OPERATION AND MAINTENANCE PLAN

FOR THE:

PHASE 1 SUB-SLAB DEPRESSURIZATION SYSTEMS AT THE FORMER HOOVER FACILITY – WEST FACTORY AREA

LOCATED AT:

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Environment / Energy / Infrastructure

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1.0 INTRODUCTION

This Operation and Maintenance (O&M) Plan has been developed by Hull & Associates, Inc. (Hull) on behalf of Maple Street Commerce, LLC (Maple Street) to describe operation, maintenance, and sampling procedures for the Phase 1 Sub-Slab Depressurization Systems (SSDS) to be installed in the West Factory Area of the Former Hoover Facility located at 101 East Maple Street, North Canton, Ohio (Site). This plan is submitted to the U.S. EPA pursuant to Section VIII.16 of the May 24, 2016 Administrative Order on Consent (AOC) for the Site, and in accordance with USEPA RCRA Guidance Documents on Interim Measures (IM) and Corrective Measures Implementation (CMI).

Redevelopment of the West Factory Area will occur in phases, and so too will the implementation of the SSDS Interim Measure. In a phased installation approach, as sub-areas of the West Factory Area become ready for human occupancy, pilot testing, SSDS design work, and HVAC installation will occur in those sub-areas, all of which may be performed subject to the U.S. EPA-approved work plan requirements, unless data demonstrates that only part or none of the interim measure work is required. Installation Plans and Specifications for the mitigation systems are included in Appendix A. This O&M Plan identifies the routine O&M tasks, monitoring, laboratory testing, potential operating problems, and record keeping required for the Phase 1 SSDSs associated with the sub-areas of the West Factory Area. In the event that later-phase SSDSs are installed in sub-areas of the West Factory Area not covered under Phase 1 of the Interim Measure, this O&M Plan may be modified to address the O&M requirements for the later-phase SSDSs.

2.0 DESCRIPTION OF PHASE 1 SUB-SLAB DEPRESSURIZATION EQUIPMENT

2.1 Mitigation Area

In Phase 1 of the Interim Measure, a total of 15 individual SSDSs will be installed in several sub-areas of the West Factory Area for vapor mitigation.[1] Each SSDS will utilize a vacuum blower to recover vapors from sub-slab extraction points or horizontal extraction laterals and will vent the vapors to ambient air above the roofline of the buildings. Sheet C3.0 in Appendix A depicts the location of the vapor extraction points/laterals, and Sheet C5.0 shows the rooftop location of each blower. The below table identifies the vapor mitigation area covered by the individual SSDSs, as well as the floor location beneath which the extraction points/laterals are installed.

TABLE 1: LIST OF PHASE 1 SUB-SLAB DEPRESSURIZATION SYSTEMS
FORMER HOOVER FACILITY - WEST FACTORY AREA

System	Vapor Mitigation Area	Blower I.D. (per Plans)	Floor Location
1	Retail 4A	B-1	First
2	Retail 3D	B-2	First
3	Office 3E Basement	B-3	Basement
4	Office 10C	B-4	Basement/First
5	Office 10C	B-5	First
6	Office 5A	B-6	First
7	Office 5A	B-7	First
8	Future Tenant 105C	B-8	Basement
9	Retail 14B	B-9	First
10	Future Tenant 109G	B-10	First
11	Future Tenant 109G	B-11	First
12	Lobby 38A/Loading 38B	B-12	First
13	Office 10B Tunnel/Cistern	B-13	First
14	Office 10B East End	B-14	First
15	Future Tenant 109G Electrical Room West of Office 5A	B-15	First
Master Control Panel	Security Guard Shack	N/A	

[1] The current 2017 Phase 1 Interim Measures work will not include sub-areas Retail 2A, Retail 2B, and Parking 8A. The HVAC systems for the Phase 1 area is separate from sub-areas Retail 2A, Retail 2B, and Parking 8A. Should these sub-areas be redeveloped for human occupancy, a later Phase 2 will include pilot testing, SSDS design work, and HVAC installation in those sub-areas, all of which may be performed subject to the U.S. EPA-approved workplan requirements, unless data demonstrates that only part or none of the interim measure work is required. If Phase 2 interim measures are implemented, this O&M Plan will be updated accordingly.

2.2 Description of Phase 1 System Components

The primary components of each Phase 1 SSDS is summarized below.

- **Extraction Points/Laterals:** Each SSDS recovers sub-slab vapors from one or more extraction points or extraction laterals. The extraction points are 12-inch diameter pits installed approximately 12-inches beneath the concrete floor slab and backfilled with a granular material. The extraction laterals are constructed of 4-inch diameter, 0.020-inch slotted pipe, and are installed in shallow trenches beneath the concrete floor slab. Construction details for the extraction points and laterals are displayed on Sheets C6.0 and C7.0 in Appendix A.

- **Extraction Risers:** Each extraction point/lateral is connected to an above ground, 3-inch or 4-inch diameter vertical extraction riser. Each riser includes a manual flow control valve, vacuum gauge, and sample port. The risers are installed adjacent to building columns, with valves, gauges and sample ports installed approximately 3-5 feet above ground surface for easy access. Construction details for the risers are displayed on Sheet C6.0 in Appendix A.

- **Manifold/Vent Piping**: Extraction risers for each SSDS are routed vertically to the first floor ceiling space where they are connected to horizontal headers. The headers connect to a main ventilation pipe for each SSDS that is routed vertically from the first floor ceiling to the building's rooftop. Each main header is connected to the SSDS enclosure via a short horizontal pipe installed at the rooftop. The manifold/vent piping plan is displayed on Sheet C4.0 in Appendix A.

- **SSD Blowers**: Each SSDS includes either a radial (centrifugal) or regenerative blower to recover sub-slab vapors. The type of blower for each SSDS was selected based on pilot testing. The radial blowers are utilized in areas that required low to moderate vacuums (approximately 5 to 30 inches of H_2O), and the regenerative blowers are utilized in areas where higher vacuums (approximately 30 to 60 inches of H_2O) are required. Each regenerative blower includes an in-line particulate filter and a fresh air dilution valve. Each radial blower includes an effluent slide-gate damper. Particulate filters are not required for the radial fans due to higher internal tolerances than the regenerative blowers. A variable frequency drive (VFD) is included for each blower to control the flow/vacuum of each system. Additionally, a vacuum transmitter is installed at the inlet to each blower.

- **Equipment Enclosure:** Each SSDS blower is housed in a small, roof-mounted metal enclosure. The enclosure is ventilated, weatherproof, and lockable. The enclosure interiors are electrically classified as Class I, Division II, Group D. An electrical panel is mounted to the outside of the enclosure to contain the VFD, circuit breakers/overload protection, and a disconnect switch. The panel includes a Hand-off-auto (HOA) switch, alarm light, running light, and radio communication equipment to transmit and receive signals to/from the master control panel.

- **Master Control Panel –** Communications signals from each individual SSDS, including the blower inlet vacuum, low vacuum alarm, and blower fault alarm, are transmitted via radio signals to a master control panel located in the Facility's Guard Shack. The master panel includes a radio communications receiver (gateway), programmable logic controller (PLC), and human-machine interface (HMI). On-Site operators can monitor the status of each SSDS from the master panel, check for system alarms, and turn on/off the individual

blowers, as needed. Operational data is logged by the master panel. Additionally, a cellular modem is installed in the control panel to allow remote monitoring of the SSDS via the internet, and to provide notification in the event of a system alarm.

Cut sheet and specifications for the equipment are included in the equipment manual provided by the SSDSs manufacturer (Appendix B).

2.3 Description of System Operation

A generalized flow diagram for the Phase 1 SSDSs is shown on Plate C8.0 of Appendix A. The purpose of the SSDSs is to prevent migration of soil gas and groundwater vapors into the buildings. While the SSDS system is designed as an engineering control to prevent vapor intrusion, the system may also provide ancillary benefit of reducing subsurface concentrations over time. Each SSDS system applies a low vacuum (in the range of 5 to 60 inches of H_2O) to the sub-slab environment via a series of extraction points or laterals to induce a negative pressure gradient beneath the subject buildings to prevent vapor intrusion to indoor air. Sub-slab vapors present beneath each subject building are subsequently recovered from each of the extraction pits/laterals. The systems are designed to operate on a continuous basis with the exception of periodic shut-downs to conduct maintenance. Based on laboratory analytical testing, the cumulative discharge of the SSDSs is expected to be well below Ohio EPA *de minimis* air emission standards, and therefore does not require treatment prior to atmospheric discharge. As described in Section 4.3.2, carbon units may be incorporated into the SSDSs in the future, as needed, based on effluent air monitoring results.

The minimum target sub-slab differential pressure for each vapor mitigation area is -0.004 in. H_2O. Based on pilot testing, the sub-slab vacuum at vapor pins in close proximity to extraction points and laterals is expected to be between -0.04 to -0.10 in. H_2O, with vacuum at certain pins greater than -0.10 H_2O. The sub-slab vacuum at pins located further from extraction points is generally expected to be between -0.04 to -0.004 in. H_2O. The exhaust temperature for the regenerative blowers are expected to be approximately 140 to 220 °F, and the exhaust temperature for the radial blowers are expected to be approximately 80 to 160°F. The SSDSs are designed to minimize power consumption while maintaining effective vapor mitigation. This is achieved by operating each blower at an optimum flow/vacuum setpoint that will maintain sub-vacuum at or above -0.004 in. H_2O across the entire mitigation area while not "over-extracting" vapors by applying excessive flow/vacuum. The optimal operating point may vary based on seasonal conditions (e.g., winter versus summer). Anticipated flow and vacuum operational parameters for the Phase 1 SSDSs under normal operating conditions are summarized in Table 2.

TABLE 2: NORMAL SSDS OPERATIONAL PARAMETERS

System	Blower I.D. (per Plans)	Type of Blower	System Air Flowrate	Vacuum at Blower Inlet	Vacuum at Riser	Filter Diff. Pressure	Blower Speed	Blower Disch. Temp
#	(B-#)	(Type)	(SCFM)	(in-H_2O)	(in-H2O)	(in-H2O)	(percent)	(deg. F)
1	B-1	Radial	500 - 600	22 - 28	18 - 24	N/A	50 - 100	80 - 160
2	B-2	Radial	650 - 750	12 - 16	12 - 16	N /A	50 - 100	80 - 160
3	B-3	Regenerative	25 - 30	40 - 50	36 - 46	4 - 8	50 - 100	140 - 220
4	B-4	Regenerative	80 - 110	55 -65	51 -61	4 - 8	50 - 100	140 - 220
5	B-5	Regenerative	90 -120	55 - 65	51 -61	4 - 8	50 - 100	140 - 220
6	B-6	Radial	250 - 300	6 - 12	4 - 10	N/A	50 - 100	80 - 160
7	B-7	Radial	350 - 400	22 - 28	18 - 24	N/A	50 - 100	80 - 160
8	B-8	Radial	200 - 275	22 - 28	18 - 24	N/A	50 - 100	80 - 160
9	B-9	Radial	200 - 275	14 - 16	10 - 12	N/A	50 - 100	80 - 160
10	B-10	Radial	200 - 275	14 - 16	10 - 12	N/A	50 - 100	80 - 160
11	B-11	Regenerative	120 - 160	55 - 65	50 -60	4 - 8	50 - 100	140 - 220
12	B-12	Regenerative	140 - 180	55 - 65	50 -60	4 - 8	50 - 100	140 - 220
13	B-13	Radial	400 - 475	3 - 6	2 - 4	N/A	50 - 100	80 - 160
14	B-14	Radial	110 - 150	3 - 6	2 - 4	N/A	50 - 100	80 - 160
15	B-15	Radial	70 - 100	3 - 6	2 - 4	N/A	50 - 100	80 - 160

The vacuum/flow of each blower can be controlled by adjusting the speed setpoint via the blower's VFD. System operational parameters will be adjusted during regularly scheduled O&M visits, as necessary, to maintain optimal system operation. While the system has been conservatively designed to provide effective sub-slab ventilation during periods of adverse weather, seasonal weather fluctuations and changes in atmospheric pressure may result in modification of the operational ranges provided in Table 2. The optimal operating parameters for each season will be evaluated and adjusted at a higher frequency throughout the first year of system operation; the above table will be modified in subsequent revisions of this O&M Plan, if necessary. Equipment malfunction and repairs will be addressed in a timely manner to maintain optimal operational parameters to the extent practical.

3.0 PHASE 1 SYSTEM MONITORING AND SAMPLING

The goal of the SSDS is to eliminate the potential for sub-slab soil gas and groundwater vapors to intrude into the indoor air of the building, thereby eliminating the potential indoor air exposure pathway. Certain system monitoring and sampling will be conducted in three distinct periods of the SSDS operational life to ensure this goal is achieved: (1) Start-up testing and verification sampling will be conducted between 30-60 days following system installation to balance the flow/vacuum across the sub-slab extraction points, to verify the system is operating as designed (See Table 3), and to document outdoor concentrations; (2) Once steady state conditions have been achieved, periodic inspections and system monitoring will be implemented to ensure the system continues to operate as designed and as described in the following sections (See Section 4.0); and (3) Sampling to terminate SSDS Operation (See Section 3.1). The system checklist provided in Appendix C will be used to document the measurements. A schedule of the monitoring tasks is included in Appendix D

3.1 Equipment Commissioning and SSDS Start-up

Commencement of SSDS operations will occur in two phases. The first phase, initial Equipment Commissioning, involves the short-term operation of each blower on an individual basis for purposes of blower system tuning and optimization. The second phase, SSDS Start-up, involves the commencement of all 15 blowers operating collectively and continuously. A description of SSDS initial Equipment Commissioning and Start-up, and the outdoor air verification sampling and the indoor air confirmation sampling programs that will be implemented upon SSDS Start-up are described in the sections below.

3.1.1 Equipment Commissioning

As described in Section 2.0, the SSDS includes 15 individual blowers with local control panels. The initial Equipment Commissioning phase will involve commissioning of the individual blower systems. This work will include verifying electrical connections and blower rotation, testing all alarms, verifying communications with the master control panel, checking the piping network, and verifying blower operational parameters (i.e., vacuum, air flow, temperature) are within expected ranges. The initial commissioning will involve operating each individual blower for a short period of time (i.e., approximately two hours per blower). One blower will be operated at a time, and the sub-slab vacuum within the area of influence of that blower will be measured. The concrete slab near the extraction points connected to the blower will be monitored for possible short-circuiting of the sub-slab vacuum. Sealing of cracks will be performed, as needed, to mitigate short-circuiting. The master control panel will also be commissioned during this initial phase of system start-up, including testing of alarms and remote communications. Following initial commissioning, all blowers will be shut-off for a minimum of two weeks prior to start-up of the entire system.

3.1.2 Start-up of Continuous SSDS Operations

Following Equipment Commissioning and subsequent down-time, SSDS Start-up will be commenced – i.e. all 15 blowers collectively will be placed into continuous operation. The individual system components will be tested and calibrated during the Equipment Commission phase (as described above) to allow optimum efficiency of the entire system to be reached as quickly as possible during the startup phase. However, it is likely that additional optimizations, such as balancing of the system flowrates, will be needed based on operation of the entire system during the startup period. During the Start-up period (approximate 30 to 60 days), the system will be closely monitored, and adjustments will be made to optimize performance as quickly as possible. Diagnostic testing and sampling will be implemented at specific intervals during this startup period. A description of the testing and sampling to be conducted is outlined in the following sections.

3.1.2.1 SSDS Diagnostic Test – Pressure Differential Measurement

The SSDSs are designed to maintain a vacuum beneath the building slab regardless of heating, ventilation, and air conditioning (HVAC) conditions, thereby creating a preferential flow pathway that will prevent migration of soil gas into the building. The selected performance standard is to maintain a minimum sub-slab differential pressure of -0.004 in. H_2O which is in conformance with industry practices for maintaining an adequate depressurization field under the floor slab of large enclosures [(Brodhead, William and Thomas E. Hatton. High Vacuum, High Airflow Blower Testing and Design for Soil Vapor Intrusion Mitigation in Commercial Buildings. pp.2.) (Radon Prevention in the Design and Construction of Schools and Other Large Buildings, EPA/625/R-92/016)]. Therefore, following a visual inspection of system components, documentation of sub-slab vacuum pressure differential will be completed one or more times at the following intervals during the start-up period:

- Within the first 24-hours after start-up;
- On the 5th day following start-up;
- On the 15th day following startup; and
- Between 15th and 60th day following startup.

