REMEDIAL INVESTIGATION WORK PLAN

743 Main Street
City of Buffalo, Erie County, New York
Tax Map ID No.: 111.30-3-5
Site No.: C915399

Prepared for:

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1.0 INTRODUCTION

This Remedial Investigation Work Plan (RIWP) document presents details of work activities designed to support a Remedial Investigation (RI) at 743 Main Street in the City of Buffalo, New York (refer to **Figure 1**). The 0.3-acre site includes one parcel (SBL: 111.30-3-5) and is located on the east side of Main Street. The Site is zone N-1C (Mixed-Use Core) in an area consisting primarily of commercial and industrial businesses. The Site is also in a designated En-Zone (Type B) for Census Tract 25.02 and is in a Disadvantaged Community.

A preliminary BCP project schedule is provided in **Figure 2** and a boundary survey map of the Site is provided in Figure 3. The Brownfield Cleanup Program (BCP) applicant, 743 Main Street LLC, has entered the program (Site No.: C915399) to remediate the Site in preparation for redevelopment of the property.

Environmental assessments and investigations conducted on the Site concluded that there are impacted soils across the Site due to the former uses and the presence of impacted urban fill. A Previous Phase II Environmental Site Assessment (ESA) identified site soils that have been impacted with metals and polycyclic aromatic hydrocarbon (PAH) related compounds. Historical use and previous environmental investigations suggest petroleum, solvents and PCB impacts may also exist at the Site.

The purpose of the RI phase of the BCP is to address the following activities and requirements:

- Obtain environmental data from the site under site specific quality assurance/quality control (QA/QC) for sampling, analyses, and data evaluation.
- Provide plans and approaches for health and safety and air monitoring for field activities.
- Summarize previous environmental assessments and investigations.
- Describe and illustrate the physical conditions of the site including surface waterbodies, ecological receptors, significant utility corridors.
- Tabulate and illustrate a proposed sampling plan and results to include location, matrix, depth, analytes, methodologies, rationale, and QA/QC.
- Provide a schedule of activities and details of the proposed investigation team.
- Describe the areas of concern including impacted soil, fill material, groundwater.
- Determine the necessity of a fish and wildlife impact analysis and, if required, gather data to evaluate impacts.
- Complete a qualitative exposure assessment for human health and fish/wildlife resources.
- Ensure (1) field work is sufficiently comprehensive to evaluate natural attenuation of groundwater, as applicable, and (2) all waste derived from field work is managed in a manner that does not negatively impact human health and the environment.

1.1 SITE DESCRIPTION AND HISTORY

The Site is composed of a single 0.3-acre parcel (refer to **Figure 3**), SBL #111.30-3-5 located at 743 Main Street in the City of Buffalo. The Site is bound by Main Street to the west, Washington to the east, a commercial and residential building to the south, and a commercial lot to the north. The surrounding land use is primarily commercial, with some residential occupancy in the adjacent southern building. Based on visual observations and available data, the commercial buildings immediately to the north and south of the Site are currently occupied.

The topography of the Site is generally level and is currently vacant. The on-Site building was demolished in early 2023 after a fire occurred in the unoccupied structure. The approximate western third of the demolished site structure had a basement (+/- 6 feet below grade surface), which upon removal of the above grade structure, was partially backfilled with off-site soil fill material from work being done at the nearby Ralph Wilson Park (formally LaSalle Park) and mixed with the exterior brick/concrete building wall material that was placed in the basement area to level the site with the surrounding area. Upon removal of the structure on the eastern portion of the site the building floor slab was broken up and mixed with existing site soils in that area to also level the site with the surrounding area. Historic addresses of the Site identified through a review of historical sources include 743-749 Main Street and 744-748 Washington Street. The earliest records of the property indicate that in 1889 the Site was undeveloped vacant land. In 1925, the Site was developed with multiple storefronts on Main Street and a garage with a gasoline underground storage tank (UST) in the adjacent roadway. The garage was an auto repair facility until the mid-1950's and there are likely sub-surface venting or dispenser equipment within the Site boundaries. The service garage and UST could be a possible source of contamination in Site soils. Multiple commercially related store fronts existed on the Site including Thos Rick (bicycles), National Flag & Emblem Co. and The Toy Tent. Elk Automotive Services was a tenant at the east end of the Site at 746 Washington Street and appears to have been operational until the 1970's. From the mid 1950's to the mid-1980's similar businesses occupied the Main Street portion of the Site including a radio equipment warehouse and most recently a costume shop which was demolished and removed.

1.2 CONTEMPLATED USE OF THE SITE

Anticipated use for the Site post remediation is commercial, residential, or mixed use.

1.3 PROJECT ORGANIZATION

The following personnel constitute the primary members of the project team:

Project Manager – Jason M. Brydges, P.E.
Engineers – John Berry, P.E., and Jason M. Brydges, P.E.
Project Staff and Field Technicians – Alexis Palumbo-Compton, E.I.T. and Paul Staub, E.I.T.
Health and Safety Officer – Jason M. Brydges, P.E.
QA/QC – John Berry, PE
Project Geologist – John Boyd
Biologist – Craig Ferris
Attorney – Melanie Marotto

2.0 GOALS AND OBJECTIVES

2.1 RI OBJECTIVES

In general, an RI has the following objectives as described in New York Codes, Rules, and Regulations (NYCRR) Part 375-1.8(e):

- Delineation of the extent of the contamination emanating from all media at the Site and the nature of that contamination;
- Characterization of the surface and subsurface characteristics of the Site, including topography, surface drainage, stratigraphy, depth to groundwater, and any aquifers that have been impacted or have the potential to be impacted;

- Identification of the sources of contamination, the migration pathways, and actual or potential receptors of contaminants;
- Evaluation of actual and potential threats to public health and the environment; and,
- Production of data of sufficient quality and quantity to support the necessity for, and the proposed extent of, remediation and to support the evaluation of proposed alternatives.

2.2 SPECIFIC GOALS

Based on the data collected to date and history of the Site, RI activities have been developed that will allow for further assessment of fill material and depth of native soil, depth to bedrock, and depth to groundwater. Specific goals for the RI are as follows:

- Perform additional soil borings at the Site to add to the existing data. The focus will be on impacted areas identified during the previous investigations;
- Install and sample groundwater wells to assess potential contamination and its sources (i.e., on or off-Site), direction of groundwater flow, and potential impacts. It should be noted that prior subsurface assessments did not encounter groundwater in the overburden;
- Perform a hydraulic assessment of the groundwater in the subsurface using the installed wells;
- Install/sample soil vapor probes to assess potential impacts from historic off-site UST areas; and,
- Fill in any data gaps resulting from previous assessments.

To the extent possible, RI field work will also include the identification of any significant structures, sensitive areas, or appurtenances that could have an impact on contaminant migration or future remedial action such as any existing stormwater and/or sewer lines.

2.3 CONTAMINANTS AND AREAS OF CONCERN

Based on the findings related to historic use of the Site and previous investigations, contaminants of concern (COCs) in the soils are semi-volatile organic compounds (SVOCs), and metals. SVOCs identified are mostly polycyclic aromatic hydrocarbons (PAHs) in multiple locations across the Site above restricted residential and commercial soil cleanup objectives (SCOs). Metal exceedances identified include lead, arsenic, mercury, cadmium and copper. The potential for chlorinated solvents and petroleum/PCBs exists due to historic petroleum use in connection with the Site and will also be assessed in site soils and groundwater. Additional chemicals used include surfactants and degreasers related to historic commercial businesses along Main Street and use as an auto garage. The full suite of soil contaminants as identified in 6 NYCRR Part 375 (revised 12/31/25) will be analyzed during the RI. Groundwater samples will also be analyzed for the full suite of contaminants per NYSDEC Division of Water TOGS. Soil vapor will be analyzed for TO-15 parameters. See Figure 4 for previous Phase 2 ESA boring/sampling locations and sample analytical exceedance results.

3.0 PAST ENVIRONMENTAL ASSESSMENTS/INVESTIGATIONS

Various Environmental assessments and remedial actions have occurred on the property including the following:

- A Phase I Environmental Site Assessment (ESA) was performed by Labella in September 2022 which identified recognized environmental conditions on the property. The eastern portion of the property was a garage with a gasoline UST located just east of the property boundary in 1925 and an auto repair shop from at least 1946 to 1955. In addition, a spill was located on the north adjacent parcel. Although the spill was closed, residual contamination remained under the structure and a vapor study was never performed.

- A Phase II ESA was performed on the Site by BE3 in June 2023 to determine the property's eligibility for the BCP Program. The results of the investigation identified several PAHs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and phenanthrene as well as metals primarily arsenic, copper, mercury, lead and cadmium above restricted residential and commercial SCOs. Two temporary wells were installed (MS07 and MS08) which revealed the presence of VOCs (acetone, benzene, chloroform and toluene) in the groundwater but below TOGS (see **Figure 4**).

4.0 INTERIM REMEDIAL MEASURES (IRM)

The primary objective of remediation is to reduce or eliminate receptor exposure to contaminants through the removal or stabilization of source contamination identified in media. Interim remedial measures (IRMs) are actions taken to mitigate exposures before the completion of the RI and remedial alternative selection. Examples of typical IRMs include the removal of source areas/hotspots/wastes, construction of collection or recovery systems, installation of engineered barriers and controls, and installation of vapor control systems.

If the need for implementing an IRM is determined during the RI, the NYSDEC will be notified and the IRM will be defined as emergency or non-emergency. Emergency IRMs are addressed as a spill response and are time-critical that are not subject to DER-10 (i.e., other guidance applies, such as Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA], spill response guidance manual, etc.). Non-emergency IRMs, such as drum removals, construction of fencing, and posting of warning signs can be performed at any time during the BCP in response to existing or potential exposures at the Site. These are best utilized when it is cost effective to complete the IRM prior to the remedial investigation and remedy selection process. In these cases, DER-10 will be followed and include corresponding documentation and oversight/approval by NYSDEC.

The most significant advantage to using IRMs is the reduction in schedule of any impending remedial activities since they may be conducted concurrently with sampling to delineate the contamination and to confirm contaminant removal. The Site does not appear to possess the potential exposures or scheduling issues that would require use of an IRM. However, the need for and design of an IRM will be developed as necessary following the implementation of the RI.

Any IRM proposed at the Site will require review and approval of an IRM workplan by NYSDEC and NYSDOH and may require a 30-day public comment period. Completed IRMs proposed as a final remedy will also require a 45-day public comment period.

5.0 INVESTIGATION SCOPE OF WORK

5.1 INTRODUCTION

The investigation will include soil sampling and analysis (refer to **Figure 5**); groundwater sampling/analysis; groundwater hydraulic assessment and soil vapor sampling/analysis. All investigation field work will be completed in accordance with the Health and Safety Plan (HASP) in **Appendix A** and the Community Air Monitoring Program (CAMP) in **Appendix B**. It is anticipated that the RI can be completed in a single phase and include the following:

- Soil investigation to supplement previous investigation findings (surface soil, soil borings, sampling, and chemical analysis);
- Groundwater investigation, to include well installation, sampling, chemical analysis, and hydraulic assessment; and,
- Soil vapor investigation to include soil vapor probe installation, sampling, and chemical analysis. These activities will be documented as daily reports and presented in the remedial investigation report (RIR). Daily reports will also be submitted to NYSDEC and NYSDOH at the end of the following day.

Any deviations from the RIWP will be reported to the NYSDEC Project Manager as soon as possible and documented in the RIR.

5.2 SURFACE, SUBSURFACE/SUB-SLAB SOIL

Surface and subsurface assessments have been conducted during previous investigations (Refer to Section 3.0). As such, the objective of the RI soil assessment will be to use the previous assessment data and complete additional borings/sampling in areas of concern identified in previous assessments. Eleven (11) soil borings will be completed as an adjunct to the former sample results. The borings will be spread out with a focus on (1) previously identified impacted areas, (2) areas where investigation has not been conducted, and (3) areas where previous historical operations may have impacted the site or where USTs were located to the east and north of the Site (See Figure 5). The precise sampling locations will be based on field observations and photoionization detector (PID) readings and will specifically target potential contaminant features while ensuring that areas of concern are examined.

The assessment will confirm the depth of fill material and collect and analyze fill and native soil samples, as appropriate, based on field soil evaluation during drilling. Secondly, the extent of known contamination will be quantified as data allows. Lastly, areas that may be source areas of contamination will be identified. As such, together with the data generated from this RI, all historic sampling data, including sampling protocols, soil boring logs and other pertinent data obtained from previous investigations will be included in the resultant remedial investigation report (RIR) for this brownfield investigation.

