

SOIL VAPOR INTRUSION WORK PLAN

GATEWAY LOFTS SUPPORTIVE APARTMENTS
31 WATER STREET
JAMESTOWN, CHAUTAUQUA COUNTY, NEW YORK


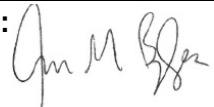
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Updated June 2024

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1.0 INTRODUCTION

This Soil Vapor Intrusion (SVI) Work Plan has been generated for The Gateway Lofts Supportive Apartments (New York State Department of Environmental Conservation [NYSDEC] Site No. C907046) located at 31 Water Street, Jamestown, Chautauqua County, New York (refer to **Figure 1**). The Site is comprised of twelve (12) individual parcels with the following SBLs (see **Figure 2**):

- 387.50-1-25.1
- 387.50-1-26.1
- 387.50-1-27
- 387.50-1-54
- 387.50-1-55
- 387.50-1-56
- 387.50-1-28
- 387.50-1-23.2
- 387.50-1-23.1
- 387.50-1-23.2
- 387.50-1-22.2
- 387.50-1-21
- 387.50-1-22.1

The following structures exist on the property:

- Eight (8) interconnected buildings varying between one (1) and four (4) stories encompassing approximately 2.24 acres; and
- Two (2) residential structures located on the most eastern parcels, 53 and 55 Water Street.

The SVI Work Plan is based on sub-slab vapor ambient air analytical results obtained during the 2018 Remedial Investigation (RI). A total of 13 sub-slab vapor samples, 13 indoor ambient air samples, and one outdoor air sample were collected from the building complex and analyzed in accordance with the approved RI Work Plan. Samples were submitted to a NYSDEC certified contract laboratory and analyzed for TCL VOCs by EPA method TO-15. The results were assessed using the New York State Department of Health (NYSDOH) matrices and indicated that trichloroethylene (TCE) was detected at elevated concentrations in all sub-sub/indoor air sample pairs that require mitigation. The only exception was the results from location SS-11 where the matrix recommends “identify source(s) and resample or mitigate”.

Detections above the NYSDOH Air Guideline Values warrant the installation of a sub-slab depressurization system (SSDS) to remove sub-slab vapors across the entire building complex. It is important to note that the two residential structures are planned to be demolished, thus the SVI Work Plan is only applicable to the main building complex.

1.1 BACKGROUND

The Site is bounded by Water Street to the south, Foote Ave to the west, the Chadakoin River to the north and commercial buildings to the east (see **Figure 3** for site boundaries). The Site is centrally located in the center of the City of Jamestown in Chautauqua County, New York. In general, the Site is situated in a mostly industrial section of the city that contains some scattered residential structures. The Site is located less than 700 feet north of UPMC Chautauqua, approximately 0.25-miles southeast of Jamestown High School and about 0.75 miles east of Jamestown Board of Public Utilities. The general

middle of the Site is located at latitude 42° 5'36.14" N; Longitude 79°13'52.93" W. There are no major changes of topography on the Site, which is generally flat with a gentle northern slope toward the Chadakoin River.

The Site and surrounding area have been predominantly used for manufacturing. Historically, the Site was used by two different manufacturing companies. In 1888, the Jamestown Woolen Spinning Company built a brick factory on the Site to produce yarns and cloth. The company changed to the Empire Worsted Mills in 1896 and operated at the Site until the late 1940s. By 1963, the Chautauqua Hardware Corporation was located on the Site. This company was involved with furniture trimmings and hardware manufacturing and fabrication including metal household furniture. Operations included electroplating, nonferrous die-casting, polishing, anodizing, and coloring, brass and zinc castings, and zinc, lead, magnesium, tin, brass, bronze, steel, and iron tubing, as well as cement, plastic and rubber tubing. This operation used various hazardous and petroleum compounds. In 2005, the Chautauqua Hardware Corporation c/o FKI Industries sold the Site to the Community Development Association, LLC, which has subsequently merged with Lynn Development, Inc.

The Site is currently used as a community service center with a soup kitchen and provides youth activities including an archery range, roller park, laser tag, and computer and other academically related youth and community services. A few small businesses also operate or store equipment and materials at the site. On the southeastern portion of the site there are two residential buildings owned by Community Helping Hands, Inc. Some of the former adjacent industrial buildings have been converted to commercial and community service operations. The Site and surrounding parcels are all zoned M for manufacturing.

2.0 OBJECTIVE

This plan provides the approach to be used at the Gateway Lofts Supportive Apartments property to mitigate contaminated sub-slab soil vapors from entering the various structures and living spaces at levels above regulatory guidance levels. Installation of active SSDSs will be used to meet this objective.

The building complex is slab on grade except for the entry building, which contains a crawlspace. Once installed throughout the various types of building foundations, the SSDS will maintain an adequate sub slab vacuum pressure (e.g., min. of -0.004" of water column (wc)) in the subsurface. This will extract suspect contaminated sub-slab soil vapors and discharge them to the exterior of the buildings, preventing the vapors from migrating into the buildings. The installation of the SSDS will conform to the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, as updated. Post installation sampling and analysis is also a significant objective for the 31 Water Street project to ensure protection of human health.

Prior to installation, a list of current occupants of the building will be generated and their location regarding the installation of SVI will be determined. A plan will be developed to address any specific protocols or mitigative actions that need to be instituted for the protection of existing occupants. This may include administrative controls such as temporary closure of those areas, preventive controls such as barricades or shielding and monitoring in accordance with Special CAMP Requirements attached to the SVI WP.

All tasks completed as part of this SVI WP will meet the appropriate sections of the RAWP and in accordance with Appendix A – Health and Safety Plan of the RAWP. Additionally, as appropriate, the requirements in the attached Special CAMP Requirements (attached to this SVI WP) will be followed.

3.0 SSDS DESIGN

3.1 SLAB ON GRADE DESIGN

The approach to evaluating and mitigating soil vapor intrusion is dependent upon site-specific conditions. As the Gateway Loft Supportive Apartments is primarily slab on grade, the SSDS design will be consistent throughout the complex except for the crawlspace area. See **Appendix A** for design specifics.

In general, SSDS require the installation of extraction points by coring through the concrete floor and replacing existing soil with stone. Any soil/material excavation and removal will be completed in accordance with Section 5.1 of the RAWP which provides procedures for proper handling of excavated materials. All replacement material brought to the site will follow the protocols provided in Section 5.1.3 of the RAWP including notifying the NYSDEC with an Import Request. Each extraction point will consist of a vertical riser of 4" or 6" polyvinyl chloride (PVC) Pipe that will connect various extraction points together forming a manifold system. Each manifold system will exit either through the side wall and vent above the roof line or will be installed internally and exit the building through the roof. A total of 14 SSDSs (including the crawl space area) are designed to be installed. Each system contains either multiple extraction points or a sub slab trench extraction system. Each system is designed to have 50-60' of interior piping in addition to the exterior stack. The inline fan will be installed either on the exterior of the building or on the rooftop as needed. All piping will be installed and anchored in accordance with all previously referenced standards. Inline fans will discharge at least twelve inches (12") above the roof or thirty feet (30') above ground level on buildings with non-operational windows. Discharge points will be at least two feet (2') above operations windows and openings that are within ten (10) feet of the discharge pipe. For active systems, fans will be wired with switches at fan locations and wired into the nearest electric panels on a dedicated circuit. Manometers will be used on the ground floor risers to provide an indication of pressure during operations.

To monitor the sub-slab vacuum response (i.e., the extent of the negative pressure beneath the building), an adequate number of vacuum test or monitoring points will be installed through the concrete floor slab, extending radially outward from each test point. After installation, a manometer will be utilized to measure pressure. The total number of test points and locations will be dependent on the location of extraction points, trenching, etc. The objective is to verify an adequate sub slab vacuum throughout the entire slab, therefore at a minimum all corners will contain a test point as well as a few centrally located test points will be installed. This is done by starting with the farthest points away from the suction points to avoid drilling unnecessary test holes. All corners and a reasonable amount of test holes along walls and the center are then tested.

3.2 CRAWLSPACE DESIGN

The design objective of the crawlspace ventilation system is to mitigate potential vapor migration into the offices and rear hallway by maintaining a negative pressure in the crawlspace of the building. Sealing cracks or openings in the crawlspace walls will result in better control of air flow into and out of the crawlspace, thereby making vapor reduction techniques more effective. Four access panels on the interior wall to the crawlspace were identified. The access panels will be sealed off with plastic and tape. Caulking along the interior wall and conduit penetrations will be completed as leaks are identified. See **Appendix B** for photographs of the access panels.

Adjustable louvers will be installed at four locations along the interior wall to the crawlspace as shown in **Figure 4**. Smoke testing will be completed to confirm air flow into the crawlspace at each louver. The louvers will be adjusted to balance the flow into the crawlspace and additional louvers will be installed if

necessary. This method of ventilation was selected over pressurization of the crawlspace as pressurization of an old structure could result in vapor and dust migration into the offices and nearby occupied spaces (i.e., thrift store and soup kitchen).

A twenty-foot length of four-inch inner diameter (ID) slotted pipe will be installed to convey the vapor to a blower enclosure located outside of the building. The pipe will perforate the exterior wall through an existing passive vent and the opening around the pipe will be sealed. See **Appendix B** for photographs of the passive vents. The pipe will be level or sloped away from the blower to prevent condensate accumulation. The extraction piping will be installed from the exterior of the building and entering the crawlspace will not be necessary.

Based on the 5,500-square foot treatment area and an estimated air flow rate of one (1) cubic foot per minute (CFM) per 30-50 square feet, the air flow rate necessary to treat the crawlspace area is 110-180 CFM. A five horsepower (5hp) New York Blower Co. Model #2004, or similar, will be used to create a negative vacuum within the crawlspace. The blower is sized to accommodate additional flow if additional piping is required in the eastern portion of the crawlspace or higher air flow needed to reduce indoor air concentrations to acceptable levels. The blower will be housed in a weatherproof enclosure located on the exterior of the building. Effluent air will be conveyed through a 4-inch ID discharge stack extending twelve (12) inches above the roofline of the building, at least ten (10) feet above ground level, at least ten (10) feet away from any opening that is less than two (2) feet below the exhaust point, and at least ten (10) feet from any adjacent buildings, heating, ventilation, and air conditioning (HVAC) intakes or supply registers.

Vacuum test/monitoring points will be installed as outlined in Section 3.1.

An anticipated schedule for the SSDS installation is provided in **Figure 4**. See **Figure 5** (Building Designations) for additional details.

4.0 PERMANENT SUB-SLAB SAMPLING POINTS

The SSDS at 31 Water Street will be installed as active in all structures as described above. At the request of NYSDEC, sub-slab sampling post installation will occur, and permanent ports will be installed. The NYSDOH manual defines sub-slab sampling as (1) a means of investigation for deciding SSDS installation, and (2) a means of confirming that remediation has been achieved. Permanent port locations will be field assessed to ensure adequate coverage of the building footprint and perimeter.

The remedial efforts as outlined within the approved RAWP will continue until a certificate of completion is achieved, and this will include various efforts of soil and groundwater remediation. These activities should mitigate contaminated vapor sources in parallel and this can be monitored using sub-slab sampling.

Comprehensive testing post installation and post certificate of completion (COC) will include a combination of indoor, outdoor, and sub slab vapor as described in Section 5.0. In accordance with Section 2.2.4 of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, indoor, outdoor, and sub slab vapor samples will be collected to confirm the effectiveness of the SSDS. Final post COC soil vapor monitoring requirements will be detailed in the anticipated Site Management Plan (SMP).

It is important to note that if shut down of the SSDS is proposed, sampling of the sub slab and indoor air would be required. Should a subsequent request be made to shut down any of the SSDS systems, a

draft SSDS Shutdown Work Plan for that respective SSDS will be provided to the NYSDEC and NYSDOH for review and approval.

5.0 SYSTEM EFFECTIVENESS CHECK

After all systems are installed negative vacuum under all building structures will be verified to adhere to at most -0.004" of water column (wc), which will indicate the systems are effective and functioning properly. Various test/monitoring points (0.5") will be installed at various locations proximate to the extraction risers. Temporary fans will be utilized to measure air flow (CFM) and static pressure. Using a digital micromanometer at each test point, readings will be documented.

6.0 POST INSTALLATION SAMPLING

As previously described, indoor and outdoor samples will be collected to evaluate indoor air conditions to assess protection of human health. Sub-slab samples will also be collected to assess remediation effectiveness. At a minimum, indoor air sampling and analyses will be conducted prior to occupancy. Indoor and ambient air samples only will be collected and analyzed by EPA Method TO-15 to achieve laboratory reporting limits of 0.20 ug/m³ or less for the following five compounds: trichloroethene; *cis*-1,2-dichloroethene; 1,1-dichloroethene; carbon tetrachloride; and vinyl chloride. All laboratory data will be reported in units of micrograms per cubic meter (ug/m³). All post installation vapor sampling should be completed when the building is substantially completed (with HVAC and adequately sealed from outdoor air) to verify that detections of contaminants of concern have decreased in indoor air. The sampling will be completed in accordance with standard SVI procedures as outlined in the Remedial Action Work Plan (RAWP). Refer to **Appendix B** for further detail. A report discussing the sampling results will be submitted to the client and the Department of Conservation (DEC) for review.

Sampling will be based on occupancy and footprint requirements and when possible completed prior to use of finish materials, such as carpet glues, to minimize the potential for ambient artifact compounds. Product inventory sheets, as appropriate, will be used to assist in evaluating artifact compounds. A product inventory questionnaire will be completed for every indoor air sampling event (refer to **Appendix C**). This form will be provided with the sample results.

The sampling is anticipated to consist of one indoor air sample for approximately 1500-2000 square foot (SF) and one outdoor sample per sampling event, however, indoor air samples will be collected from each specific building area that is mitigated by its individual SSDS. All VOC samples will be collected for a 24-hour period using Summa® canisters and analyzed for Target Compound List (TCL) VOCs via EPA Method TO-15 by a certified laboratory.

The initial SSDS installations, negative pressure testing data, and post-mitigation indoor air sampling will be provided as a separate letter report (or similar) to the NYSDEC and NYSDOG. Post mitigation indoor air sampling in each specific area will be conducted after the respective individual SSDSs have been operating effectively for a minimum of 30 days.

7.0 OPERATIONS AND MAINTENANCE (O&M) PLAN

7.1 ROUTINE MAINTENANCE

Routine inspection of the SSDS should be conducted by property maintenance staff or superintendent after the system becomes operational. Each system will have an active alarm/warning device that will

notify the maintenance personnel that there is an issue with the SSDS. After inspection, the staff/superintendent will notify BE3 or the engineer of record to assess the situation and propose mitigation measures to rectify the problem. The SSDS effectiveness and post-mitigation indoor air sampling results reports are to be included in the O&M Plan as an addendum. Inspections should occur monthly and include the following activities (at a minimum):

- A visual inspection of the entire system including vents, fans, piping, alarms, pressure gauges, labeling, soil vapor retarder integrity, etc.
- Perform system-related checks for the electrical equipment including the alarms and fans.
- Log the results of the inspection including the identification of any leaks, broken equipment, etc.
- Assess the exhaust or discharge point to verify no newly construction air intakes have been located too close to the exhaust.