Sub-slab differential pressure measurements will be collected using a series of permanent, sub-slab monitoring points (consisting of Cox-Colvin Vapor Pins) to ensure the performance standard is met. Sub-slab vacuum monitoring points have been installed through the floor slab that may be used to monitor vacuum and area being influenced by the system. The locations of the monitoring points are displayed on Sheet C3.0 in Appendix A.

In addition to confirming the pressure differential performance standard has been met, SSDS diagnostic testing will include measurements of the blower speed, inlet vacuum, air flow, and exhaust temperature. The criteria for these measurements are listed in Table 2 above. Data collected from the diagnostic testing will be used to optimize system performance by balancing the air flow and/or adjusting blower operational parameters (e.g., speed setpoint).

3.1.2.2 Outdoor Air Verification Sampling

Air emissions calculations utilizing concentrations obtained as part of the pilot test indicate that full-scale SSDS emissions are anticipated to meet de minimis criteria (i.e., <10 lbs/day and < 1 ton/yr HAPs) following full operation of the SSDS. Outdoor air sampling will be conducted to verify that concentrations of trichloroethene (TCE) in air emissions from the SSDS do no present an unacceptable risk to human health without the SSDS being equipped with emission controls. Details of the SSDS post-startup outdoor air verification sampling program are included in Appendix E.

3.1.2.3 SSDS Effluent Discharge Sampling

As stated previously, based on numerous samples collected during pilot testing, potential emissions of organic compounds from the proposed blower system were estimated to be substantially below de minimis air emissions standards pursuant to Ohio Administrative Code (OAC) 3745-15-05. In addition to outdoor air verification sampling (see Section 3.1.4), effluent discharge sampling will be completed after the SSDSs are operational to confirm that system emissions remain below de minimis criteria and that carbon treatment is not necessary. Effluent air grab samples will be collected from blower discharge streams at the same time outdoor air samples are collected as summarized in Section 3.1.2.2. This data will be utilized to identify which, if any, blowers may require activated carbon treatment. Summa canisters or tedlar bags will be used to collect effluent samples. The samples will be submitted to a certified laboratory for analysis of VOCs by U.S. EPA Method TO-15.

3.1.2.4 Indoor Air Confirmation Sampling

Two rounds of indoor air sampling will be implemented at the locations listed in Table 3, below, to confirm the SSDSs maintain concentrations of VOCs in the breathing space below the established indoor air standards. Prior to sampling, pre-sampling inspection activities are to be conducted at each location using a photoionization detector (PID), and an inspection of each sampling location will be completed in order to rule out any potential influences from building materials or consumer products. One outdoor air sample will also be collected from a location upwind of the West Factory Area to evaluate ambient air conditions during the indoor air sampling event. Summa canisters will be used at each location, certified by a laboratory and fitted with a regulator that

allows ambient air to be collected over a 24-hour period. The air samples will be submitted to Pace Analytical for analysis of select VOCs by U.S. EPA Method TO-15. The sample locations are shown on sheet C3.0 in Appendix A.

TABLE 3

PHASE 1 CONFIRMATORY SAMPLING REGIME

Sample I.D.		Building/Zone Location	Target Analyte List	Matrix	Method	Container(s) (number, size & type per sample)	Sample Collection Duration
Indoor Air	AI-1	Basement (Zone 5)	1,2-Dichloroethane 1,2,4-Trimethylbenzene Carbon Tetrachloride Chloroform Methylene Chloride Naphthalene Tetrachloroethene Trichloroethene Vinyl Chloride	Air	VOCs by U.S. EPA Method TO-15	(1) 6-L Summa	24-Hr Composite
	AI-1 FLR1	Future Tenant 105C (Zone 5)					
	AI-16AFLR1	Near Retail 3B A (Zone1)					
	AI-17	Retail 4A (Zone1)					
	AI-18	Office 5A (Zone 4)					
	AI-21	Future Tenant 109G (Zone 7A)					
	AI-22	Future Tenant 109C (Zone 7A)					
	AI-23	Basement below Office 10C (Zone 3)					
	AI-23BFLR1	Retail 10B (Zone 2)					
	AI-23CFLR1	Retail 10C (Zone 3)					
	AI-24	Retail 14B (Zone 6)					
	AI-23DFLR1	Lobby 38A					
	AI-23EFLR1	Lobby 38B					
	TBD [a.]	Upwind of West Factory Area					
Ambient (Outside) Air							Background 24-hr

a. TBD - Ambient Air Sample Location To Be Determined (TBD).

Indoor air confirmation sampling will be conducted twice during the first year of operation and will include one baseline sampling event that will be conducted concurrent with the initial system diagnostic test described in Section 3.1.2.1, above, and a second event, preferably in the winter of that year (November 1 to March 31) if the initial event was not conducted in the winter. The analytical results of the indoor air confirmatory samples will be compared to U.S. EPA Regional Screening Levels (RSLs) for Residential Indoor

Air where the hazard index is equivalent to 1 and the cancer risk goal is equivalent to 1 x 10^{-5} (i.e., the same hazard and risk goals utilized to identify the necessity of active vapor mitigation) or site-specific risk-based criteria. If the initial diagnostic test demonstrates that pressure differential performance standard has been met, and the results from both indoor air confirmation sampling events are below the RSLs (or site-specific criteria) for the target VOCs, then the SSDS implementation will be deemed effective and the second phase of system monitoring will be commenced (see Section 3.2). No further indoor air sampling will be conducted as long as the semi-annual pressure differential tests continue to provide confirmation that the performance standard is being met.

If analytical results exceed the RSLs (or site-specific criteria), (1) the results will be compared to historic analytical results at the affected location to determine if concentrations have increased or decreased; and (2) an evaluation will also be made to determine if materials stored within or as part of new construction may be contributing to the indoor air exceedances. The indoor air sample(s) will be recollected following another 2 to 4 weeks of SSDS operation. If the resampling shows analytical results exceeding the RSLs, system operational adjustments and/or modifications to enhance performance may then be necessary. Indoor air sample(s) will then be recollected following another 2 to 4 weeks of SSDS operation. If analytical results continue to exceed their respective RSLs (or site-specific criteria), a multiple lines of evidence approach may be utilized to demonstrate that attainment of a numerical value (i.e., the RSL) may not be likely in a given area, however, attainment of the RSL may not be necessary for various reasons (i.e., occupancy characteristics, location, etc.). The results of the confirmatory sampling event(s), including any potential demonstrations, will be reported to the U.S. EPA in a summary report.

If at any time the SSDS fails to operate effectively (i.e. the system is not achieving the desired target sub-slab differential pressure of 0.004 inches of H_2O), or there is a significant alteration that may affect system operation, another sampling event outside of this schedule may be completed to ensure the protection of human receptors. A significant alteration to the building would include any change that could diminish or short circuit the sub-slab vacuum, such as a building add-on, foundation modification, utility installation, HVAC alteration, etc.

3.2 Periodic System Monitoring

Once proper system operation and effectiveness is confirmed by the testing described in Section 3.1, periodic system monitoring will be conducted to ensure the system continues to operate as designed. The periodic system monitoring will include the following activities.

3.2.1 Master Control Panel - Telemetry and Remote Monitoring

The master control panel will receive operational data from the individual SSDS blowers and will be used to remotely view the status of each blower. The panel will transmit a daily operational report that will be sent via electronic communications (e.g., text or email) to the Project Manager and Project Engineer. The daily report will include the following information, at a minimum, for each blower:

- Blower operational status (HAND/ON/OFF);
- The blower inlet vacuum level;
- A list of all active system alarms, if present, including
  - Blower fault alarm;
  - low vacuum alarm;
  - communication/power loss alarm.

While periodic visual inspections and manual measurements will be collected from the SSDDs as described below, the master control panel will provide ongoing, real-time monitoring data and immediate notification of system alarms.

3.2.2 Visual Inspections and System Measurements

The following routine visual inspections of the SSDS components, and documentation of system operational conditions will be conducted to confirm that the SSDS is effectively operating as designed.

- Visual inspection of system components, including extraction risers, piping, equipment, and enclosure for damage or abnormal conditions;
- Visual inspections to ensure there are no significant changes to the building construction that would impact operation of the mitigation system (e.g., foundational concerns, cracks, remodeled areas, or additions to the building);
- Measurements of the blower speed, inlet vacuum, air flow, exhaust temperature;
- Measurement of the differential pressure across the in-line filters for the regenerative blowers.

Flowrate/vacuum measurements will also be collected from the individual extraction risers, as needed, to balance the sub-slab area of influence. Following the startup period (i.e., the initial 3 months of operation), the measurements listed above will be collected at a minimum on a semi-annual basis for the first year and on an annual basis thereafter. The measurements may be conducted more frequently based on observed operations (i.e. if the operational parameters have significantly changed from the previous monitoring event, if the operational parameters are outside the anticipated range listed in Table 2, or if inspections indicate potential damage or malfunction of equipment) and seasonal fluctuations (i.e.

temperature or pressure changes that may affect system operations). Specifically, the following measurements will be collected:

1. Visual inspections following construction work near system piping or equipment;
2. Visual inspections and repairs, if needed, in response to a system alarm;
3. System operational measurements and visual inspection when a blower inlet vacuum is outside the anticipated normal range listed in Table 2
4. System operational measurements during the winter and summer seasons during the first year of operation.

Operational status will be monitored frequently at the master control panel by Facility personnel, and daily operational reports will be sent to the project team as described in Section 3.2.1. A user's guide containing normal operational ranges and contact information in the event of abnormal operations will be placed adjacent to the master panel.

3.2.3 Documentation of Pressure Differential

Routine documentation of sub-slab vacuum pressure differential will be completed utilizing a series of permanent, sub-slab monitoring points (consisting of Cox-Colvin Vapor Pins) to ensure the pressure differential performance standard (see Section 3.1.1) is met. Following the startup period, these measurements will be collected on a semi-annual basis for the first year and on an annual basis thereafter. The measurements may be conducted more frequently based on observed operations and seasonal fluctuations. Specifically, sub-slab pressure measurements will be collected.

1. Following any significant changes to the building construction that may impact operation of the mitigation system. Significant changes to the building may include building add-ons, foundation modifications, utility installation, HVAC alterations, etc.
2. Following any significant repair/change to an SSDS system. Significant repair/change could include adding or removing an extraction point, changing the size or type of blower, adding any form of effluent treatment, changing the operating speed of the blower by VFD adjustments, cleaning/replacing an in-line filter, or repair/modification of system extraction piping.
3. Following any adjustment to the extraction riser manual control valves to "balance" flow/vacuum.
4. If the blower inlet vacuum is outside the anticipated normal range listed in Table 2.

4.0 SYSTEM OPERATIONS AND MAINTENANCE

4.1 Routine Maintenance of System Components

Routine maintenance of system components will be completed to ensure the system is operating at peak performance. The equipment manual provided by the SSDS equipment vendor is included as Appendix B, and describes routine maintenance for the system components, including O&M manuals (i.e., system manuals) for each system component. A schedule of the O&M tasks in included in Appendix D. The radial and regenerative blowers utilized by the SSDSs generally require minimal maintenance. Routine maintenance will include the following in accordance with Appendix B:

- Radial blowers – visual inspection/cleaning of dirt/debris on the outside of the blower; visual inspection/cleaning of the blower wheel for corrosion, wear, or buildup; lubrication of blower bearings; and draining of any condensate from the blower housing.
- Regenerative blowers - visual inspections/cleaning of dirt/debris on the outside of the blower; monitoring/cleaning of the blower inlet (e.g., inline filter) to prevent restrictions that could resulting in increased operational temperature.
- The influent filters for the regenerative blowers will be changed when the differential pressure across the filter exceed approximately 6 to 10 in. H_2O above the normal "clean" pressure differential.
- Visual inspections of the SSDSs will routinely be completed as summarized in Section 3.1, and any system maintenance or repairs will be implemented as needed based on the visual inspections.

4.2 Parts Replacement Schedule

The inline particulate filter elements are the only components of the SSDS that require routine replacement. A filter element will be replaced when the differential pressure exceeds 6 to 10 in. H_2O above the normal "clean" differential pressure. The replacement frequency of a particulate filters will vary depending on the particulate loading in the recovered vapor stream, but is anticipated to be approximately every 6 to 18 months. Besides the particulate filter elements, a SSDS part will only require replacement when the part is damaged or malfunctions. Damaged components will be replaced using the same component model or an engineer approved equal. Based on experience with similar SSDSs, the following components are more prone to periodic replacement:

- Vacuum Gauge - A vacuum gauge will be replaced when the gauge stops recording or the dial becomes "stuck". The replacement vacuum gauge will be scaled for the full vacuum range of the SSDS blower.
- Temperature Gauge - A temperature gauge will be replaced when the gauge stops recording or the dial becomes "stuck". The replacement gauge will be scaled from 0 to 250°F.

- Manual Control valve – A manual control valve will be replaced if it is damaged or stuck in a particular position. The control valve will be replaced using a PVC industrial ball valve with lockable handle.
- Piping component – An extraction pipe or fitting will be replaced if it is shows signs of deterioration or damage, such as warping, cracking, or discoloration. The piping will be replaced with a schedule 40 PVC or higher rated pressure pipe (e.g. schedule 80 PVC).

In addition to the above specific components, any other component that is damaged or malfunctions will be promptly replaced, and the system will be returned to normal operations as quickly as possible. The Manufacturer's System Manual (Appendix B) will include a full list of system components, including model numbers and specifications.

4.3 Potential Operating Problems

The SSDSs are relatively simple systems with components that typically are durable and long lasting. However, if mechanical problems cause the SSDS to be inoperable, the system will be repaired as quickly as possible. Other than the vacuum blowers, the components of the SSDS (i.e., piping and electrical parts) are off-the-shelf items for which replacements parts should be readily available. If an electrical or piping component fails causing a blower to temporarily shut down, the failed component will be repaired or replaced and the blower restarted as soon as possible, generally within a week or less. Because the typical lead time for a replacement blower is 4 to 6 weeks, if a blower fails and must be replaced or sent offsite for repair, a temporary replacement blower will be installed as a contingency to maintain operation of the extraction network if repair or replacement of the damaged blower is anticipated to take longer than one week. A temporary replacement blower will be kept at the site and will be available to immediately replace a damaged SSDS, if repairs cannot be promptly implemented. The temporary replacement blower will be sized to maintain the desired target sub-slab differential pressure of 0.004 inches of H_2O. Based on historical sub-slab and indoor air concentrations from previous sampling, this temporary downtime is not expected to result in exceedances resulting in exposures to residences. The site-wide SSDS includes 15 individual blower units. Temporary shutdown of one of the individual blowers will not affect operation of the remaining 14 blowers. Potential operating problems are identified below, including procedures that will be used to analyze and diagnose the problems, sources of information regarding the problems, and common or anticipated troubleshooting steps and remedies.

4.3.1 Obstruction or Blockage in System

The SSDS blowers may experience low flow and/or high exhaust temperature if an obstruction develops in the vacuum or discharge piping. Blower inlet vacuum substantially higher than those displayed on Table 2, and/or blower flowrates substantially lower than those displayed on Table 2 are indicative of a blockage

or obstruction. Riser vacuums substantially lower than those displayed on Table 2 may also be indicative of an obstruction between the blower and the riser. If the effluent temperature of a blower exceeds 230 °F for a regenerative blower, or 160 °F for a radial blower, an obstruction in the piping may exist. The blower VFDs are equipped with an overload alarm to protect the blower from damage due to abnormal operations. The thermal overload alarm will shut the blower down and trigger a "blower fault" alarm at both the local and main control panel. If a piping obstruction is suspected, the piping will be promptly inspected and repaired. Piping obstruction may include, but or not limited to, a completely closed control valve or discharge damper, a clogged filter, debris, condensate, or ice buildup.

4.3.2 Break or Leak in System Piping

A break or leak in the extraction piping will cause a large amount of ambient air to be drawn into the system, resulting in higher than normal flows and lower than normal vacuum levels. Depending on the size of the leak, the sub-slab vacuum field may be diminished, potentially resulting in insufficient vapor mitigation. Each SSDS will be equipped with a low vacuum switch. The low vacuum alarm point will be determined for each system during startup based on the minimum vacuum that must be sustained at the blower inlet to consistently maintain a sub-slab vacuum above the target of -0.004 in. H_2O. The low vacuum switch will trigger a "low vacuum" alarm at both the local and main control panels. The cause of the low vacuum condition will be promptly investigated and repaired, and the blower, riser and sub-slab vacuums will be subsequently monitored to ensure they are within the normal anticipated range.