5.2.1 Surface Soil

All Site structures were demolished and removed in 2023. At a minimum, to characterize exposures to site contaminants in surface soil, three samples will be collected in the 0-2-inch interval below the vegetative cover at the Site and analyzed for full suite analysis (Part 375 Brownfields constituent list parameters) minus VOCs. The surface samples will be collected based on field observations of surface soils.

5.2.2 Soil Borings – Subsurface Soil

The borings will be advanced to an estimated depth of between 8 to 16 feet bgs, to native soil, or refusal using Geoprobe® direct push technology. The borings will be advanced deeper than 16 feet if environmental impacts appear to continue deeper. During the Phase II investigation, bedrock was not encountered. Continuous soil sampling will be conducted using a Geoprobe® with a two-inch diameter, 4-foot-long sampler. Visual observations and PID readings will be used to assess potential contaminant downward migration in the soil below the fill layer. If impacts are observed either by visual/olfactory observations and/or PID readings, the boring will be advanced as deep as possible based on equipment location and limitations. If no impacts are identified in a soil boring, samples will be collected from the bottom interval of the bore or from immediately above confirmed confining layers. Based on the Phase 2 program an urban fill layer (mix of brick, stone and soil) was encountered between 4 and 8 feet bgs and a lower fill layer (sandy soil some stone/clay) between 4 and 12 feet bgs across the site. Table 5.2.2 reflects these subsurface conditions. A minimum of 21 subsurface fill/soil samples and 5 native soil samples will be collected from soil borings. An additional 4 soil samples will be collected during groundwater well borings plus associated 3 QA/QC samples for a total of 39 subsurface soil samples. All boreholes will be filled with indigenous soil or clean sand prior to leaving each location and backfilling of boreholes will follow DER-10 Section 3.3(e).

Table 5.2.2 Summary of Proposed Soil Sampling

Location	Boring Depths (ft bgs)	Proposed Sampling Depth (ft bgs)	Sampling	Target Analysis
RI BH-1/ RI VP-1	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-8	Urban Fill Layer	
		8-12	Sand/Fill Mix	
		12-16	Native	
RI-BH2/ RI VP-2	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-8	Urban Fill Layer	
		8-12	Sand/Fill Mix	
		12-16	Native	
RI BH-3	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-8	Urban Fill Layer	
		8-12	Sand/Fill Mix	
		12-16	Native	

RI BH-4	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-8	Urban Fill Layer	
		8-12	Sand/Fill Mix	
		12-16	Native	
RI BH-5	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-8	Urban Fill Layer	
		8-12	Sand/Fill Mix	
		12-16	Native	
RI BH-6	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Sand/Fill Mix	
		12-16	Nature	
RI BH-7	16	0-4	Extent of Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Sand/Fill Mix	
		12-16	Native	
RI BH-8/ VP-7	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Sand/Fill Mix	
		12-16	Native	
RI BH-9/ VP-6	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs,

		4-12	Sand/Fill Mix	TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		12-16	Native	
RI BH -10	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Sand/Fill Mix	
		12-16	Native	
RI BH-11/ RI VP-4	16	0-4	Urban Fill Layer	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide
		4-12	Sand/Fill Mix	
		12-16	Native	
RI MW-1 through RI-MW-5	16	10-16	Characterize Soil Surrounding Well Screens	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS) Total Cyanide

5.2.3 Soil Data Collection and Analysis

At each boring location the following will be recorded:

- Thickness and characteristics of the cover/fill material;
- Depth to bedrock, if encountered;
- Depth to groundwater, if encountered;
- Thickness and characteristics of the native soil, if encountered;
- PID screening results; and,
- Estimated depth of analytical samples collected.

A record of soil stratigraphy and PID soil gas readings will be recorded. Soil samples will be collected from locations showing the highest PID reading and/or visual/olfactory observations; and/or based on location. A detailed log of these records will be maintained to assist field personnel in selecting the most appropriate sample location, and to supplement future analytical results. Soil data will also be collected and recorded during installation of monitoring wells including soil sampling. These samples may include native soils and should be at screened intervals to allow for soil and groundwater data comparison. An estimated total of 31 samples including subsurface soil, QA/QC samples, surface soil, and soil from well locations will be collected for laboratory analyses.

As per DER-10 Section 3.11(b)3, if more than one type of historic fill material is encountered in any boring, one sample is required for each type of fill material encountered. All soil samples collected from the borings will be grab samples. Proposed soil samples to be collected are summarized in **Appendix C** – Quality Assurance/Quality Control Plan. Please note that any surface samples collected will originate from the top 2 inches of surface material below any vegetative or hardscape cover.

The soil samples will be analyzed by a NYSDOH environmental laboratory accreditation program (ELAP) certified laboratory that produces NYSDEC Category B data package deliverables. Data Usability Summary Reports (DUSRs) will be prepared for all samples. All samples will be analyzed for the full Part 375 Brownfields constituent list which includes the following along with the EPA analytical method:

- Target Compound List (TCL) VOCs + TICs (Method-8260).
- TCL SVOCs (Method-8270).
- Target Analyte List (TAL) Metals (including total mercury and hexavalent chromium) (Methods-6010/7470/7471).
  Cyanide Total (Method 9012)
- PCBs (Method-8082).
- TCL Pesticides (Method- 8081).
- 1,4-dioxane (Method-8270SIM).
- Per & Polyfluoroalkyl Substances (PFAS) (Method-1633).

Note: Surface soil samples will not be analyzed for VOCs.

Field equipment will be operated in accordance with standard practices and in a safe and efficient manner as to minimize any hydraulic system leaks or lubricant and fuel leaks (See Appendix A for details).

Additional field activities performed by the geologist/technician include properly labeling, packaging, delivering samples to the laboratory; supervising field operations; and completing boring logs, which can be performed in the office after recording field data in a logbook. The geologist/technician will update the Project Manager daily on progress in the field and results of the subsurface investigation. Major changes in the subsurface investigations will not occur unless approved by the Project Manager, who will also notify the Client and NYSDEC regarding project developments. A detailed description of the sampling methods is provided in **Appendix D** – Field Sampling Plan (FSP). A table which includes the analytical results compared to applicable SCOs and protection of groundwater will be provided in the RI report.

5.3 GROUNDWATER

During the Phase II investigation groundwater was identified approximately 10 feet below ground surface. To meet the BCP requirements to assess groundwater, a total of four (4) overburden groundwater monitoring wells will be installed using a conventional truck mounted drill rig with hollow stem auger drilling techniques. One well boring will be advanced at the southwest corner, one will be advanced at the southeast corner adjacent to the former UST area which was located just outside the BCP boundary in the right of way, and one at the north end of the site adjacent to the historic spill/UST on the north adjacent parcel. (Refer to **Figure 5** for locations) Note that well locations may be revised in the field to accommodate logistics and previous PID detections). In addition, as noted in Section 5.2.2, four samples will be collected for laboratory analysis during installation of the wells.

5.3.1 Well Construction

Each well will be installed to an approximate depth of 16 feet and will consist of a 2-inch inside diameter, schedule 40 PVC casing equipped with a well screen that is Schedule 40 pipe with 0.010 slot size and 10 feet in length. Place sand in the space between the borehole and the PVC screen and riser to the required depth then place bentonite and cement above the sand- pack. Place the sand in very slowly so it does not bridge in the well bore. Section 3.1 of **Appendix D** provides a step-by-step method of installing a groundwater well once a boring or augured hole has been drilled to a desired depth within the subsurface.

Wells will either be completed at the ground surface and covered with a curb box in current or future high traffic areas or be completed as a stick up, where the top of the well riser pipe extends approximately three feet above grade and be fitted with a lockable J-plug and protected by a vented, 4-inch diameter protective steel casing. The steel casing will be installed to a depth of approximately 2 feet bgs and anchored in a 2-foot by 2-foot concrete surface pad. Each steel protective casing will be fitted with a locking cap, keyed alike (for all three wells) lock, and labeled with permanent markings for identification. The concrete surface pad will be constructed around the protective steel casing to allow surface water to drain away from the well.

In accordance with DER-10 Section 3.3(e) ii (2), cuttings and spoil from boreholes used for the installation of a monitoring well cannot be reused on-site and require disposal. Therefore, all cuttings and spoil will be placed in sealed NYSDOT-approved drums and labeled for subsequent characterization and disposal. Disposal will be done in accordance with all RCRA standards.

A survey will be completed of the wells following installation to record the location and elevation of the well casing.

All fieldwork will adhere to the Health and Safety Plan provided in **Appendix A**.

5.3.2 Well Development

After installation of monitoring wells, but not within 24 hours, new wells will be developed in accordance with **Appendix D** – Section 3.2 and NYSDEC protocols. Initially, development water will be containerized in NYSDOT-approved drums and labeled per monitoring well location. If light non-aqueous phase liquid (LNAPL), dense nonaqueous phase liquid (DNAPL), odors, or sheen are encountered during well development, water will be properly characterized and disposed accordingly. Based on the RI groundwater analytical results, it will be determined, in consultation with NYSDEC, if the containerized development water is acceptable for surface discharge in the vicinity of the monitoring well being developed or requires subsequent on-site treatment and/or off-site disposal.

5.3.3 Groundwater Sampling

Sampling will commence as soon as adequate well recharge has occurred. It is recommended that purging and sampling occur at least 24 hours after development to allow for adequate recharge. Prior to sample collection, static water levels will be measured and recorded from all on-site monitoring wells to facilitate the preparation of an isopotential map. Following water level measurement, field personnel will purge and sample monitoring wells using a submersible pump or low-flow surface pump depending on well depth with dedicated pump tubing following low-flow/minimal drawdown purge and sample collection procedures provided in Sections 3.3 – Well Purging and 3.4 – Well Sampling of **Appendix D**. In the event of pump failure or the saturated unit does not permit the proper implementation of low-flow sampling, a dedicated polyethylene bailer will be used to purge and sample the well. Field measurements for pH, temperature, turbidity, DO, ORP, specific conductance and water level, as well as PID, visual and olfactory field observations will be periodically recorded and monitored for stabilization and health and safety purposes. Low-flow purging will be considered complete when the field measurements stabilize, and turbidity falls below 50 Nephelometric Turbidity Units (NTU) or becomes stable above 50 NTU regardless of volume purged. A second sampling event will be conducted approximately 3-6 months after this first sampling event to fully delineate the extent of contamination in groundwater.

Collected groundwater samples will be transported under chain-of-custody to a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory for the analyses indicated in Section 5.3.4.

5.3.4 Groundwater Sample Analyses

One groundwater sample will be collected from each of the four monitoring wells. Well development and sampling will be in accordance with **Appendix D** - FSP. Groundwater samples will be analyzed for the following Part 375 brownfield constituents:

- Target Compound List (TCL) VOCs + TICs (Method-8260).
- TCL SVOCs (Method-8270).
- Target Analyte List (TAL) Metals (including total mercury and hexavalent chromium) (Methods-6010/7470/7471).
  Cyanide Total (Method 9010)
- PCBs (Method-8082).
- TCL Pesticides (Method- 8081).
- 1,4-dioxane (Method-8270SIM).
- Per & Polyfluoroalkyl Substances (PFAS) (Method-1633).

Sample analysis will be in accordance with ASP, Cat B requirements. DUSRs will be completed for all samples. QA/QC requirements for all sample analysis are provided in **Appendix C** Quality Assurance/Quality Control Plan. Table 1 in Appendix C summarizes the number of Groundwater samples to be collected.

All detected sample concentrations will be included in a table and compared to NYSDEC Groundwater Standards (TOGS) as well as applicable standards, criteria, and guidance materials (e.g., Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances [PFAS]).

Table 5.3.4 Summary of Proposed Groundwater Monitoring Wells

Location	Estimated Depth (ft bgs)	Screen interval (ft bgs)	Target Analysis
RI MW-1	16	10-16	TCL VOCs + TICs, TCL SVOCs + TICs, TAL Metals, PCBs, TCL Pesticides, 1,4dioxane, PFAS (PFOA/PFOS)
RI MW-2	16	10-16	
RI MW-3	16	10-16	
RI MW-4	16	10-16	

5.3.5 Groundwater Flow/Hydraulic Assessment

A hydraulic assessment of the Site will be performed. Static depth to groundwater measurements will be obtained from the newly installed RI monitoring wells. Groundwater elevation data will be calculated and used to develop an isopotential map that will indicate the general direction of groundwater flow. Groundwater elevations will be relative to an arbitrary site-specific vertical datum and benchmark (e.g., fire hydrant)/survey). A well construction summary table will be prepared and include top of riser and grade elevations as well as construction depths (elevations) and materials.