As appropriate preventative maintenance (e.g., replacing vent fans), repairs and adjustments should be made to the system to ensure its continued effectiveness at mitigating exposures related to soil vapor intrusion. The need for preventative maintenance will depend upon the life expectancy and warranty for the specific part, as well as visual observations over time. The need for repairs and/or adjustments will depend upon the results of a specific activity compared to that obtained when system operations were initiated. If significant changes are made to the system or when the system's performance is unacceptable, the system may need to be redesigned and restarted. The extent of such activities will primarily depend upon the reason for the changes and the documentation of sub-slab depressurization. Refer to Section 4.4 of the NYSDOH guidance manual: http://www.health.ny.gov/environmental/investigations/soil_gas/svi_guidance/

7.2 NON-ROUTINE MAINTENANCE

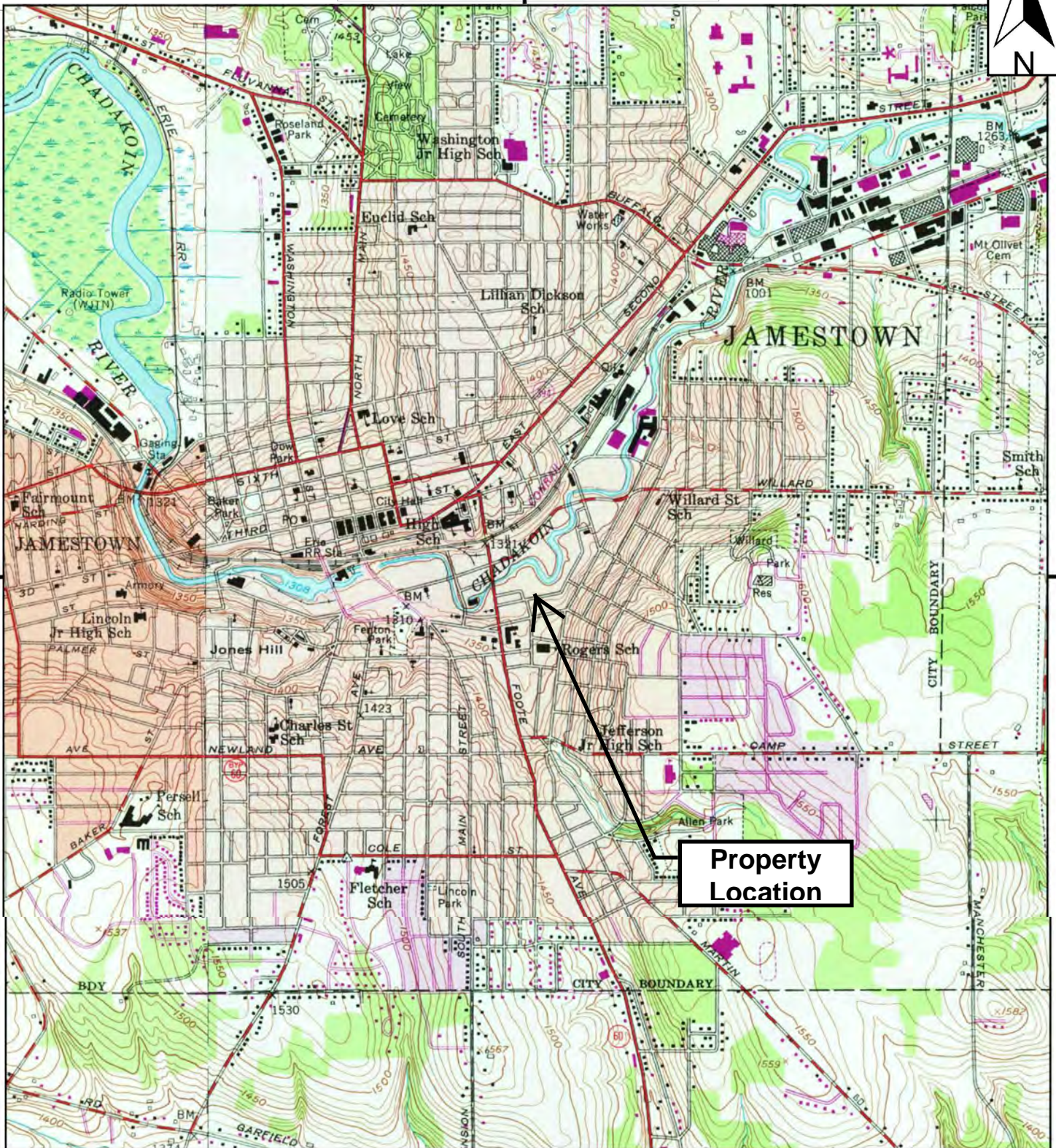
Non-routine maintenance may also be appropriate during the operation of a mitigation system. Examples of such situations include the following:

- the building's owners or occupants report that the warning device or indicator indicates the mitigation system is not operating properly;
- the mitigation system becomes damaged; and
- the building has undergone renovations that may reduce the effectiveness of the mitigation system.

Activities conducted during non-routine maintenance visits will vary depending upon the reason for the visit. In general, building-related activities may include examining the building for structural or HVAC system changes, or other changes that may affect the performance of the depressurization system (e.g., new combustion appliances, deterioration of the concrete slab, or significant changes to other building factors that may affect the SSDS). Depressurization system-related activities may include examining the operation of the warning device or indicator and the vent fan, or the extent of sub-slab depressurization. Repairs or adjustments should be made to the system as appropriate. If appropriate, the system should be redesigned and restarted.

An Interim Site Management Plan (ISMP) will be completed for the continued operation of the SSDSs. The ISMP will be submitted to the NYSDEC and NYSDOH for review and approval after installation and initial testing of the systems is complete.

FIGURES



This report includes information from the following map sheet(s).

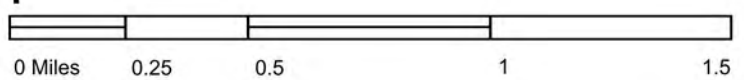


Figure 1: Property Location Map

Gateway Lofts Supportive Apartments

3/11/2019

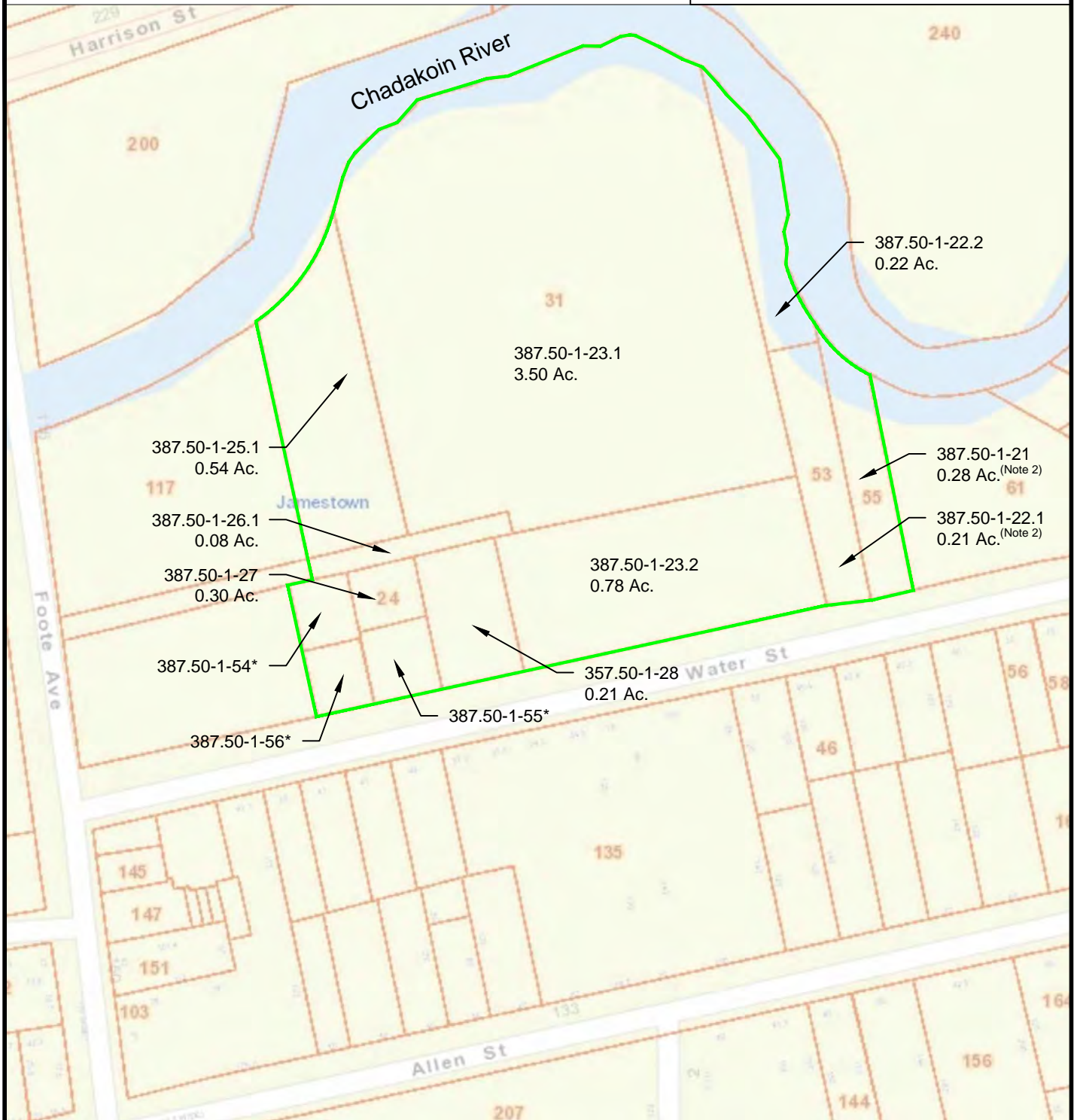
Jamestown, NY

STEL, Inc.



LEGEND

— INCLUDED PARCELS PROPERTY BOUNDARY



NOTES:
1) Parcels were part of a courtesy merge; acreage is included in SBL 387.50-1-28
2) Parcels 53 and 55 were added with an addendum.



Figure 2 - Property Tax Map and Parcel Acreage

STEL
31 Water Street
Jamestown, New York 14701

01-13-2020

SCALE: 1:1,800

SHEET 1 OF 1



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Figure 3: Property Boundary Map

Client: STEL

SCALE: 1:2400

Project: Gateway Lofts Supportive Apartments

Date: 07/28/2023

FIGURE 4: ANTICIPATED PROJECT SCHEDULE - June 2024

31 Water Street, Jamestown, NY

TASK	2024																							
	June				July				Aug				Sept				Oct				Nov			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. SVI Work Plan Approval	■	■	■	■																				
2. SSDS Building 1 Installation					■	■	■	■	■	■	■	■												
3. SSDS Building 2 Installation													■	■	■	■								
4. SSDS Building 3 Installation																	■	■	■	■				
5. Closeout Sampling and Reporting																					■	■	■	■



LEGEND

- Building 1
- Building 2
- Building 3

NOTES

(1) These buildings identifiers should only be referenced in regards to Figure 4 (Anticipated Project Schedule - June 2024). These are not official designations in regards to the project.



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CLIENT: STEL, INC.

FIGURE 5
Building Designations

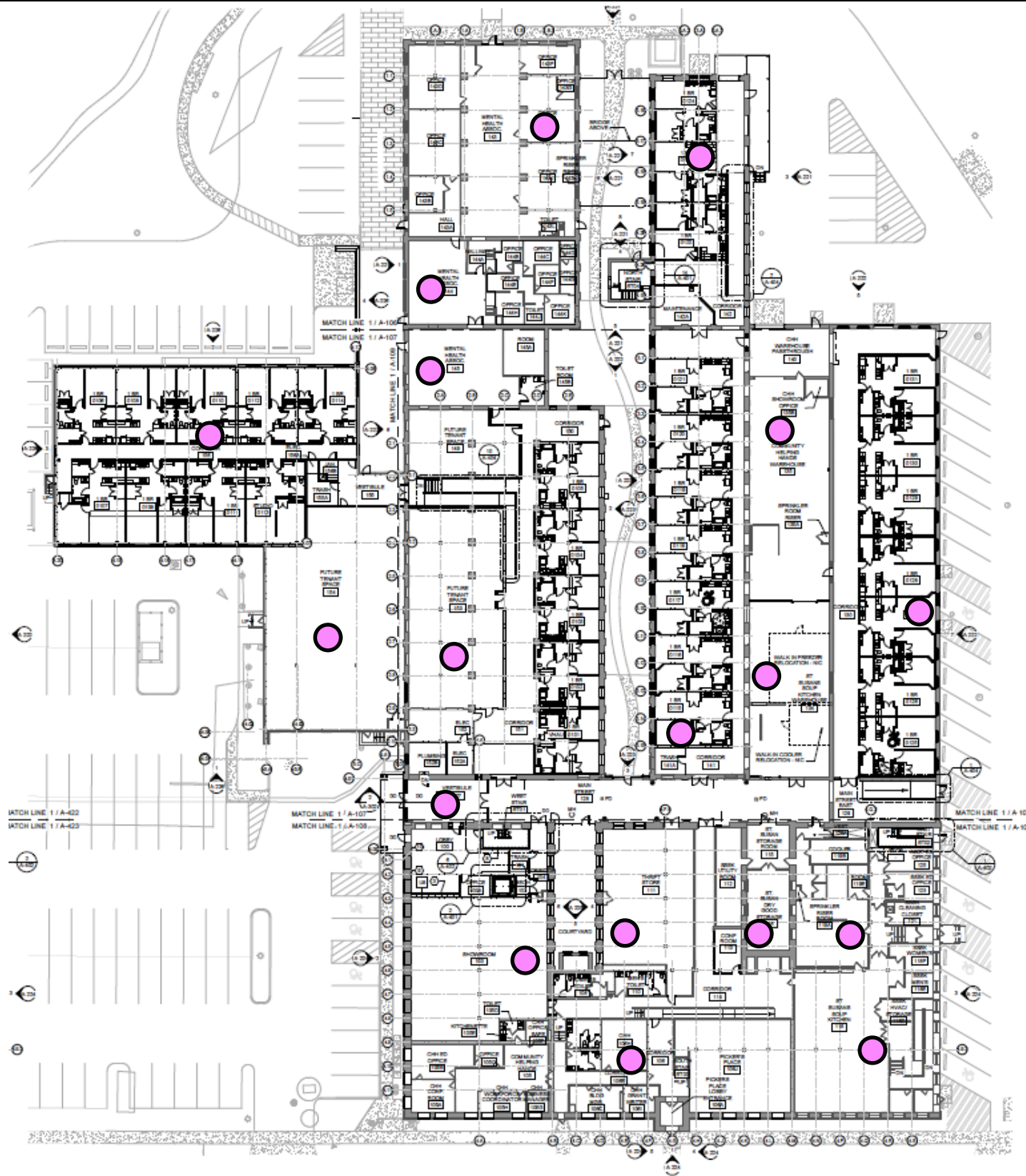
Gateway Lofts Supportive Apartments
Jamestown, NY 14701



DATE ISSUED:
April 10, 2024

△
△
△

FIGURE NTS



LEGEND

● Permanent Sub-slab Sampling Port

NOTES

- (1) Sampling locations may change upon field observations.
- (2) Sampling locations points are not to scale and have been enlarged for visibility



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AND ENERGY, DPC

960 Busti Avenue
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CLIENT: STEL, INC.

FIGURE 6
Permanent Sub-slab Sampling
Port Locations
Gateway Lofts Supportive Apartments
Jamestown, NY 14701



DATE ISSUED:
June 10, 2024

△
△
△

FIGURE NTS

APPENDICES

APPENDIX A

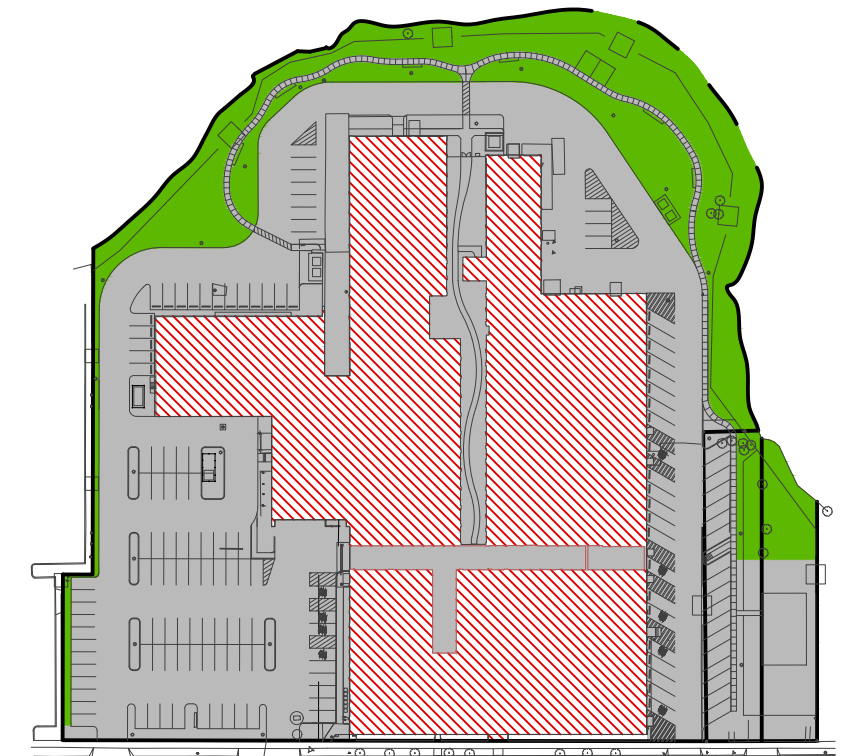
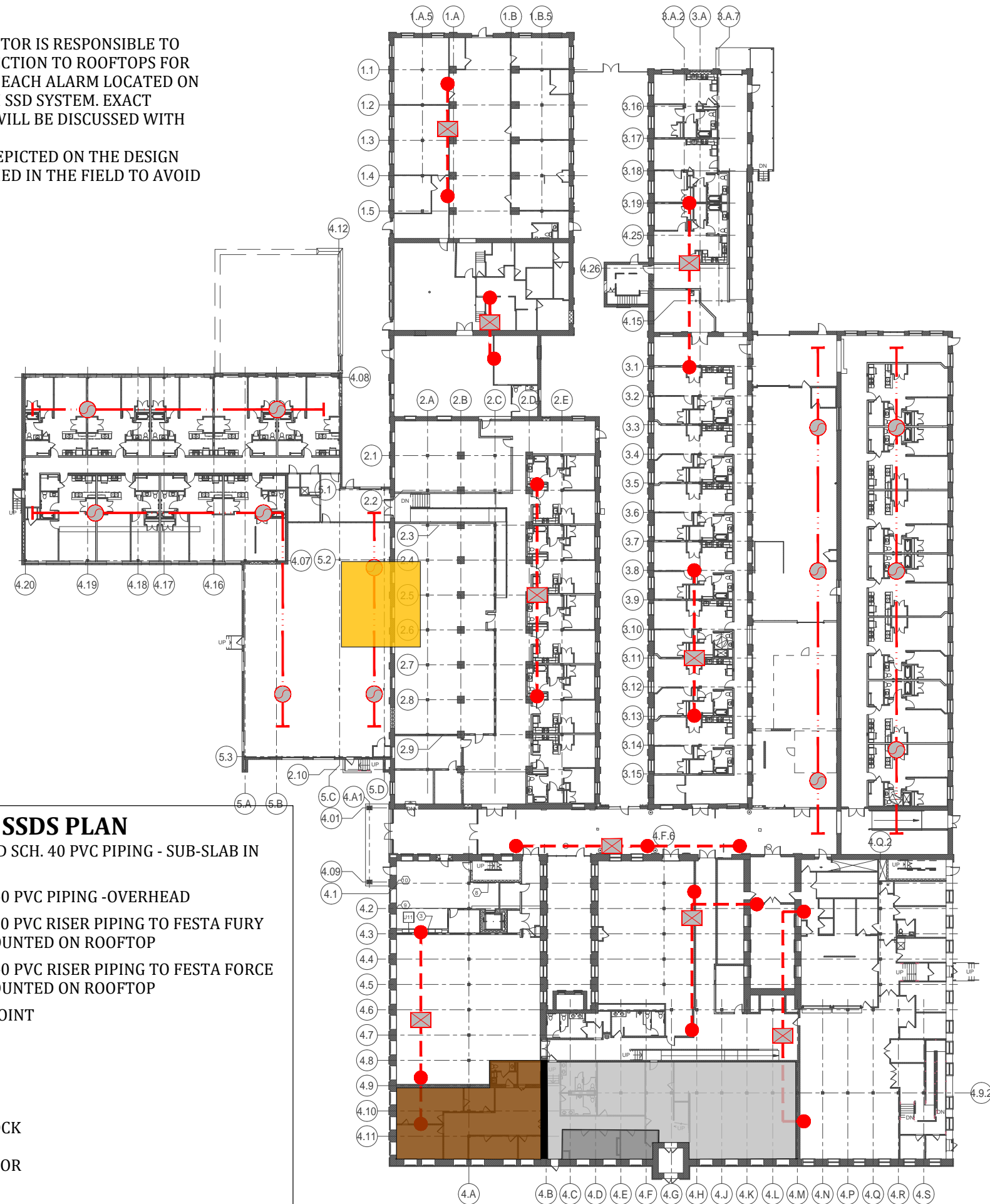
SUB-SLAB DEPRESSURIZATION SYSTEM DRAWINGS

NOTES:











- CONSTRUCTION CONTRACTOR IS RESPONSIBLE TO PROVIDE ELECTRIC CONNECTION TO ROOFTOPS FOR EACH SSDS SYSTEM AND TO EACH ALARM LOCATED ON THE FIRST FLOOR OF EACH SSDS SYSTEM. EXACT LAYOUT AND LOCATIONS WILL BE DISCUSSED WITH THE SSDS CONTRACTOR.
- SSDS RISER LOCATIONS DEPICTED ON THE DESIGN DRAWINGS CAN BE MODIFIED IN THE FIELD TO AVOID MEP.
- FRIDGE IS IMMOBILE.