4.3.3 Blower Malfunction

Each blower has a set of performance curves that define the static pressure and flowrate for a given operating speed. Performance curves for each blower are included in the manufacturer's equipment manual (Appendix B). A blower that is operating outside the performance curve will be inspected to determine if repairs are needed. Excessive noise, vibrations or operating temperature are also indications that a blower is malfunctioning. If malfunctions or abnormal operations are encountered, the main electrical disconnect for the SSDS on the local control panel should be turned off, the blower should be locked-out/tagged out (LO/TO), and the blower's O&M manual in Attachment B should be consulted for troubleshooting. If a blower fails to start, or shuts down unexpectedly, a "blower fault" alarm will be triggered at both the local and main control panel. The cause of the malfunction will be repaired prior to restarting the blower. Any repair or replacement of internal blower components must be completed by a qualified blower repair technician. As stated in Section 4.3, a temporary replacement blower will be installed as a contingency measure to maintain SSDS operation for situations in which repair or replacement of the damaged blower is anticipated to take longer than one week.

4.3.4 Low Sub-Slab Differential Pressure

A sub-slab differential pressure less than the target of -0.004 in. H_2O may result in insufficient vapor mitigation. A low differential pressure may be the result of an "imbalanced" system caused by higher air flow from certain extraction points than others, indicating the manual flow control valves at each riser need adjusted to generate a near uniform vacuum field across the entire mitigation area. The blower's speed can also be increased as a contingency to garner additional vacuum/flow, as needed. A low sub-slab vacuum could also be caused by a blower malfunction or damage to system piping. If the blower and piping are not damaged, and the sub-slab vacuum cannot be increased above the target level via system balancing, refer to Section 4.4.1 for alternative O&M to increase the sub-slab differential pressure.

4.3.5 System Controls Malfunction

As previously stated, SSDSs are equipped with local control panels that individually report back to the main control panel. If a failure occurs in the main control panel, such as damage to the PLC, modem, or radio communication equipment, local and remote monitoring via the main panel will be temporarily unavailable; however, the individual SSDSs will continue to operate (as long as there are no other alarms). If radio communication equipment fails at one of the local control panels, the blower for that system will continue to operate (as long as there are no alarms), and a loss of communication alarm will be indicated at the main panel. If a VFD or other critical electrical component of an individual SSDS fails, causing the blower to cease operation, a "blower fault" alarm will be triggered at the main control panel. The manufacture's equipment manual (Appendix B) includes a troubleshooting guide for the electrical components of both the main and local panels. All electrical repair work must be completed by a qualified electrician or technician following appropriate LO/TO procedures. As stated in Section 4.3, electrical components for the SSDS are readily available and will be promptly repaired or replaced in the event of a failure.

4.3.6 Power Loss

If an individual blower system shuts down due to a power loss, and alarm will be triggered in the main control panel and a notification will be sent to the project team. The cause of the power loss will be investigated and repaired as quickly as possible. The main control panel will be equipped with an uninterruptable power supply (UPS). If the main panel loses power, the UPS will maintain power to the telemetry system and a power loss alarm notification will be sent to the project team. As a contingency, the SSDS blower units will be connected to the facility's back-up generator. The generator will provide back-up power to the blowers during a facility-wide power loss.

4.4 Alternate O&M

This section describes alternate O&M procedures that will be employed should the SSDSs fail to operate as intended or if unanticipated conditions are encountered.

4.4.1 Sub-slab Differential Pressure Below Target Level

If the target sub-slab differential pressure of -0.004 in. H_2O cannot be achieved for a SSDS following system adjustments described in Section 4.3.4, alternative measures will be taken to ensure effective vapor mitigation is maintained. This may include one or more of the following:

- Additional data collection, such as targeted indoor air sampling, smoke testing, or other measurements to verify if sufficient vapor mitigation is achieved at sub-slab differential pressure less than -0.004 in. H_2O;
- Installation of additional extraction points to increase vacuum coverage in areas below the target differential pressure;
- Repair or replacement of extraction points that garner minimal sub-slab vacuum influence;
- Repair of any areas causing "short-circuiting" of the vacuum (e.g., cracks in the concrete floor); and/or
- Upsizing the SSDS vacuum blower.

4.4.2 *De Minimis* Standards Exceeded

In the event that the cumulative effluent discharge from the SSDSs exceed *de minimis* standards, granulated activated carbon (GAC) vessel(s) may be installed to reduce VOC concentrations prior to discharge. Carbon treatment would likely only be required for a limited number SSDSs, based on the individual system(s) discharging the highest amount of VOCs. In general, the SSDS have been conservatively designed to support incorporation of carbon treatment; however, if installation of carbon treatment is anticipated to diminish the effectiveness of a SSDS, installation of larger blower(s) will be evaluated on a case-by-case basis. Sampling results from the individual SSDSs will be used to determine which systems require carbon treatment. The effectiveness of GAC at treating the effluent discharge below *de minimis* standards will be assessed, initially, by sampling the effluent VOC concentrations in accordance with Section 3.1.2.3. If the results of the emissions samples conducted in accordance with Section 3.1.3 show that the treated emissions are below *de minimis* criteria, the blower effluent will then be monitored periodically using a photoionization detector (PID) to estimate emissions in lieu of air sample collection. The PID measurements (in ppm) will be converted to a concentration unit (e.g. mg/m^3) based on COCs identified in previous air sampling, and effluent emission (in lbs/day) will then be calculated based on system air flow rates.

The need for GAC change outs and/or continued treatment of discharge air will be continually re-evaluated following collection and review of the system effluent air samples. The Canton City Health Department will be notified upon SSDS air emissions in exceedance of de minimis criteria and consulted for the proper course of action to facilitate rapid restart of the SSDS. A permit exemption or Permit to Install/Permit to Operate will be obtained if necessary.

4.4.3 Excessive Moisture Buildup

It is anticipated that minimal moisture will be recovered during SSDS operation based on pilot testing. The extraction piping is sloped such that any entrained moisture should drain back to the extraction points. However, if excessive moisture is encountered in any of the SSDSs, the extraction piping will be modified to include moisture collection legs and/or a small moisture knockout tank upstream of the blower to facilitate collection and drainage of the moisture. Additionally, if excessive condensation or freezing is encountered in the exterior system piping, heat tracing and insulation will be installed to prevent damage to the system.

4.4.4 Indoor Air Concentration Exceedances

If indoor air concentrations exceedances are detected, one or more of the following will be implemented.

- Conduct additional investigations to identify if an indoor air source may be the cause of the exceedance;
- Conduct additional SSDS inspections and maintenance to ensure the system is not compromised and is operating as designed;
- Implement SSDS adjustments, such as balancing the system or increasing the blower speed to increase the sub-slab vacuum and air flow;
- Enhance vacuum coverage via one or more of the methods listed in Section 4.4.1.

5.0 RECORD KEEPING AND REPORTING

5.1 O&M Record Keeping

An SSDS O&M form (Appendix C) will be completed during each routine Site visit to document system monitoring, inspections, and maintenance. Operational parameters will be recorded on the O&M form, along with the name of the operator, date, time, and weather conditions. The O&M form includes the frequency of which each O&M item should be conducted. An O&M form will also be completed during unanticipated site visits in response to a system alarm or malfunction. The cause of the system alarm/malfunction will be documented, along with corrective actions. In addition to the manual O&M form, operational data for the SSDSs will be continuously logged via the main control panel and electronically saved. Operational parameters that will be logged include the operating status of each system, a list of alarms, system run hours, and the blower inlet vacuum. The main control panel will automatically send daily operational reports and notifications of system alarms via electronic communications (e.g., text or email). All system sampling and operating records will be maintained electronically.

5.2 Data Management

Hull field technical staff members will manage raw data during field activities. Data such as readings, and test results will be recorded on the appropriate field forms or in field logbooks. The Hull Project Manager or Data Manager will periodically collect data gathered during assessment activities in order to maintain results. As appropriate, the Hull Project Manager or Data Manager will coordinate transfer of raw data to computer formats such as Microsoft® Excel or Microsoft® Access to better organize and track incoming data. This will enable the Hull Project Manager or Data Manager to identify any data gaps. Any flaws in field QA/QC will be brought to the attention of the Hull Project Manager or Data Manager.

The Laboratory project managers will be responsible for laboratory data management and reporting to Hull. The data reports will include a laboratory narrative for the data set describing any out of control analyses and their effect on sample results, explanation of all lab applied qualifiers; all sample results including the % moisture content for soil samples, the spike and duplicate analysis results (or MS/MDS results) including the % recoveries. The following data must be available upon request from the lab on a case by case basis, if data issues arise: summaries of daily calibration check samples (including notation of any outliers), calibration blank results, surrogate results including % recoveries (as applicable per analysis), the method blank results, and lab control sample (LCS) results including % recoveries. All data, including QA/QC results, will become part of the project files and will be maintained by the Hull Project Manager or Data Manager. Upon report delivery, Hull personnel will analyze laboratory data in accordance with accepted statistical methodologies and will be supervised by the Hull Project Manager or Data Manager.

5.3 *De Minimis* Record Keeping

Results of system air flow measurements and effluent air sampling and PID monitoring will be maintained to demonstrate that that air discharge is below *de minimis* standards. Additionally, indoor air sampling results will be maintained on file to demonstrate indoor air levels are maintained below standards.

5.4 Emergency Reporting

Failure of an SSDS blower or operation below the target vacuum should be automatically be reported to the project team via and immediate electronic notification sent by the telemetry system in the main control panel. Emergency contact information will be provided in a user's guide located adjacent to the master control panel inside the Facility guard shack and in each SSDS enclosure in the event damage or abnormal operating conditions are detected to an SSDS, or if any emergency situation is encountered. Emergency contacts will include the following:

Owner:
Justin Lichter, Environmental Manager
Maple Street Commerce, LLC
Office: (530) 426-2226
Cell: (805) 207-1830

Consultant:
Lindsay Crow, Project Manager
Hull & Associates, Inc.
Office: (216) 505-1174
Cell: (330) 205-7757

5.5 Annual O&M Report

An annual O&M report will be prepared to document SSDS operation, maintenance, and monitoring activities following the first full year of system operation. Reports will be submitted to the USEPA, and will include the following:

1. Results from routine inspections of the SSDS;
2. A summary of any changes or modifications to the SSDSs;
3. A demonstration that the SSDS is functioning properly;
4. Operational reports, trends, and alarm history from the telemetry system; and
5. Confirmation that the remedial activities remain necessary to achieve or maintain applicable standards, or verification that the remedial activities are no longer needed for the Facility to comply with applicable standards.

6.0 PROJECT PERSONNEL AND TRAINING

6.1 Project Team

The project team responsible for O&M and reporting of the SSDS will include a project manager, data manager project engineer, field technician(s), and project scientist(s). Daily operational status emails as well as system alarms will be sent to the project team via the main control panel. The roles of each team member are described below.

6.1.1 Project Manager

The Project Manager will be responsible for overall management of O&M activities and reporting associated with the SSDS. The master control panel will transmit a daily operational report that will be sent via electronic communications (e.g., text or email) to the Project Manager for daily review. The Project Manager will coordinate O&M activities and will ensure the required inspections, measurements, and sampling are completed in accordance with this O&M plan. The project manager will review system operational data, field measurements, and sampling results to ensure the SSDS is operating effectively and will coordinate implementation of system adjustments and/or alternate O&M, if needed.

6.1.2 Data Manager

The Data Manager will maintain a record of all samples collected and the sample identification information on each sample. They will also manage data acquired from laboratory analyses. The Data Manager will be responsible for assembly of data into computer format.

6.1.3 Project Engineer

The Project Engineer will provide technical support for the Project Manager and field personnel to ensure the SSDS is operating as designed. The master control panel will transmit a daily operational report that will be sent via electronic communications (e.g., text or email) to the Project Engineer for daily review. The Project Engineer will assist with interpretation of operational data and field measurements to determine if system adjustments are warranted, and will prepare engineering plans/details for system adjustments and/or alternate O&M, if needed. The Project Engineer will also review effluent air monitoring data and calculate system VOC emissions to ensure discharge remains below de minimis levels.

6.1.4 Field Technician/Project Scientist

The Field Technician and/or Project Scientist will be responsible for implementing field O&M activities including routine inspections, monitoring, sampling, and maintenance as described in this O&M Plan. These personnel will also be responsible for system maintenance and repairs in response to system alarms, and will work closely with the Project Manager and Project Engineer to evaluate field data and make system

adjustments, as needed, to ensure the SSDS is operating efficiently and effectively. The Field Technician or Project Scientist will be responsible for collecting indoor air samples following system startup, and in accordance with the Sampling and Analysis Plan. The Field Technician and Project Scientist will also support preparation of system O&M reports.

6.2 Personnel Training

All personnel responsible for implementing this O&M plan will be trained to ensure they are correctly performing their respective O&M duties. The SSDS manufacturer will provide onsite training for personnel responsible for operation of the SSDS, including startup, shutdown, and normal operations. A Manufacturer's System Manual (Appendix B) will be provided for all SSDS equipment and will be reviewed and understood by all members of the project team prior to operating the SSDS. The SSDS operators will be familiar with normal operating parameters (e.g. vacuum readings) and will be trained to detect unexpected or abnormal operating conditions. Personnel will review the manufacturers equipment manual as well as historical operational records, including SSDS field O&M sheets, as described in Section 5 to evaluate system performance and to determine if the SSDS is operating correctly. Readings outside the normal anticipated range will be evaluated, and system adjustments, repairs, or alternate O&M as described in Section 4 will be implemented as needed. If an SSDS is modified, the manufacturers equipment manual and this O&M plan will be updated as needed to reflect the modification. All personnel responsible for implementing this O&M plan will be informed of the change and the project engineer and/or equipment manufacturer will perform requisite additional personnel training to cover any operational changes associated with SSDS modification.

System repairs will be implemented by qualified technicians. Repairs to the internal components of the blowers, if needed, will be implemented by the manufacturer. Electrical repairs, if necessary, will be completed by a qualified electrician.

Personnel responsible for collecting sub-slab vacuum measurements and effluent air measurements will be trained for correct use of the micro-manometer and photo-ionization detector instruments, respectively. Also, personnel responsible for collecting air samples will be trained to ensure the samples are correctly collected in an accordance with the Sampling and Analysis Plan and Project Quality Assurance Plan.

7.0 TERMINATION OF THE OPERATION AND MAINTENANCE PLAN

It is anticipated that all O&M Plan activities may be terminated when they are no longer necessary for the Facility to comply with the applicable standards. SSDS operation may reduce contaminant levels soil gas to levels no longer resulting in VI. If so, it may be possible to terminate operation of VI mitigation systems. A demonstration that termination of the VI mitigation system will be completed by implementation of the following tasks:

- Prior to sampling for system termination, shut down the mitigation system for a period of at least 30 days to allow re-development of pre-mitigation subsurface conditions.
- Where possible, a combination of indoor air and sub-slab vapor samples will be collected from the original locations initially collected and utilized to determine that vapor mitigation was necessary.
- Analytical results obtained from:
    - the indoor air samples will be compared against their respective residential and/or commercial/industrial indoor air RSLs (or site-specific criteria), where the hazard index is equivalent to one and the cancer risk is equivalent to 1×10^{-5}.[2] A cumulative adjustment will also be completed to account for the presence of multiple chemicals, if necessary.
    - Since the active vapor mitigation activities do not include active remediation of the soil gas beneath the building slab, the sub-slab vapor analytical results will be retained for qualitative and/or semi-quantitative purposes in the event that multiple lines of evidence are necessary in order to make the demonstration that implementation of vapor mitigation activities are no longer necessary.
- If the results of the single-chemical comparison to RSLs (or site-specific criteria), as well as a cumulative adjustment (if necessary), indicate that acceptable hazard and risk goals are met for the vapor intrusion exposure pathway, the system will remain shut down until the next sampling event.
- System termination is appropriate when indoor air concentrations are below RSLs (or site specific criteria) during two sampling rounds performed at least 4 months apart with at least one round during the heating season while the system is not in operation.
    - Note that as indicated above, analytical results obtained from indoor air samples alone may not be solely relied upon to make the demonstration that acceptable hazard and risk goals may be achieved. Specifically, analytical results obtained from sub-slab vapor samples may also be relied upon as part of a multiple lines of evidence demonstration to demonstrate that applicable hazard and risk goals have been achieved.

[2] Numerical values (i.e., RSLs) that will be utilized for comparison purposes have not been presented herein. However, U.S. EPA's Indoor Air RSLs dated June 2017, current at the time of this O&M Plan and adjusted to reflect a hazard index equivalent to one and a cancer risk goal equivalent to 1×10^{-5} will be utilized for comparison purposes. However, Maple Street reserves the right to utilize any future revised RSLs that may aide in future demonstrations regarding compliance with acceptable hazard and risk goals.

