALER	15	14	1/2"	0.3				0.2		1/2"	14	15	WATER TANK HTR CONTROL	10
11	FACP	15	14	1/2"		0.3				0.5	1/2"	12	20	FIRE PUMP #1 CONTROL	12
13	WATER JACKET HTR No.1	30	10	1/2"	2.5				0.5		1/2"	12	20	FIRE PUMP #2 CONTROL	14
15	WATER JACKET HTR No.2	30	10	1/2"		2.5				0.5	1/2"	12	20	FIRE PUMP #3 CONTROL	16
17	WATER JACKET HTR No.3	30	10	1/2"	2.5								20	SPARE	18
19	SPARE	20								0.5			20	SPARE	20
21	SPARE	20											20	SPARE	22
23	SPARE	20											20	SPARE	24
	SUBTOTAL LOAD PER LEG				7.0	4.3			1.8	2.1	SUBTOTAL LOAD PER LEG				
	TOTAL LOAD PER LEG				8.8	6.4									

CONTINUOUS LOAD = 15200 x 1.25 = 19000 VA
TOTAL LOAD = kW = 80 AMPS; A.I.C. = 10 kAMPS



POWER DISTRIBUTION DIAGRAM

LIGHTING FIXTURE SCHEDULE						
TYPE	DESCRIPTION	MOUNTING	LAMPS NO.	LAMPS WATTS	LAMPS TYPE	MANUFACTURER & NUMBER OR APPROVED EQUAL
A	DUST/MOISTURE RESISTANT TWO LAMP FLUORESCENT FIXTURE	CEILING SURFACE	2	40	T12/CW	LITHONIA TDM240120CW
B	EXTERIOR HIGH PRESSURE SODIUM WALL MOUNT WITH INTEGRAL PHOTOCELL CONTROL	WALL	1	70	HPS	GENERAL ELECTRIC WL07S1PE
C	LIGHTED EXIT SIGN SUITABLE FOR DAMP LOCATIONS	WALL	2	7	PL	FAILSAFE X10WSRW120CBPTBK
D	EMERGENCY LIGHTING UNIT FOR DAMP LOCATIONS	WALL	2	7.2	AS-SB	DUAL-LITE N4X14-12V

FIRE PUMP HOUSE HEATING AND VENTILATION EQUIPMENT		
ITEM	DESCRIPTION	MANUFACTURER (OR APPROVED EQUIVALENT)
UNIT HEATER	CONVECTION HEATER, 3000 WATTS, 480 VOLTS, 3 PHASE, 10,245 BTU.	ELECTROMODE SERIES EUH, CATALOG No. EUH03K.
VENTILATION FAN	WALL EXHAUST FAN, 24" BLADE, DIRECT DRIVE, 4090 CFM AIR MOVEMENT AT 0" S.P., 460 VOLT.	LOREN COOK TYPE SPD.

NOTE

1. COORDINATE WITH MECHANICAL WORK AND FURNISH #2AWG COPPER PIGTAIL STUB-OUTS OF GROUND GRID TO PROPOSED EQUIPMENT.
2. LOCATION OF ELECTRIC EQUIPMENT IS APPROXIMATE. THE CONTRACTOR SHALL COORDINATE INSTALLATION OF ELECTRIC EQUIPMENT WITH MECHANICAL WORK.

AS BUILT

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REV.	DATE	REMARKS
	07/01/2001	AS-BUILT

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

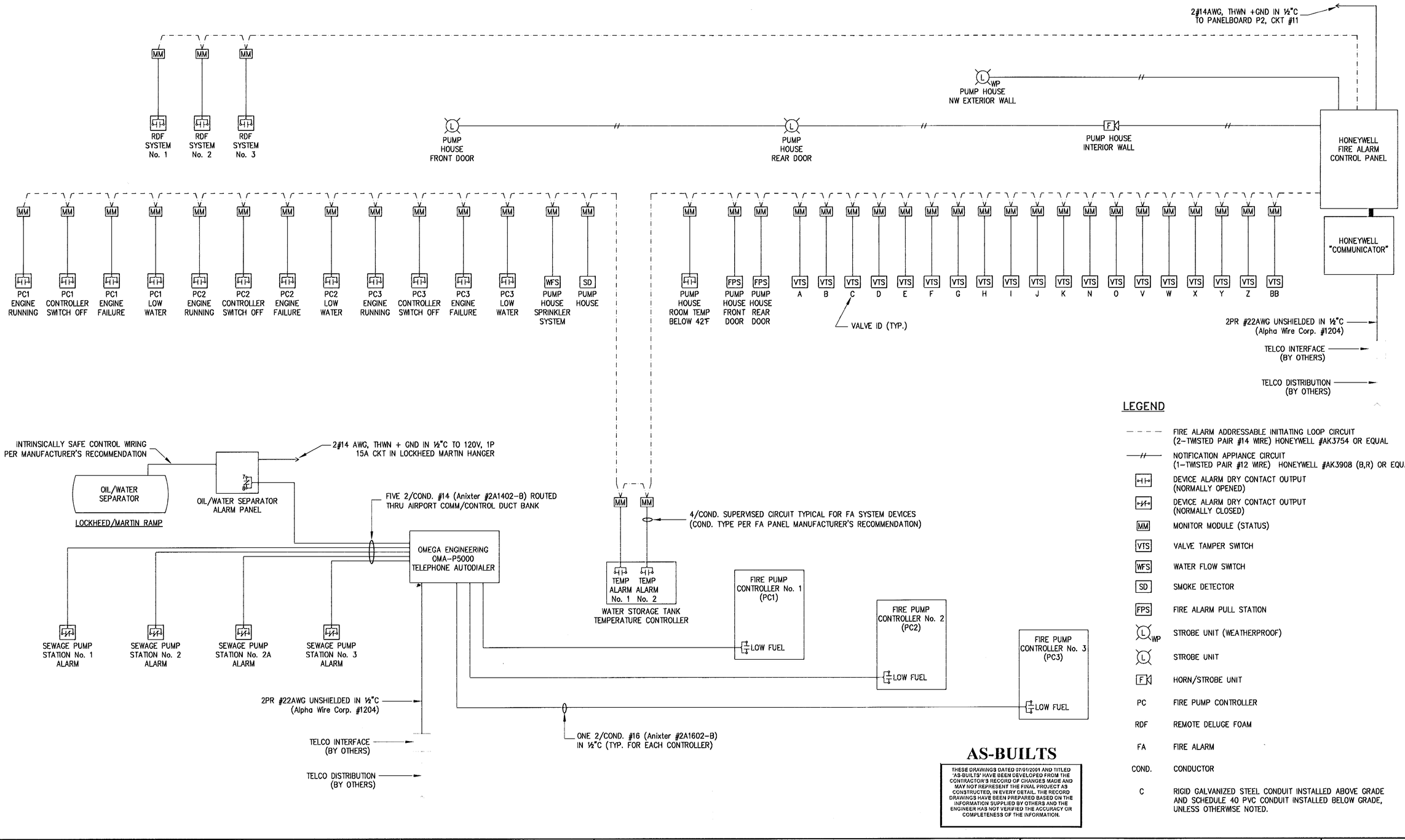
SHEET TITLE: FIRE PUMP HOUSE ELECTRICAL PLAN & DETAILS

SCALE: AS SHOWN

DATE: September 08, 1998

PROJECT NO.: MAA-CO-97-019

SHEET NO.: E-10



LEGEND

– – – –	FIRE ALARM ADDRESSABLE INITIATING LOOP CIRCUIT (2-TWISTED PAIR #14 WIRE) HONEYWELL #AK3754 OR EQUAL
—//	NOTIFICATION APPLIANCE CIRCUIT (1-TWISTED PAIR #12 WIRE) HONEYWELL #AK3908 (B,R) OR EQUAL
	DEVICE ALARM DRY CONTACT OUTPUT (NORMALLY OPENED)
	DEVICE ALARM DRY CONTACT OUTPUT (NORMALLY CLOSED)
MM	MONITOR MODULE (STATUS)
VTS	VALVE TAMPER SWITCH
WFS	WATER FLOW SWITCH
SD	SMOKE DETECTOR
FPS	FIRE ALARM PULL STATION
L WP	STROBE UNIT (WEATHERPROOF)
L	STROBE UNIT
F	HORN/STROBE UNIT
PC	FIRE PUMP CONTROLLER
RDF	REMOTE DELUGE FOAM
FA	FIRE ALARM
COND.	CONDUCTOR
C	RIGID GALVANIZED STEEL CONDUIT INSTALLED ABOVE GRADE AND SCHEDULE 40 PVC CONDUIT INSTALLED BELOW GRADE, UNLESS OTHERWISE NOTED.

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APPROVED	TS

STATE OF MARYLAND — TECHNICAL CORPORATION — LICENSE NO. 12408 — REGISTERED PROFESSIONAL ENGINEER

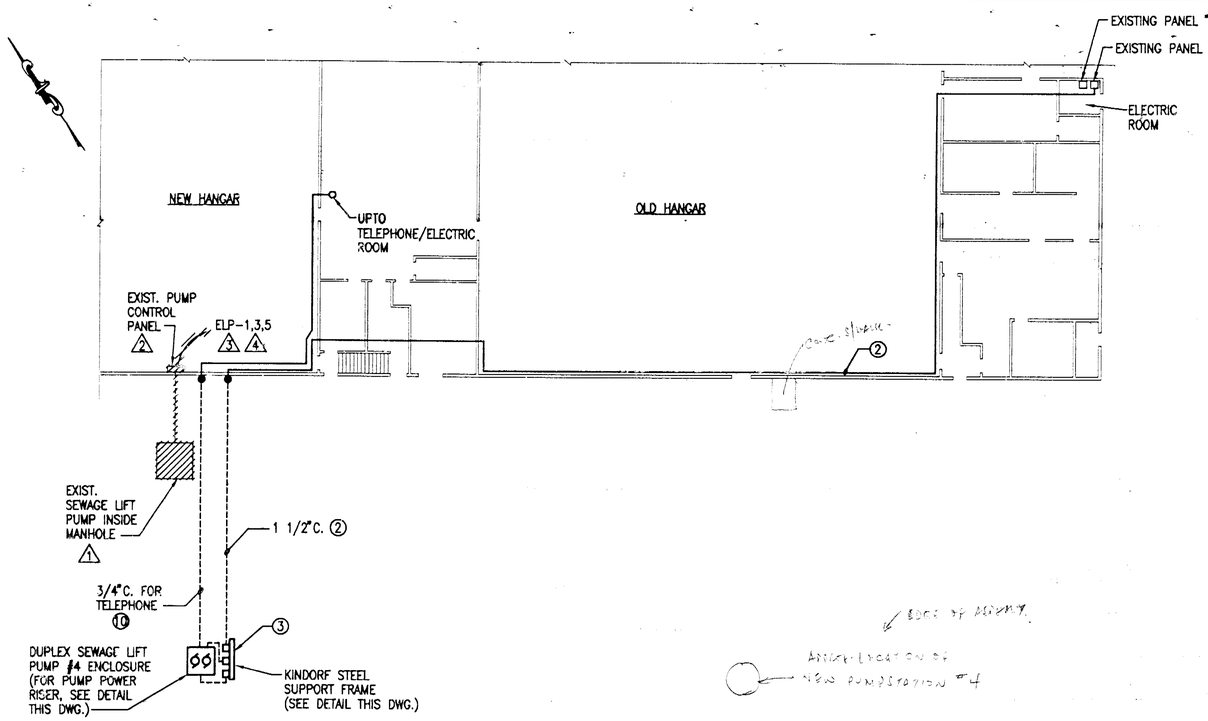
REV.	DATE	REMARKS
1	8/30/99	Added room temp monitoring & revised device alarm contacts.

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

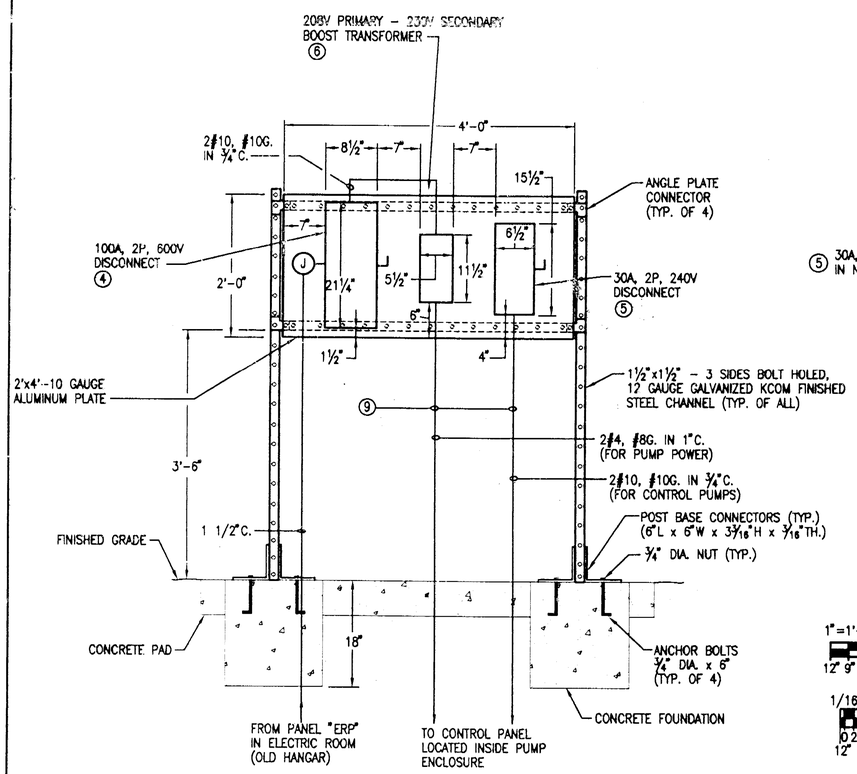
MARTIN STATE AIRPORT

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
PROJECT NO.: MAA-CO-97-019
SHEET TITLE: CONTROL INTERCONNECTIONS
SHEET NO.: E-10A
SCALE: AS SHOWN
DATE: AUGUST 04, 1998



PARTIAL FLOOR PLAN – AIRCRAFT HANGAR

SCALE: 1/16" = 1'-0"



MOUNTING DETAIL FOR BOOST TRANSFORMER AND DISCONNECTS

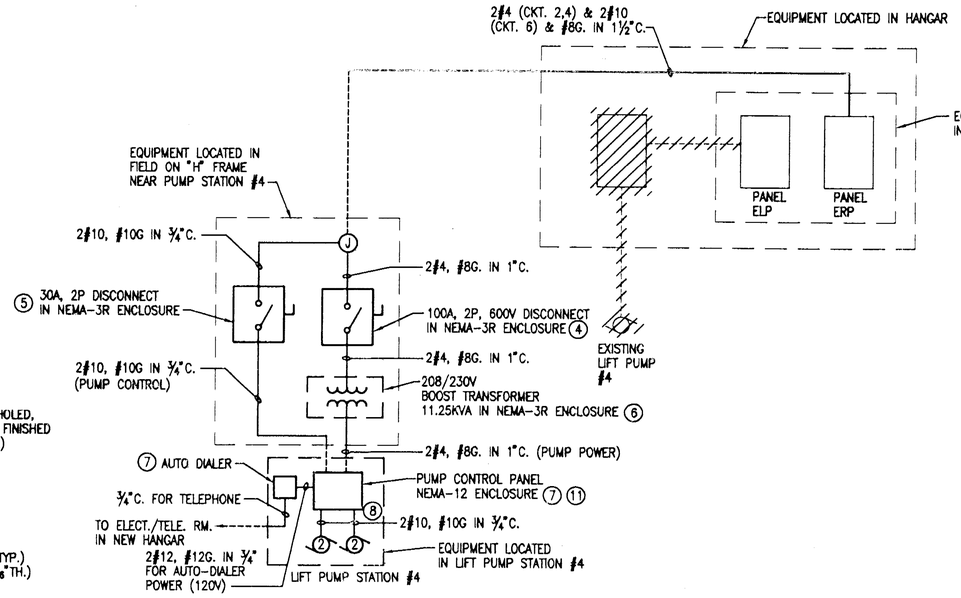
1" = 1'-0"

LEGEND

- EQUIPMENT TO BE REMOVED
- BURIED CONDUIT, 24" BELOW GRADE
- EXISTING SURFACE MOUNTED EQUIPMENT AND CONDUIT
- NEW CONDUIT AND EQUIPMENT
- NON-FUSED DISCONNECT, RATING AS SHOWN
- CONDUIT GOING DOWN
- CONDUIT GOING UP
- 1 DEMOLITION NOTE
- 5 NEW WORK NOTE
- BOOST TRANSFORMER, 208V PRIMARY, 230V SECONDARY, SINGLE PHASE
- 2 PUMP MOTORS, 2 HORSEPOWER, 230V, SINGLE PHASE

ABBREVIATIONS

A	AMPERES
C	CONDUIT
CKT	CIRCUIT
DIA	DIAMETER
DWG	DRAWING
ELECT	ELECTRICAL ROOM
G	GROUND
KVA	KILOVOLT AMPERES
P	POLE
RM	ROOM
TYP	TYPICAL
V	VOLTS



POWER RISER FOR LIFT PUMP STATION #4

NOT TO SCALE

1"=1'-0"
12" 9" 6" 3" 0 1' 3'

1/16"=1'-0"
0 2" 8" 16" 32'
12" 4'

DEMOLITION NOTES:

1. REMOVE THE EXISTING LIFT PUMP #4 IN ITS ENTIRETY, MANHOLE TO REMAIN.
2. REMOVE THE EXISTING LIFT PUMP #4 CONTROL PANEL IN ITS ENTIRETY AND HANDOVER TO OWNER.
3. REMOVE AND DEMOLISH ALL THE EXISTING CONDUCTORS FROM LIFT PUMP STATION #4 TO PANEL "ELP" - CIRCUITS 1,3,5.
4. REMOVE EXISTING SURFACE MOUNTED CONDUITS USED FOR CIRCUITING OF LIFT PUMP STATION #4, FOR BURIED CONDUITS, CUT THE CONDUITS 6" ABOVE THE FLOOR LEVEL, SEAL AND CAP THE CONDUITS AND ABANDON THE CONDUITS IN ITS PLACE.
5. REVISE THE PANEL SCHEDULES FOR EXISTING PANEL "ELP".

NEW WORK NOTES:

1. PROVIDE AND INSTALL 70A, 208V, 2 POLE BREAKER IN EXISTING SPACES AT CIRCUITS 2 & 4 (FOR PUMP POWER) & 30A, 1 POLE BREAKER IN EXISTING SPACE CIRCUIT 6 (FOR PUMP CONTROL) AT PANEL "ERP". REVISE PANEL SCHEDULE ACCORDINGLY.
2. PROVIDE AND INSTALL 2#4 (CIRCUITS 2 & 4 – 208V), 2#10 (CIRCUIT #6 – 120V – CONTROLS) AND #8G. – THWN WIRE IN 1½" CONDUIT. RUN THE CONDUIT ON SURFACE INSIDE THE HANGAR AND DIRECT BURIED OUTDOORS. INDOOR CONDUITS SHALL BE RIGID GALVANIZED STEEL. OUTDOOR CONDUIT SHALL BE P.V.C. COATED RIGID GALVANIZED STEEL. (OCAL BLUE). PROVIDE JUNCTION BOXES AS REQUIRED.
3. PROVIDE AND INSTALL GALVANIZED STEEL CHANNEL FRAME AS SHOWN IN DETAIL, THIS SHEET.
4. PROVIDE AND INSTALL HEAVY DUTY NON-FUSED, 2 POLE, 600V, 100 AMP DISCONNECT (SQUARE D CAT. #H223DS) IN NEMA-3R ENCLOSURE. DISCONNECT SHALL BE LOCKABLE IN OPEN/CLOSE POSITION.
5. PROVIDE AND INSTALL HEAVY DUTY NON-FUSED, 2 POLE, 240V, 30 AMP DISCONNECT (SQUARE D CAT. #H221DS) IN NEMA-3R ENCLOSURE. DISCONNECT SHALL BE LOCKABLE IN OPEN/CLOSE POSITION.
6. PROVIDE AND INSTALL A 11.25 KVA BOOST TRANSFORMER WITH 208V PRIMARY AND 230V SECONDARY IN NEMA-3R ENCLOSURE (MODEL #T-1-13074, MANUFACTURED BY ACME TRANSFORMER CO.).
7. PROVIDE AND INSTALL AUTO DIALER AND CONTROL PANEL AS PER MANUFACTURER RECOMMENDATIONS.
8. PROVIDE AND INSTALL 3/4"C. FOR WIRING OF LEVEL SWITCHES. WIRING FOR LEVEL SWITCHES SHALL MEET ALL THE REQUIREMENTS OF N.E.C. ARTICLE 501.
9. THE CONDUITS ENTERING THE PUMP ENCLOSURE SHALL BE PROVIDED WITH SEALS AS PER REQUIREMENTS OF N.E.C. ARTICLE 501.
10. PROVIDE AND INSTALL 3/4" PVC COATED RGS CONDUIT BETWEEN TELEPHONE/ELECT. RM. – UPPER LEVEL – NEW HANGAR AND LIFT PUMP STATION #4. PROVIDE AND INSTALL NUMBER AND TYPE OF WIRES AS PER MANUFACTURERS RECOMMENDATIONS.
11. PROVIDE AND INSTALL A LABEL ON THE FACE OF THE CONTROL PANEL WITH THE FOLLOWING CAUTION:
    "THIS PANEL HAS DIFFERENT POWER SOURCES FOR PUMP CONTROLS AND PUMP POWER. DE-ENERGIZE BOTH POWER SOURCES BEFORE OPENING PANEL."