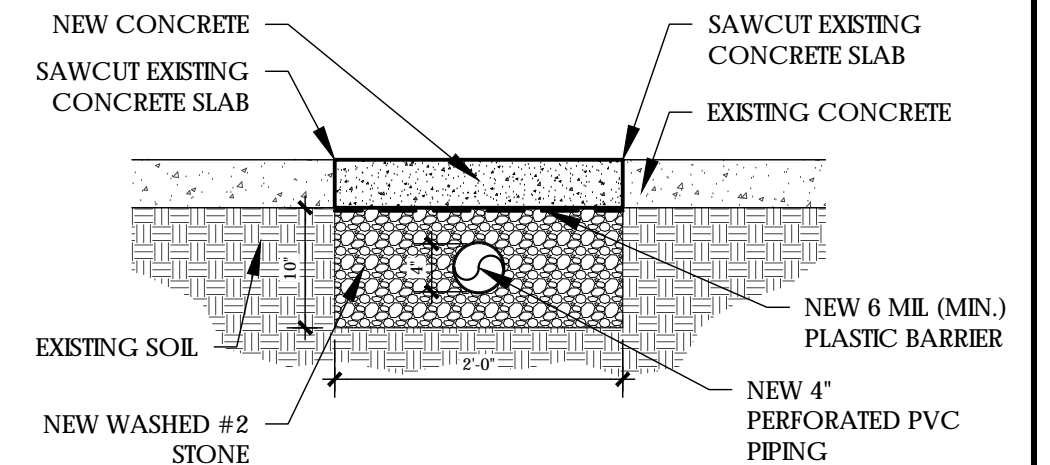
LEGEND - SITE PLAN

-  BUILDING
-  HARDSCAPE
-  GREEN SPACE





SITE PLAN

- LEGEND - SSDS PLAN**
-  4" PERFORATED SCH. 40 PVC PIPING - SUB-SLAB IN SSDS TRENCH
 -  4" SOLID SCH. 40 PVC PIPING -OVERHEAD
 -  6" SOLID SCH. 40 PVC RISER PIPING TO FESTA FURY INLINE FAN MOUNTED ON ROOFTOP
 -  4" SOLID SCH. 40 PVC RISER PIPING TO FESTA FORCE INLINE FAN MOUNTED ON ROOFTOP
 -  EXTRACTION POINT
 -  FRIDGE
 -  DIRT FLOOR
 -  CONCRETE BLOCK
 -  CONCRETE FLOOR
 -  DIVIDING WALL



TRENCH DETAIL



		Figure 1 SSDS Plan		Revisions
		Gateway Lofts Apartments 31 Water Street Jamestown, New York 14701		1 8/19/20
06-25-2020	SCALE: N/A	SHEET 1 OF 2		

FAN NOTES:

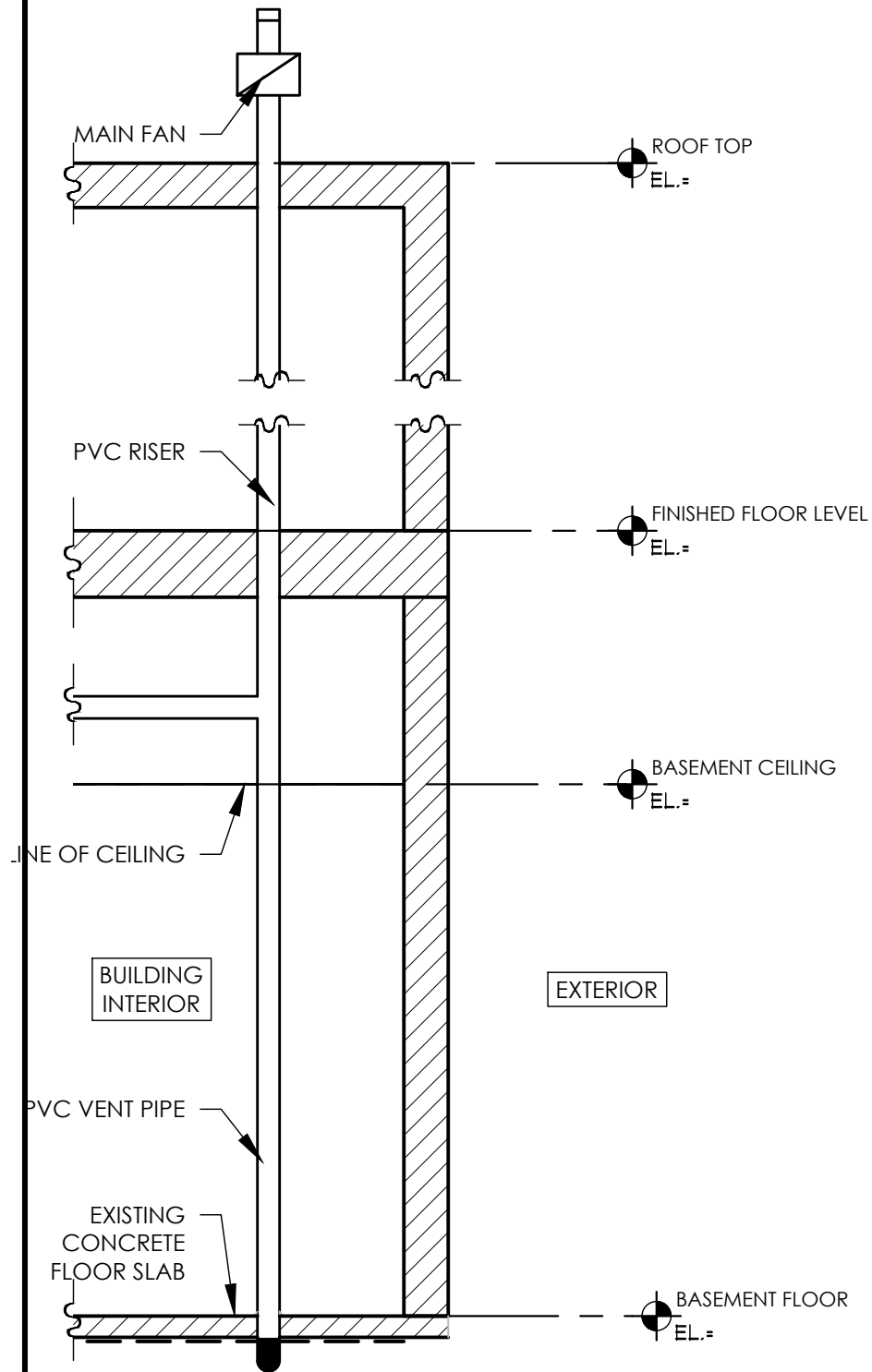
- 1) SSDS INSTALLED WITHIN EACH BUILDING WILL BE CLEARLY LABELED.
- 2) CRACKS IN THE EXISTING CONCRETE SLAB WILL BE SEALED TO MAXIMIZE EFFECTIVENESS OF SSDS.

VENT NOTES:

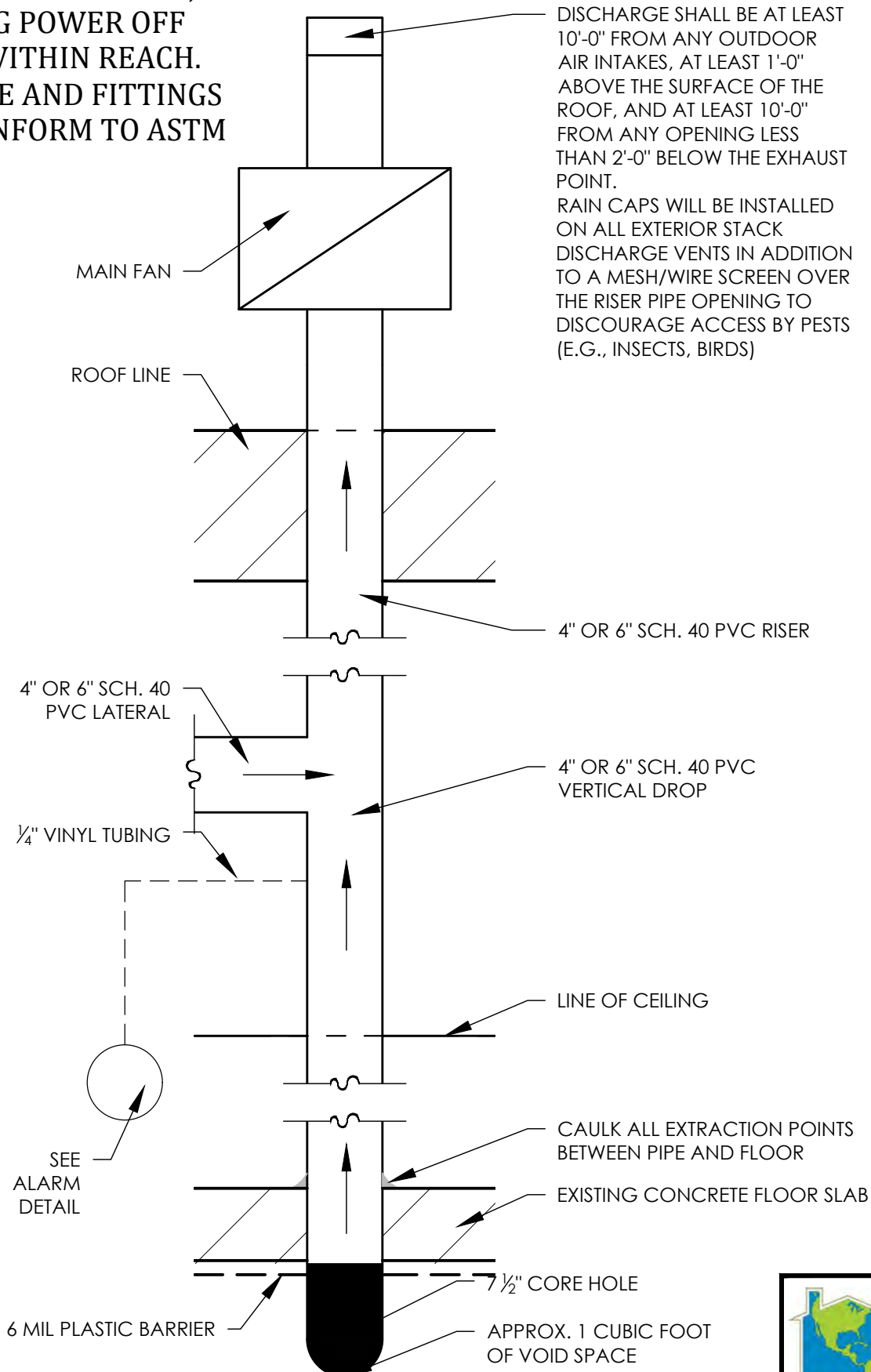
- 1) INSTALL ELECTRICAL, INCLUDING POWER OFF SWITCH, WITHIN REACH.
- 2) PVC PIPE AND FITTINGS SHALL CONFORM TO ASTM D3034.

ALARM NOTES:

- 1) PRESSURE SET POINT: -0.25 INCH WC.
- 2) PROVIDE ALARM COMPANY LABEL AND CONTACT INFORMATION.
- 3) LOCATE DEVICE WHERE IT CAN BE SEEN AND HEARD.
- 4) CONNECT DEVICE TO A SEPARATE CIRCUIT FROM THE FAN SO THAT IT WILL ACTIVATE IF POWER TO THE FAN IS INTERRUPTED.
- 5) ALARM WILL SOUND WHEN PRESSURE WITHIN THE VENT PIPE DROPS BELOW THE SET POINT.

