GROUNDWATER INJECTION WORK PLAN

FOR

MOYER CARRIAGE LOFTS
BCP SITE NO. C734151
1714 NORTH SALINA STREET
SYRACUSE, ONONDAGA COUNTY, NEW YORK

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APPENDICES

ACRONYM LIST

ASP	Analytical Services Protocol
BGS	Below Ground Surface
CAMP	Community Air Monitoring Plan
COC	Contaminants of Concern
CPP	Citizen Participation Plan
DER	Department of Environmental Remediation
DNAPL	Dense Non-aqueous Phase Liquid
DUSR	Data Usability and Summary Report
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
HASP	Health and Safety Plan
HFM	Historic Fill Material
IRM	Interim Remedial Measures
MS/MSD	Matrix Spike / Matrix Spike Duplicate
NYSDEC	NYS Department of Environmental Conservation
NYSDOH	New York State Department of Health
OM&M Plan	Operation, Monitoring and Maintenance Plan
PAH	Polycyclic Aromatic Hydrocarbons
PCE	Tetrachloroethylene
PID	Photo-ionization Detector
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
ROD	Record of Decision
SCO	Soil Cleanup Objectives
Site	1714 North Salina Street, Syracuse, New York
SSDS	Sub-slab Depressurization System
SVOC	Semi-volatile Organic Compounds
TCE	Trichloroethene
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

I, Nevin Bradford, certify that I am currently a NYS Registered Professional Engineer and that this 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).

Nevin Bradford
State of New York Professional Engineer No. 086008

May 4, 2022

1 INTRODUCTION

This Work Plan (WP) provides a description of the procedures that will be implemented to perform targeted groundwater remediation in the vicinity of MW-2 at the Moyer Carriage Lofts Site (the Site). This WP has been prepared consistent with New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation "Technical Guidance for Site Investigation and Remediation" (DER-10). To effectively characterize the environmental conditions, this WP discusses the following:

- Current and historic site conditions
- Contaminants of concern and the extent of the contamination
- Pre-treatment investigation activities
- Quality controls and protocols for analytical sampling
- Proposed remedial measures
- Health and safety procedures to protect site workers and the local community

1.1 Site Description

The Site is located at 1714 North Salina Street in the City of Syracuse, Onondaga County, New York. The Site includes two contiguous tax parcels: ID numbers are 002.-03-05.1 and 002.-03-05.2. The Site includes five brick and block buildings which account for approximately 204,964 square feet of gross building space. The buildings were constructed sometime before 1892 until 1956. The Site is approximately 2.12 acres in size, which includes a parking lot with 76 parking spaces along the northwestern side of the Site buildings. The buildings are currently vacant and in a distressed condition.

The Site is located in the Syracuse North Side community. The Site is located within the Hiawatha - Lodi (Hi-Lo) Brownfield Opportunity Area (BOA). The Site is bounded to the north by Park Street, south by North Salina Street, east by Wolf Street, and west by Exchange Place. Properties surrounding the Site are commercial and industrial facilities. A gas station was formerly located to the northeast and a dry cleaner was formerly located to the east, on the opposite sides of the adjoining streets.

Figure 1 shows the location of the Site and **Figure 2** shows the Site boundaries and identified pertinent site features.

1.2 Site History

The Site has been used for industrial and commercial purposes since it was first developed prior to 1892 as the Moyer Carriage Factory (a.k.a. Moyer Automobile Company). Site operations included carriage and vehicle manufacturing. Between 1912 and 1958, the Site was home to the Porter Cable Company for use as a tool manufacturing facility. From 1958 to 2012, the Site was owned and operated by Penfield Mattress Company. Site operations included machining, plating, as well as parts and equipment cleaning. In 2012, the Site was purchased by G&K Trucking, LLC. The Site is currently unoccupied and only partially used for material storage. The buildings are in poor condition and not habitable.

1.3 Site Geography, Geology, and Hydrogeology

The Site elevation ranges from approximately 409 feet above mean sea level (amsl) on the west to 415 feet amsl on the east. The Site and vicinity slopes gently toward the west, in the direction of Onondaga Lake, which lies approximately one-half mile to the west.

The Site contains historic fill material (HFM) with observed thickness as deep as approximately nine feet with an average of four to five feet. Per 6 NYCRR Part 375, historic fill is defined as: *non-indigenous or non-native material, historically deposited or disposed in the general area of, or on, a site to create useable land by filling water bodies, wetlands or topographic depressions, which is in no way connected with the subsequent operations at the location of the emplacement, and which was contaminated prior to emplacement*. The HFM contains gravel, black sand, brick, ash, and coal. Native soil is located below the HFM and consists of dense, dry silty clay.

According to USGS documents (*Hydrogeology of the Valley-Fill Aquifer in the Onondaga Trough, Onondaga County, New York*, William M. Kappel and Todd Miller), the Site area is underlain by artificial fill (HFM), lacustrine silt and clay, and till over Vernon shale bedrock. The depth to bedrock at the Site is approximately 44 - 45 feet (371 to 372 feet amsl) along Exchange Place in the west (MW-1 and MW-3). Bedrock was not encountered along the eastern side of the Site.

At MW-1 through MW-4, the groundwater depth at the time of drilling ranged from 40 to 43 feet below grade within a narrow band (one to two feet) of fractured shale bedrock and till sitting on top of bedrock. The band of water bearing material was observed to be one foot in thickness or less. Immediately subsequent to drilling, MW-5 was dry at 50 feet, but the static water level was 36 feet the subsequent morning. Within the well casing subsequent to development, coupled with hydraulic pressure, the static water levels were approximately 35 to 38 feet below ground surface. Onondaga Lake is located approximately one-half mile to the west. Based on water elevations measured during the RI, groundwater flow is to the west.

The primary drinking water source for the City of Syracuse is Skaneateles Lake, located 15 miles to the southwest. Water processed in the Onondaga County Water Authority (OCWA) potable water plants for the City of Syracuse undergoes varying levels of treatment to ensure that drinking water meets NYSDEC and United States Environmental Protection Agency (USEPA) standards. Groundwater in the City of Syracuse is prohibited from being used for public drinking water supply. Local groundwater is not potable due to elevated concentrations of dissolved inorganics (salts, aluminum, iron, etc.).

1.4 Previous Investigations

In 2019 and 2020, several investigations occurred. These included:

- Phase I Environmental Site Assessment (Phase I ESA)
- Limited Phase II ESA
- Limited Hazardous Building Material Pre-Renovation Survey
- Geotechnical Investigation

Based on the information and data gathered from these investigations, the Site was entered into the BCP.

The BCP Remedial Investigation (RI) was performed in 2021 and was conducted to assess the nature and extent of contamination at the Site. The RI consisted of:

- A buried utilities evaluation
- The collection and analysis of four surface soil samples
- The advancement of 39 (five being groundwater monitoring wells) soil borings and collection and analysis of 76 subsurface soil samples
- The installation of five groundwater monitoring wells and performance of two rounds of groundwater sampling
- The collection of six sub-slab and two soil vapor well air samples
- The collection of quality assurance / quality control (QA / QC) samples

Soil and groundwater samples were analyzed for a combination of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, herbicides, polychlorinated biphenyls (PCBs), metals (including cyanide and hexavalent chromium), and per- and polyfluoroalkyl substances (PFAS). Vapor samples were analyzed for TO-15 list VOCs.

HFM is distributed across the Site. Based on the findings of the RI, the known contaminants of concern in the HFM include SVOCs and metals. The variation in analyte concentrations in the soils that contain HFM indicates that the source of contamination in soil samples containing HFM is the HFM itself and no apparent discrete source is located on-site or off-site. HFM will be addressed during remediation by excavation and disposal or placement under a two-foot thick clean soil cover.

A pair of 10,000-gallon underground storage tanks (USTs) are closed-in-place and are located beneath an above grade loading dock along the northwest side of the building. Several soil borings were advanced around the tanks during the RI and there was no physical evidence (stains, odors, detectable photoionization detector readings) of releases from the USTs. The tanks will be removed and properly disposed during remediation.

Tetrachloroethylene (PCE) is present in an isolated area of soil and HFM under the northern portion of the building. A soil delineation effort was performed which indicates that the impacts are isolated to a confined area around SB-15. The impacted soil is underlain by approximately 25 feet of dense native silty clay that extends to bedrock. The impacted soil will be excavated and disposed during remediation.

Soil vapor samples were collected from underneath the slab on grade and basement portions of buildings that will remain after redevelopment. Soil vapor samples were also collected from beneath the parking lot on the west / southwest portion of the Site. Sampling results indicate that vapor mitigation is required for TCE. The building will be equipped with a sub-slab depressurization system (SSDS) to mitigate soil vapor, including CVOCs and radon.

Chlorinated VOCs (CVOCs) are present in groundwater, located approximately 35 to 38 feet below grade. The CVOCs include tetrachlorethylene (PCE), tetrachloroethene (TCE), and cis-1,2 dichloroethene (Cis 1,2-DCE). These contaminants exceed their respective NYSDEC TOGS limits. The only CVOCS in soil identified from the remedial investigation are in the immediate area of SB-15. The vertical and horizontal limits of soil impacts in this area are well defined, but may be a source of the CVOCs in groundwater. A former dry cleaner is located immediately upgradient of the Site, and, based on groundwater data collected from the upgradient edge of the Site, may be a contributing source of the CVOC contamination in local groundwater. Groundwater flow is to the west towards an area lacking residential development. The area west of the Site includes an industrial recycling facility, a car wash, a car dealership, and Hiawatha Boulevard / Interstate 81. Groundwater in the City of Syracuse is prohibited from being used for public drinking water supply. Local groundwater is not potable due to elevated concentrations of dissolved inorganics (salts, aluminum, iron, etc.). This WP was prepared to address the groundwater impacts by CVOC.

Attached are **Figures 3, 4a,** and **5** that show the results of the soil CVOC investigation, site-wide groundwater testing, and site-wide soil vapor testing, respectively.

2 SUMMARY OF ENVIRONMENTAL CONDITIONS

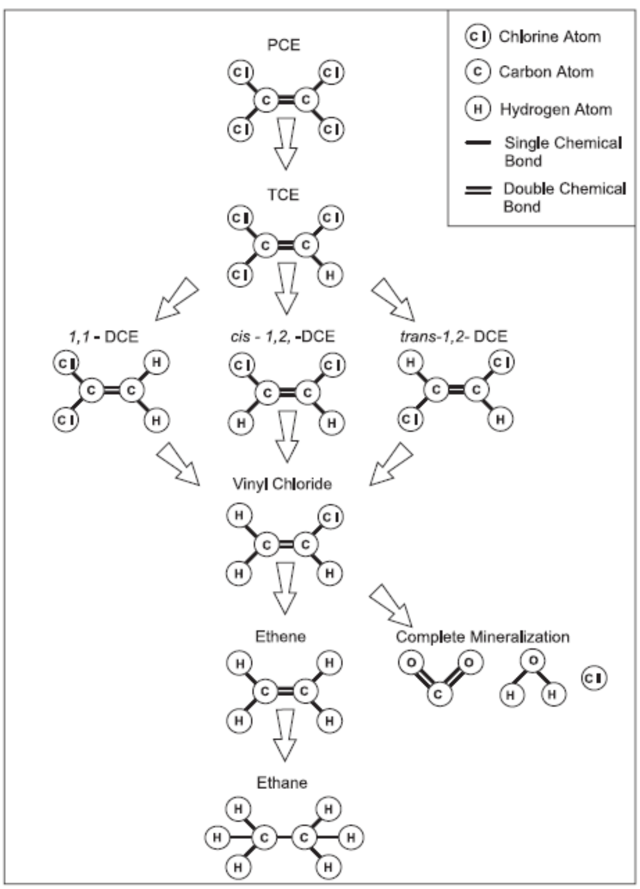
2.1 Nature and Extent of Contamination

Chlorinated solvents, primarily PCE and TCE, were identified as the contaminants of concern (COC) for this Site. PCE and TCE are man-made volatile organic compounds used for degreasing metal and electronic parts and dry cleaning. Remedial considerations for PCE / TCE include its low solubility value and heavy molecular weight. PCE / TCE are in a class of chemicals called dense non-aqueous phase liquids (DNAPL) that sink through the water column until they encounter an impermeable barrier.

Groundwater contaminant plumes with PCE / TCE can undergo a process of reductive dechlorination, during which chlorine atoms are stripped from PCE / TCE and daughter compounds are produced. The rate of dechlorination can vary based on:

- Amount of PCE / TCE in the subsurface;
- Amount of organic material present in the subsurface; and
- Type and concentration of electron acceptors available in the system.