AS-BUILTS

THESE DRAWINGS DATED JULY 1, 2001 AND TITLED AS-BUILTS HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED. IN EVERY DETAIL, THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

DRAWN BY: | CHECKED BY:

STATE OF MARYLAND — 15351 — PROFESSIONAL ENGINEER — 7/1/99

Maryland Department of Transportation

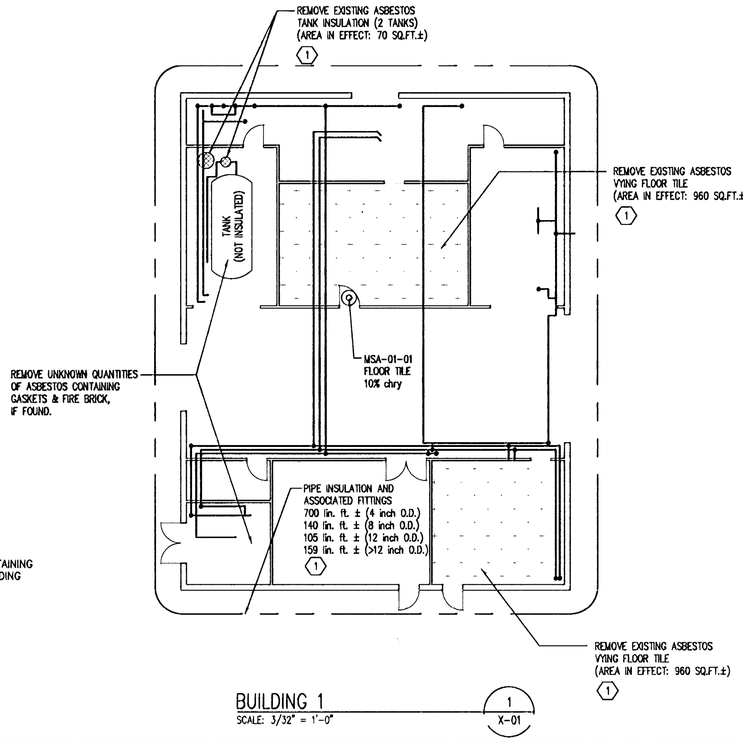
SIDHU ASSOCIATES, INC.
Consulting Engineers
EXECUTIVE PLAZA III, SUITE 1000
11350 McCORMICK ROAD
HUNT VALLEY, MARYLAND 21031
PHONE (410) 329-1115

NO.	DATE	REVISION

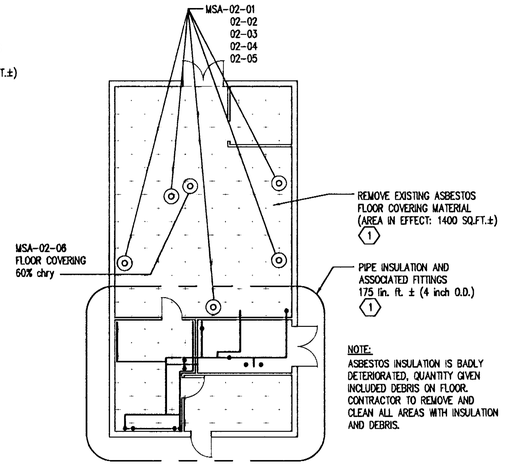
DUPLEX SEWAGE LIFT PUMP #4
ELECTRICAL PLAN
MARYLAND STATE POLICE
MARTIN STATE AIRPORT

PROJECT NO.:
DATE: MAY 17, 1999
DRAWING NO.: E-11
SHEET 1 OF 1

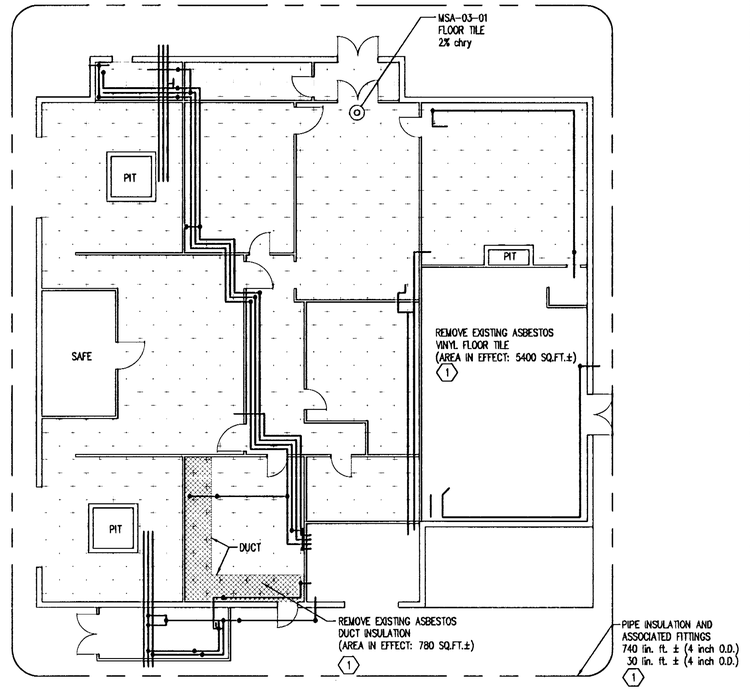
MAA-00-97-019



BUILDING 1
SCALE: 3/32" = 1'-0"
1 X-01



BUILDING 2
SCALE: 3/32" = 1'-0"
2 X-01



BUILDING 3
SCALE: 3/32" = 1'-0"
3 X-01

LEGEND

- INDICATES QUANTITY OF ASBESTOS CONTAINING LINEAR INSULATION AND FITTINGS, INCLUDING RISERS WITHIN BOUNDED AREA.
  - INDICATES RISER.
- INDICATES ASBESTOS – CONTAINING TANK AND DUCT INSULATION
- INDICATES VINYL ASBESTOS FLOOR TILE

GENERAL NOTES

1. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING LOCATION OF ALL EXISTING UTILITIES PRIOR TO BEGINNING THE WORK.
2. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING EXISTING CONSTRUCTION OF ALL ASPHALT PAVING AROUND SITE AND PATCH/REPAIR TO MATCH ANY DAMAGE INCURRED DURING THE WORK.
3. CONTRACTOR SHALL PROVIDE DUST AND SOUND BARRIERS FOR CONSTRUCTION AREAS.
4. TEMPORARY ELECTRICITY
   A. COMPLY WITH NEC AND OSHA.
   B. PROVIDE AND MAINTAIN SPECIFIED MINIMUM TEMPORARY ELECTRIC POWER SYSTEM FOR CONSTRUCTION NEEDS THROUGHOUT CONSTRUCTION PERIOD.
   C. PROVIDE SECONDARY POWER CENTERS FOR MISCELLANEOUS TOOLS AND EQUIPMENT USED IN ASBESTOS ABATEMENT WORK.
      1) PROVIDE MINIMUM OF ONE PER SEALED ABATEMENT AREA
      2) LOCATE SO THAT POWER IS AVAILABLE AT ANY DESIRED POINT WITH NO MORE THAN 30 METERS EXTENSION.
      3) PROVIDE WEATHERPROOF DISTRIBUTION BOXES WITH MINIMUM OF FOUR (4) GROUNDED OUTLETS EACH.
      4) PROVIDE CIRCUIT PROTECTION FOR EACH CIRCUIT.
      5) PROVIDE GROUND FAULT PROTECTION FOR EACH CIRCUIT IN ACCORDANCE WITH APPLICABLE FEDERAL AND STATE REQUIREMENTS.
      6) EACH CONTRACTOR AND SUBCONTRACTOR USING THE SECONDARY POWER CENTERS SHALL PROVIDE THEIR OWN GROUNDED, UL LISTED EXTENSION CORDS AND OTHER ACCESSORIES FROM SECONDARY POWER CENTERS TO POINT OF OPERATION.
   D. PROVIDE ADDITIONAL SERVICE CONNECTIONS REQUIRED FOR:
      1) TEMPORARY LIGHTING
      2) TEMPORARY HEATING
      3) TEMPORARY VENTILATING
      4) TEMPORARY FIRE ALARM SYSTEM
      5) PUMPING
      6) TESTING AND CHECKING ALL PERMANENT MECHANICAL, ELECTRICAL, ELEVATOR AND HOISTING EQUIPMENT
   E. ALL CONTRACTORS WHO REQUIRE PRIMARY OR SECONDARY POWER CENTERS OR SERVICE CONNECTIONS IN EXCESS OF THE SPECIFIED MINIMUM SHALL MAKE ARRANGEMENTS WITH THE CONTRACTING OFFICE.
5. TEMPORARY LIGHTING
   A. PROVIDE TEMPORARY LIGHTING AS REQUIRED FOR SAFE AND ADEQUATE WORKING CONDITIONS THROUGHOUT PROJECT FOR PUBLIC SAFETY, SECURITY LIGHTING, AND ABATEMENT NEEDS.

GENERAL NOTES (CONT.)

   B. REQUIRED MINIMUM LIGHTING LEVELS: (USE INCANDESCENT LIGHTING, UNLESS OTHERWISE SPECIFIED.)
      1) 150 WATTS SPACED 6 METERS ON CENTERS EACH WAY THROUGHOUT THE BUILDING(S).
      2) 150 WATTS AT EACH LANDING AND STORY IN EACH STAIRWAY.
      3) 200 WATTS SPACED 9 METERS ON CENTERS IN ALL CORRIDORS.
      4) ADDITIONAL LIGHTING REQUIRED FOR SAFETY PURPOSES
   C. UNLESS OTHERWISE INDICATED, MOUNT TEMPORARY LIGHTING AT A MAXIMUM HEIGHT OF 3 METERS ABOVE EACH FLOOR LEVEL.
   D. SECURITY LIGHTING
      1) WITHIN THE BUILDING, ILLUMINATE ALL STAIRWAYS, CORRIDORS AND ENTRANCES INVOLVED IN ABATEMENT WORK ON A 24 HOUR PER DAY BASIS. CONTRACTOR MAY USE CONSTRUCTION LIGHTING FOR THIS PURPOSE.
   E. SAFETY LIGHTING
      1) PROVIDE 150 WATTS OVER ALL EXCAVATIONS, BARRIERS AND OTHER OBSTACLES WHICH ARE NOT APPARENT AS SAFETY HAZARDS.
      2) PROVIDE SAFETY LIGHTING WITHIN PROJECT SITE AT ALL TIMES AUTHORIZED PERSONS ARE PRESENT.
      3) PROVIDE SAFETY LIGHTING IN PUBLIC AREAS AT ALL TIMES.
   F. PROVIDE WORK LIGHTING CONTINUOUSLY FROM 15 MINUTES PRIOR TO AND 15 MINUTES PAST SCHEDULED WORK HOURS ON SCHEDULED WORK DAYS.
   G. ALL LAMPS SHALL BE COVERED WITH SAFETY GUARD OR DEEPLY RECESSED IN REFLECTOR. DO NOT SUSPEND BY THEIR ELECTRIC CORDS UNLESS CORD AND FIXTURE ARE DESIGNED FOR THAT PURPOSE.
6. TEMPORARY TELEPHONE
   PROVIDE TEMPORARY TELEPHONE SERVICE FOR CONSTRUCTION PERIOD, AS NEEDED.
7. TEMPORARY WATER
   A. PROVIDE AND MAINTAIN TEMPORARY WATER SERVICE CONNECTION THROUGHOUT CONSTRUCTION PERIOD.
      1) FOR CONSTRUCTION PURPOSES:
         A) PROVIDE A MINIMUM OF ONE 20 MM WATER SERVICE CONNECTION TO EACH AREA
         B) MINIMUM DISCHARGE AT WATER SERVICE CONNECTION NOT REQUIRED FOR FIRE PROTECTION: 20 PSI
         C) EACH CONTRACTOR AND SUBCONTRACTOR SHALL SUPPLY ADEQUATE WATER HOSES FROM HOSE BIBS TO POINT OF HIS OPERATIONS.

GENERAL NOTES (CONT.)

      2) FOR OTHER PURPOSES:
         A) TEMPORARY FIRE PROTECTION
         B) CLEANING
         C) DUST CONTROL
   B. MAINTAIN ADEQUATE VOLUME OF WATER FOR ALL PURPOSES.
   C. EACH CONTRACTOR AND SUBCONTRACTOR SHALL PROVIDE DRINKING WATER FOR HIS OWN FORCES.
8. TEMPORARY FIRE PROTECTION
   A. SCHEDULE MEANS OF FIRE PROTECTION OF ALL CONSTRUCTION, MATERIALS AND PERSONNEL PRIOR TO STARTING WORK IN ACCORDANCE WITH GOVERNING AUTHORITY.
   B. SECURE APPROVAL OF THE LOCAL FIRE DEPARTMENT AND OTHER GOVERNING AUTHORITY, AS REQUIRED.
   C. PROVIDE AND PERFORM PROTECTION AND PREVENTION DURING THE CONSTRUCTION PERIOD IN ACCORDANCE WITH THE CONTRACTING OFFICER'S RECOMMENDATIONS FOR PROTECTION OF BUILDINGS UNDER CONSTRUCTION AND ALL OTHER LAWS AND REGULATIONS.
9. TEMPORARY ENCLOSURES
   IN AREAS REQUIRING TEMPORARY HEATING OR COOLING, PROVIDE SUFFICIENT PRELIMINARY ENCLOSURE TO PREVENT ENTRANCE OR INFILTRATION OF RAINWATER, WIND AND OTHER ELEMENTS AND TO PREVENT UNDUE HEAT LOSS OR HEAT GAIN FROM WITHIN ENCLOSED AREAS.
10. SITE SECURITY
    THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING ACCESS TO THE WORK AREA AND SURROUNDING CONTROLLED AREAS. THE CONTRACTOR SHALL SUBMIT A LIST OF DOORS AND OTHER OPENINGS THAT MUST BE SECURED TO ISOLATE THE WORK AREA, INCLUDE ON THIS LIST ALL DOORS OR OPENINGS INDICATED AS EMERGENCY EXITS. AFTER RECEIVING WRITTEN AUTHORIZATION FROM THE CONTRACTING OFFICER LOCK ALL DOORS AND OPENINGS INTO THE WORK AREA, IF DOORS CANNOT BE LOCKED, CHAIN THE DOOR OR OPENING SHUT. COVER ALL SIGNS THAT DIRECT EMERGENCY EXITING TO LOCKED DOORS, EITHER OUTSIDE OR INSIDE THE WORK AREA. DO NOT OBSTRUCT DOORS REQUIRED FOR EMERGENCY EXIT FROM THE WORK AREA. ARRANGE THE WORK AREA SO THAT THE ONLY ACCESS INTO THE WORK AREA IS CONTROLLED BY THE CONTRACTOR AT ALL TIMES. PROVIDE WARNING SIGNS (IN ALL RELEVANT LANGUAGES) AT EACH DOOR LEADING TO THE WORK AREA READING AS FOLLOWS:

GENERAL NOTES (CONT.)

KEEP OUT
BEYOND THIS POINT
ASBESTOS ABATEMENT WORK
IN PROGRESS
BREATHING ASBESTOS DUST MAY
BE HAZARDOUS TO YOUR HEALTH

IMMEDIATELY INSIDE DOORS AND OUTSIDE CRITICAL BARRIERS POST MANUFACTURED SIGNS (IN ALL RELEVANT LANGUAGES) APPROXIMATELY 356 MM BY 508 MM AS REQUIRED BY 29 CFR 1926 READING AS FOLLOWS:

SITE SECURITY TWENTY-FOUR HOURS A DAY FOR THE DURATION OF THE PROJECT.

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

THE CONTRACTOR SHALL PROTECT THE WORK AREA AND SURROUNDING AREAS AGAINST VANDALISM OF ALL KINDS. CONTRACTOR SHALL BE RESPONSIBLE FOR

11. PCB CONTAINING FLUORESCENT LIGHT BALLASTS. CONTRACTOR TO REMOVE EXISTING FLUORESCENT LIGHTS FROM EACH WORK AREA, HEPA VACUUM EACH FIXTURE AND STORE IN AN AREA DESIGNATED BY THE CONTRACTING OFFICER FOR REMOVAL. BALLASTS SHALL BE PROPERLY CONTAINERIZED, MANIFESTED, SHIPPED AND DISPOSED BY THE CONTRACTOR AT HIS OWN EXPENSE.
12. CONTRACTOR TO LIMIT BREAKAGE OF FLUORESCENT LIGHT TUBES TO GREATEST EXTENT POSSIBLE. CONTRACTOR IS TO PACKAGE ALL FLUORESCENT LIGHT TUBES FOR SHIPPING TO PREVENT BREAKAGE DURING SHIPPING.
13. CONTRACTOR TO IDENTIFY, REMOVE AND DISPOSE ALL FIRE DOORS WITH ASBESTOS-CONTAINING INSULATING MATERIALS AND/OR LEAD-BASED PAINT.
14. CONTRACTOR SHALL BE REQUIRED TO REMOVE ASBESTOS-CONTAINING ELECTRICAL WIRE AND /OR ASBESTOS-CONTAINING MATERIALS LOCATED IN SUBSURFACE DUCT BANKS WHEN LOCATED.
15. CONTRACTOR SHALL COORDINATE CLEARING OF ACCESS AND WORK AREAS.
16. AS THE EXISTING STRUCTURES ARE IN DISREPAIR, THE CONTRACTOR SHALL TAKE SAFETY PRECAUTIONS RELATIVE TO THE SOUNDNESS OF THE STRUCTURES.
17. ROOFING MATERIALS NOT SAMPLED DUE TO THE SOUNDNESS OF THE STRUCTURES. DUE TO THE STRUCUTRAL SOUNDNESS, REMOVAL OF ROOFING MATERIALS ARE NOT REQUIRED.

DRAWING NOTES

1. THIS DRAWING IS NOT AN "AS BUILT" DRAWING OR REPRESENTATION OF THE BUILDING. IT IS PREPARED FOR THE PURPOSE OF DEPICTING AREAS OF ASBESTOS CONTAINING MATERIALS IN THE BUILDING AND FOR THAT PURPOSE ONLY. IT IS NOT TO BE RELIED UPON BY OTHER THAN THOSE INTENDED WITHIN THE STATED PURPOSE OF OUR SCOPE OF WORK.
2. QUANTITIES GIVEN ARE APPROXIMATES, FOR ESTIMATING PURPOSES ONLY, CONTRACTORS ARE URGED TO VERIFY QUANTITIES. ALL ACM IN WORK AREAS, INDICATED OR NOT, ARE TO BE REMOVED.
3. QUANTITIES OF ASBESTOS CONTAINING PIPE INSULATION AND DUCT INSULATION CONCEALED WITHIN EXISTING WALLS CANNOT BE FULLY DETERMINED UNTIL EXPOSED. CONTRACTOR IS RESPONSIBLE FOR REMOVAL OF ALL ACM'S FROM CONCEALED SPACES.

CODED NOTES

(1) INDICATES FULL SCALE CONTAINMENT FOR GROSS REMOVAL OR GLOVE BAG WITH CRITICAL BARRIERS. NEGATIVE AIR AND CONTIGUOUS DECON UNIT REQUIRED. PCM CLEARANCE.

(○) SAMPLE LOCATION, BUILDING, NUMBER MATERIAL TYPE, % AND TYPE ASBESTOS

AS-BUILTS

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URS Greiner
CONSULTING ENGINEERING AND PLANNING
TIMONIUM, MARYLAND

DESIGNED	J.D.H.
DRAWN	M.C.G.
CHECKED	J.D.H.
APPROVED	G.M.L.

REV.	DATE	REMARKS

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
DIVISION OF ENGINEERING

MARTIN STATE AIRPORT

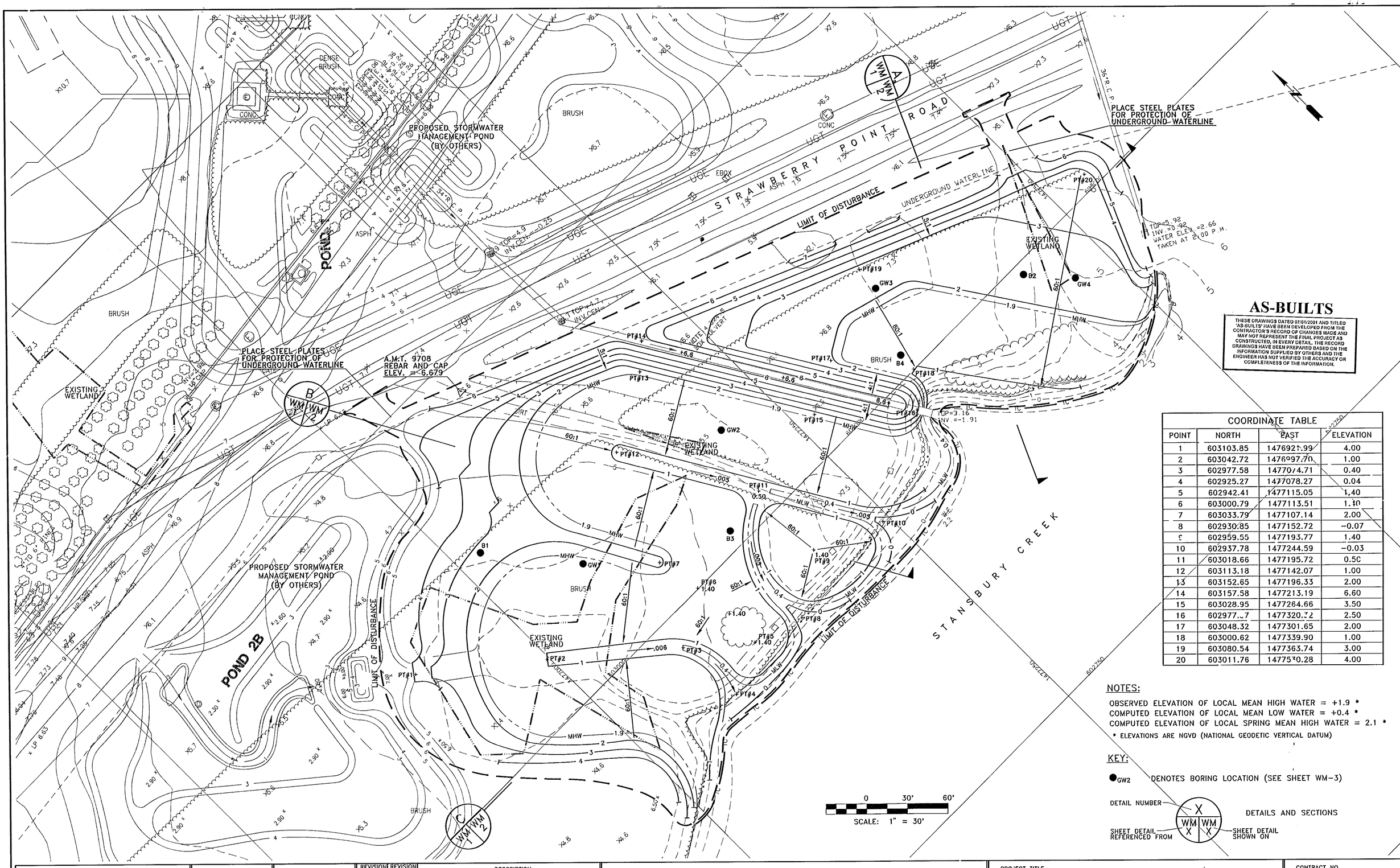
PROJECT TITLE
MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT
PHASE I

SHEET TITLE
ASBESTOS ABATEMENT - PARTIAL FLOOR PLANS FOR BLDGS. 1, 2 & 3

SCALE: AS SHOWN
DATE: MARCH 24, 1998

PROJECT NO.
MAA-CO-97-019

SHEET NO.
X-01



AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

COORDINATE TABLE

POINT	NORTH	EAST	ELEVATION
1	603103.85	1476921.99	4.00
2	603042.72	1476997.70	1.00
3	602977.58	1477074.71	0.40
4	602925.27	1477078.27	0.04
5	602942.41	1477115.05	1.40
6	603000.79	1477113.51	1.40
7	603033.79	1477107.14	2.00
8	602930.85	1477152.72	-0.07
9	602959.55	1477193.77	1.40
10	602937.78	1477244.59	-0.03
11	603018.66	1477195.72	0.50
12	603113.18	1477142.07	1.00
13	603152.65	1477196.33	2.00
14	603157.58	1477213.19	6.60
15	603028.95	1477264.66	3.50
16	602977.[illegible]7	1477320.[illegible]2	2.50
17	603048.32	1477301.65	2.00
18	603000.62	1477339.90	1.00
19	603080.54	1477363.74	3.00
20	603011.76	1477530.28	4.00

NOTES:

OBSERVED ELEVATION OF LOCAL MEAN HIGH WATER = +1.9 *
COMPUTED ELEVATION OF LOCAL MEAN LOW WATER = +0.4 *
COMPUTED ELEVATION OF LOCAL SPRING MEAN HIGH WATER = 2.1 *
* ELEVATIONS ARE NGVD (NATIONAL GEODETIC VERTICAL DATUM)

KEY:

●GW2 DENOTES BORING LOCATION (SEE SHEET WM-3)

DETAIL NUMBER — X — DETAILS AND SECTIONS
SHEET DETAIL REFERENCED FROM — WM X — SHEET DETAIL SHOWN ON — WM X

URS Greiner CONSULTING ENGINEERING AND PLANNING TIMONIUM, MARYLAND	DESIGNED CPK	REVISION NO.	REVISION DATE	DESCRIPTION
	DRAWN JDD	2	4/23/98	ADDENDUM 2 – NEW SHEET ADDED
	CHECKED			
	APPROVED			

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: WETLAND MITIGATION GRADING PLAN