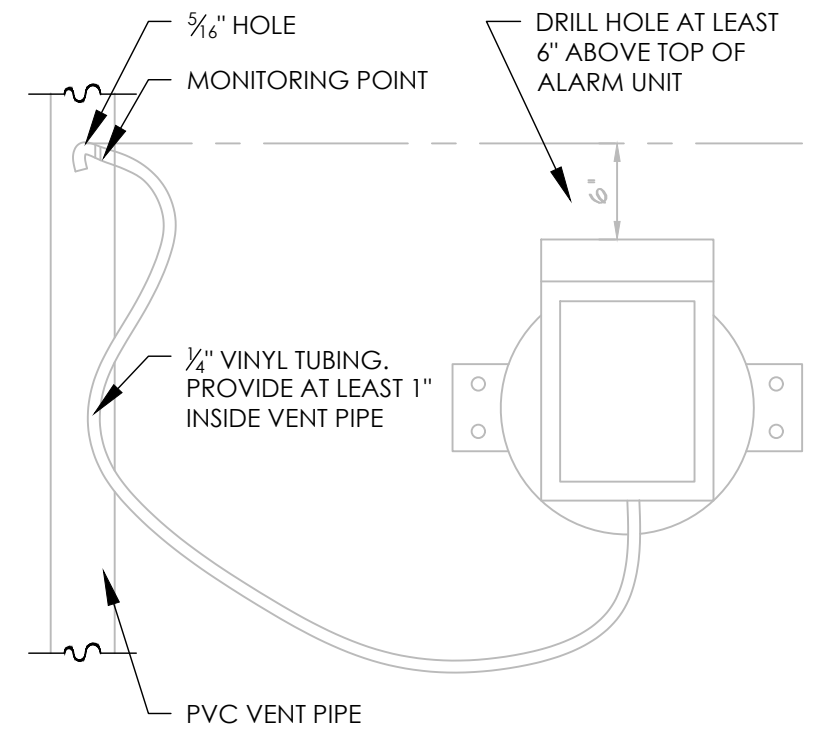


FAN PROFILE





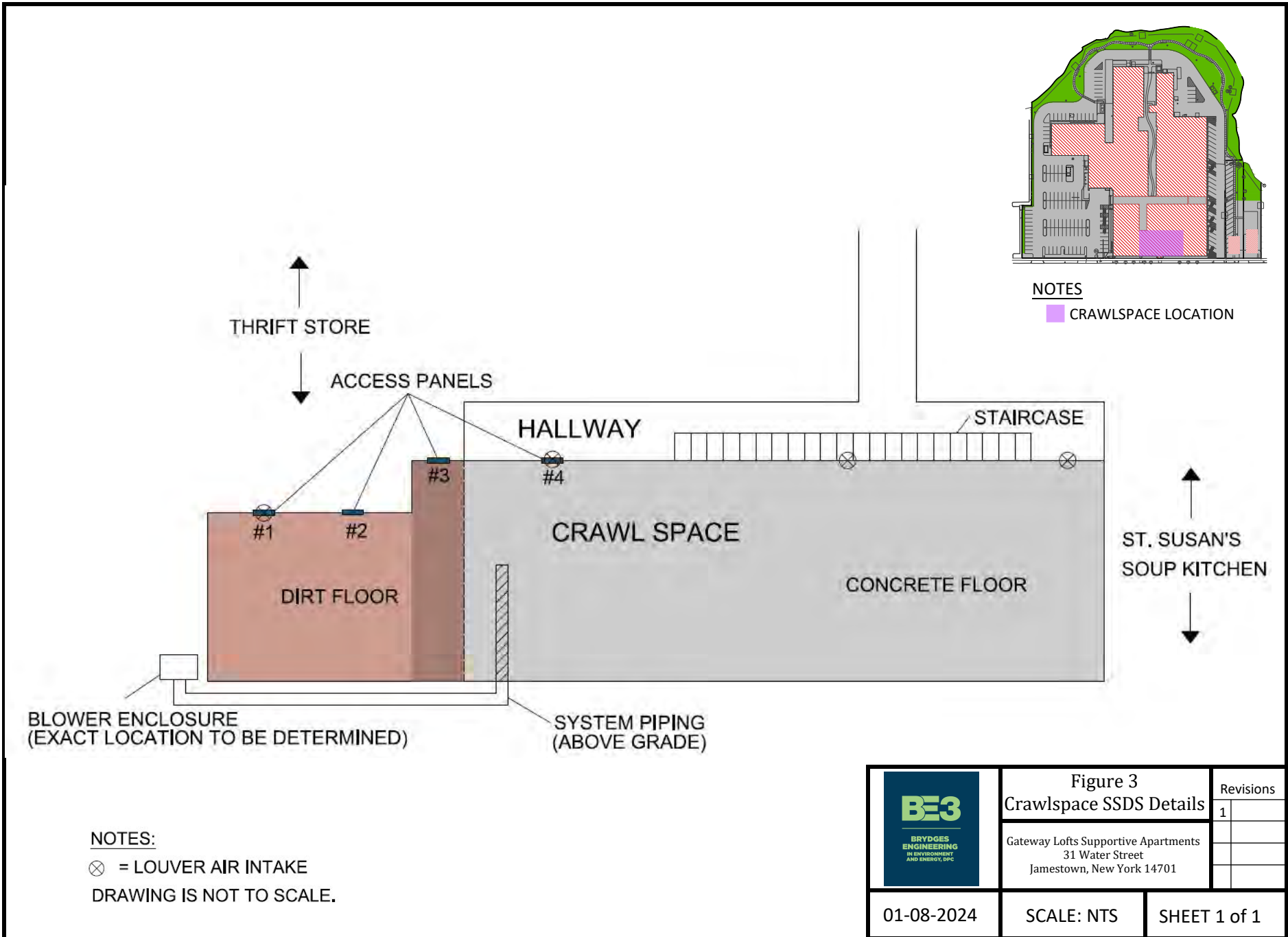
TYPICAL VENT DETAIL


DISCHARGE SHALL BE AT LEAST 10'-0" FROM ANY OUTDOOR AIR INTAKES, AT LEAST 1'-0" ABOVE THE SURFACE OF THE ROOF, AND AT LEAST 10'-0" FROM ANY OPENING LESS THAN 2'-0" BELOW THE EXHAUST POINT.
 RAIN CAPS WILL BE INSTALLED ON ALL EXTERIOR STACK DISCHARGE VENTS IN ADDITION TO A MESH/WIRE SCREEN OVER THE RISER PIPE OPENING TO DISCOURAGE ACCESS BY PESTS (E.G., INSECTS, BIRDS)



ALARM DETAIL

		Figure 2 System Details		Revisions 1 8/19/20
		Gateway Lofts Supportive Apartments 31 Water Street Jamestown, New York 14701		
01-08-2024		SCALE: NTS	SHEET 2 OF 2	



	Figure 3 Crawlspace SSDS Details		Revisions
	Gateway Lofts Supportive Apartments 31 Water Street Jamestown, New York 14701		1
01-08-2024	SCALE: NTS	SHEET 1 of 1	

APPENDIX B

VAPOR INTRUSION SAMPLING

SITE SPECIFIC SOIL VAPOR SAMPLING PROCEDURES

This procedure has been adopted from the Field Sampling Plan contained in Appendix D of the Remedial Action Work Plan (RAWP).

Soil vapor intrusion (SVI) investigation consists of sampling contaminant vapors that may exist beneath the building slabs, inside the buildings, and outside the buildings. Sample collection includes the following procedures per New York State Department of Health *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*.

1.1 SUB-SLAB AIR SAMPLING PROCEDURES

1.1.1 Sampling Locations

Select the sub-slab sample collection points by observing the condition of the building floor slab for apparent penetrations such as concrete floor cracks, floor drains, or sump holes. The floor conditions will be noted, and potential locations of subsurface probes will be selected. The locations will ideally be away from the foundation walls, apparent penetrations and buried pipes.

1.1.2 Sampling Probes

Construct a sampling probe using a ¼-inch Swagelok union connected to a short length of ¼-inch diameter stainless steel tubing, as necessary. Select a length of stainless-steel tubing (as needed) so that the bottom of the probe extends approximately 2 inches below the bottom of the slab; however, tubing should be extended into the subsurface ensuring no clogging. When not using stainless-steel sampling probe, simply extend approximately 2 feet of Teflon or polyethylene tubing through the sample collection point into the subsurface; again, ensuring no clogging. Plug up the other end of the tubing with a small piece of modeling clay to seal the system and prevent air flow in or out of the sub slab while the probe and tubing sits idle.

1.1.3 Installation of the Sampling Probe

Drill through and about 1 inch below the concrete slab using a portable coring drill and 2-inch diameter core drill bit. Record the thickness of the concrete slab. When installing the probe, first put a few inches of driller's sand at the bottom of the cored hole so that the grout will sit on top of the sand and not go all the way to the bottom of the hole and plug the probe inlet.

Install the probe into the hole, with the tubing already attached. Use the tubing to hold the union at the correct height in the hole (just below the top). Mix hydraulic cement and water in a ziplock bag. Cut a hole in one corner of the bag and use it like a pastry chef's bag to grout the probe in place. Use a small rod to push/tap in the grout. Leave the top 1-inch or so of the hole unfilled, being sure that the threaded top of the union (where the tubing attaches) is above the cement. Allow the probe to sit in place for at least one hour to allow the cement to set. If possible, install the probe one day and allow it to sit overnight.

1.1.4 Helium Tracer Gas Testing

Place a 2-quart (or similar size) bucket over the sample probe after threading the Teflon sample tube through a hole in the top of the bucket. Seal the tube to the bucket with clay. The bucket

should also have another hole drilled in the top for the injection of helium, and a hole in the side near the floor for the measurement of helium gas concentrations.

Connect helium (99.999% pure) cylinder tubing to the top port of bucket enclosure and seal with clay or other sealing material. Insert a helium detector probe in the bottom port of the bucket. Release enough helium to displace any ambient air in the bucket until the concentration of helium reaches a minimum of 90%. Maintain this minimum concentration by testing with a helium detector. The Helium cylinder should be open during the purge time to cause a slight positive pressure within the enclosure. Connect the sample tubing to a GilAir vacuum pump or equivalent using 3/8-inch O.D. silicone tubing. Connect a 1-liter Tedlar bag to the outlet of the pump using silicone tubing and collect a 1-liter sample. Purging flow rates must not exceed 0.2 liters per minute (L/min). Analyze the Tedlar bag for helium using a helium detector and record the results on the Summa Canister Data Sheet. A concentration of helium 10% or greater indicates a poor seal of the sample probe and it must be reinstalled and retested. After purging, remove the bucket enclosure from over the sample probe.

1.1.5 Sample Collection

Assign sample identification to the Summa canister sample identification tag and record on chain of custody (COC), and the Summa Canister Data Sheet. Also record the Summa canister and flow controller (regulator) serial numbers on the COC and Summa Canister Data Sheet. Attach a pre-calibrated/certified 24-hour flow controller, and particulate filter to the Summa canister. Attach the sample tube to the Summa canister using a ¼-inch Swagelok nut with appropriate ferrules, to the end of the flow controller/particulate filter assembly.

Open canister valve to initiate sample collection and record sample start time, date and initial canister vacuum on the canister identification tag and on the Summa Canister Data Sheet. If the canister does not show sufficient vacuum (generally less than 25 " Hg"), do not use. Take a digital photograph of canister setup and surrounding area. Include in the photograph a dry erase board or similar display which presents sample ID, location and date.

After 24 hours, record sample end time and canister pressure on the Summa Canister Data Sheet, and close valve. Disconnect the Teflon tubing and remove flow controller/particulate filter assembly from canister. Ship the samples, with COCs, overnight, to the selected laboratory for standard TO-15 analysis.

1.1.6 Removing the Sample Probe

If the probe is to be reused, remove the ¼-inch tubing and place a Swagelok cap on the exposed part of the union. The cap should be flush or below the level of the floor. If the probe is not to be reused, remove the probe by drilling around the probe with a hammer drill and a ¼ or 3/8-inch drill bit until loose. Keep the tubing attached to the implant to aid in its removal. Fill the core hole with hydraulic cement.

1.2 INDOOR/OUTDOOR AIR SAMPLING PROCEDURES

Place the indoor air Summa canister/flow controller inlet at breathing height in the approximate center of the space being sampled, or, for the outdoor air sample, elevated on a table or other object in a location upwind of the building being sampled. The breathing height is defined as four

to six feet above the floor or ground. As an option, a length of Teflon tubing can be attached to the Summa canister/flow controller inlet and raised to breathing zone height. Record the canister and flow controller serial numbers on the canister identification tag, COC and the Summa Canister Data Sheet. Assign sample identification to the canister identification tag, and record on the COC and the Summa Canister Data Sheet. Remove brass plug from canister fitting and save. Attach a pre-calibrated/certified 24-hour flow controller and particulate filter to the Summa canister. For the outside air sample, also connect the laboratory supplied “candy cane” fitting to the flow controller. Open canister valve to initiate sample collection and record start time, date and gauge vacuum reading on the canister identification tag and on the Summa Canister Data Sheet. Take a photograph of canister setup and surrounding area.

After 24 hours, record the gauge vacuum reading, close the Summa canister valve completely and record the end time on the Summa Canister Data Sheet. There should still be a slight vacuum in the Summa canister. If no vacuum remains in the canister, or the canister does not show a significant net loss in vacuum after sampling, the sample should be re-collected using a new Summa canister and flow controller. Disconnect any tubing and candy cane fittings from the Summa canister and remove the flow controller. Replace the brass plug on the canister. Ship canister, with COCs, overnight, to the selected laboratory

1.3 QUALITY CONTROL

The number of Quality Control samples (duplicates) to be taken during sub-slab sampling may be found in the QA/QC Plan. The duplicate sample rate is usually 10 percent. Field duplicates for sub-slab, indoor air and outdoor air samples will be collected by attaching the T-fitting supplied by the laboratory to two Summa canisters with attached regulators. For sub-slab samples, the inlet of the T-fitting will then be attached to the sub-slab sample tubing using a Swagelok fitting.

For indoor and outdoor air samples, any tubing used to raise the sampling height will also be attached to the inlet of the T fitting. For sampling, both Summa canister valves are opened and closed simultaneously.

1.4 SAMPLE LABELING

Each sub-slab sample should have the following information at a minimum placed on the laboratory supplied sample label:

- Site name
- Sample identification – see below
- Date/time
- Sampler's initials
- Analysis required – **TO-15**

The serial number of the canister and regulator used during sampling is also noted on the Summa canister identification tag and on the COC. Each sub-slab, indoor air and outdoor air sample will be assigned a unique alpha-numeric code. An example of this code and a description of its components are presented below. Field duplicate samples will be assigned a unique identification alphanumeric code that specifies the date of collection, the letters FD (for field duplicate) and an ascending number that records the number of duplicate samples collected that day. For example,

the first field duplicate collected on February 22, 2009 would be assigned the sample number in the format YYYYMMDD-FD-1 = 20090222-FD-1.

Subsequent duplicates collected on the same day will be assigned FD-2, FD-3 etc. Field sampling crew will record the duplicate sample information on the Summa Canister Data Sheets and in the field book.

1.5 FIELD DOCUMENTATION

Field notebooks are used during all on-site work. A dedicated field notebook is maintained by the field technician overseeing the site activities. Photographs will be taken during on-site work and provided in the Final Engineering Report (FER) including sub-slab sampling procedures.

The field sampling team will maintain sampling records that include the following data:

- Sample Identification
- Date and time of sample collection
- Identity of samplers
- Sampling methods and devices
- Purge volumes (soil vapor)
- Volume of soil vapor sample extracted
- The Summa canister vacuum before and after samples collected
- Chain of Custody and shipping information
-

The proper completion of the following forms/logs is considered correct procedure for documentation during the indoor air-sampling program:

1. Field Log Book - weather-proof hand-bound field book
2. Summa Canister Data Sheet
3. Chain of Custody Form

1.6 SAMPLE SHIPPING

Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The following chain-of-custody guidelines should be utilized during sample collection as outlined in and prepared by the National Enforcement Investigations Center (NEIC) Policies and Procedures of the USEPA Office of Enforcement:

- Complete the chain-of-custody (COC) record with all relevant information.
- Ship original COC with the samples in a sealed waterproof plastic bag and place inside the box containing a Summa canister.
- Retain a copy of the COC for field records.
- Ship Summa canisters in the same boxes the laboratory used for shipping.

- Place the lab address on top of sample box/cooler.
- Fix numbered custody seals across box lid flaps and cooler lid.
- Cover seals with wide, clear tape.
- Ship samples via overnight carrier within three days of sample collection if possible.

APPENDIX C

PRODUCT INVENTORY QUESTIONNAIRE

Site No. : _____ Site Name : _____

Date: _____ Time: _____

Structure Address : _____

Preparer's Name & Affiliation : _____

Residential ? Yes No Owner Occupied ? Yes No Owner Interviewed ? Yes No

Commercial ? Yes No Industrial ? Yes No Mixed Uses ? Yes No

Identify all non-residential use(s) : _____

Owner Name : _____ Owner Phone : () _____ - _____

Secondary Owner Phone : () _____ - _____

Owner Address (if different) : _____

Occupant Name : _____ Occupant Phone : () _____ - _____

Secondary Occupant Phone : () _____ - _____

Number & Age of All Persons Residing at this Location : _____

Additional Owner/Occupant Information : _____

Describe Structure (style, number floors, size) : _____

Approximate Year Built : _____ Is the building Insulated? Yes No

Lowest level : Slab-on-grade Basement Crawlspace

Describe Lowest Level (finishing, use, time spent in space) : _____

Floor Type: Concrete Slab Dirt Mixed : _____

Floor Condition : Good (few or no cracks) Average (some cracks) Poor (broken concrete or dirt)

Sumps/Drains? Yes No Describe : _____

Identify other floor penetrations & details : _____

Wall Construction : Concrete Block Poured Concrete Laid-Up Stone

Identify any wall penetrations : _____

Identify water, moisture, or seepage: location & severity (sump, cracks, stains, etc) : _____

Heating Fuel : Oil Gas Wood Electric Other : _____

Heating System : Forced Air Hot Water Other : _____

Hot Water System : Combustion Electric Boilermate Other: _____

Clothes Dryer : Electric Gas Where is dryer vented to? _____

If combustion occurs, describe where air is drawn from (cold air return, basement, external air, etc.) : _____

Fans & Vents (identify where fans/vents pull air from and where they vent/exhaust to) : _____

Describe factors that may affect indoor air quality (chemical use/storage, unvented heaters, smoking, workshop):

Attached garage ? Yes No Air fresheners ? Yes No

New carpet or furniture ? Yes No What/Where ? _____

Recent **painting** or **staining** ? Yes No Where ? : _____

Any **solvent** or **chemical-like** odors ? Yes No Describe : _____

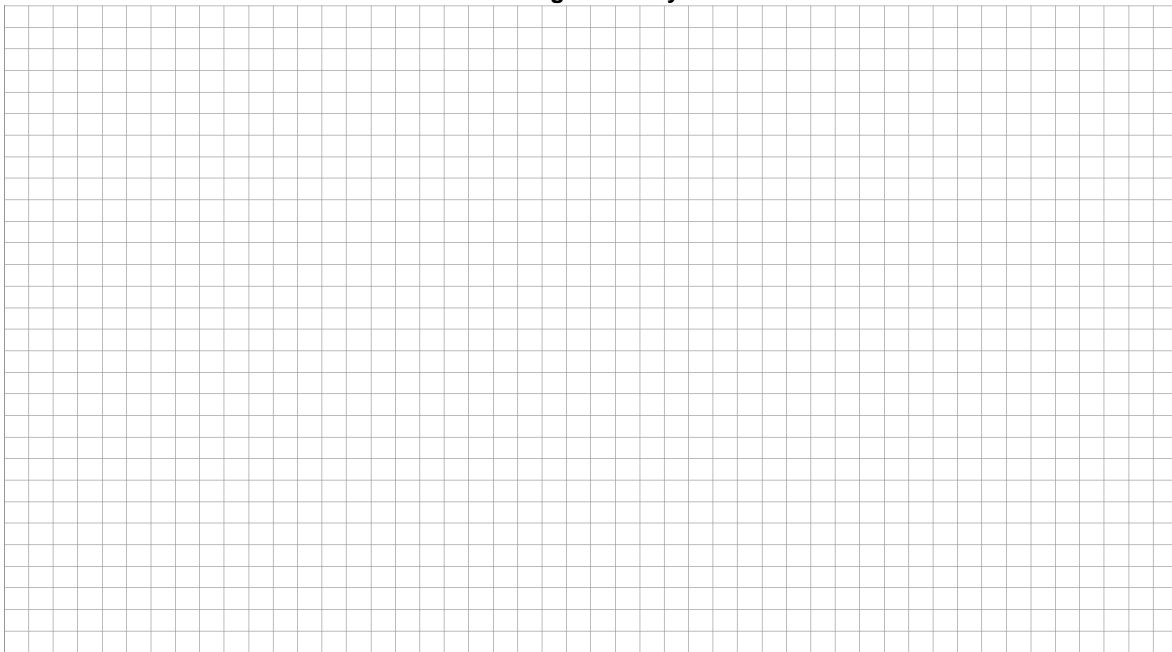
Last time **Dry Cleaned** fabrics brought in ? _____ What / Where ? _____

Do any building occupants use solvents at work ? Yes No Describe : _____

Any testing for Radon ? Yes No Results : _____

Radon System/Soil Vapor Intrusion Mitigation System present ? Yes No If yes, describe below

Lowest Building Level Layout Sketch



- Identify and label the locations of all sub-slab, indoor air, and outdoor air samples on the layout sketch.
- Measure the distance of all sample locations from identifiable features, and include on the layout sketch.
- Identify room use (bedroom, living room, den, kitchen, etc.) on the layout sketch.
- Identify the locations of the following features on the layout sketch, using the appropriate symbols:

B or F	Boiler or Furnace	o	Other floor or wall penetrations (label appropriately)
HW	Hot Water Heater	xxxxxxx	Perimeter Drains (draw inside or outside outer walls as appropriate)
FP	Fireplaces	#####	Areas of broken-up concrete
WS	Wood Stoves	● SS-1	Location & label of sub-slab vapor samples
W/D	Washer / Dryer	● IA-1	Location & label of indoor air samples
S	Sumps	● OA-1	Location & label of outdoor air samples
@	Floor Drains	● PFET-1	Location and label of any pressure field test holes.