The process of reductive dechlorination is shown below:



A potential onsite contributing source area is located beneath the northern portion of the building. The former building activities in this area are unknown. However, it is noteworthy that floor drain trenches are located in this area. It is proposed in the Remedial Action Work Plan (RAWP), that this soil be excavated and managed at a solid waste disposal facility. Confirmatory soil samples will be collected to document the complete removal of the impacted soil.

A second potential contributing area is a former dry cleaner facility located directly upgradient of the Site, on the opposite (east) side of Wolf Street. The Site groundwater monitoring wells are located downgradient or cross-gradient of this site. The highest concentrations were identified at MW-2 and MW-5, which are downgradient of the former dry cleaner.

Groundwater is present within a narrow band (one to two feet) of fractured shale bedrock and till sitting on top of bedrock. The band of water bearing material is one foot in thickness or less. The plume is believed to be present under the majority of the 2.12-acre Site.

Figure 4a provides the baseline groundwater monitoring data. **Figure 4b** provides groundwater elevations / contours.

3 OBJECTIVES, SCOPE AND RATIONALE

The goal for the remedial program is to restore the site to pre-disposal conditions to the extent feasible. At a minimum, the remedy shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the site through the proper application of scientific and engineering principles.

3.1 Record of Decision

As stated in the Decision Document (DD), the remedial action objectives (RAOs) selected for groundwater at this Site are:

Soil RAOs

The RAOs for soil used in this AA are:

- RAOs for Public Health Protection
  - Prevent ingestion/direct contact with contaminated soil.
  - Prevent inhalation exposure to contaminants volatilizing from soil.

- RAOs for Environmental Protection
  - Prevent migration of contaminants that would result in groundwater or surface water contamination.

Groundwater RAOs

The RAOs for groundwater used in this AA are:

- RAOs for Public Health Protection
  - Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards; and
  - Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

- RAOs for Environmental Protection
  - Restore groundwater aquifer to pre-disposal / pre-release conditions, to the extent practicable.
  - Remove the source of the ground or surface water contamination.

Soil Vapor RAOs

The RAOs for soil vapor used in this AA are:

- RAOs for Public Health Protection
- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a Site.

3.2 Standards, Criteria, and Guidance

The remedy must conform to promulgated standards and criteria that are directly applicable or that are relevant and appropriate. The standards, criteria and guidance (SCGs) that will be, or will likely be, directly applicable to the site's remediation include those listed below.

- NYSDEC Technical and Operational Guidance Series (TOGS), *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations*, June 1998.

- 6 NYCRR Part 703, *Surface Water and Groundwater Quality Standards and Groundwater Effluent Limitations.*

- NYSDEC Sampling, Analysis, and Assessment of PFAS, June 2021.

4 DESCRIPTION OF REMEDIAL ACTION

The most elevated concentrations of PCE and TCE are at MW-2 and MW-5, respectively. MW-5 is the most upgradient well located offsite with the City of Syracuse right-of-way. The area downgradient of MW-5 is obstructed by Site buildings. MW-2 is located on the western side of the Site buildings and is readily accessible, particularly after the demolition of the loading dock on that side of the building. MW-6 will be installed subsequent to building demolition to assess groundwater on the northeast portion of the Site. MW-6 will be installed at the approximate location of TW-1, as shown on **Figure 4**.

The vicinity of MW-2 will be the focus of the remedial action due to its onsite location and elevated contaminant concentrations. Treatment of the groundwater in the vicinity of MW-2 also provides control for the potential of contaminated groundwater leaving the Site. The following will be implemented to address the groundwater contamination in the vicinity of MW-2:

- Construct three injection wells at locations that will transect groundwater flow just upgradient of MW-2.

- Inject batches of Anaerobic Biochem (ABC) and RTB-1 bacteria in deoxygenated water. Dependent on how the formation accepts the injectate, natural bacteria may deoxygenate the injectate by consuming some of the fermentable carbon in the injectate. If more rapid deoxygenation is needed, a small volume of sodium sulfite can be added to the injectate. With Dehalococcoides bacteria (DHC), a dissolved oxygen of less than 1 mg/L in the fluid surrounding the bacteria (injectate) is ideal. In the formation, when organic carbon is present, indigenous bacteria will rapidly consume dissolved oxygen.

This section of the work plan identifies the steps to be taken to perform the injections.

4.1 Treatment Area

The injection wells will be installed directly upgradient of MW-2. The target depth is 42 feet bgs. A 10-foot radius of influence has been conservatively applied. Therefore, injection wells will be spaced 20 feet from MW-2 and 20’ from each injection point, as shown on **Figure 4b**.

4.2 Remedial Approach

The remedial method listed in the DD is in-situ chemical oxidation (ISCO). The precise type of in-situ treatment was not proposed in the RAWP or indicated in the DD. C&S recommends enhanced bioremediation via the injection of ABC and RTB-1 DHC bacteria through the wells.

Chlorinated ethenes such as TCE and PCE can be destroyed by both chemical oxidants (ISCO) or a combination chemical / biological reductive process (enhanced bioremediation). Both methods are commonly utilized for remediation, and selection depends on a variety of factors including natural redox state of soils or groundwater, accessibility of contamination, cost, timeframe for cleanup, etc. For chlorinated solvents, a reductive biological approach is often the most economical long-term and most likely to achieve the lowest concentrations.

Chemical oxidation is typically used in situations where background or natural oxidant demand is low (i.e. few reduced minerals, low concentrations of organic matter, higher oxidation-reduction potential (ORP) and dissolved oxygen (DO) content in groundwater, etc.). Although remediation by ISCO is often more rapid than biological reductive methods, it is limited by the need for direct contact of the oxidant with the contaminant before it is consumed by reactions (natural oxidant demand) with other reduced materials in the soil and groundwater. Typically the oxidant demand from natural materials in soil and groundwater is at least 10 times higher than the oxidant demand from the contaminants. An ISCO approach at the Site is expected to have limited mobility from isolated injections, therefore a limited affect. A biological approach is expected to have significant mobility and affect (further discussed below).

Chemical reduction (e.g., reducing agents like zero valent iron) is often a preferred method for remediation of chlorinated contaminants because it can be more economical and is often capable of remediating contaminants to non-detect levels of concentration. Remediation of chlorinated solvents by reduction typically is slower than ISCO, but is far less impacted by "reductive demand" from natural constituents. Therefore, it is far more targeted to acting on the chlorinated contaminants. In addition, the bacteria that degrade can proliferate and consume contaminants far from the injection pathways (even in low permeability formations). Therefore, contact of injectate with contaminants is less of a concern than with ISCO injectates. Chemical and biological reduction is nearly always preferred in situations where soils and groundwater are in a reducing state (low ORP, low DO, etc.). As discussed below, it is apparent that conditions already exist to promote natural reduction of chlorinated compounds in groundwater.

At the Site, the relatively low permeability soils in the vadose zone are holding residual contamination, but in most of the affected area, very little natural degradation is occurring, as evidenced by elevated PCE and very low TCE concentrations. Although the contaminant release at this site appears to be primarily tetrachloroethene (PCE), the analyses of groundwater from RI-MW-2 show significant concentrations of trichloroethene (TCE) and cis 1,2 dichloroethene (cDCE) which indicates that naturally occurring reductive biodegradation of the PCE is already occurring in the groundwater. This is expected given the low permeability soils. Since there is evidence that the groundwater is already reducing, it is preferred to enhance the natural reductive degradation by providing fermentable carbon (i.e., ABC) that would diffuse into the tight formation, and bolster dehalococcoides bacteria (RTB-1), which are expected to grow out into the formation or potentially move (by chemotaxis) into the formation. Although conditions are already anticipated to be reducing, dehalococcoides bacteria will be injected in case indigenous dechlorinating bacteria are absent or in low quantities. DHC bacteria obtain energy via the oxidation of hydrogen and subsequent reductive dehalogenation of halogenated organic compounds such as PCE / TCE and breakdown compounds. The process is referred to as organohalide respiration.

The relatively low permeability soils in the vadose zone under the northern portion of the existing building are effectively holding residual solvents. PCE concentrations are approximately 50 to 100 times more than TCE in some of the soil boring locations in that area. As indicated above, to treat CVOCs in the vadose zone, a remedial approach requires direct contact with the contaminants via soil blending or a substantial number of injection points using an oxidant like permanganate. To ensure direct contact with the affected area of groundwater at the Site, a significant number of groundwater injection wells would be required for ISCO injections. In the long-term, it is more efficient, more economical, and easier to manage a site with three injections wells versus dozens. An ISCO approach has been proposed as a contingency remedial element for an isolated area of the soil under the northern portion of the existing building.

The materials provided in **Appendix A** include case studies demonstrating the effectiveness of this approach for chlorinated solvent remediation.

4.2.1 Anaerobic Biochem (ABC) Information

ABC is a patented mixture of lactates, fatty acids, and a phosphate buffer. ABC contains soluble lactic acid as well as slow- and long-term releasing components. The phosphate buffer provides phosphates, which are a micronutrient for bioremediation. In addition, the buffer helps to maintain the pH in a range that is best suited for microbial growth, which is widely recognized as preferably between 6 and 8.

ABC is composed of several water soluble and metabolically available fractions. As a result, it has components such as lactic acids, which are available almost immediately. The C14 to C18 fatty acids in ABC provide longer lasting carbon sources that feed the bacteria and keep the formation suitable for complete dechlorination. The breakdown of ABC produces weak organic acids that could reduce the pH of the aquifer to unsuitably low levels if the phosphate buffers were not present.

ABC is completely soluble in water, even the long-lasting carbon. There is no need to emulsify the product, and therefore no concerns about an emulsion breaking. Because it is a water soluble product, large volumes of chase water are not needed.

ABC has C14 to C18 fatty acids that have been shown in the field to last over two years. Emulsified oils break down into C18 fatty acids through hydrolysis, therefore the product has the same long-lived components of emulsified oils without the need to emulsify or wait for hydrolysis to occur.

ABC adds ethyl lactate, which is a green co-solvent. This helps dissolve the fatty acids, and it also serves as a solvent for sites that may have DNAPL, because the ethyl lactate solvates the DNAPL and promotes rapid treatment.

ABC is formulated with byproducts from green energy processes, so it is better for the environment.

4.2.2 Source Area

Proprietary mixing / injection trailers will be utilized to mix batches of ABC and RTB-1 bacteria in deoxygenated water for injection into the three injection wells. The product will be injected directly into the well / groundwater. The wells will be located upgradient of MW-2 as shown on **Figure 4b**.
Each well will received the following:

- 1,000 pounds of ABC
- 2 liters of RTB-1

The need for a subsequent injection will be based on groundwater quality / chemistry / analytical data generated from the sampling of the wells (described in Section 5). The data will be reviewed to ensure that contaminant concentrations are trending downward and that the water quality environment is suitable for the bacteria. The success of the injections will be evaluated and presented in a report following the groundwater sampling. If a second round of injections is required, the loading will be reduced to 50% of the original injections.

4.2.3 Storage of Chemicals

The product will be shipped directly to the Site and stored in conditions in accordance with the manufacturer's specifications. All product will be used for this treatment.

Decontamination of equipment, storage, personal protection, and other related safety concerns will be completed in accordance with vendor recommendations. Product safety data sheets (SDS) are presented in **Appendix A**.

5 POST-TREATMENT MONITORING PLAN

Post-treatment groundwater sampling will be conducted consistent with the approved Remedial Investigation Work Plan (RIWP) / Quality Assurance Project Plan (QAPP). This section of the Work Plan includes:

- Groundwater Monitoring
- Sampling Program
- Laboratory Analysis

5.1 Groundwater Monitoring

A groundwater monitoring program has been designed to provide the data necessary to demonstrate the effectiveness of the treatment program. Groundwater monitoring will be conducted approximately two to three weeks following the injections and again at six months.

5.1.1 Monitoring Well Network

The Site contains a total of five monitoring wells (MW-1 through MW-5) installed in 2021. MW-6 is slated to be installed and sampled during remediation.

5.1.2 Groundwater Monitoring

To assess the effectiveness of the groundwater treatment program, three existing monitoring wells located downgradient / cross-gradient of MW-2 will be sampled. This includes MW-1, MW-2, and MW-3. Sampling will be performed prior to injections, +/- 1 month post-injection, and +/- 6 months post-injection. The groundwater samples will be analyzed for:

- Target Compound List (TCL) VOCs
- Total organic carbon (TOC)
- Sulfate / Sulfite
- Ferrous iron / total iron
- Nitrate / nitrite

The locations of the monitoring wells to be sampled are shown in **Figure 4a**. Note that all of the Site wells are expected to be sampled at an annual interval for VOCs and MNA parameters consistent with the forthcoming Site Management Plan (SMP).