SCALE: AS SHOWN — DATE: APRIL, 1998

CONTRACT NO. MAA-AE-96-001

SHEET NO. WM-1

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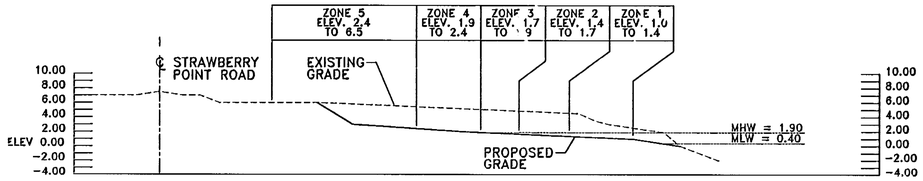
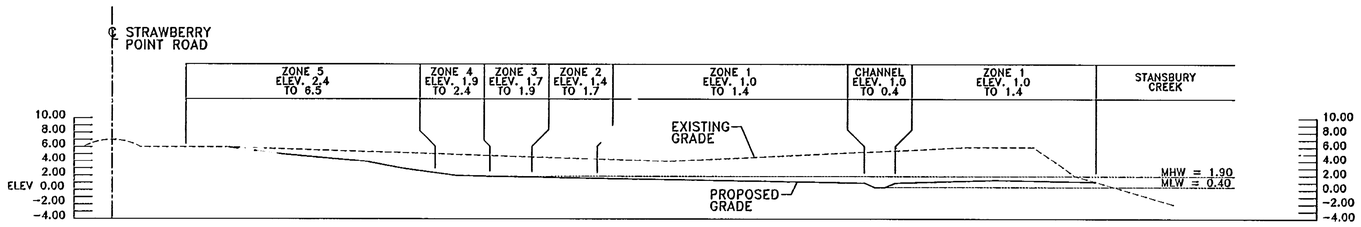


A SECTION (WM 1 | WM 2)

SECTION A–A THROUGH SITE SHOWING PROPOSED GRADES, CHANNELS AND PLANTING ZONES

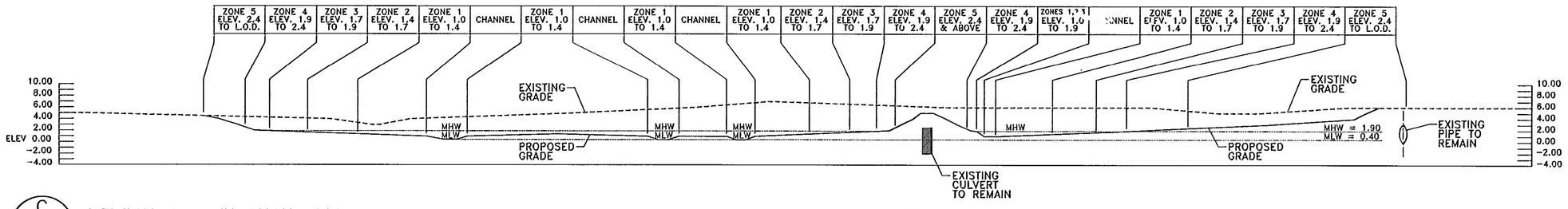
HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 10'



B SECTION (WM 1 | WM 2)

SECTION B–B THROUGH SITE SHOWING PROPOSED GRADES, CHANNELS AND PLANTING ZONES

HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 10'



C SECTION (WM 1 | WM 2)

SECTION C–C THROUGH SITE SHOWING PROPOSED GRADES, CHANNELS AND PLANTING ZONES

HORIZ. SCALE: 1" = 30'
VERT. SCALE: 1" = 10'

AS-BUILTS

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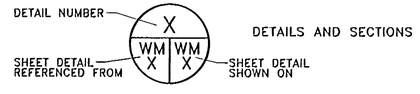
KEY:



NOTE:

SECTIONS ARE PROVIDED FOR INFORMATION ONLY. THEY SHALL NOT BE USED FOR THE PURPOSE OF ESTIMATING OR MEASURING EARTHWORK QUANTITIES. ILLUSTRATIVE SECTIONS ARE INTENDED ONLY TO CONVEY THE INTENT OF THE DESIGN AND TO SHOW THE APPROXIMATE LOCATION OF DRAINAGE FEATURES AND PLANTING ZONES.

URS Greiner
CONSULTING ENGINEERING AND PLANNING
TIMONIUM, MARYLAND

DESIGNED	CPK
DRAWN	JDD
CHECKED	
APPROVED	

REVISION NO.	REVISION DATE	DESCRIPTION
2	4/23/98	ADDENDUM 2 – NEW SHEET ADDED

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE 1

SHEET TITLE: WETLAND MITIGATION ILLUSTRATIVE SITE SECTIONS

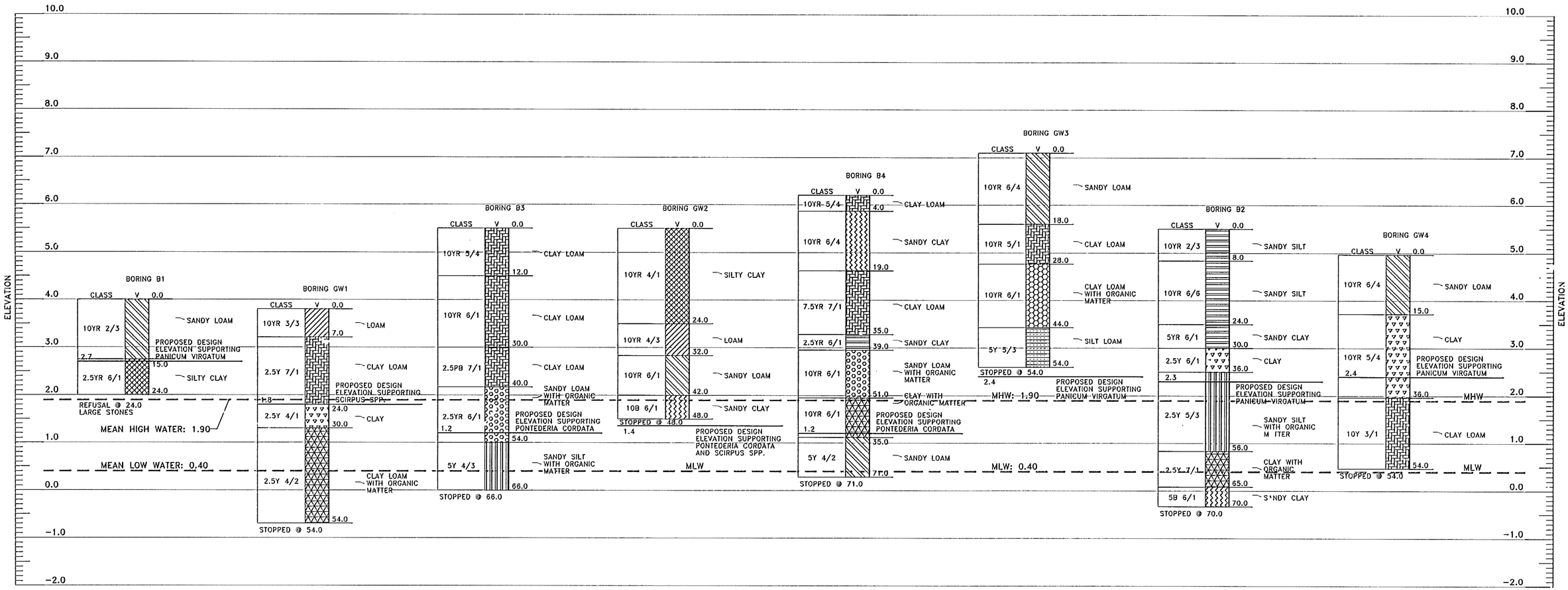
SCALE: AS SHOWN

DATE: APRIL, 1998

CONT. \CT NO.: MAA-AE-96-001

SHEET NO.: WM-2

P:\D100551.0\WETLAND\PS02WETL.DWG



LEGEND

CLASS V DEPTH

10YR 6/1

CLASS – SOIL CLASSIFICATION
V – ALTERNATE SOIL LAYERS
DEPTH – IN INCHES

SOIL LEGEND

- LOAM
- SANDY LOAM
- SANDY LOAM WITH ORGANIC MATTER
- SILT LOAM
- CLAY
- SANDY CLAY
- CLAY WITH ORGANIC MATTER
- SILTY CLAY
- CLAY LOAM
- CLAY LOAM WITH ORGANIC MATTER
- SANDY SILT
- SANDY SILT WITH ORGANIC MATTER

NOTES:

1. BORINGS WERE PERFORMED BY STRAUGHAN ENVIRONMENTAL SERVICES, INC. ON JULY 25, 28 AND 30, 1997.
2. BORINGS LABELED B-1, B-2, B-3 AND B-4 WERE PERFORMED FOR THE PURPOSE OF CHARACTERIZING SOIL TEXTURES AND DEPTHS. BORINGS LABELED GW-1, GW-2, GW-3 AND GW-4 WERE PERFORMED FOR THE PURPOSE OF INSTALLING SHALLOW GROUND WATER MONITORING WELLS. THE SOIL TEXTURES AND DEPTHS WERE ALSO RECORDED FOR THOSE BORINGS.
3. BORING LOGS ARE PROVIDED FOR THE PURPOSE OF SHOWING THE NATURE OF THE MATERIAL TO BE STRIPPED, STOCKPILED AND REPLACED IN THE MITIGATION AREA; FOR SHOWING THE NATURE OF THE MATERIALS TO BE EXCAVATED AND REMOVED FROM THE SITE; AND FOR SHOWING THE NATURE OF THE MATERIAL AT THE FINAL PROPOSED ELEVATION.
4. IF SOIL MATERIALS ARE FOUND BY THE CONTRACTOR DURING THE EXCAVATION WORK TO BE OTHER THAN AS SHOWN, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER.

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

URS Greiner
CONSULTING ENGINEERING AND PLANNING
TIMONIUM, MARYLAND

DESIGNED	CPK
DRAWN	JDD
CHECKED	
APPROVED	

REVISION NO.	REVISION DATE	DESCRIPTION
2	4/23/98	ADDENDUM 2 – NEW SHEET ADDED

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: WETLAND MITIGATION SOIL BORINGS

SCALE: AS SHOWN

DATE: APRIL, 1998

CONTRACT NO.: MAA-AE-96-001

SHEET NO.: WM-3

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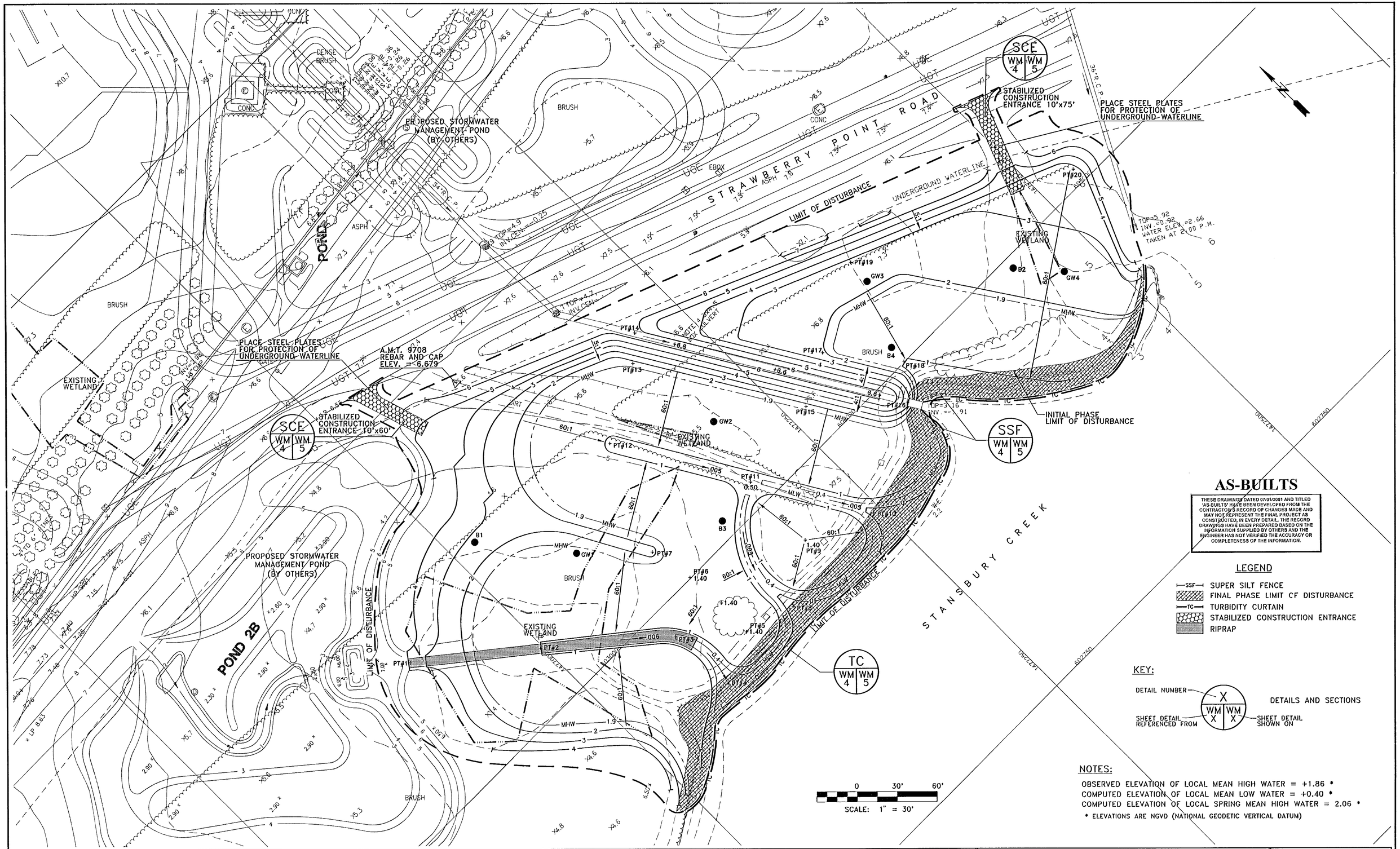

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

LEGEND

- SSF — SUPER SILT FENCE
- FINAL PHASE LIMIT OF DISTURBANCE
- TC — TURBIDITY CURTAIN
- STABILIZED CONSTRUCTION ENTRANCE
- RIPRAP

KEY:

DETAIL NUMBER — X — DETAILS AND SECTIONS

SHEET DETAIL REFERENCED FROM — WM X — WM X — SHEET DETAIL SHOWN ON

NOTES:

OBSERVED ELEVATION OF LOCAL MEAN HIGH WATER = +1.86 *
COMPUTED ELEVATION OF LOCAL MEAN LOW WATER = +0.40 *
COMPUTED ELEVATION OF LOCAL SPRING MEAN HIGH WATER = 2.06 *
* ELEVATIONS ARE NGVD (NATIONAL GEODETIC VERTICAL DATUM)

URS Greiner CONSULTING ENGINEERING AND PLANNING TIMONIUM, MARYLAND	DESIGNED CSH DRAWN JDD CHECKED APPROVED	REVISION NO. / REVISION DATE / DESCRIPTION 2 / 4/23/98 / ADDENDUM 2 – NEW SHEET ADDED	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION OFFICE OF PLANNING AND ENGINEERING	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: WETLAND MITIGATION EROSION & SEDIMENT CONTROL PLAN SCALE: AS SHOWN — DATE: APRIL, 1998	CONTRACT NO. MAA-AE-96-001 SHEET NO. WM-4

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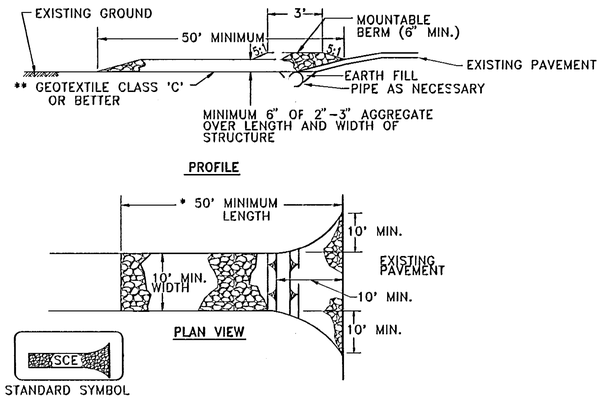


CONSTRUCTION SPECIFICATION

1. LENGTH – MINIMUM OF 50' (*30' FOR SINGLE RESIDENCE LOT).

2. WIDTH – 10' MINIMUM, SHOULD BE FLARED AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.

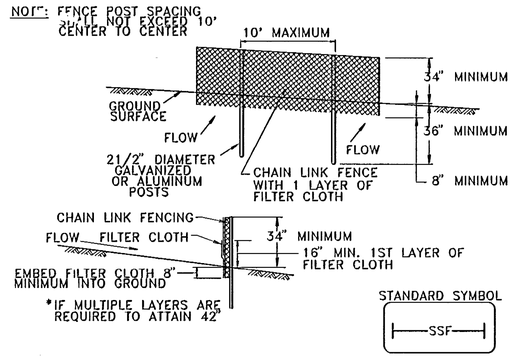
3. GEOTEXTILE FABRIC (FILTER CLOTH) SHALL BE PLACED OVER THE EXISTING GROUND PRIOR TO PLACING STONE. **THE PLAN APPROVAL AUTHORITY MAY NOT REQUIRE SINGLE FAMILY RESIDENCES TO USE GEOTEXTILE.

4. STONE – CRUSHED AGGREGATE (2" TO 3") OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT SHALL BE PLACED AT LEAST 6" DEEP OVER THE LENGTH AND WIDTH OF THE ENTRANCE.

5. SURFACE WATER – ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED THROUGH THE ENTRANCE, MAINTAINING POSITIVE DRAINAGE. PIPE INSTALLED THROUGH THE STABILIZED CONSTRUCTION ENTRANCE SHALL BE PROTECTED WITH A MOUNTABLE BERM WITH 5:1 SLOPES AND A MINIMUM OF 6" OF STONE OVER THE PIPE. PIPE HAS TO BE SIZED ACCORDING TO THE DRAINAGE. WHEN THE SCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY A PIPE WILL NOT BE NECESSARY. PIPE SHOULD BE SIZED ACCORDING TO THE AMOUNT OF RUNOFF TO BE CONVEYED. A 6" MINIMUM WILL BE REQUIRED.

6. LOCATION – A STABILIZED CONSTRUCTION ENTRANCE SHALL BE LOCATED AT EVERY POINT WHERE CONSTRUCTION TRAFFIC ENTERS OR LEAVES A CONSTRUCTION SITE. VEHICLES LEAVING THE SITE MUST TRAVEL OVER THE ENTIRE LENGTH OF THE STABILIZED CONSTRUCTION ENTRANCE.

SCE WM 4 | WM 5 — STABILIZED CONSTRUCTION ENTRANCE



CONSTRUCTION SPECIFICATIONS

1. FENCING SHALL BE 42" IN HEIGHT AND CONSTRUCTED IN ACCORDANCE WITH THE LATEST MARYLAND STATE HIGHWAY DETAILS FOR CHAIN LINK FENCING. THE SPECIFICATION FOR A 6' FENCE SHALL BE USED, SUBSTITUTING 42" FABRIC AND 6' LENGTH POSTS.

2. CHAIN LINK FENCE SHALL BE FASTENED SECURELY TO THE FENCE POSTS WITH WIRE TIES. THE LOWER TENSION WIRE, BRACE AND TRUSS RODS, DRIVE ANCHORS AND POST CAPS ARE NOT REQUIRED EXCEPT ON THE ENDS OF THE FENCE.

3. FILTER CLOTH SHALL BE FASTENED SECURELY TO THE CHAIN LINK FENCE WITH TIES SPACED EVERY 24" AT THE TOP AND MID SECTION.

4. FILTER CLOTH SHALL BE EMBEDDED A MINIMUM OF 8" INTO THE GROUND.

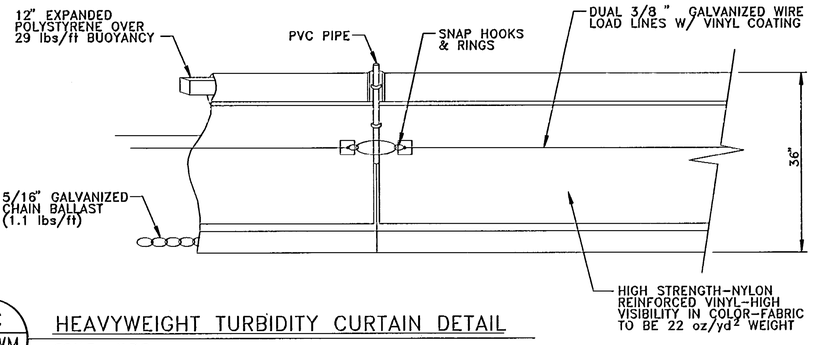
5. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER, THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.

6. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND SILT BUILDUPS REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE, OR WHEN SILT REACHES 50% OF FENCE HEIGHT

7. FILTER CLOTH SHALL BE FASTENED SECURELY TO EACH FENCE POST WITH WIRE TIES OR STAPLES AT TOP AND MID SECTION AND SHALL MEET THE FOLLOWING REQUIREMENTS FOR GEOTEXTILE CLASS F:

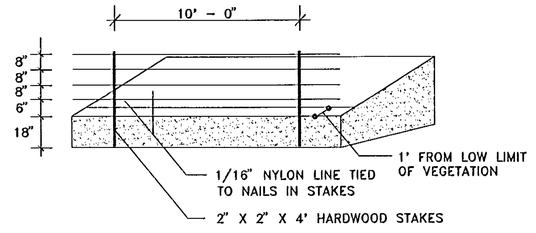
TENSILE STRENGTH	50 LBS/IN (MIN.)	TEST: MSMT 509
TENSILE MODULUS	20 LBS/IN (MIN.)	TEST: MSMT 509
FLOW RATE	0.3 GAL/FT /MINUTE (MAX.)	TEST: MSMT 322
FILTERING EFFICIENCY	75% (MIN.)	TEST: MSMT 322

SSF WM 4 | WM 5 — SUPER SILT FENCE



TC WM 4 | WM 5 — HEAVYWEIGHT TURBIDITY CURTAIN DETAIL

SCALE: N.T.S.



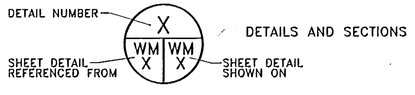
GF WM 7 | WM 5 — GOOSE FENCE DETAIL

SCALE: N.T.S.