In-Situ Hydraulic Conductivity Testing will be determined using the variable-head test method ("rising head") (Bouwer and Rice Method, 1976). Hydraulic assessment includes the completion of hydraulic conductivity tests and the measurement of water levels in monitoring wells. Variable head tests will be completed using a stainless steel or PVC slug to displace water within the well or by removing water from the well with a bailer or pump. The recovery of the initial water level is then measured with respect to time. Data obtained using this test will be evaluated using procedures presented in "The Bouwer and Rice Slug Test - An Update," Bouwer, H., Groundwater Journal, Vol. 27, No. 3, May-June 1989, or similar method.

5.4 SOIL VAPOR INVESTIGATION

Historical records identified a gasoline UST immediately adjacent to the east end of the Site in the Washington Street right-of-way and there is the possibility that product piping and fuel dispenser may have been located on-site. North of the Site to the west end was historically utilized as a gasoline filling station. Remedial work, including a UST removal, was completed in 2001, subsurface gasoline impact may remain in-place on the north adjacent property. Because of these historic operations a vapor intrusion investigation will be undertaken to assess possible impacts to the Site.

Soil vapor probes will be installed directly using a Geoprobe or in converted RI soil borings upon completion of boring and soil sampling.

Vapor samples will be collected from the following seven (7) soil vapor probe locations which are also shown on **Figure 5**:

RI VP-1 installed in soil boring RI BH-1.
RI VP-2 installed in soil boring RI BH-2 near the Phase 2 groundwater sample with VOC detections.
RI VP-3 installed along the north property boundary directly south of the historic off-site UST.
RI VP-4 installed in soil boring RI BH-11.
RI VP-5 installed along the east property boundary directly west of the historic off-site UST.
RI VP-6 installed in soil boring RI BH-9.
RI VP-7 installed in soil boring RI BH-8.

Probe holes will be 2 inches in diameter and installed with a Geoprobe to between 8 and 10 feet bgs or, a minimum of one foot above the groundwater table. A ¼ inch PVC tube with a 3/8-inch stainless steel screen will be installed at the bottom of each probe hole. Vapor Point Installation diagrams will be developed. Porous sand will be backfilled around the screen to a two-foot depth (or less depending on total depth of the borehole) of each hole. Soil vapor probes will be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 feet to prevent outdoor air infiltration and the remainder of the borehole backfilled with clean material in accordance with Final NYSDOH SVI 2006. Installation/sampling procedures will be in accordance with Section 2.7.1 of the October 2006, New York State Department of Health Guidance for Evaluating Soil Vapor Intrusion in the State of New York and its amendments. Six (6) liter Summa canisters will be used to collect all samples by attaching a pre-calibrated/certified 24-hour flow controller to the summa canisters. Flow rates will not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling. A tracer gas will be used prior to collecting soil vapor samples to verify that an adequate seal has been achieved. NYSDEC Category B analytical data package deliverables will be provided. Vapor samples to be collected are summarized in Table 1 of **Appendix C** along with QA/QC requirements. Data Usability Summary Reports (DUSRs) will be completed for all samples. Soil vapor probes will be temporary.

All soil vapor/air samples will be analyzed for TCL VOCs by EPA Method TO-15.

Table 5.4 Summary of Proposed Vapor Probes

Location	Estimated Depth (ft bgs)	Screen Interval (ft bgs)	Target Analysis
RI BH-1/ RI VP-1	10	8-10 or 1 above water level	TO-15
RI-BH2/ RI VP-2	10	8-10 or 1 above water level	
RI VP-3	10	8-10 or 1 above water level	
RI BH-11/ RI VP-4	10	8-10 or 1 above water level	
RI VP-5	10	8-10 or 1 above water level	
RI BH-9/ VP-6	10	8-10 or 1 above water level	
RI BH-8/ VP-7	10	8-10 or 1 above water level	

6.0 ADDITIONAL SUPPLEMENTAL FIELD INVESTIGATIONS

All the data generated during the RI will be evaluated to determine if additional investigation activities are needed beyond what is described herein. Additional assessment may include an additional subsurface boring and sample analysis limited to contaminants identified during the RI program.

7.0 INVESTIGATION DERIVED WASTE MANAGEMENT

Investigation-derived waste (IDW) will include soil, groundwater, and miscellaneous solid waste generated on site during the RI. Waste soil will be returned to their respective boring location within 12 inches of the surface and restored. Activities that would require disposal off- site include well installations and groundwater sampling. IDW generated on site that cannot be disposed of on site will be containerized and disposed of at an approved facility typically during the remedial phase of the project following NYCRR Part 360 guidance. IDW will be managed in accordance with NYSDEC DER-10 Section 3.3e.

8.0 QUALITATIVE EXPOSURE ASSESSMENT

Qualitative exposure assessments will be completed in accordance with DER-10 sections 3.3(c) 3 & 4. The assessments will include what impacts site contaminants and field activities may have, if any, on human health and fish and wildlife resources considering all media (ground/surface water, soil, soil vapor, ambient air, and biota). Human health and ecological exposure impacts will be assessed as outlined in DER-10 Appendix 3B - Qualitative Human Health Exposure Assessment and Appendix 3C - Fish and Wildlife Resources Impact Analysis (FWRIA) Decision Key. The Appendix 3C Fish and Wildlife Resources Impact Analysis Decision Key is provided in **Appendix E**. No FWRIA is needed based on the completed decision key process. This determination is based on the following:

- The Site was a commercial property in a mixed-use zone (N1-C);
- The contamination at the site has very low potential to migrate into or impact any on or off-site habitat of endangered, threatened, or special concern species or other fish and wildlife resource; there are no critical habitats onsite, and the closest offsite habitat is more than ¼ mile away with the Niagara River and Lake Erie more than 1 mile away per FEAF and Env. Resource Mapper.

The qualitative human health exposure assessment will evaluate the five elements (DER-10 Appendix 3B) associated with exposure pathways and describe how each of these elements pertains to the Site. The exposure pathway elements that will be addressed include:

- A description of the contaminant source(s) including the location of the contaminant release to the environment (any waste disposal area or point of discharge) or if the original source is unknown, the contaminated environmental medium (soil, indoor or outdoor air, biota, and water) at the point of exposure;
- An explanation of the contaminant release and transport mechanisms to the exposed population;
- Identification of all potential exposure point(s) where actual or potential human contact with a contaminated medium may occur;
- Description(s) of the route(s) of exposure (i.e., ingestion, inhalation, dermal absorption); and,
- A characterization of the receptor populations who may be exposed to contaminants at a point of exposure.

As called for in DER-10 for volunteers in the BCP, sufficient field information and sampling data will be provided to identify the presence of contamination, if any, that maybe leaving the Site to support qualitative off-site exposure assessments by others. As part of the Qualitative Human Health Exposure Assessment in the Remedial Investigation Report, potential sensitive receptor populations such as nearby schools, daycares, nursing homes, and other community facilities will also be identified and evaluated.

9.0 REPORTING

An RI report will be prepared in accordance with the applicable requirements of DER-10 and Part 375. All validated RI data will be submitted to the NYSDEC EQuIS database. Once the approved lab has completed its sample analysis of a lab data sample batch it is inserted by the lab into lab EDD forms (only lab data) and a CAT B is prepared and sent to the independent preparer of DUSRs. Once the DUSRs are received, the final EDD is prepared for the sample batch incorporating the lab data plus the site-specific data called for in the EDD. Any data changes called for in the DUSRs are also incorporated in the final EDD (latest format). The latest NYSDEC EDD Valid values tables are also checked. Select computers and staff have standalone Electronic Data Processors (EDP) inserted from NYSDEC on their computers. The final EDD is inserted in the EDP which confirms if all the data has been correctly inserted and shows where data is incomplete. Corrections are then made until the EDP indicates the EDD data is correct. Once correct the EDP has a process to submit the completed EDD in Zip format to Albany for final check.

A schedule is provided in **Figure 2**. It is anticipated that upon completion of the 30-day public comment period an RI report will be drafted. This report may also include a corresponding AAR that (1) evaluates remedial alternatives based upon the data obtained in the RI, and (2) initiates the 45-day public comment period for the generation of the remedial action work plan (RAWP) and final decision document produced by the NYSDEC.

A Citizen Participation Plan (CPP) has been prepared for the Site in accordance with the requirements outlined in NYSDEC's DER-23 Citizen Participation Handbook for Remedial Programs, issued January 2010, as amended and submitted separately with the RIWP. The CPP provides for issuance of fact sheets and public meetings at various stages in the investigation/remedial process. A fact sheet will be prepared by NYSDEC to announce the availability of the RIWP for review, followed by a 30-day comment period. A public meeting will be held, if requested, during the public comment period.

The major components of the CPP are as follows:

- Names and addresses of the interested public as set forth on the Brownfield site contact list provided with the BCP application;
- Identification of major issues of public concern related to the site and that may be encountered during the remediation project;
- A description of citizens participation activities already performed and to be performed during remediation;
- Identification of document repositories for the project; and,
- A description and schedule of public participation activities that are either required by law or needed to address public concerns related to the Site.

Summaries of the RI investigation will be submitted to the NYSDEC as monthly progress reports as noted in Section XI of the BCA. Fact sheets documenting the goals and progress of the project will be prepared at key milestones during the project and distributed to those on the project mailing list. The distribution list is included in the CPP.

10.0 WORK PLAN CERTIFICATION

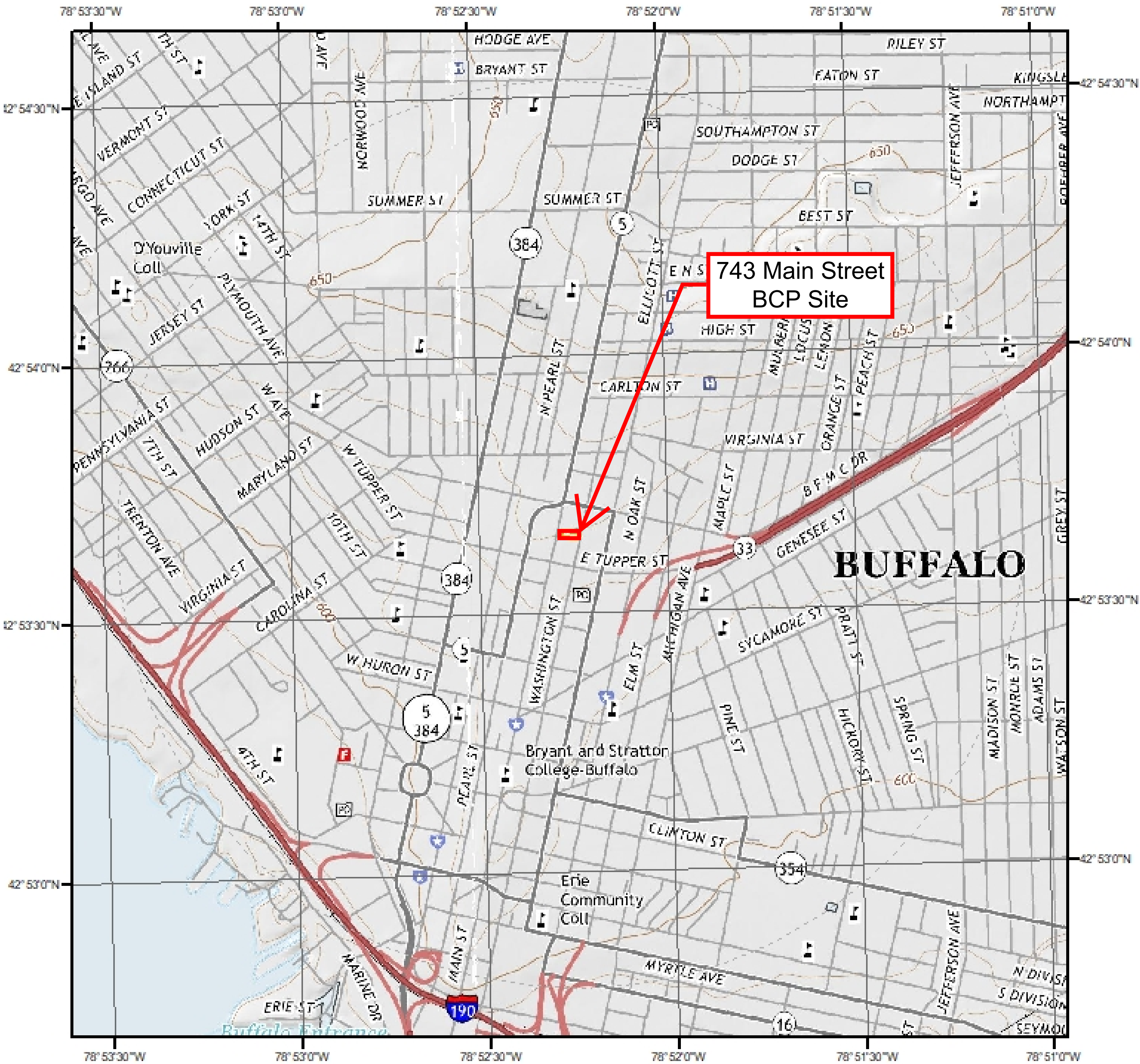
I Jason M. Brydges certify that I am currently a New York State registered professional engineers/Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Jason M. Brydges, P.E.