Groundwater sampling will be conducted using low-flow purging and sampling techniques. Before purging the well, water levels will be measured using an electric water level sounder capable of measuring to the 0.01-foot accuracy. Peristaltic or bladder pumps using manufacturer-specified tubing will be used for purging and sampling groundwater. Calibration, purging and sampling procedures will be performed as specified by the USEPA[1] for low-flow sampling. Decontamination will be conducted after each well is sampled to reduce the likelihood of cross contamination. Calibration times, purging volumes, water levels and field measurements will be recorded in a field log. Purge fluids will be collected for proper disposal.

[1] U.S. EPA Region 1 Low Stress (low-flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, January 19, 2010.

5.2 Soil Vapor Monitoring

Consistent with the Decision Document (DD), determination of the effectiveness of the remedy requires consideration of further assessment for soil vapor. The need for additional soil vapor testing will be discussed with the Department during the preparation of the SMP.

6 QUALITY ASSURANCE AND QUALITY CONTROL PROTOCOLS

To ensure that suitable and verifiable data results are obtained from the information collected at the Site, quality assurance procedures are detailed in this section.

6.1 Sampling Methods, Analytical Procedures and Documentation

6.1.1 Sampling Methods

Sampling procedures will be conducted consistent with the NYSDEC *Sampling Guidelines and Protocols Manual*. Collection of representative samples will include the following procedures:

- Ensuring that the sample taken is representative of the material being sampled;
- Using proper sampling, handling and preservation techniques;
- Properly identifying the collected samples and documenting their collection in field records;
- Maintaining chain-of-custody; and
- Properly preserving samples after collection.

Groundwater Sampling

Groundwater sampling will be conducted consistent with USEPA guidance for low-flow purging and sampling, as described in **Section 5**.

Water samples will be collected in glassware provided by the laboratory and immediately placed on ice. The water will be analyzed on a standard turnaround time.

In addition to collecting samples for laboratory analysis, groundwater chemistry will be continuously monitored during sample collection. Groundwater chemistry will be monitored for the following:

- pH;
- Turbidity;
- Oxidation Reduction Potential;
- Specific Conductance;
- Dissolved Oxygen; and
- Temperature

QA/QC Sampling

Duplicate samples will be collected from a minimum of 5% of the locations, and will be selected randomly. Additionally, Quality Assurance/Quality Control (QA/QC) samples will be collected, and the following describes the minimum number of groundwater QA/QC samples.

- Trip blank – 1 per shipment
- Blind Duplicate – 1 per monitoring event
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) – 1 MS / 1 MSD per monitoring event

6.1.2 Analytical Procedures

Laboratory Analysis

Laboratory analysis will be conducted by a third-party laboratory that is accredited by the NYSDOH Environmental Laboratory Accreditation Program (ELAP). Laboratory analytical methods will include the most current NYSDEC Analytical Services Protocol (ASP).

Groundwater samples sent to a certified laboratory will be analyzed in accordance with EPA SW-846 methodology for the following contaminants:

- VOCs (EPA Method 8260);
- Total Iron (EPA Method 6010D)
- Ferrous Iron (EPA Method SM3500Fe-B)
- Sulfate (EPA Method 300, 9038, or 9056)
- Sulfite (EPA Method 9030B or SM4500)
- Nitrite and Nitrate (EPA Method 353.2)

Category B deliverable will be requested to be used in a third-party data validation.

Data Usability

Data Usability Summary Report (DUSR) will be performed by a third-party data consultant using the most recent methods and criteria from the U.S. EPA. The DUSR will assess all sample analytical data, blanks, duplicates and laboratory control samples and evaluate the completeness of the data package.

6.1.3 Documentation

Custody Procedures

As outlined in NYSDEC *Sampling Guidelines and Protocols,* a sample is in custody under the following conditions:

- It is in your actual possession;
- It is in your view after being in your physical possession;
- It was in your possession and then you locked or sealed it up to prevent tampering; or
- It is in a secure area.

The environmental professional will maintain all chain-of-custody documents that will be completed for all samples that will leave the Site to be tested in the laboratory.

7 HEALTH AND SAFETY

To verify the safety of the workers and the local community during the performance of the work, monitoring practices of the work environment will be in place during all phases of activities. A Health and Safety Plan (HASP) was prepared that details procedures for maintaining safe working conditions and minimizing the potential for exposure to contaminated material. The HASP is provided in **Appendix B**.

8 REPORTING

Based on the results of the work described above, a letter report will be prepared to describe the methodologies and results of the injections. The portions of the report will describe:

- Investigative methods;
- Observations and findings;
- Inspection/monitoring observations of the remedial measures; and
- Analytical results.

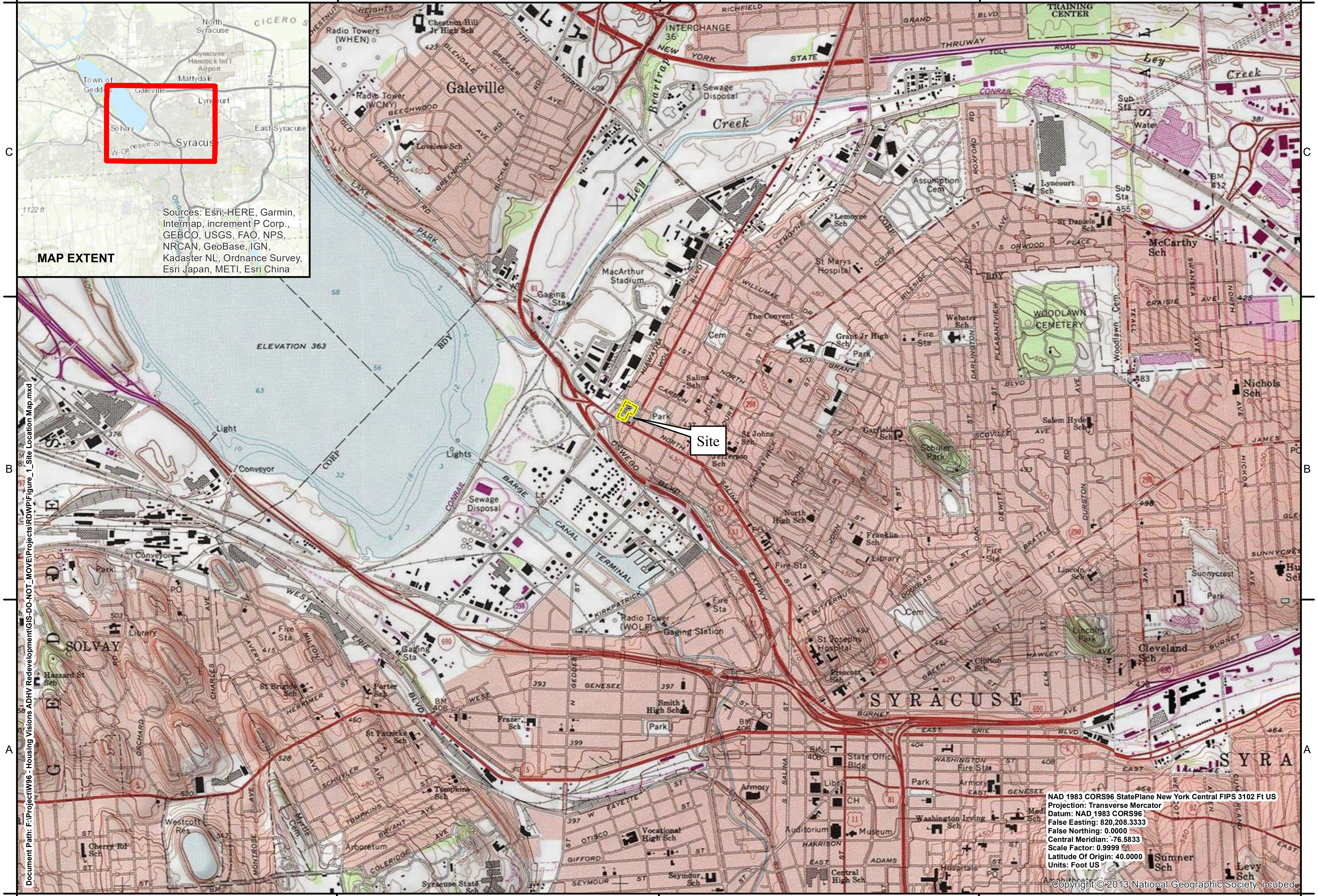
The documents will be submitted to the NYSDEC for review and approval.

9 SCHEDULE

Below is an anticipated schedule of milestones for the injections.

Anticipated Date	Milestone
March 2022	Groundwater Injection Work Plan Submission
May 2022	Groundwater Injection Work Plan Approval
May 2022	Pre-Injection Groundwater Sampling
July 2022	Injection Program
July 2022	Initial Post-Injection Groundwater Sampling (+/- 1 month post injection)
December 2022	Second Round Post-Treatment Groundwater Monitoring (+/- 6 months post injection)
Winter 2023	Report Submission

FIGURES



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N

0 2,000 Feet

1 inch = 2,000 feet

Moyer Carriage Lofts
1714 North Salina Street
Syracuse, Onondaga County, New York

PROJECT NO:	W96.001.004
DATE:	February 2022
SCALE:	AS SHOWN
DRAWN BY:	JTB
DESIGNED BY:	JTB
CHECKED BY:	MLW

Modified: 2/8/2022 @ 12:39:51 PM

SITE LOCATION

Figure 1

C&S COMPANIES®

C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, New York 13212
Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

N

0 60 Feet

1 inch = 60 feet

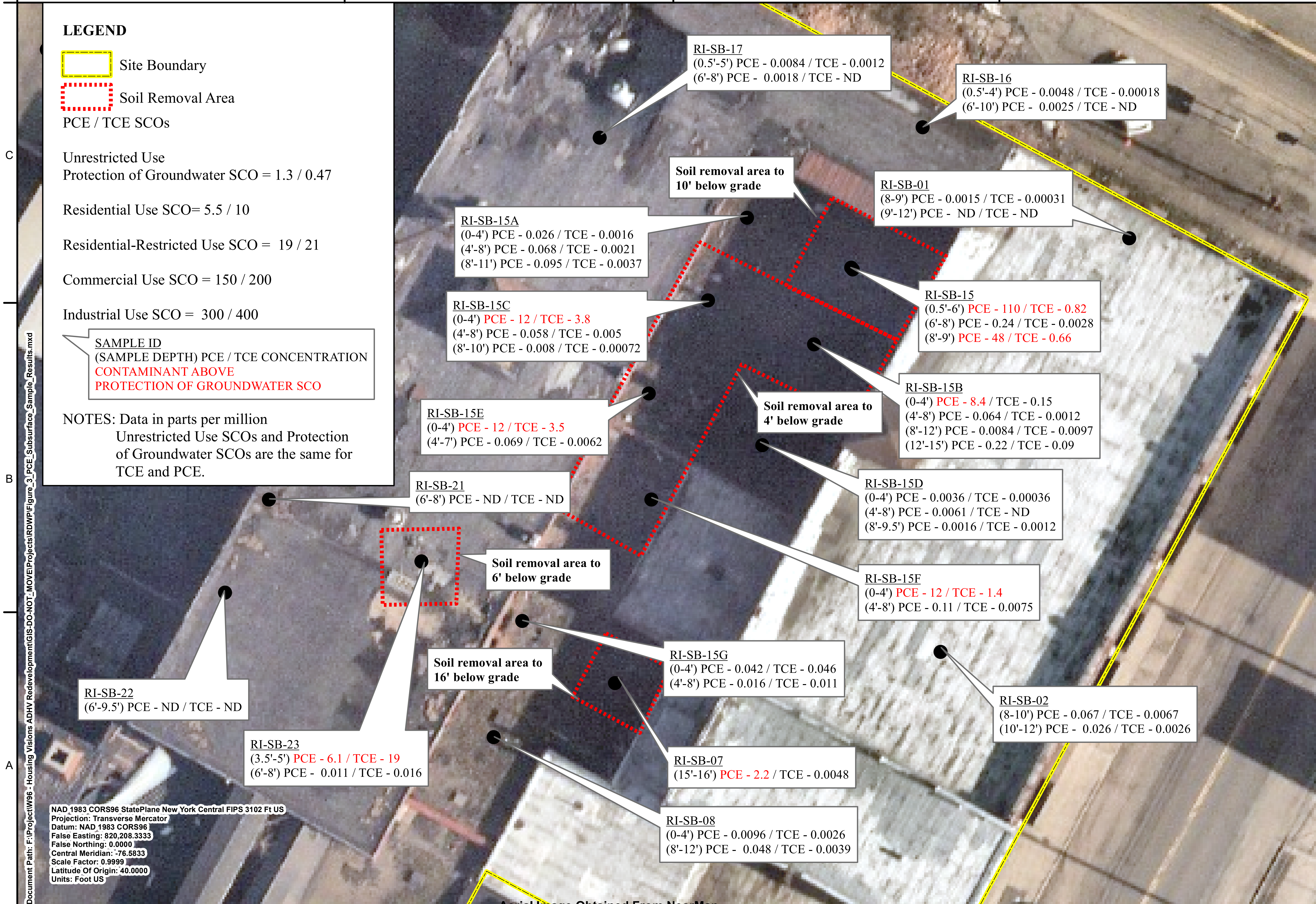
Moyer Carriage Lofts
1714 North Salina Street
Syracuse, Onondaga County, New York