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

KEY:



URS Greiner
CONSULTING ENGINEERING AND PLANNING
TOWSON, MARYLAND

DESIGNED	CSH
DRAWN	JDD
CHECKED	
APPROVED	

REVISION NO.	REVISION DATE	DESCRIPTION
2	4/23/98	ADDENDUM 2 – NEW SHEET ADDED

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: WETLAND MITIGATION EROSION & SEDIMENT CONTROL DETAILS

SCALE: AS SHOWN

DATE: APRIL, 1998

CONTRACT NO.: MAA-AE-96-001

SHEET NO.: WM-5

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STANDARD EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR SHALL NOTIFY THE WATER MANAGEMENT ADMINISTRATION (WMA) AT (410) 631-3510 SEVEN (7) DAYS BEFORE COMMENCING ANY LAND DISTURBING ACTIVITY AND, UNLESS WAIVED BY THE ADMINISTRATION, SHALL BE REQUIRED TO HOLD A PRE-CONSTRUCTION MEETING BETWEEN PROJECT REPRESENTATIVES AND A REPRESENTATIVE OF WMA.
2. THE CONTRACTOR MUST NOTIFY WMA IN WRITING AND BY TELEPHONE AT THE FOLLOWING POINTS:
   A. THE REQUIRED PRE-CONSTRUCTION MEETING.
   B. FOLLOWING INSTALLATION OF SEDIMENT CONTROL MEASURES.
   C. DURING THE INSTALLATION OF SEDIMENT BASINS (TO BE CONVERTED INTO PERMANENT STORMWATER MANAGEMENT STRUCTURES) AT THE REQUIRED INSPECTION POINTS (SEE INSPECTION CHECKLIST ON PLAN). NOTIFICATION PRIOR TO COMMENCING CONSTRUCTION OF EACH STEP IS MANDATORY.
   D. PRIOR TO REMOVAL OR MODIFICATION OF ANY SEDIMENT CONTROL STRUCTURE(S).
   E. PRIOR TO REMOVAL OF ALL SEDIMENT CONTROL DEVICES.
   F. PRIOR TO FINAL ACCEPTANCE.
3. THE CONTRACTOR SHALL CONSTRUCT ALL EROSION AND SEDIMENT CONTROL MEASURES PER THE APPROVED PLAN AND CONSTRUCTION SEQUENCE AND, SHALL HAVE THEM INSPECTED AND APPROVED BY THE AGENCY INSPECTOR OR WMA INSPECTOR PRIOR TO BEGINNING ANY OTHER LAND DISTURBANCES. MINOR SEDIMENT CONTROL DEVICE LOCATION ADJUSTMENTS MAY BE MADE IN THE FIELD WITH THE APPROVAL OF THE WMA INSPECTOR. THE CONTRACTOR SHALL ENSURE THAT ALL RUNOFF FROM DISTURBED AREAS IS DIRECTED TO THE SEDIMENT CONTROL DEVICES, AND SHALL NOT REMOVE ANY EROSION OR SEDIMENT CONTROL MEASURE WITHOUT PRIOR PERMISSION FROM WMA INSPECTOR AND AGENCY INSPECTOR. THE CONTRACTOR MUST OBTAIN PRIOR AGENCY AND WMA APPROVAL FOR CHANGES TO THE SEDIMENT CONTROL PLAN AND/OR SEQUENCE OF CONSTRUCTION.
4. THE CONTRACTOR SHALL PROTECT ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS TO PREVENT THE DEPOSITION OF MATERIALS ONTO PUBLIC ROADS. ALL MATERIALS DEPOSITED ONTO PUBLIC ROADS SHALL BE REMOVED IMMEDIATELY.
5. THE CONTRACTOR SHALL INSPECT DAILY AND MAINTAIN CONTINUOUSLY IN AN EFFECTIVE OPERATING CONDITION ALL EROSION AND SEDIMENT CONTROL MEASURES UNTIL SUCH TIMES AS THEY ARE REMOVED WITH PRIOR PERMISSION FROM WMA INSPECTOR AND AGENCY INSPECTOR.
6. ALL SEDIMENT BASINS, TRAP EMBANKMENTS AND SLOPES, PERIMETER DIKES, SWALES AND ALL DISTURBED SLOPES STEEPER OR EQUAL TO 3:1 SHALL BE STABILIZED WITH SOD OR SEED AND ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES, AS SOON AS POSSIBLE BUT NO LATER THAN SEVEN (7) CALENDAR DAYS AFTER ESTABLISHMENT. ALL AREAS DISTURBED OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM MUST BE MINIMIZED. MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. (REQUIREMENT FOR STABILIZATION MAY BE REDUCED TO THREE (3) DAYS FOR SENSITIVE AREAS.)
7. THE CONTRACTOR SHALL APPLY SOD OR SEED AND ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES TO ALL DISTURBED AREAS AND STOCKPILES WITHIN FOURTEEN (14) CALENDAR DAYS AFTER STRIPPING AND GRADING ACTIVITIES HAVE CEASED IN THE AREA. MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. (REQUIREMENT MAY BE REDUCED TO SEVEN (7) DAYS FOR SENSITIVE AREAS.)
8. PRIOR TO REMOVAL OF SEDIMENT CONTROL MEASURES, THE CONTRACTOR SHALL STABILIZE AND HAVE ESTABLISHED PERMANENT STABILIZATION FOR ALL CONTRIBUTORY DISTURBED AREAS USING SOD OR AN APPROVED PERMANENT SEED MIXTURE WITH REQUIRED SOIL AMENDMENTS AND AN APPROVED ANCHOR MULCH. WOOD FIBER MULCH MAY ONLY BE USED IN SEEDING SEASON WHERE THE SLOPE DOES NOT EXCEED 10 PERCENT AND GRADING HAS BEEN DONE TO PROMOTE SHEET FLOW DRAINAGE. AREAS BROUGHT TO FINISHED GRADE DURING THE SEEDING SEASON SHALL BE PERMANENTLY STABILIZED AS SOON AS POSSIBLE, BUT NO LATER THAN FOURTEEN (14) CALENDAR DAYS AFTER ESTABLISHMENT. WHEN PROPERTY IS BROUGHT TO FINISHED GRADE DURING THE MONTHS OF NOVEMBER THROUGH FEBRUARY, AND PERMANENT STABILIZATION IS FOUND TO BE IMPRACTICAL, TEMPORARY SEED AND ANCHORED STRAW MULCH SHALL BE APPLIED TO DISTURBED AREAS. THE FINAL PERMANENT STABILIZATION OF SUCH PROPERTY SHALL BE APPLIED BY MARCH 15 OR EARLIER IF GROUND AND WEATHER CONDITIONS ALLOW.
9. THE SITE'S APPROVAL LETTER, APPROVED EROSION AND SEDIMENT CONTROL PLANS, DAILY LOG BOOKS, AND TEST REPORTS SHALL BE AVAILABLE AT THE SITE FOR INSPECTION BY DULY AUTHORIZED OFFICIALS OF WMA AND AGENCY RESPONSIBLE FOR PROJECT.
10. SURFACE DRAINAGE FLOWS OVER UNSTABILIZED CUT AND FILL SLOPES SHALL BE CONTROLLED BY EITHER PREVENTING DRAINAGE FLOWS FROM TRAVERSING THE SLOPES OR BY INSTALLING PROTECTIVE DEVICES TO LOWER THE WATER DOWNSLOPE WITHOUT CAUSING EROSION. DIKES SHALL BE INSTALLED AND MAINTAINED AT THE TOP OF CUT OR FILL SLOPES UNTIL THE SLOPE AND DRAINAGE AREA TO IT ARE FULLY STABILIZED, AT WHICH TIME THEY MUST BE REMOVED AND FINAL GRADING DONE TO PROMOTE SHEET FLOW DRAINAGE. PROTECTIVE METHODS MUST BE PROVIDED AT POINTS OF CONCENTRATED FLOW WHERE EROSION IS LIKELY TO OCCUR.
11. PERMANENT SWALES OR OTHER POINTS OF CONCENTRATED WATER FLOW SHALL BE STABILIZED WITH SOD OR SEED WITH AN APPROVED EROSION CONTROL MATTING, RIPRAP, OR OTHER APPROVED STABILIZATION MEASURES.
12. TEMPORARY SEDIMENT CONTROL DEVICES MAY BE REMOVED, WITH PERMISSION OF WMA INSPECTOR AND AGENCY INSPECTORS, WITHIN THIRTY (30) CALENDAR DAYS FOLLOWING ESTABLISHMENT OF PERMANENT STABILIZATION IN ALL CONTRIBUTORY DRAINAGE AREAS. STORMWATER MANAGEMENT STRUCTURES USED TEMPORARILY FOR SEDIMENT CONTROL SHALL BE CONVERTED TO THE PERMANENT CONFIGURATION WITHIN THIS TIME PERIOD AS WELL.
13. NO PERMANENT CUT OR FILL SLOPE WITH A GRADIENT STEEPER THAN 3:1 WILL BE PERMITTED IN LAWN MAINTENANCE AREAS. A SLOPE GRADIENT OF UP TO 2:1 WILL BE PERMITTED IN NON-MAINTENANCE AREAS PROVIDED THAT THOSE AREAS ARE INDICATED ON THE EROSION AND SEDIMENT CONTROL PLAN WITH A LOW-MAINTENANCE GROUND COVER SPECIFIED FOR PERMANENT STABILIZATION. SLOPE GRADIENT STEEPER THAN 2:1 WILL NOT BE PERMITTED WITH VEGETATIVE STABILIZATION.
14. FOR FINISHED GRADING, THE CONTRACTOR SHALL PROVIDE ADEQUATE GRADIENTS SO AS TO: PREVENT WATER FROM STANDING ON THE SURFACE MORE THAN TWENTY-FOUR (24) HOURS AFTER THE END OF A RAINFALL EXCEPT IN DESIGNATED DRAINAGE COURSES AND SWALE FLOW AREAS WHICH MAY DRAIN AS LONG AS FORTY-EIGHT (48) HOURS AFTER THE END OF A RAINFALL. AREAS DESIGNED TO HAVE STANDING WATER SHALL NOT BE REQUIRED TO MEET THIS REQUIREMENT.
15. SEDIMENT TRAPS OR BASINS ARE NOT PERMITTED WITHIN 20 FEET OF A FOUNDATION WHICH IS EXISTING OR UNDER CONSTRUCTION. NO STRUCTURE MAY BE CONSTRUCTED WITHIN 20 FEET OF AN ACTIVE SEDIMENT TRAP OR BASIN.
16. THE WMA INSPECTOR HAS THE OPTION OF REQUIRING ADDITIONAL SAFETY OR SEDIMENT CONTROL MEASURES, IF DEEMED NECESSARY.
17. ALL TRAP DEPTH DIMENSIONS ARE RELATIVE TO THE OUTLET ELEVATION. ALL TRAPS MUST HAVE A STABLE OUTFALL. ALL TRAPS AND BASINS SHALL HAVE STABLE INFLOW POINTS.
18. VEGETATIVE STABILIZATION SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL. REFER TO APPROPRIATE SPECIFICATIONS FOR TEMPORARY SEEDING, PERMANENT SEEDING, MULCHING, SODDING, AND GROUND COVERS.
19. TEMPORARY SEDIMENT TRAP(S) SHALL BE CLEANED OUT AND RESTORED TO THE ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO A POINT ONE HALF (1/2) THE DEPTH BETWEEN THE OUTLET CREST AND THE BOTTOM OF THE TRAP. SEDIMENT BASINS SHALL BE CLEANED OUT AND RESTORED TO THE ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO ONE HALF (1/2) THE DEPTH BETWEEN THE DEWATERING ELEVATION AND THE BOTTOM OF THE BASIN.
20. SEDIMENT REMOVED FROM TRAPS (AND BASINS) SHALL BE PLACED AND STABILIZED IN APPROVED AREAS, BUT NOT WITHIN A FLOODPLAIN, WETLAND, OR TREE-SAVE AREA. WHEN PUMPING SEDIMENT LADEN WATER, THE DISCHARGE MUST BE DIRECTED TO A SEDIMENT TRAPPING DEVICE PRIOR TO RELEASE FROM THE SITE.
21. WHERE DEEMED APPROPRIATE BY THE ENGINEER OR INSPECTOR, SEDIMENT BASINS AND TRAPS MAY NEED TO BE SURROUNDED WITH AN APPROVED SAFETY FENCE. THE FENCE MUST CONFORM TO LOCAL ORDINANCES AND REGULATIONS. THE DEVELOPER OR OWNER SHALL CHECK WITH LOCAL BUILDING OFFICIALS ON APPLICABLE SAFETY REQUIREMENTS. WHERE SAFETY FENCE IS DEEMED APPROPRIATE AND LOCAL ORDINANCES DO NOT SPECIFY FENCING SIZES AND TYPES, THE FOLLOWING SHALL BE USED AS A MINIMUM STANDARD: THE SAFETY FENCE MUST BE MADE OF WELDED WIRE AND AT LEAST 42 INCHES HIGH, HAVE POSTS SPACED NO FARTHER APART THAN 8 FEET, HAVE MESH OPENINGS NO GREATER THAN 2 INCHES IN WIDTH AND 4 INCHES IN HEIGHT WITH A MINIMUM OF 14 GAUGE WIRE. SAFETY FENCE MUST BE MAINTAINED AND IN GOOD CONDITION AT ALL TIMES.
22. SEDIMENT CONTROL FOR UTILITY CONSTRUCTION FOR AREAS OUTSIDE OF DESIGNED CONTROLS OR AS DIRECTED BY ENGINEER OR WMA INSPECTOR:
   A. CALL "MISS UTILITY" AT 1-800-257-7777 48 HOURS PRIOR TO THE START OF WORK.
   B. EXCAVATED TRENCH MATERIAL SHALL BE PLACED ON THE HIGH SIDE OF THE TRENCH.
   C. TRENCHES FOR UTILITY INSTALLATION SHALL BE BACKFILLED, COMPACTED, AND STABILIZED AT THE END OF EACH WORKING DAY. NO MORE TRENCH SHALL BE OPENED THAN CAN BE COMPLETED THE SAME DAY, UNLESS OTHERWISE DIRECTED.
   D. TEMPORARY SILT FENCE SHALL BE PLACED IMMEDIATELY DOWNSTREAM OF ANY DISTURBED AREA INTENDED TO REMAIN DISTURBED FOR MORE THAN ONE DAY.
23. OFF-SITE SPOIL OR BORROW AREAS ON STATE OR FEDERAL PROPERTY MUST HAVE PRIOR APPROVAL BY WMA, OTHERWISE, APPROVAL MUST BE GRANTED BY THE LOCAL AUTHORITIES. ALL WASTE AND BORROW AREAS OFF-SITE MUST BE PROTECTED BY SEDIMENT CONTROL MEASURES AND STABILIZED.
24. SITES WHERE INFILTRATION DEVICES ARE USED FOR THE CONTROL OF STORMWATER, EXTREME CARE MUST BE TAKEN TO PREVENT RUNOFF FROM UNSTABILIZED AREAS FROM ENTERING THE STRUCTURE DURING CONSTRUCTION. SEDIMENT CONTROL DEVICES PLACED IN INFILTRATION AREAS MUST HAVE BOTTOM ELEVATIONS AT LEAST TWO (2) FEET HIGHER THAN THE FINISH GRADE BOTTOM ELEVATION OF THE INFILTRATION PRACTICE. WHEN CONVERTING A SEDIMENT TRAP TO AN INFILTRATION DEVICE, ALL ACCUMULATED SEDIMENT MUST BE REMOVED AND DISPOSED OF PRIOR TO FINAL GRADING OF INFILTRATION DEVICE.
25. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS IN UNPAVED AREAS SHALL BE STABILIZED AND PROTECTED TO PREVENT TRACKING OF MUD ONTO PUBLIC WAYS.
26. WHEN A STORM DRAIN SYSTEM OUTFALL IS DIRECTED TO A SEDIMENT TRAP OR SEDIMENT BASIN AND THE SYSTEM IS TO BE USED FOR TEMPORARILY CONVEYING SEDIMENT LADEN WATER, ALL STORM DRAIN INLETS IN NON-SUMP AREAS SHALL HAVE TEMPORARY ASPHALT BERMS CONSTRUCTED AT THE TIME OF BASE PAVING TO DIRECT GUTTER FLOW INTO THE INLETS TO AVOID SURCHARGING AND OVERFLOW OF INLETS IN SUMP AREAS.
27. SITE INFORMATION:

TOTAL AREA OF SITE	3.59	ACRES
AREA DISTURBED	3.59	ACRES
AREA TO BE ROOFED OR PAVED	0	ACRES
TOTAL CUT	15,400	CU. YDS.
TOTAL FILL	0	CU. YDS.
OFFSITE WASTE/BORROW AREA LOCATION	TO BE DETERMINED	

DESIGN CERTIFICATION

"I HEREBY CERTIFY THAT THIS PLAN HAS BEEN DESIGNED IN ACCORDANCE WITH THE 1994 STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL OR CURRENT REVISIONS THEREOF, AND DEPARTMENT OF THE ENVIRONMENT STORMWATER MANAGEMENT REGULATIONS.

DATE _____ DESIGNER'S SIGNATURE _____

MD. REGISTRATION NO.
P.E., R.L.S. OR R.L.A. (CIRCLE) _____ PRINTED NAME

OWNER'S/DEVELOPER'S CERTIFICATION

"I/WE HEREBY CERTIFY THAT ALL CLEARING, GRADING, CONSTRUCTION, AND/OR DEVELOPMENT WILL BE DONE PURSUANT TO THIS PLAN AND THAT ANY RESPONSIBLE PERSONNEL INVOLVED IN THE CONSTRUCTION PROJECT WILL HAVE A CERTIFICATE OF ATTENDANCE AT A MARYLAND DEPARTMENT OF THE ENVIRONMENT APPROVED TRAINING PROGRAM FOR THE CONTROL OF SEDIMENT AND EROSION BEFORE BEGINNING THE PROJECT. I HEREBY AUTHORIZE THE RIGHT OF ENTRY FOR PERIODIC ON-SITE EVALUATION BY STATE OF MARYLAND, DEPARTMENT OF THE ENVIRONMENT, COMPLIANCE INSPECTORS."

DATE _____ OWNER/DEVELOPER SIGNATURE _____

CARD NO. _____ PRINTED NAME AND TITLE _____

ENFORCEMENT

ALL EROSION AND SEDIMENT CONTROL IS DESIGNED AND SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE "1994 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL". ALL EROSION AND SEDIMENT CONTROL WILL BE STRICTLY ENFORCED.

STANDARD STABILIZATION NOTE:

FOLLOWING INITIAL SOIL DISTURBANCE OR REDISTURBANCE, PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITHIN SEVEN (7) CALENDAR DAYS AS TO THE SURFACE OF ALL PERIMETER CONTROLS. DIKES, SWALES, DITCHES, PERIMETER SLOPES, AND ALL SLOPES GREATER THAN 3 HORIZONTAL TO 1 VERTICAL (3:1); AND FOURTEEN (14) DAYS AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE.

SEQUENCE OF CONSTRUCTION

1. NOTIFY WATER MANAGEMENT ADMINISTRATOR (WMA) AT (410) 631-3510 OF INTENT TO BEGIN CONSTRUCTION AND ARRANGE FOR A PRE-CONSTRUCTION MEETING ON SITE IF REQUESTED.
2. INSTALL STABILIZED CONSTRUCTION ENTRANCES, PERIMETER CONTROLS AS REQUIRED BY PLANS AND/OR INSPECTOR.
3. PERFORM SITE WORK WITHIN INITIAL PHASE LIMIT OF DISTURBANCE.
4. APPLY PERMANENT SEEDING AND MULCHING IN THE AREAS ABOVE ELEVATION 2.4.
5. PERFORM WORK IN FINAL PHASE LIMIT OF DISTURBANCE.
6. LEAVE SITE IN THIS CONDITION FOR SEVEN DAYS TO ALLOW TIDES TO CONSOLIDATE THE SOILS.
7. PLANT AREAS BELOW ELEVATION 2.4 (LOW MARSH AND HIGH MARSH AREAS).
8. REMOVE EROSION AND SEDIMENT CONTROL MEASURES AFTER UPLAND AREAS ARE STABILIZED AND AS DIRECTED BY THE MDE INSPECTOR.
9. STABILIZE AREAS DISTURBED DURING REMOVAL OF THE EROSION AND SEDIMENT CONTROLS.

AS-BUILTS

THESE DRAWINGS DATED 07/01/2001 AND TITLED 'AS-BUILTS' HAVE BEEN DEVELOPED FROM THE CONTRACTOR'S RECORD OF CHANGES MADE AND MAY NOT REPRESENT THE FINAL PROJECT AS CONSTRUCTED, IN EVERY DETAIL. THE RECORD DRAWINGS HAVE BEEN PREPARED BASED ON THE INFORMATION SUPPLIED BY OTHERS AND THE ENGINEER HAS NOT VERIFIED THE ACCURACY OR COMPLETENESS OF THE INFORMATION.

URS Greiner
CONSULTING ENGINEERING AND PLANNING
TIMONIUM, MARYLAND

DESIGNED	CSH
DRAWN	JDD
CHECKED	
APPROVED	

REVISION NO.	REVISION DATE	DESCRIPTION
1	4/23/98	ADDENDUM 2 - NEW SHEET ADDED

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
SHEET TITLE: WETLAND MITIGATION EROSION & SEDIMENT CONTROL DETAILS
SCALE: AS SHOWN
DATE: APRIL, 1998
CONTRACT NO.: MAA-AE-96-001
SHEET NO.: WM-6

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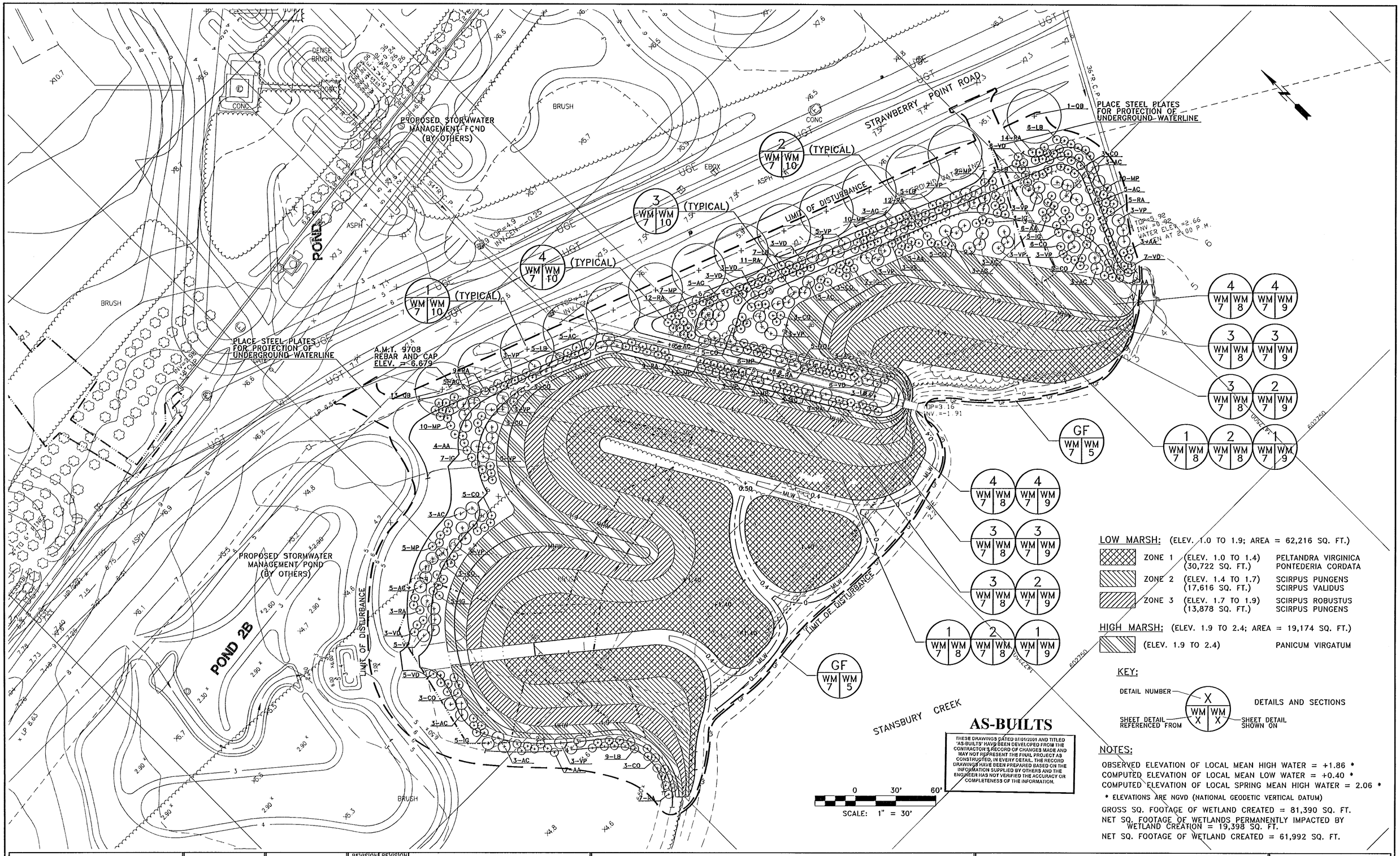

AS-BUILTS

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LOW MARSH: (ELEV. 1.0 TO 1.9; AREA = 62,216 SQ. FT.)