FIGURES

Figure 1 - Property Location

Topographic Information



Current USGS Topo (2016)

0 0.2 0.4 0.8 Miles

N

Quadrangle(s): Buffalo NE,NY; Buffalo NW,NY

Source: USGS 7.5 Minute Topographic Map

ERIS

FIGURE 2 - PROJECT SCHEDULE - 743 MAIN STREET BCP SITE NO. C915399

743 MAIN STREET, BUFFALO, NY

TASK	2026																												2027																			
	JUNE				JUL				AUG				SEPT				OCT				NOV				DEC				JAN				FEB				MAR				APR				MAY			
	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	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
I. Remedial Investigation																																																
a. Final RIWP Submittal		■																																														
b. DEC/DOH Approval			■																																													
c. RI Field Work					■	■	■	■	■	■	■	■	■																																			
d. Submit RIR															■																																	
II. RWP with AAR Attachment																																																
a. Initial Submittal																			■																													
b. DEC/DOH Review and 45-Day Public Comment Period																				■	■	■	■	■	■	■	■																					
c. Final Submittal																												■																				
d. DD																													■																			
III. Remediation																														■	■	■	■	■	■	■	■	■										
IV. Environmental Easement																																																
a. Initial Submittal																									■	■	■	■	■																			
b. DEC Review																														■	■	■	■	■	■	■	■	■										
c. Final submittal/approval																																							■	■	■							
V. SMP																																																
a. Initial Submittal																													■	■	■	■																
b. DEC Review																																	■	■	■	■	■	■										
c. Final Submittal/Report Approval																																							■	■	■							
VI. Final Engineering Report																																																
a. Initial Submittal																																	■	■	■	■	■	■	■	■	■							
b. DEC Review																																										■	■	■	■			
c. Final Submittal/Report Approval																																														■	■	
VII. COC Receival																																																■

Notes:
BCP - Brownfield Cleanup Program
DEC - Department of Environmental Conservation
DD - Decision Document
DOH - Department of Health
FER - Final Engineering Report
COC - Certificate of Completion
RWP - Remedial Work Plan
RIR - Remedial Investigation Report
RIWP - Remedial Investigation Work Plan
SMP - Site Management Plan

Figure 3 - Site Boundary Survey

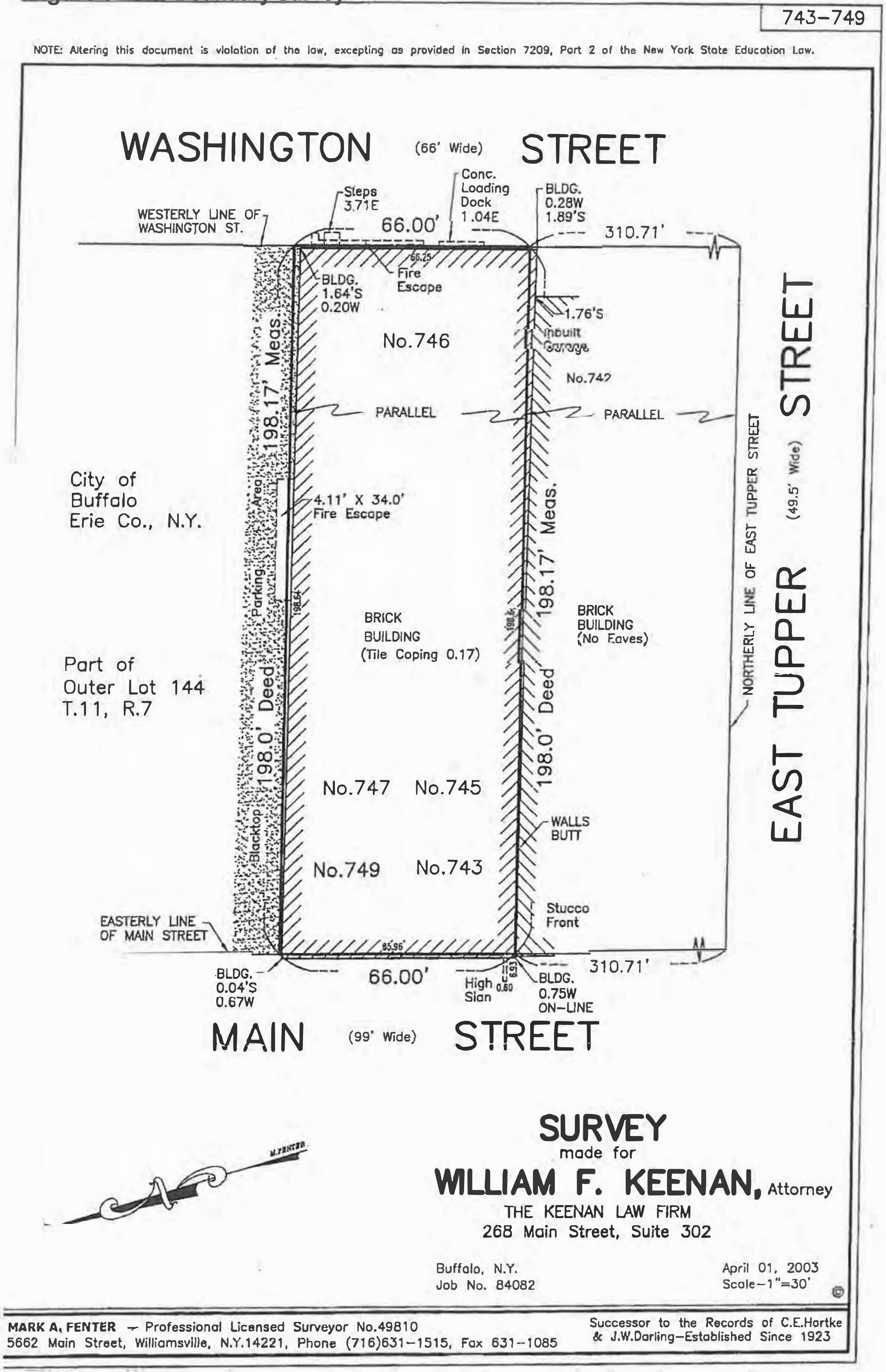


Figure 4 - 743 Main Street - Phase II ESA Boring Locations

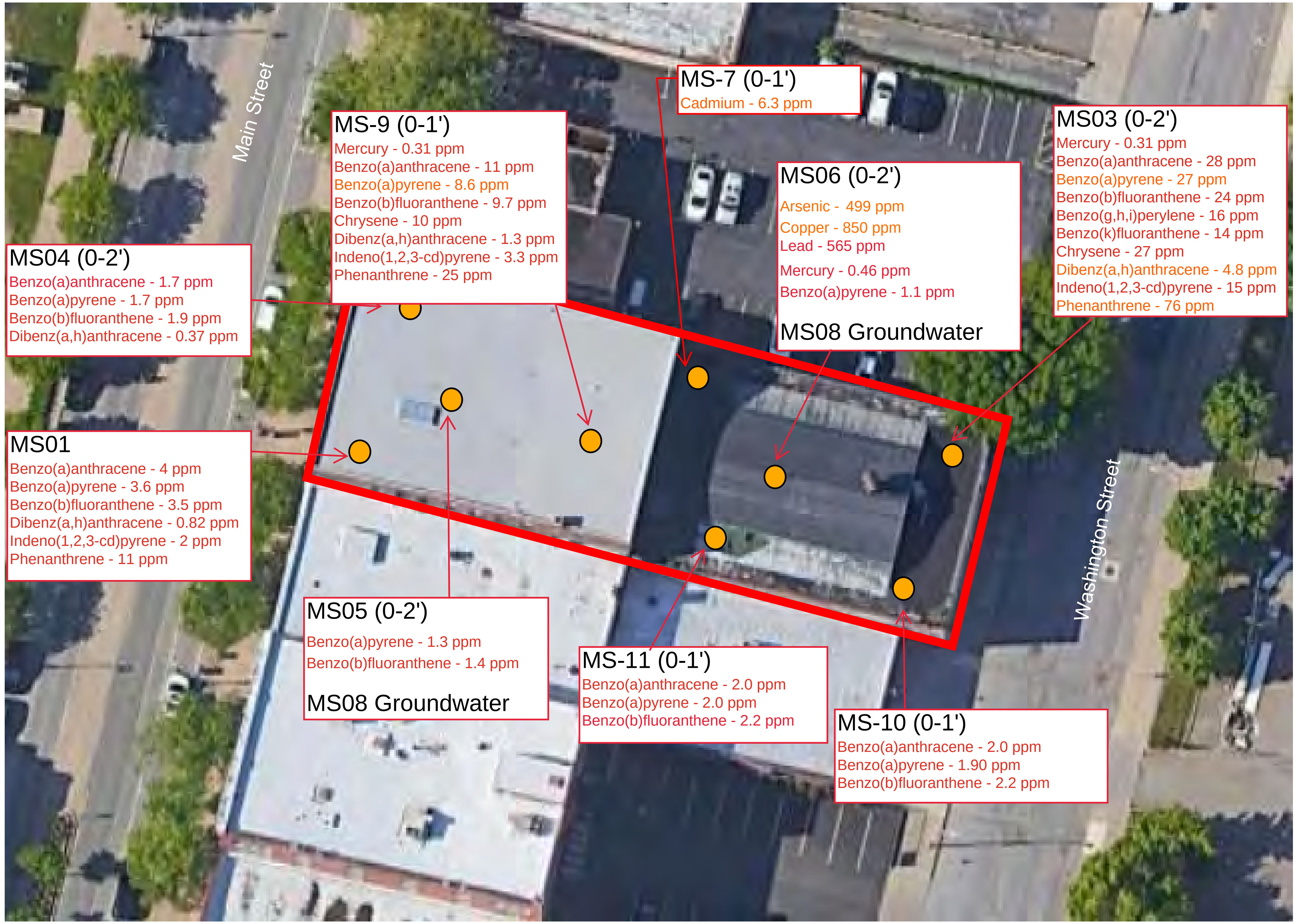
Note: All analytical results listed in this figure are above restricted residential or commercial SCOs.

Soil Boring
Site Boundary

Concentration above NYSDEC Part 375 Restricted Residential SCOs (12/31/2025 updated standard)

Concentration above NYSDEC Part 375 Commercial SCOs (12/31/2025 updated standard)

Part 375 - SCOs (ppm)		
Analyte	RR	Commercial
Arsenic	16	16
Cadmium	2.5	3.7
Copper	280	280
Lead	400	1,000
Mercury	0.3	1.1
Benzo(a)anthracene	1.4	37
Benzo(a)pyrene	1	3.7
Benzo(b)fluoranthene	1.4	37
Benzo(g,h,i)perylene	4.9	47
Benzo(k)fluoranthene	4.9	47
Chrysene	4.9	47
Dibenz(a,h)anthracene	0.33	3.7
Indeno(1,2,3-cd)pyrene	1.4	37
Phenanthrene	4.9	47