PROJECT NO:	W96.001.004
DATE:	February 2022
SCALE:	AS SHOWN
DRAWN BY:	JTB
DESIGNED BY:	JTB
CHECKED BY:	MLW

Modified: 2/8/2022 @ 12:40:17 PM

SITE MAP

Figure 2



C&S COMPANIES®
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Syracuse, New York 13212
Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

N

0 20 Feet

1 inch = 20 feet

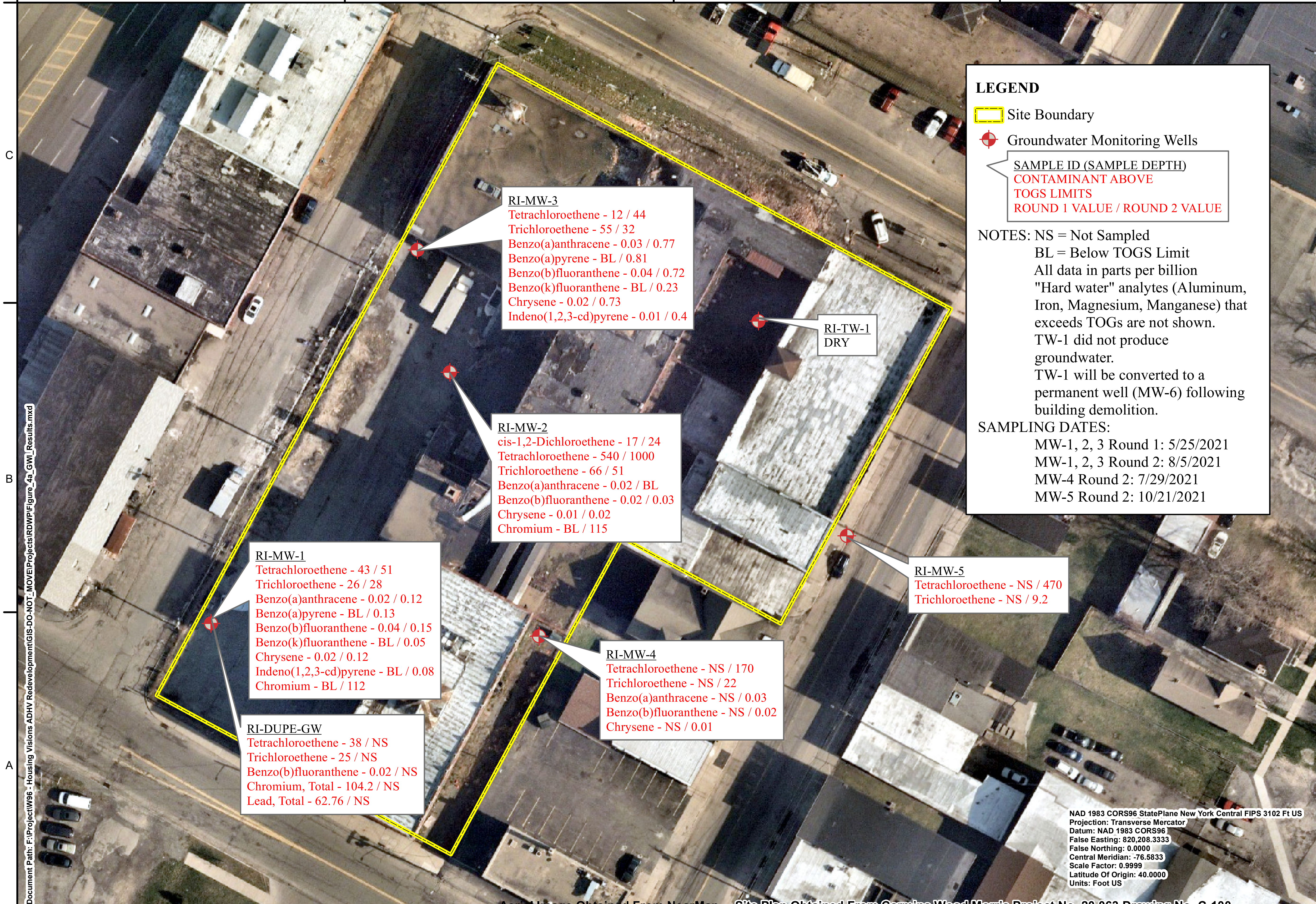
Moyer Carriage Lofts
1714 North Salina Street
Syracuse, Onondaga County, New York

PROJECT NO:	W96.001.002
DATE:	February 2022
SCALE:	AS SHOWN
DRAWN BY:	JTB
DESIGNED BY:	JTB
CHECKED BY:	MLW

Modified: 2/8/2022 @ 12:48:15 PM

PCE SUBSURFACE SAMPLE RESULTS

Figure 3



C&S COMPANIES®
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Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

N

0 50 Feet

1 inch = 50 feet

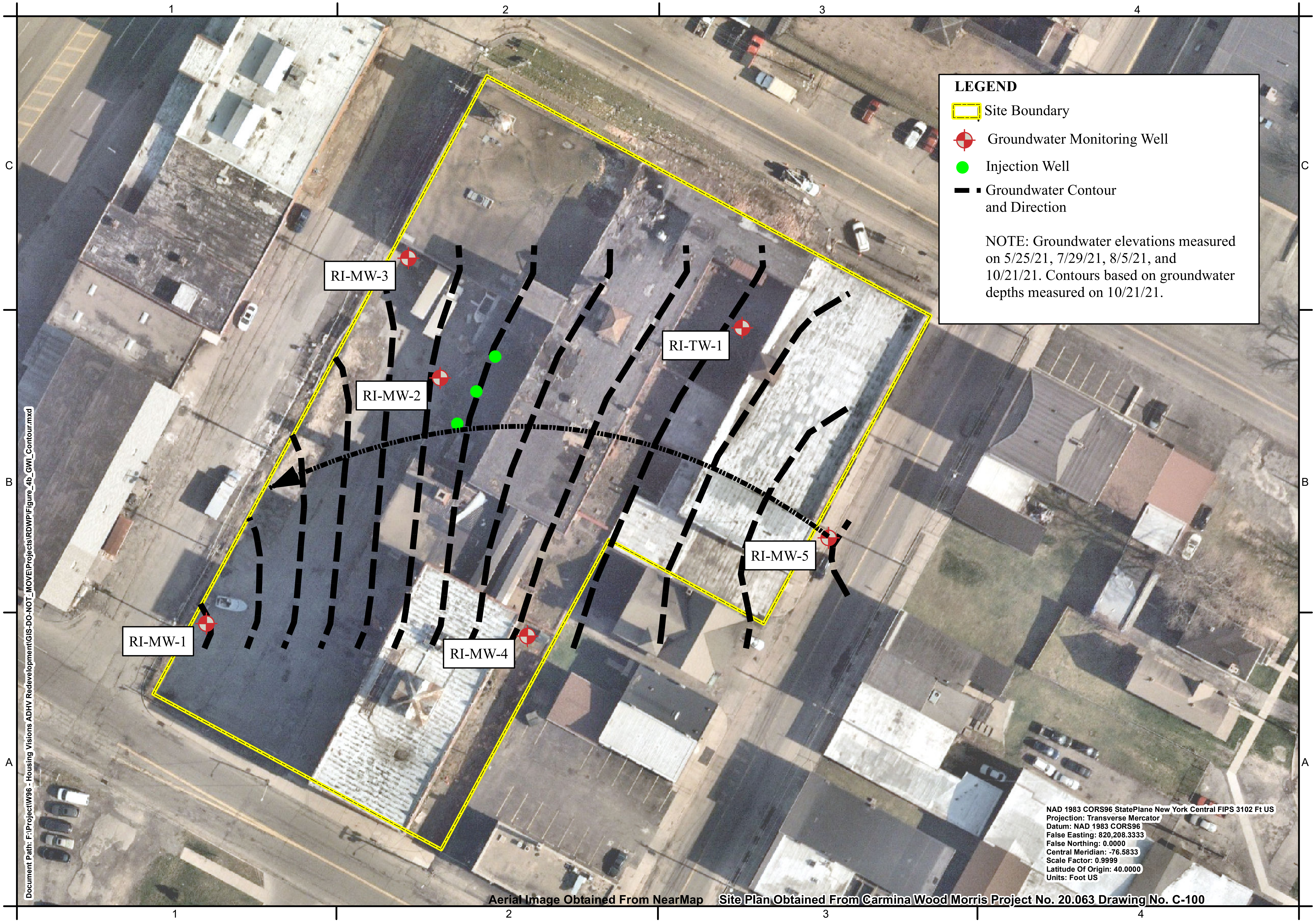
Moyer Carriage Lofts
1714 North Salina Street
Syracuse, Onondaga County, New York

PROJECT NO:	W96.001.002
DATE:	February 2022
SCALE:	AS SHOWN
DRAWN BY:	JTB
DESIGNED BY:	JTB
CHECKED BY:	MLW

Modified: 2/8/2022 @ 12:42:04 PM

GROUNDWATER SAMPLING RESULTS

Figure 4a



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N

0 50 Feet

1 inch = 50 feet

Moyer Carriage Lofts
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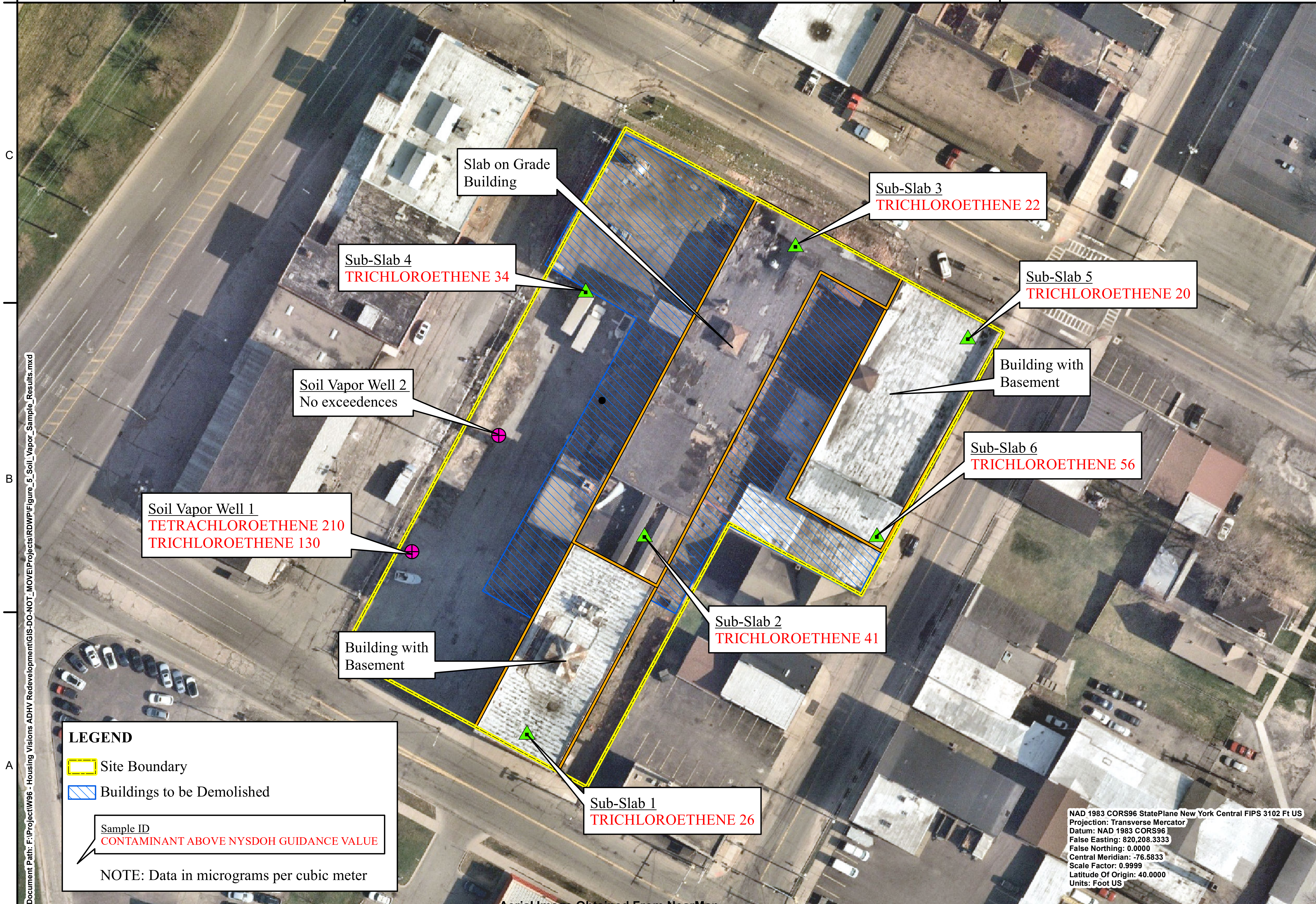
GROUNDWATER CONTOURS

Figure 4b



C&S Engineers, Inc.
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Fax: 315-455-9667
www.cscos.com

N

0 60 Feet

1 inch = 60 feet

Moyer Carriage Lofts
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Syracuse, Onondaga County, New York

PROJECT NO:	W96.001.004
DATE:	February 2022
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SOIL VAPOR SAMPLE RESULTS

Figure 5

APPENDICES

APPENDIX A

ABC PRODUCT INFORMATION

REDOX TECH, LLC

"Providing Innovative In Situ Soil and Groundwater Treatment"

Anaerobic BioChem (ABC®)
The "Green" Substrate

In 2003, Redox Tech introduced its proprietary formulation for anaerobic biodegradation of halogenated solvents in groundwater. The product, Anaerobic Biochem ABC®, is a patented mixture of lactates, fatty acids, alcohols and a phosphate buffer. ABC® contains soluble lactic acid as well as slow- and long-term releasing components. Redox Tech was one of the first companies to recognize the importance of maintaining optimum pH, and for that reason, ABC has always had a phosphate buffer and other alkaline materials, when necessary, to maintain the optimal pH. The phosphate buffer provides phosphates, which are a micronutrient for bioremediation. In addition, the buffer helps to maintain the pH in a range that is best suited for microbial growth.