ZONE 1	(ELEV. 1.0 TO 1.4) (30,722 SQ. FT.)	PELTANDRA VIRGINICA PONTEDERIA CORDATA
ZONE 2	(ELEV. 1.4 TO 1.7) (17,616 SQ. FT.)	SCIRPUS PUNGENS SCIRPUS VALIDUS
ZONE 3	(ELEV. 1.7 TO 1.9) (13,878 SQ. FT.)	SCIRPUS ROBUSTUS SCIRPUS PUNGENS

HIGH MARSH: (ELEV. 1.9 TO 2.4; AREA = 19,174 SQ. FT.)

(ELEV. 1.9 TO 2.4) PANICUM VIRGATUM

KEY:

DETAIL NUMBER — X / WM X | WM X — SHEET DETAIL REFERENCED FROM / SHEET DETAIL SHOWN ON — DETAILS AND SECTIONS

NOTES:

OBSERVED ELEVATION OF LOCAL MEAN HIGH WATER = +1.86 *
COMPUTED ELEVATION OF LOCAL MEAN LOW WATER = +0.40 *
COMPUTED ELEVATION OF LOCAL SPRING MEAN HIGH WATER = 2.06 *
* ELEVATIONS ARE NGVD (NATIONAL GEODETIC VERTICAL DATUM)
GROSS SQ. FOOTAGE OF WETLAND CREATED = 81,390 SQ. FT.
NET SQ. FOOTAGE OF WETLANDS PERMANENTLY IMPACTED BY WETLAND CREATION = 19,398 SQ. FT.
NET SQ. FOOTAGE OF WETLAND CREATED = 61,992 SQ. FT.

DESIGNED	CPK
DRAWN	JDD
CHECKED	
APPROVED	

REVISION NO.	REVISION DATE	DESCRIPTION
2	4/23/98	ADDENDUM 2 – NEW SHEET ADDED

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MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: WETLAND MITIGATION PLANTING PLAN

SCALE: AS SHOWN

DATE: APRIL, 1998

CONTRACT NO.: MAA-AE-96-001

SHEET NO.: WM-7

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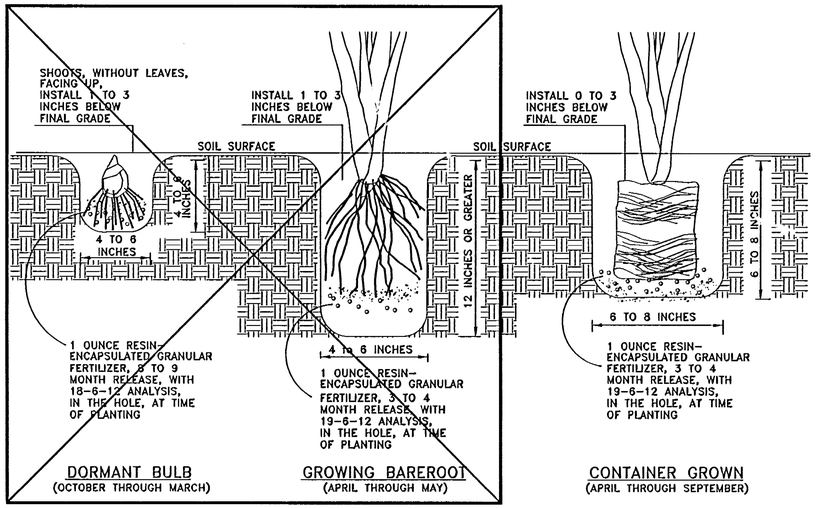
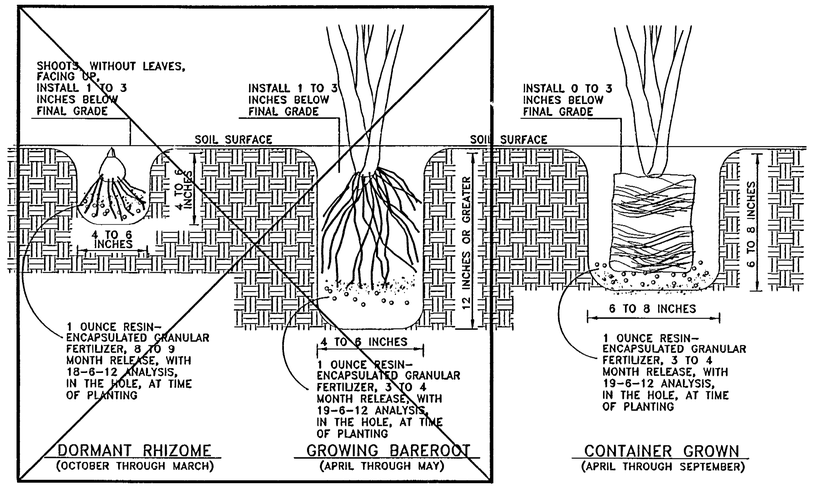


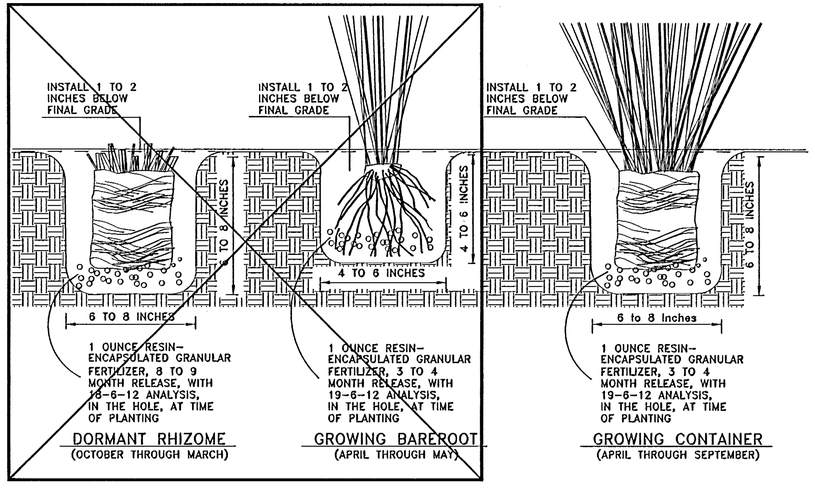
1 WM 7 | WM 8 — PLANTING DETAIL -- PELTANDRA VIRGINICA (ARROW ARUM)

NOT TO SCALE



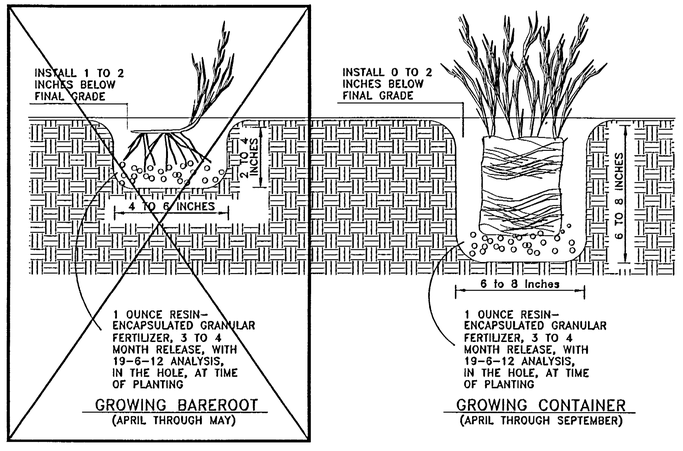
2 WM 7 | WM 8 — PLANTING DETAIL -- PONTEDERIA CORDATA (PICKERELWEED)

NOT TO SCALE



3 WM 7 | WM 8 — PLANTING DETAIL -- SCIRPUS PUNGENS (COMMON THREESQUARE) SCIRPUS ROBUSTUS (SALTMARSH BULRUSH) SCIRPUS VALIDUS (SOFTSTEM BULRUSH)

NOT TO SCALE



4 WM 7 | WM 8 — PLANTING DETAIL -- PANICUM VIRGATUM (SWITCHGRASS)

NOT TO SCALE

AS-BUILTS

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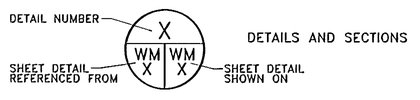
NOTE:

ALL PLANT MATERIAL FOR HIGH AND LOW MARSH PLANTINGS SHALL BE SUPPLIED IN THE "CONTAINER-GROWN" CONDITION, AS SHOWN. SEE SPECIFICATIONS FOR ACCLIMATING PLANT MATERIAL TO BRACKISH WATER CONDITIONS BEFORE INSTALLATION.

KEY:



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REVISION NO.	REVISION DATE	DESCRIPTION
2	4/23/98	ADDENDUM 2 - NEW SHEET ADDED

MARTIN STATE AIRPORT

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND AVIATION ADMINISTRATION
OFFICE OF PLANNING AND ENGINEERING

PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I

SHEET TITLE: WETLAND MITIGATION PLANTING DETAILS AND SCHEDULES

SCALE: AS SHOWN

DATE: APRIL, 1998

CONTRACT NO.: MAA-AE-96-001

SHEET NO.: WM-8

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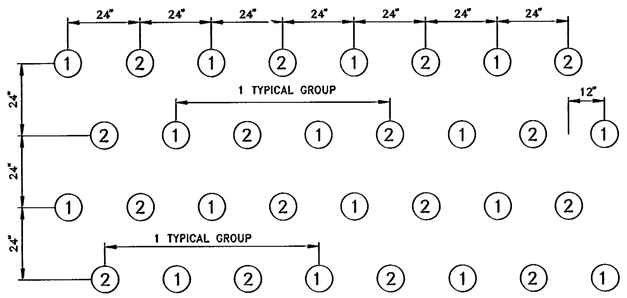


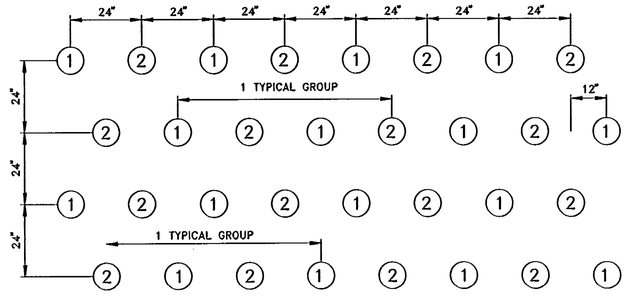
PLANT EMERGENT PLANTS IN EVEN-ALTERNATING ROWS 24" O.C. AS SHOWN
PLANT EACH ROW IN GROUPS OF 2 PLANTS WITH 1 EACH OF THE 2 SPECIES

(1) DENOTES PELTANDRA VIRGINICA

(2) DENOTES PONTEDERIA CORDATA

1 / WM 7 / WM 9 — TYPICAL LOW MARSH PLANTING LAYOUT FOR ZONE 1

(ELEV. 1.0 TO 1.4)
NOT TO SCALE



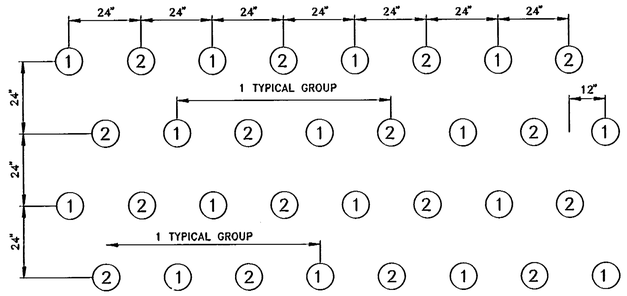
PLANT EMERGENT PLANTS IN EVEN-ALTERNATING ROWS 24" O.C. AS SHOWN
PLANT EACH ROW IN GROUPS OF 2 PLANTS WITH 1 EACH OF THE 2 SPECIES

(1) DENOTES SCIRPUS PUNGENS

(2) DENOTES SCIRPUS VALIDUS

2 / WM 7 / WM 9 — TYPICAL LOW MARSH PLANTING LAYOUT FOR ZONE 2

(ELEV. 1.4 TO 1.7)
NOT TO SCALE



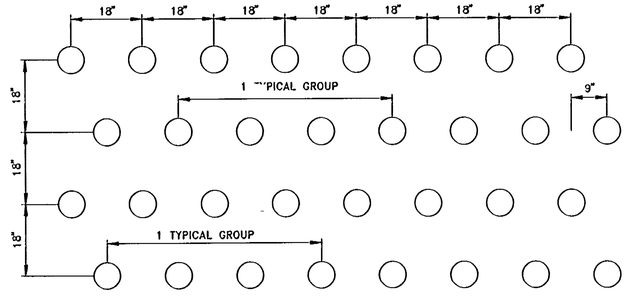
PLANT EMERGENT PLANTS IN EVEN-ALTERNATING ROWS 24" O.C. AS SHOWN
PLANT EACH ROW IN GROUPS OF 2 PLANTS WITH 1 EACH OF THE 2 SPECIES

(1) DENOTES SCIRPUS ROBUSTUS

(2) DENOTES SCIRPUS PUNGENS

3 / WM 7 / WM 9 — TYPICAL LOW MARSH PLANTING LAYOUT FOR ZONE 3

(ELEV. 1.7 TO 1.9)
NOT TO SCALE



PLANT EMERGENT PLANTS IN ROWS 18" O.C. AS SHOWN

◯ DENOTES PANICUM VIRGATUM

4 / WM 7 / WM 9 — TYPICAL HIGH MARSH PLANTING LAYOUT

(ELEV. 1.9 TO 2.4)
NOT TO SCALE

AS-BUILTS

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KEY:

DETAIL NUMBER — X / WM X / WM X — DETAILS AND SECTIONS

SHEET DETAIL REFERENCED FROM

SHEET DETAIL SHOWN ON

URS Greiner CONSULTING ENGINEERING AND PLANNING TIMONIUM, MARYLAND	DESIGNED CPK	MARTIN STATE AIRPORT	MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION OFFICE OF PLANNING AND ENGINEERING
	DRAWN JDD		PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I
	CHECKED		SHEET TITLE: WETLAND MITIGATION PLANTING DETAILS
	APPROVED		SCALE: AS SHOWN — DATE: APRIL, 1998

REVISION NO.	REVISION DATE	DESCRIPTION
2	4/23/98	ADDENDUM 2 - NEW SHEET ADDED

CONTRACT NO. MAA-AE-96-001

SHEET NO. WM-9

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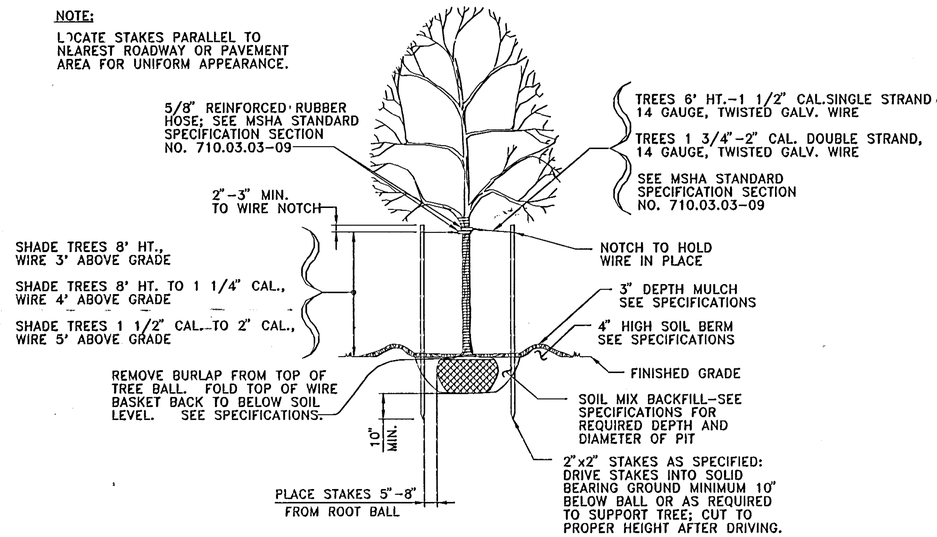
SEED SCHEDULE

ALL DISTURBED AREAS ABOVE ELEVATION 2.4 EXCEPT AREAS OF STONE SHALL BE SEEDED AS FOLLOWS: (1.39 ACRES)

BOTANICAL NAME	COMMON NAME	LBS\ACRE	% OF MIX	QUANTITY	REMARKS
AGROSTIS ALBA PANICUM VIRGATUM	RED TOP SWITCHGRASS	2.2 10.0	40% 60%	3 lbs 14 lbs	PURE LIVE SEED
	WETLAND SEED MIX	12.2	100%	17 lbs	TOTALS

PLANT SCHEDULE

KEY	QUAN.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	SPACING	REMARKS
UPLAND TREE AND SHRUB PLANTINGS							
AA	30	ARONIA ARBUTIFOLIA	RED CHOKEBERRY	3 GALLON	CONTAINER GROWN	5' O.C.	
AC	65	AMELANCHIER CANADENSIS	SERVICEBERRY	5 GALLON	CONTAINER GROWN	8' O.C.	
CO	50	CEPHALANTHUS ACCIDENTALIS	BUTTONBUSH	3 GALLON	CONTAINER GROWN	5' O.C.	
IG	35	ILEX GLABRA	INKBERRY	3 GALLON	CONTAINER GROWN	5' O.C.	
LB	25	LINDERA BENZOIN	SPICEBUSH	3 GALLON	CONTAINER GROWN	5' O.C.	
MP	65	MYRICA PENSYLVANICA	BAYBERRY	2 GALLON	CONTAINER GROWN	5' O.C.	
QB	14	QUERCUS BOREALIS	NORTHERN RED OAK	2-2 1/2" CAL.	B & B	35' O.C.	SPRING PLANTING
RA	100	RHUS AROMATICA	FRAGRANT SUMAC	2 GALLON	CONTAINER GROWN	5' O.C.	
VP	60	VIBURNUM PRUNIFOLIUM	BLACKHAW	5 GALLON	CONTAINER GROWN	8' O.C.	
VD	35	VIBURNUM DENTATUM	ARROWWOOD	3 GALLON	CONTAINER GROWN	5' O.C.	
HIGH AND LOW MARSH PLANTINGS							
	9800	PANICUM VIRGATUM	SWITCHGRASS	1-3/4" PEAT POT	CONTAINER GROWN	18" O.C.	
	4450	PELTANDRA VIRGINICA	ARROW ARUM	1 QUART POT	CONTAINER GROWN	24" O.C.	
	4450	PONTEDERIA CORDATA	PICKEREL	1 QUART POT	CONTAINER GROWN	24" O.C.	
	4550	SCIRPUS PUNGENS	COMMON THREESQUARE	1 QUART POT	CONTAINER GROWN	24" O.C.	
	2000	SCIRPUS ROBUSTUS	SALT MARSH BULRUSH	1 QUART POT	CONTAINER GROWN	24" O.C.	
	2550	SCIRPUS VALIDUS	SOFTSTEM BULRUSH	1 QUART POT	CONTAINER GROWN	24" O.C.	



1 / WM 7 / WM 10 — LARGE TREE PLANTING AND GUYING DETAIL

NOT TO SCALE
FOR DECIDUOUS AND EVERGREEN TREES

AS-BUILTS

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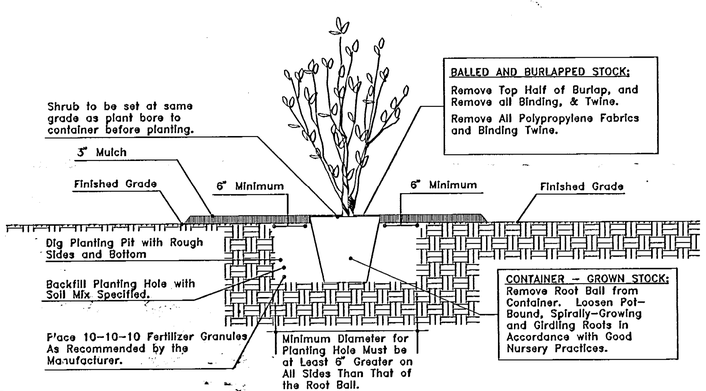
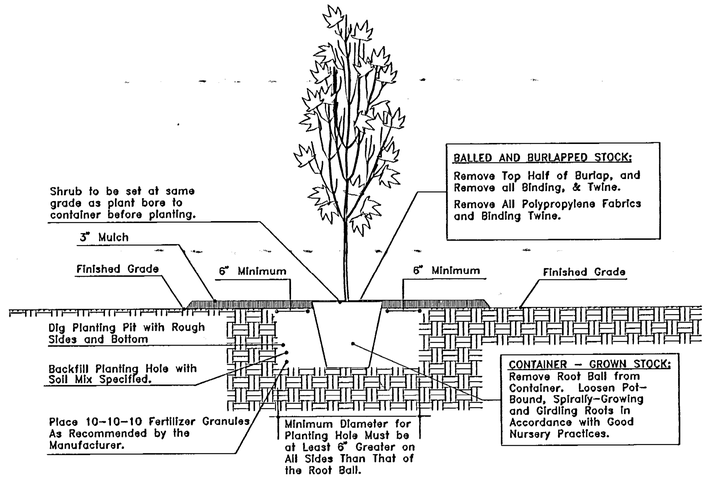


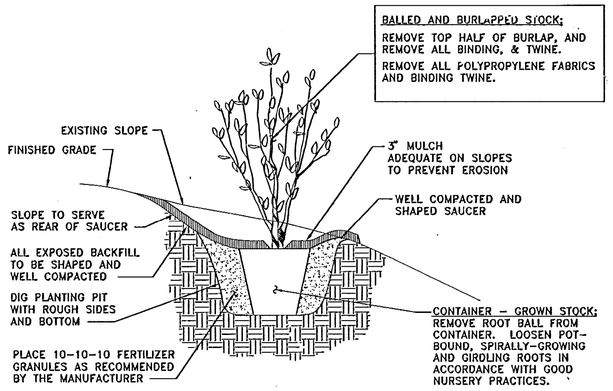
2 / WM 7 / WM 10 — PLANTING DETAIL -- DECIDUOUS AND EVERGREEN SHRUBS

NOT TO SCALE



3 / WM 7 / WM 10 — PLANTING DETAIL -- SMALL DECIDUOUS AND EVERGREEN TREES

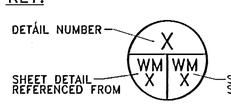
NOT TO SCALE



4 / WM 7 / WM 10 — PLANTING DETAIL -- SHRUB PLANTING ON SLOPE

NOT TO SCALE

KEY:



URS Greiner CONSULTING ENGINEERING AND PLANNING TIMONIUM, MARYLAND	DESIGNED CPK DRAWN JDD CHECKED APPROVED		REVISION NO.	REVISION DATE	DESCRIPTION	MARTIN STATE AIRPORT MARYLAND DEPARTMENT OF TRANSPORTATION MARYLAND AVIATION ADMINISTRATION OFFICE OF PLANNING AND ENGINEERING	PROJECT TITLE: MIDFIELD TERMINAL COMPLEX SITE DEVELOPMENT PHASE I SHEET TITLE: WETLAND MITIGATION PLANTING DETAILS AND SCHEDULES SCALE: AS SHOWN DATE: APRIL, 1998	CONTRACT NO.: MAA-AE-96-001 SHEET NO.: WM-10
			2	4/23/98	ADDENDUM 2 - NEW SHEET ADDED			

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APPENDIX F—OTHER HISTORICAL RECORDS

TECHNOLOGY

Liquid Metal Loop Gets Under Way

Martin will collect engineering data on molten lithium at high temperatures for help in designing nuclear reactors for space

Martin Co.'s nuclear division is putting the finishing touches on a new facility near Baltimore, Md., for getting engineering data on liquid metal coolants for reactors. Molten lithium above 1800 F. will be the first liquid metal studied. The company is seeking data on corrosion, mass transfer, heat transfer, fluid flow, and purification techniques, as well as other information needed in high temperature liquid metal coolant systems.

