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**Transmittal Letter**

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From:
Lisa Collins

Date:
July 2, 2013

Subject:
Summary Report for SSDS Pilot Test in Area of VMP-7A

ARCADIS Project No.:
NJ001043.0001

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Ms. Ruth Curley
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway
Albany, New York 12233-7258

Subject:
Summary Report for SSDS Pilot Test in Area of VMP-7A
Solvent Dock Area
Former Lockheed Martin French Road Facility
525 French Road, Utica, New York

ENVIRONMENTAL

**Date:**
July 2, 2013

**Contact:**
Jeffrey J. Bonsteel

**Phone:**
267.685.1874

**Email:**
jeffrey.bonsteel@
arcadis-us.com

**Our reference:**
NJ001043.0001

Dear Ms. Curley:

ARCADIS (on behalf of the Lockheed Martin Corporation) has prepared this summary report for the pilot test conducted in the area of vacuum monitoring point (VMP) VMP-7A at the former Lockheed Martin French Road facility in Utica, New York. The basis for the pilot test was presented in ARCADIS' November 30, 2012 report to the New York State Department of Environmental Conservation (NYSDEC), titled *Evaluation Report on SSDS Performance in Area of VMP-7A* (ARCADIS 2012). A description of the proposed methodology for the pilot test was provided in ARCADIS' *Work Plan for SSDS Pilot Test in Area of VMP-7A* (ARCADIS 2013), which was submitted to the NYSDEC on March 14, 2013 and approved in a letter from NYSDEC dated April 9, 2013.

As indicated by recent operations, maintenance and monitoring (OMM) reports as well as continued evaluation of performance monitoring data, the existing sub-slab depressurization system (SSDS) has substantially maintained sufficient vacuum during historical and recent operations at all monitored locations with the exception of VMP-7A. Figure 1 shows the portion of the pre-existing SSDS in the vicinity of VMP-7A, which is located in the southwestern corner of "Warehouse J" within the ConMed Corporation (site occupant) facility. The purpose of the pilot test was to identify an effective location for an additional sub-slab depressurization sump (SDS) to mitigate the potential for vapor intrusion impacts in indoor air.

**Pilot Test Setup**

The following sections provide a description of the activities conducted prior to implementation of the pilot test. With the exception of utility clearance activities, all activities were conducted between May 21 and May 29, 2013.

Utility Clearance:

Prior to any intrusive activities, a review of ground-penetrating radar (GPR) data was conducted to determine utility clearance in the proposed sump/monitoring point locations. This included reviewing both August 2012 data completed as part of previous site activities, as well as April 2013 GPR survey data collected specifically for this effort. None of the proposed SDS or VMP locations needed to be significantly modified due to the presence of subsurface utilities. The April 2013 GPR survey report has been provided as Appendix A.

SDS-8 Installation:

Pilot test sump SDS-8 was installed in the immediate vicinity of VMP-7A. Figure 2 depicts the location of SDS-8 as well as the other pilot test monitoring locations. An electric, water-fed core drill equipped with an 8-inch diameter bit was used to core through the existing slab. The concrete thickness at SDS-8 was found to be approximately 15 inches, consistent with observations of slab thickness previously noted in this area. Once through the slab, hand tools were used to create a roughly 6-inch diameter borehole in the materials below the slab (i.e., gravels and native soils) deep enough to facilitate the installation of the 1.5-foot long well screen below the bottom of the existing slab. The sump was constructed of 3-inch diameter schedule (SCH) 40 polyvinyl chloride (PVC) well casing with 1.5 feet of 10-slot PVC well screen placed vertically in the hole. The annular space between the well casing and the borehole was filled with a $^{3}/_{8}$-inch peastone filterpack to a depth of 10 inches below the top of the slab. The remaining annulus was filled with non-shrink grout to the floor surface to create a vacuum seal. Approximately 2 feet of well casing was left above the floor surface for implementation of the pilot test.

Permanent VMP Installation:

Four permanent VMP's (identified as VMP-8A, VMP-8B, VMP-8C, and VMP-8D) were installed to assist in the evaluation of the pilot test. The locations of these new, permanent VMP's were within areas which were targeted by Lockheed Martin for mitigation as part of an expanded SSDS (as identified in the *Sub-Slab Depressurization System – 100% Design Work Plan* (ARCADIS 2010). Figure 2 depicts the locations of the four new permanent vacuum monitoring points.

A 6-inch diameter core drill bit was used to drill through the existing concrete slab at each of the four new permanent VMP locations. The thickness of the existing concrete slab at each of these locations was measured as follows: VMP-8A (8.5 inches), VMP-8B (5 inches), VMP-8C (9.5 inches), and VMP-8D (19 inches). Each permanent VMP installation included placement of a ½-inch diameter, 6-inch long stainless steel screen. As with SDS-8, hand tools were used to remove sub-slab soils to a depth deep enough to facilitate the installation of the screen such that the top of the screen was flush with the bottom of the existing slab. Teflon tubing with an interior diameter of ¼ inch was connected to the top of the stainless steel screen. Sand was placed in the annular space between the borehole and the screen to a depth of approximately 1 inch above the bottom of the existing concrete slab. The permanent VMP's were each finished with flushmount covers which were installed in conjunction with placement of non-shrink grout in the space between the cover and the perimeter of the borehole. It should be noted that the new permanent VMP's were installed in the same manner as pre-existing VMP's.

Temporary VMP Installation:

Two temporary vacuum monitoring points (TVMP's), TVMP-5 and TVMP-8, were installed to assess the influence of new pilot test sump SDS-8 in the eastern and northeastern directions, respectively. TVMP-5 and TVMP-8 were each installed using a $^{3}/_{8}$-inch diameter electric hammer drill bit to drill a hole approximately 2 inches through the bottom of the existing concrete slab. The thickness of the concrete at TVMP-5 and TVMP-8 was found to be approximately 8 inches and 17 inches, respectively. Teflon tubing (¼-inch outside diameter) was inserted into each hole to a depth flush with the bottom of the existing concrete slab. Non-shrink clay was placed around the outside of the tubing at the floor surface to create a vacuum seal. The locations of TVMP-5 and TVMP-8 are shown on Figure 2. It should be noted that TVMP-5 was installed in the same location as, and named identically as, one of the seven temporary monitoring points used to further evaluate the extent of the influence of the existing SSDS, as summarized in ARCADIS' *Evaluation Report on SSDS Performance in Area of VMP-7A* (ARCADIS 2012).

Fugitive Dust Control and Air Monitoring:

In accordance with the Site specific Health and Safety Plan (HASP) (ARCADIS 2012), fugitive dust monitoring was performed using a Thermo PDMIE Personal Mini-Dataram (PDR-1000) particulate meter during all intrusive activities. A stop work action level of 100 micrograms per cubic meter ($\mu g/m^3$) above background levels over a fifteen minute period was instituted. Engineering controls (i.e., dust suppression via water spraying) were continuously utilized to mitigate and control dust generation during all intrusive activities, and dust levels did not exceed the stop work level over the duration of intrusive work.

Continuous monitoring for volatile organic compounds (VOC's) was also employed during all intrusive work activities using a multi-gas meter. The stop work action level of 5 parts per million (ppm) over a five minute period was not exceeded during intrusive work.

Waste Management

Concrete generated from intrusive activities was containerized in a steel dumpster located outside of the ConMed facility building. The dumpster waste will eventually be transported to the local municipal landfill for disposal.

Water used during operation of the electric core drill was containerized in one steel 55-gallon drum and transferred for treatment to the groundwater collection and treatment system (GCTS) building located onsite.

Equipment and Work Area Setup:

The existing operable SSDS was used for a source of applied vacuum to extract and treat the soil vapor from the SDS-8 pilot test location. Existing sump SDS-7 was used for a local source of vacuum. For the initial portion of the pilot test, the SDS-7 vacuum piping was temporarily rerouted directly to SDS-8. This was accomplished by removing the existing SCH 40 PVC tee fitting (3-inch x 3-inch x ¾-inch) including vacuum gauge located at the SDS-7 sump and installing a 3-inch SCH 40 PVC elbow on the vacuum side of the SDS-7 piping. The existing SDS-7 flow control valve and orifice plate were left in place on the vacuum (downstream) side of the SDS-7 piping. The sump side of the SDS-7 piping was capped to keep soil vapors from potentially entering the building during the pilot test, as well as prevent the possibility of short circuiting during the pilot test. The vacuum gauge tee fitting was then installed at the new SDS-8 riser pipe to allow for monitoring of applied vacuum at SDS-8. Applied vacuum was directed to SDS-8 by connecting the two locations using a length of 3-inch diameter flexible PVC hose with cam-lock fittings on either end. All joints were made by either threaded connections or by dry-fitting connections and sealing with reducing flexible rubber couplers.

The second portion of the pilot test, which included application of vacuum at both SDS-7 and SDS-8 simultaneously, differed from the setup described above in that the elbow installed at SDS-7 to reroute applied vacuum was replaced with a 3-inch x 3-inch x 3-inch SCH 40 PVC tee fitting. The tee fitting was connected to both the pre-existing SDS-7 sump piping and the SDS-8 hose, allowing for vacuum to be applied concurrently to sumps SDS-7 and SDS-8.

The temporary vacuum hose was hung on the existing storage racks in Warehouse J to ensure that accessibility to the storage racks would not be limited and the trip hazard risk associated with the hose would be minimized.

**Pilot Test Methodology**

The SDS-8 pilot test was conducted on May 23 and May 24, 2013, with additional data pertinent to the pilot test evaluation collected on May 29, 2013. In general, the pilot test data that was periodically measured/recorded included the following:

- *Sub-slab Differential Pressure* – Measuring of sub-slab differential pressure from seven pilot test monitoring points. Monitoring points included the pre-existing VMP-7A, the four new permanent VMP's (VMP-8A, VMP-8B, VMP-8C, and VMP-8D), and the two temporary VMP's (TVMP-5 and TVMP-8). Differential pressure was measured using a digital micromanometer or a magnehelic gauge, depending on the magnitude of the differential pressure.
- *Applied Vacuum* – Recording of applied vacuum at SDS-8 wellhead using existing sump vacuum gauge.
- *Orifice Plate Differential Pressure* – Measuring of differential pressure from the existing orifice plate located on the SDS-7 vacuum line to estimate flowrate for either SDS-8, or for the aggregate flow from SDS-7 and SDS-8, depending on the phase of the pilot test.
- *Air Velocity* – Measuring of air velocity using an anemometer from a straight section of 3-inch diameter SCH 40 PVC piping to estimate flowrate from SDS-8.
- *Flow Control Valve Position* – Recording position of the existing flow control valve located on the SDS-7 vacuum line.
- *Barometric Pressure and Temperature* – Continuous monitoring of the barometric pressure and temperature inside Warehouse J using a pressure and temperature data logger.
- *Overall System Parameters* – Recording overall system parameters including the blower speed and applied vacuum at the knockout tank.