Since ABC's introduction, millions of pounds of ABC have been used on hundreds of sites throughout the United States and even Europe. Over time, the "essential ingredients" have been slightly modified, but to our knowledge, ABC remains the only carbon substrate on the crowded market that is formulated specifically for each site's own unique geochemistry, biology, and hydrogeology.

"Green" Before Green was Cool

Redox Tech is a niche environmental remediation contractor. Therefore, we have always felt obligated to be environmentally conscious. Before "green" was all the rave, Redox Tech utilized waste streams from green energy processes, such as ethanol and biodiesel production to formulate ABC. Only a small percentage of the components are "virgin" chemicals. The phosphate buffer provides phosphates, which are a micronutrient for bioremediation. In addition, the buffer helps to maintain the pH in a range that is best suited for microbial growth.

ABC® Advantages

- WATER SOLUBLE - the biggest advantage with ABC is that it is completely soluble in water, even the long-lasting carbon. There is no need to emulsify our product, and thus no worry about an emulsion breaking. Also, because it is a water soluble product, the need for large volumes of "chase" water is eliminated. ABC is typically injected at about 15 to 25 weight percent mixed into about 100 to 200 gallons of water.
- LONG LASTING – ABC has C14 to C18 fatty acids that have been shown in the field to last over two years. Emulsified oils break down into C18 fatty acids through hydrolysis, so we are essentially using the same long-lived components of emulsified oils without having to emulsify or wait for hydrolysis to occur.
- NATURAL CO-SOLVENT – ABC, through a license with Oregon State University, adds ethyl lactate which is a "green" co-solvent. This helps dissolve the fatty acids, and it also serves as a solvent for sites that may have DNAPL, because the ethyl lactate solvates the DNAPL and promotes rapid treatment.
- GREEN – ABC is formulated with byproducts from "green" energy processes, so it is better for the environment.
- COST-COMPETITIVE – carbon substrates are becoming commodities, and ABC is priced accordingly. When all factors are considered, ABC is a great value.

200 QUADE DRIVE, CARY NC 27513 P. 919.678.0140 F. 919.678.0150
www.redox-tech.com

A CASE STUDY FOR THE APPLICATION OF ABC® TO STIMULATE ANAEROBIC BIODEGRADATION OF TRICHLOROETHANE (TCA)

Project Location
Stoughton, MA

Contaminants
Trichloroethane (TCA)

Product Used
ABC®

Scope and Media
Enhanced Reductive Dechlorination (ERD) of Impacted Groundwater

Results
Concentrations of TCA Reduced by an Order of Magnitude in Observed Monitoring Wells

In May 2005, ABC® was applied into the overburden and upper weathered bedrock zones at an industrial complex in Stoughton, MA where elevated concentrations of trichloroethane (TCA) have been reported in groundwater. The original source of contamination appears to be associated with past handling practices of TCA. Elevated concentrations of PCE, TCE, cis-DCE and daughter products of TCA, specifically DCA and DCE, have also been reported. Currently, a pump and treat system is in place that recovers and treats groundwater from within the deeper bedrock zone. Anaerobic BioChem (ABC®) was applied at the site to enhance the anaerobic decay of target contaminants. The area of treatment encompasses approximately 4,000 square feet and targets a saturated thickness of approximately 10 feet within a glacial till overburden and the top of bedrock.

APPLICATION METHODS

Approximately 650 and 1,300 pounds of ABC® were injected into each injection well location targeting the overburden soils, and the upper weathered bedrock zone, respectively. **Figure 1** illustrates the injection locations with respect to the current monitoring well network. Injection of ABC® was performed through ¾-inch diameter PVC wells, constructed with 5 foot long screens. Eleven (11) injection wells were installed in the overburden using a Geoprobe® direct push drill rig, and four (4) injection wells were installed in the upper bedrock zone using an auger drill rig.

ABC® solution was mixed with water into a fifteen percent by weight solution to increase dispersion during injection. At injection locations screened within the upper bedrock, a denser solution of ABC® was prepared so that it would fall under gravity into the bedrock. The recovery wells that are part of the pump and treat system were allowed to operate to enhance the downward migration of the solution. Due to its chemical makeup and high solubility in water, no adverse impacts to the pump and treat system would occur if the ABC® solution were recovered by the system.

RESULTS

Groundwater samples from monitoring wells were collected approximately five and a half (5.5) months following the application of ABC®. Results from monitoring wells MW-02, MW-45I, and MW-46I are presented in **Figure 2**. An order of magnitude decrease in concentrations of TCA, PCE, and TCE are evident in samples from monitoring wells MW-02 and MW-46I, with nearly 50% reduction in MW-45I. TCA concentrations in monitoring well MW-02 decreased from 24,500 ppb prior to injections, to 980 ppb post ABC® treatment. Increases in DCA concentrations, a daughter product of TCA, were reported in samples from all three monitoring wells providing evidence that reductive dechlorination of TCA is occurring. In addition, the decreasing concentrations of TCE, and the subsequent increases in cis-1,2-DCE concentrations, a daughter product of TCE, is evident in monitoring wells MW-02, MW-45I, and MW-46I providing further evidence of reductive dechlorination.

Another line of evidence suggesting that ABC® has enhanced reductive dechlorination of TCA and subsequent daughter products is the reported concentrations of chloroethene in wells RW-100 and RW-102 at 152 ppb and 81 ppb, respectively. Chloroethene is a daughter product of DCA and has never been reported in samples collected from within the target area (since 1998). The operation of these recovery wells subsequent to the ABC® application has likely drawn those compounds downward from the treatment areas through the bedrock. Full-scale application will be completed at the site in 2006.

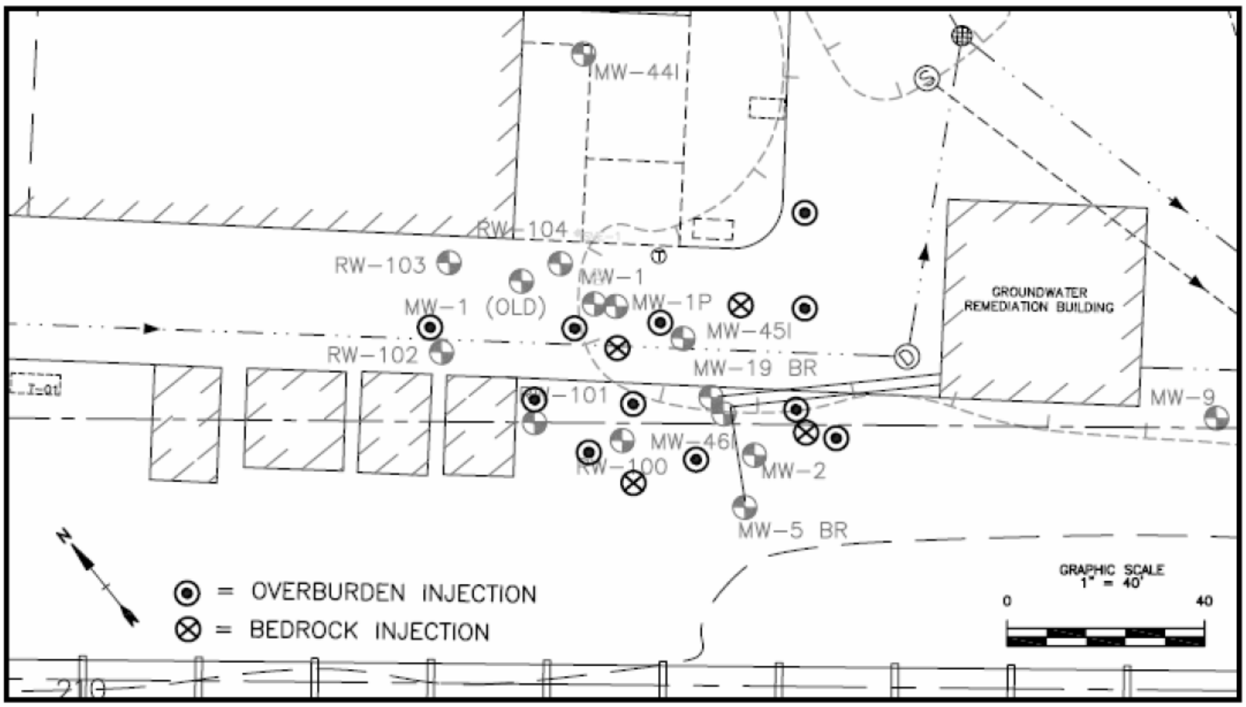


Figure 1. Injection Points and Monitoring Well Locations

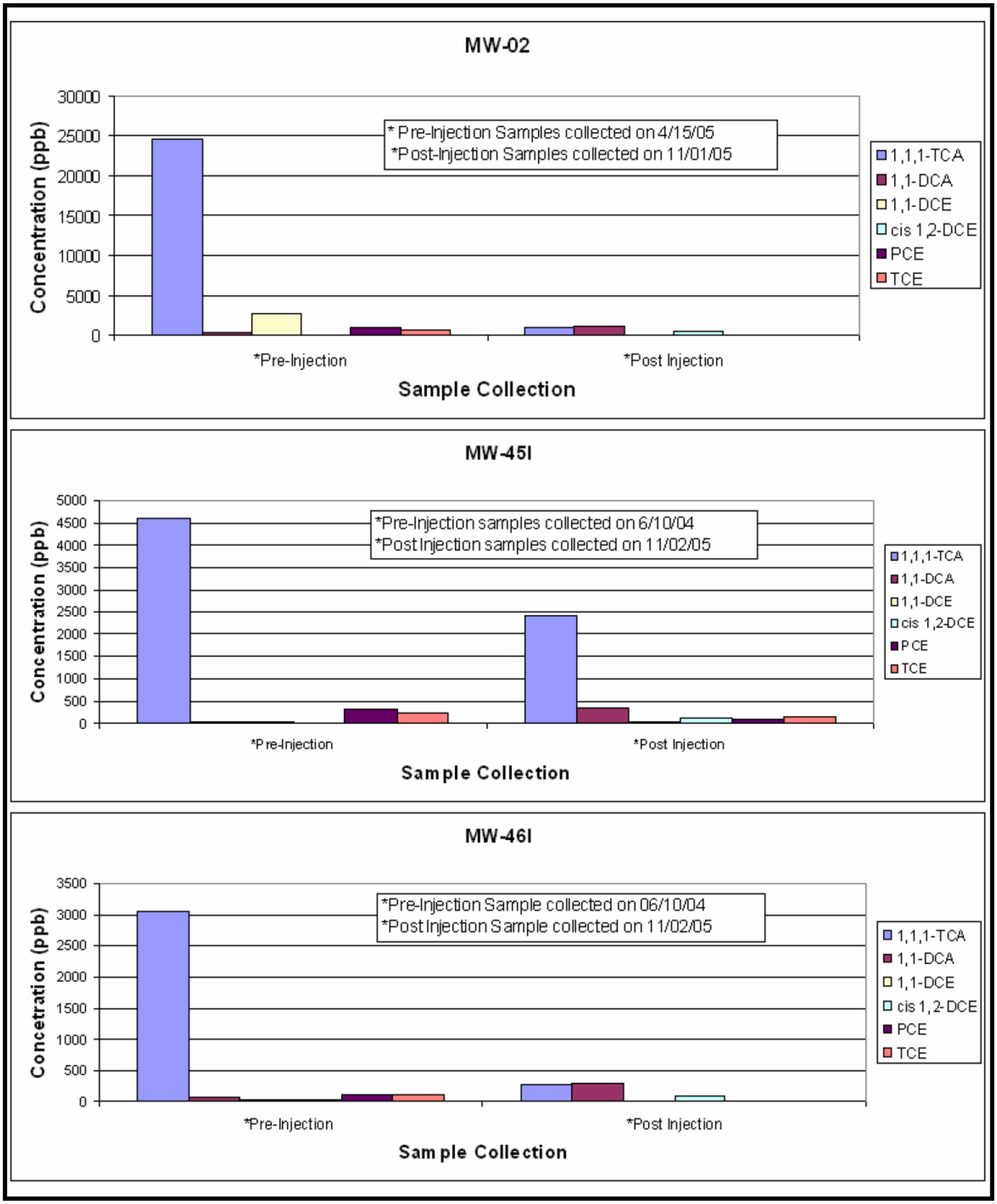


Figure 2. Monitoring Data

Redox Tech, LLC

A CASE STUDY FOR THE APPLICATION OF ABCÒ INJECTION TO STIMULATE ANAEROBIC BIODEGRADATION OF CIS-DICHLOROETHENE AND VINYL CHLORIDE