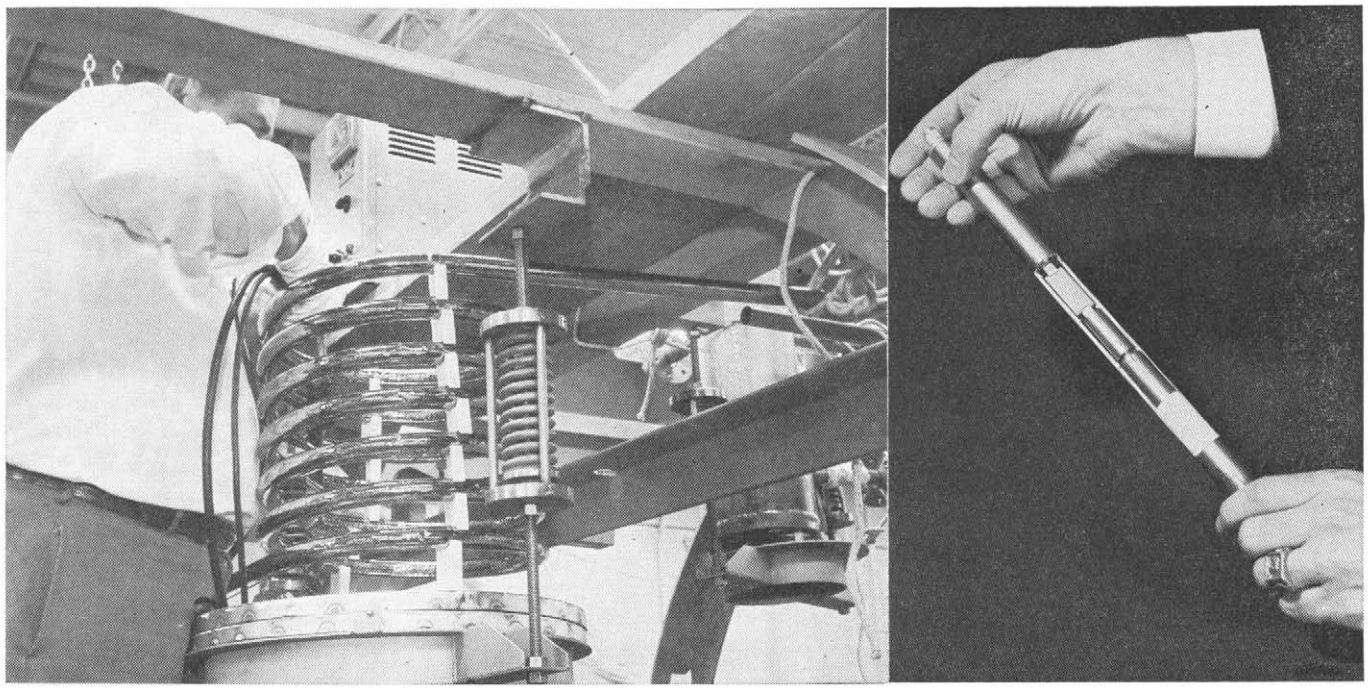
The work is part of a three-pronged research and development program for direct conversion nuclear reactors for use in space. The other two approaches involve experimental investigations on thermionic conversion of heat directly to electricity, and preparation of conceptual engineering designs of thermionic reactor systems.

While a great deal of information has been collected on such liquid metal systems as molten sodium or NaK at temperatures of around 1400 F., little is available at the higher temperatures Martin is investigating, or on lithium.

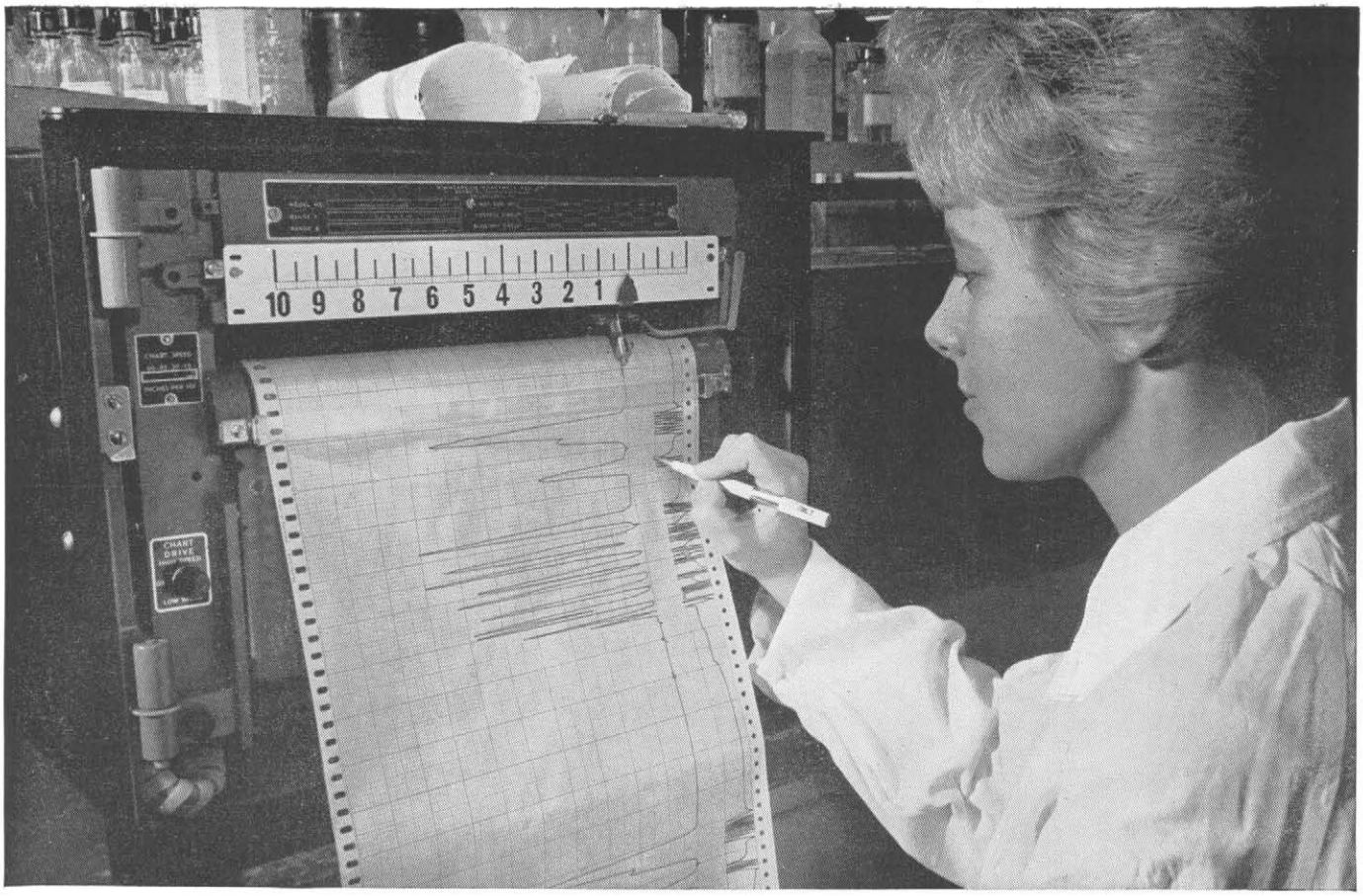
Heart of the facility is a large, 1-in. diameter, forced convection loop of niobium alloy. Liquid metal will circulate through the various pumps, heat exchangers, and other components of the loop, while numerous thermocouples give the data needed for determining heat transfer rates under various conditions. Containing the hot, reactive lithium is a tough engineering problem. Also, the niobium picks up nitrogen and oxygen from the air under certain conditions.

To keep air away, the loop is placed in a horizontal, cylindrical environmental chamber 19 ft. long and 7 ft. in diameter. The chamber can be evacuated to about 10^{-3} mm. Hg, or it can be filled with an inert gas—argon—at 1 atm. Evacuations are alternated with refilling with argon several times to ensure that the trace of residual gases left in the evacuated chamber is chiefly argon, and the quantity of oxygen and nitrogen present is extremely low. For ease of maintenance and modification, the loop is mounted within a framework which can be rolled out of the chamber, and moved about on a wheeled stand.

Niobium alloy has good corrosion and creep resistance qualities. It is, however, expensive—nearly $100 per foot for 1-in. o.d. tubing with 4-mil wall thickness. And it's difficult to weld in such a way that welds will resist liquid metal corrosion. Physical specifications for a material with such a relatively small volume of sales are much less detailed than those for a big volume material such as stainless steel. A small defect in an ingot shows up as a weak spot or hole when it is rolled into a thin sheet.



NIOBIUM LOOP. Technician assembles heat exchanger which is part of the 1-in. diameter niobium tubing test loop. Nickel foil is used for reflective insulation. Data are for design of a nuclear reactor with elements of the type at the right. Each element contains a thermionic generator for converting heat directly to electricity



NEW HONEYWELL CHROMATOGRAPHY RECORDER

The new Honeywell Chromatography Recorder offers true versatility in a quality recorder. Specifically designed to meet demanding chromatography needs, the new unit provides the high impedance, high gain, and high stray rejection required for all available detection methods.

Here are the operating and service features that make the new chromatography recorder the ultimate in reliable instrumentation:

- **high impedance**—up to 25,000 ohm source
- **high gain, high torque servo drive**—one second pen speed, spans from one to 100 millivolts
- **high stray rejection**—transverse 5000:1 (5 times span); longitudinal 10,000,000:1 (10V ac); d-c longitudinal 12,000,000:1 (12V dc)
- **true modular design**—amplifier, constant voltage unit, measuring circuit contained in separate modules for maximum flexibility and ease of servicing

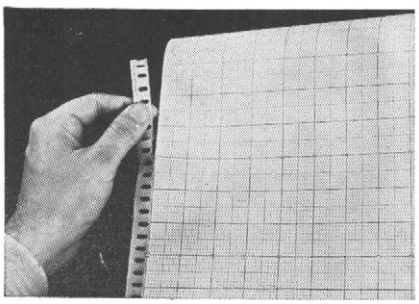


Chart paper for the new Honeywell Chromatography Recorder is available with special easy-tear edge perforations to facilitate trimming of laboratory chart records to fit standard 8½" x 11" report format.

- **quick-change range cards**—have integral zero and span adjustments; cards interchangeable after initial calibration
- **Zener diode constant voltage standardizing**—eliminates batteries, standard cells, and standardization mechanisms
- **all-new remote reservoir capillary pen**
- **adaptable for auxiliary devices**—integrators, alarm switches, retransmitting slidewires, digital encoder, etc.
- **flush, surface, or bench-top (lab feet) mounting**
- **optional 4-speed manual shift chart drive**—base speeds from one inch per hour to one inch per second in 1:2:3:4 ratio
- **optional dual speed chart drive mechanism** — reduces base speeds 6:1, 10:1, 30:1 or 60:1.

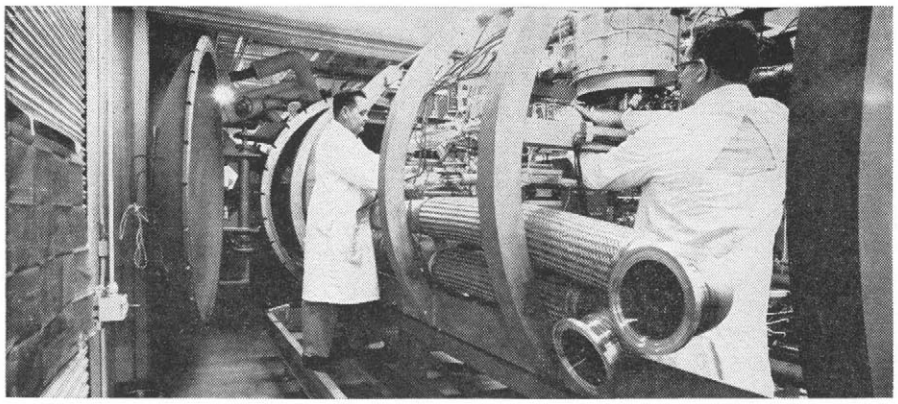
And with the new recorder goes the big plus of *Honeywell fast, expert service.* More than four hundred factory-trained service engineers are spotted strategically throughout 125 service centers in the United States and Canada. No matter where you are, you're sure of getting the service you need.

For complete details on the New Chromatography Recorder, contact your nearby Honeywell field engineer. MINNEAPOLIS-HONEYWELL, Wayne and Windrim Aves., Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario

Honeywell

First in Control

HONEYWELL INTERNATIONAL Sales and Service offices in principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, France, Japan.



METAL ENVIRONMENT. The test loop at the left is mounted on a framework which can roll on a track into the environmental chamber at the rear. The chamber can be either evacuated or filled with argon at 1 atm.

Metal Heated. Schematically, the loop is in the form of a figure 8—with an economizer at the central point, where the line crosses over itself. This heat exchanger heats up liquid metal from the first part of the loop from 1750° F. to 2050° F. as it passes through. On the return journey through the other side of the heat exchanger the stream is cooled a similar amount. The exchanger is a simple, annular type.

A radiant heater with three tantalum heating elements adds another 50° F. to the temperature of the hot leg stream.

The thermocouples used are generally of chromium and alumel. Some have stainless steel sheathing, others tantalum. However, at temperatures of 2150° F., nickel-cadmium thermocouples are used.

An electromagnetic pumping system is used. The magnetic field set up in a conducting coil wound around a pipe containing the liquid metal moves it along. The flow meter is a magnetic unit.

Lines of the loop are insulated with reflective material. An ordinary insulator, such as magnesite powder, retains gases which would gradually release, making it difficult to keep a high vacuum in the environmental chamber. Reflective insulation consists of a number of layers of nickel foil wrapped around the piping. These are separated by a nickel knitted wire. Each of the nickel foil layers tends to reflect heat back to the pipe.

Big Problem. Purification is a big problem in any liquid metals system. A continuous system must be used to eliminate impurities picked up. Lithium oxide and lithium nitride, from reactions with minute quantities of air and which somehow find their way into the system, are the most important impurities. To remove the oxide—usually present at 3000 to 4000 p.p.m. in lithium as it is purchased—part of the metal in the loop is made to flow through a cold trap. This reduces the temperature to 400° F., causing the oxide to settle out.

The argon system must also contain a purification setup. An argon blanket is used in the surge tank for the molten metal. Molecular sieves remove moisture, a hot trap removes oxygen and nitrogen.

In addition to the large facility, Martin has a number of smaller loops which it has used in screening materials of construction and determining corrosion resistance. The small loops use ¼-in. i.d. piping, and liquid metal circulates by thermal convection rather than by pumping. The cold legs run about 1000° F., and the hot ones 2100° F. A great many runs of several hundred hours have been made in loops of this type.

The ultimate aim of the liquid metal research, together with that on thermionic generators—which produce electricity directly from a diode surrounded by hot cesium vapor—is to develop fast reactors suitable for space. The main object is to cut down weight in the reactor. By using a fast, rather than a thermal neutron reactor, the need for bulky moderator is eliminated. Lithium metal is a light, efficient heat transfer medium. By placing a small thermionic generator in each fuel element, the need for boilers and other bulky equipment for conversion of heat into electricity disappears.

So far, Martin has conceptually designed a 60-kw. reactor system, a 300-kw. system, and is developing a conceptual design of a 2000-kw. system. The company expects these reactors to be very useful in the space program during 1970 to 1975.

Foxboro Adds Digital Systems

Company forms digital division, will use RCA electronic equipment on a nonexclusive basis

Foxboro has formed a new digital systems division which will design and make automation systems for industrial process control. The move gives Foxboro complete in-house capability to engineer and manufacture integrated digital and analog systems for both measurement and control.

The digital systems division will call Natick, Mass., its home. Richard W. Sonnenfeldt, formerly with Radio Corporation of America at Natick, moves next door to head Foxboro's new division.

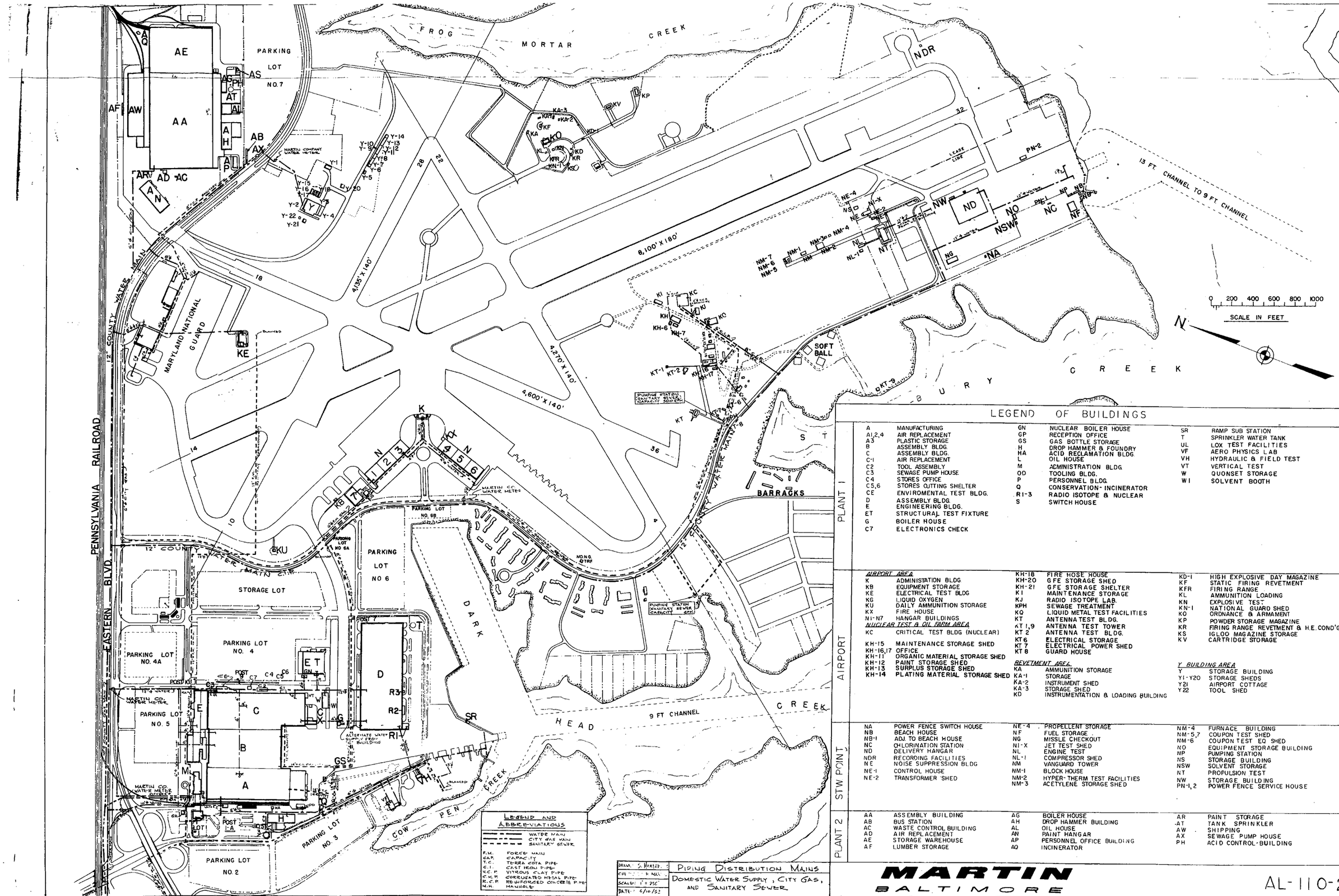
Coincidentally, RCA will provide Foxboro with some of the equipment which it will need for its new, integrated systems. Principally, Foxboro will use, on a nonexclusive basis, RCA computers made at Van Nuys, Calif., and West Palm Beach, Fla. Also included will be RCA's industrial data transmission link.

Three-Year Program. Until three years ago, Foxboro concentrated on mechanical, pneumatic, and electronic analog-type industrial instruments. Then, realizing the major role that electronic data processing could play in industrial telemetry and remote supervisory control, it formed a systems team to study specific industrial applications for digital computers and allied equipment. Out of these studies came the entry into the digital field.

The next step came last year when Foxboro bought Waugh Engineering of Van Nuys, Calif. Waugh broadened Foxboro's capabilities with such systems as fully automatic blending control.

At its Natick plant, the new division is cranking up to make input-output equipment, including analog-to-digital converters and other equipment used in the interfaces between process instruments and computers. Foxboro has already outfitted the division with experienced programers and systems project teams. Now it's training its service people to handle the completed installations.

The chemical industry has been Foxboro's best customer, responsible for about a third of its $54 million sales in 1960. But for the digital systems division, the prime target—for the moment, at least—will be the power plant field.