- In the event that acceptable hazard and risk goals are not met for both sampling events, the SSDS will be re-started and will remain operational until applicable standards and the termination monitoring criteria established herein are met.

In the event that termination of the vapor mitigation system can be supported using the approach detailed above, a letter report documenting that the Site complies with acceptable hazard and risk goals for the vapor intrusion exposure pathway without further operations of the engineering control(s) under the O&M Plan will be prepared and submitted to U.S. EPA for review and approval. Note that the Owner may prefer to keep the system in place in lieu of removal following termination of active vapor mitigation activities.

APPENDIX A

SSDS Installation Plans and Specifications

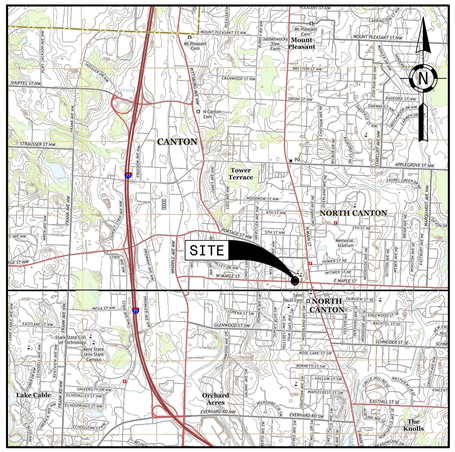
FORMER HOOVER FACILITY

101 EAST MAPLE STREET

STARK COUNTY

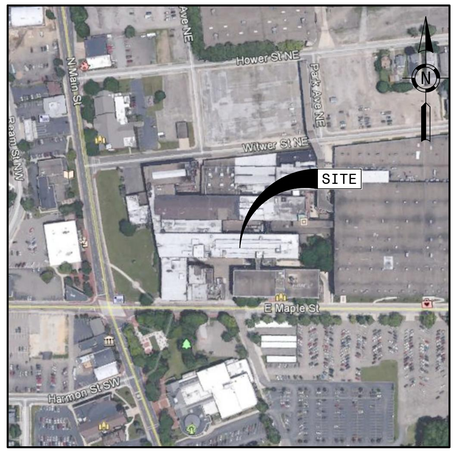
NORTH CANTON, OHIO 44720

SUB-SLAB DEPRESSURIZATION SYSTEMS



SITE VICINITY MAP

SCALE: 1"=5000'



SITE LOCATION MAP

SCALE: 1"=500'

SHEET TITLE	SHEET NO.
TITLE SHEET	C1.0
GENERAL NOTES & SPECIFICATIONS	C2.0
SSDS EXTRACTION LAYOUT (SUBSURFACE)	C3.0
SSDS OVERHEAD PIPING LAYOUT (FIRST FLOOR)	C4.0
SSDS BLOWER/FAN LOCATIONS (ROOF LEVEL)	C5.0
SSDS DETAILS	C6.0
SSDS DETAILS	C7.0
TYPICAL PIPING AND INSTRUMENTATION DIAGRAM	C8.0

PRE-CONSTRUCTION NOTICE

THESE PLANS HAVE BEEN PREPARED USING THE MOST ACCURATE INFORMATION AND DATA AVAILABLE AT THE TIME OF PREPARATION. FIELD CONDITIONS MAY BE ENCOUNTERED DURING CONSTRUCTION WHICH VARY FROM THOSE DEPICTED HEREIN. MODIFICATIONS TO THE DESIGN AS SHOWN MAY BE REQUIRED BASED ON FIELD CONDITIONS AT THE TIME OF CONSTRUCTION. IN ANY EVENT, THE ENGINEERING OBJECTIVES OF THE DESIGN SHALL BE MET.

Ohio Utilities Protection Service
Call 811 before you dig
800-362-2764

OGPUPS
Ohio Oil & Gas Producers Underground Protection Service
800-925-0988

DRAFT - NOT FOR CONSTRUCTION

HULL
BROWNFIELDS
SHALE OIL & GAS
WASTE MANAGEMENT
ENVIRONMENTAL
ALTERNATIVE ENERGY

6397 Emerald Parkway
Suite 200
Dublin, Ohio 43016

Phone: (614) 793-8777
Fax: (614) 793-9070
www.hullinc.com

Project Title:

SUB-SLAB DEPRESSURIZATION SYSTEMS
FORMER HOOVER FACILITY

101 E. MAPLE STREET
STARK COUNTY
NORTH CANTON, OH 44720

Owner:

MAPLE STREET COMMERCE, LLC

101 E. MAPLE STREET
NORTH CANTON, OH 44720

Mark	Description	Date

Project No.:	MPL001
CAD DWG File:	MPL001.300.0017
Plot Date:	11/18/16
Layout By:	TEO
Drawn By:	BA
Check By:	TEO
Scale:	AS NOTED
Issue Date:	NOVEMBER 2016

Sheet Title:

TITLE SHEET

Sheet Number: 1 OF 8

C1.0

GENERAL NOTES:

1. THE CONTRACTORS REFERENCED HEREIN SHALL SUPPLY ALL LABOR, EQUIPMENT AND MATERIALS TO COMPLETE THE SUB-SLAB EXTRACTION PITS/TRENCHES, PIPING, MANIFOLDS, EQUIPMENT STAGING, REMEDIAL EQUIPMENT CONNECTIONS AND CONCRETE SLAB REPAIR AND RESTORATION ACCORDING TO THE PLANS AND SPECIFICATIONS HEREIN. SEE DIVISION OF WORK FOR CONTRACTOR RESPONSIBILITIES.

2. ALL WORK WILL BE IN COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL STANDARDS AND REGULATIONS. IF THERE SHOULD ARISE ANY CONFLICT BETWEEN ANY NOTES AND/OR DETAILS ON THE APPROVED DRAWINGS OR SPECIFICATIONS FOR THE PROJECT, THIS NOTE WILL SUPERSEDE AND GOVERN UNLESS THERE IS A WRITTEN SIGNED DOCUMENT FROM THE ENGINEER STATING OTHERWISE.

3. EACH CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR COMPLYING WITH ALL FEDERAL, STATE AND LOCAL SAFETY REQUIREMENTS INCLUDING THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970. EACH CONTRACTOR SHALL EXERCISE PRECAUTION ALWAYS FOR THE PROTECTION OF PERSONS (INCLUDING EMPLOYEES) AND PROPERTY. IT SHALL ALSO BE THE SOLE RESPONSIBILITY OF EACH CONTRACTOR TO INITIATE, MAINTAIN AND SUPERVISE ALL SAFETY REQUIREMENTS, PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, INCLUDING THE REQUIREMENTS FOR CONFINED SPACES PER 29 CFR 1910.146.

4. THESE DRAWINGS WERE PRODUCED FROM MAPS, DRAWINGS AND RECORDS COLLECTED FROM THE OWNER AND DURING HISTORIC SITE INVESTIGATIONS. THE LOCATIONS OF FEATURES AND OBJECTS ARE APPROXIMATE. IT IS NOT INTENDED TO BE AN ACCURATE PROPERTY SURVEY.

5. EACH CONTRACTOR WILL BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, PROCEDURES OR TECHNIQUES.

6. EACH CONTRACTOR SHALL BE RESPONSIBLE TO OBTAIN ALL NECESSARY PERMITS AND GOVERNMENT FEES, LICENSES AND INSPECTIONS ASSOCIATED WITH THE IMPROVEMENTS UNDER THEIR RESPONSIBILITY AS OUTLINED IN THE DIVISION OF WORK.

7. ANY MODIFICATION TO THE SPECIFICATIONS OR CHANGES TO THE WORK AS SHOWN ON THE DRAWINGS MUST HAVE PRIOR WRITTEN APPROVAL BY THE OWNER AND ENGINEER.

8. SHOULD WATER BE ENCOUNTERED, THE CONTRACTOR SHALL FURNISH AND OPERATE SUITABLE PUMPING EQUIPMENT OF SUCH CAPACITY ADEQUATE TO DEWATER ACCUMULATED WATER WITHIN EXCAVATION AREAS. AREAS SHALL BE SUFFICIENTLY DEWATERED SO THAT THE PLACEMENT OF BACKFILL IS MADE IN AN AREA FREE OF STANDING WATER. THE CONTRACTOR SHALL PROPERLY CONTAINERIZE, CHARACTERIZE AND DISPOSE OF WATER IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL RULES AND REGULATIONS. THE CONTRACTOR SHALL CONSULT THE OWNER AND ENGINEER TO DETERMINE SUITABLE WATER AND SOIL CHARACTERIZATION AND DISPOSAL METHODS.

9. THESE PLANS HAVE BEEN PREPARED USING THE MOST ACCURATE INFORMATION AND DATA AVAILABLE AT THE TIME OF PREPARATION. FIELD CONDITIONS MAY BE ENCOUNTERED WHICH VARY FROM THOSE DEPICTED HEREIN. AS SUCH, THESE PLANS SHOULD BE USED AS A CONSTRUCTION CONTROL REFERENCE, NOT A PRECISE CONSTRUCTION DOCUMENT. MODIFICATIONS TO THE DESIGN AS SHOWN MAY BE REQUIRED BASED ON FIELD CONDITIONS AT THE TIME OF CONSTRUCTION. IN ANY EVENT, THE ENGINEERING OBJECTIVES OF THE DESIGN SHALL BE MET.

10. EACH CONTRACTOR SHALL CONFINE HIS ACTIVITIES TO THE PROJECT SITE AND SHALL NOT TRESPASS UPON OTHER PROPERTIES OR DISRUPT THE OPERATIONS OF ADJACENT PROPERTY OWNERS WITHOUT THE WRITTEN PERMISSION OF THOSE OWNERS.

11. HORIZONTAL AND VERTICAL CONTROL WILL BE ESTABLISHED BY EACH CONTRACTOR FOR THE PROJECT. THE CONTRACTOR IS RESPONSIBLE FOR ALL REQUIRED SURVEYS TO COMPLETE THE PROJECT INCLUDING REESTABLISHMENT OF CONTROL POINTS AND PROJECT LAYOUT.

12. FLOW IN EXISTING STORM AND SANITARY SEWERS SHALL BE MAINTAINED AT ALL TIMES DURING EXECUTION OF THE WORK FOR THIS PROJECT. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING SEWERS RESULTING FROM THEIR OPERATIONS OR NEGLIGENCE.

13. SUITABLE BACKFILL MATERIALS MAY BE STOCKPILED ON-SITE, BUT MUST BE POSITIONED SO AS NOT TO COMINGLE WITH EXCAVATED SOILS.

14. THE TRACKING OR SPILLAGE OF MUD, DIRT, CONCRETE, OR DEBRIS UPON STATE, COUNTY, TOWNSHIP, PRIVATE, OR CITY STREETS IS PROHIBITED AND ANY SUCH OCCURRENCE SHALL BE CLEANED UP IMMEDIATELY BY THE CONTRACTOR.

15. DUST CONTROL SHALL BE MAINTAINED THROUGHOUT THE ENTIRE SITE. SAW-CUTTING SHALL BE PERFORMED USING A WET SAW TO MINIMIZE DUST.

16. EACH CONTRACTOR SHALL MAINTAIN WORK AREA FREE OF WASTE MATERIALS, DEBRIS, AND RUBBISH. MAINTAIN SITE IN A CLEAN AND ORDERLY CONDITION. CONTRACTOR IS RESPONSIBLE FOR COLLECTING AND REMOVING WASTE MATERIALS, DEBRIS AND RUBBISH FROM THE SITE AND DISPOSING OF OFF SITE.

17. FACILITY INTERIOR WORK AREAS MUST BE LEFT FREE OF DEBRIS AND MATERIALS AT THE COMPLETION OF EACH WORK PERIOD. ANY FLOOR SPACE AND/OR EQUIPMENT WITHIN THE WORK AREA AND IMMEDIATE VICINITY MUST BE MOPPED AND WIPED CLEAN OF DIRT, MUD, DEBRIS AND DUST PRIOR TO COMPLETION OF WORK.

18. MAINTAIN DRIVEWAYS AND PEDESTRIAN ACCESS IN A SAFE AND CLEAN CONDITION. COOPERATE WITH THE OWNER IN EVERY WAY PRACTICAL IN ORDER TO MINIMIZE DISRUPTION TO THEIR OPERATIONS.

19. EACH CONTRACTOR SHALL REPAIR AND REPLACE ANY AND ALL EXISTING EQUIPMENT, SITE FEATURES OR WORK DAMAGED DURING OR DUE TO THE EXECUTION OF THIS PROJECT AT HIS OWN EXPENSE. ALL SAID WORK SHALL BE TO THE SATISFACTION OF THE OWNER.

HEALTH AND SAFETY:

1. CONTRACTOR SHALL COMPLY WITH 40 CFR 1910.120 (OSHA HAZWOPER).

2. COMPLY WITH BASIC PROVISIONS OF OSHA HEALTH AND SAFETY STANDARDS 29 CFR 1910 AND GENERAL CONSTRUCTION STANDARDS 29 CFR 1926, AS APPROPRIATE TO THIS CONSTRUCTION AND SITE ACTIVITY.

3. ADHERE TO OSHA EXCAVATION REGULATIONS 29 CFR SECTIONS 1926.650, 1926.651, AND 1926.652.

4. ENSURE THAT ALL PERSONNEL ON SITE AND ALL ACTIVITIES CONTAINED THEREIN COMPLY WITH APPLICABLE LAWS AND REGULATIONS OF THE PUBLIC BODY HAVING JURISDICTION FOR SAFETY OF PERSONS OR PROPERTY.

5. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR THE IMPLEMENTATION AND ENFORCEMENT OF THEIR HEALTH AND SAFETY PLAN, AND TAKE THE NECESSARY PRECAUTIONS AND PROVIDE PROTECTION FOR:
   A. PERSONNEL WORKING ON OR VISITING THE PROJECT SITE (IRRESPECTIVE OF EMPLOYED BY THE CONTRACTOR);
   B. WORK MATERIAL(S) TO BE INCORPORATED INTO THE WORK AREA ON OR OFF SITE;
   C. OTHER PROPERTY AT OR ADJACENT TO THE PROJECT SITE; AND
   D. MEMBERS OF THE PUBLIC POTENTIALLY EXPOSED TO JOB RELATED ACTIVITY.

DIVISION OF WORK:

1. ENVIRONMENTAL DRILLING CONTRACTOR TO REMOVE SELECT PILOT TEST EXTRACTION RISER PIPES AND REPAIR CONCRETE SLAB IN ACCORDANCE WITH THE LOCATIONS AND DETAILS PROVIDED HEREIN.

2. ENVIRONMENTAL DRILLING CONTRACTOR TO INSTALL ALL VERTICAL EXTRACTION PITS (PVE-#), TRENCHING AND PIPING INSTALLATION TO ADJACENT COLUMNS, AND PIPING STUB-UPS TO 2 FT. ABOVE THE FLOOR SLAB IN ACCORDANCE WITH THE PLANS AND SPECIFICATION PROVIDED HEREIN.

3. OWNERS'S CONTRACTOR TO INSTALL AND/OR RETROFIT ALL HORIZONTAL EXTRACTION PIPES (VM-#) IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS PROVIDED HEREIN.

4. OWNER'S PLUMBING CONTRACTOR TO COMPLETE ALL PIPING INSTALLATION WORK FROM 2 FT. STUB-UPS PROVIDED AT FIRST FLOOR SLAB TO SSDS EQUIPMENT AT ROOF IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS HEREIN.

5. OWNER'S CONTRACTOR TO INSTALL AND SECURE ALL SSDS PRE-PACKAGED EQUIPMENT AT THE ROOF LOCATIONS SHOWN HEREIN. EQUIPMENT SHALL BE ANCHORED/SECURED TO ROOF AS DIRECTED BY OWNER. ENGINEER TO COORDINATE EQUIPMENT PROCUREMENT AND DELIVERY TO THE SITE. ENGINEER TO INSPECT ALL EQUIPMENT AT SITE PRIOR TO STAGING ON ROOF.

6. OWNER'S ELECTRICAL CONTRACTOR TO COMPLETE ALL ELECTRICAL WORK NECESSARY TO SUPPLY POWER TO THE SSDS PRE-PACKAGED AND PRE-WIRED SYSTEMS STAGED AT ROOF, INCLUDING ALL ELECTRICAL CONNECTIONS TO THE PANEL-MOUNT DISCONNECT SWITCHES PROVIDED WITH EACH SYSTEM. ELECTRICAL CONTRACTOR TO ALSO MOUNT AND CONNECT POWER TO THE PRE-ASSEMBLED AND PRE-WIRED CONTROL PANEL TO BE INSTALLED IN THE GUARD SHACK, AND SUPPORT EXTENSION OF RADIO ANTENNAE FROM THE MASTER PANEL AT GROUND LEVEL TO ABOVE ROOF LINE AS NECESSARY, IN ACCORDANCE WITH ELECTRICAL AND TELEMETRY SCHEMATICS TO BE PROVIDED BY REMEDIAL EQUIPMENT VENDOR.