Redox Tech, LLC developed a proprietary process to promote anaerobic biodegradation of chlorinated solvents in groundwater. The process involves the injection of a patented mixture (Anaerobic Biochem ABC®) of lactates, fatty acids, and a phosphate buffer. Unlike competitor's products, the mixture is specifically formulated for each site. ABC® contains soluble lactic acid as well as slow- and long-term releasing components. The phosphate buffer provides phosphates, which are a micronutrient for bioremediation. In addition, the buffer helps to maintain the pH in a range that is best suited for microbial growth. Using a GeoProbe® and proprietary injection equipment, Redox Tech is able to inject ABC® in most geologic environments, including low-permeability silt and clay. Redox Tech conducted a field pilot test to demonstrate the application of its injection process and its effectiveness on cis-dichloroethene (cis-DCE) and vinyl chloride.

AN INSIDE LOOK AT THE REDOX TECH REMEDIAL APPROACH

Many common organic groundwater contaminants can be treated in situ by enhanced anaerobic processes. These types of contaminants include chlorinated solvents, some chlorinated aromatics, nitroaromatics, inorganics (e.g. nitrate and perchlorate), and metals (e.g. chromium). With anaerobic biodegradation, the target contaminants are "reduced" with hydrogen, unlike chemical oxidation or aerobic processes where oxygen is the working chemical. For optimal anaerobic degradation to occur, more energetically favorable electron acceptors such as oxygen, nitrate, manganese, ferric iron or sulfate must first be consumed. There also must be sufficient food, or electron donors, for the bacteria to thrive. Microorganisms, like humans, breath electron acceptors and eat electron donors. To optimize anaerobic biodegradation, the goal is to choke the plume (deplete oxygen and other electron acceptors), before it starves (depletes food or electron donors). Electron donors can include co-contaminants such as petroleum hydrocarbons or natural organic matter. If these donors are not available or are not sufficient, the anaerobic process can be enhanced by introducing a food source into the subsurface. One of the most effective and environmentally benign food sources are fatty acids, such as ABC®. Under reducing conditions, the bacteria that degrade chlorinated organics use the chlorinated organics as electron receptors. Natural degradation can be halted by:

- Inadequate source of food or electron donors
- Inadequate source or type of microorganism
- Highly reducing conditions in which competing microorganisms use the food source with alternative electron acceptors

Reductive dechlorination involves the sequential removal of chlorine atoms. Tetrachloroethene (PCE) is sequentially converted to its daughter products trichloroethene (TCE), cis-DCE, vinyl chloride, ethene, and ethane. Organisms capable of fully degrading PCE and TCE to ethene use hydrogen as a food source. However, excessive hydrogen levels will compete with and impede the growth of degrading microorganisms.

[1] ABC® is protected by US Patent 6,001,252; Redox Tech has a license for this product.

CASE STUDY RESULTS

MacDill Air Force Base

MacDill Air Force Base (MacDill) is located in Tampa, Florida. The base supports the Air Force Central Command and is approximately 5, 638 acres. It formerly served as a mission training base for F-16 fighter squadrons. Groundwater and soil at the site are contaminated with a wide range of contaminants, including petroleum products, pesticides, munitions, polychlorinated biphenyls, heavy metals, volatile organic compounds, and solvents. The pilot test was completed at Site 57, which contains trace levels of TCE, plus the anaerobic daughter products including cis-DCE and vinyl chloride (VC). The original TCE at the site has essentially anaerobically decayed, however, cis-DCE and VC levels were stagnant. Extensive geochemical data for Site 57 indicated that the conditions were reducing, but the conditions were not ideal for reduction of cis-DCE and vinyl chloride. Redox Tech formulated ABC® for Site 57 and used hydraulic fracturing to inject ABC®. The goal of the pilot test was to demonstrate that ABC® would stimulate degradation of the cis-DCE and vinyl chloride.

Redox Tech completed field activities at Site 57 in April 2003. ABC® solutions were injected near an apparent source zone of the cis-DCE plume, defined as concentrations greater than 700 ppb. The area also had high vinyl chloride concentrations, defined as concentrations greater than 70 ppb. The target interval was a silt, sand and limestone mixture, commonly called limestone mud. ABC® was injected at 18 locations circling monitoring well MW06A. As shown in Figure 1, the locations included an inner circle of 6 points located 5 to 10 ft from the well and an outer circle of 12 points located 15 to 20 ft from the well.

Redox Tech completed the injections with a Geoprobe® using standard 1-1/4 inch rods and a Geoprobe® proprietary injection tool. The injection was completed over a two and one-half day period. The formation first was hydraulically fractured with the ABC® solution at depth. Fracture initiation pressures were as high as 175 psi in some locations. The desired volume of solution was injected over each interval. Injections proceeded upwards from the bottom of the targeted interval in approximate 3-foot increments.

The enhanced biodegradation results from the ABC® injection are shown in Figure 2. Within weeks of injecting ABC®, there was a significant decrease in the observed levels of DCE. In conjuction and as expected, there was a corresponding increase in the levels of VC. The VC resulted from the anaerobic decay of the DCE. There was also an increase in ethene and ethane levels from the VC being converted to ethene and ethane. After two months, the DCE levels were below the regulatory limit. The VC continued to decrease after the DCE reach non-detect levels. Volatile fatty acid (VFA) analyses were completed during the test. The VFA levels increased after the injection and remained elevated for six months following injection. The site is now being considered for full-scale remediation with injection of ABC®.

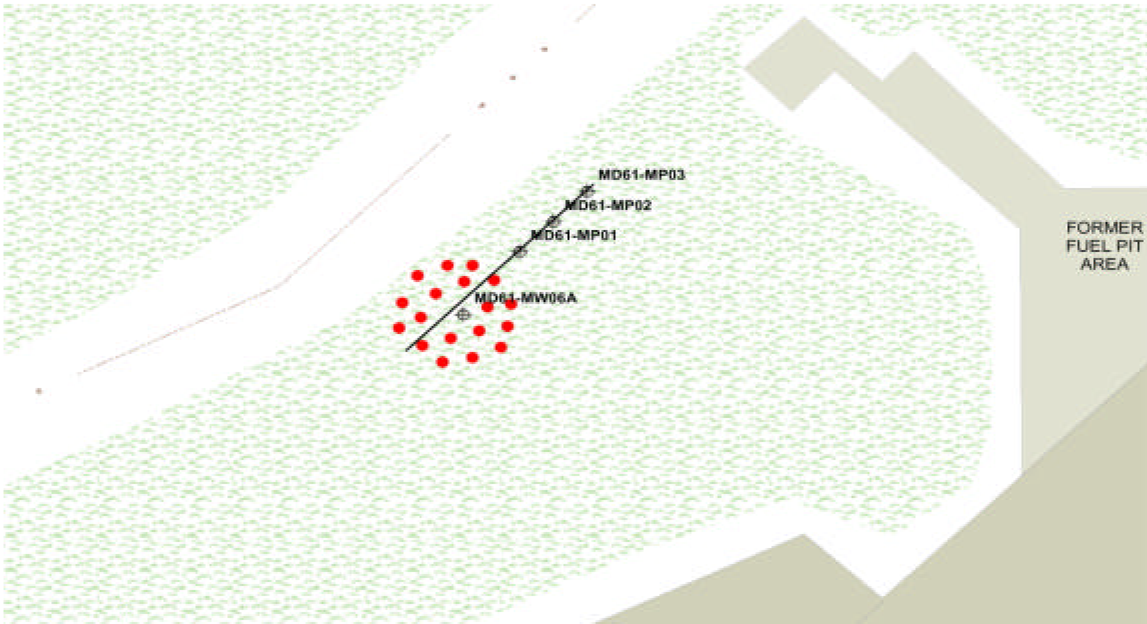


Figure 1. Injection Points and Monitoring Well Locations

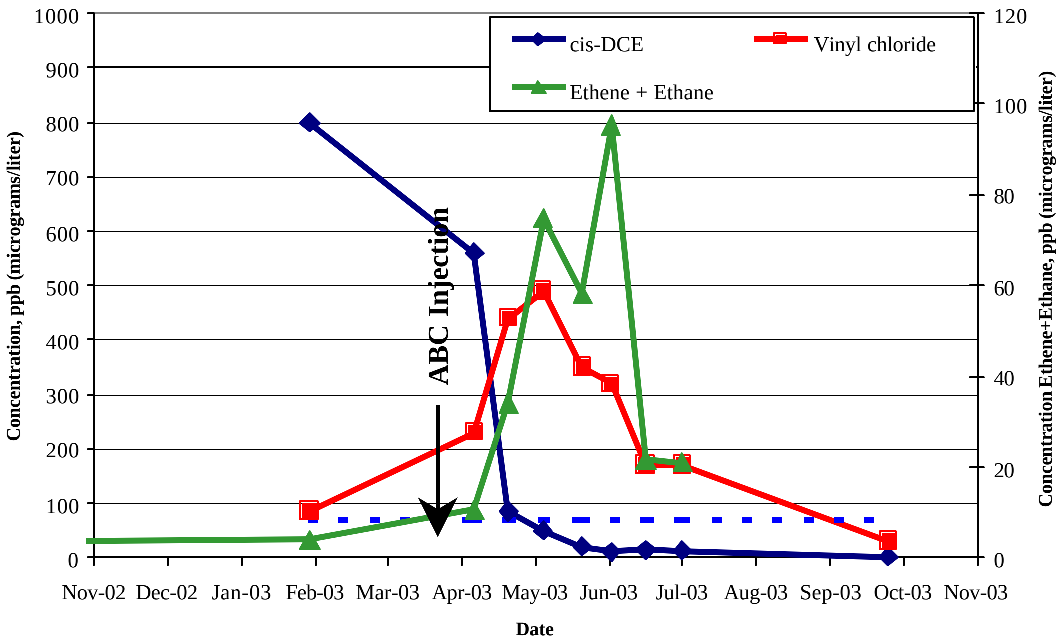


Figure 2. Monitoring Data from MW06A

REDOX TECH, LLC

"Providing Innovative In Situ Soil and Groundwater Treatment"

A CASE STUDY FOR THE PILOT STUDY APPLICATION OF ABC-OLÉ TO REMEDIATE GROUNDWATER CONTAINING LOW CONCENTRATIONS OF CHLORINATED ALKENES AND SULFATE

Project Location
Former Landfill
Blackstone, VA

Contaminants
Tetrachloroethene
Trichloroethene
Dichloroethene Isomers
Vinyl Chloride

Product Used
ABC- Olé

Scope and Media
15-month ERD Pilot Study in Groundwater

Results
PCE↓ 95.6%
TCE↓ 95.5%
Sulfate↓91.5%
DHC Microbes↑100X
↑ Chloride

A bioremediation pilot study using the emulsified carbon substrate ABC-Olé was conducted from July 2013 through October 2014 near Blackstone, Virginia. Contaminants of concern at the site include several chlorinated alkenes. The pilot study was completed to determine the effectiveness of enhanced anaerobic bioremediation to treat groundwater *in-situ* and to provide site-specific data for a full scale design.