BE3 Structure Sampling - Product Inventory

Page ____ of ____

Homeowner Name & Address: _____ Date: _____

Samplers & Company: _____ Structure ID: _____

Site Number & Name: _____ Phone Number: _____

Make & Model of PID: _____ Date of PID Calibration: _____

Identify any Changes from Original Building Questionnaire : _____

Product Name/Description	Quantity	Chemical Ingredients	PID Reading	Location

APPENDIX D

HEALTH AND SAFETY PLAN (HASP)

HEALTH AND SAFETY PLAN
for
SITE INVESTIGATIONS AND REMEDIAL OVERSIGHT

GATEWAY LOFTS SUPPORTIVE APARTMENTS
31 WATER STREET
JAMESTOWN, NEW YORK 14701
NYSDEC SITE #907046

Prepared for:

Southern Tier Environments for Living, Inc.
715 Central Ave
Dunkirk, New York, 14048

Prepared by:



Brydges
Engineering
in Environment
and Energy

1270 Niagara Street
Buffalo, New York 14213

July 2023

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ATTACHMENTS

- 1 – Table of Potential Hazards and OSHA Standards
- 2 – Heat Stress Management Program and Procedures
- 3 – Trenching and Excavation Health and Safety Requirements
- 4 – Map to Hospital
- 5 – NYSDOH Generic CAMP and Fugitive Dust and Particulate Monitoring

1.0 INTRODUCTION

The following health and safety procedures apply to BCP project personnel, including subcontractors, performing activities described in the Remedial Action Work Plan for the 31 Water Street BCP Project. Please note, however, contractors performing remedial work are required to either develop their own plans meeting these requirements at a minimum or adopt this plan.

1.1 PURPOSE

Directed at protecting the health and safety of the field personnel during field activities, the following Health and Safety Plan (HASP) was prepared to provide safe procedures and practices for personnel engaged in conducting the field activities associated with this project. The plan has been developed using the Occupational Safety and Health Administration (OSHA) 1910 and 1926 regulations and NYSDEC Brownfields DER-10 as guidance. The purpose of this HASP is to establish personnel protection standards and mandatory safety practices and procedures for this task specific effort. This plan assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may arise during the field efforts.

1.2 APPLICABILITY

The provisions of the plan are mandatory for all personnel engaged in field activities. All personnel who engage in these activities must be familiar with this plan and comply with its requirements. The plan is based on available information concerning the project area and planned tasks. If more data concerning the project area becomes available that constitute safety concerns, the plan will be modified accordingly. A member of each contractor on the BCP project will be designated as Field Safety Officer and will be responsible for field safety. Any modifications to the plan will be made by the Field Safety Officer after discussion with the Project Manager and Health and Safety Officer. All modifications will be documented and provided to the Project Manager and the Health and Safety Officer for approval. A copy of this plan will be available to all on-site personnel, including subcontractors prior to their initial entry onto the site.

Before field activities begin, all personnel will be required to read the plan. All personnel must agree to comply with the minimum requirements of the plan, be responsible for health and safety, and sign the Statement of Compliance before site work begins.

1.3 FIELD ACTIVITIES

The work addressed by this HASP includes remedial activities such as soil excavation, backfilling, possible tank removal, groundwater treatment system installation, and oversight activities related to remediation. Field work will be conducted that can include test trenches/soil borings, monitoring well installation, groundwater and soil sampling, building demolition, soil excavation, etc.

1.4 PERSONNEL REQUIREMENTS

Key personnel are as follows: Health and Safety Officer - Peter J. Gorton, CHCM
Sr. Engineer and Project Manager - Jason Brydges, P.E.
Geologist – John Boyd, PG

Engineer/Technician – Paul Staub

QA/QC – John Berry, P.E.

Responsibilities of some of the key personnel are as follows:

Project Manager

- Assuring that personnel are aware of the provisions of the HASP and are proficient in work practices necessary to ensure safety and in emergencies;
- Verifying that the provisions of this plan are implemented;
- Assuring that appropriate personnel protective equipment (PPE), if necessary, is available and properly utilized by all personnel;
- Assuring that personnel are aware of the potential hazards associated with Site operations;
- Supervising the monitoring of safety performance by all personnel and ensuring that required work practices are employed; and,
- Maintaining sign-off forms and safety briefing forms.

Health and Safety Officer:

- Monitoring work practices to determine if potential hazards are present, such as heat/cold stress, safety rules near heavy equipment, etc.;
- Determining changes to work efforts or equipment to ensure the safety of personnel;
- Evaluating on-site conditions and recommend to the Project Manager modifications to work plans needed to maintain personnel safety;
- Determining that appropriate safety equipment is readily available and monitor its proper use;
- Stopping work if unsafe conditions occur or if work is not being performed in compliance with this plan;
- Monitoring personnel performance to ensure that the required safety procedures are followed.
- Documenting incident and reporting to Project Manager within 48 hours of occurrence if established safety rules and practices are violated; and,
- Conducting safety meetings as necessary.

Field Personnel, including geologists and technicians:

- Understanding the procedures outlined in this plan;
- Taking precautions to prevent injury to themselves and co-workers;
- Performing only those tasks believed to be safe;
- Reporting accidents or unsafe conditions to the Health and Safety Officer and Project Manager;
- Notifying the Health and Safety Officer and Project Manager of special medical problems (e.g., allergies, medical restrictions, etc.);
- Thinking about safety first while conducting field work; and,
- Not eating, drinking or smoking in work areas.

All Site personnel has the authority to stop work if conditions are deemed to be unsafe. Visitors will be required to report to the overall Site PM or designee and follow the requirements of this plan and the Contractor's HASP (if different).

2.0 SITE DESCRIPTION AND SAFETY CONCERNS

2.1 SITE BACKGROUND AND DESCRIPTION

The Site was used by different manufacturing companies beginning in 1888 with Jamestown Woolen Spinning Company that produced yarns and cloth. The company changed to the Empire Worsted Mills in 1896 that operated until the late 1940s, and in 1963 the Chautauqua Hardware Corporation was involved with furniture trimmings and hardware manufacturing and fabrication including metal household furniture. In 2005, Community Development Association, LLC occupied the site and has subsequently merged with Lynn Development, Inc., who currently uses the Site as a community service center with a soup kitchen, and provides youth activities such as archery ranges, roller park, laser tag and computer and other academic related youth and community services. The Site is comprised of 10 individual parcels and is approximately located in the center of the City of Jamestown along Water Street and bordered to the north by the Chadakoin River. The site includes a large sprawling former manufacturing facility with multiple sections containing one; two and four-story areas that are surrounded by asphalt parking and drive areas. See the RAWP for details on Site background and description.

2.2 HAZARD EVALUATION

Specific health and safety concerns to the project tasks include working around heavy metals, PCBs, SVOCs and VOCs in the soil, groundwater, soil vapor, and indoor air. Physical hazards include those associated with working near open excavations and adjacent to manual/mechanical field equipment. Contractors will have separate detailed health and safety procedures/requirements for excavations and the transportation and disposal of impacted material that will meet or exceed requirements in this plan. A table of potential hazards and OSHA Standards for consideration during investigation and remedial activities is provided in **Attachment 1**.

2.2.1 *Chemical Hazards*

Chemical hazards detected at the site include metals and organic compounds that were detected in soil samples at elevated concentrations that exceed Part 375 soil cleanup objectives. These compounds could be encountered during the RI and remedial activities and potential routes of exposure include:

- Skin contact;
- Inhalation of vapors or particles;
- Ingestion; and,
- Entry of contaminants through cuts, abrasions or punctures.

The anticipated levels of personnel protection will include Level D PPE that includes the following:

1. Long sleeve shirt and long pants
2. Work boots with steel toe
3. Hard hats when heavy equipment or overhead hazards are present
4. Safety glasses
5. Work gloves and chemical resistant gloves when sampling potentially contaminated materials
6. High visibility vests or outer gear when Site traffic is significant

Modifications may include booties, overalls, hearing protection, or respiratory protection if air monitoring levels indicate sustained PID readings greater than 5 ppm above established background. When these levels are reached, work will be halted pending discussions with field and office management. If any readings are recorded above background, work will proceed with caution and breathing zone monitoring will be conducted.

2.2.2 Other Physical Hazards

Depending on the time of year, weather conditions or work activity, some of the following physical hazards could result from project activities:

- Noise
- Heat Stress
- Cold Stress
- Slips, trips, and falls
- Exposure to moving machinery during drilling and excavation activities
- Physical eye hazards
- Lacerations and skin punctures
- Back strain from lifting equipment
- Electrical storms and high winds
- Contact with overhead or underground utilities

Slips, Trips, and Falls. Field personnel shall become familiar with the general terrain and potential physical hazards that is associated with the risk of slips, trips, and falls. Special care shall be taken when working near demolition and excavation operations and material stockpiles. Workers will observe all pedestrian and vehicle rules and regulations. Extra caution will be observed while working near roadways and while driving in reverse to ensure safety.

Noise. All personnel shall wear hearing protection devices, such as ear muffs or ear plugs, if work conditions reach the OSHA standard of 85 decibels or greater. These conditions would include difficulty hearing while speaking to one another at a normal tone within three feet. If noise levels reach 85 decibels or greater, the Health and Safety Officer or designee will mandate the use of hearing protection or other noise-producing equipment or events.

Heat/Cold Stress. Heat stress work modification may be necessary during ambient temperatures of greater than 29° C (85° F) while wearing normal clothing or exceeding 21° C (70° F) while wearing PPE. Because heat stress is one of the most common and potentially serious illnesses at work sites, regular monitoring and preventive measures will be utilized such as additional rest periods, supplemental fluids, restricted consumption of drinks containing caffeine, use of cooling vests, or modification of work practices. Most of the work to be conducted during the oversight and monitoring operations is expected to consist of light manual labor and visual observation. Given the nature of the work and probable temperatures, heat stress hazards are not anticipated. See **Attachment 2** for heat stress management procedures.

If work is to be conducted during winter conditions, cold stress may be a concern to the health and safety of personnel. Wet clothes combined with cold temperatures can lead to hypothermia. If air temperature is less than 40° F (4° C) and a worker perspires, the worker should change to dry clothes. The following summary of the signs and symptoms of cold stress are provided as a guide for field personnel.

1. Incipient frostbite is a mild form of cold stress characterized by sudden blanching or whitening of the skin.

2. Chilblain is an inflammation of the hands and feet caused by exposure to cold moisture. It is characterized by a recurrent localized itching, swelling, and painful inflammation of the fingers, toes, or ears. Such a sequence produces severe spasms, accompanied by pain.
3. Second-degree frostbite is manifested by skin with a white, waxy appearance and the skin is firm to the touch. Individuals with this condition are generally not aware of its seriousness because the underlying nerves are frozen and unable to transmit signals to warn the body. Immediate first aid and medical treatment are required.
4. Third-degree frostbite will appear as blue blotchy skin. The tissue is cold, pale, and solid. Immediate medical attention is required.
5. Hypothermia develops when body temperature falls below a critical level. In extreme cases, cardiac failure and death may occur. Immediate medical attention is warranted when the following symptoms are observed:
 - Involuntary shivering
 - Irrational behavior
 - Slurred speech
 - Sluggishness

Fire and Explosion. These hazards will be minimal for activities associated with this project. All heavy equipment will be equipped with a fire extinguisher.

Trenching and Excavations. There are a variety of potential health and safety hazards associated with excavations. These include:

- Surface encumbrances, such as structures, fencing, stored materials, etc.;
- Below- and above-ground utilities, such as water and sewer lines, gas lines, telephone lines, and optical cable lines, etc.;
- Overhead power lines and other utilities;
- Vehicle and heavy equipment traffic around the excavations;
- Falling loads from lifting or digging equipment;
- Water accumulation within excavations;
- Hazardous atmospheres, such as oxygen deficiency, flammable gases, and toxic gases;
- Falling into or driving equipment into unprotected or unmarked excavations; and,
- Cave-in of loose rocks and soil at the excavation face.

OSHA requirements for trenching and excavations are contained in 29 CFR, subpart P, 1926:650 thru 1926.652. See **Attachment 3** for details on excavation and trenching safety requirements, which include the following basic minimum excavation requirements:

- Personnel entry into excavations should be minimized whenever possible and no entry will occur in pits greater than 4 feet bgs. Sloping, shoring or equivalent means should be utilized.
- Surface encumbrances such as structures, fencing, piping, stored material etc. that may interfere with safe excavations should be avoided, removed or adequately supported prior to the start of excavations. Support systems should be inspected daily.
- Underground utility locations should be checked and determined, and permits should be obtained prior to initiating excavations. Local utility companies will be contacted at least two days in advance, advised of proposed work, and requested to locate underground installations. When excavations approach the estimated location of utilities, the exact location should be determined by careful probing or hand digging and when it is uncovered, proper supports should be provided.

- A minimum safe distance of 15 feet should be maintained when working around overhead high-voltage lines or the line should be de-energized following appropriate lock-out and tag-out procedures by qualified utility personnel.
- Excavations five feet or more, if entered, will require an adequate means of exit, such as a ladder, ramp, or steps and located to require no more than 25 feet of lateral travel. Under no circumstances should personnel be exited/entered an excavation using heavy equipment.
- Personnel working around heavy equipment, or who may be exposed to public vehicular traffic should wear high visibility clothes, especially at night.
- Heavy equipment or other vehicles operating next to or approaching the edge of an excavation will require that the operator have a clear view of the edge of the excavation, or that warning systems such as barricades, hand or mechanical signals, or stop logs be used. If possible, the surface grade should slope away from the excavation.
- Personnel should be safely located in and around the trench/excavation face and should not work underneath loads handled by lifting or digging equipment.
- Hazardous atmospheres, such as oxygen deficiency (atmospheres containing less than 19.5% oxygen), flammable gases (airborne concentrations greater than 20% of the lower explosive limit), and toxic gases (airborne concentrations above the OSHA Permissible Exposure Limit or other exposure limits) may occur in excavations. Monitoring should be conducted for hazardous atmospheres prior to entry and at regular intervals. Ventilation or respiratory protection may be provided to prevent personnel exposures to oxygen deficient or toxic atmospheres. Periodic retesting (at least each shift) of the excavation will be conducted to verify that the atmosphere is acceptable. A log or field book records should be maintained.
- Personnel should not work in excavations that have accumulated water or where water is accumulating unless adequate precautions have been taken. These precautions can include shield systems, water removal systems, or safety harnesses and lifelines. Groundwater entering the excavation should be properly directed away and down gradient from the excavation.
- Safety harnesses and lifelines should be worn by personnel entering excavations that qualify as confined spaces.
- Excavations near structures should include support systems such as shoring, bracing, or underpinning to maintain the stability of adjoining buildings, walls, sidewalks, or other structures endangered by the excavation operations.
- Loose rock, soil, and spoils should be piled at least two and preferably 5 feet or more from the edge of the excavation. Barriers or other effective retaining devices may be used to prevent spoils or other materials from falling into the excavation.
- Walkways or bridges with standard guardrails that meet OSHA specifications will be provided where employees, the public, or equipment are required to cross over excavations.
- Adequate barrier physical protection should be provided, and excavations should be barricaded or covered when not in use or left unattended. Excavations should be backfilled as soon as possible when completed.
- Safety personnel should conduct inspections prior to the start of work and as needed throughout the work shift and after occurrence that increases the hazard of collapse (i.e., heavy rain, vibration from heavy equipment, freezing and thawing, etc.).
- Personnel working in excavations should be protected from cave-ins by sloping or benching of excavation walls, a shoring system or some other equivalent means in accordance with OSHA regulations. Soil type is important in the determination of the angle

of repose for sloping and benching, and the design of shoring systems.

2.2.3 Biological Hazards

Biological hazards can result from encounters with mammals, insects, snakes, spiders, ticks, plants, parasites, and pathogens. Mammals can bite or scratch when cornered or surprised. The bite or scratch can result in local infection with systemic pathogens or parasites. Insect and spider bites can result in severe allergic reactions in sensitive individuals. Exposure to poison ivy, poison oak or poison sumac results in skin rash. Ticks are a vector for several serious diseases. Dead animals, organic wastes, and contaminated soil and water can harbor parasites and pathogens. These hazards are reduced if work is conducted during late fall and winter months. The following are highlighted because they represent more likely concerns for the site- specific tasks and location:

Bees, Ants, Wasps and Hornets. Sensitization by the victim to the venom from repeated stings can result in anaphylactic reactions. If a stinger remains in the skin, it should be removed by teasing or scraping, rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic corticosteroid lotion is often useful. People with known hypersensitivity to such stings should consult with their doctor about carrying a kit containing an antihistamine and aqueous epinephrine in a pre-filled syringe when in endemic areas. Nests and hives for bees, wasps, hornets and yellow jackets often occur in the ground, trees and brush. Before any nests or hives are disturbed, an alternate sampling location should be selected. If the sample location cannot be relocated, site personnel who may have allergic reactions shall not work in these areas.