A description of the pilot test steps is as follows:

- Prior to turning SDS-8 online, and with the SSDS operating as typical (with sumps SDS-1 through SDS-7 online), sub-slab differential pressure from each of the seven pilot test monitoring points was measured.
- After temporarily turning the SSDS offline to allow for pilot test equipment setup, the SSDS was restarted with SDS-8 online and SDS-7 offline (on May 23, 2013).
- The flow control valve and the blower variable frequency drive were used to apply vacuum at the SDS-8 wellhead at four different increments: 24 inches of water column (in.W.C.), 48 in.W.C., 66 in.W.C., and 79 in.W.C. Sub-slab differential pressures and orifice plate differential pressures were measured for each of the four applied vacuum increments.

- After turning the SSDS offline to allow for modification of equipment setup, the SSDS was restarted with SDS-1 through SDS-8 online and an applied vacuum of 66 in.W.C. at SDS-7 and SDS-8.
- Two rounds of sub-slab differential pressures, orifice plate differential pressures, and anemometer readings were then collected approximately 1 hour apart from each other.
- The SDS-7 and SDS-8 applied vacuum was then briefly increased to 80 in.W.C. by speeding up the blower to measure sub-slab differential pressure at a single monitoring point (TVMP-8).
- After returning the blower to its original speed, two more rounds of sub-slab differential pressures, orifice plate differential pressures, and anemometer readings were collected on May 24, 2013 approximately 2 hours apart from each other. The system was then returned to its normal operating status (SDS-1 through SDS-7 online) following measurements.
- After turning SDS-8 online (in addition to SDS-1 through SDS-7), sub-slab differential pressures, orifice plate differential pressures, applied vacuums, and overall system parameters were collected for the entire SSDS layout area on May 29, 2013. At the completion of the collection of measurements, SDS-8 was turned off.

It should be noted that the pilot test methodology implemented did vary from the methodology outlined in the work plan due to several factors. First, the evaluation of SDS-8's influence at any given applied vacuum was available nearly immediately as vacuum influence was observed to remain relatively stable after operating at a single applied vacuum for a short period of time. This allowed for real-time modification of the pilot test steps in an effort to achieve the desired vacuum influence in the most time-effective way. Additionally, while several pilot test monitoring points were not substantially meeting performance criteria with SDS-8 operating, it was determined that modifying the pilot test temporary piping to allow for operation of the pre-existing SDS-7 in parallel with SDS-8 would be more cost-effective than proceeding with installation of another sub-slab depressurization sump. This would also allow for collection of vacuum influence readings which would be the most representative of what the overall SSDS would actually produce during normal operation (i.e., all SDS's operating at once). In addition to pilot test results, the methodology for the pilot test is provided in Table 1.

**Pilot Test Results**

The data collected during the pilot test are provided in Table 1. A summary of the results is provided below:

- Applied vacuums of 24 in.W.C., 48 in.W.C., and 66 in.W.C. at SDS-8 corresponded to estimated SDS-8 flowrates of 21 standard cubic feet per minute (scfm), 32 scfm, and 38 scfm as per orifice plate measurements.

- Sub-slab differential pressures at each of the seven pilot test monitoring points while SDS-8 had an applied vacuum of 66 in.W.C. and SDS-7 was offline were:
    - VMP-7A (-30 in.W.C.)
    - VMP-8A (-1.175 in.W.C.)
    - VMP-8B (-9 in.W.C.)
    - VMP-8C (0 to -0.005 in.W.C.)
    - VMP-8D (-0.006 in.W.C.)
    - TVMP-5 (-1.043 in.W.C.)
    - TVMP-8 (0 to -0.005 in.W.C.)
- Sub-slab differential pressures at each of the seven pilot test monitoring points while SDS-7 and SDS-8 were operated simultaneously with applied vacuums of 66 in.W.C. were:
    - VMP-7A (-32 in.W.C.)
    - VMP-8A (-1.8 in.W.C.)
    - VMP-8B (-11.5 in.W.C.)
    - VMP-8C (-0.005 to -0.008 in.W.C.)
    - VMP-8D (-0.022 to -0.026 in.W.C.)
    - TVMP-5 (-0.805 in.W.C.)
    - TVMP-8 (0.000 in.W.C.)
- Sub-slab differential pressures at the other SSDS layout-wide VMP's while SDS-1 through SDS-8 were online ranged from a minimum vacuum of -0.009 in.W.C. at VMP-3B to a maximum vacuum of -1.020 at VMP-7.
- Air flow from the indoor air to sub-slab zone (i.e., air pathway through floor) was heard in the area north of VMP-8B around column N31 while SDS-8 was operating. While sealing of the leak was attempted, limited accessibility to the apparent source area prevented the leak from being completely sealed. This leak will attempt to be sealed as part of routine monthly O&M activities.

**Pilot Test Evaluation**

Evaluation of the pilot test results indicates the following:

- Operation of SDS-8 has created a sub-slab vacuum at VMP-7A well in excess of the target performance criteria of -0.004 in.W.C. of vacuum.
- Operation of SDS-8 has resulted in performance criteria being exceeded at additional pilot test monitoring points of VMP-8A, VMP-8B, and TVMP-5.
- Operation of SDS-8 alone has little to no influence on VMP-8C, VMP-8D, and TVMP-8. However, operation of SDS-7 concurrently with SDS-8 resulted in VMP-8C and VMP-8D exceeding performance criteria for sub-slab vacuum.

- The additional flow from SDS-8 did not significantly impact the influence of the other SSDS sumps, as all twenty of the remaining VMP's maintained sufficient sub-slab vacuums.
- The additional flow from SDS-8 was well within the existing SSDS's extraction and treatment capabilities.

The pilot test sump SDS-8 has successfully induced sub-slab vacuum beyond the performance criteria (-0.004 in.W.C.) in the area of VMP-7A. In addition to VMP-7A, each of the four permanent monitoring points (VMP-8A, VMP-8B, VMP-8C, and VMP-8D) installed for the SDS-8 pilot test experienced sub-slab vacuum influence in excess of the performance criteria during the test. One of the two temporary monitoring points, TVMP-8, did not consistently experience sub-slab vacuum during the pilot test. The TVMP's were installed to evaluate the extent of the influence of SDS-8. It can also be noted that the vacuum influence observed at VMP-8A during the pilot test as well as from nearby TVMP-2, which had been utilized during field activities for the *Evaluation Report on SSDS Performance in Area of VMP-7A* (ARCADIS 2012), indicates that the lack of influence at TVMP-8 could be an isolated condition in that immediate area.

**Recommendations**

ARCADIS recommends installation of permanent piping and infrastructure to incorporate SDS-8 into the full-scale SSDS. In addition to achieving the objectives of the pilot test (i.e., vacuum influence at VMP-7A), the inclusion of SDS-8 as part of the full-scale SSDS would also expand the radius of vacuum influence for the system to cover other areas in this portion of the ConMed facility which had previously been investigated. Design specifications for permanently adding SDS-8 to the SSDS would be provided in a separate work plan and would be consistent with those details included in the design work plan for the existing SSDS, *Sub-Slab Depressurization 100% Work Plan* (ARCADIS 2010).

Feel free to contact us if you have any questions or comments regarding this work plan.

Sincerely,

ARCADIS U.S., Inc.

T. Carignan

Todd Carignan
Project Engineer

Jeffrey J. Bonsteel
Project Manager

Attachments:
Table 1: VMP-7A Area Pilot Test Data
Figure 1: Pre-Existing SSDS Layout in VMP-7A Area
Figure 2: SDS-8 Pilot Test Locations
Appendix A: GPR Survey

Copies:
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Ms. Kay Armstrong, Armstrong & Associates
Ms. Mary Morningstar, Lockheed Martin
Ms. Glenda Smith, Lockheed Martin
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Tables