Scale - 1:400

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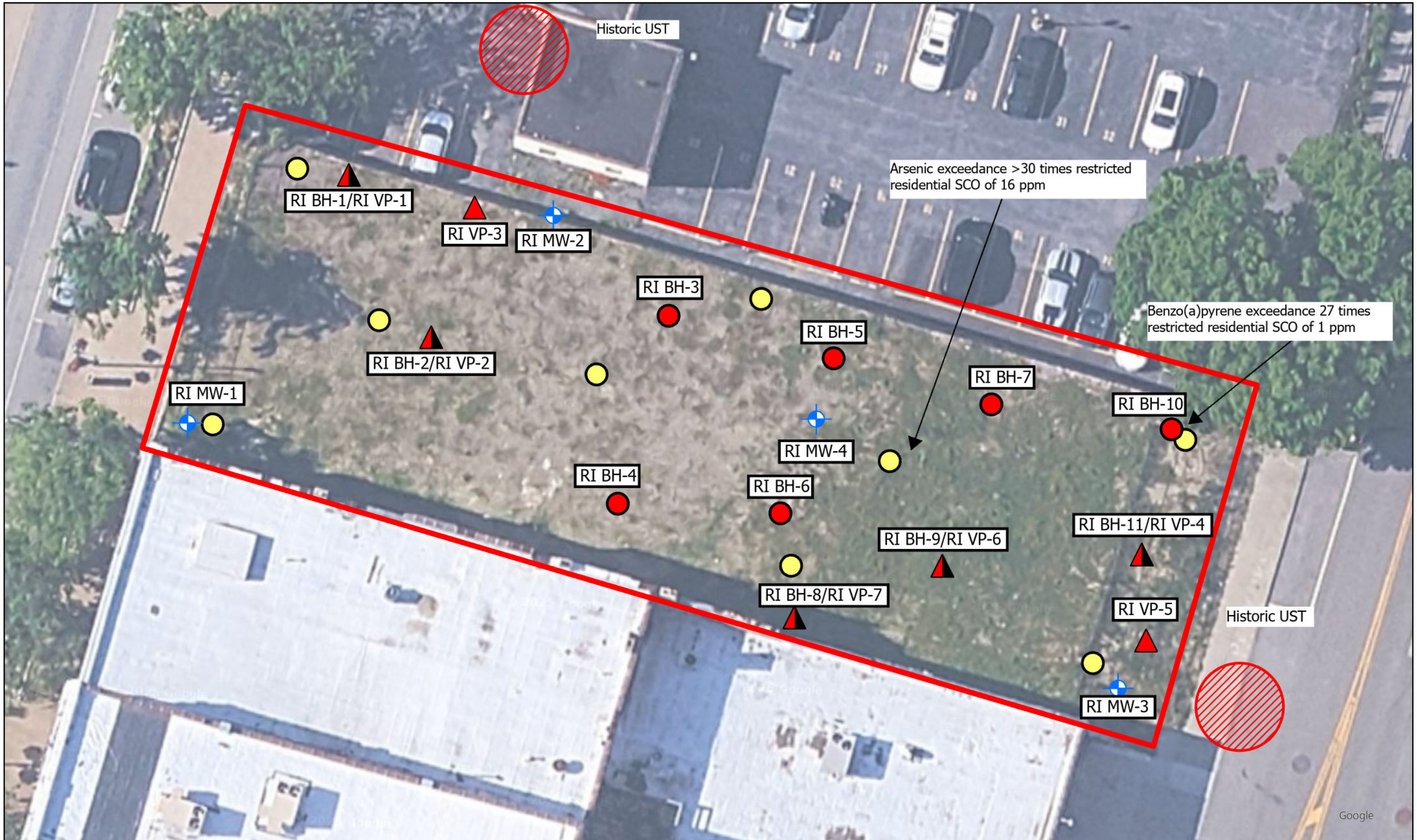
BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC

Figure 4 - 743 Main Street - Phase II ESA Boring Locations	
743 Main Street	3/13/2026
Buffalo, New York	Avalon Development



LEGEND

- Site Boundary
- BE3 Phase II ESA (June 2023)
- Proposed RI Soil Boring Location
- Proposed RI Vapor Point Location
- Proposed RI Soil Boring/Monitoring Well
- Historic UST Location
- Proposed RI Soil Boring/Vapor Point Location

BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC
960 Busti Avenue
Buffalo, NY 14213
716.249.6880
jbrydges@be3corp.com

CLIENT - Avalon Development LLC

Figure 5
Remedial Investigation (RI) Plan

743 Main Street
Buffalo, NY 14203

N

DATE ISSUED:
July 17, 2024

△ August 6, 2025: Added BH-8/VP-7
△
△
△

Scale: 1:300

APPENDICES

APPENDIX A

HEALTH AND SAFETY PLAN
for
SITE INVESTIGATIONS AND REMEDIAL OVERSIGHT

743 Main Street Buffalo
743 Main Street
City of Buffalo, New York
Tax Map ID No.: 111.30-3-5
Property County: Erie
Site No.: C915399

Prepared for:

Avalon Development
701 Seneca Street, Suite 200
Buffalo, NY 14210

Prepared by:

BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC
960 Busti Avenue, Suite B-150
Buffalo, New York 14213

March 2025

Table of Contents

ATTACHMENTS

1.0 INTRODUCTION

The following health and safety procedures apply to Brownfield Cleanup Program (BCP) project personnel, including subcontractors, performing activities described in the Release Investigation Work Plan (RIWP). Please note, however, that contractors performing investigation/remedial work are required to either develop their own Health and Safety Plans (HASPs) 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 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 New York State Department of Environmental Conservation (NYSDEC) Brownfields Department of Environmental Remediation (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 this 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 investigation (RI) activities such as assessment of subsurface conditions related to soil, groundwater and vapor and oversight activities related to remediation. Field work will be conducted that can include soil borings, monitoring well installation, groundwater, vapor sampling and soil sampling, etc.

1.4 PERSONNEL REQUIREMENTS

Key personnel are as follows:

Health and Safety Officer – Jason M Brydges, PE – Masters Level
Engineer and Project Managers – Jason M Brydges, P.E, Jacob Cox, EIT, Paul Staub, EIT
Geologist – John Boyd, PG
Technicians – Alexis Palumbo, Joe Gambino
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 have the authority to stop work if conditions are deemed to be unsafe. Visitors will be required to report to the overall Site Project Manager 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 is currently a vacant lot but once contained a 4-story commercial building that was destroyed by fire and demolished in March of 2023. The Site is located between the Theatre District and the Buffalo/Niagara Corridor and bound by Washington Street to the west, Main Street to the east, a parking lot to the north and a commercial building to the south. The surrounding area is predominantly commercial.

Historical records including street directories and Sanborn Maps suggest that the site was mixed use residential/commercial. Some of these uses include a jeweler, bike shop, dance hall, skating rink, residential, produce market and storage. The history and use of the subject property suggests there were potential environmental impacts associated with fill material as well as adjacent properties historical uses. Potential contaminants include metals, polycyclic aromatic hydrocarbons (PAHs), petroleum and solvents.

2.2 Hazard Evaluation

Specific health and safety concerns to the project tasks include working around low levels of heavy metals, semi-volatile organic compounds (SVOCs), and volatile organic compounds (VOCs) in soil and groundwater. Physical hazards include those associated with working near open excavations and adjacent to field equipment and heavy equipment such as back hoes and drill rigs. 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 and groundwater at concentrations that exceed NYSDEC Part 375 soil cleanup objectives or groundwater standards. 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 photoionization detector (PID) readings greater than 5 ppm above established background levels. If 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 are 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 earmuffs or ear plugs, if work conditions warrant. These conditions would include difficulty hearing while speaking to one another at a normal tone within three feet. If normal speech is interfered with due to work noise, 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 degrees Celsius (°C) (85 degrees Fahrenheit [°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 the air temperature is less than 4°C (40°F) and a worker perspires, the worker should change to dry clothes. The following summary of the signs and symptoms of cold stress is 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 Code of Federal Regulations (CFR), Subpart P, 1926:650 through 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 below ground surface (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 exit/enter 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 the 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 lightning 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 sunscreen 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 an RI.

Table 1. Activity Hazard Analysis

PRINCIPAL STEPS	POTENTIAL SAFETY/HEALTH HAZARDS	RECOMMENDED CONTROLS
RI soil/groundwater investigation	Potential exposure to low levels of metals, PAHs, petroleum products and solvents	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 4. Wear gloves when handling soil and groundwater 5. Actions levels for dust and vapors
EQUIPMENT TO BE USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**
Excavation and other heavy equipment, Backhoe or Geoprobe	1. Daily inspection of equipment 2. Continuous safety oversight	1. Safety plan review 2. Routine safety briefings 3. PID and Dust Monitor

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.

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 soil is 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 mg/m^3 total dust
- 5 mg/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 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 the soil 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:
  - Accessibility to personnel, equipment, and vehicles.
  - Areas of known or suspected contamination.
  - Site access.
  - 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 the 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 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 zone and include an exclusion area and support zone. The 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, BE3 716-830-8636
- Taylor Monnin, NYSDEC PM 716 851-7220
- TBD, NYSDOH 518-402-7860
- Buffalo General Hospital 100 High Street, Buffalo - **(716) 859-5600** See **Attachment 4**.

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 cannot 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 logbook. 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 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 New York State Department of Health (NYSDOH) generic CAMP obtained from NYSDEC DER-10 is presented in the **Appendix B** of the RIWP 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 **Appendix B**. The fugitive dust suppression and particulate monitoring program will be employed at the site during building demolition, IRM 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 Assessmen & 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 N29 CFR 1926.600-60229 CFR 1926.604
Building Demolition	covered by 1926	29 CFR 1926 Subpart T
Site ContaminantAbatement	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 L29 CFR 1926 Subpart M29 CFR 1926.552
Chemical Storage	29 CFR 1910 Subpart H29 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 0
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

BRYDGES ENGINEERING
IN ENVIRONMENT AND ENERGY, DPC

INTRODUCTION

Panamerican employees engage in a variety of activities with potential exposure to excessive ambient temperatures and humidity, with the overall result being Aheat 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 21º C (70º F) while wearing protective equipment (e.g., hazardous waste site investigations) or when the ambient temperature exceeds 29º (85º F) while wearing normal clothing. Because heart 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 site employers under the Ageneral 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 feed back 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) Acore@ or Adeep 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 of 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 - Not withstanding 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 cardiovasculatory 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.

<u>Work Schedules and Activity</u>

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 encourages 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.

<u>Acclimatization of Workers</u>

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 he loss of acclimatization is substantial, several days at work will be needed before heat tolerance is fully restored.

<u>Drinking Sufficient Quantities of Fluids</u>

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 seat they produce of 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 10º to 15º (50 to 59º 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, impending 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 29º C, (85º F) and 2) employees wearing chemical protective clothing (including paper coveralls) working in ambient temperatures exceeding 21º C (70º F). The temperature differential is related to the reduced ability of a person to maintain a core temperature of $\pm$ 37º C (98.6º 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 39ºC (102.2º 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.

<u>Phase 1 - Determination of the Initial Work - Rest Regimen</u>

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:

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

-OR-

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

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
90^0F (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 are-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	25^0C/77^0F
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 30^0 C (86^0F) but above that limit work breaks are needed to recover from the heat; light work at temperatures of between 30.0 and 30.6^{0}C (86 to 87^{0}F) 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 11^{0}C (42.8 to 51.8^{0}F) 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

BRYDGES ENGINEERING
IN ENVIRONMENT AND ENERGY, DPC

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 tat 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 methjod 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 ans 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: plascticity; dry strength; tumb penetration; drying test; and strength tests using a pocket penetrometer or hand-operated shearvane.

<u>Sloping and Benching</u>

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 0ne-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.

<u>Support Systems, Shield Systems, and Other Protective Devices</u>

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.**

<u>Installation and Removal of Support</u>

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.

<u>Shield Systems</u>

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__________________

		Yes	No	N/A
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 71/2 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:____
____
____
____