Ticks. The incidence of Lyme disease is correlated to outdoor workers in areas where the disease is widespread and heightened risk of encountering ticks infected with *B. burgdorferi*, which varies from state to state, within states, and even within counties. Preventing tick bites is of utmost importance in preventing Lyme disease and other tickborne illnesses. Tick bite prevention strategies include avoidance or clearing of tick-infested habitats and use of personal protective measures (e.g., repellents and protective clothing). Tick checks should be done regularly, and ticks should be removed promptly. If a worker in a high-risk area develops flu-like symptoms (fever, chills, muscle aches, joint pains, neck stiffness, headache) or a bulls-eye rash, they should seek medical attention even if there is no recall of a tick bite. Workers who have experienced a tick bite should remove the tick and seek medical attention if signs and symptoms of tick-borne diseases occur.

Storm Conditions. When lightening is within 10 miles of the work site, all personnel should evacuate to a safe area.

Sun. When working in the sun, personnel should apply appropriate sun screening lotions (30 sun screen or above), and/or wear long sieve clothing and hats.

2.2.4 Activity Hazard Analysis

Table 1 presents a completed activity hazard analysis for the performance of a RAWP.

Table 1. Activity Hazard Analysis

PRINCIPAL STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
Remedy of the site	Potential exposure to levels of petroleum products and other contaminants	<ol style="list-style-type: none"> 1. Use of administrative controls (site control and general safety rules), work cloths, dust suppression 2. Use of real-time monitoring and action levels 3. Use Physical Hazards SOPs
EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Excavation and other heavy equipment, Backhoe	<ol style="list-style-type: none"> 1. Daily inspection of equipment 2. Continuous safety oversight 	<ol style="list-style-type: none"> 1. Safety plan review 2. Routine safety briefings

3.0 MONITORING

The purpose of air monitoring for potential airborne contaminants is to verify that protection levels are suitable. Monitoring will be performed for dust/particulates and volatile organic compounds during excavation activities. Daily background and calibration readings will be recorded prior to the start of field activities. All monitoring equipment used during this investigation will be maintained and calibrated and records of calibration and maintenance will be kept in accordance with 29 CFR 1910.120(b)4(11)E. All daily reports will be submitted to the NYSDEC/NYSDOH weekly or as requested by the department. It is important to note that all exceedances will be reported that day to the NYSDEC/NYSDOH project managers.

3.1 PARTICULATE MONITORING

Real-time air monitoring readings are obtained from upwind and downwind locations in accordance with DER-10 for community air-monitoring. Daily field reports will be completed that document activities performed, equipment and manpower onsite, screening and monitoring results, general Site conditions, and weather conditions.

3.2 AIR MONITORING FOR WORKER PROTECTION

Real time air monitoring will be conducted whenever site soils are disturbed during sampling, excavation, grading, etc. A real time personal aerosol monitor (i.e., TSI SidePak AM5 10 Personal

Aerosol monitor or equivalent) will be used. This monitor is a laser photometer that measures data as both real-time aerosol mass-concentration and 8-hour time weighted

average (TWA). The monitor will be used to measure real-time concentrations in milligrams per meter cubed (mg/m^3). Action levels are based on potential exposure to calcium carbonate and will be as follows:

- $15 \text{ mg}/\text{m}^3$ total dust
- $5 \text{ mg}/\text{m}^3$ respirable fraction for nuisance dusts

Dust suppression techniques should be employed prior to exceeding the action levels. However, if these levels are exceeded, then work will be halted, and additional dust suppression techniques employed until safe levels are reached.

3.3 TOTAL VOLATILE ORGANICS MONITORING

Monitoring of VOCs will be conducted using a photo-ionization detector (PID). If a sustained reading of 5 ppm above background occurs, then work will be halted, and personnel will evacuate the work area. Levels will be allowed to stabilize, and another reading will be taken in the breathing zone. If background levels continue to be exceeded, then work will not continue at that location and the project manager will be notified of the situation. Action levels will remain the same.

4.0 SAFE WORKING PRACTICES

The following general safe work practices always apply to a construction site:

- Eating, drinking, chewing gum or tobacco and smoking are prohibited within the work area.
- Contact with potentially contaminated substances should be avoided.
- Puddles, pools, mud, etc. should be avoided if possible.
- Kneeling, leaning, or sitting on equipment or on the ground should be avoided if possible.
- Upon leaving the work area, hands, face and other exposed skin surfaces should be thoroughly washed.
- Unusual site conditions shall be promptly conveyed to the project manager, health and safety officer, or site superintendent for resolution.
- A first-aid kit shall be available at the site.
- Field personnel should use all their senses to alert themselves to potentially dangerous situations (i.e., presence of strong, irritating, or nauseating odors).
- If severe dusty conditions are present, then soils will be dampened to mitigate dust.
- All equipment will be cleaned before leaving the work area.
- Field personnel must attend safety briefings and should be familiar with the physical characteristics of the investigation, including:
 1. Accessibility to personnel, equipment, and vehicles.
 2. Areas of known or suspected contamination.
 3. Site access.
 4. Routes and procedures to be used during emergencies.
- Personnel will perform all investigation activities with a “buddy” who is able to:
 - Provide his or her partner with assistance.
 - Notify management or emergency personnel if needed.
- Excavation activities shall be terminated immediately in event of thunder or electrical storm.

- The use of alcohol or drugs at the site is strictly prohibited.

5.0 PERSONAL SAFETY EQUIPMENT AND SITE CONTROL

5.1 PERSONAL SAFETY EQUIPMENT

As required by OSHA in 29 CFR 1920.132, this plan constitutes a workplace hazard assessment to select personal protective equipment (PPE) to perform the site investigation. The PPE to be donned by on-site personnel during this investigation are those associated with the industry standard of level D. Protective clothing and equipment to initiate the project will include:

- Work clothes, pants and long sleeves
- Work boots with steel toe
- Work gloves as necessary
- Hard hat if work is conducted near equipment
- Safety glasses
- Hearing protection as necessary

Modifications may include chemically resistant gloves, booties, and overalls. If air monitoring indicates levels are encountered that require respiratory protection (sustained readings at or above action levels above a daily established background), then work will be halted, and an adequate resolution of PPE will be made by the health and safety manager, field manager, and project manager.

5.2 SITE CONTROL

Site control will be established near each work zone by the Contractor. The purpose is to control access to the immediate work areas from individuals not associated with the project. All work zones will be fenced off with controlled access and appropriately designated as an exclusion area.

Each excavation or drilling area where heavy equipment is being utilized will be set up as a work zones and include an exclusion area and support zone. Exact configuration of each zone is dependent upon location, weather conditions, wind direction and topography. The Contractor's safety manager will establish the control areas daily at each excavation.

An area of 10 feet (as practical) around each excavation will be designated as the exclusion area. This is the area where potential physical hazards are most likely to be encountered by field personnel. The size of the exclusion area may be altered to accommodate site conditions and the drilling/excavation location. If levels of protection higher than level D are used, this plan will be modified to include decontamination procedure. The Site excavation contractor will be required to have eye/face wash equipment/means available on-site.

A support area will be defined for each field activity where support equipment will be located. Normal work clothes are appropriate within this area. The location of this area depends on factors such as accessibility, wind direction (upwind of the operation.), and resources (i.e., roads, shelter, utilities). The location of this zone will be established daily. Excavation areas will be filled or secured (fencing) to prevent access from the public.

6.0 EMERGENCY INFORMATION

In the event of an emergency, the field personnel or the health and safety manager will employ emergency procedures. A copy of emergency information will be kept in the field and will be reviewed during the initial site briefing. Copies of emergency telephone numbers and directions to the nearest hospital will be prominently posted in the field.

6.1 MEDICAL TREATMENT AND FIRST AID

A first aid kit adequate for anticipated emergencies will be maintained in the field. If any injury should require advanced medical assistance, emergency personnel will be notified, and the victim will be transported to the hospital. The Contractor will establish his own first aid station and details will be provided in his HASP.

In the event of an injury or illness, work will cease until the field safety and oversight inspector has examined the cause of the incident and taken appropriate corrective action. Any injury or illness, regardless of extent, is to be reported to the project manager and health and safety officer.

6.2 EMERGENCY CONTACTS

Emergency telephone numbers will be posted in the field and are listed below:

- Ambulance, Fire, Police 911
- Poison Control Center 800-222-1222
- NYSDEC Spills Hotline 800-457-7362
- Jason M. Brydges, PM 716-830-8636
- Taylor Monnin, NYSDEC PM 716 851-7220
- Renata E. Ockerby, NYSDOH 518-402-7860
- UPMC Chautauqua WCA 716-487-0141 See **Attachment 4** for route to facility.

Verbal communications between workers or use of a vehicle horn repeatedly at intervals of three short beeps shall be used to signal all on-site personnel to immediately evacuate the area and report to the vehicle parking area.

6.3 EMERGENCY STANDARD OPERATING PROCEDURES

The following standard operating procedures are to be implemented by on-site personnel in the event of an emergency. The health and safety manager and Contractor's field manager shall manage response actions.

1. Upon notification of injury to personnel, the designated emergency signal shall be sounded. All personnel are to terminate their work activities and assemble in a safe location. The emergency facility listed above shall be notified. If the injury is minor, but requires medical attention, the Contractor's field manager or the health and safety manager shall accompany the victim to the hospital and help in describing the circumstances of the accident to the attending physician.
2. Upon notification of an equipment failure or accident, the Contractor's field manager or the health and safety manager shall determine the effect of the failure or accident on site operations. If the failure or accident affects the safety of personnel or prevents completion of the scheduled operations, all personnel are to leave the area until the

situation is evaluated, and appropriate actions taken.

3. Upon notification of a natural disaster, such as tornado, high winds, flood, thunderstorm or earthquake, on-site work activities are to be terminated and all personnel are to evacuate the area.

6.4 EMERGENCY RESPONSE FOLLOW-UP ACTIONS

Following activation of an emergency response, the health and safety officer shall notify the project manager, and the Contractor's field manager shall submit a written report documenting the incident to the project manager.

6.5 MEDICAL TREATMENT

The Contractor's field manager shall be informed of any site-related injury, exposure or medical condition resulting from work activities. All personnel are entitled to medical evaluation and treatment in the event of a site accident or incident.

6.6 SITE MEDICAL SUPPLIES AND SERVICES

The Contractor's field manager or a trained first aid crew member shall evaluate all injuries at the site and render emergency first-aid treatment, as appropriate. If an injury is minor but requires professional medical evaluation, the field manager shall escort the employee to the appropriate emergency room. For major injuries occurring at the site, emergency services shall be requested. A first-aid kit shall be readily accessible, fully supplied, and maintained at specified locations used for on-site operations.

6.7 PRECAUTIONS

Universal precautions shall be followed on-site that consist of treating all human blood and certain body fluids as being infected with Human Immune Deficiency Virus (HIV), Hepatitis B virus (HBV), or other blood borne pathogens. Clothing and first-aid materials visibly contaminated with blood or other body fluids will be collected and placed into a biohazard bag. Individuals providing first aid or cleanup of blood- or body-fluid contaminated items should wear latex gloves. If providing CPR, a one-way valve CPR device should be used. Biohazard bags, latex gloves, and CPR devices will be included in the site first-aid kits.

Work areas visibly contaminated with blood or body fluids shall be cleaned using a 1:10 dilution of household bleach. If equipment becomes contaminated with blood or body fluids, and can not be sufficiently cleaned, the equipment shall be placed in a plastic bag and sealed. Any personnel servicing the equipment shall be made aware of the contamination, so that proper precautions can be taken.

7.0 RECORDKEEPING

The Contractor's field manager and health and safety officer are responsible for site record keeping. Prior to the start of work, they will review this Plan along with the Contractor's HASP. A Site safety briefing will be completed prior to the initiation of field activities. This shall be recorded in the field log book. An accident report should be completed by the Field Manager if an accident occurs and forwarded to the project manager.

8.0 PERSONNEL TRAINING REQUIREMENTS

8.1 INITIAL SITE BRIEFING

Prior to site entry, the Contractor's health and safety manager shall provide all personnel (including site visitors) with site-specific health and safety training. A record of this training shall be maintained. This training shall consist of the following:

- Discussion of the elements contained within this plan
- Discussion of responsibilities and duties of key site personnel
- Discussion of physical, biological and chemical hazards present at the site
- Discussion of work assignments and responsibilities
- Discussion of the correct use and limitations of the required PPE
- Discussion of the emergency procedures to be followed at the site
- Safe work practices to minimize risk
- Communication procedures and equipment
- Emergency notification procedures

8.2 DAILY SAFETY BRIEFINGS

The Contractor's health and safety manager will determine if a daily safety briefing is required. The briefing shall discuss the specific tasks scheduled for that day and the following topics:

- Specific work plans
- Physical, chemical or biological hazards anticipated
- Fire or explosion hazards
- PPE required
- Emergency procedures, including emergency escape routes, emergency medical treatment, and medical evacuation from the site
- Weather forecast for the day
- Buddy system
- Communication requirements
- Site control requirements
- Material handling requirements

9.0 COMMUNITY AIR MONITORING PROGRAM (CAMP)

A Community Air Monitoring Program (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the upwind and downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The program is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors and on-site workers not directly involved with work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. A NYSDOH generic CAMP obtained from NYSDEC DER-10 is presented in **Attachment 5** that will be followed and adhered to for work activities that could generate dust from an impacted area.

A program for suppressing fugitive dust and particulate matter monitoring will also be conducted in accordance *NYSDEC DER-10* titled *Appendix 1B Fugitive Dust and Particulate Monitoring*, which is also provided in **Attachment 5**. The fugitive dust suppression and particulate monitoring program will be employed at the site during building demolition, site remediation and other intrusive activities which warrant its use.

Both the CAMP and the fugitive dust and particulate monitoring program will be administered by the environmental engineer/consultant. Monitoring results of the CAMP will be reported to the New York State Department of Health daily for review.

ATTACHMENT 1

Table of Potential Hazards and OSHA Standards

Potential Hazards and OSHA Standards for Consideration during IRMs

Site Exposure/Control	Potentially Applicable OSHA Standard*	
	1910 General Industry	1926 Construction
Hazard Assessment & Employee Training	29 CFR 1910.132(d)	29 CFR 1926.21(b)
Chemical Exposure	29 CFR 1910.1000	29 CFR 1926.55
Noise Exposure	29 CFR 1910.95	29 CFR 1926.52
Sanitation	29 CFR 1910.141	29 CFR 1926.51
Wiring Methods (temporary wiring)	29 CFR 1910.305(a)(2) 29 CFR 1910.333	29 CFR 1926.405(a)(2)
Electrical Hazards		29 CFR 1926.416
Emergency Action Planning	29 CFR 1910.38	29 CFR 1926.35
Excavation	covered by 1926	29 CFR 1926 Subpart P
Confined Space Entry	29 CFR 1910.146	29 CFR 1926.21(b)(6) 29 CFR 1926.353(b)
Material Handling	29 CFR Subpart N	29 CFR Subpart N 29 CFR 1926.600-602 29 CFR 1926.604
Building Demolition	covered by 1926	29 CFR 1926 Subpart T
Site Contaminant Abatement	29 CFR 1910.1000-1029 29 CFR 1910.1043-1052	29 CFR 1926.5529 CFR 1926.6229 CFR 1926.1101-1152
Elevated Work Surfaces	29 CFR 1910 Subpart D 29 CFR 1910 Subpart F	29 CFR 1926 Subpart L 29 CFR 1926 Subpart M 29 CFR 1926.552
Chemical Storage	29 CFR 1910 Subpart H 29 CFR 1910.1200	29 CFR 1926.5929 CFR 1926 Subpart F
Personal Protective Equipment	29 CFR 1910 Subpart I	29 CFR 1926 Subpart E
Heavy Equipment Operation	29 CFR 1910.9529 CFR 1910 Subpart N	29 CFR 1926.5229 CFR 1926 Subpart O
Tasks-Long Duration	29 CFR 1910.141-142	29 CFR 1926.51

The Federal General Industry and Construction citations are provided above

ATTACHMENT 2

Heat Stress Management Program and Procedures

INTRODUCTION

Panamerican employees engage in a variety of activities with potential exposure to excessive ambient temperatures and humidity, with the overall result being heat stress. This procedure establishes the Panamerican Heat Stress Management Program. It establishes responsibilities and basic requirements for personnel who may be required to work in situations where the ambient temperature exceeds 21° C (70° F) while wearing protective equipment (e.g., hazardous waste site investigations) or when the ambient temperature exceeds 29° (85° F) while wearing normal clothing. Because heat stress is one of the most common and potentially serious illnesses at job sites and particularly hazardous waste sites, regular monitoring and other preventive measures are warranted.

There are no regulations addressing heat stress. However, it should be noted that OSHA does recognize heat stress as a potentially serious health hazard and can cite employers under the general duty clause of the Occupational Safety Health Act if heat-related illness is occurring or likely to occur.

PROGRAM ADMINISTRATION AND RESPONSIBILITIES

The Heat Stress Management Program is administered by Panamerican Managers and Health and Safety personnel.