UTILITIES:

1. THE CONTRACTOR IS RESPONSIBLE FOR THE INVESTIGATION, LOCATION, SUPPORT, PROTECTION, AND RESTORATION OF ALL EXISTING UTILITIES AND APPURTENANCES WHETHER SHOWN ON THESE PLANS OR NOT. THE CONTRACTOR SHALL EXPOSE ALL UTILITIES OR STRUCTURES PRIOR TO CONSTRUCTION TO VERIFY THE VERTICAL AND HORIZONTAL EFFECTS ON THE PROPOSED CONSTRUCTION.

2. THE CONTRACTOR SHALL NOTIFY THE OHIO UTILITIES PROTECTION SERVICE (1-800-362-2764) AND THE OWNER OF THE UNDERGROUND UTILITIES THAT ARE NOT MEMBERS OF A REGISTERED UNDERGROUND PROTECTION SERVICE AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION.

3. WHERE POTENTIAL GRADE CONFLICTS MIGHT OCCUR WITH EXISTING UTILITIES, THE CONTRACTOR SHALL UNCOVER THE EXISTING UTILITY IN ADVANCE OF LAYING PIPE IN ORDER THAT THE ENGINEER MAY DETERMINE THE EXACT ELEVATION AND MAKE ANY NECESSARY ADJUSTMENTS.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR EXERCISING REASONABLE CARE IN OPERATING EQUIPMENT IN THE VICINITY OF UTILITIES, WHETHER OVERHEAD, AT GROUND LEVEL, OR BURIED, AND SHALL SAVE AND HOLD HARMLESS HULL & ASSOCIATES, INC., THE OWNER AND ANY OF THEIR DESIGNATED AGENTS FROM AND AGAINST ANY AND ALL CLAIMS AND DAMAGES OF ANY KIND OF INJURY TO, OR DEATH TO, ANY PERSON OR PERSONS AND FROM DAMAGE TO OR LOSS OF PROPERTY, ARISING OUT OF, OR ATTRIBUTED TO THE NEGLIGENCE OF CONTRACTOR'S OPERATIONS.

TRENCHING & PIPING:

1. THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR DESIGNING AND CONSTRUCTING STABLE TRENCHES AND SHOULD SHORE, SLOPE OR BENCH THE SIDES OF TRENCHES AS REQUIRED TO MAINTAIN STABILITY OF BOTH EXCAVATION SIDES AND BOTTOM. ALL EXCAVATIONS SHOULD COMPLY WITH APPLICABLE LOCAL, STATE, AND FEDERAL SAFETY REGULATIONS INCLUDING THE CURRENT OSHA EXCAVATION AND TRENCH SAFETY STANDARDS (29 CFR PART 1926).

2. SUB-SLAB DEPRESSURIZATION SYSTEM (SSDS) PIPING AND FITTINGS SHALL CONFORM TO THE FOLLOWING, EXCEPT WHERE OTHERWISE NOTED:
   A. PIPING SHALL BE SCHEDULE 40 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE MADE FROM CLASS 12454 MATERIALS IN ACCORDANCE WITH ASTM D1784, UNLESS NOTED OTHERWISE. PIPE DIMENSIONS SHALL CONFORM TO ASTM D1785.
   B. SLOTTED PIPE SHALL BE SCHEDULE 40 PVC, 0.020 INCH SLOT, WITH ASTM D2466 FLUSH THREAD FITTINGS.
   C. PVC FITTINGS SHALL BE SCHEDULE 40 PVC SOCKET STYLE IN ACCORDANCE WITH ASTM D1784.
   D. SUB-SLAB PIPING FROM VERTICAL EXTRACTION PITS (VE-#) TO DESIGNATED VERTICAL RISER SHALL BE SCHEDULE 40 STANDARD WALL LOW-PRESSURE, THREADED GALVANIZED STEEL PIPE (NPT) MADE FROM CLASS 150 MATERIALS IN ACCORDANCE WITH ASTM A53.
   E. GALVANIZED STEEL FITTINGS SHALL BE THREADED (NPT) LOW-PRESSURE GALVANIZED STEEL MADE OF CLASS 150 MATERIALS IN ACCORDANCE WITH ASTM A197.

3. ALL PVC PIPE SHALL BE SOLVENT WELDED USING LOW VOC PRIMER AND LOW VOC PVC CEMENT IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.

4. ALL PVC PIPE INSTALLED ON THE EXTERIOR OF THE FACILITY SHALL BE PAINTED WITH A UV-RESISTANT, WATER-BASED LATEX PAINT. PAINT COLOR TO BE APPROVED BY OWNER.

5. SOLID-WALLED SSDS PIPING FROM FIRST FLOOR TO ROOF SHALL BE SUCCESSFULLY PRESSURE TESTED PRIOR TO EQUIPMENT CONNECTIONS. LINES SHALL BE PRESSURE TESTED BY APPLYING THIRTY (30) INCHES WATER COLUMN VACUUM TO THE SSDS LINES. THE LINES WILL PASS THE TEST IF THE PRESSURE IS MAINTAINED FOR 30 MINUTES WITHOUT DEVIATING. THE BALL VALVE LOCATED ON EACH RISER PIPE AT FIRST FLOOR LEVEL MAY BE PLACED IN THE CLOSED POSITION TO ACHIEVE TEST VACUUM IF NECESSARY.

6. ALL TRENCHES AND EXTRACTION PITS SHALL BE BACKFILLED OR SECURELY PLATED DURING NON-WORKING HOURS.

BACKFILL:

1. BACKFILL MATERIAL SHALL BE SOILS OR STONE AS DEFINED HEREIN OR AS OTHERWISE APPROVED BY THE ENGINEER.
   A. SOILS USED FOR SUBGRADE MATERIAL SHALL HAVE A UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) CLASSIFICATION OF CL-ML, GC OR SC. ADDITIONALLY, THEY SHOULD BE FREE OF ALL DELETERIOUS MATERIALS (E.G., LARGE ROCKS, LIMBS, ROOTS, ETC.).
   B. BEDDING MATERIAL AND EXTRACTION PIT BACKFILL MATERIAL SHALL BE WASHED RIVER RUN GRAVEL (PEA GRAVEL) WITH SIZE EQUIVALENT TO 3/8".

2. SOIL BACKFILL SHALL BE PLACED IN LIFTS. EACH LIFT SHALL HAVE A MAXIMUM THICKNESS OF 6 INCHES (LOOSE MEASURE), WITH THE CLOD SIZE NOT EXCEEDING THE MAXIMUM LOOSE LIFT THICKNESS. ROCKS SHALL NOT EXCEED 3 INCHES (OR HALF THE LIFT THICKNESS).

3. COMPACTION OF SOIL SHALL BE PERFORMED IN 6 INCH LIFTS USING EQUIPMENT ACCEPTABLE TO THE OWNER AND ENGINEER. SOIL SHALL BE COMPACTED TO A MINIMUM OF 98 PERCENT OF THE MAXIMUM DRY DENSITY (STANDARD PROCTOR), AS ESTABLISHED BY ASTM D698.

4. THE CONTRACTOR SHALL PERFORM COMPACTION TESTING WITH A NUCLEAR DENSITOMETER TO VERIFY THAT THE BACKFILL MEETS THE ABOVE COMPACTION SPECIFICATIONS. COMPACTION TESTING RESULTS SHALL BE PROVIDED TO THE OWNER AND ENGINEER.

CONCRETE:

1. CONCRETE SHALL BE 4,000 PSI (28-DAY) MINIMUM COMPRESSIVE STRENGTH.

2. ALL INTERIOR CONCRETE WORK SHALL BE COMPLETED IN ACCORDANCE WITH ACI 301, ACI 315, AND ACI 318.

SITE RESTORATION:

1. REPAIR AND/OR REPLACE ANY DRIVEWAYS, CONCRETE SIDEWALKS, CONCRETE APRONS, LANDSCAPING, ETC. DAMAGED OR REMOVED DURING CONSTRUCTION ACTIVITIES.

WARRANTY:

1. ALL WORK PERFORMED BY THE CONTRACTOR (OR CONTRACTOR'S SUBCONTRACTORS) TO BE WARRANTED FOR ONE YEAR FROM THE DATE OF COMPLETION.

2. DURING THE WARRANTY PERIOD, THE CONTRACTOR SHALL COMPLETE ANY ITEM OF WORK NEEDING TO BE REPLACED AND/OR REPAIRED AT NO COST TO THE OWNER, WITHIN TWO WEEKS AFTER NOTIFICATION BY THE OWNER.

ELECTRICAL:

1. SEE DIVISION OF WORK FOR ELECTRICAL REQUIREMENTS AND RESPONSIBILITIES.

2. ALL ELECTRICAL WORK TO BE COMPLETED IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL ELECTRICAL CODES, REGULATIONS AND REQUIREMENTS.

REMEDIAL EQUIPMENT:

1. ENGINEER WILL PROCURE REMEDIAL EQUIPMENT BIDS AND DESIGN SUBMITTALS FROM REMEDIAL EQUIPMENT SUPPLIERS FOR OWNER REVIEW AND APPROVAL.

2. REMEDIAL EQUIPMENT TO BE MOUNTED IN A PRE-FABRICATED ENCLOSURE (AS NECESSARY) AND PRE-PLUMBED AND WIRED TO THE EXTENT PRACTICAL BY REMEDIAL EQUIPMENT SUPPLIER PRIOR TO DELIVERY TO THE SITE.

3. ENGINEER TO COORDINATE EQUIPMENT DELIVERY, INSTALLATION AND STARTUP WITH REMEDIAL EQUIPMENT SUPPLIER AND CONTRACTOR.

4. SEE DIVISION OF WORK FOR EQUIPMENT INSTALLATION RESPONSIBILITIES.

CONTAMINATED SOIL AND GROUNDWATER ENCOUNTERED DURING CONSTRUCTION:

1. THE REMEDIAL AREA CONTAINS SOILS IMPACTED WITH VOCs. INVESTIGATION AND REMEDIAL ACTIVITIES ARE BEING COMPLETED UNDER THE RESOURCE CONSERVATION AND RECOVERY ACT (RCRA). CONTAMINATED SOILS AND GROUNDWATER ARE PRESENT AT THE PROPERTY THAT MUST BE MANAGED IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL RULES AND REGULATIONS.

2. ALL ACTIVITIES RELATED TO THE DISTURBANCE OF SOILS, TRENCH AND EXCAVATION WATER AND/OR GROUNDWATER AT THE SITE SHOULD BE CONDUCTED IN ACCORDANCE WITH AN ADEQUATE HEALTH AND SAFETY PLAN IN ACCORDANCE WITH OSHA REQUIREMENTS. THE CONTRACTOR MUST HAVE ITS OWN HEALTH AND SAFETY PLAN.

3. SOILS SHALL NOT BE TRANSPORTED OFF SITE UNTIL THE SOILS ARE CHARACTERIZED TO DETERMINE PROPER DISPOSAL REQUIREMENTS AND APPLICABLE PERMITS OR REGULATORY APPROVAL IS OBTAINED.

4. SHOULD WATER BE ENCOUNTERED, THE CONTRACTOR SHALL FURNISH AND OPERATE SUITABLE PUMPING EQUIPMENT OF SUCH CAPACITY ADEQUATE TO DEWATER THE TRENCH OR EXCAVATION. TRENCHES SHALL BE SUFFICIENTLY DEWATERED SO THAT THE PLACEMENT OF BEDDING AND LAYING AND JOINING OF THE PIPE IS MADE IN A TRENCH FREE OF STANDING WATER. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER TO PROPERLY PLAN AND MANAGE SURFACE WATER AND GROUNDWATER IN TRENCHES AND EXCAVATIONS.

5. SURFACE WATER OR GROUNDWATER COLLECTED IN A TRENCH OR EXCAVATION SHALL NOT BE DISCHARGED TO A STORM OR SANITARY SEWER.

6. INFORMATION REGARDING THE CONTAMINANTS IDENTIFIED AT THIS SITE CAN BE OBTAINED FROM THE ENGINEER, IF NECESSARY.

ABBREVIATIONS:

C.Y.	CUBIC YARDS
L.F.	LINEAL FEET
S.Y.	SQUARE YARDS
DIA.	DIAMETER
S.F	SQUARE FOOT
C.F.	CUBIC FOOT
EL.	ELEVATION
F.F.	FINISHED FLOOR
PVC	POLYVINYL CHLORIDE
ROW	RIGHT-OF-WAY
WWR	WELDED WIRE REINFORCEMENT
C/C	CENTER TO CENTER
ACI	AMERICAN CONCRETE INSTITUTE
SSDS	SUB-SLAB DEPRESSURIZATION SYSTEM
AOS	APPARENT OPENING SIZE
RCRA	RESOURCE CONSERVATION AND RECOVERY ACT

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Project Title:

SUB-SLAB DEPRESSURIZATION SYSTEMS
FORMER HOOVER FACILITY
101 E. MAPLE STREET
STARK COUNTY
NORTH CANTON, OH 44720

Owner:

MAPLE STREET COMMERCE, LLC

101 E. MAPLE STREET
NORTH CANTON, OH 44720

Mark	Description	Date
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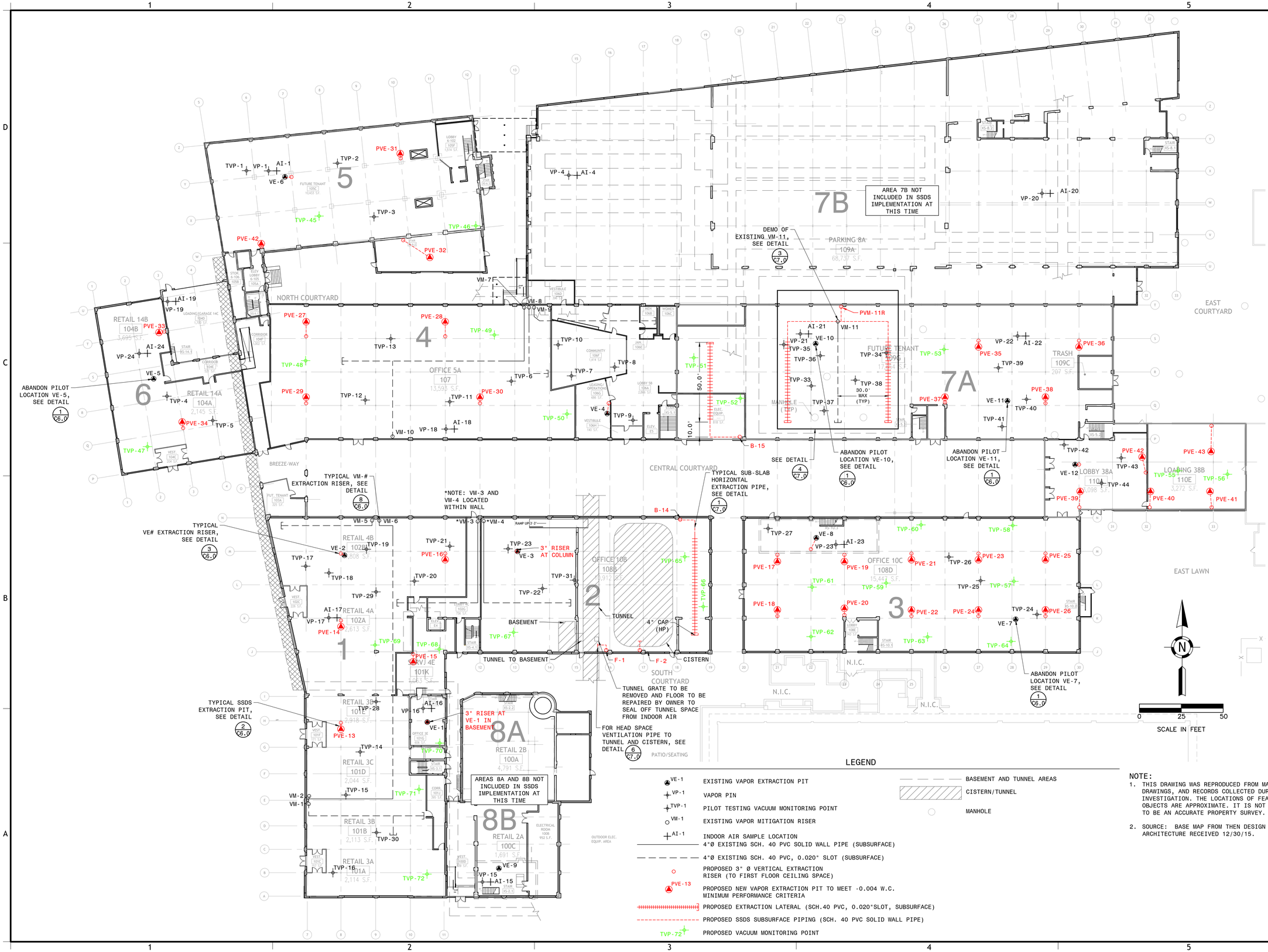
Project No.:	MPL001
CAD DWG File:	MPL001.300.0017
Plot Date:	11/18/16
Layout By:	TEO
Drawn By:	BA
Check By:	TEO
Scale:	AS NOTED
Issue Date:	NOVEMBER 2016

Sheet Title:

GENERAL NOTES & SPECIFICATIONS

Sheet Number: 2 OF 8

C2.0



LEGEND

- VE-1 — EXISTING VAPOR EXTRACTION PIT
- VP-1 — VAPOR PIN
- TVP-1 — PILOT TESTING VACUUM MONITORING POINT
- VM-1 — EXISTING VAPOR MITIGATION RISER
- AI-1 — INDOOR AIR SAMPLE LOCATION
- 4"Ø EXISTING SCH. 40 PVC SOLID WALL PIPE (SUBSURFACE)
- 4"Ø EXISTING SCH. 40 PVC, 0.020" SLOT (SUBSURFACE)
- PROPOSED 3" Ø VERTICAL EXTRACTION RISER (TO FIRST FLOOR CEILING SPACE)
- PVE-13 — PROPOSED NEW VAPOR EXTRACTION PIT TO MEET -0.004 W.C. MINIMUM PERFORMANCE CRITERIA
- PROPOSED EXTRACTION LATERAL (SCH.40 PVC, 0.020"SLOT, SUBSURFACE)
- PROPOSED SSDS SUBSURFACE PIPING (SCH. 40 PVC SOLID WALL PIPE)
- TVP-72 — PROPOSED VACUUM MONITORING POINT
- BASEMENT AND TUNNEL AREAS
- CISTERN/TUNNEL
- MANHOLE

NOTE:

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2. SOURCE: BASE MAP FROM THEN DESIGN ARCHITECTURE RECEIVED 12/30/15.