___________________________ ___________________________________

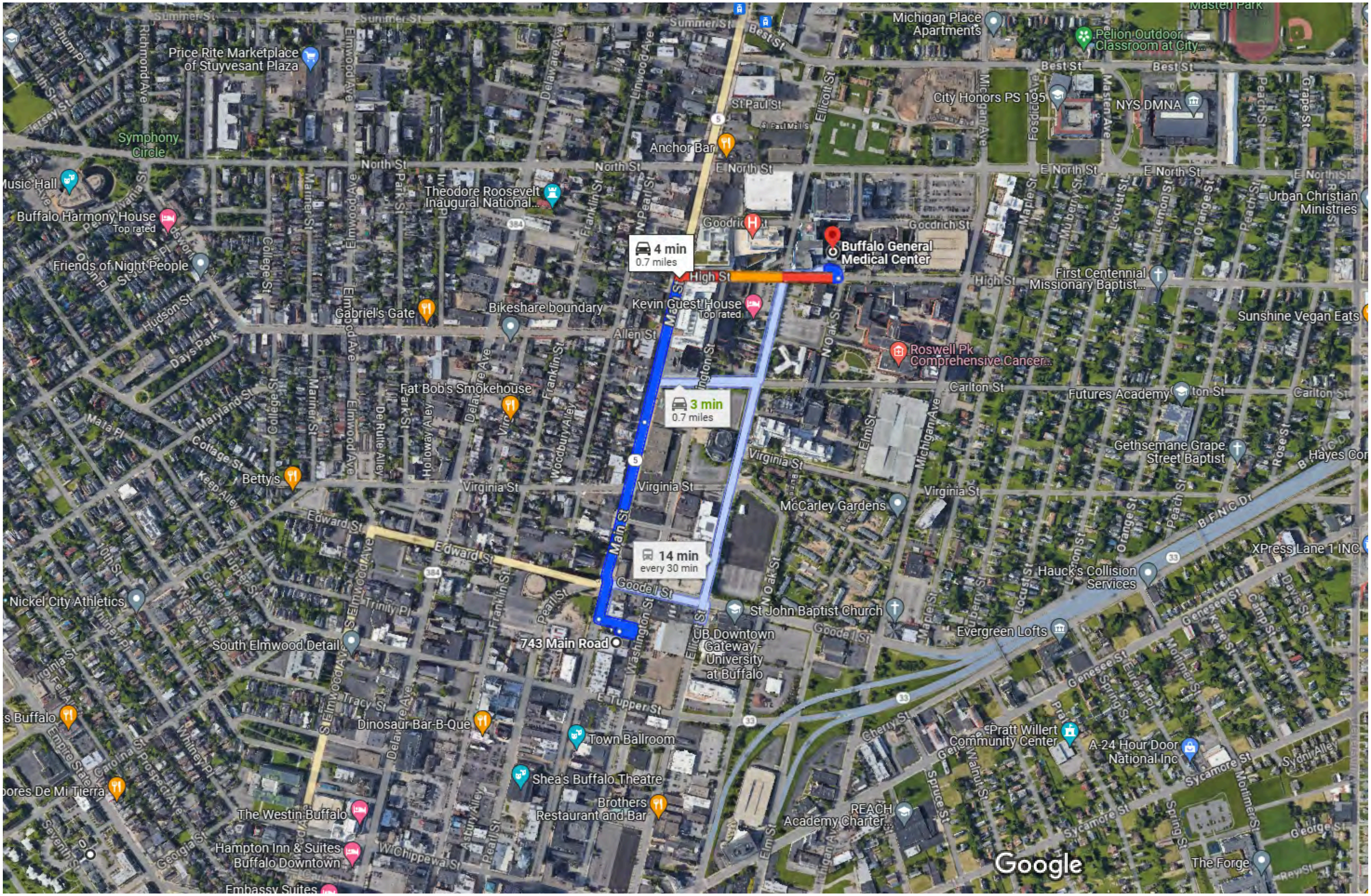
CPs Name (Print) **Signature**

ATTACHMENT 4

MAP TO HOSPITAL

Google Maps 743 Main Rd, Buffalo, NY 14203 to Buffalo General Medical Center

Drive 0.7 mile, 4 min



Imagery ©2024 Google, Imagery ©2024 Airbus, CNES / Airbus, Maxar Technologies, Map data ©2024 Google 500 ft

via Main Rd and High St 4 min
Best route, lighter traffic than usual 0.7 mile

via Main Rd 3 min
0.7 mile

11:21 AM—11:35 AM 14 min
> 8 >

Explore nearby Buffalo General Medical Ctr

Restaurants Hotels Gas stations Parking Lots More

Measure distance
Total distance: 2,245.20 ft (684.34 m)

APPENDIX B

COMMUNITY AIR MONITORING PROGRAM

743 Main Street Buffalo
743 Main Street
City of Buffalo, New York
Tax Map ID No.: 111.30-3-5
Property County: Erie
Site No.: C915399

Prepared for:

Avalon Development
701 Seneca Street, Suite 200
Buffalo, NY 14210

Prepared by:

BRYDGES ENGINEERING IN ENVIRONMENT AND ENERGY, DPC
960 Busti Avenue, Suite B-150
Buffalo, New York 14213

July 2024

Table of Contents

Attachments

1.0 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 1 that will be followed and adhered to for work activities that could release potential contaminants 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 1. The fugitive dust suppression and particulate monitoring program will be employed at the site during building demolition, site investigations/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.

NYSDEC and NYSDOH are to be provided CAMP data on a daily basis when collected. When sample excursions occur, identify the reason for the excursions and measures to address the excursions.

ATTACHMENT 1

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 mcg/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 mcg/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 mcg/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 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/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 :m, 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 ug/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.

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.

APPENDIX C

QUALITY ASSURANCE/QUALITY CONTROL PLAN

743 Main Street Buffalo
743 Main Street
City of Buffalo, New York
Tax Map ID No.: 111.30-3-5
Property County: Erie
Site No.: C915399

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Revised March 2026

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1.0 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Plan provides an overview of QA/QC procedures required for the project. It also provides methods for laboratory testing of environmental samples obtained from the Site, which helps to ensure the quality of the data produced. The organizational structure for this project is presented in the Work Plan, which identifies the names of key project personnel. The project manager is responsible for verifying that QA procedures are followed in the field so that quality, representative samples are collected. The Project Manager is in contact with the analytical laboratory to monitor laboratory activities so that holding times and other QA/QC requirements are met. The anticipated quantity of field samples collected, and corresponding analytical parameters/methods are provided below.

ANALYTICAL SUMMARY TABLE

PARAMETER	EPA METHOD	QUANTITY (GW)A	Soil	Air
Part 375 VOCs + TICs	8260	6	39	
Part 375 SVOCs + TICs	8270	6	42	
Part 375 Metals	6010/7470/7471	6	42	
Part 375 Cyanide	9012		42	
Part 375 Cyanide	9010	6		
Part 375 PCBs	8082	6	42	
Part 375 Pesticides	8081	6	42	
PFAS Contaminants	1633	6	42	
1,4 Dioxane	8270SIM	6	42	
VOCs	TO-15			7

Note, soil totals include 1 sample for a duplicate pre 20 samples. Holding Times: 8260-14 days and 8270, 8081, and 8082-7 days
A = 1 MS, 1MSD and 1 duplicate

All samples analyzed for VOCs and/or SVOCs will report TICs as specified in DER-10 Section 2.1(a)1.i. Sampling for emerging contaminants be conducted in accordance with the NYSDEC Guidance for Sampling and Analysis of PFAS (April 2023). As detailed in the guidance document, PFAS compounds should be analyzed under EPA Method 1633. The analytical laboratory proposed for use for the analysis of samples will be a certified NYSDOH ELAP laboratory. The QA Manager of the laboratory will be responsible for performing project-specific audits and for overseeing the quality control data generated. The field geologist/technician coordinates all personnel involved with field sampling, verifies that all sampling is conducted per the FSP, and communicates regularly with the Project Manager. The ultimate responsibility for maintaining quality throughout the project rests with the Project Manager, including field and laboratory QA/QC.

2.0 DATA QUALITY OBJECTIVES

2.1 BACKGROUND

Data quality objectives (DQOs) are qualitative and quantitative statements, which specify the quality of data required supporting the investigation for the site. DQOs focus on the identification of the end use of the data to be collected. The project DQOs are achieved utilizing the definitive data category as outlined in *Guidance for the Data Quality Objectives Process,* EPA QA/G-4 (September 1994). All sample analyses will provide definitive data, which are generated using rigorous analytical methods such as reference methods approved by the United States Environmental Protection Agency (USEPA). The purpose of this investigation is to determine the nature and extent of contamination at the site.

Within the context of the purpose stated above, the project DQOs for data collected during this investigation are:

- To assess the nature and extent of contamination in soil, groundwater, and soil vapor;
- To maintain the highest possible scientific/professional standards for each procedure;
- To develop sufficient data to assess whether the levels of contaminates identified in the media sampled exceed regulatory guidelines.

2.2 QA OBJECTIVES FOR CHEMICAL DATA MEASUREMENT

Sample analytical methodology for the media sampled and data deliverables are required to adhere to the requirements in NYSDEC Analytical Services Protocol. Laboratories are instructed to complete Sample Preparation and Analysis Summary forms and submit them with the data packages. The laboratory is instructed that matrix interferences must be fixed to the extent practicable. To achieve the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness are measured during analysis.

2.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix and by errors made in field or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate (for organics) and matrix duplicates (for inorganics), which indicate analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision and it must meet the method requirements.

2.2.2 Accuracy

Accuracy measures the analytical bias in a measurement system. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. This data helps to assess the potential concentration contribution from various outside sources. The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the applied analytical methods on samples of the same matrix. The percent recovery criterion is used to estimate accuracy based on recovery in the matrix spike/matrix spike duplicate and matrix spike blank samples. The spike and spike duplicate, which will give an indication of matrix effects that may be affecting target compounds is also a good gauge of method efficiency.

2.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represents the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter, which is most concerned with the proper design of the sampling program or sub-sampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives. The sampling procedures described in the Field Sampling Plan have been selected with the goal of obtaining representative samples for the media of concern.

2.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. A DQO for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units. Complete field documentation will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, comparability), because only when precision and accuracy are known can data sets be compared with confidence. For data sets to be comparable, it is imperative that contract-required methods and procedures be explicitly followed.

2.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is important that appropriate QA procedures be maintained to verify that valid data are obtained to meet project needs. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, then project personnel will determine whether the deviations might cause the data to be rejected.

3.0 SAMPLING LOCATIONS, CUSTODY, AND HOLDING TIMES

Sampling locations are discussed in the Work Plan. Procedures addressing field and laboratory sample chain-of-custody and holding times details are presented in the Field Sampling Plan. The laboratory must meet the method required detection limits which are referenced within the methods.

4.0 CALIBRATION PROCEDURES AND FREQUENCY

To obtain a high level of precision and accuracy during sample processing procedures, laboratory instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

4.1 ANALYTICAL SUPPORT AREAS

Prior to generating quality data, several analytical support areas must be considered; these are detailed in the following paragraphs.

Standard/Reagent Preparation – Primary reference standards and secondary standard solutions shall be obtained from National Institute of Standards and Technology (NIST), or other reliable commercial sources to verify the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished according to the methods referenced. All standards and standard solutions are to be formally documented (i.e., in a logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparers name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well documented procedures.

Balances – The analytical balances shall be calibrated and maintained in accordance with manufacturer specifications. Calibration is conducted with two Class AS" weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and they must be properly documented in permanently bound logbooks.

Refrigerators/Freezers – The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised, and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (2 to 6°C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System – The laboratory must maintain a sufficient water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) to eliminate false positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

4.2 LABORATORY INSTRUMENTS

Calibration of instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet established quantitation limits. Each instrument for organic and inorganic analyses shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to specified methods.

In addition to the requirements stated within the analytical methods, the contract laboratory will be required to analyze an additional low-level standard at or near the detection limits. In general, standards will be used that bracket the expected concentration of the samples. This will require the use of different concentration levels, which are used to demonstrate the instrument's linear range of calibration.

Calibration of an instrument must be performed prior to the analysis of any samples and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still calibrated. If the contract laboratory cannot meet the method required calibration requirements, corrective action shall be taken. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

5.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect sample matrix may have on data being generated. Two types of internal checks are performed and are described as batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the contract laboratory will be according to the specified analytical method and project specific requirements. Acceptable criteria and target ranges for these QC samples are presented within the referenced analytical methods.

QC results which vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples including any project-specific QC that will be analyzed are discussed below.

5.1 BATCH QC

Method Blanks – A method blank is defined as laboratory-distilled or deionized water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples – A matrix spike blank (MSB) sample is an aliquot of water spiked (fortified) with all the elements being analyzed for calculation of precision and accuracy to verify that the analysis that is being performed is within control limits. An MSB will be performed for each matrix and organic parameter only.

5.2 MATRIX-SPECIFIC QC

Matrix Spike Samples – An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD) are subjected to the entire analytical procedure to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix.

Matrix Duplicates – The matrix duplicate (MD) is two representative aliquots of the same sample which are prepared and analyzed identically. The collection of duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. Obtaining duplicate samples from a soil matrix requires homogenization (except for volatile organic compounds) of the sample aliquot prior to filling sample containers, to best achieve representative samples. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of the soil samples, the analytical results are not always reproducible.

Rinsate (Equipment) Blanks – A rinsate blank is a sample of laboratory demonstrated analyte-free water passed through and over the cleaned sampling equipment. A rinsate blank is used to indicate potential contamination from ambient air and from sample instruments used to collect and transfer samples. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The rinsate blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Rinsate blanks for nonaqueous matrices should be performed at a rate of 10 percent of the total number of samples collected throughout the sampling event. Rinse blanks will not be performed on samples (i.e., groundwater) where dedicated disposable equipment is used.

Trip Blanks – Trip blanks are not required for nonaqueous matrices. Trip blanks are required for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte free water. These samples then accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the lab with the same set of bottles they accompanied to the field. Trip blanks will be analyzed for volatile organic parameters. Trip blanks must be included at a rate of one per volatile sample shipment.

6.0 CALCULATION OF DATA QUALITY INDICATORS

6.1 PRECISION

Precision is evaluated using analyses of a field duplicate or a laboratory MS/MSD that indicate analytical precision through the reproducibility of the analytical results. RPD is used to evaluate precision by the following formula:

$$RPD = \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \times 100\%$$

where:

X_1 = Measured value of sample or matrix spike

X_2 = Measured value of duplicate or matrix spike duplicate

Precision will be determined using MS/MSD (for organics) and matrix duplicates (for inorganics) analyses.