These Individuals:

- Oversee the implementation of the Heat Stress Management Program;
- Periodically audit and evaluate program implementation;
- Evaluate this procedure on an ongoing basis to see that it reflects current practice and regulations;
- Assist field crews in their implementation of this procedure.

Project Managers (PM) and Safety Personnel are responsible for:

- Implementing this Procedure in all field operations;
- Providing guidance to staff regarding heat stress management as described in the Procedure; and
- Providing feedback to management regarding program effectiveness.

Staff Members are responsible for:

- Complying with this Procedure as it applies to their activities; and
- Providing feedback to their supervisor regarding program effectiveness.

HEAT STRESS HAZARDS AND RISK FACTORS

Heat Stress is defined as the total net load on the body with contributions from both exposure to external sources, such as sunshine and hot surfaces, and from internal metabolic heat production. A person's

exposure to the increased ambient temperatures and humidity produces physiological responses referred to as heat stress which are characterized by an increase in the: a) Core or deep body temperature. b) heart rate, c) blood flow to the skin, and d) water and salt loss due to sweating. Conditions of excessive heat stress may occur either when the physical work is too heavy or the environment is too hot in relation to the work being performed. If work is performed under hot environmental conditions, the work load effort must be reviewed and the heat exposure limit maintained at or below the levels to protect the worker from the risk of acute heat illness.

In general, there are four types of physiological disorders associated with heat stress. They include:

- Heat Rash - a skin reaction occurring as a result of obstructed sweat glands, often associated with impermeable clothing.
- Heat Cramps - painful muscle spasms of extremities and abdomen, resulting from inadequate balance of electrolytes which are lost from sweating.
- Heat Exhaustion - a mild form of heat stroke due to depletion of body fluids and electrolytes. Blood vessels dilate despite decreased volume of blood. Symptoms include weakness, dizziness, nausea, rapid pulse, and a small increase in body temperature.
- Heatstroke - a potentially fatal disorder resulting from failure of the body's thermoregulatory system. The classical description of heatstroke includes (1) a major disruption of central nervous function (unconsciousness or convulsions), (2) a lack of sweating (3) hot, dry, red or mottled skin, and (4) a core temperature in excess of 41°C (105.8°F). Heatstroke is a serious medical condition which calls for emergency medical action.

Seven factors play significant roles in the development of or predisposition to, heat stress disorders. These factors include:

- Acclimatization - Heat acclimatization leads to increased and quicker sweating, cooler skin due to an increase in evaporative cooling and a lower, more stable core body temperature. Maximal sweating rates in unacclimatized persons are lower, but salt concentrations in their perspiration are higher, requiring a higher rate of salt replacement.
- Age - Older individuals are generally more susceptible to heat stress than younger individuals. However, older healthy workers are able to perform well in hot jobs if permitted to proceed at a self-regulated pace.
- Gender - The average woman has a lower aerobic capacity than a similar-sized man. Nevertheless, when working at similar proportions of their maximum aerobic capacity, women perform similarly or only slightly less well than men.
- Body Fat - The lower level of physical fitness, decreased maximum work capacity and decreased cardiovascular capacity frequently associated with obesity predispose individuals to heat disorders.
- Water and Electrolyte Balance - Sustained, effective work performance in heat requires a

replacement of body water and electrolytes lost through sweating. If this water is not replaced by drinking, continued sweating will draw on water reserves from both tissues and body cells leading to dehydration.

- Use of Alcohol and Medication - Notwithstanding the potential hazards from impaired coordination and judgment, the ingestion of alcohol before or during work in the heat should not be permitted because it reduces heat tolerance and increases the risk of heat illness. Many drugs, including diuretics and antihypertensives, can interfere with the body's thermoregulation.
- Physical Fitness - Physical conditioning enhances heat tolerance by increasing the functional capacity of the cardiovascular system, and reduces the time required to develop heat acclimatization by about 50% over those not physically fit.

The factors listed above are to be taken into account by all project personnel when planning or executing a project subject to heat stress conditions. The factors should be taken into consideration for:

- the development of the project schedule;
- the ordering of supplies/equipment;
- the support facilities to be made available at the site;
- the execution of work tasks; and
- the after work hours activities.

The following is a summary of signs and symptoms of heat stress:

Heat Rash may result from continuous exposure to heat or humid air .

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:

- Muscle Spasms
- Pain in the hands, feet and abdomen.

Heat Exhaustion occurs from increased stress on various body organs, including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool and moist skin
- Heavy sweating
- Dizziness, fainting and nausea

Heat stroke is the most serious form of heat stress. Temperature regulation fails, and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury or death occurs. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot and unusually dry skin
- Lack of or reduced perspiration
- Dizziness and confusion

- Strong, rapid pulse and coma.

HEAT AND STRESS PREVENTION

Preventive measures should be taken to prevent personnel from experiencing heat stress illness. Prevention of heat stress is also important because if an individual has experienced a heat illness incident, he has an increased likelihood of future occurrences. Preventive measures include: favorable work scheduling, acclimatization of workers to hot environments, drinking sufficient quantities of fluids, providing cool, sheltered work and rest areas, and utilizing cooling devices as appropriate of feasible. Heat stress monitoring/work rest regimens are discussed below.

Work Schedules and Activity

If possible, work should be scheduled during the coolest part of the day. Early morning and evening work can be considerably more effective than working midday when the additional time for breaks and heat stress monitoring are taken into account.

Employees should also be encouraged to maintain a certain level of activity during the work shift. Prolonged standing in hot environments can lead to heat illness because the blood pools in the lower extremities. Workers should periodically walk about to encourage blood circulation from the feet and legs.

Acclimatization of Workers

A properly designed and applied heat acclimatization program will dramatically increase the ability of workers to work at a hot job and will decrease the risk of heat-related illnesses and unsafe acts. Heat acclimatization can usually be induced in 5 to 7 days of exposure to the hot job. For workers who have had previous experience with the job, the acclimatization regimen should be exposure for 50% on day 1, 60% on day 2, 80% on day 3 and 100% on day 4. For workers new to job the schedule should be 20% on day 1 with a 20% increase in each additional day.

Acclimatization can be induced by sustained elevations of the skin and core body temperatures above levels for the same work in cool environments for an hour or more per day. Acclimatization needs periodic reinforcement such as occurs daily during the work week. Persons may show some loss of acclimatization on the first day of the new shift after being idle for two days or over a weekend. After vacations of two weeks or longer the loss of acclimatization is substantial, several days at work will be needed before heat tolerance is fully restored.

Drinking Sufficient Quantities of Fluids

Under hot conditions where sweat production may reach 6 to 8 liters per day, voluntary replacement of the water lost is usually incomplete. The normal thirst mechanism is not sensitive enough to urge us to drink enough water to prevent dehydration. Individuals are seldom aware of the exact amount of sweat they produce or how much water is needed to replace that lost in sweat; 1 liter/hour is not an uncommon rate of water loss. Every effort should be made to encourage individuals to drink water, low-sodium noncarbonated beverages or electrolyte replacement fluids (e.g., Gatorade). Lightly salted water (1 gram/liter of water (0.1%) or one level teaspoon per 15 quarts of water), should be provided to unacclimated workers. The salt should be dissolved completely and the water kept cool. Salt tablets as dietary supplements are not generally recommended.

Workers should drink at least 500 ml (one pint) of water before beginning work. The fluid should be maintained at temperatures of 10° to 15° (50 to 59° F). If possible, small quantities of fluids should be consumed at frequent intervals (e.g., 150 to 250 milliliters (ml), or at least a quarter pint, every 20 minutes) rather than the intake of 750 ml (3 cups) or more once per hour. Individuals vary, but water intake should total 4 to 8 liters (quarts) per day. When heat stress is considered a potential problem, a minimum of 1 liter/hour/person of water are to be maintained onsite. Individual paper or plastic cups will be provided in order to prevent the spread of communicable disease.

Alcohol and diuretics such as caffeine (contained in coffee, tea and soft drinks) can increase dehydration. Therefore employees with potential exposure to heat stress should be discouraged from the consumption of these types of fluids during and after working hours.

Cool, sheltered Work and Rest Areas

Exposure to direct sunlight significantly increases the overall thermal loading of the body, thereby increasing an individuals susceptibility to heat stress illnesses. Whenever possible work should be conducted under suspended tarps, in shady areas or in other sheltered areas in order to reduce thermal loading caused by the sun. Cool sheltered areas should be provided also for rest breaks. A rest area should be situated so that part of it is in the contamination reduction area so that workers can take breaks without being required to undertake a full decontamination procedure. Canopies or tarps and open air tents, are types of cool shelters which can provide shaded rest areas.

Cooling Devices

Auxiliary cooling devices can be successfully used to provide body cooling, especially to workers wearing protective garments at hazardous waste sites. Vortex coolers utilize high velocity air which is directed inside the protective clothing. Vortex coolers have been used successfully in some operations. Cooling vests utilizing Ablue ice@ type packs can provide some cooling to the torso, but add weight for the wearer and can inhibit body movements.

Newer, more sophisticated tube and refrigerant systems woven into undergarments are also available. However, some of these systems „may not be effective in situations where the work involves considerable motion, since bending and lifting can crimp the tubes, impeding the flow of refrigerant.

Heat Stress Monitoring

Several heat stress monitoring systems have been devised to help manage heat stress in hot work environments. Panamerican performs heat stress monitoring when: 1) employees are wearing normal work clothing in ambient temperatures exceeding 29° C, (85° F) and 2) employees wearing chemical protective clothing (including paper coveralls) working in ambient temperatures exceeding 21° C (70° F). The temperature differential is related to the reduced ability of a person to maintain a core temperature of $\pm 37^{\circ}$ C (98.6° F) when wearing chemical protective clothing.

It should be noted by personnel that there are no Afast and true@ methods of heat stress monitoring; likewise there are no regulations concerning heat stress monitoring. Individual susceptibility to heat stress is highly variable. Some individuals are highly susceptible to any increase in their internal body temperature while other individuals can work very well with internal body temperatures of 39°C (102.2° F) or higher.

The heat stress monitoring systems should be used by Site Safety Officers as guidelines and not necessarily as hard, fast rules. Individuals working in elevated temperatures should be queried on a regular basis regarding their perceived state of heat stress. If the calculated heat stress index value indicates that work can continue but a person states that they believe they are experiencing heat stress, the work effect should be discontinued and a rest break taken.

Likewise, if the calculated heat stress index value indicates that a rest break should be taken but the workers believe they can work longer, they should be permitted to work longer providing that their heart rates do not exceed 110 beats per minute. If the individual's heart rate rates exceed 110 beats per minute a rest break will be taken. In all cases, individual workers should not be permitted or expected to perform excessive work which could result in heat stress. If a SSO has any concerns that an individual may be pushing himself/herself past the Abreaking point@ the calculated work/rest regimen will be followed.

For strenuous field activities that are part of ongoing site work activities in hot weather, the following procedures shall be used to monitor the body's physiological response to heat, and to monitor the work cycle of each site worker. There are two phases to this monitoring: the initial work/rest cycle is used to estimate how long the first work shifts of the day should be. Heart rate monitoring of each worker will establish the length of the successive work periods. Both phases are to be used are to be used for heat stress monitoring. Failure to use either one could place workers at risk of heat-related disorders.

Phase 1 - Determination of the Initial Work - Rest Regimen

The determination of the initial work - rest regimen can be performed using either of two methods:

- The Modified Dry Bulb Index; or
- The Wet Bulb Globe Thermometer (WBGT) Index

After the initial work - rest regimen has been determined, environmental conditions must be monitored for changes which would require a modification to the work - rest regimen. This, coupled with the heart rate monitoring, determines the work cycles to be followed on a site.

The Modified Dry Bulb Index accounts for the effects caused by solar, load, air temperature, and chemical protective clothing, under a light work load (walking at approximately 3 mph). A mercury thermometer, shielded from direct sunlight, is used to measure ambient temperature. The percentages of (of time) of sunlight and cloud cover are then estimated to determine a sunshine quality factor (e.g., 100% sunshine - no cloud cover = 1.0; 50% sunshine - 50% cloud cover = 0.5; 0% sunshine - 100% cloud cover = 0.0). When these two sets of values have been obtained, they are inserted into the following equation to calculate the adjusted temperature:

$$T (^{\circ}\text{C, adjusted}) = T (^{\circ}\text{C, actual}) + (7.2 \times \text{sunshine quality factor})$$

-OR-

$$T (^{\circ}\text{F, adjusted}) = T (^{\circ}\text{F, actual}) + (13 \times \text{sunshine quality factor})$$

After the adjusted temperature has been calculated, the length of the first work shift can be determined using the following table:

Initial Break and Physiological Monitoring Cycles

ADJUSTED TEMPERATURE	NORMAL WORK CLOTHES	PROTECTIVE CLOTHING
90 ⁰ F (32.2 ⁰ C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5 ⁰ -90 ⁰ F (30.8 ⁰ -32.2 ⁰ C)	After each 60 minutes of work	After each 30 minutes of work
82.5 ⁰ -87.5 ⁰ F (28.1 ⁰ -30.8 ⁰ C)	After each 90 minutes of work	After each 60 minutes of work
77.5 ⁰ -82.5 ⁰ F (25.3 ⁰ -28.1 ⁰ C)	After each 120 minutes of work	After each 90 minutes of work
72.5 ⁰ -77.5 ⁰ F (22.5 ⁰ -25.3 ⁰ C)	After each 150 minutes of work	After each 120 minutes of work

NOTE: The standard rest period is 15 minutes

WET BULB GLOBE THERMOMETER INDEX

The Wet Bulb Globe Thermometer (WBGT) Index was developed by the U.S. Army in the 1950s to prevent heat stress in army recruits. The WBGT Index accounts for the effects caused by humidity, air movement, evaporation, air temperature and work rate. It does not, however, account for the effects of chemical protective clothing, non-acclimatized workers, age, or other factors which may affect the likelihood of heat stress. Because of this, it is necessary to make adjustments to the index and conduct Heart Rate Monitoring.

WBGT measurements are usually obtained through the use of air-contained electronic devices. Such devices are easy to set up and can provide the user with the capabilities to store data and download to print out a hard copy.

Heat produced by the body and the environmental heat together determine the total heat load. Therefore, after the WBGT Index has been obtained, the anticipated work load category of each job shall be determined and the initial-rest regimen established using the table below.

The work load category may be determined by ranking each job into light, medium and heavy categories on the basis of type of operation. Examples of each category are:

- Light work: sitting or standing to control machines, performing light hand work
- Moderate work: walking about with moderate lifting and pushing; and
- Heavy work: pick and shovel work.

PERMISSIBLE HEAT EXPOSURE			
WORK-REST REGIMEN	WORK LOAD		
	LIGHT	MODERATE	HEAVY
	30.0 ⁰ C/86 ⁰ F	26.7 ⁰ C/80.1 ⁰ F	25 ⁰ C/77 ⁰ F
75% Work-25% Rest Each Hour	30.6 ⁰ C/87.1 ⁰ F	28 ⁰ C/82.4 ⁰ F	25.9 ⁰ C/78.6 ⁰ F
50% Work-50% Rest Each Hour	31.4 ⁰ C/88.5 ⁰ F	29.4 ⁰ C/85.0 ⁰ F	27.9 ⁰ C/82.2 ⁰ F
25%Work-75 % Rest Each Hour	32.2 ⁰ C/90.0 ⁰ F	31.1 ⁰ C/88.0 ⁰ F	30.0 ⁰ C/86.0 ⁰ F

The table reads as follows:

Light, continuous work is possible at any WBGT reading up to 30⁰ C (86⁰F) but above that limit work breaks

are needed to recover from the heat; light work at temperatures of between 30.0 and 30.6⁰C (86 to 87⁰F) can be conducted, but 15 minute breaks must be taken every hour, etc. It is important to note that this table is applicable primarily to healthy, acclimatized personnel; wearing standard work clothing.

NOTE: An additional 6 to 11⁰C (42.8 to 51.8⁰F) must be added to the calculated WBGT temperature for personnel wearing chemical protective clothing prior to determining the initial work - rest regimen from this table. Because the WBGT Index does not take into account unacclimatized workers, or individual susceptibilities, the addition to the WBGT value does not eliminate the requirement for Heart Rate Monitoring after work has begun.

Phase 2 - Heart Rate Monitoring

An increase in the heart rate is a significant indication of stress, whether induced by exposure to heat or through physical labor. Although baseline heart rates can vary significantly between individuals and during the day for an individual, a heart rate of 110 beats per minute or greater is an indication of physiological stress. To prevent heat stress illnesses, the heart rate (HR) should be measured by radial (wrist) or carotid (neck) pulse for 30 seconds as early as possible in the rest period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33 percent while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats/minute at the beginning of the next rest period, the following work period should be further shortened by 33 percent while the length of the rest period stays the same.

ATTACHMENT 3

Trenching and Excavation Health and Safety Requirements

REGULATORY AUTHORITY

Excavations will be performed in accordance with OSHA 29 CFR, subpart P, 1926.650-1926.652 and USACOE EM 385-1-1 section 25 requirements as they apply to project activities.

GENERAL

- At all times the need for personnel to enter excavations will be minimized. Inspections or sample removal will be done from above the excavation, whenever possible.
- Personnel will only enter excavations after the requirements of this plan have been met.
- Personnel protective equipment including hard hat, safety glasses and steel-toe work boots may be required.

SURFACE ENCUMBRANCES

Surface encumbrances such as structures, fencing, piping, stored material etc. which may interfere with safe excavations will be avoided, removed or adequately supported prior to the start of excavations. Support systems will be inspected daily.