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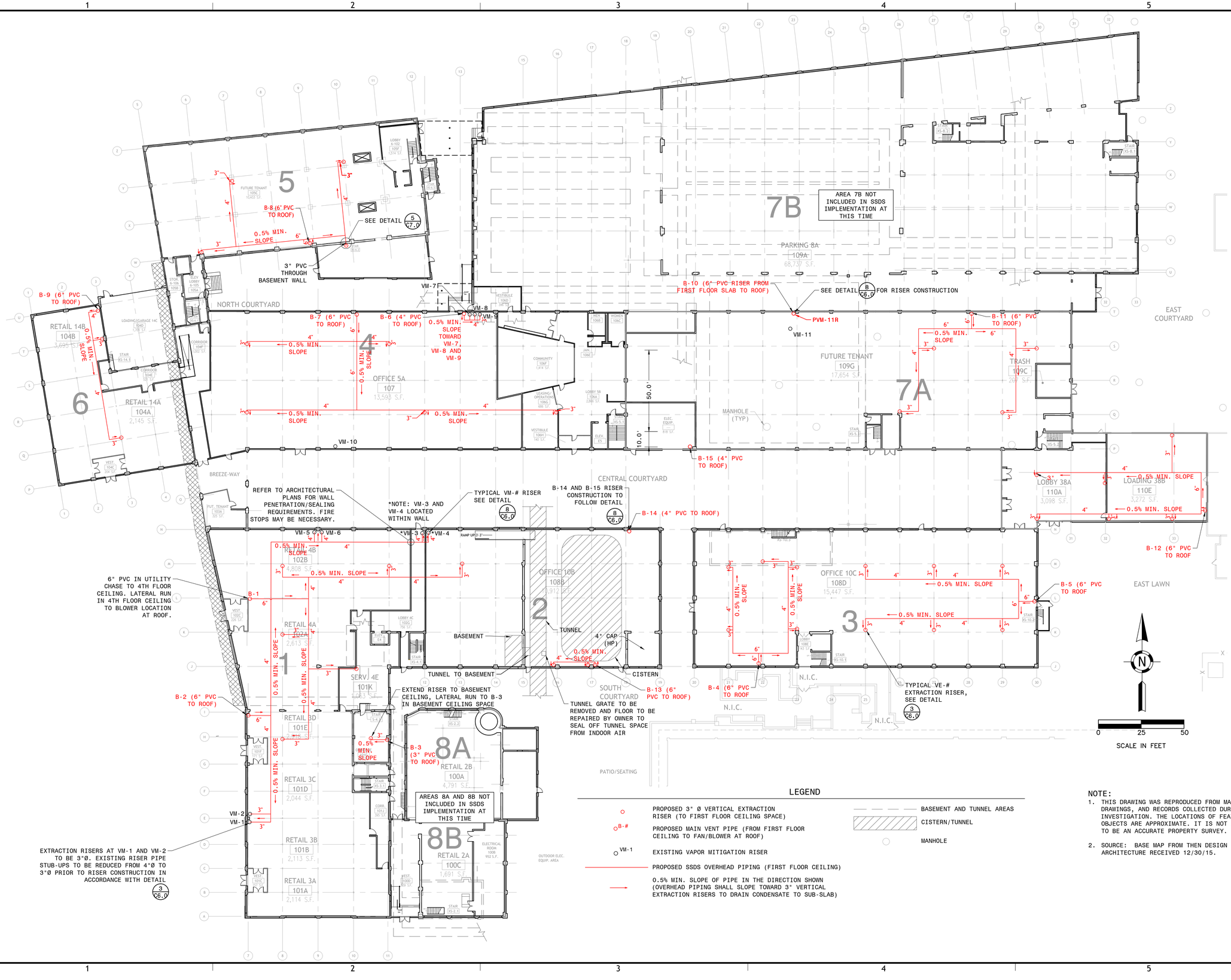
Issue Date:	NOVEMBER 2016
Sheet Title:	

SSDS EXTRACTION LAYOUT (SUBSURFACE)

Sheet Number: 3 OF 8

C3.0



LEGEND

- PROPOSED 3" Ø VERTICAL EXTRACTION RISER (TO FIRST FLOOR CEILING SPACE)
- B-# PROPOSED MAIN VENT PIPE (FROM FIRST FLOOR CEILING TO FAN/BLOWER AT ROOF)
- VM-1 EXISTING VAPOR MITIGATION RISER
- PROPOSED SSDS OVERHEAD PIPING (FIRST FLOOR CEILING)
- 0.5% MIN. SLOPE OF PIPE IN THE DIRECTION SHOWN (OVERHEAD PIPING SHALL SLOPE TOWARD 3" VERTICAL EXTRACTION RISERS TO DRAIN CONDENSATE TO SUB-SLAB)
- BASEMENT AND TUNNEL AREAS
- CISTERN/TUNNEL
- MANHOLE

NOTE:

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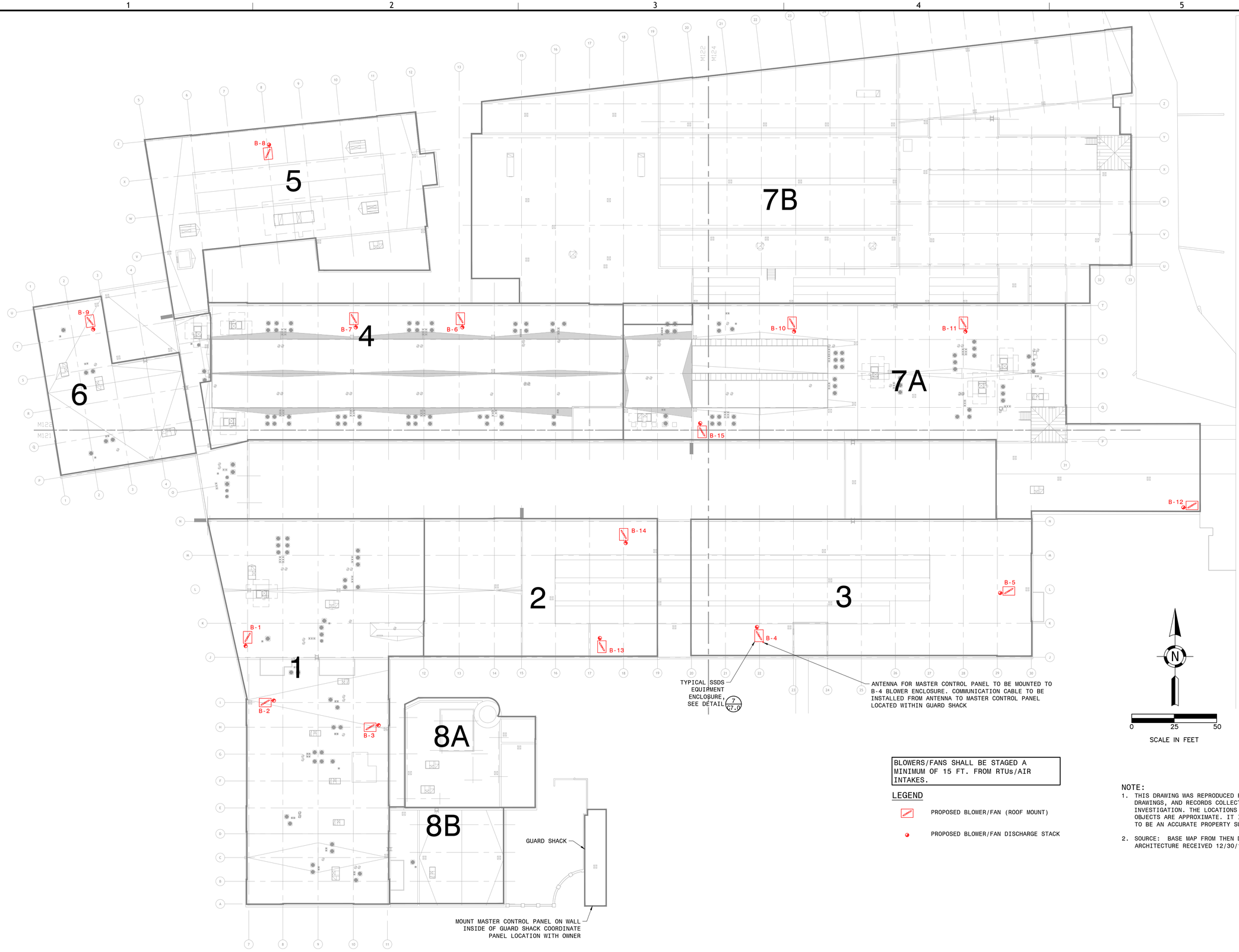
Sheet Title:	

SSDS OVERHEAD PIPING LAYOUT (FIRST FLOOR)

Sheet Number: 4 OF 8

C4.0



BLOWERS/FANS SHALL BE STAGED A MINIMUM OF 15 FT. FROM RTUs/AIR INTAKES.

LEGEND

PROPOSED BLOWER/FAN (ROOF MOUNT)

PROPOSED BLOWER/FAN DISCHARGE STACK

NOTE:

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2. SOURCE: BASE MAP FROM THEN DESIGN ARCHITECTURE RECEIVED 12/30/15.

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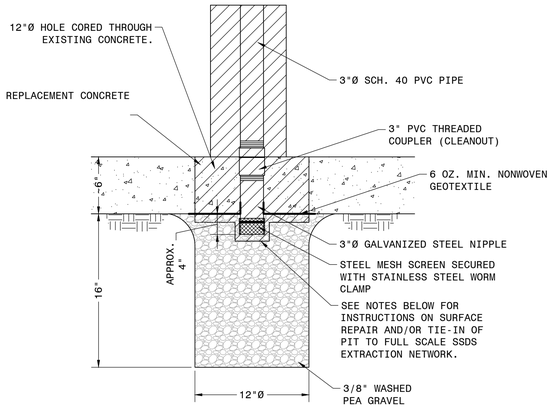
Sheet Title:

SSDS BLOWER/FAN LOCATIONS (ROOF LEVEL)

Sheet Number: 5 OF 8

C5.0



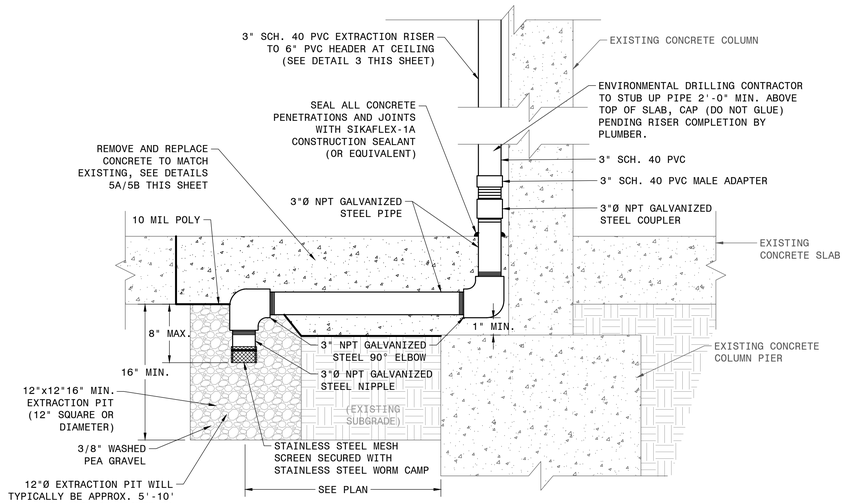
1 DEMO OF EXISTING SSD PILOT EXTRACTION POINT

SCALE: N.T.S.

NOTES:

1. EXISTING VE-5, VE-7, VE-10 AND VE-11 TO BE ABANDONED. SEE DETAILS 7 & 8 THIS SHEET FOR SURFACE REPAIR FOLLOWING PIPE REMOVAL.

2. EXISTING VE-1 THROUGH VE-4, VE-6, VE-8, VE-9 & VE-12 TO BE RETROFITTED INTO PERMANENT EXTRACTION PITS PER DETAIL 2.

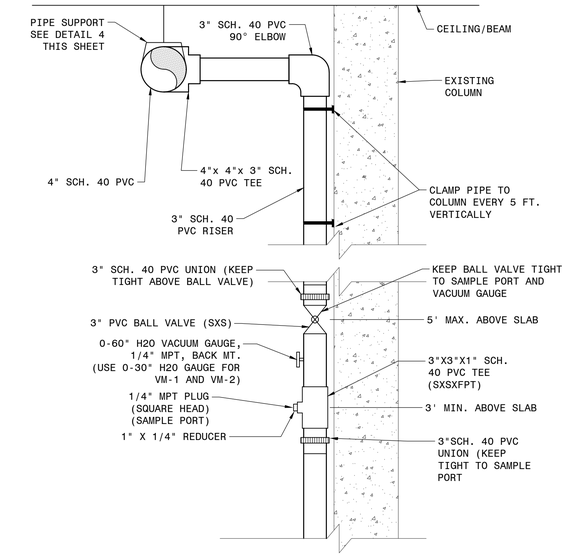


2 TYPICAL SSD EXTRACTION PIT DETAIL

SCALE: N.T.S.

NOTES:

1. SAW-CUT AND EXCAVATE 12"x12"x16" OR CORE 12" DIAMETER HOLE THROUGH EXISTING CONCRETE USING DIAMOND CORE RIG.
2. ANCHOR CORE RIG TO CONCRETE IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
3. ALL EXCAVATED SUB-SLAB MATERIALS TO BE DRUMMED OR CONTAINERIZED.
4. REINFORCING STEEL NOT SHOWN.
5. ENVIRONMENTAL DRILLING CONTRACTOR TO COMPLETE ALL SUBSURFACE WORK WITH PIPING STUBBED UP 2 FT. ABOVE SLAB PENDING RISER COMPLETION BY PLUMBING CONTRACTOR, IN ACCORDANCE WITH DETAIL 3.
6. CONTRACTOR IS TO PREP AND COMPACT EXISTING SUBGRADE PRIOR TO PLACEMENT OF PEA GRAVEL AND CONCRETE. SUBGRADE SHALL BE COMPACTED TO 100% STANDARD PROCTOR.



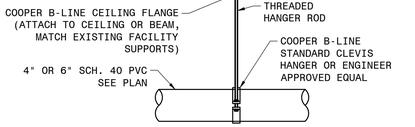
3 TYPICAL VE-# EXTRACTION RISER

SCALE: N.T.S.