6.2 ACCURACY

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed using known and unknown QC samples and spiked samples. It is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to organic fractions (i.e., volatiles, semivolatiles, PCB), and is calculated as follows:

$$Accuracy\ (\%R) = \frac{(X_s - X_u)}{K} \times 100\%$$

where:

X_s - Measured value of the spike sample

X_u - Measured value of the unspiked sample

K - Known amount of spike in the sample

6.3 COMPLETENESS

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$Completeness\ (\%C) = \frac{(X_v - X_n)}{N} \times 100\%$$

where:

X_v - Number of valid measurements

X_n - Number of invalid measurements

N - Number of valid measurements expected to be obtained

7.0 CORRECTIVE ACTIONS

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

7.1 INCOMING SAMPLES

Problems noted during sample receipt shall be documented by the laboratory. The Project Manager shall be contacted immediately for problem resolution. All corrective actions shall be documented thoroughly.

7.2 SAMPLE HOLDING TIMES

If any sample extraction or analyses exceed method holding time requirements, the Project Manager shall be notified immediately for problem resolution. All corrective actions shall be documented thoroughly.

7.3 INSTRUMENT CALIBRATION

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with method requirements. If any initial/continuing calibration standards exceed method QC limits, recalibration must be performed and, if necessary, reanalysis of all samples affected back to the previous acceptable calibration check.

7.4 REPORTING LIMITS

The laboratory must meet the method required detection limits listed in NYSDEC ASP, 10/95 criteria. If difficulties arise in achieving these limits due to a sample matrix, the laboratory must notify BE3 project personnel for problem resolution. To achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures to retain the project required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, the Project Manager will be immediately notified so that appropriate corrective actions can be initiated.

7.5 METHOD QC

All QC method-specified QC samples shall meet the method requirements referenced in the analytical methods. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed or re-extracted/redigested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed or re-extracted/redigested, then reanalyzed at no cost. The Project Manager shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

7.6 CALCULATION ERRORS

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review calculation or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

8.0 DATA REDUCTION, VALIDATION, AND USABILITY

8.1 DATA REDUCTION

Laboratory analytical data are first generated in raw form at the instrument. These data may be either in a graphic or printed tabular format. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or USEPA sources. Individuals experienced with an analysis and knowledgeable of requirements will perform data reduction.

8.2 DATA VALIDATION

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use. All analytical results from soil and groundwater samples will have ASP Category B deliverables and DUSRs. The data validation will be in accordance with DER-10 Section 2.2 with ASP - Category B data deliverables provided by the laboratory and a DUSR provided for validation. Where possible, discrepancies will be resolved by the project manager.

- Technical holding times will be in accordance with NYSDEC ASP, 7/2005 edition.
- Organic calibration and QC criteria will be in accordance with NYSDEC ASP, 7/2005 edition. Data will be qualified if it does not meet NYSDEC ASP, 7/2005 criteria.

Note that analytical results from the PCB Survey will also complete DUSRs and be submitted to EQuIS, in accordance with the Quality Assurance/Quality Control Plan (QA/QC Plan).

9.0 REFERENCES

-Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy, Revision I, October 1989.

-National Enforcement Investigations Center of USEPA Office of Enforcement. *NEIC Policies and Procedures.* Washington: USEPA.

-New York State Department of Environmental Conservation (NYSDEC) 2005. *Analytical Services Protocol*, (ASP) 7/2005 Edition. Albany: NYSDEC.

-NYSDEC "DER-10 Technical Guidance for Site Investigation and Remediation (DER-10)," dated May 3, 2010, Appendix 2B.

-NYSDEC Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substances (PFAS), Under NYSDEC's Part 375 Remedial Programs, April 2023.

APPENDIX D

FIELD SAMPLING PLAN

743 Main Street Buffalo
743 Main Street
City of Buffalo, New York
Tax Map ID No.: 111.30-3-5
Property County: Erie
Site No.: C915399

Prepared for:

Avalon Development
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Revised May 2026

Table of Contents

1.0 INTRODUCTION

This Field Sampling Plan (FSP) provides procedures for the field activities designed in the Work Plan where soil, groundwater, and vapor sampling are required at the Site. The field procedures presented in this manual should be followed by all field personnel, as adherence can help to ensure the quality and usability of the data collected. The FSP should be used collectively with and comply with the following documents:

- The HASP.
- The QA/QC Plan.
- The RI Work Plan.

PFAS sampling and analysis should be done in accordance with the 'NYSDEC Guidance for Sampling and Analysis of PFAS (April 2023)". This document is to be used with both soil and groundwater samples.

All field equipment requiring calibration will be calibrated per, and at the frequency, recommended by the equipment manufacturer.

2.0 SOIL SAMPLING

Soil samples are obtained as outlined in the Work Plan, considering the following general protocol:

1. Inspect newly created boring core stratigraphy once obtained in/from the subsurface.
2. Quickly place the calibrated PID into the exposed soil and record the instrument readings in the logbook.
3. Sample soil, and record depth and any physical characteristics (e.g., contamination, odor, discoloration, debris, etc.) in the logbook.
4. ASTM 2488 and/orD5434 will be followed in preparing geological logs
5. Samples should be collected at locations and frequency per the Work Plan and QA/QC Plan.
6. Decontaminate sampling implements after use and between sample locations. In most cases, dedicated sampling equipment is utilized thereby eliminating equipment decontamination. If dedicated equipment is not used, a 50/50 deionized water/liquid alconox solution will be used to decontaminate PID, sampling tools, set up table, etc. between borings. At a minimum soil boring augers will be dry brushed at each boring location. For well installations a decontamination pad will be established (ballasted polyethylene at a minimum) and augers wet and dry brushed on the pad after each use with everything on the pad containerized in drums at the end of the fieldwork for regulated disposal.
7. Label each sample container with the appropriate sample identification and place samples in a cooler (cooled to 4 degrees C.) for shipment to the laboratory.
8. Initiate chain-of-custody procedures.

In general, sample contacting equipment should be washed with a detergent solution followed by a series of control water and deionized water rinses. Non-sample contacting equipment should be washed with water or without a detergent solution depending on the type and degree of contaminants and rinsed with control water. Although such techniques may be difficult to perform in the field, they may be necessary to most accurately evaluate low concentrations of the chemical con stituent(s) of interest. Additional enhancements to the decon tamination process include the use of hot water or steam for cleaning

2.2 GEOPROBE PROCEDURES

Geoprobe direct push sampling is a standard method of soil sampling to obtain representative samples from the subsurface. Field preparation, sample collection, and data logging activities for Geoprobe sampling are identical to that of test pitting/trenching listed above. The following procedures detail activities, as directed by the field technician, for the execution of Macro Core drilling operations:

1. Startup drill rig and raise mast.
2. Use star bit with rig in rotary setting to penetrate pavement (if applicable).
3. Excavate a hole large enough to set a road box before you advance the borehole (if applicable).
4. Unthread the shoe from the bottom of the sample tube and inset a sample liner and rethread the shoe on the bottom of the sample tube.
5. Thread the drive cap on the top of the sample tube.
6. Align the sample tube so it is plumb in both directions to ensure a straight borehole is drilled.
7. Drive the top of the sample tube into ground surface to a depth of 4-feet for the first 4-foot sample.
8. Unthread the drive cap from the top of the sample tube and thread the pull cap in its place.
9. Pull the sample tube from the ground using caution to not pinch your hand between the drill rods, pull cap, or rig.
10. Unthread the cutting shoe and pull the sample liner from the bottom of the sample tube. Use pliers to reach in the sample tube and grab the liner, if needed.
11. Cut the sample liner lengthwise in two places and present the sample on a table or plastic sheeting (or similar) to ensure all sample material is contained. Quickly screen the soil for volatile organic vapors using a PID. Describe the soil and collect any necessary samples into appropriate containers and label the containers.
12. Insert a new liner and thread on the cutting shoe and repeat steps from #4 to #11 with the addition of a 4-foot-long drill rod onto the top of the sample tube to advance a second 4-foot interval.
13. Proceed with this procedure until the desired depth or refusal is reached.
14. Upon completion of probing, decontaminate all equipment in contact with the soil/fill in a decontamination area using Alcon ox and water.
15. Backfill borings with indigenous soil in the order in which the material was removed with the topsoil/sand/cover soil placed last to cover the hole. Soil samples that exhibit detectable vapors or exhibit grossly other contaminated characteristics shall not be placed back into the borehole but shall be containerized for proper disposal.

Reference: American Society for Testing Material (ASTM), 1992, ASTM D1586-84, Standard Method for Penetration Test and Split Barrel Sampling of Soils.

2.3 HOLLOW-STEM AUGER DRILLING AND SAMPLING PROCEDURES

Drilling with Hollow Stem Augers (HSAs) is a standard method for collecting undisturbed soil samples at depths that can exceed 100 feet below ground surface (bgs). This drilling and sampling method uses auger flights with a hollow center that can be used for sample collection during the drilling program. For environmental soil investigations, augers are typically 5-feet in length with a 4 1/4-inch hollow center section.

While drilling with HSAs, a plug is placed at the base of the auger string to prevent soil from entering the augers. When the sampling depth is reached, the center plug is removed and replaced with a 2-foot-long split-spoon soil sampler. A 140-pound hammer, mounted on the drill rig, is then used to drive the soil sampler and connect drill rods 2 feet into the undisturbed soil at the base of the augers. Removal of the soil sampler from the augers allows description and sampling of the collected soil. To sample the next lower 2-foot soil sample, the center plug is again placed at the base of the auger string and drilling and then sampling is continued. Continuous soil samples can be collected using HSAs to any drillable depths.

Field procedures.

1. HSAs, drill rods and the drilling rig will be thoroughly decontaminated prior to initial borehole installation, and between each borehole, at the centralized decontamination area. All decontamination liquids and solids will be collected and placed in DOT approved 55-gallon drums.
2. The drill rig will be inspected for oil leaks and any other leaks prior to starting drilling operations.
3. Lower the center plug to the bottom of the augers. Advance the boring by rotating and advancing the HSAs to the desired depth. The boring will be advanced incrementally to permit continuous or intermittent subsurface soil sampling, as required.
4. Remove the center plug from the HSAs and lower the 2-foot-long split-spoon sampler to the base of the augers. Use the rigs 140 hammer to drive the split-spoon sampler 2-feet into the undisturbed soil. Record the number of hammer blows (blow counts) for each 6-inches of sampler penetration.
5. Remove the split-spoon sampler from the borehole, open the split-spoon and quickly scan the soil for VOCs with a PID or FID. Describe the soil, collect the project required samples, place them in the proper containers, label the containers and place on ice.
6. Continue the above drilling and sampling steps until the final desired depth is reached.
7. If a monitoring well will not be constructed in the borehole, backfill the borehole with either uncontaminated soil cuttings or grout, as specified by the project work plan.

Reference: American Society for Testing Material (ASTM), ASTM D5784, Standard Guide for Use of Hollow-Stem Augers for Geoenvironmental Exploration and the Installation of Subsurface Water Quality Monitoring Devices

3.0 GROUNDWATER SAMPLING

3.1 WELL INSTALLATION PROCEDURES

Monitoring wells will be installed per Section 2.4.1 "Well Installation" of the "EPA Design and Installation of Monitoring Wells Guidance" for the method of installing a groundwater well once a boring or augured hole has been drilled to a desired depth within the subsurface.

In accordance with DER-10 Section 3.3(e) ii (2), cuttings and spoil from boreholes used for the installation of a monitoring well cannot be reused on-site and require disposal. Therefore, all cuttings and spoil will be placed in sealed NYSDOT-approved drums and labeled for subsequent characterization and disposal. Disposal will be done in accordance with all RCRA standards.

Well construction log/diagrams will also be provided in accordance with DER-10 Section 3.7.2 (C)7.

3.2 WELL DEVELOPMENT PROCEDURES

At least 24 hours after completion of drilling and installation, well development is completed through pumping or bailing until the discharged water is relatively sediment free and the indicator parameters (e.g., pH, temperature, specific conductivity, etc.) have reached steady state. Development removes sediment and can improve the hydraulic properties of the sand pack. The effectiveness of this process is monitored to minimize the volume of discharged waters to obtain sediment-free samples. Well development water will be containerized upon generation and will not be discharged or disposed of without prior department approval.

Monitoring wells will be developed per Section 2.7 “Well Development” of the “EPA Design and Installation of Monitoring Wells Guidance”.