## Table 1. VMP-7A Area Pilot Test Data, Former Lockheed Martin French Road Facility, Utica, New York

| Date/Time | | Applied Vacuum at Knockout Tank (VI-201) | B-200 Speed (Hz) | Sumps Online | Flow Control Valve | | Wellhead Vacuum | | Orifice Plate Differential Pressure | | | Aggregate System Air Velocity (fpm) | Aggregate System Air Flowrate (acfm) | SDS-8 Air Velocity (fpm) [sch. 40 3" PVC] | SDS-8 Air Flowrate (acfm) | | Induced Vacuum (in. W.C.) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Turns Open | SDS-# | (in.W.C.) | SDS-# | (in.W.C.) | SDS-# | Q (scfm) | | | | | VMP-7A | VMP-8A | VMP-8B | VMP-8C | VMP-8D | TVMP-5 | TVMP-8 |
| 5/23/2013 | 7:35 | 72.5 | 47.9 | 1 thru 7 | 7.625 | 7 | 71.9 | 6 | 0.018 | 6 | 7 | 1100 | 95 | offline | - | 0.000 | 0.000 | 0.000 w/ jumps to +0.010 | -0.007 | -0.014 | -0.027 | 0 to -0.008 (cyclical) |
| | | | | | | | 72.1 | 7 | 0.016 | 7 | 5 | | | | | | | | | | | |
| | 8:37 | System turned off. | | | | | | | | | | | | | | | | | | | | |
| | 10:50 | System turned on (SDS-1 through SDS-6) | | | | | | | | | | | | | | | | | | | | |
| | 11:05 | Begin applying vacuum at SDS-8. | | | | | | | | | | | | | | | | | | | | |
| | 11:17 | NM | 47.9 | 1 thru 6, 8 | 0.875 | 8 | 24 | 8 | 0.23 | 8 | 21 | NM | - | NM | - | -11.400 | -0.269 | -3.000 | 0.000 | 0.000 w/ jumps to -0.003 | -0.215 | 0.000 |
| | 11:33 | Open FCV-107 to 1.25 turns open total. | | | | | | | | | | | | | | | | | | | | |
| | 11:45 | NM | 47.9 | 1 thru 6, 8 | 1.25 | 8 | 48.2 | 8 | 0.57 | 8 | 32 | NM | - | NM | - | > -15.000 | -0.763 | -7.000 | 0.000 | 0.000 | -0.230 | -0.006 |
| | 12:06 | Open FCV-107 to 7.625 turns open total. | | | | | | | | | | | | | | | | | | | | |
| | 12:38 | NM | 47.9 | 1 thru 6, 8 | 7.625 | 8 | 66 | 8 | 0.85 | 8 | 38 | NM | - | NM | - | -30.000 | -1.175 | -9.000 | 0 to -0.005 | -0.006 | -1.043 | 0 to -0.005 |
| | 12:47 | Turn B-200 speed up to 53.0 Hz. | | | | | | | | | | | | | | | | | | | | |
| | 12:50 | NM | 53.0 | 1 thru 6, 8 | 7.625 | 8 | 79 | 8 | NM | - | - | NM | - | NM | - | -32.000 | -1.445 | -10.000 | 0 to -0.004 | -0.004 to -0.009 | -1.138 | 0.000 |
| | 14:30 | Pulling water from SDS-8. Drained 1/4 gallons from hose. Turned system off. Due to the lack of vacuum influence at VMP-8C SDS-7 was retrofited in order to operate SDS-7 and SDS-8 together in order to mimic a more realistic full-scale operation scenario with SDS-8 online. | | | | | | | | | | | | | | | | | | | | |
| | 16:42 | Turned system on (SDS-1 through SDS-8). Return B-200 speed back to 47.9 Hz. | | | | | | | | | | | | | | | | | | | | |
| | 17:03 | NM | 47.9 | all eight | 7.625 | 7 & 8 | 63.5 | 7 | 1.2 - 1.5 | sum of 7 & 8 | 47 | 2500 | 215 | 880 | 45 | -32.000 | -1.500 | -9.000 | -0.005 to -0.008 | -0.022 | -1.063 | 0.000 |
| | | | | | | | 63.5 | 8 | | | | | | | | | | | | | | |
| | 17:30 | Closed FCV-107 100%. | | | | | | | | | | | | | | | | | | | | |
| | 17:50 | Vacuumed 3-4 gallons of water from SDS-8 sump. | | | | | | | | | | | | | | | | | | | | |
| | 17:53 | Open FCV-107 to 7.625 turns open total. | | | | | | | | | | | | | | | | | | | | |
| | 18:11 | NM | 47.9 | all eight | 7.625 | 7 & 8 | 66 | 7 | 1.5 | sum of 7 & 8 | 50 | NM | - | 730 | 37 | -38.000 | -1.888 | -12.800 | -0.022 | -0.022 | -1.877 | 0.000 |
| | | | | | | | 66 | 8 | | | | | | | | | | | | | | |
| | 19:12 | Turn B-200 speed up to 52.5 Hz. New applied vacuum for SDS-7 & SDS-8 of 75 in.W.C. TVMP-8 still has induced vacuum of 0.000 in.W.C. | | | | | | | | | | | | | | | | | | | | |
| | 19:27 | Turn B-200 speed up to 54.9 Hz. New applied vacuum for SDS-7 & SDS-8 of 80 in.W.C. TVMP-8 still has induced vacuum of 0.000 in.W.C. | | | | | | | | | | | | | | | | | | | | |
| | 19:45 | Turn B-200 speed down to 47.9 Hz. All eight sumps online. | | | | | | | | | | | | | | | | | | | | |

**Table 1. VMP-7A Area Pilot Test Data, Former Lockheed Martin French Road Facility, Utica, New York**

| | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5/24/2013 | 7:50 | FT-301 = 172-224 cfm, VT-201 = -68.2 in.W.C., PT-201 = 3.8 in.W.C. | | | | | | | | | | | | | | | | | | | | |
| | 8:05 | 69-71 | 47.9 | all eight | 7.625 | 7 & 8 | 66 | 7 | ~2.0 (water causing fluctuation) | sum of 7 & 8 | 58 | 1230 | 106 | 760-810 | 40 | -32.000 | -1.800 | -11.500 | -0.005 to -0.008 | -0.022 to -0.026 | -0.805 | 0.000 |
| | | | | | | | 66 | 8 | | | | | | | | | | | | | | |
| | 10:18 | NM | 47.9 | all eight | 7.625 | 7 & 8 | 66 | 7 | ~1.5-2.0 (water causing fluctuation) | sum of 7 & 8 | 54 | NM | - | 800-823 | 42 | -32.000 | -0.720 (borehole for 8A hole open) | -12.000 | -0.003 to -0.005 | -0.022 to -0.026 | -1.600 | 0.000 w/ jumps to -0.003 |
| | | | | | | | 66 | 8 | | | | | | | | | | | | | | |
| | ~12:00 | Turn off SDS-8. | | | | | | | | | | | | | | | | | | | | |
| 5/29/2013 | 14:33 | Remobilize to the site verify the vacuum at each new permanent VMP location post-installation of flush mount covers. System online with sumps SDS-1 through SDS-7. FT-301 = 91-114 cfm, VT-201 = -72 in.W.C., PT-201 = 2.0 in.W.C., TT-201 = 210 F, VFD = 47.9 Hz., air velocity (total) = 1410 fpm. | | | | | | | | | | | | | | | | | | | | |
| | 14:56 | NM | 47.9 | 1 thru 7 | 7.625 | 7 | 73 | 7 | 0.013 | 7 | 5 | 1410 | 122 | NM | - | NM | NM | NM | NM | NM | NM | NM |
| | 15:25 | Turn on SDS-8 in addition to SDS-1 through SDS-7. | | | | | | | | | | | | | | | | | | | | |
| | 16:04 | NM | 47.9 | all eight | 7.625 | 1 | 68.8 | 1 | 0.025 | 1 | 10 | 2450-2500 | 213 (172 scfm) | 850 | 44 | -37.500 | -2.100 | -13.500 | -0.006 | -0.010 | - | - |
| | | | | | 0.75 | 2 | 0.865 | 2 | 0.05 | 2 | 8 | | | | | Additionally monitored VMPs: | VMP-1A = -0.037 | | VMP-3B = -0.009 | | VMP-5B = -0.036 | |
| | | | | | 1 | 3 | 1.02 | 3 | 0.4 | 3 | 23 | | | | | | VMP-1B = -0.462 | | VMP-3C = -0.025 | | VMP-6 = -0.205 | |
| | | | | | 1.25 | 4 | 0.925 | 4 | 1.6 | 4 | 45 | | | | | | VMP-1C = -0.160 | | VMP-3D = -0.017 | | VMP-6A = -0.865 | |
| | | | | | 1.25 | 5 | 60 | 5 | 0.32 | 5 | 20 | | | | | | VMP-2A = -0.076 | | VMP-3E = -0.015 | | VMP-6B = -0.284 | |
| | | | | | 7.75 | 6 | 66.5 | 6 | 0.021 | 6 | 8 | | | | | | VMP-2B = -0.181 | | VMP-4 = -0.036 | | VMP-7 = -1.020 | |
| | | | | | 7.625 | 7 & 8 | 64 | 7 | 2 | sum of 7 & 8 | 58 | | | | | | VMP-2C = -0.163 | | VMP-5 = -0.094 | | VMP-7B = -0.109 | |
| | | | | | | | 64 | 8 | | | | | | | | | VMP-3A = -0.059 | | VMP-5A = -0.054 | | - | |
| | 17:30 | System online with sumps SDS-1 through SDS-8 running. FT-301 = 199-217 cfm, VT-201 = -66.6 in.W.C., PT-201 = 4.1 in.W.C., TT-201 = 181 F (Note temperature drop across the blower with SDS-8 online) , VFD = 47.9 Hz, air velocity (total) = 2450-2500 fpm. | | | | | | | | | | | | | | | | | | | | |

**Notes:**

- No correction factors have been applied to the flowrates estimated per orifice plates, as opposed to performance tracking tables which do use correction factors to set the sum of individual sump flow rate estimates as per orifice plates equal to the aggregate flow rate per an anemometer measurement. It should be noted that the aggregate anemometer reading on 5/29/13 results in an estimated aggregate flowrate of 172 scfm (following conversion from acfm), which is identical to the sum of the individual sump flowrates as per orifice plate readings (172 scfm).