NOTE:

1. PLUMBING CONTRACTOR TO COMPLETE RISER CONSTRUCTION AND ALL PIPING FROM STUB-UP 2 FT ABOVE FLOOR SLAB TO SSDS EQUIPMENT AT ROOF.

2. EXTRACTION RISERS VM-1 AND VM-2 TO BE REDUCED FROM 4" SCH 40 PVC AT RISER STUB-UP AND CONSTRUCTED IN ACCORDANCE WITH THIS DETAIL INSTEAD OF THE VM-# RISER DETAIL 8 ON THIS SHEET.



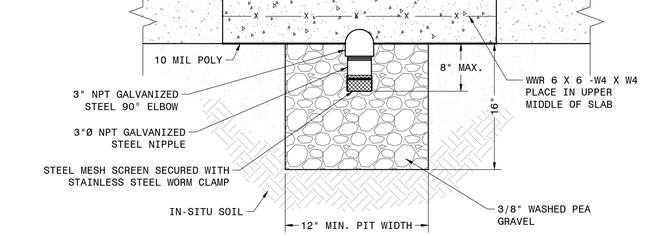
4 HANGING PIPE SUPPORT (TYP.)

SCALE: N.T.S.

NOTES:

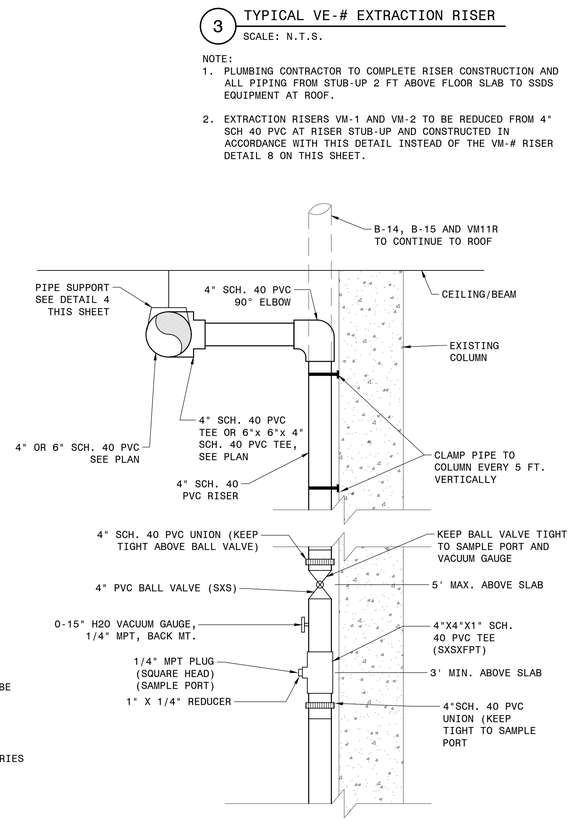
1. HORIZONTAL PIPING SHALL BE SUPPORTED A MINIMUM OF EVERY 10 FEET.

2. HORIZONTAL PIPING SHALL BE INSTALLED WITH 0.5% SLOPE TO FACILITATE DRAINAGE OF CONDENSATE. REFER TO SHEET C4.0 FOR SLOPE DIRECTION.



5A EXTRACTION PIT CONCRETE SLAB REPAIR DETAILS

SCALE: N.T.S.



8 TYPICAL VM-# EXTRACTION RISER

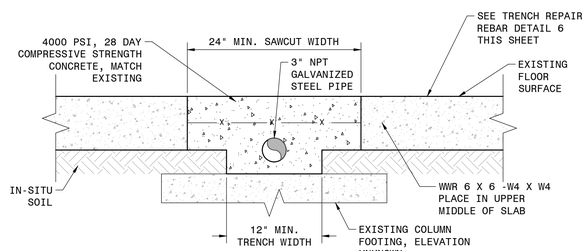
SCALE: N.T.S.

NOTE:

1. PLUMBING CONTRACTOR TO COMPLETE RISER CONSTRUCTION AND ALL PIPING FROM STUB-UP 2 FT ABOVE FLOOR SLAB TO SSDS EQUIPMENT AT ROOF.

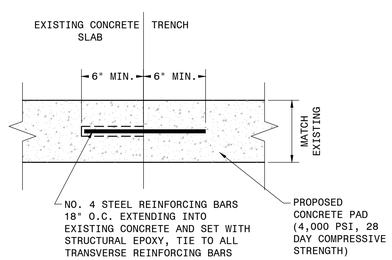
2. EXTRACTION RISERS FOR B-14, B-15 AND VM-11R TO BE CONSTRUCTED IN ACCORDANCE WITH THIS DETAIL.

3. EXTRACTION RISER VM-11R TO BE CONSTRUCTED OF 6"Ø SCH. 40 PVC PIPE AND FITTINGS.



5B PIPING TRENCH TO COLUMN CONCRETE SLAB REPAIR DETAILS

SCALE: N.T.S.

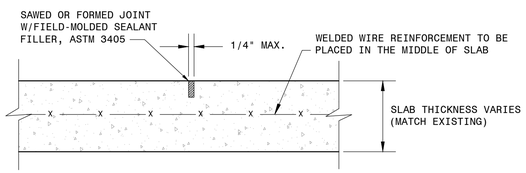


6 TYPICAL TRENCH REPAIR REBAR DETAIL

SCALE: N.T.S.

NOTE:

1. WHERE TRENCH LENGTHS EXCEEDS 10 FT. TRANSVERSE CONTROL JOINTS TO BE PLACED ON 10 FT. SPACING. SEE DETAIL 7 THIS SHEET.
2. 10 MIL POLY TO BE PLACED OVER TRENCH OR EXTRACTION PIT PRIOR TO CONCRETE POUR.



7 CONTROL JOINT DETAIL

SCALE: N.T.S.

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Project Title:

SUB-SLAB DEPRESSURIZATION SYSTEMS
FORMER HOOVER FACILITY

101 E. MAPLE STREET
STARK COUNTY
NORTH CANTON, OH 44720

Owner:

MAPLE STREET COMMERCE, LLC

101 E. MAPLE STREET
NORTH CANTON, OH 44720

Mark	Description	Date
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Project No.:	MPL001
CAD DWG File:	MPL001.300.0017
Plot Date:	11/18/16
Layout By:	AA
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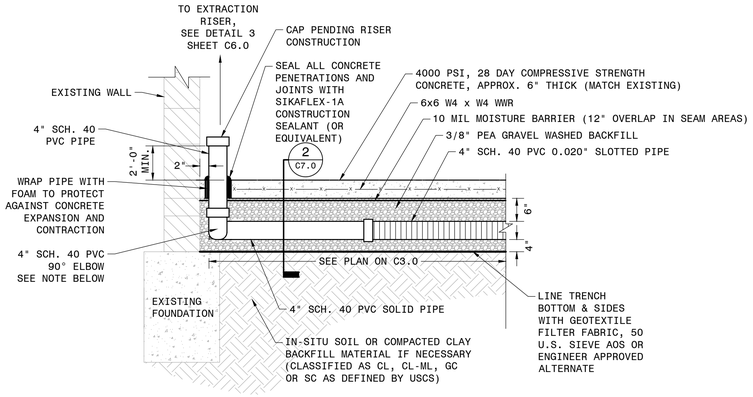
Check By:	TO
Scale:	AS NOTED
Issue Date:	NOVEMBER 2016

Sheet Title:

SSDS DETAILS

Sheet Number: 6 OF 8

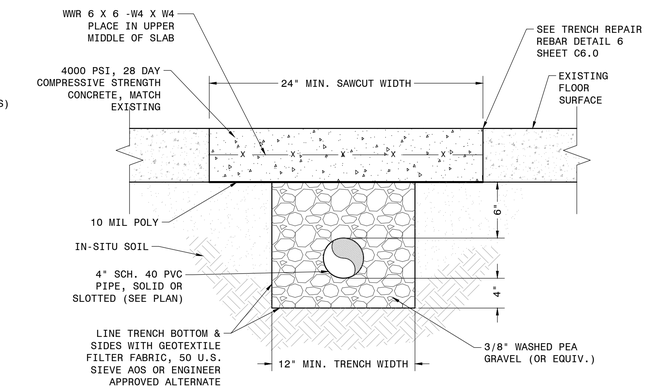
C6.0



1 TYPICAL SUB-SLAB HORIZONTAL EXTRACTION PIPE DETAIL

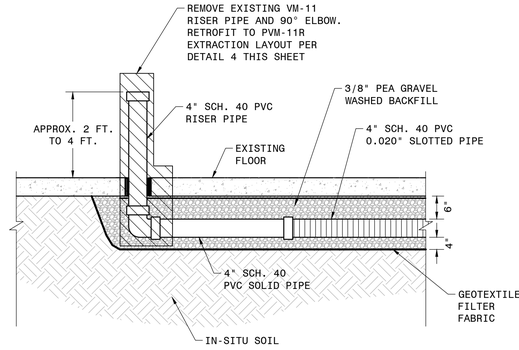
SCALE: N.T.S.

NOTE:
1. TOP OF FOOTING ELEVATION UNKNOWN. MINIMIZE ADDITIONAL BENDS TO ROUTE PIPING OVER FOOTING TO STUB UP 2" FROM WALL, AS NECESSARY.
2. INSTALL 4" SCH. 40 PVC CAP AT END OF SLOTTED HORIZONTAL EXTRACTION PIPE.



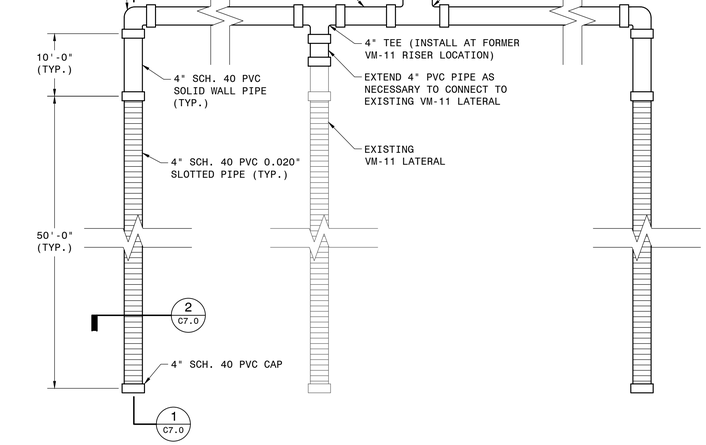
2 TYPICAL TRENCH REPAIR DETAIL

SCALE: N.T.S.



3 DEMO OF EXISTING VM-11

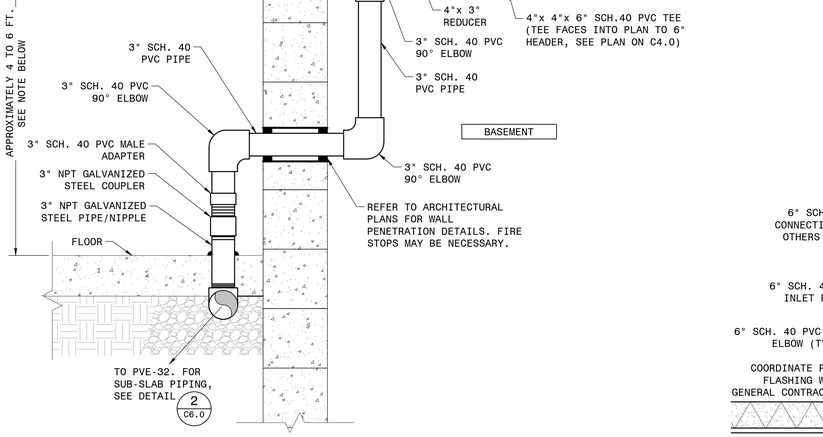
SCALE: N.T.S.



4 PVM-11R SUBSURFACE HORIZONTAL EXTRACTION LAYOUT (PLAN VIEW)

SCALE: N.T.S.

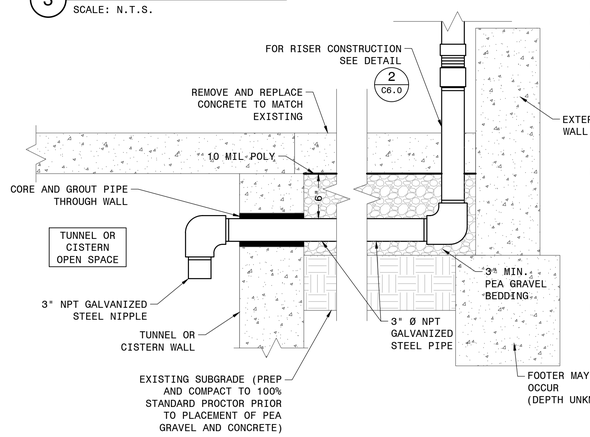
NOTE:
ALL TRENCH SPOILS TO BE DRUMMED OR CONTAINERIZED PENDING CHARACTERIZATION AND OFFSITE DISPOSAL (BY OTHERS)



5 PVE-32 RISER TIE-IN TO EXTRACTION HEADER

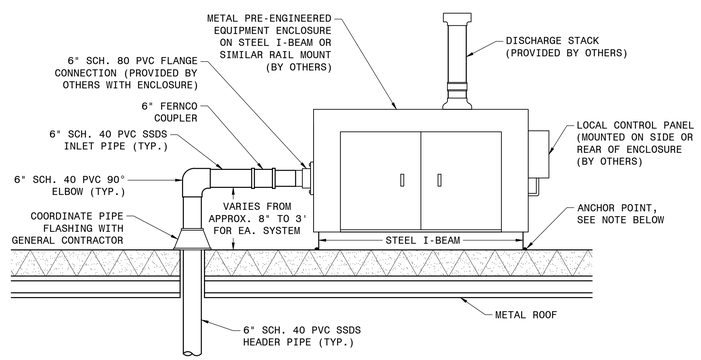
SCALE: N.T.S.

NOTE:
1. MINIMIZE PIPE STUB-UP HEIGHT TO WALL PENETRATION IN LOBBY TO EXTENT PRACTICAL TO ALLOW SUFFICIENT SPACE FOR PIPE TRANSITIONS IN BASEMENT BENEATH CEILING.
2. ALIGN PIPING STUB-UP IN LOBBY WITH 4" HEADER PIPE IN ADJACENT BASEMENT FOR LINEAR TIE-IN.



6 TYPICAL VENTILATION PIPE TO TUNNEL AND CISTERN

SCALE: N.T.S.



7 TYPICAL SSDS EQUIPMENT ENCLOSURE

SCALE: N.T.S.

NOTE:
1. SSDS HEADER PIPES AND INLET PIPES FOR BLOWERS B-6, B-14, AND B-15 ARE 4" SCH. 40 PVC, AND 3" SCH. 40 PVC FOR B-3. ALL OTHER HEADER AND INLET PIPES ARE 6" SCH. 40 PVC.
2. ANCHOR POINTS TO BE INSTALLED ON FOUR CORNERS OF STEEL I-BEAM RAIL SYSTEM USING APPROPRIATE ANCHOR TYPES AND EMBEDMENT DEPTHS FOR ROOF TYPE. ENCLOSURE STAGING AND ANCHORING TO BE COORDINATED AND COMPLETED BY OWNER'S CONTRACTOR.