UNDERGROUND UTILITIES

Underground utility locations will be checked and determined and permits as necessary will be in place prior to initiating excavations. Local utility companies will be contacted at least two days in advance, advised of proposed work, and requested to locate underground installations. When excavations approach the estimated location of utilities, the exact location will be determined by careful probing or hand digging and when it is uncovered, proper supports will be provided.

OVERHEAD OBSTACLES

A minimum safe distance of 20 feet will be maintained when working around overhead high-voltage lines or the line will be de-energized following appropriate lock-out and tag-out procedures by qualified utility personnel.

ENTRY/EXIT ROUTES

Excavations five feet or more deep will require an adequate means of exit, such as a ladder, ramp, or steps and located so as to require no more than 25 feet of lateral travel. Under no circumstances will

personnel be raised.

VEHICLE CONTROL/SAFETY

Personnel working around heavy equipment, or who may be exposed to public vehicular traffic will wear a traffic warning vest consisting of at least 400 square inches of red or orange material. At night, at least 400 square inches of florescent or other reflective material will be worn.

For excavation work on or adjacent to highways or streets, signs, signals, and barricades that conform to the requirements of the current American National Standards Institute (ANSI) D6.1, Manual on Uniform Traffic Control Devices for Streets and Highways will be used to protect work areas. Signs, signals, and barricades will be adequately lighted at night. Flagmen will be provided when signs, signals and barricades do not provide adequate protection. Flagmen will use signals and procedures contained in the current issue of ANSI D6.1. At night, flagmen will be clearly illuminated so as to be easily seen by approaching traffic.

For mobile equipment operating next to or approaching the edge of an excavation, the operator will have a clear view of the edge of the excavation, or a warning system such as barricades, hand or mechanical signals, or stop logs will be used. If possible the surface grade will slope away from the excavation.

Personnel will be safely located in and around the trench and will not be permitted to work underneath loads handled by lifting or digging equipment. Personnel are required to stand away from vehicles being loaded and unloaded. Operators can remain in the cabs of vehicles being loaded or unloaded provided the vehicles are equipped to provide adequate protection to the operator.

HAZARDOUS ATMOSPHERES

Hazardous atmospheres, such as oxygen deficiency (atmospheres containing less than 19.5% oxygen), flammable gases or vapors (airborne concentrations greater than 20% of the lower explosive limit), and toxic gases or vapors (airborne concentrations above the OSHA Permissible Exposure Limit or other exposure limits) may occur in excavations, especially around landfills and hazardous waste sites.

In locations where oxygen deficiency or hazardous gaseous conditions are possible, the air in the excavation will be tested before personnel are permitted to enter an excavation deeper than 4 feet. When flammable gases are present, adequate ventilation will be provided and sources of ignition will be eliminated. Ventilation or respiratory protection will be provided to prevent personnel exposures to oxygen deficient or toxic atmospheres. Periodic retesting (at least each shift) of the excavation will be conducted to verify that the atmosphere is acceptable. A log or field book records will be maintained of all test results.

WATER ACCUMULATION HAZARDS

Personnel will not work in excavations that have accumulated water or where water is accumulating unless adequate precautions have been taken. These precautions can include special support or shield systems, water removal systems such as pumps, or safety harnesses and lifelines. Water removal systems will be operated and monitored by experienced personnel. Diversion ditches or dikes will be used to prevent surface water from entering the excavation and to provide adequate drainage of the area around the excavation. Adequate precautions, as described above, will be taken for excavating

subject to heavy rains.

STABILITY OF ADJACENT STRUCTURES

Support systems such as shoring, bracing, or underpinning will be provided to maintain the stability of adjoining buildings, walls, or other structures endangered by the excavation operations. Excavations below a foundation or retaining wall that could be reasonably expected to pose a hazard to personnel will not be permitted unless:

- a support system is provided
- The excavation is in stable rock; or
- A Registered Professional Engineer has determined that the structure will not be effected by the excavation activity or that the excavation work will pose a hazard to employees. The Professional Engineer is required to demonstrate how the above determination was made on the basis of appropriate calculations.

Sidewalks will not be undermined unless shored to protect from possible collapse.

PROTECTION FROM LOOSE ROCK, MATERIALS OR SPOILS

In excavations and trenches that personnel may be required to enter, loose rock, excavated or other material, and spoils will be effectively stored and retained at least two feet or more from the edge of the excavation.

As an alternative to the clearance prescribed above, barriers or other effective retaining devices may be used in order to prevent spoils or other materials from falling into the excavation.

Walkways, runways, and sidewalks will be kept clear of excavated material from other obstructions.

Scaling operations may be used to remove loose material and will be performed only by experienced crews under the direct supervision of a competent supervisor. The scalers will be provided with scaler=s lifelines, safety belts, boatswain chair, and other safety equipment necessary for their protection.

FALL PROTECTION

Walkways or bridges with standard guardrails that meet OSHA specifications will be provided where employees, the public, or equipment are required to cross over excavations.

Adequate barrier physical protection will be provided at all remotely located excavations. All excavations will be barricaded or covered.

EMERGENCY RESCUE

In the event of a cave-in, the Emergency Rescue Squad will be immediately notified. The caller should provide his name, location, nature of the accident (an excavation collapse), the dimensions of the excavation, and number of people trapped in the excavation. Personnel are not to enter a collapsed trench to attempt rescue. This may cause a further collapse of the trench. Under no circumstance is heavy equipment to be used to attempt rescue of personnel in a collapsed excavation; injury or decapitation could be the result. All heavy equipment and traffic in the area is to be shut down and

stopped to reduce vibration. Pumps should be started if water ensues.

INSPECTION PROGRAM

Safety personnel will conduct daily inspections of the excavation, the adjacent areas, and protective systems. Inspections will be conducted prior to the start of work and as needed throughout the work shift. Inspections will also be made after every rainstorm or other occurrence that increases the hazard of collapse (i.e., vibration from heavy equipment, freezing and thawing, etc.).

The excavation inspection will include a check for the following:

- Evidence if situations that could result in possible cave-in (i.e. soil crumbling or sloughing, water saturated soils, freezing and thawing, unusual vibrations such as from heavy equipment, heavy rains, surface run off entering trench, etc.);
- Indications of failure of protective systems;
- Hazardous atmosphere (oxygen deficiency, flammable and toxic gases and vapors);
- Condition and support of exposed underground installations;
- Adequate means of egress;
- Signs, signals, and barricades for work area protection;
- Precautionary measures to control water accumulation;
- Stability and support of adjacent structures; and
- Adequate protection from loose rock and soil.

PROTECTIVE SYSTEMS

Personnel working in excavations will be protected from cave-ins by sloping and/or benching of excavation walls, a shoring system or some other equivalent means except when:

- The excavation is made entirely in stable rock; or
- Excavations are less than five feet deep and safety personnel have determined that there is no indication of potential cave-in. Depending on site and soil conditions protective measures may be taken for the excavations less than five feet in depth.

The most important factor influencing the choice of protective systems is the soil type classification. Once the soil type has been classified, selection of the protective system, the determination of the angle of repose for sloping and benching, and the design of shoring systems will be made. Decisions will be based on careful evaluation of pertinent factors such as depth of cut; possible variation in water content of the material while the excavation is open; anticipated changes in materials from exposure to air, sun, water, or freezing; loading imposed structures equipment, overlying material, or stored material; and vibration from equipment, blasting traffic or other sources.

Soil Classification

Appendix A of the OSHA Excavation Standard describes a method to classify soils into four types:

1. **Stable Rock** - Solid mineral matter that can be excavated with vertical sides.
2. **Type A** - cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) or greater. Examples include: clay; silty clay; sandy clay; clayey loam; and cemented soils such as caliche and hardpan. No soil is considered to be Type A if it is fissured, subject to vibration, previously disturbed, or part of a sloped, layered system.
3. **Type B** - cohesive soils with an unconfined compressive strength of greater than 0.5 tsf but less than 1.5 tsf. Examples include: angular gravel similar to crushed rock; silt; silty loam; and sandy loam; Type B soils also include : previously disturbed soils that are not type C; Type A soils that are fissured or subject to vibration; and dry rock that is not stable.
4. **Type C** - cohesive soils with an unconfined compressive strength of 0.5 tsf or less. Examples include: gravel; sand; loamy sand; submerged soil or soil from which water is seeping; submerged rock that is not stable.

The engineer, geologist, or safety personnel will conduct at least one visual and at least one manual test as described in the OSHA excavation standard in order to classify soils. Visual tests include looking for : particle size and soil cohesiveness (clumping); cracking in the excavation sides which suggests fissured material; underground installations and previously disturbed soils; layered soil systems that slope toward the excavation; evidence of surface water and water seeping from the sides of the excavation; and sources of vibration that may affect the excavation stability. Manual tests include: plasticity; dry strength; tumb penetration; drying test; and strength tests using a pocket penetrometer or hand-operated sheervane.

Sloping and Benching

One of the following options for sloping and benching systems described in section 1926.652(b) of the OSHA Excavation Standard will be used in excavations of .5 foot or deeper or at the discretion of the safety personnel:

- The walls of excavation will be sloped at an angle not steeper than one-and one-half horizontal to one vertical. Sloping configurations will follow the slopes shown for Type C soils in Appendix B of the OSHA Excavation Standard.
- Maximum allowable slopes and sloping and benching configurations will be determined according to soil type as described in Appendices A and B of the OSHA Excavation Standard.
- Use of other written tabulated data and designs, such as tables and charts, to design sloping and benching systems. A copy of the tabulated data must be approved by a registered Professional Engineer. A copy of the tabulated data must be kept at the job site.

Personnel are not allowed to work on the faces of sloped or benched excavations above other workers unless the workers at the lower levels are protected from falling material or equipment. Similar protection will be provided for personnel working in excavations below other workers.

Support Systems, Shield Systems, and Other Protective Devices

One of the following options described in OSHA (1926.652 (c)) will be followed.

- Timber shoring, designed according to the conditions and requirements of Appendix C of the OSHA Excavation Standard or aluminum hydraulic shoring designed according to manufacturers tabulated data or Appendix D of the OSHA Excavation Standard. In order to use the information in Appendices C or D, the soil type must first be determined using the classification system in Appendix A. For each soil type the size and spacing of the cross braces, uprights, and walls that comprise the shoring system are then selected based on the depth and width of the trench.
- Use of the manufacturer=s written tabulated to design support systems, shielded systems, and other protective devices. Any deviation from this tabulated data must be approved by the manufacturer. A copy of the tabulated data as well as any approvals to deviate from the tabulated data must be kept at the job site.
- Use of other written tabulated data to design support systems, shield systems, and other protective devices. The tabulated data must be approved by a Registered Professional Engineer. A copy of the tabulated data must be kept at the job site.
- Use of a written support system, shield system, and other protective device design that has been approved by a Registered Professional Engineer. A copy of the written design must be kept at the job site.

Installation and Removal of Support

Cross braces or trench jacks, uprights, and walls will be secured together to prevent sliding, falling or kickouts.

Additional precautions by way of shoring and bracing will be taken to prevent slides or cave-ins when excavations or trenches are made in locations adjacent to backfilled excavations, or where excavations are subjected to vibrations from railroad or highway traffic, the operation of machinery, or any other source.

If it is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above or near any excavation, the side of the excavation will be sheetpiled, shored, and braced as necessary to resist the extra pressure due to such superimposed loads.

Backfilling and removal of trench supports will progress together from the bottom of the trench. Jacks or braces will be released slowly and , in unstable soil, ropes will be used to pull out the jacks or braces from above after employees have cleared the trench.

Shield Systems

Portable trench boxes or sliding trench shields may be used for protection of personnel in lieu of a shoring system or sloping. Where such trench boxes or shields are used, they will be designed, constructed and maintained in a manner which will provide protection equal to or greater than the sheeting or shoring required for the trench. Shields will be installed so as to restrict lateral or other hazardous movement. Personnel are not allowed inside shields when shields are being moved.

EXCAVATION SAFETY LIST

To be completed prior to each work shift, or prior to personnel entering a new trench for the first time, by the Site Safety Officer/Competent Person:

Project _____ Location _____

Job Number _____

Competent Person(CP)* _____ Date _____

	<u>Yes</u>	<u>No</u>	<u>N/A</u>
1. Has the site been cleared for utilities and other underground obstructions?	_____	_____	_____
2. If on public property, has the regional utility locating service been notified?	_____	_____	_____
3. Has the excavation equipment been safety checked by the operator?	_____	_____	_____
4. Are copies of relevant OSHA excavation regulations available on site?	_____	_____	_____
5. Will the excavation be 5 feet or more in depth?	_____	_____	_____
6. If 4 is yes, will personnel enter the excavation at any time?	_____	_____	_____
7. If 4a is yes, have provisions been made for shoring, sloping, or benching the excavation? Describe: _____ _____ _____	_____	_____	_____
8. Has an inspection of the site and excavation been conducted by the SSO?	_____	_____	_____
9. Has the Competent Person conducted visual and manual tests to classify the soil?	_____	_____	_____

* According to Federal OSHA, A Competent Person is a person who is capable of identifying existing and predictable hazards in the surroundings; or working conditions which are unsanitary, hazardous, or dangerous to employees; and who has the authority to take prompt corrective measures to eliminate them.

- | | | | | | |
|-----|---|--|-------|-------|-------|
| 10. | G | Visual Test _____ (type) | | | |
| | G | Manual Test _____ (type) | | | |
| | G | Soil Classification _____ (type) | | | |
| 11. | | Are there any conditions that might expose employees to injury from possible moving ground? | _____ | _____ | _____ |
| 12. | | Is excavated material being placed at least 2 feet from the edge of the excavation? | _____ | _____ | _____ |
| 13. | | Is work in the excavation at all times under the immediate supervision of the SSO or other competent person? | _____ | _____ | _____ |
| 14. | | Is there a stairway, ladder, or ramp securely fastened in place to provide ingress and egress from the excavation? | _____ | _____ | _____ |
| 15. | | If the excavation is 4 feet or more in depth, are safe means of access (see 8) provided so as to require no more than 25 feet of lateral travel to reach them? | _____ | _____ | _____ |
| 16. | | If structural ramps are installed that are used for access/egress: were they designed by a qualified engineer? | _____ | _____ | _____ |
| 17. | | Do the structural ramps have appropriate means to prevent slipping and are the ramps uniform in thickness? | _____ | _____ | _____ |
| 18. | | Are walkways or bridges provided across the excavation to safe crossing? | _____ | _____ | _____ |
| 19. | | If excavations are 7 1/2 or more feet in depth, do the walkways have guardrails and toeboards? | _____ | _____ | _____ |
| 20. | | Are undermined structures adequately supported to safely carry all anticipated loads and protect workers? | _____ | _____ | _____ |
| 21. | | Are there adequate means provided to prevent mobile equipment from inadvertently entering the excavation? | _____ | _____ | _____ |
| 22. | | Is the excavation well marked and barricaded to prevent personnel from falling IN? | _____ | _____ | _____ |
| 23. | | Are means available to prevent surface water from entering the excavation and to provide | _____ | _____ | _____ |

adequate drainage of the area adjacent to the trench?

- | | | | | |
|------------|--|-------|-------|-------|
| 24. | Where it is reasonable to expect hazardous atmospheres, including oxygen deficiency, to exist in the excavation, is appropriate atmosphere testing equipment available. | _____ | _____ | _____ |
| 25. | Has the testing equipment been calibrated, and the calibrations recorded, today? | _____ | _____ | _____ |
| 26. | Are employees trained in proper use of this equipment? | _____ | _____ | _____ |
| 27. | Has a harness and lifeline been provided whenever an employee is required to enter a confined footing excavation? | _____ | _____ | _____ |
| 28. | Is appropriate personal protective equipment (hardhat, safety boots, eye protection, etc.) available and in use? | _____ | _____ | _____ |

Notes: _____

CPs Name (Print)

Signature

ATTACHMENT 4

Map to Hospital

7/25/2018

31 Water St, Jamestown, NY 14701 to 31 water street jamestown ny nearest hospital - Google Maps

Google Maps

31 Water St, Jamestown, NY 14701 to 31 water street jamestown ny nearest hospital

Drive 0.2 mile, 1 min



Map data ©2018 Google 200 ft



via Water St and Foote Ave

Fastest route

1 min

0.2 mile

ATTACHMENT 5

NYSDOH Generic CAMP and Fugitive Dust and Particulate Monitoring

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \text{ mcg}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

- (a) Objects to be measured: Dust, mists or aerosols;
- (b) Measurement Ranges: 0.001 to 400 mg/m³ (1 to 400,000 µg/m³);
- (c) Precision (2-sigma) at constant temperature: +/- 10 µg/m³ for one second averaging; and +/- 1.5 g/m³ for sixty second averaging;
- (d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 µm, g= 2.5, as aerosolized);
- (e) Resolution: 0.1% of reading or 1g/m³, whichever is larger;
- (f) Particle Size Range of Maximum Response: 0.1-10;
- (g) Total Number of Data Points in Memory: 10,000;
- (h) Logged Data: Each data point with average concentration, time/date and data point number
- (i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
- (j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
- (k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
- (l) Operating Temperature: -10 to 50° C (14 to 122° F);
- (m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 µg/m³ (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m³, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m³ above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m³ continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM₁₀ at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

- (a) Applying water on haul roads;
- (b) Wetting equipment and excavation faces;
- (c) Spraying water on buckets during excavation and dumping;
- (d) Hauling materials in properly tarped or watertight containers;
- (e) Restricting vehicle speeds to 10 mph;
- (f) Covering excavated areas and material after excavation activity ceases; and
- (g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m³ action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

Attachment A

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3 , work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.
- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work With Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g. weekends or evenings) when building occupancy is at a minimum.