**Abbreviations:**

"-" - Not Applicable

acfm - actual cubic feet per minute

B - blower

FCV - flow control valve

fpm - feet per minute

Hz - hertz

in.W.C. - inches of water column

PVC - polyvinyl chloride

scfm - standard cubic feet per minute

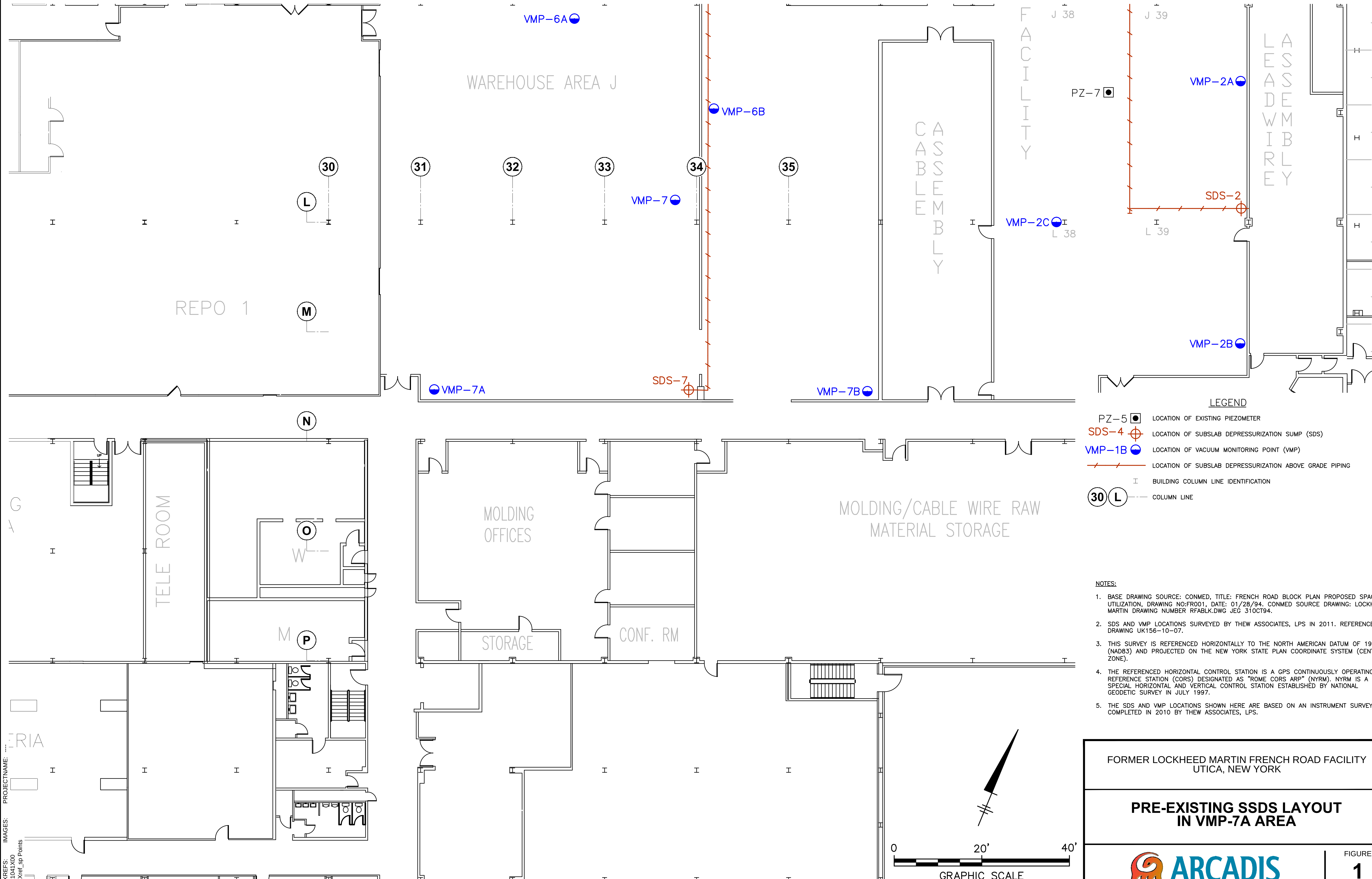
SDS - sub-slab depressurization sump

TVMP - temporary vacuum monitoring point

VMP - vacuum monitoring point

ARCADIS

# Figures




NOTES:

1. BASE DRAWING SOURCE: CONMED, TITLE: FRENCH ROAD BLOCK PLAN PROPOSED SPACE UTILIZATION, DRAWING NO:FR001, DATE: 01/28/94. CONMED SOURCE DRAWING: LOCKHEED MARTIN DRAWING NUMBER RFABLK.DWG JEG 31OCT94.
2. SDS AND VMP LOCATIONS SURVEYED BY THEW ASSOCIATES, LPS IN 2011. REFERENCE DRAWING UK156-10-07.
3. THIS SURVEY IS REFERENCED HORIZONTALLY TO THE NORTH AMERICAN DATUM OF 1983 (NAD83) AND PROJECTED ON THE NEW YORK STATE PLAN COORDINATE SYSTEM (CENTRAL ZONE).
4. THE REFERENCED HORIZONTAL CONTROL STATION IS A GPS CONTINUOUSLY OPERATING REFERENCE STATION (CORS) DESIGNATED AS "ROME CORS ARP" (NYRM). NYRM IS A SPECIAL HORIZONTAL AND VERTICAL CONTROL STATION ESTABLISHED BY NATIONAL GEODETIC SURVEY IN JULY 1997.
5. THE SDS AND VMP LOCATIONS SHOWN HERE ARE BASED ON AN INSTRUMENT SURVEY COMPLETED IN 2010 BY THEW ASSOCIATES, LPS.

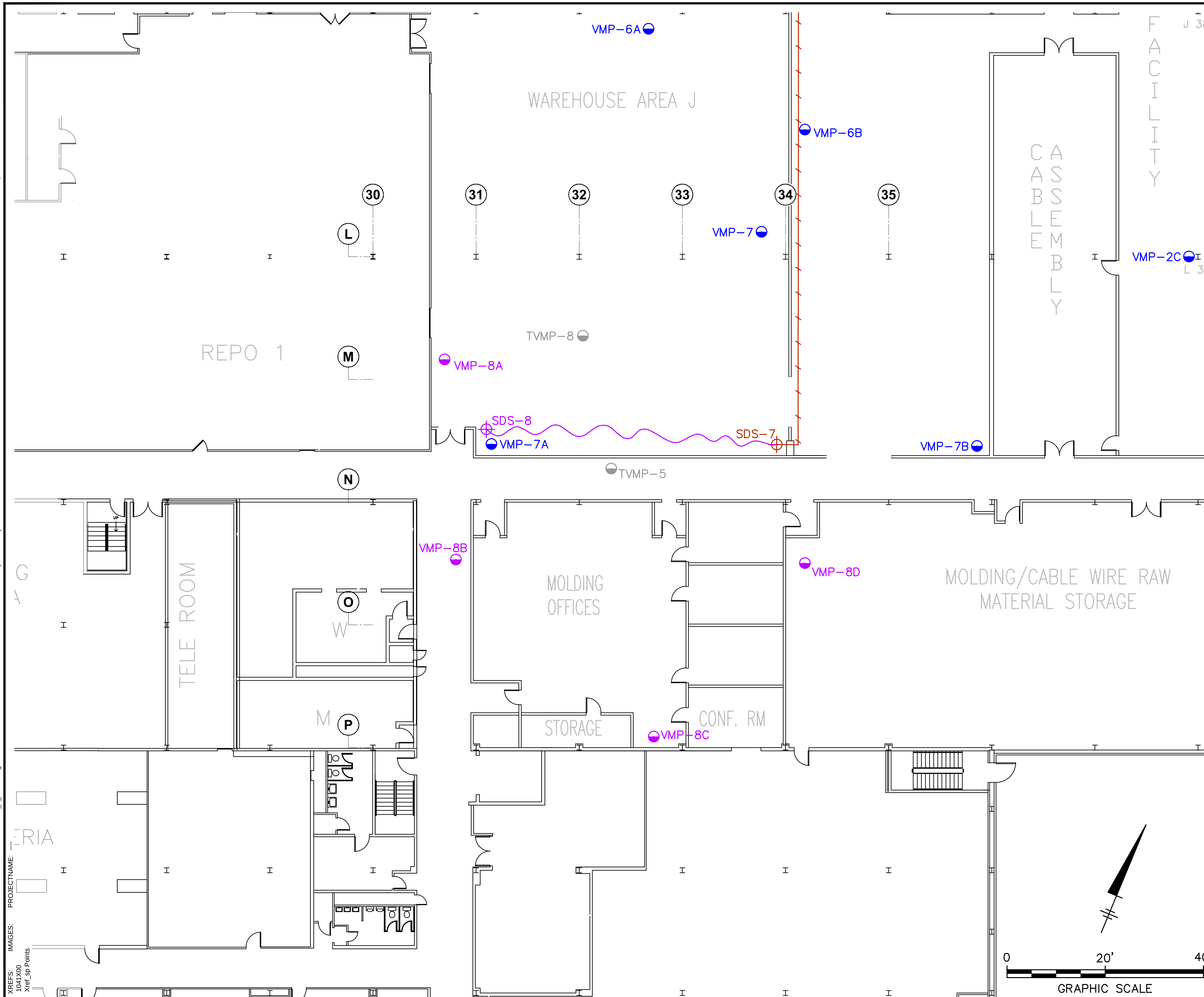
FORMER LOCKHEED MARTIN FRENCH ROAD FACILITY
UTICA, NEW YORK

**PRE-EXISTING SSDS LAYOUT IN VMP-7A AREA**

ARCADIS

FIGURE
1

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\NJ001043\0001\00008\NJ1043_1_8 F01.dwg LAYOUT: 1 SAVED: 6/7/2013 10:06 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: PDF-11X17 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 6/7/2013 10:33 AM BY: SANCHEZ, ADRIAN
XREFS: IMAGES: PROJECTNAME: ---
1041X00
Xref_sp Points




## LEGEND

- BUILDING COLUMN LINE IDENTIFICATION
- 30 L — COLUMN LINE
- LOCATION OF SUBSLAB DEPRESSURIZATION ABOVE GRADE PIPING
- PZ-5 — LOCATION OF EXISTING PIEZOMETER
- SDS-4 — LOCATION OF SUBSLAB DEPRESSURIZATION SUMP (SDS)
- VMP-1B — LOCATION OF VACUUM MONITORING POINT (VMP)
- VMP-8C — NEW VACUUM MONITORING POINT (VMP) LOCATION (INSTALLED WEEK OF MAY 20, 2013)
- SDS-8 — NEW SUBSLAB DEPRESSURIZATION SUMP (SDS) LOCATION (INSTALLED WEEK OF MAY 20, 2013)
- TVMP-5 — TEMPORARY VACUUM MONITORING POINT (TVMP) LOCATION (INSTALLED WEEK OF MAY 20, 2013 AND ABANDONED AFTER TESTING)
- TEMPORARY VACUUM HOSE

NOTES:

1. BASE DRAWING SOURCE: CONMED, TITLE: FRENCH ROAD BLOCK PLAN PROPOSED SPACE UTILIZATION, DRAWING NO:FR001, DATE: 01/28/94. CONMED SOURCE DRAWING: LOCKHEED MARTIN DRAWING NUMBER RFABLK.DWG JEG 31OCT94.
2. LOCATIONS OF SDS-8, VMP-8A, VMP-8B, VMP-8C, VMP-8D, AND ALL TVMP's ARE APPROXIMATE. ALL OTHER SDS AND VMP LOCATIONS SURVEYED BY THEW ASSOCIATES, LPS IN 2011. REFERENCE DRAWING UK156-10-07.
3. THIS SURVEY IS REFERENCED HORIZONTALLY TO THE NORTH AMERICAN DATUM OF 1983 (NAD83) AND PROJECTED ON THE NEW YORK STATE PLAN COORDINATE SYSTEM (CENTRAL ZONE).
4. THE REFERENCED HORIZONTAL CONTROL STATION IS A GPS CONTINUOUSLY OPERATING REFERENCE STATION (CORS) DESIGNATED AS "ROME CORS ARP" (NYRM). NYRM IS A SPECIAL HORIZONTAL AND VERTICAL CONTROL STATION ESTABLISHED BY NATIONAL GEODETIC SURVEY IN JULY 1997.