SITE BACKGROUND

The site is a former landfill located in the Piedmont physiographic province of south central Virginia. Contaminants associated with historical waste disposal at the landfill include the chlorinated alkenes of tetrachloroethene (PCE) and trichloroethene (TCE). Groundwater at the site occurs within a single, unconfined aquifer system consisting of saprolite overlying fractured bedrock.

When the pilot study was initiated, PCE concentrations in groundwater at the test wells ranged from 53.6 79.3 ppb, and TCE concentrations ranged from 21.2 to 33.5 ppb. Total chlorinated alkene concentrations, inclusive of parent and daughter compounds, were less than 130 ppb. Natural sulfate concentrations varied from 17.6 to 24.3 ppm in groundwater.

PILOT STUDY METHODS

The pilot study was conducted using single well "push-pull" methods at the injection well (IW-1) combined with groundwater monitoring at four performance monitoring wells (PW-1, PW-2, PW-3 and PW-4). The performance monitoring wells were located at distances of 5 feet or 10 feet hydraulically down gradient and/or slightly side gradient from the injection well. Two ABC-Olé injection events were performed at IW-1 eight months apart. The first injection event in August 2013 used 500 pounds of ABC-Olé mixed with groundwater purged from IW-1 to create 130 gallons of injectate liquid. Carbon substrate concentrations and volumes were increased to 1,500 pounds of ABC-Olé in 225 gallons of injectate fluid for a second injection event in April 2014.

Pre-injection and post-injection groundwater sampling was performed at IW-1 and the four down gradient monitoring wells to assess the impact of the ABC-Olé on the subsurface microbial community, changes in groundwater geochemistry, and biodegradation of chlorinated alkenes. A baseline groundwater sampling event was performed in July 2013, one month prior to the first injection. This was followed by two performance sampling events in November 2013 and February 2014. Two additional groundwater sampling events were performed in July 2014 and October 2014 after the second ABC-Olé injection event (April 2014).

Push-pull tests performed with each injection event at IW-1 consisted of two stages. In the first stage (the "push" step), the ABC-Olé liquid substrate was injected into test well IW-1. The injectate fluid was allowed three months to migrate away from the injection well. After each injection event, the "pull" stage was initiated whereby groundwater was extracted periodically from IW-1 for analyses of chlorinated alkenes, biogeochemical parameters and microbial populations. Groundwater affected by ABC-Olé injection was also monitored at the four down gradient wells.

Dissolved gases (i.e., methane, ethene and ethane), chlorinated alkenes and chloride were analyzed during each groundwater sampling event to provide direct evidence of reductive dechlorination. Volatile fatty acids (VFAs) and total organic carbon were analyzed to provide information on the distribution, required dosing rates and dosing frequencies of the carbon substrate for the full-scale remedial design. Geochemical parameters and/or terminal electron acceptors including dissolved iron, sulfate, nitrate, pH and oxidation-reduction potential were analyzed during each groundwater sampling event to monitor the progress of reducing conditions. Phospholipid Fatty Acid Analysis (PLFA) and analyses for *Dehalococcoides spp*. (DHC) dechlorinating bacteria were also performed.

RESULTS

Groundwater showed varying responses in chlorinated alkene concentrations, biogeochemical parameters, and microbial populations during the 15-month pilot study. Well IW-1 and the two monitoring wells located directly downgradient of the injection well (PW-2, PW-4) had the largest reductions of parent chlorinated alkenes. Reductions of PCE concentrations occurred at all five wells and ranged from 95.6% to 15.7% at the end of the pilot study. PCE reductions were not attributable to dilution based on several lines of evidence, including ratios of PCE to cis-1,2-dichloroethene (cDCE) that were maintained in the wells, increases in chloride and ethene, and stable background concentrations of chlorinated alkenes during the study.

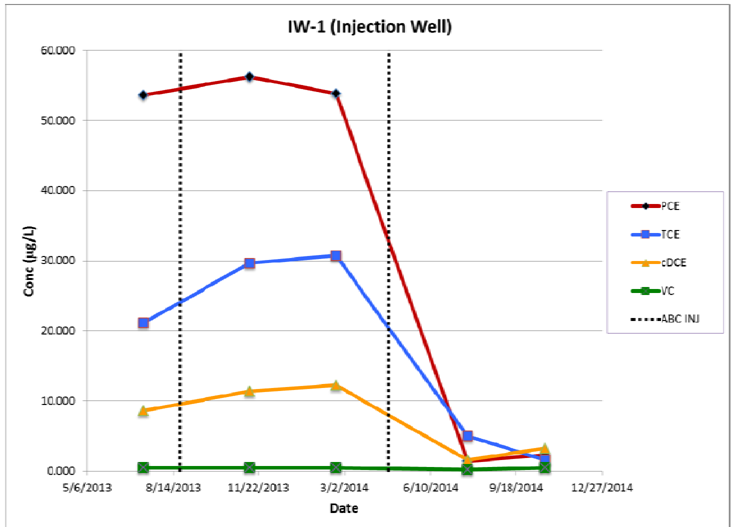
Because TCE is a parent contaminant at the site and is also a dechlorination daughter product of PCE, its concentrations fluctuated and showed higher variability at each well during the pilot study. TCE reductions ranging from 94.5% to 51% were observed at IW-1, PW-2 and PW-4, while minor increases in TCE occurred at the two side-gradient wells PW-1 and PW-3. Concentrations of other dechlorination daughter compounds (cDCE and vinyl chloride) also varied during the pilot test.

Sulfate was reduced and both dissolved iron and VFAs increased at the five test wells. Methane, which was naturally-occurring in groundwater beneath the landfill, also increased at four of the wells.

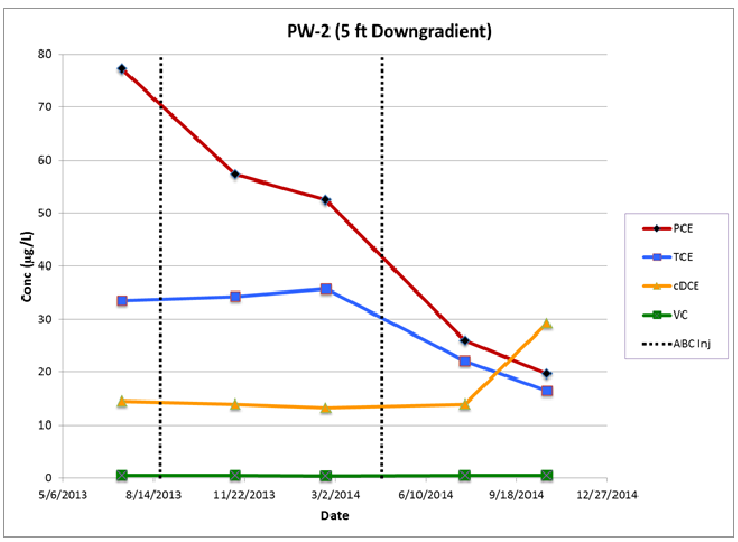
IW-1:The largest reductions in PCE and TCE (>94%) occurred at injection well IW-1. PCE and TCE concentrations decreased from pre-injection levels of 53.6 μg/L and 21.2 μg/L, respectively, to 2.35 μg/L (PCE) and 1.16 μg/L (TCE) during the push-pull tests conducted at this well.

Concentrations of PCE and TCE were relatively unchanged from the baseline concentrations for six months after the first ABC®-Oléinjection, but decreased significantly following the second injection.

Decreases in PCE and TCE concentrations were accompanied by the corresponding generation of ethane at IW-1 toward the end of the pilot study. Chloride concentrations also increased up to 3.7-fold at the end of the test compared to the baseline levels. DHC microbes were below 4.00E-01 cells per milliliter (cells/mL) in the baseline sampling event, increased to 1.36E+01 cells/mL six months after the first ABC-Olé injection, and then declined to baseline levels at the end of the pilot study. This indicates that DHC growth was temporarily stimulated by introduction of the organic substrate.



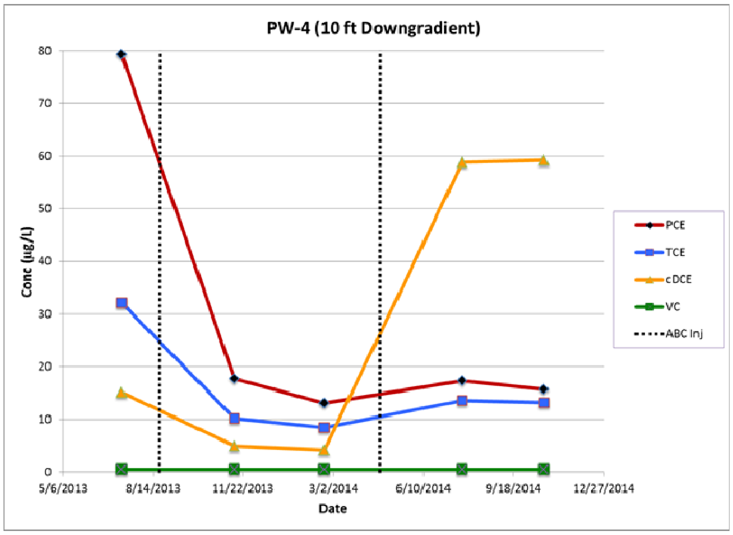
PW-2: Well PW-2 also showed evidence of chlorinated alkenes biodegradation in groundwater following the ABC-Olé injections. PCE concentrations decreased 74%, from pre-injection levels of 77.2 µg/L to 19.7 µg/L at the end of the pilot study. TCE also decreased 51% during this time period, from 33.5 µg/L (baseline) to 16.5 µg/L at the pilot test conclusion.



Although cDCE concentrations at PW-2 remained relatively unchanged during most of the pilot test, they increased by 100% compared to baseline levels toward the end of the pilot study. The pre-injection ratios of PCE to cDCE changed significantly at PW-2 during the pilot study, from 5.3 during the baseline sampling event to a ratio of 0.7 at the end of the test. Vinyl chloride and ethane were also produced at various times during the test. Chloride increased two-fold compared to the baseline levels, providing further evidence that the parent chlorinated alkenes were dehalogenated.

DHC microbes were not detected (<4.0E-01 cells/mL) in the baseline sampling event at PW-2. Following the ABC-Olé injections, DHC populations increased to concentrations ranging from 3.8 cells/mL to 9.8 cells/mL in three out of the four post-injection sampling events.

<u>PW-4</u>: Monitoring well PW-4, located 10 feet hydraulically downgradient of the injection well, also showed evidence of PCE and TCE dechlorination in groundwater following the injections. PCE concentrations initially declined 77% within three months following the first injection, remained near these levels throughout the pilot test, and were reduced by 80% after 14 months. TCE concentrations showed a similar trend, in which there was a substantial initial reduction (68%) after three months followed by maintenance of reduced levels for the remainder of the pilot study.



Groundwater at PW-4 showed the largest percentage increase in cDCE compared to the other monitoring wells. Following the initial ABC-Olé injection, the cDCE concentrations declined up to 72% during the first six months of monitoring. The six-month period following the second ABC-Olé injection produced a 290% increase in cDCE compared to the initial baseline concentrations. Vinyl chloride and ethene were not detected at PW-4 during any sampling events, and chloride remained unchanged. However, sulfate was reduced by 69% and dissolved iron increased more than one order of magnitude at this well.

Microbial analyses indicated that DHC bacteria were not detected at PW-4 during the baseline sampling event or the first two post-injection sampling events. DHC populations increased from non-detectable (<4.00E-01 cells/mL) to 7.20E+01 cells/mL following the second injection event.

Microbial Responses

Chemical and geochemical data, combined with the results for DHC, provide strong evidence of complete biological reductive dechlorination of PCE to ethene at wells IW-1 and PW-2.DHC bacteria populations generally increased in ABC-Olé substrate-enhanced groundwater, although the magnitude of the increases showed spacial and temporal variability. In addition, with the exception of well PW-3, groundwater analyzed for PLFA generally showed an increase in total microbial biomass by one to two orders of magnitude.

SAFETY DATA SHEET
Anaerobic BioChem (ABC®)

Aug 23, 2021

Section 1: Identification	
Product Name:	Anaerobic BioChem (ABC®)
Chemical Description:	Fermentable organic carbon with micronutrients
Manufacturer:	Redox Tech, LLC 200 Quade Drive Cary NC 27513 919-678-0140 www.redox-tech.com
Recommended Use:	Treatment of halogenated solvents and metals in soil and groundwater
Restricted Use:	
24-Hour Emergency Contact:	ChemTrec: Within USA and Canada: 1-800-424-9300 International +1 703-527-3887 (collect calls accepted)

Section 2: Hazard(s) Identification	
Hazard Classification:	Irritant (skin and eye)
Signal Word:	Warning
Hazard Statement(s):	Potential eye and skin irritant.
Pictograms:	 
Precautionary Statement(s):	Not for human consumption. Do not store near excessive heat or oxidizers. Avoid contact with eyes and skin. Wear protective gloves and eye protection.