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SSDS DETAILS

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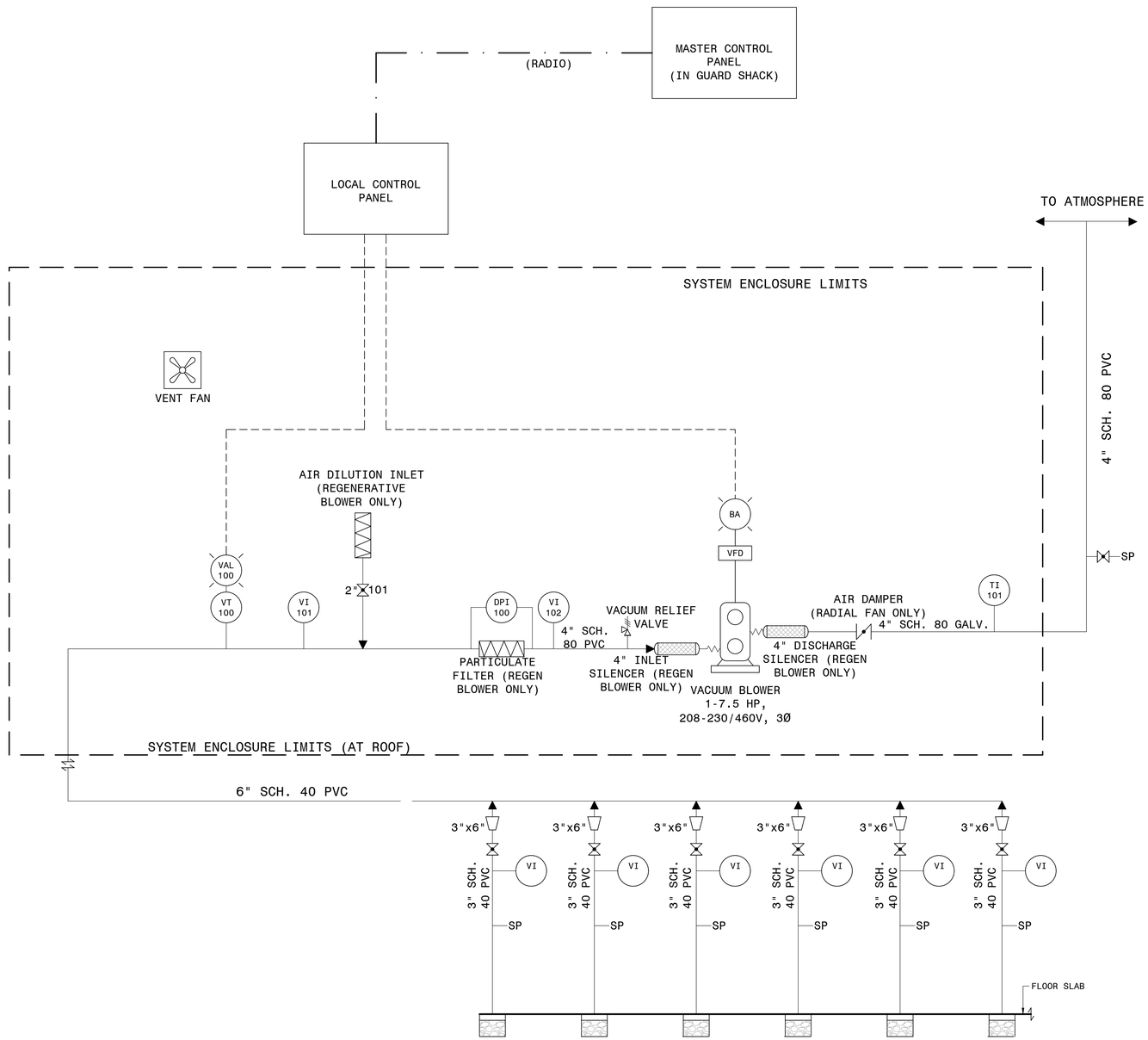
LEGEND

- DPI — DIFFERENTIAL PRESSURE INDICATOR
- VT — VACUUM TRANSMITTER
- BA — BLOWER RUN ALARM
- VI — VACUUM INDICATOR
- TI — TEMPERATURE INDICATOR
- VFD — VARIABLE FREQUENCY DRIVE
- VACUUM RELIEF VALVE
- VAL — VACUUM ALARM LOW
- BALL VALVE
- REDUCER
- SP — SAMPLE PORT ACCESS (SEE SHEET C6.0, DETAIL 3)
- SP — SAMPLE PORT WITH BALL VALVE
- AIR DAMPER



TYPICAL SSDS EXTRACTION POINTS (QUANTITY PER SYSTEM VARIES- SEE PLAN ON C3.0 AND C4.0)

TYPICAL P&ID PROVIDED FOR CONCEPTUAL PURPOSES ONLY. FINAL P&ID AND ELECTRICAL SCHEMATICS TO BE PROVIDED BY REMEDIAL EQUIPMENT VENDOR UPON FABRICATION OF PRE-ENGINEERED SYSTEMS.

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Sheet Title:

TYPICAL PIPING & INSTRUMENTATION DIAGRAM

Sheet Number: 8 OF 8

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APPENDIX B

Manufacturer's Manual (To Be Provided Upon SSDS Delivery)

APPENDIX C

System O&M Form

O&M FIELD DATA SHEET
FOR THE SSDS SYSTEM AT THE FORMER HOOVER FACILITY
101 E. MAPLE STREET, CANTON, OHIO

Date/Time Arrived: _____ Barometric Pressure: _____
Time Departed: _____ Weather Conditions: _____
Operator: _____ Approx. Temperature: _____

SYSTEM MEASUREMENTS

Blower ID	VFD Speed Setting (Hz)	Inlet Vacuum Pre-Filter (in. H2O)	Post-Filter Vacuum (in. H2O)	Filter Diff. Pressure (in. H2O)	Exhaust Temp (deg. F)	Blower Flowrate (scfm)	Damper Position (% Open)	Other (specify)
B-1								
B-2								
B-3								
B-4								
B-5								
B-6								
B-7								
B-8								
B-9								
B-10								
B-11								
B-12								
B-13								
B-14								
B-15								

SYSTEM INSPECTIONS AND MAINTENANCE

Item	Frequency	Results/Comments
Visual Inspection of SSDS Piping and Fittings	First Year: semi-ann. Thereafter: ann.	
Visual Inspection of Building Floor for cracks/damage	First Year: semi-ann. Thereafter: ann.	
Visual Inspection of SSDS Equipment/Enclosures	First Year: semi-ann. Thereafter: ann.	
Inspection of Building/Slab for Modifications	First Year: semi-ann. Thereafter: ann.	
Clean or Change In-line Filter	Diff. pressure 6 to 10 in. H_2O above normal.	
Blower Inspections & Maintenance	Consult Blower Manual for Schedule	
Other (Specify)		

ABNORMAL OPERATING CONDITIONS

Description of Alarm or Malfunction	Date/Time	Blower ID	Describe Troubleshooting/Corrective Actions

O&M FIELD DATA SHEET
FOR THE SSDS SYSTEM AT THE FORMER HOOVER FACILITY
101 E. MAPLE STREET, CANTON, OHIO

SUB-SLAB MONITORING POINTS DIFFERENTIAL PRESSURE MEASUREMENTS
(collected annually following first year of operation)

Date	Sub-slab Monitoring Point	Diff. Press. (in. H2O)	Date	Sub-slab Monitoring Point	Diff. Press. (in. H2O)	Date	Sub-slab Monitoring Point	Diff. Press. (in. H2O)

Notes/Comments

APPENDIX D

Schedule of Routine O&M Tasks

SCHEDULE OF ROUTINE O&M TASKS
FOR THE SSDS SYSTEM AT THE FORMER HOOVER FACILITY
101 E. MAPLE STREET, CANTON, OHIO

O&M Task	Schedule
Visual Inspections	
Inspection of SSDS Piping and Fittings for Wear or Damage	Year 1: Semi-Annual Year 2+: Annual
Inspection of Building Floor for Cracks or Damage	Year 1: Semi-Annual Year 2+: Annual
Inspection of SSDS Equipment /Enclosures for Damage or Abnormal Conditions	Year 1: Semi-Annual Year 2+: Annual
Inspection of Building/Slab for Modifications	Year 1: Semi-Annual Year 2+: Annual
System Monitoring and Maintenance	
Monitoring System Operational Reports and System Alarms from Telemetry System	Daily via the remote telemetry system
Manually Record System Operational Parameters on SSDS Field Data Sheet at described in O&M Plan	Year 1: Semi-Annual Year 2+: Annual
Replacement of In-line Particulate Filter Element	When differential pressure exceed 6 to 10 in. H2O above normal ("clean") differential pressure
Radial Blowers - Inspection/cleaning of dirt/debris on the outside of the blower; inspection/cleaning of the blower wheel for corrosion, wear, or buildup; lubrication of blower bearings; and draining of any condensate from the blower housing.	Year 1: Semi-Annual Year 2+: Annual (consult manufacturer's manual for schedule of any additional O&M)
Regenerative Blowers - Inspections/cleaning of dirt/debris on the outside of the blower; monitoring/cleaning of the blower inlet line/filter.	Year 1: Semi-Annual Year 2+: Annual (consult manufacturer's manual for schedule of any additional O&M)
Effluent Air Monitoring of SSDS Blowers	During system startup - see Section 3.1.2.3 of O&M Plan
Sub-Slab Differential Pressure Measurements	
Sub-Slab Differential Pressure Measurements from Vacuum Monitoring Pins	Year 1: Semi-Annual Year 2+: Annual
Confirmatory Indoor Air Sampling	
Indoor Air Verification Sampling	Year 1: one event 30 to 60 days after startup & a second event during the winter months (November 1 to March 31)

Note. This table presents a schedule for routine O&M. Additional, non-routine O&M may be required as outlined in the O&M plan in response to system alarms or adjustments.

APPENDIX E

SSDS Post-Startup Outdoor Air Verification Sampling

E.1 Post-Start-up Outdoor Air Verification Sampling Plan

Following review of the pilot study test data, U.S. EPA has indicated that the highest potential of TCE emissions to outdoor air may originate from Zones 1, 3, 4 and/or 7A. Based upon the redevelopment plan, which includes retail and office space on the ground level and residential units (i.e., apartments) on subsequent higher floors, and the concentrations of TCE observed in the pilot study, the following sampling plan is proposed to confirm that the uncontrolled SSDS emissions do not pose an unacceptable risk to human health. Up to three sampling events will be conducted at the locations described below (see attached table and figure). The first event will be conducted on Day 1 of SSDS Start-up and the second sampling event will be conducted on Day 5. If results of the second sampling event are above the established applicable outdoor air standards, then a third sampling event will be conducted on Day 15. If the results of the second sampling event are below established applicable outdoor air standards, then the outdoor air verification sampling program will be complete, and no further sampling will be conducted. Concurrent with outdoor air samples, samples will be collected from the effluent stream of each individual SSDS blower. Outdoor air samples collected during each sampling event will be collected at breathing level and all samples will be collected over an 8-hour time period as directed by the USEPA during a discussion on June 27, 2018. Figure 1 shows the locations of outdoor air samples that will be collected during start-up activities.

Zone 1

On-Site Commercial/Industrial Worker

- Four outdoor air samples will be collected on the ground floor immediately adjacent to the Zone 1 building perimeter.
- Sample locations have been biased towards the north, west and east of Zone 1 due to observed TCE concentration locations during the pilot study and/or RFI.

On-Site Resident

- One outdoor air sample will be collected from each of the 2nd, 3rd and 4th floor balconies facing the Central Courtyard for a total of three outdoor air samples.
- Sample locations have been biased towards the pilot study and/or RFI sampling locations at Zone 1 displaying detected concentrations of TCE.

Zone 3

On-Site Commercial/Industrial Worker

- One outdoor air sample will be collected on the ground floor immediately adjacent to the Zone 3 building perimeter.
- The sample location has been biased toward the south of Zone 3 due to observed TCE concentration locations during the pilot study and/or RFI.

Zone 4

On-Site Commercial/Industrial Worker

- One outdoor air sample will be collected on the ground floor immediately adjacent to the Zone 4 building perimeter.
- The sample location has been biased towards the north of Zone 4 due to observed TCE concentration locations during the pilot study and/or RFI. Outdoor air sampling locations have not been identified towards the west or east due to the presence of existing buildings.

Zone 7A

On-Site Commercial/Industrial Worker

- One outdoor air sample will be collected on the ground floor immediately adjacent to the Zone 7A building perimeter.
- The sample location has been biased towards the south of Zone 7A due to (1) the observed TCE concentration locations during the pilot study and/or RFI; and (2) the presence of the existing adjacent building to the north.

On-Site Resident

- One outdoor air sample will be collected from each of the 2nd, 3rd and 4th floor balconies facing the Central Courtyard for a total of three outdoor air samples.
- The sample location has been biased towards the pilot study and/or RFI sampling locations at Zone 7A displaying detected concentrations of TCE.

West Factory Area Perimeter Considerations

Commercial/Industrial Worker

- Two outdoor air samples will be collected at the perimeter of the West Factory Area in order to assess the Off-Site Commercial/Industrial Worker who may potentially be exposed to emissions from the SSDS.
- Sample locations have been biased to the southwest along Maple Street and to the east along Witwer Street.

Resident

- One outdoor air sample will be collected at the perimeter of the West Factory Area in order to assess the Resident who may potentially be exposed to emissions from the SSDS.
- The sample location has been biased to the northwest along Witwer Street.

All outdoor air sampling will be implemented utilizing the following methodology:

- 6-Liter Summa canisters will be utilized for all outdoor air sampling events. Sampling locations that have been identified to assess commercial/industrial exposures will include 8-hour regulators; sampling locations that have been identified to assess residential exposures will include 24-hour regulators.
- All samples will be collected from the breathing zone (3 to 6 feet above ground surface), where feasible.
- Outdoor air samples will be collected on Day 1, Day 5, and Day 15 (if needed). Note that the sampling schedule may change slightly, in necessary, to account for potential schedule delays associated with weather, unforeseen circumstances, etc.
- All outdoor air samples will be submitted to Pace Laboratories for laboratory analysis of TCE only.
- An upwind ambient air background sample will be obtained during each sampling event in order to assess any potential artificial influences that may impact the Site-specific sampling results.

E.2 Comparison of Data

Analytical results obtained from the outdoor air sampling activities will be compared to Site-specific outdoor air screening levels developed in conjunction with U.S. EPA. Specifically, the screening levels were developed utilizing the U.S. EPA Regional Screening Level (RSL) calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search) and modified to incorporate Site-specific information.[3] To confirm that outdoor air meets acceptable human health criteria and, thus, neither SSDS emission controls nor changes from the approved 100% Design Report are necessary, analytical data obtained from the outdoor air sampling events will be compared to the following Site-specific outdoor air screening levels:

On-Site Residential Outdoor Air Screening Level: 25 ug/m3
On-Site Outdoor Worker Air Screening Level: 20 ug/m3

[3] U.S. EPA acknowledged the residential Site-specific screening level and concurred with the outdoor worker Site-specific screening level in their Response to May 14, 2018 Technical Memorandum response letter received on June 25, 2018.

All outdoor air analytical results will be compared to their applicable receptor screening level.

Based on analytical results obtained from outdoor air sampling, the following decision rules will be applied:

1. If detected concentrations of TCE from biased locations exceed screening levels:

   - Then the upwind background location analytical data will be reviewed to determine if there are any artificial influences that could be impacting the site-specific results. Redevelopment activities, including storage and use of new building materials will also be evaluated;
   - No additional sampling will be completed prior to the scheduled Day 5 sampling activities. Results from the Day 1 blower discharge stack samples will be reviewed to evaluate if there are one or more blowers that may be contributing to the exceedance(s) and adjustments any high-contributing blowers may be made, as appropriate, prior to Day 5 sampling.
   - If exceedance(s) are observed on Day 5 sampling, then (1) an additional round of outdoor air sampling will be completed on Day 15. Additionally, results from the Day 5 blower discharge stack samples will be reviewed to evaluate if there are one or more blowers that may be contributing to the exceedance(s). f exceedance(s) are observed on Day 15, all data collected from the outdoor air samples and blower effluent stack samples will be reviewed to determine if a trend is evident with the observed exceedances. Data review and trend assessment will be used to determine which blower(s) are contributing to the exceedance(s). Based on this review, the blower(s) that are identified to be contributing to the exceedances will have activated carbon vessels installed.
   - Within 24-hours after installation of the carbon vessels, the blower(s) another round of outdoor air samples will be collected from the area(s) previously exceeding standards. Additionally, for each blower receiving activated carbon, the post-carbon effluent stream will be sampled following re-start.

   - If detected concentrations of COCs from biased locations do not exceed site-specific outdoor screening levels after the Day 5 sampling event and/or background levels, then no further sampling beyond the proposed Day 5 sampling activities will be completed. If results from the Day 1 and Day 5 sampling events show that sampling locations do not exceed site-specific outdoor screening levels, then those sampling locations will be removed from the sampling set and sampling during the Day 15 sampling event will be biased toward locations where exceedances of site-specific outdoor screening levels were observed.

E.4 Submittal of Analytical Results

Samples will be analyzed on a 24-hour turn around with results provided to both the U.S. EPA and Hull simultaneously following each outdoor air sampling event at the Site. A final report will be submitted to U.S. EPA following the conclusion of sampling that summarizes the sampling results and any corrective actions, if any, taken to mitigate outdoor air exposures.

Notes:
The aerial photo was acquired through the ESRI Imagery web service. Aerial photography dated 2016.

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August 2018

Former Hoover Facility
RCRA Facility Investigation Work Plan

SSDS Start-up Outdoor Air Sampling Locations

101 E. Maple Street
North Canton, Stark County, Ohio

Figure
1

Produced using ArcGIS 10.5

File Name: MPL001_49_Fig01_AirSampLocs.mxd

Edited: 8/29/2018 By: mopel