FORMER LOCKHEED MARTIN FRENCH ROAD FACILITY
UTICA, NEW YORK

# SDS-8 PILOT TEST LOCATIONS

ARCADIS

FIGURE
2


CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\NJ001043\0001\00008\NJ1043_1_8 F02.dwg LAYOUT: 2 SAVED: 6/7/2013 11:10 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: PDF-11X17 PLOTSTYLETABLE: ARCADIS.CTB PLOTTED: 6/7/2013 1:08 PM BY: SANCHEZ, ADRIAN
XREFS: IMAGES: PROJECTNAME: ---
1041X00
Xref_sp Points

ARCADIS

**Appendix A**

# LOCKHEED MARTIN
# FORMER FRENCH ROAD FACILITY

# UTICA, NEW YORK

## GROUND PENETRATING RADAR INVESTIGATION
## APRIL 2013 INTERIOR INVESTIGATION

***Prepared for:***

Arcadis U.S., Inc.
465 New Karner Road
Albany, New York 12205

***Prepared by:***

Spectra Subsurface Imaging Group, LLC
19 British American Boulevard
Latham, New York 12110

**May 2013**

# FORMER LOCKHEED MARTIN FACILITY
# GROUND PENETRATING RADAR INVESTIGATION

## TABLE OF CONTENTS



## FIGURES

## 1.0 INTRODUCTION

At the request of Arcadis U.S., Inc. (Arcadis), Spectra Subsurface Imaging Group, LLC (Spectra) performed a ground penetrating radar (GPR) investigation at the Lockheed Martin, Former French Road Facility in Utica, New York. The scope of work for this project called for a GPR investigation at five areas to determine if utilities or other subsurface features were present in building interior areas where subsurface borings are scheduled to occur. The GPR survey was performed on April 25, 2013.

## 2.0 GEOPHYSICAL SURVEY PROCEDURE

### 2.1 RADAR INSTRUMENTATION

To map the subsurface at the site, Spectra used a 400 MHz single channel GPR antenna. This GPR system uses a single antenna to produce a two dimensional (length and depth) cross section. This antenna has a maximum depth penetration of 8-10 feet depending on subsurface conditions, and is ideally suited to map utilities.

GPR utilizes high frequency electromagnetic waves that are directed into the ground by a transmitting antenna. Radar reflections are produced in the subsurface at material boundaries that have differing electrical properties. These subsurface reflections return back to the surface and are detected by a receiving antenna. Figure 1 illustrates a schematic radar signature that is commonly observed in recorded profiles and illustrates the reflection response that is characteristic of a small subsurface object such as a utility pipe. Since the buried object in this example has a curved surface, radar reflections will be received from the top of the object and from both sides as the antenna passes over the feature. As a result, the radar signature is parabolic in nature and is commonly referred to as a “diffraction hyperbola.”

**Figure 1 – Data Collection – Point Target**

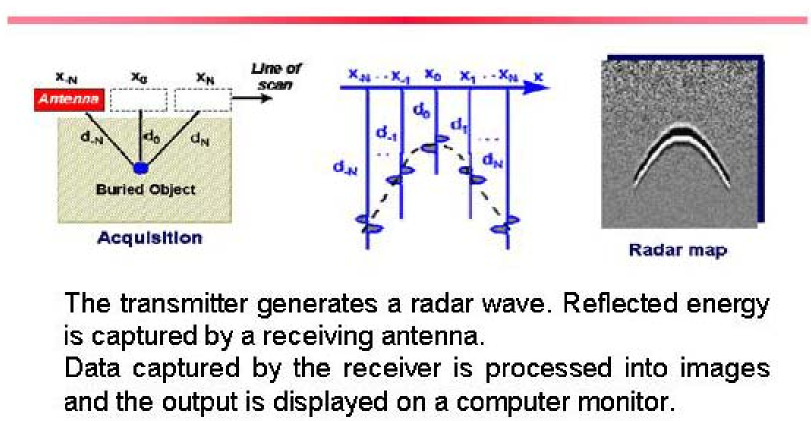



Figure 1 illustrates how a point target creates a diffraction hyperbola. Because the radar signal is emitted in a cone shape, the antenna unit begins to detect the subsurface object before it is directly beneath the antenna and continues to detect the object after it has passed. The oblique segments travel a longer path compared to those from directly over the target, and thus the object appears deeper, forming the “legs” of the hyperbola.

## 2.2 DATA COLLECTION METHODOLOGY

Figure 2 shows the general areas where the GPR survey was conducted. Included in these investigations was a hallway area (Figure 3), two warehouse areas (Figures 4 & 7), and the Molding Offices (Figures 5 & 6). GPR interpretations for these areas were already provided to Arcadis on 05/03/13. GPR data collection geometry was strongly influenced by the physical size of the space and the existence of obstructions due to walls and racking areas. To the extent possible, GPR transects were collected in a perpendicular grid pattern. A majority of these transects were spaced at a 2 foot perpendicular grid where possible. Spectra created a sketch map of each investigation area using physical measurements from the interior walls, other permanent objects, and the proposed drilling locations.

## 3.0 DATA INTERPRETATION

Radar signatures from the GPR survey transects were reviewed for reflections that could indicate the existence of subsurface utilities. A curved surface, such as a pipe, will produce a hyperbolic radar signature as illustrated on Figure 1. Prior to interpretation, the GPR data was processed using RADAN (a commercially available program developed by Geophysical Survey Systems, Inc.). Data processing steps included enhancing the radar signature of the targets by adjusting the signal amplitude, removing background noise, and time-zero correction.

Radar data quality and penetration depths within the investigation areas were strongly influenced by the composition of the concrete floors. All of the investigation areas contained a combination of wire mesh, rebar, and/or metal tubing. The floor in warehouse area 1 (Figure 4) contained very strong shallow reflections, believed to be caused by copper tubing. This tubing was closely spaced (2 feet) and typically about 0.25 – 0.5 ft. deep. Because of the strong reflection response from the tubing, returns from deeper features (if present) were somewhat obscured. Along with the copper tubing in this area the concrete floor contained either closely spaced wire mesh or rebar reinforcements. These materials also reduced penetration depth and deeper data quality.

That being said, there were two features detected at deeper depths beneath the metal tubing in warehouse area 1. On Figure 4 a feature spanning two transects is shown at a depth of 6.4 ft. to 6.5 ft. and another linear feature is shown at a depth of 1.9 ft. to 2.1 ft.

In the office and hallway areas (Figures 3, 5, & 6) metal tubing was not observed in the floor. However, closely spaced wire mesh and rebar was again present, which limited data quality and penetration depth. Despite this, two deeper features were detected in the hallway area (Figure 3) through the wire mesh at estimated depths of 4 to 5.5 feet, along with one other feature oriented perpendicular to the hallway walls at a depth of 1.1 ft. Several shallow features were detected in the office areas. Around SDS-8D (Figure 5) three linear features are shown at depths ranging from 1.3 ft. to 2.6 ft. Around SDS-8C (Figure 6) three features are shown at depths ranging from 1.6 ft. to 1.9 ft.

Despite the existence of shallow interferences produced by reinforcement, wire mesh, and metal tubing, possible utilities were identified in the investigation areas. Some of the identified features are relatively short and do not span more than one GPR transect. In these cases, it is possible that the GPR survey was only able to detect segments of an actual utility. Alternatively, the mapped features may represent voids or buried debris pieces. Due to the risks and costs associated with utility strikes, Spectra was conservative in selecting subsurface features. Care should be taken when drilling near any of the features identified.

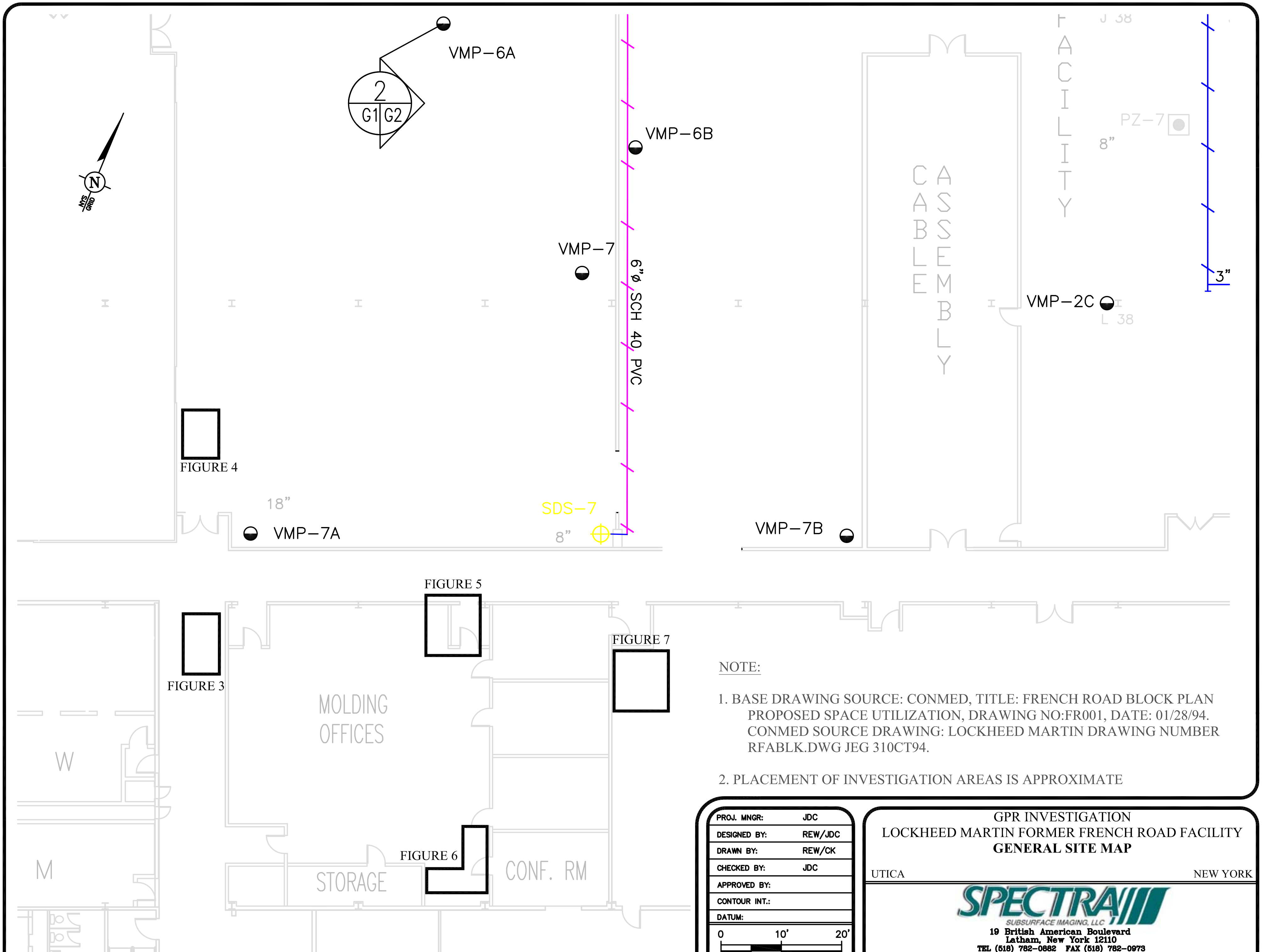
## 4.0 CONCLUSIONS

Spectra performed ground penetrating radar investigations at five proposed drilling locations inside the Lockheed Martin Former French Road Facility in Utica, New York on April 25, 2013. The survey was conducted using a 400 MHz single channel GPR antenna. The primary purpose of the investigation was to determine whether any utilities were present near the proposed drilling locations.