LEGEND OF BUILDINGS

PLANT 1

A	MANUFACTURING	GN	NUCLEAR BOILER HOUSE	SR	RAMP SUB STATION
A1,2,4	AIR REPLACEMENT	GP	RECEPTION OFFICE	T	SPRINKLER WATER TANK
A3	PLASTIC STORAGE	GS	GAS BOTTLE STORAGE	UL	LOX TEST FACILITIES
B	ASSEMBLY BLDG.	H	DROP HAMMER & FOUNDRY	VF	AERO PHYSICS LAB
C	ASSEMBLY BLDG.	HA	ACID RECLAMATION BLDG.	VH	HYDRAULIC & FIELD TEST
C-1	AIR REPLACEMENT	L	OIL HOUSE	VT	VERTICAL TEST
C2	TOOL ASSEMBLY	M	ADMINISTRATION BLDG.	W	QUONSET STORAGE
C3	SEWAGE PUMP HOUSE	OD	TOOLING BLDG.	WI	SOLVENT BOOTH
C4	STORES OFFICE	P	PERSONNEL BLDG.		
C5,6	STORES CUTTING SHELTER	Q	CONSERVATION- INCINERATOR		
CE	ENVIROMENTAL TEST BLDG.	R1-3	RADIO ISOTOPE & NUCLEAR		
D	ASSEMBLY BLDG.	S	SWITCH HOUSE		
E	ENGINEERING BLDG.				
ET	STRUCTURAL TEST FIXTURE				
G	BOILER HOUSE				
C7	ELECTRONICS CHECK				

AIRPORT

AIRPORT AREA

K	ADMINISTATION BLDG	KH-18	FIRE HOSE HOUSE	KD-1	HIGH EXPLOSIVE DAY MAGAZINE
KB	EQUIPMENT STORAGE	KH-20	G.F.E STORAGE SHED	KF	STATIC FIRING REVETMENT
KE	ELECTRICAL TEST BLDG	KH-21	G.F.E STORAGE SHELTER	KFR	FIRING RANGE
KG	LIQUID OXYGEN	KI	MAINTENANCE STORAGE	KL	AMMUNITION LOADING
KU	DAILY AMMUNITION STORAGE	KJ	RADIO ISOTOPE LAB.	KN	EXPLOSIVE TEST
KX	FIRE HOUSE	KPH	SEWAGE TREATMENT	KN-1	NATIONAL GUARD SHED
N1-N7	HANGAR BUILDINGS	KQ	LIQUID METAL TEST FACILITIES	KO	ORDNANCE & ARMAMENT

NUCLEAR TEST & OIL FARM AREA

KC	CRITICAL TEST BLDG (NUCLEAR)	KT	ANTENNA TEST BLDG.	KP	POWDER STORAGE MAGAZINE
KH-15	MAINTENANCE STORAGE SHED	KT 1,9	ANTENNA TEST TOWER	KR	FIRING RANGE REVETMENT & H.E. COND'G
KH-16,17	OFFICE	KT 2	ANTENNA TEST BLDG.	KS	IGLOO MAGAZINE STORAGE
KH-11	ORGANIC MATERIAL STORAGE SHED	KT6	ELECTRICAL STORAGE	KV	CARTRIDGE STORAGE
KH-12	PAINT STORAGE SHED	KT 7	ELECTRICAL POWER SHED		
KH-13	SURPLUS STORAGE SHED	KT 8	GUARD HOUSE		
KH-14	PLATING MATERIAL STORAGE SHED				

REVETMENT AREA

KA	AMMUNITION STORAGE		
KA-1	STORAGE		
KA-2	INSTRUMENT SHED		
KA-3	STORAGE SHED		
KD	INSTRUMENTATION & LOADING BUILDING		

Y BUILDING AREA

Y	STORAGE BUILDING
Y1-Y20	STORAGE SHEDS
Y21	AIRPORT COTTAGE
Y22	TOOL SHED

STW POINT

NA	POWER FENCE SWITCH HOUSE	NE-4	PROPELLENT STORAGE	NM-4	FURNACE BUILDING
NB	BEACH HOUSE	NF	FUEL STORAGE	NM-5,7	COUPON TEST SHED
NB-1	ADJ TO BEACH HOUSE	NG	MISSLE CHECKOUT	NM-6	COUPON TEST EQ SHED
NC	CHLORINATION STATION	NI-X	JET TEST SHED	NO	EQUIPMENT STORAGE BUILDING
ND	DELIVERY HANGAR	NL	ENGINE TEST	NP	PUMPING STATION
NDR	RECORDING FACILITIES	NL-1	COMPRESSOR SHED	NS	STORAGE BUILDING
NE	NOISE SUPPRESSION BLDG	NM	VANGUARD TOWER	NSW	SOLVENT STORAGE
NE-1	CONTROL HOUSE	NM-1	BLOCK HOUSE	NT	PROPULSION TEST
NE-2	TRANSFORMER SHED	NM-2	HYPER-THERM TEST FACILITIES	NW	STORAGE BUILDING
		NM-3	ACETYLENE STORAGE SHED	PN-1,2	POWER FENCE SERVICE HOUSE

PLANT 2

AA	ASSEMBLY BUILDING	AG	BOILER HOUSE	AR	PAINT STORAGE
AB	BUS STATION	AH	DROP HAMMER BUILDING	AT	TANK SPRINKLER
AC	WASTE CONTROL BUILDING	AL	OIL HOUSE	AW	SHIPPING
AD	AIR REPLACEMENT	AN	PAINT HANGAR	AX	SEWAGE PUMP HOUSE
AE	STORAGE WAREHOUSE	AP	PERSONEL OFFICE BUILDING	PH	ACID CONTROL-BUILDING
AF	LUMBER STORAGE	AQ	INCINERATOR		

LEGEND AND ABBREVIATIONS

WATER MAIN
CITY GAS MAIN
SANITARY SEWER

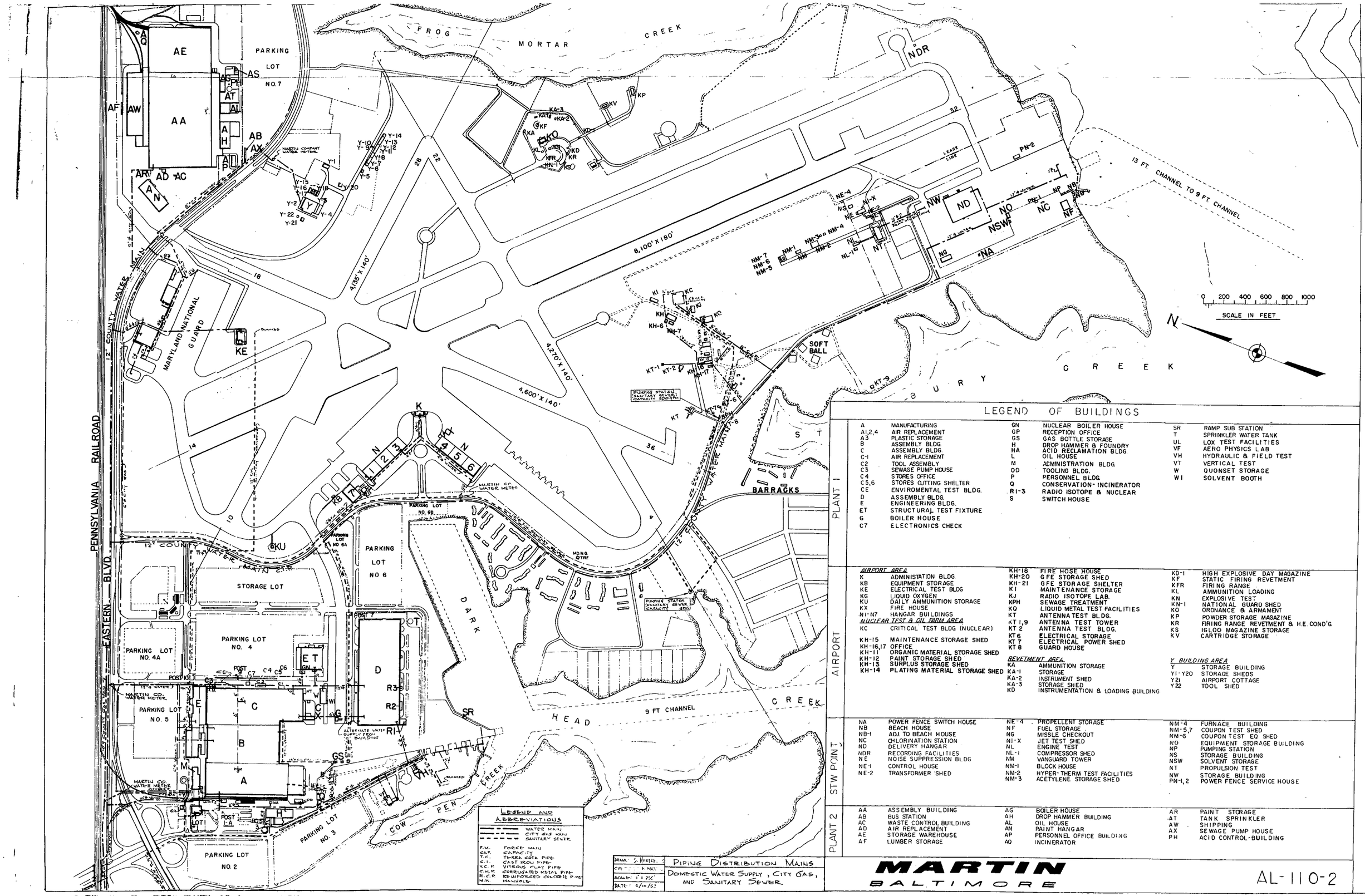
F.M.	FORCE MAIN
CAP.	CAPACITY
T.C.	TERRA COTA PIPE
C.I.	CAST IRON PIPE
V.C.P.	VITROUS CLAY PIPE
C.M.P.	CORRUGATED METAL PIPE
R.C.P.	REINFORCED CONCRETE PIPE
M.H.	MANHOLE

DRAWN: S. HARTZER
CHECKED: H. HALL
SCALE: 1" = 250'
DATE: 6/10/52

PIPING DISTRIBUTION MAINS
DOMESTIC WATER SUPPLY, CITY GAS, AND SANITARY SEWER

MARTIN
BALTIMORE

AL-110-2



LEGEND OF BUILDINGS

PLANT 1

A	MANUFACTURING	GN	NUCLEAR BOILER HOUSE	SR	RAMP SUB STATION
A1,2,4	AIR REPLACEMENT	GP	RECEPTION OFFICE	T	SPRINKLER WATER TANK
A3	PLASTIC STORAGE	GS	GAS BOTTLE STORAGE	UL	LOX TEST FACILITIES
B	ASSEMBLY BLDG.	H	DROP HAMMER & FOUNDRY	VF	AERO PHYSICS LAB
C	ASSEMBLY BLDG.	HA	ACID RECLAMATION BLDG.	VH	HYDRAULIC & FIELD TEST
C-1	AIR REPLACEMENT	L	OIL HOUSE	VT	VERTICAL TEST
C2	TOOL ASSEMBLY	M	ADMINISTRATION BLDG.	W	QUONSET STORAGE
C3	SEWAGE PUMP HOUSE	OD	TOOLING BLDG.	WI	SOLVENT BOOTH
C4	STORES OFFICE	P	PERSONNEL BLDG.		
C5,6	STORES CUTTING SHELTER	Q	CONSERVATION- INCINERATOR		
CE	ENVIROMENTAL TEST BLDG.	RI-3	RADIO ISOTOPE & NUCLEAR		
D	ASSEMBLY BLDG.	S	SWITCH HOUSE		
E	ENGINEERING BLDG.				
ET	STRUCTURAL TEST FIXTURE				
G	BOILER HOUSE				
C7	ELECTRONICS CHECK				

AIRPORT

AIRPORT AREA

K	ADMINISTATION BLDG	KH-18	FIRE HOSE HOUSE	KD-1	HIGH EXPLOSIVE DAY MAGAZINE
KB	EQUIPMENT STORAGE	KH-20	G.F.E STORAGE SHED	KF	STATIC FIRING REVETMENT
KE	ELECTRICAL TEST BLDG	KH-21	G.F.E STORAGE SHELTER	KFR	FIRING RANGE
KG	LIQUID OXYGEN	KI	MAINTENANCE STORAGE	KL	AMMUNITION LOADING
KU	DAILY AMMUNITION STORAGE	KJ	RADIO ISOTOPE LAB.	KN	EXPLOSIVE TEST
KX	FIRE HOUSE	KPH	SEWAGE TREATMENT	KN-1	NATIONAL GUARD SHED
N1-N7	HANGAR BUILDINGS	KQ	LIQUID METAL TEST FACILITIES	KO	ORDNANCE & ARMAMENT

NUCLEAR TEST & OIL FARM AREA

KC	CRITICAL TEST BLDG (NUCLEAR)	KT 1,9	ANTENNA TEST TOWER	KP	POWDER STORAGE MAGAZINE
KH-15	MAINTENANCE STORAGE SHED	KT 2	ANTENNA TEST BLDG.	KR	FIRING RANGE REVETMENT & H.E. COND'G.
KH-16,17	OFFICE	KT6	ELECTRICAL STORAGE	KS	IGLOO MAGAZINE STORAGE
KH-11	ORGANIC MATERIAL STORAGE SHED	KT 7	ELECTRICAL POWER SHED	KV	CARTRIDGE STORAGE
KH-12	PAINT STORAGE SHED	KT 8	GUARD HOUSE		
KH-13	SURPLUS STORAGE SHED				
KH-14	PLATING MATERIAL STORAGE SHED	*REVETMENT AREA*		*Y BUILDING AREA*	
		KA	AMMUNITION STORAGE	Y	STORAGE BUILDING
		KA-1	STORAGE	Y1-Y20	STORAGE SHEDS
		KA-2	INSTRUMENT SHED	Y21	AIRPORT COTTAGE
		KA-3	STORAGE SHED	Y22	TOOL SHED
		KD	INSTRUMENTATION & LOADING BUILDING		

STW POINT

NA	POWER FENCE SWITCH HOUSE	NE-4	PROPELLENT STORAGE	NM-4	FURNACE BUILDING
NB	BEACH HOUSE	NF	FUEL STORAGE	NM-5,7	COUPON TEST SHED
NB-1	ADJ. TO BEACH HOUSE	NG	MISSLE CHECKOUT	NM-6	COUPON TEST EQ SHED
NC	CHLORINATION STATION	NI-X	JET TEST SHED	NO	EQUIPMENT STORAGE BUILDING
ND	DELIVERY HANGAR	NL	ENGINE TEST	NP	PUMPING STATION
NDR	RECORDING FACILITIES	NL-1	COMPRESSOR SHED	NS	STORAGE BUILDING
NE	NOISE SUPPRESSION BLDG	NM	VANGUARD TOWER	NSW	SOLVENT STORAGE
NE-1	CONTROL HOUSE	NM-1	BLOCK HOUSE	NT	PROPULSION TEST
NE-2	TRANSFORMER SHED	NM-2	HYPER-THERM TEST FACILITIES	NW	STORAGE BUILDING
		NM-3	ACETYLENE STORAGE SHED	PN-1,2	POWER FENCE SERVICE HOUSE

PLANT 2

AA	ASSEMBLY BUILDING	AG	BOILER HOUSE	AR	PAINT STORAGE
AB	BUS STATION	AH	DROP HAMMER BUILDING	AT	TANK SPRINKLER
AC	WASTE CONTROL BUILDING	AL	OIL HOUSE	AW	SHIPPING
AD	AIR REPLACEMENT	AN	PAINT HANGAR	AX	SEWAGE PUMP HOUSE
AE	STORAGE WAREHOUSE	AP	PERSONEL OFFICE BUILDING	PH	ACID CONTROL-BUILDING
AF	LUMBER STORAGE	AQ	INCINERATOR		

LEGEND AND ABBREVIATIONS

WATER MAIN
CITY GAS MAIN
SANITARY SEWER

F.M. FORCE MAIN
CAP. CAPACITY
T.C. TERRA COTA PIPE
C.I. CAST IRON PIPE
V.C.P. VITROUS CLAY PIPE
C.M.P. CORRUGATED METAL PIPE
R.C.P. REINFORCED CONCRETE PIPE
M.H. MANHOLE

DRAWN: S. HARTER
CHK'D: H. HALL
SCALE: 1" = 250'
DATE: 6/10/62

PIPING DISTRIBUTION MAINS
DOMESTIC WATER SUPPLY, CITY GAS, AND SANITARY SEWER

MARTIN BALTIMORE

AL-110-2

APPENDIX G—PHOTOGRAPHIC LOG

Appendix G
Photographic Log

Photos Taken April 16, 2014



Stormwater detention basin at north end of REC #11 looking southwest towards Strawberry Point Road.



Former Building KJ location, looking northeast towards Taxiway F; detention basin at right.



Brick debris in REC # 11 northern end of wooded area.



Large piece of concrete in embankment along north-east side of detention basin; corporate hangar in background.



Metal girder or beam (center) and yellow foam or painted concrete (upper left).



18-inch diameter concrete pipe partially buried in REC #11 northern end of wooded area; water from drainage channel in foreground.



Aged, discarded 18-inch diameter concrete pipe near treeline at northern end of REC #11 wooded area.



EM-61 Operating in grassy field area northwest of Taxiway J near former location of maintenance storage buildings.

APPENDIX H—GAMMA SCREENING DOCUMENTATION

Radiological Survey Form

Survey #: 14 - MRC - 001 | Page 1 of 2

Location: Middle River/Strawberry Point | RWP# NA | Date: 4/14/14 - 4/16/14

Purpose: Perform Gamma Survey of Area of Concern for Personnel Protection during Geophysical Survey

Instrument and Probe Type	Instrument Serial #		Air Sampler Serial #	Surveyor Print / Sign
Ludlum 2221 / Ludlum 44-10	190171 / PR150784	1	NA	A Stanford /
NA	NA	2	NA	NA
NA	NA	3	NA	NA
NA	NA	4	NA	NA
NA	NA	5	NA	NA

#	α Tranferable Contamination (dpm/100cm²)	β-γ Tranferable Contamination (dpm/100cm²)
1	NA	NA
2	NA	NA
3	NA	NA
4	NA	NA
5	NA	NA
6	NA	NA
7	NA	NA
8	NA	NA
9	NA	NA
10	NA	NA
11	NA	NA
12	NA	NA

#	Tranferable Contamination (dpm/LAW)	
1	NA	NA
2	NA	NA
3	NA	NA
4	NA	NA
5	NA	NA
6	NA	NA
7	NA	NA
8	NA	NA
9	NA	NA
10	NA	NA
11	NA	NA
12	NA	NA

ABC	Static Count (dpm/100cm²)	
A	NA	NA
B	NA	NA
C	NA	NA
D	NA	NA
E	NA	NA
F	NA	NA
G	NA	NA
H	NA	NA
I	NA	NA
J	NA	NA
K	NA	NA
L	NA	NA

Illustrations/Remarks:

Perform gamma walkover surveys to establish radiation levels for personnel performing geophysical survey in areas where research and development facilities were once located for nuclear reactor fuel elements.

Background gamma count rates were taken in a nearby shopping center which had grassy areas, ashphalt areas, and concrete areas similar to those near the airport.

- Gamma count rates were between 4200 and 5900 counts per minute.
- The average count rate was around 4500 counts per minute.

Gamma count rates were taken at one meter intervals in the area of concern.

- Gamma count rates were between 3856 and 5752 counts per minute in all areas.
- The average count rate was around 4700 counts per minute.

A map is attached showing the Area of Concern and buildings with radiological history.

There were no areas where readings exceeded levels where an individual could receive more than 25 mrem/yr (millirem per year), which is the federal limit for maximum annual radiation exposure to a member of the public.

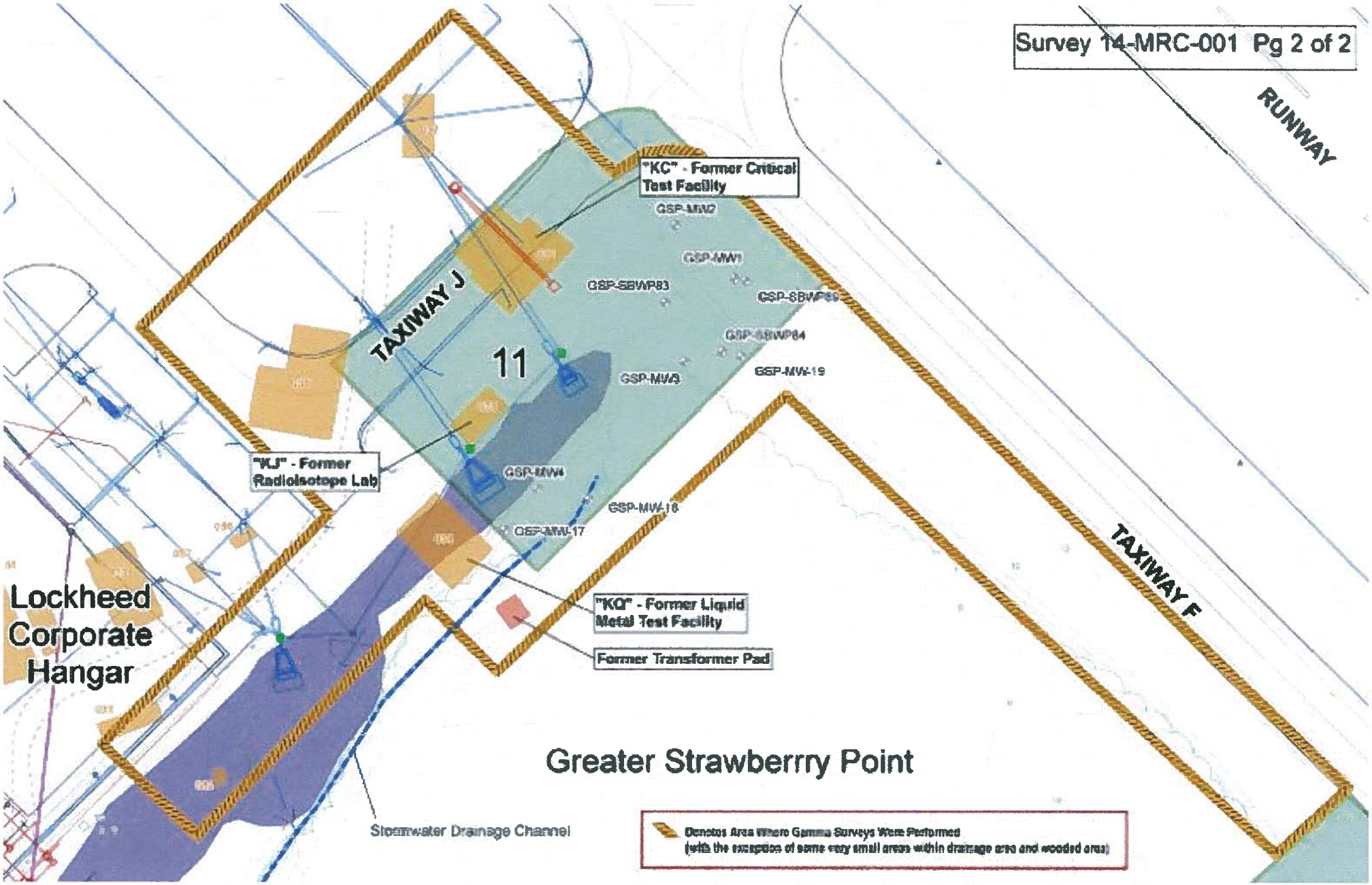
Legend ND= No detectable activity above background

(#) = 100cm² wipe | SOP = Step Off Pad | Dose Rates in mrem/hr@30cm (unless otherwise noted)

(#) = LAW | AS-# = Air Sample | GA=General Area | SD=Skin Dose (30cm) | Dβ=mrad/hr

ABC = Static Count | ⬠ = Soil Sample (Results Attached) | CT=Contact(2.5cm) | ED=Extremity Dose (5cm)

Reviewed by: **Lawson Bailey** / Lawson Bailey Date: **4/23/14**


Survey 14-MRC-001 Pg 2 of 2
RUNWAY
"KC" - Former Critical Test Facility
GSP-MW2
GSP-MW1
GSP-SBWP83
GSP-SBWP85
GSP-SBWP84
GSP-MW3
GSP-MW-19
TAXIWAY J
11
"KJ" - Former Radioisotope Lab
GSP-MW4
GSP-MW-18
GSP-MW-17
TAXIWAY F
Lockheed Corporate Hangar
"KQ" - Former Liquid Metal Test Facility
Former Transformer Pad
Greater Strawberrry Point
Stormwater Drainage Channel
Denotes Area Where Gamma Surveys Were Performed
(with the exception of some very small areas within drainage area and wooded area)

STRAWBERRY POINT GEOPHYSICAL SURVEY SUPPORT SURVEYS

CHI SQUARE for 2221 #190171 with 44-10 #PR150784

	Gross Count	Net Count	(Count-Mean)	(Count-Mean)^2
1	878643	873001	19.3	372.49
2	879785	874143	1161.3	1348617.69
3	878679	873037	55.3	3058.09
4	876726	871084	-1897.7	3601265.29
5	878967	873325	343.3	117854.89
6	875562	869920	-3061.7	9374006.89
7	879993	874351	1369.3	1874982.49
8	877576	871934	-1047.7	1097675.29
9	878880	873238	256.3	65689.69
10	881426	875784	2802.3	7852885.29
Sum	8786237	8729817		25336408.10
Mean	872981.7		Chi-Squared*=	29.02
Bkgd	5642			

*Chi-Squared value must fall between 10.12 and 30.14

Sigma	1677.84
2 Sigma	3355.69
3 Sigma	5033.53
Plus 2S	876337.39
Plus 3S	878015.23
Minus 2S	869626.01
Minus 3S	867948.17

Instrument Calibration Due
4/3/2015
(Certificate of Calibration Attached)

SOURCE CHECKS for 2221 # 190171 w/ 44-10 # PR150784

Day	Date	Gamma	Mean	Plus 2	Plus 3	Minus 2	Minus 3	P/F
1	4/14/14	876898	872981.7	876337.39	878015.23	869626.01	867948.17	P
2	4/15/14	NA	NA	NA	NA	NA	NA	NA
3	4/16/14	877132	872981.7	876337.39	878015.23	869626.01	867948.17	P

Certificate of Calibration

Calibration and Voltage Plateau

Environmental Restoration Group, Inc.
8809 Washington St NE, Suite 150
Albuquerque, NM 87113
(505) 298-4224
www.ERGoffice.com

Meter:	Manufacturer:	Ludlum	Model Number:	2221r	Serial Number:	190171
Detector:	Manufacturer:	Ludlum	Model Number:	44-10	Serial Number:	PR150784

- [x] Mechanical Check
- [x] F/S Response Check
- [x] Geotropism
- [x] Meter Zeroed
- [x] THR/WIN Operation
- [x] Reset Check
- [x] Audio Check
- [x] Battery Check (Min 4.4 VDC)

HV Check (+/- 2.5%): [x] 500 V [x] 1000 V [x] 1500 V

Cable Length: [ ] 39-inch [x] 72-inch [ ] Other:

Source Distance: [ ] Contact [x] 6 inches [ ] Other:

Source Geometry: [x] Side [ ] Below [ ] Other:

Threshold: 10 mV

Window:

Barometric Pressure: 24.36 inches Hg

Temperature: 76 °F

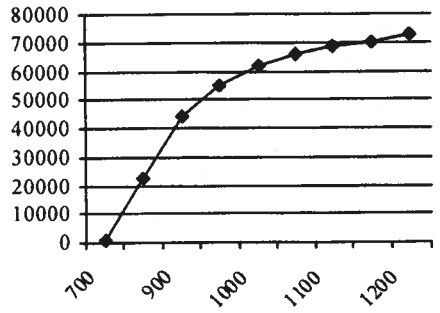
Relative Humidity: 20 %

Instrument found within tolerance: [x] Yes [ ] No

Range/Multiplier	Reference Setting	"As Found Reading"	Meter Reading	Integrated 1-Min. Count	Log Scale Count
x 1000	400	400	400	400520	400
x 1000	100	100	100		100
x 100	40	400	400	40011	400
x 100	10	100	100		100
x 10	4	400	400	4002	400
x 10	1	100	100		100
x 1	400	400	400	400	400
x 1	100	100	100		100

High Voltage	Source Counts	Background
700	617	
800	22332	
900	44120	
950	55023	
1000	61945	
1050	66016	
1100	68581	
1150	70000	10912
1200	72379	

Voltage Plateau



Comments: HV Plateau Scaler Count Time = 1-min. Recommended HV = 1150

Reference Instruments and/or Sources:

Ludlum pulser serial number: [ ] 97743 [x] 201932

Fluke multimeter serial number: [ ] 8749012

[ ] Alpha Source: Th-230 @ 12,800 dpm (1/4/12) sn: 4098-03

[x] Gamma Source Cs-137 @ 5.2 uCi (1/4/12) sn: 4097-03

[ ] Beta Source: Tc-99 @ 17,700 dpm (1/4/12) sn: 4099-03

[ ] Other Source:

Calibrated By:

Calibration Date: 4-3-14 Calibration Due: 4-3-15

Reviewed By:

Date: 4/3/14

This calibration conforms to the requirements and acceptable calibration conditions of ANSI N323A - 1997.