3.3 WELL PURGING PROCEDURES

To collect representative samples, groundwater wells must be adequately purged prior to sampling. Low-flow purging will be considered complete when the field measurements stabilize, and turbidity falls below 50 Nephelometric Turbidity Units (NTU) or becomes stable above 50 NTU regardless of volume purged. In addition to the turbidity level, water quality parameters (pH, temperature, specific conductivity and turbidity) should have stabilized prior to sampling. Sampling should commence as soon as adequate recharge has occurred. It is recommended that purging and sampling occur at least 7 days after development. Well development water will be containerized upon generation and will not be discharged or disposed of without prior department approval.

1. Remove well cover ensuring no foreign material enters the well.
2. Monitor the interior of the riser pipe for organic vapors using a PID. If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before pumping is started.
3. Measure the water level below top of casing using an electronic water level indicator.
4. Determine the volume of water within the well by knowing the total depth of the well.
5. Wash the end of the probe with soap and rinse with deionized water between wells.
6. Calibrate field instruments for measuring water quality parameters (e.g., pH, specific conductance, turbidity, etc.)
7. In all wells, a peristaltic pump will be used to purge the required water volume (i.e., until stabilization of pH, temperature specific conductivity and turbidity). If depths to water exceed about 25 feet below ground, bailers and/or submersible pumps may be used.
8. Utilize dedicated, new polyethylene bailers and tubing for sampling. If sampling for emerging contaminants such as PFAS, HDPE bailers and tubing must be used.
9. Purge until the required volume is removed. If the well purges to dryness and recharges within 15 minutes, purging can continue as it recharges. If the well purges to dryness

and the recharge is greater than 15 minutes, purging is terminated, and sampling can occur as soon as the well recharges.
10. Calculate the well volumes and record measurements for pH, temperature, turbidity, and conductivity during the purging along with physical observations.

3.4 Well Sampling Procedures

1. Perform well sampling within 24 hours of purging if well has recovered sufficiently to sample. If sufficient volume for analytical testing cannot be obtained from a well or if recharge exceeds 24 hours, then DEC should be consulted on analytical priorities and validity of the sample. If low flow sampling procedures are followed they will follow EPA low stress (Low Flow) procedures.
2. Collect samples using appropriate containers.
3. Label sample bottles using a waterproof permanent marker per procedures outlined below.
4. Use verifiably clean sample bottles (containing required preservatives) and place samples on ice in coolers for transport to the analytical laboratory, who will certify bottles are analyte-free.
5. Initiate chain-of-custody.
6. Record well sampling data field notebook and on the Well Development/Purging Log.

4.0 SAMPLE DOCUMENTATION

Each soil and groundwater sample are logged in a bound field notebook by the technician or geologist. Field notes should include, but are not limited to the following:

- descriptions of subsurface material encountered during sampling,
- sample numbers and types of samples recovered, and
- date and time of sampling event.

The technician or geologist also completes a daily drilling or sampling record and chains-of-custody for all samples collected that are being transported to the laboratory. Once the sampling program is complete, the geologist or technician transfers field notes/logs onto standard forms (e.g., boring logs, sampling logs, daily reports, etc.) to be included with the formal investigation report.

5.0 SAMPLING CONTAINER SELECTION

The selection of sample containers is based on the media being sampled and the required analysis. Container selection should be completed in advance of mobilizing into the field with close communications with the laboratory.

6.0 SAMPLE LABELING

The following procedure helps to prevent misidentification of samples and to clarify the location and purpose of environmental samples collected during the investigation:

1. Fix a non-removable (when wet) label to each container.
2. Wrap each sample bottle with 2-inch cellophane tape.

3. Write the following information with permanent marker on each label:
    A. Site name
    B. Sample identification
    C. Project number
    D. Date/time
    E. Sampler's initials
    F. Sample preservation
    G. Analysis required

Each sample is assigned a unique identification alpha-numeric code, such as RR-ss1 or WS-TP1 (2-3'), where the abbreviations represent RR – River Road (site), surface sample 1 and Waste Site, test pit 1, obtained at 2-3' bgs. Other common abbreviations include the following:

- BH = Geoprobe Borehole
- SW = Surface Water
- SED = Sediment
- SB = Soil Boring
- MSB = Matrix Spike Blank
- NSS = Near Surface Soil (1' - 2' depth)
- EB = Equipment Rinse Blank
- HW = Hydrant Water (Decon/Drilling Water)
- GW = Groundwater
- TB = Trip Blank
- RB = Rinse Blank
- MS/MSD =Matrix Spike/Matrix Spike Duplicate

7.0 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 (1) presenting analytical results in a legal or regulatory forum (e.g., evidence in litigation or administrative hearings), (2) minimizing loss or misidentification of samples, and (3) ensuring 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:

1) Complete chain-of-custody record with all relevant information.
2) Send original chain with the samples in a sealed, waterproof bag taped inside the sample cooler.
3) Place adequate inert cushioning material (e.g., corrugated plastic, polypropylene foam wrap, etc.) in bottom of cooler.
4) Place bottles in cooler so they do not touch (use cushioning material for dividers).
5) Place VOA vials in sealed/waterproof bags in the center of the cooler.
6) Pack cooler with ice in sealed/waterproof plastic bags.
7) Pack the cooler with cushioning material.
8) Place any additional paperwork in sealed bag with original chain.
9) Tape cooler drain shut.
10) Wrap cooler with packing tape at two locations to secure lid. Do not cover labels.
11) Place lab address on top of cooler.

12) Ship samples via overnight carrier the same day that they are collected.
13) Label cooler with "This side up" on all sides and "Fragile" on at least two sides.
14) Fix custody seals on front right and left of cooler and cover with packaging tape.

APPENDIX E

Appendix 3C Fish and Wildlife Resources Impact Analysis Decision Key		If YES Go to:	If NO Go to:
1.	Is the site or area of concern a discharge or spill event?	13	2
2.	Is the site or area of concern a point source of contamination to the groundwater which will be prevented from discharging to surface water? Soil contamination is not widespread, or if widespread, is confined under buildings and paved areas.	13	3
3.	Is the site and all adjacent property a developed area with buildings, paved surfaces and little or no vegetation?	4	9
4.	Does the site contain habitat of an endangered, threatened or special concern species?	Section 3.10.1	5
5.	Has the contamination gone off-site?	6	14
6.	Is there any discharge or erosion of contamination to surface water or the potential for discharge or erosion of contamination?	7	14
7.	Are the site contaminants PCBs, pesticides or other persistent, bioaccumulable substances?	Section 3.10.1	8
8.	Does contamination exist at concentrations that could exceed ecological impact SCGs or be toxic to aquatic life if discharged to surface water?	Section 3.10.1	14
9.	Does the site or any adjacent or downgradient property contain any of the following resources? i. Any endangered, threatened or special concern species or rare plants or their habitat ii. Any DEC designated significant habitats or rare NYS Ecological Communities iii. Tidal or freshwater wetlands iv. Stream, creek or river v. Pond, lake, lagoon vi. Drainage ditch or channel vii. Other surface water feature viii. Other marine or freshwater habitat ix. Forest x. Grassland or grassy field xi. Parkland or woodland xii. Shrubby area xiii. Urban wildlife habitat xiv. Other terrestrial habitat	11	10
10.	Is the lack of resources due to the contamination?	3.10.1	14
11.	Is the contamination a localized source which has not migrated and will not migrate from the source to impact any on-site or off-site resources?	14	12
12.	Does the site have widespread surface soil contamination that is not confined under and around buildings or paved areas?	Section 3.10.1	12
13.	Does the contamination at the site or area of concern have the potential to migrate to, erode into or otherwise impact any on-site or off-site habitat of endangered, threatened or special concern species or other fish and wildlife resource? (See #9 for list of potential resources. Contact DEC for information regarding endangered species.)	Section 3.10.1	14
14.	No Fish and Wildlife Resources Impact Analysis needed.		

APPENDIX F

TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS

Parameter Tested	743 Main Street - May 2023 - Sample ID, Sample Depth in feet below ground surface (bgs), and Sample Date									NYSDEC Soil Cleanup Objectives (SCOs)	
	MS05	MS01	MS03	MS04	MS06	MS-7	MS-9	MS-10	MS-11	Restricted Residential	Commerical
	0-2'	0-2'	0-2'	0-2'	0-2'	0-1'	0-1'	0-1'	0-1'		
	5/9/2023	5/9/2023	5/9/2023	5/9/2023	5/9/2023	6/28/2023	6/28/2023	6/28/2023	6/28/2023		
METALS											
Arsenic	12.5	9.0	3.8	5.0	499.0	7.6	8.0	7.8	6.8	16	16
Barium	99.2	114	60.0	222	50.8	105	91.5	103	104	400	400
Beryllium	0.81	0.73	0.33	0.58	0.15 J	0.78	0.67	0.58	0.70	72	590
Cadmium	0.43	0.47	0.5	0.38	0.28	6.3	0.4	0.440	0.36	4.3	3.7
Chromium	20.0	22.0	11.0	17.0	90.3	18.8	20.2	18.9	16.9	180	1,500
Copper	34.9	37.8	16.6	28.2	850.0	30.2	31.1	45.3	28.8	270	270
Lead	97.9	113	63.3	89.9	565	82.5	81.3	100	83.0	400	1,000
Manganese	421 B	430 B	569	392 B	439 B	392 B	406 B	389 B	356 B	2,000	10,000
Mercury	0.079	0.067	0.310	0.10	0.46	0.19 B	0.31 B	0.14 B	0.1 B	0.3	1.1
Nickel	25.7	25.3	9.0	17.3	33.3	21.7	22.8	20.4	22.4	310	310
Zinc	108	130	75.3	128	169	977	97.5	108	95.4	10,000	10,000
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)											
Acenaphthene	ND	0.79 J	11	0.46 J	0.19	0.71 J	2.5	0.49	0.330	100	500
Acenaphthylene	ND	0.27 J	2.5 J	ND	0.12 J	0.050 J	0.72 J	0.11 J	0.061 J	100	500
Anthracene	0.47	2.8	22	0.85 J	0.55	0.22	8.1	1.2	1.6	100	500
Benzo(a)anthracene	1.2 J	4.0	28	1.7 J	1.1	0.64	11	2.0	2.0	1.4	37
Benzo(a)pyrene	1.3 J	3.6	27	1.7 J	1.1	0.69	8.6	1.9	2.0	1	3.7
Benzo(b)fluoranthene	1.4 J	3.5	24	1.9	1.1	0.78	9.7	2.2	2.2	1.4	37
Benzo(g,h,i)perylene	0.78 J	2	16	1.2	0.62	0.37	2.8	0.88	0.77	4.9	47
Benzo(k)fluoranthene	0.88 J	1.9 J	14	0.86	0.62	0.29	4	0.84	0.900	4.9	47
Chrysene	1.4 J	3.7	27	1.8	1.1	0.68	10	2	2	4.9	47
Dibenz(a,h)anthracene	ND	0.82 J	4.8	0.37	0.21	0.13 J	1.3	0.29	0.26	0.33	0.56
Dibenzofuran	ND	1.1 J	6.8	0.33	0.18 J	0.052 J	2.2	0.32	0.36	18	180
Fluoranthene	3.0	13	80	4.6	2.6	1.1 F1	25	4.2	4.5	100	500
Fluorene	ND	1.7	11	0.39	0.26	0.085 J	3.8	0.55	0.54	100	500
Indeno(1,2,3-cd)pyrene	0.85 J	2.0	15	1.0	0.62	0.36	3.3	0.89	0.83	1.4	37
Naphthalene	ND	ND	13	ND	0.21	0.034 J	0.77 J	0.47	0.21	100	500
Phenanthrene	1.4 J	11	76	3.3	2.0	0.860 F1	25	4.2	4.3	4.9	37
Pyrene	1.7 J	6	47	2.8	1.8	1.1	16	3.6	3.3	100	500

ND Analyte not detected
- Not Applicable or sample not tested for this analyte
J Estimated Concentration
B Analyte detected in method blank
K Result is reported as Benzo(b)fluoranthene
E Results exceeded calibration range
T Result is Tentatively Identified Compound and an estimated value

Red: Reported concentration greater than or equal to the NYSDEC Restricted Residential SCO
Orange: Reported concentration greater than or equal to the NYSDEC Commercial SCO

TABLE 2
SUMMARY OF GROUNDWATER RESULTS

Sample ID, Groundwater Depth (Top of Casing), and Sample Date			
Parameter Tested	MS07 12-16'	MS08 12-16'	NYSDEC TOGS 1.1.1 GA
	5/9/2023		
Volatile Organic Compounds (VOCs)			
Acetone	10 J	6.2 J	50
Benzene	ND	0.49 J	1
Chloroform	1.4 J	1.4	7
Toluene	ND	0.69 J	5

Notes: All units in microgams per liter (µg/L)

NYSDEC New York State Department of Environmental Conservation

TOGS Technical and Operational Guidance Series

500 Analyte exceeds NYSDEC TOGS guidance value