Despite the presence of shallow interferences from wire mesh, rebar, and suspected metal tubing data quality was generally good across the investigation areas with typical penetration depths of 5 feet. Data interpretation revealed a few subsurface features in the general vicinity of the proposed drilling locations and as stated previously, caution should be used when drilling near any detected subsurface feature.

Spectra performed this survey with standard GPR equipment (approved by the FCC) and trained professionals. However, GPR is a non-intrusive investigation technique and may not fully detect all subsurface features depending upon site-specific conditions.

# FIGURES




NOTE:

1. BASE DRAWING SOURCE: CONMED, TITLE: FRENCH ROAD BLOCK PLAN PROPOSED SPACE UTILIZATION, DRAWING NO:FR001, DATE: 01/28/94. CONMED SOURCE DRAWING: LOCKHEED MARTIN DRAWING NUMBER RFABLK.DWG JEG 310CT94.

2. PLACEMENT OF INVESTIGATION AREAS IS APPROXIMATE

| | |
|---|---|
| PROJ. MNGR: | JDC |
| DESIGNED BY: | REW/JDC |
| DRAWN BY: | REW/CK |
| CHECKED BY: | JDC |
| APPROVED BY: | |
| CONTOUR INT.: | |
| DATUM: | |

0 10' 20'

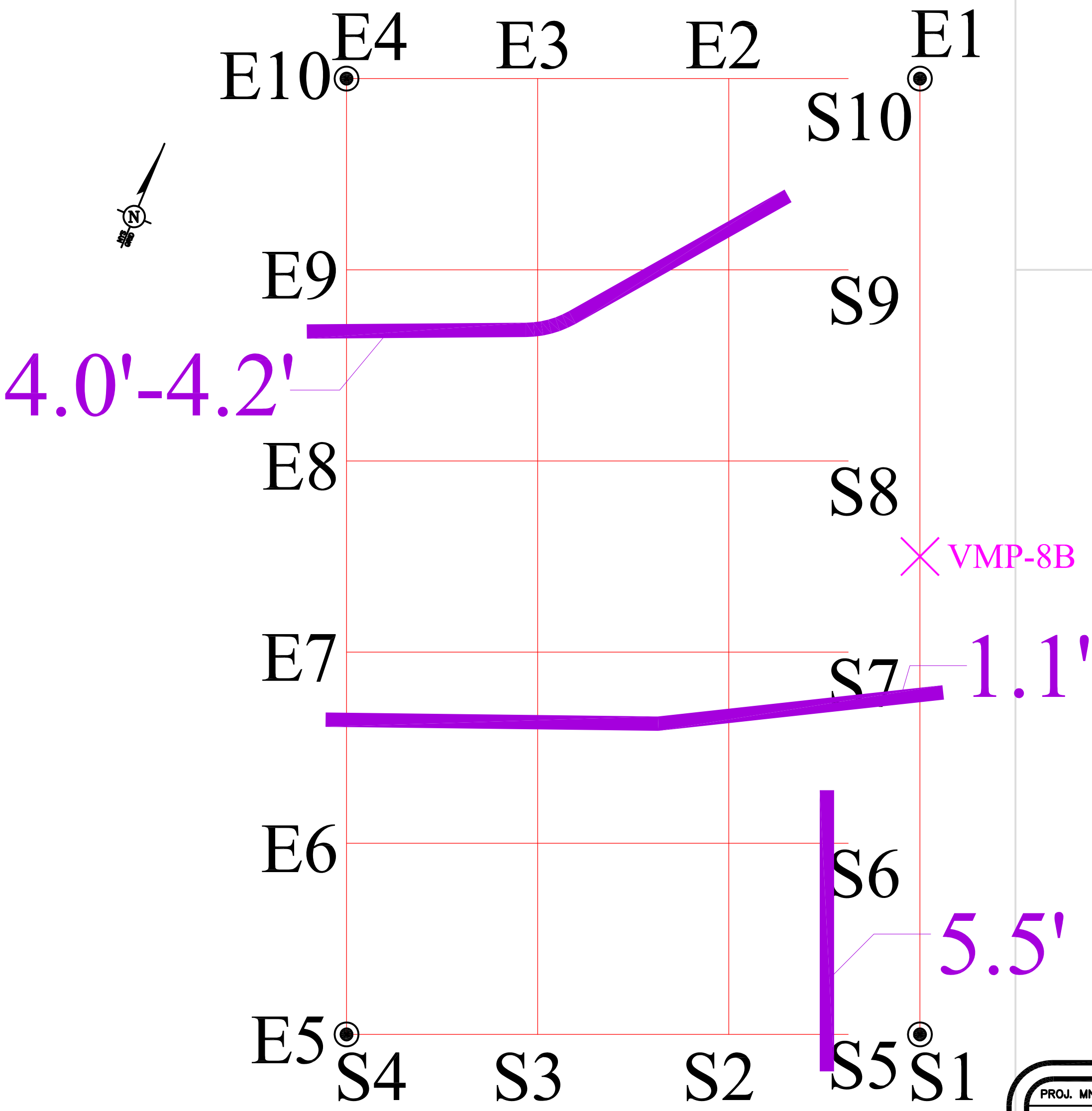
1"=20'

GPR INVESTIGATION
LOCKHEED MARTIN FORMER FRENCH ROAD FACILITY
**GENERAL SITE MAP**

UTICA NEW YORK

SPECTRA SUBSURFACE IMAGING, LLC
19 British American Boulevard
Latham, New York 12110
TEL (518) 782-0882 FAX (518) 782-0973

| DATE: | 05/13/13 | SCALE: | 1"=20' | PROJ NO. | 09091 | FIGURE 2 |
|---|---|---|---|---|---|---|




## LEGEND

| | |
|---|---|
| SDS-8D | PROPOSED BORING LOCATION IDENTIFIED IN FIELD BY ARCADIS REPRESENTATIVE |
| ◉ | BASE POINT OF GPR INVESTIGATION MARK ON FLOOR AS BLACK CIRCLE WITH DOT |
| S1/E1 | START/END OF GPR TRANSECT |
| (red line) | GPR TRANSECT |

NOTES:

1. RADAR PENETRATION DEPTH ~5.0'-5.5'
2. CLOSELY SPACED REINFORCEMENT OR WIRE MESH BENEATH ENTIRE INVESTIGATION AREA IN TOP 1.0'
3. DEPTHS OF FEATURES ARE APPROXIMATE WITHIN ±10-20%.
4. GPR IS A NON-INVASIVE INVESTIGATION TECHNIQUE THAT MAY NOT FULLY RESOLVE ALL SUBSURFACE CONDITIONS DUE TO LOCAL VARIATIONS IN SUBSURFACE PROPERTIES AND THE PHYSICAL NATURE OF THE UNDERGROUND FEATURES.

| | |
|---|---|
| PROJ. MNGR: | JDC |
| DESIGNED BY: | REW/JDC |
| DRAWN BY: | REW |
| CHECKED BY: | JDC |
| APPROVED BY: | |
| CONTOUR INT.: | |
| DATUM: | |

0 1' 2'

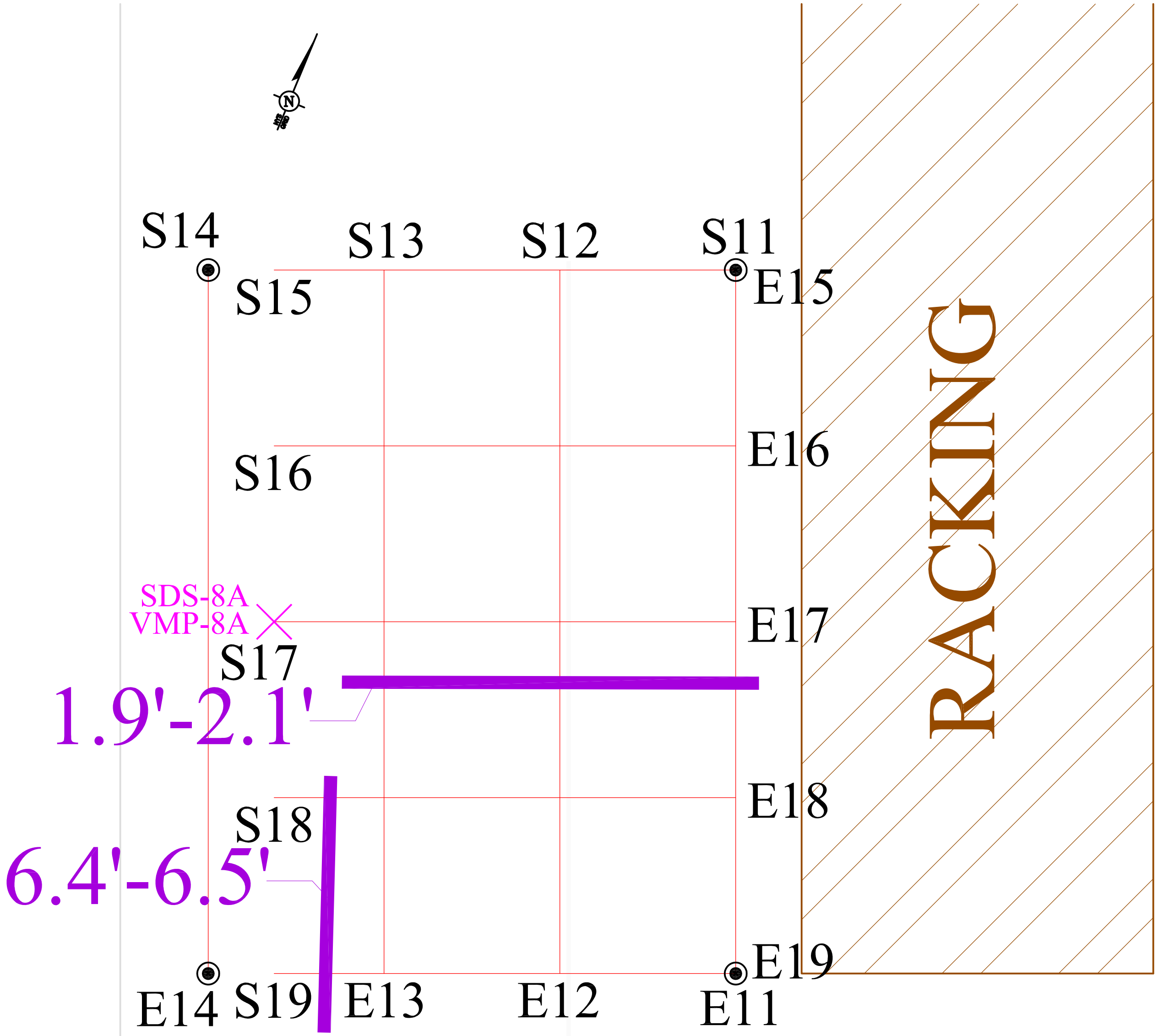
1"=2'