APPENDIX I—GEOPHYSICAL INVESTIGATION REPORT

Final Report
Geophysical Survey – Metallic Target Detection/Delineation
~ 4-Acre Area – REC 11, Greater Strawberry Point
Middle River Complex
Middle River, MD
Enviroscan Reference Number 031443

Prepared For: Tetra Tech NUS, Inc.
Prepared By: Enviroscan, Inc.
June 24, 2014

1051 Columbia Avenue ● Lancaster, PA 17603 ● 717.396.8922 ● Fax 717.396.8746 ● email@enviroscan.com ● www.enviroscan.com

June 24, 2014

Ms. Amy McGivney
Tetra Tech NUS, Inc.
20251 Century Boulevard
Suite 200
Germantown, MD 20874-7114

RE: Geophysical Survey – Metallic Target Detection/Delineation
~ 4-Acre Area – REC 11, Greater Strawberry Point
Middle River Complex
Middle River, MD
Enviroscan Reference Number 031443

Dear Ms. McGivney:

Pursuant to your request, Enviroscan, Inc. (Enviroscan) has completed a geophysical survey of the above-referenced site. The survey consisted of a reconnaissance-level electromagnetic (EM) survey. The methods and results of the survey are described below.

Survey Purpose and Site Description

The primary purpose of the survey was to determine whether there is evidence of buried metallic debris (e.g. tanks, drums, building foundations, etc.) beneath a 4-acre client-designated area centered on the REC 11 Area.

Survey Methods

In order to provide detection of large subsurface metallic targets, while minimizing interference from surficial debris and structures, Enviroscan performed an electromagnetic (EM) survey using a Geonics, Ltd. EM-61 MK2 instrument. Ground penetrating radar (GPR) was then utilized to further characterize targets identified with the EM-61 MK2. The principles of each technique are described below.

EM-61 MK2

The EM-61 MK2 uses a one-meter by ½-meter coil to transmit 150 electromagnetic pulses per second into the ground at each measurement station. During the off-time between transmitted pulses, a receiver coil measures the decay of transient electrical currents induced by the transmitted pulses. The decay is characterized by recording the strength of the transient electrical currents (in milliVolts) at four different delays or time gates following shut-off of the applied field. Electrical currents in moderately conductive earth materials (e.g. electrolytic soils) dissipate rapidly, leaving the more prolonged currents due to buried metallic objects. The EM-61 MK2 measures the surficial electrical potential due to the prolonged subsurface currents, providing a digital read-out of the relative metallic content of the subsurface.

To complete the EM-61 MK2 survey, a system of profiles (at approximately 5-foot intervals) was surveyed by towing the EM-61 MK2 with a low metallic profile Yamaha Rhino UTV. Data were collected at a rate of eight readings per second (for an average station spacing of approximately one foot). Location control was maintained using a Topcon GMS-110 global positioning system (GPS) receiver. The GPS positions were collected with real-time differential correction, using the corrections from a coastguard beacon in Annapolis, MD. The resulting differential GPS (DGPS) positions have an accuracy of better than two feet. GPS and EM data were fed simultaneously to a Juniper System Allegro data logger running Trackmaker 61 software by Geomar, Inc. This software allows display of the data coverage in real time to ensure complete site coverage.

The EM-61 MK2 records four measurements spaced by time (time gates) after the initial transmit pulse. Gate 1 reads responses from metal targets of all depth and size within the range and sensitivity of the instrument. Gate 2 filters out the smallest targets. Gates 3 and 4 read responses from large targets, with Gate 4 showing the least interference from smaller targets. The purpose of this survey was to detect and delineate possible individual buried metallic targets of a size comparable to drums and USTs; therefore, Gate 3 was selected for the best display of possible targets of interest. Results of the EM-61 MK2 survey are depicted as contours of the individual EM-61 MK2 station measurements in millivolts on Figure 1. The color contours depicted in Figure 1 show increasing metallic response from green to yellow to orange to red to pink colors.

TW-6

In order to re-acquire the location of identified metallic anomalies detected in the EM-61 MK2 survey, Enviroscan employed a GPS and a Fisher TW-6 pipe and cable locator and tracer. In pipe and cable search mode, the TW-6 is essentially a deep-sensing metal detector that detects any highly electrically conductive materials (e.g. metals) by creating an electromagnetic field with a transmitting coil. A receiving coil at a fixed separation from the transmitter measures the field strength. As the instrument is swept along the ground surface, subsurface metallic bodies distort the transmitted field. The change in field strength/orientation is sensed by the receiver, setting off an audible alarm and/or causing deflection of an analog meter. The TW-6 can nominally detect a 2-inch metal pipe to a depth of 8 feet and a 10-inch metal pipe to a depth of 14 feet.

Ground Penetrating Radar Survey

Anomalies in the EM-61 MK2 data that indicated the presence of subsurface metallic objects indicative of building debris, USTs, or drums (see Figure 1) were re-located using DGPS and the TW-6, and then scanned with GPR to identify any high-amplitude parabolic reflections of the type indicative of intact tanks, utilities, or buried debris. GPR systems produce cross-sectional images of subsurface features and layers by continuously emitting pulses of radar-frequency energy from a scanning antenna as it is towed along a survey profile. The radar pulses are reflected by interfaces between materials with differing dielectric properties. The reflections return to the antenna and are displayed on a color monitor as a continuous cross section in real time. Since the electrical properties of metal are distinctly different from soil and backfill materials, metallic pipes and other structures produce dramatic and characteristic reflections. Fiberglass, plastic, concrete, and terra-cotta pipes and structures also produce recognizable, but less dramatic, reflections.

Enviroscan performed GPR scanning of the survey area using a GSSI UtilityScan DF GPR controller, along with a dual frequency 800/300 MHz scanning antenna. During data collection, the GPR images were inspected in real-time for any GPR reflections that are characteristic of metallic USTs such as high-amplitude parabolic reflections. Anomalies identified in the field were marked with semi-permanent marking paint and flags. The EM anomalies further investigated with GPR are depicted in Figure 1 overlain on the EM-61 MK2 data as blue- and purple-outlined rectangles/ovals. Blue rectangles/ovals indicate that GPR images of the target anomalies showed no characteristic shapes matching those expected for USTs, drums, or building remnants. These EM anomalies were noted as scattered metallic debris. Purple rectangles/ovals indicate that the GPR images show some characteristic shapes matching those expected for USTs, drums, or building remnants.

Results

The EM survey results are depicted in Figure 1, showing the Channel 3 EM-61 MK2 results in millivolts from this survey. The wooded area to the south of Taxiway Foxtrot and east of the Black and Decker Hanger (see Building labeled "8", Figure 1) could not be surveyed due to poor GPS reception and underbrush. The fenced and paved area directly east of the Black and Decker Hanger (see green-hatched area, Figure 1) was scanned with TW-6 and GPR, and no anomalies were found.

The EM survey shows numerous small low- to moderate-amplitude and several large varying-amplitude EM anomalies. Enviroscan identified 18 anomalous areas with the possibility of containing remnant building structures, USTs, or drums. Of the remaining small low- to moderate-amplitude anomalies, Enviroscan randomly chose 10 of them for relocation and GPR scanning. The resulting scans of these smaller anomalies showed all of them to be small pieces of metal comparable in size to a one-gallon paint can or smaller.

All 18 of the larger anomalous areas were further scanned with GPR. Each area was scanned multiple times in a variety of directions to insure that the source objects were fully imaged. The GPR scan of 14 of the anomalies showed no characteristic shapes matching those expected for USTs, drums, or building remnants (see blue polygons, Figure 1). These EM anomalies were noted as scattered metallic debris. In several cases the GPR images revealed that larger/higher response EM anomalies within these debris areas were caused by buried pipe remnants (see "Pipe" label, Figure 1). The remaining four areas had one or more GPR/EM characteristics that mark them as possible remnant buildings or drums. No EM anomalies showed GPR images characteristic of USTs.

Anomaly of Interest 1 shows no GPR images consistent with drums or remnant structures; however, further review of the EM-61 MK2 data shows a clear linear anomaly, not associated with a utility, located on the outer edges of the area, indicating a possible remnant wall (see black dash dot line, Figure 1).

Anomaly of Interest 2, depicted in Figure 2, was scanned with GPR and the images revealed a long high-amplitude parabolic anomaly that could result from buried drums. Please note the location of this anomaly is between the storm water retention pond and a drainage swale to the southeast, which are known to be connected further south by a culvert. The high amplitude response portion of the anomaly, see pink shaded area, is noticeably linear in the northwest to southeast direction. Anomaly of Interest 2 could be a large-diameter drain pipe or the remnants of one.

GPR scanning of Anomaly of Interest 3 showed images consistent with possible buried drums in a 6-foot by 6-foot area. The images of these scans are shown in Figure 2. The left most radargram is across the short access of the GPR anomalies imaged within the EM Anomaly of Interest 3. Two parabolic reflections are visible in this scan, labeled 1 and 2, both have a rounded shape. The right most radargram is across long axis of GPR Anomaly 1, perpendicular to previous direction. This radargram reveals a longer, flat, tilted surface, indicative of a box like shape in the long axis. These two scans together indicate that Parabolic Anomaly 2 has a cylindrical shape that is approximately 2 feet by 4 feet. GPR Anomaly 1 has similar characteristics

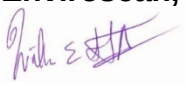
GPR scanning of Anomaly of Interest 4 delineated several objects consistent with buried construction/demolition debris. All four Anomalies of Interest should be further investigated to discover the source material for the EM and GPR anomalies.

Limitations

The geophysical survey described above was completed using standard and/or routinely accepted practices of the geophysical industry and equipment representing the best available technology. Enviroscan does not accept responsibility for survey limitations due to inherent technological limitations or site-specific conditions. However, we make every effort to identify and notify the client of such limitations or conditions.

As always, we have appreciated this opportunity to have worked with you. If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,
Enviroscan, Inc.



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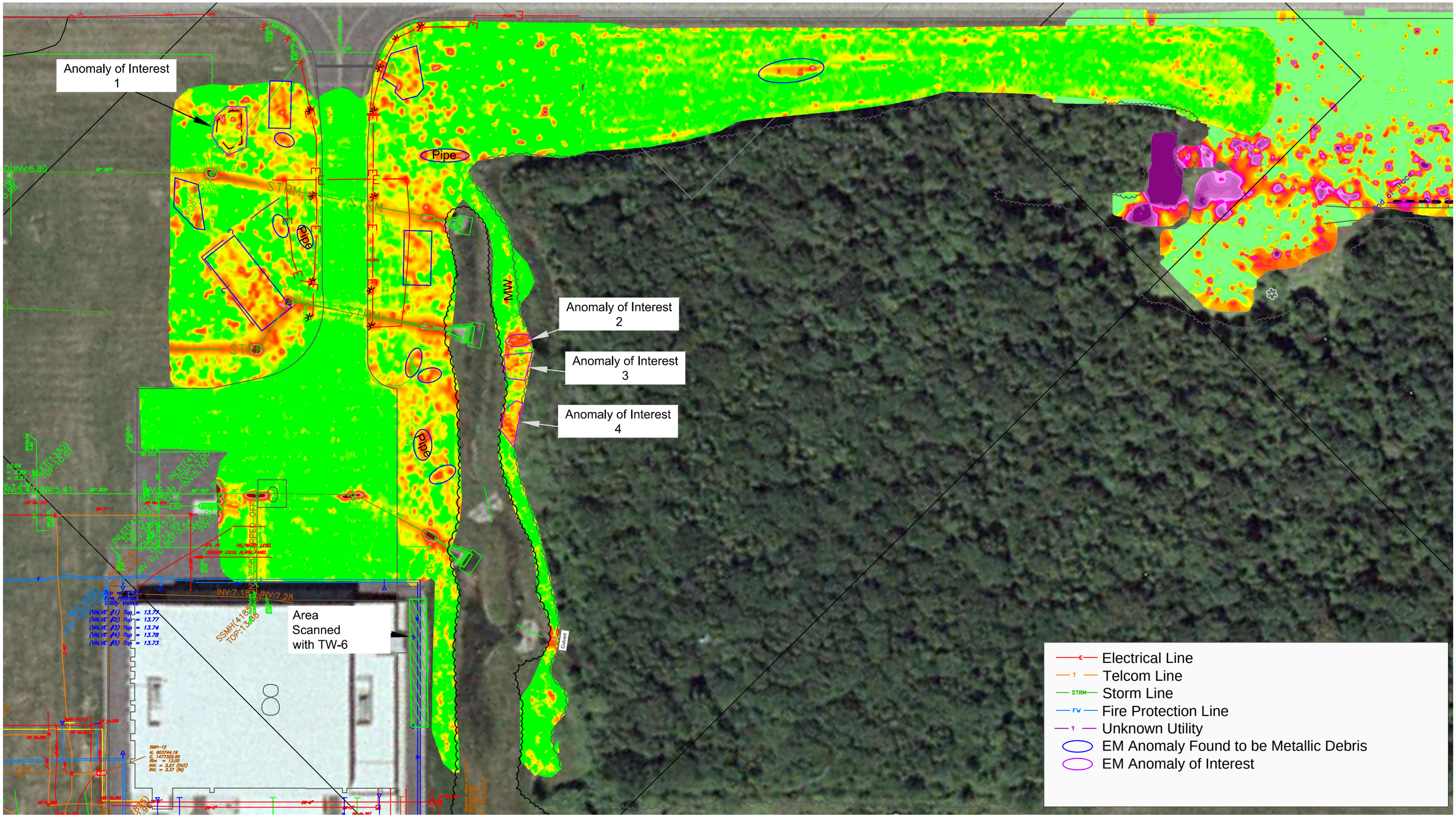
Technical Review By:
Enviroscan, Inc.



Felicia Kegel Bechtel, M.Sc., P.G.
President

enc.: Figure 1: EM-61 Survey Results
Figure 2: EM-61 Survey Results and Example GPR Profiles



The information depicted on this drawing represents survey results on the date surveyed and can only be considered to be indicative of the general conditions existing on that survey date.

Coordinates in Maryland State Plane (feet) NAD-83 Datum.

0 100′ 200′

Increasing Metallic Response (mV)

0 1 2 4 6 8 10 12 14 16 18 20 40 55 100 200 300 500 800 1200 1500 2000

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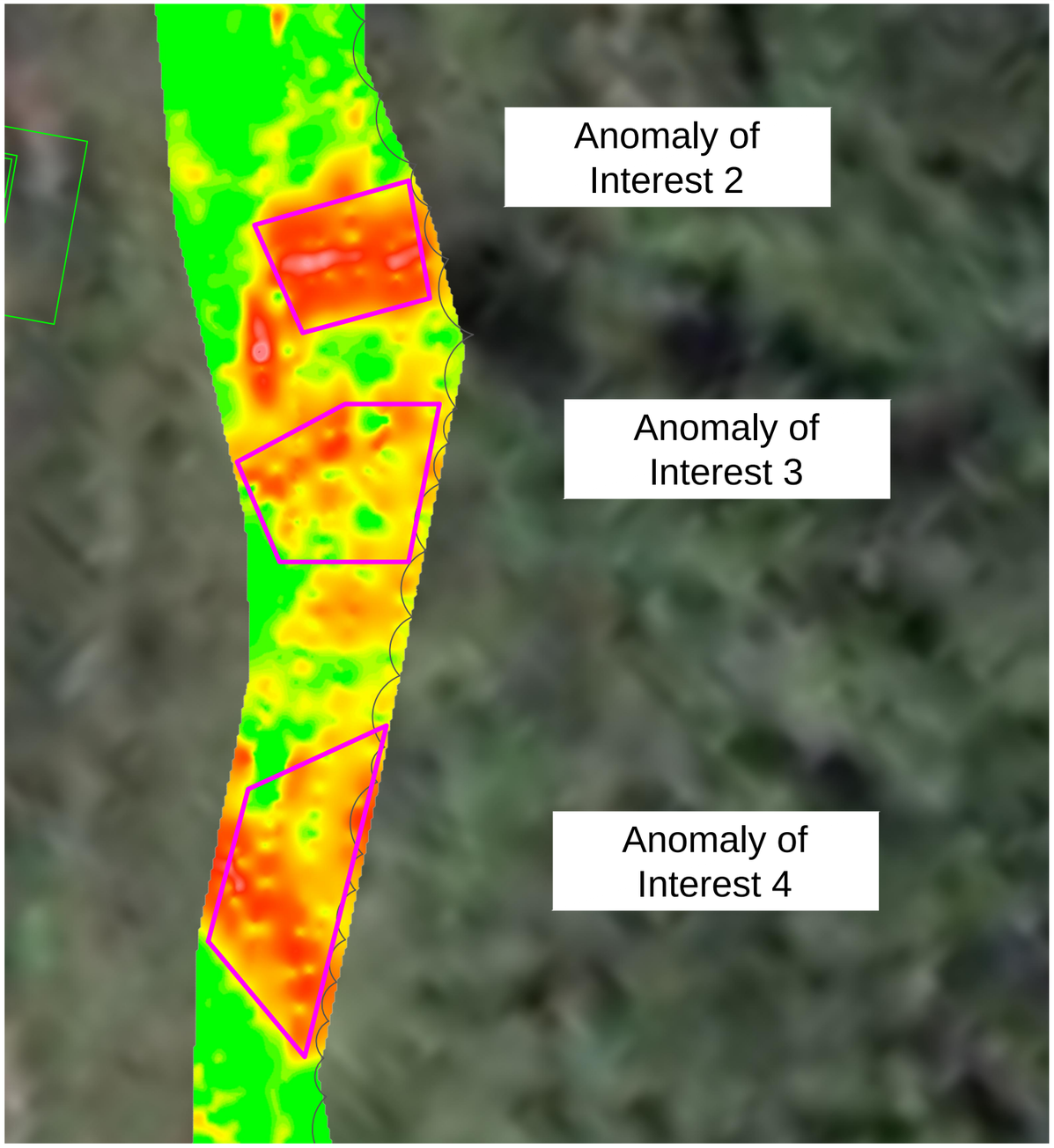
EM-61 Survey Results

Greater Strawberry Point REC 11 Survey Area

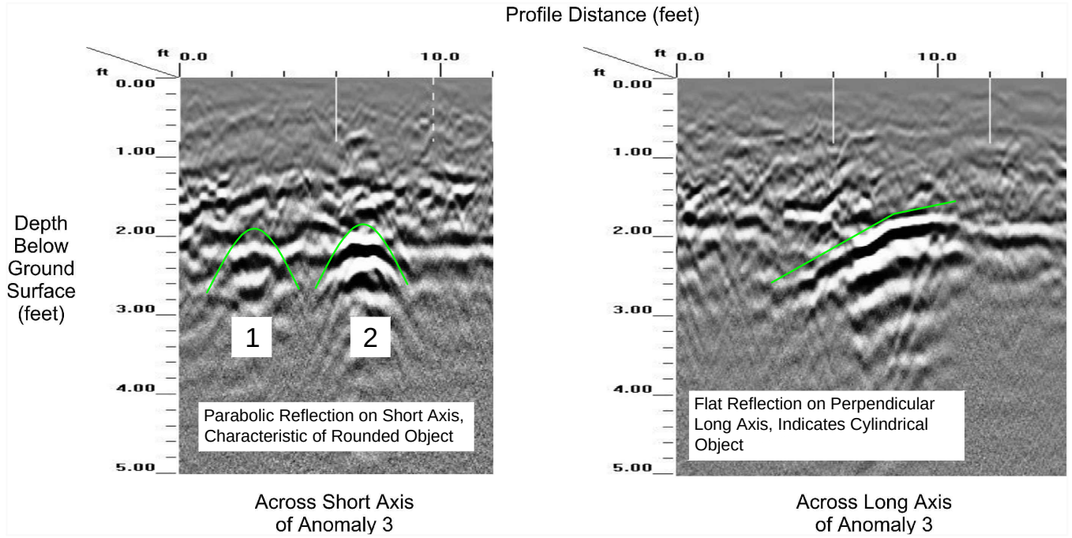
Martin State Airport Middle River, MD

Figure 1

Project Number	Survey Date	Drawn by:
031443	04/17/14	WES
Original Scale	Revision/Issue	Approved by:
1" = 100'	07/24/14	FKB



Example GPR Profiles of Anomaly of Interest 3



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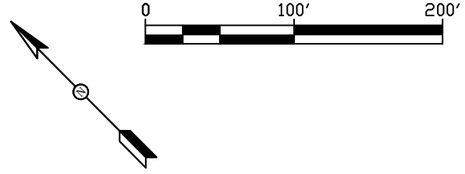
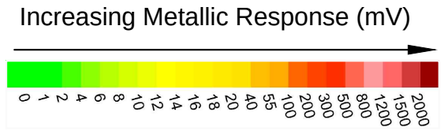
Coordinates in Maryland State Plane (feet) NAD-83 Datum.





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EM-61 Survey Results and Example GPR Profiles

Greater Strawberry Point
REC 11 Survey Area

Martin State Airport
Middle River, MD

Figure 2

Project Number	Survey Date	Drawn by:
031443	04/17/14	WES
Original Scale	Revision/Issue	Approved by:
1" = 100'	07/24/14	FKB