GPR INVESTIGATION
LOCKHEED MARTIN FORMER FRENCH ROAD FACILITY
**VMP-8B/HALLWAY**

UTICA NEW YORK


SPECTRA SUBSURFACE IMAGING, LLC
19 British American Boulevard
Latham, New York 12110
TEL (518) 782-0882 FAX (518) 782-0973


| DATE: | 05/13/13 | SCALE: | 1"=2' | PROJ NO. | 09091 | FIGURE 3 |
|---|---|---|---|---|---|---|




LEGEND

| | |
|---|---|
| SDS-8D | PROPOSED BORING LOCATION IDENTIFIED IN FIELD BY ARCADIS REPRESENTATIVE |
| ◉ | BASE POINT OF GPR INVESTIGATION MARK ON FLOOR AS BLACK CIRCLE WITH DOT |
| S1/E1 | START/END OF GPR TRANSECT |
| | GPR TRANSECT |
| 3.0' | DETECTED SUBSURFACE FEATURE (APPROXIMATE DEPTH SHOWN IN FEET) |

NOTES:

1. SHALLOW TUBING THROUGHOUT ENTIRE AREA SPACED ~2.0 FT. APART. REINFORCEMENT OR WIREMESH BELOW THIS.

2. TUBING REDUCES GPR DATA QUALITY.

3. PENETRATION DEPTH BETWEEN THE TUBING IS ~5.0 FT. PENETRATION DEPTH IS LESS THAN THIS BENEATH THE TUBING.

4. DEPTHS OF FEATURES ARE APPROXIMATE WITHIN ±10-20%.

5. GPR IS A NON-INVASIVE INVESTIGATION TECHNIQUE THAT MAY NOT FULLY RESOLVE ALL SUBSURFACE CONDITIONS DUE TO LOCAL VARIATIONS IN SUBSURFACE PROPERTIES AND THE PHYSICAL NATURE OF THE UNDERGROUND FEATURES.

| | |
|---|---|
| PROJ. MNGR: | JDC |
| DESIGNED BY: | REW/JDC |
| DRAWN BY: | REW |
| CHECKED BY: | JDC |
| APPROVED BY: | |
| CONTOUR INT.: | |
| DATUM: | |

0 1' 2'

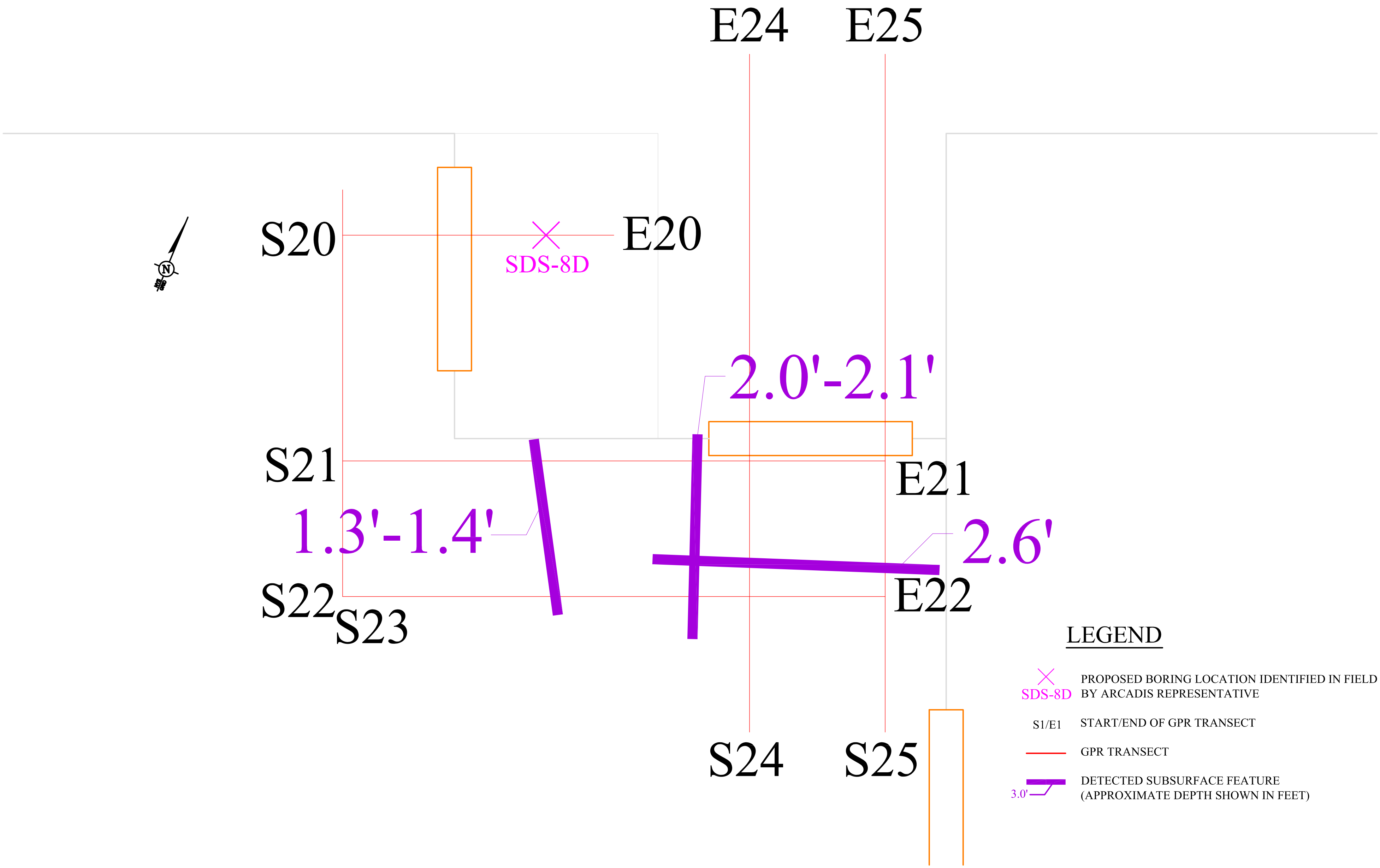
1"=2'

GPR INVESTIGATION
LOCKHEED MARTIN FORMER FRENCH ROAD FACILITY
**SDS-8A/VMP-8AWAREHOUSE 1**

UTICA NEW YORK

SPECTRA SUBSURFACE IMAGING, LLC
19 British American Boulevard
Latham, New York 12110
TEL (518) 782-0882 FAX (518) 782-0973

| DATE: | SCALE: | PROJ NO. | FIGURE |
|---|---|---|---|
| 05/13/13 | 1"=2' | 09091 | 4 |




NOTES:
1. RADAR PENETRATION DEPTH ~4.5'-5.0'

2. CLOSELY SPACED REINFORCEMENT BENEATH ENTIRE INVESTIGATION AREA IN TOP 1.0'

3. DEPTHS OF FEATURES ARE APPROXIMATE WITHIN ±10-20%.

4. GPR IS A NON-INVASIVE INVESTIGATION TECHNIQUE THAT MAY NOT FULLY RESOLVE ALL SUBSURFACE CONDITIONS DUE TO LOCAL VARIATIONS IN SUBSURFACE PROPERTIES AND THE PHYSICAL NATURE OF THE UNDERGROUND FEATURES.

| | |
|---|---|
| PROJ. MNGR: | JDC |
| DESIGNED BY: | REW/JDC |
| DRAWN BY: | REW |
| CHECKED BY: | JDC |
| APPROVED BY: | |
| CONTOUR INT.: | |
| DATUM: | |

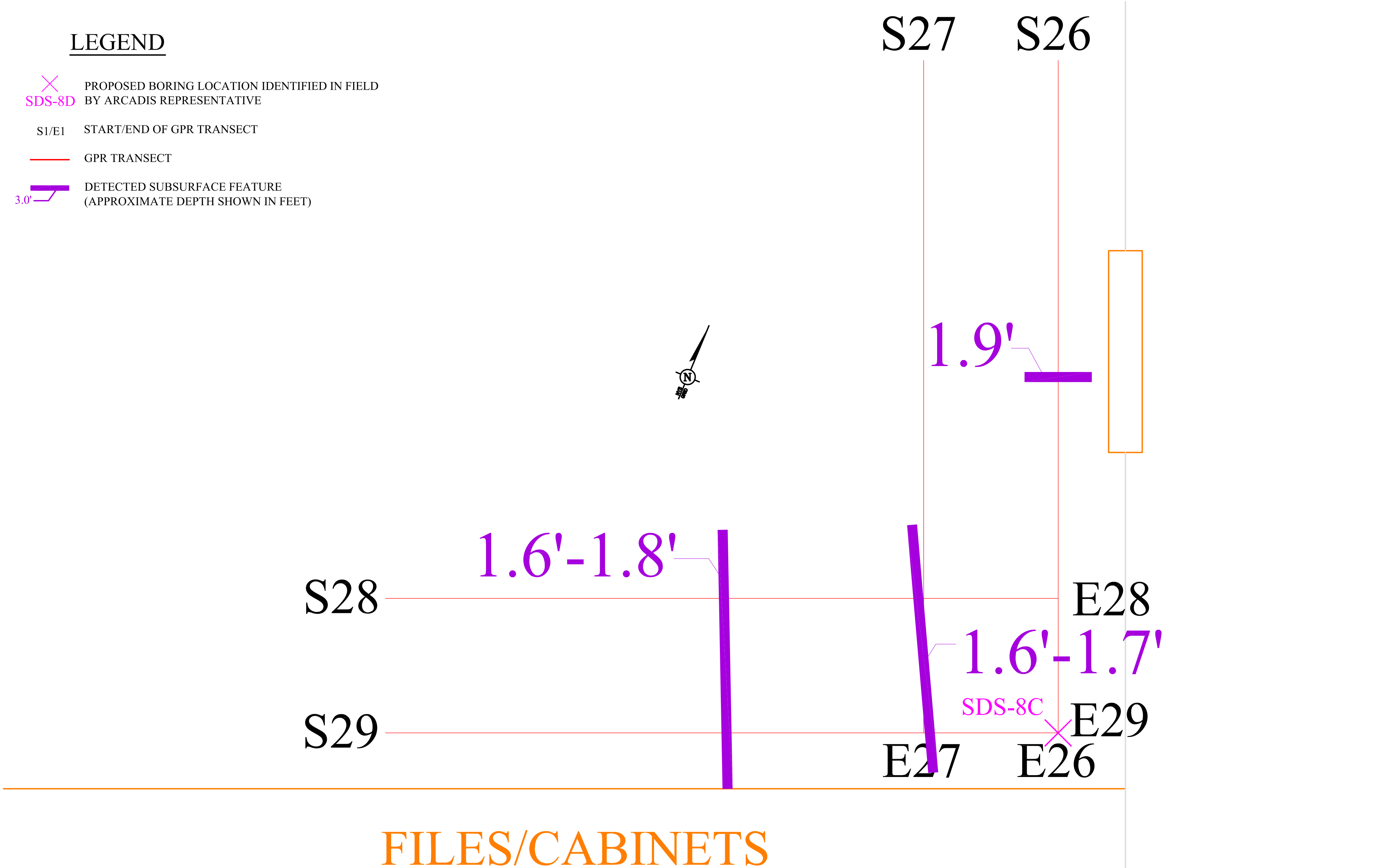
0 1' 2'
1"=2'

GPR INVESTIGATION
LOCKHEED MARTIN FORMER FRENCH ROAD FACILITY
**SDS-8D/OFFICE**

UTICA NEW YORK

SPECTRA SUBSURFACE IMAGING, LLC
19 British American Boulevard
Latham, New York 12110
TEL (518) 782-0882 FAX (518) 782-0973

| DATE: | 05/13/13 | SCALE: | 1"=2' | PROJ NO. | 09091 | FIGURE 5 |
|---|---|---|---|---|---|---|




NOTES:
1. RADAR PENETRATION DEPTH ~3.0'-5.0'

2. CLOSELY SPACED REINFORCEMENT BENEATH ENTIRE INVESTIGATION AREA.

3. DEPTHS OF FEATURES ARE APPROXIMATE WITHIN ±10-20%.

4. GPR IS A NON-INVASIVE INVESTIGATION TECHNIQUE THAT MAY NOT FULLY RESOLVE ALL SUBSURFACE CONDITIONS DUE TO LOCAL VARIATIONS IN SUBSURFACE PROPERTIES AND THE PHYSICAL NATURE OF THE UNDERGROUND FEATURES.

| | |
|---|---|
| PROJ. MNGR: | JDC |
| DESIGNED BY: | REW/JDC |
| DRAWN BY: | REW |
| CHECKED BY: | JDC |
| APPROVED BY: | |
| CONTOUR INT.: | |
| DATUM: | |

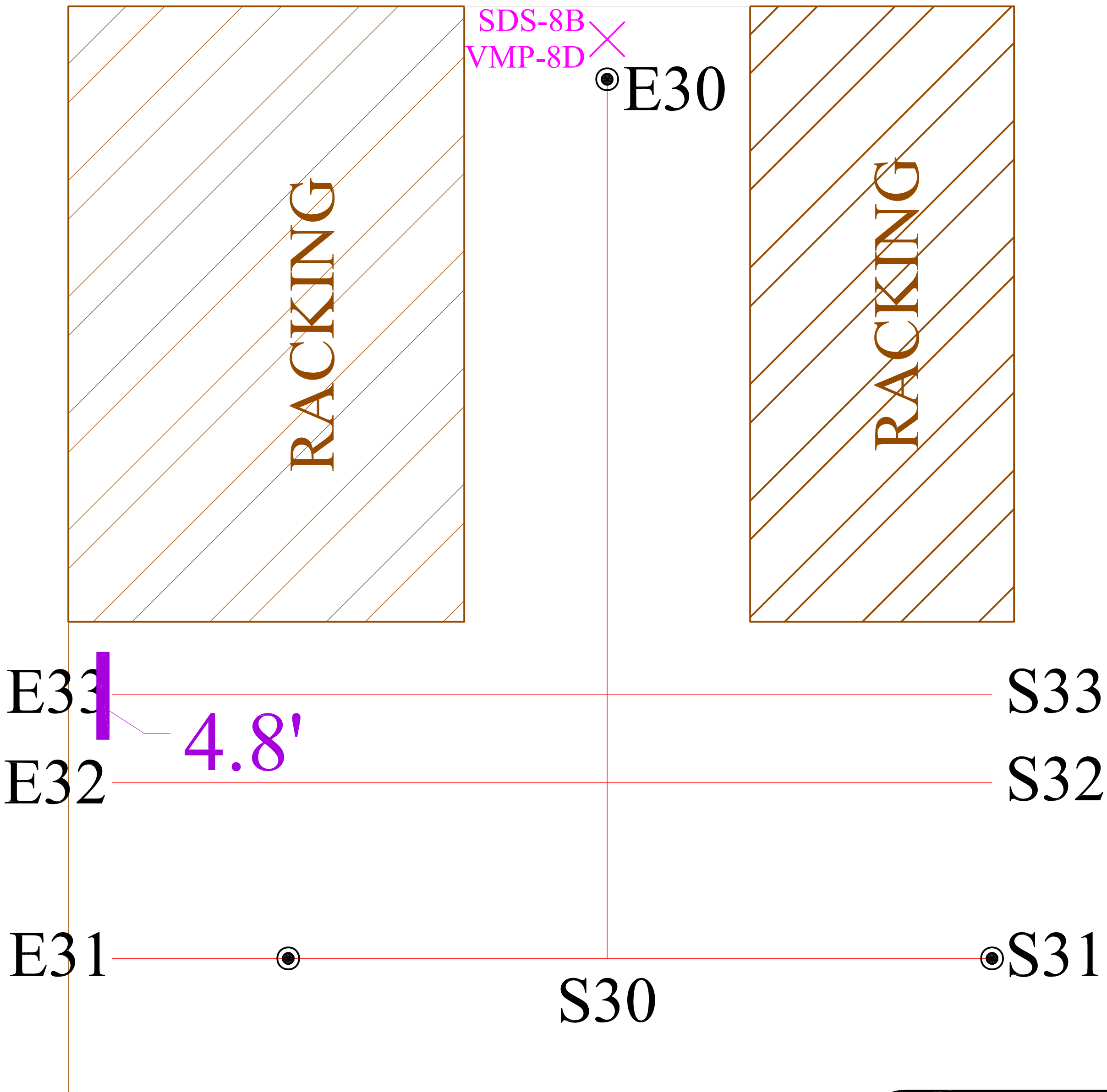
0 1' 2'
1"=2'

GPR INVESTIGATION
LOCKHEED MARTIN FORMER FRENCH ROAD FACILITY
**SDS-8C/OFFICE**

UTICA NEW YORK

SPECTRA SUBSURFACE IMAGING, LLC
19 British American Boulevard
Latham, New York 12110
TEL (518) 782-0882 FAX (518) 782-0973

| | | | | | | |
|---|---|---|---|---|---|---|
| DATE: 05/13/13 | SCALE: | 1"=2' | PROJ NO. | 09091 | FIGURE 6 | |




## LEGEND

SDS-8D — PROPOSED BORING LOCATION IDENTIFIED IN FIELD BY ARCADIS REPRESENTATIVE

BASE POINT OF GPR INVESTIGATION MARK ON FLOOR AS BLACK CIRCLE WITH DOT

S1/E1 — START/END OF GPR TRANSECT

GPR TRANSECT

3.0' — DETECTED SUBSURFACE FEATURE (APPROXIMATE DEPTH SHOWN IN FEET)

NOTES:
1. RADAR PENETRATION DEPTH ~4.0'-5.0'

2. TUBING OR REINFORCEMENT PRESENT BENEATH THE FLOOR WITH A SPACING OF ABOUT 1.0 FEET.

3. DEPTHS OF FEATURES ARE APPROXIMATE WITHIN ±10-20%.

4. GPR IS A NON-INVASIVE INVESTIGATION TECHNIQUE THAT MAY NOT FULLY RESOLVE ALL SUBSURFACE CONDITIONS DUE TO LOCAL VARIATIONS IN SUBSURFACE PROPERTIES AND THE PHYSICAL NATURE OF THE UNDERGROUND FEATURES.

| | |
|---|---|
| PROJ. MNGR: | JDC |
| DESIGNED BY: | REW/JDC |
| DRAWN BY: | REW |
| CHECKED BY: | JDC |
| APPROVED BY: | |
| CONTOUR INT.: | |
| DATUM: | |

0 1' 2'
1"=2'

GPR INVESTIGATION
LOCKHEED MARTIN FORMER FRENCH ROAD FACILITY
**SDS-8B/VMP-8D/WAREHOUSE 2**

UTICA NEW YORK

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Latham, New York 12110
TEL (518) 782-0882 FAX (518) 782-0973

| DATE: | 05/13/13 | SCALE: | 1"=2' | PROJ NO. | 09091 | FIGURE 7 |
|---|---|---|---|---|---|---|