Section 3: Chemical Composition		
Chemical Name	CAS Number	Weight Percentage
Sodium Lactate	867-56-1	0 to 60
Ethyl Lactate	687-47-8	0 to 95
Glycerol	56-81-5	0 to 98
Fatty Acid Esters	135800-37-2	0 to 30
Phosphate Salts	14265-44-2	0 to 1.0

Section 4: First-Aid Measures	
Routes of Exposure	**Emergency First-Aid Procedures**
Inhalation	Remove to fresh air.
Eye Contact	Flush with water for 15 minutes; if irritation persists see a physician.
Skin Contact	Wash with mild soap and water.
Ingestion	Product is non-toxic. If nausea occurs, induce vomiting and seek medical attention.

Section 5: Fire-Fighting Measures	
Extinguishing Media:	CO_2, foam, dry chemical Note: Water, fog and foam may cause frothing and spattering.
Special Fire Fighting Procedures:	Wear self-contained breathing apparatus and chemical resistant clothing. Use water spray to cool fire exposed containers.
Fire Hazard(s):	Combustion will generate carbon dioxide and carbon monoxide

Section 6: Accidental Release Measures	
Personal Precautions:	Avoid contact with eyes and skin. Do not consume.
Emergency Procedures:	Avoid discharge to surface water bodies as it may cause depressed oxygen levels
Methods & Materials used for Containment:	Absorbent media, sorbent media, vacuum collection and disposal.
Cleanup Procedures:	Vacuum up excess liquid. Use absorbent media. Dispose of material according to local, state or federal requglations

Section 7: Handling and Storage	
Safe Handling & Storage:	Do not store near excessive heat or oxidizers.
Other Precautions:	Consumption of food and beverages should be prevented in work area where product is being used. After handling product, always wash hands and face thoroughly with soap and water before eating, drinking, or smoking.

Section 8: Exposure Controls/Personal Protection		
Exposure Limits		
OSHA PEL:	NE	
ACGIH TLV:	NE	
NIOSH REL:	NE	
Personal Protective Measures		
Respiratory Protection:	Not normally required. Avoid splashing and aerosols.	
Hand Protection:	Protective gloves are recommended	
Eye Protection:	Recommended with side shields	
Engineering Measures:	None should be required	
Hygiene Measures:	Wash promptly with soap & water if skin becomes irritated from contact.	
Other Protection:	Wear appropriate clothing to prevent skin contact.	

Section 9: Physical and Chemical Properties			
Appearance:	Clear or Milky	Explosive Limits:	NA
Odor:	Mild Organic	Vapor Pressure:	NA
Odor Threshold:	NA	Vapor Density:	Heavier than air
pH:	6 to 8 su	Relative Density:	0.8-1.3
Melting Point/Freezing Point:	Liquid at room temperature	Solubility:	Soluble
Boiling Point:	> 100C	Partition coefficient:	NE
Flash Point:	>300°F (149°C)	Auto-ignition Temperature:	NE
Evaporation Rate:	NA	Decomposition Temperature:	N/A
Flammability (solid, gas):	NA	Viscosity:	10-150 cP

NA – Not Available

Section 10: Stability and Reactivity	
Stability:	Stable
Incompatibility:	Oxidizers
Hazardous Decomposition Products:	Thermal decomposition may product carbon dioxide, carbon monoxide and other organic compounds
Hazardous Reactions/Polymerization:	None known
Conditions to Avoid:	Separation of product may occur if exposed to heat

Section 11: Toxicological Information		
Likely Routes of Exposure:		Ingestion, dermal and eye contact
Signs and Symptoms of Exposure:		None known
Health Hazards		
	Acute:	Potential eye and skin irritant
	Chronic:	None known
Carcinogenicity		
	NTP:	No
	IARC:	No
	OSHA:	No

Section 12: Ecological Information
Product is known to cause suppressed dissolved oxygen in water which can create aquatic stress

Section 13: Disposal Considerations	
Waste Disposal Methods:	Dispose of according to Federal and local regulations for non-hazardous material. Redox Tech will sometimes take product back.

Section 14: Transport Information

The product is not covered by international regulation on the transport of dangerous goods.
This product is non-hazardous for DOT

Section 15: Regulatory Information

Not subject to regulation. Generally recognized as safe.

Section 16: Other Information

Date of Preparation:	1 April 2003
Last Modified Date:	23 August 2021

Safety Data Sheet

Shaw Environmental, Inc.
17 PRINCESS ROAD
LAWRENCEVILLE, N.J. 08648
(609) 895-5340

SECTION 1 - MATERIAL IDENTIFICATION AND INFORMATION

Material Name: DHC microbial consortium (RTB-1 SDC-9) MSDS #: ENV 1033

Date Prepared: 10/06/2003 CAS #: N/A (Not Applicable)

Prepared By: Simon Vainberg Formula #: N/A

Material Description: Non-hazardous, naturally occurring non-altered anaerobic microbes and enzymes in a water-based medium.

24 HOUR EMERGENCY RESPONSE PHONE NUMBER (800)424-9300

SECTION 2 - INGREDIENTS

Components	%	OSHA PEL	ACGIH TLV	OTHER LIMITS
Non-Hazardous Ingredients	100	N/A	N/A	N/A

SECTION 3 - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: 100° C (water)

Specific Gravity (H_2O = 1): 0.9 - 1.1

Vapor Pressure @ 25° C: 24 mm Hg (water)

Melting Point: 0° C (water)

Vapor Density: N/A

Evaporation Rate (H_2O = 1): 0.9 - 1.1

Solubility in Water: Soluble

Water Reactive: No

pH: 6.0 - 8.0

Appearance and Odor: Murky, yellow water. Musty odor.

SECTION 4 - FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A

Flammable Limits: N/A

Extinguishing Media: Foam, carbon dioxide, water

Special Fire Fighting Procedures: None

Unusual Fire and Explosion Hazards: None

SECTION 5 - REACTIVITY DATA

Stability: Stable

Conditions to Avoid: None

Incompatibility (Materials to Avoid): Water-reactive materials

Hazardous Decomposition Byproducts: None

SECTION 6 - HEALTH HAZARD DATA

<u>HEALTH EFFECTS</u>

The effects of exposure to this material have not been determined. Safe handling of this material on a long-term basis will avoid any possible effect from repetitive acute exposures. Below are possible health effects based on information from similar materials. Individuals hyper allergic to enzymes or other related proteins should not handle.

Ingestion: Ingestion of large quantities may result in abdominal discomfort including nausea, vomiting, cramps, diarrhea, and fever.

Inhalation: Hypersensitive individuals may experience breathing difficulties after inhalation of aerosols.

Skin Absorption: N/A

Skin Contact: May cause skin irritation. Hypersensitive individuals may experience allergic reactions to enzymes.

Eye Contact: May cause eye irritation.

FIRST AID

Ingestion: Get medical attention if allergic symptoms develop (observe for 48 hours). Never give anything by mouth to an unconscious or convulsing person.

Inhalation: Get medical attention if allergic symptoms develop.

Skin Absorption: N/A

Skin Contact: Wash affected area with soap and water. Get medical attention if allergic symptoms develop.

Eye Contact: Flush eyes with plenty of water for at least 15 minutes using an eyewash fountain, if available. Get medical attention if irritation occurs.

NOTE TO PHYSICIANS: All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this material may have occurred.

SECTION 7 - SPILL AND LEAK PROCEDURES

Reportable quantities (in lbs of EPA Hazardous Substances): N/A

Steps to be taken in case of spill or release: No emergency results from spillage. However, spills should be cleaned up promptly. All personnel involved in the cleanup must wear protective clothing and avoid skin contact. Absorb spilled material or vacuum into a container. After clean-up, disinfect all cleaning materials and storage containers that come in contact with the spilled liquid.

Waste Disposal Method: No special disposal methods are required. The material may be sewered, and is compatible with all known biological treatment methods. To reduce odors and permanently inactivate microorganisms, mix 100 parts (by volume) of DHC consortium with 1 part (by volume) of bleach. Dispose of in accordance with local, state and federal regulations.

SECTION 8 - HANDLING AND STORAGE

Hand Protection: Rubber gloves.

Eye Protection: Safety goggles with side splash shields.

Protective Clothing: Use adequate clothing to prevent skin contact.

Respiratory Protection: Surgical mask.

Ventilation: Provide adequate ventilation to remove odors.

Storage & Handling:
Material may be stored for up to 3 weeks at 2-4° C without aeration.

Other Precautions: An eyewash station in the work area is recommended.

While the information and recommendations set forth herein are believed to be accurate as of the date hereof, Shaw Environmental, Inc. MAKES NO WARRANTY WITH RESPECT HERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

APPENDIX B

HEALTH AND SAFETY PLAN

Health and Safety Plan
for
Brownfield Remedial Investigation

Moyer Carriage Lofts

1714 North Salina Street
(SBL 002.-03-05.0)
Syracuse, Onondaga County, New York

Site No. TBD

Prepared by

C&S Engineers, Inc.
499 Colonel Eileen Collins Boulevard
Syracuse, New York 13212

September 2020

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SECTION 1 – GENERAL INFORMATION

The Health and Safety Plan (HASP) described in this document will address health and safety considerations for all those activities that personnel employed by C&S Engineers, Inc., may be engaged in during site investigation and remediation work at the Moyer Carriage Lofts Site located at 1714 North Salina Street in Syracuse, Onondaga County, New York (Site). **Figure 1** shows the approximate location of the Site. This HASP will be implemented by the Health and Safety Officer (HSO) during site work.

Compliance with this HASP is required of all C&S personnel who enter this Site. The content of the HASP may change or undergo revision based upon additional information made available to the health, safety, and training (H&S) committee, monitoring results or changes in the technical scope of work. Any changes proposed must be reviewed by the H&S committee.

DISCLAIMER

This document addresses health and safety considerations for all those activities that personnel employed by C&S Engineers, Inc., may be engaged in during site investigation and remediation work. Every contractor is expected to prepare and implement their own site-specific health and safety plan. This document may be used as a general outline to inform the creation of other health and safety plans for this NYSDEC Brownfield site.

Responsibilities

Project Manager and H&S Manager…………………………………………………….	Matt Walker Phone: (315) 703-4323 Cell: (315) 200-5872
Site Health and Safety Officer…………………………...	Jordan Berti Phone: (315) 703-4349 Cell: (315) 657-6202
Emergency Coordinator………………………………….	Jordan Berti Phone: (315) 703-4349 Cell: (315) 657-6202

Emergency Phone Numbers

Emergency Medical Service...911

Police: Onondaga County Sheriff or NYS Police 911

Fire: Syracuse Fire Department...911

Hospital: Upstate Medical University..(315) 464-4276

National Response Center ....(800) 424-8802

Poison Control Center ....(800) 222-1222

Center for Disease Control...(800) 311-3435

NYSDEC Region 7 (Syracuse, New York) ....(315) 426-7400

C&S Engineers...(315) 455-2000

Site Superintendent ....**TBD**

Project Field Office Trailer ....**TBD**

SECTION 2 - HEALTH AND SAFETY PERSONNEL

2.0 Health and Safety Personnel Designations

The following information briefly describes the health and safety designations and general responsibilities for this Site.

2.1 Project Manager (PM)

The PM is responsible for the overall project including the implementation of the HASP. Specifically, this includes allocating adequate manpower, equipment, and time resources to conduct Site activities safely.

2.2 Health and Safety Manager

- Has the overall responsibility for coordinating and reporting all health and safety activities and the health and safety of Site Workers.
- Must have completed, at a minimum, the OSHA 30-Hour Construction Safety Training, and either the 24-Hour training course for the Occasional Hazardous Waste Site Worker or the 40-Hour training course for the Hazardous Waste Operations Worker that meets OHSA 29 CFR 1910.
- Must have completed the 8-Hour Site supervisor/manager's course for supervisors and managers having responsibilities for hazardous waste Site operations and management.
- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment (PPE).
- Conducts initial on-site specific training prior to Site Workers commencing work.
- Conducts and documents daily and periodic safety briefings.
- Ensures that field team members comply with this HASP.
- Immediately notifies the Construction Manager (CM) Project Manager and Superintendent of all accident/incidents.
- Determines upgrading or downgrading of PPE based on Site conditions and/or real time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as the manufacturer's instructions determine.
- Reports to the CM Project Manager and Superintendent to provide summaries of field operations and progress.
- Submits and maintains all documentation required in this HASP and any other pertinent health and safety documentation.

2.3 Health and Safety Officer (HSO)

- Must be designated to the Health and Safety Manager by each Subcontractor as a Competent Person having, at a minimum, the OSHA 30-Hour Construction Safety Training
- Must schedule and attend a Pre-Construction Safety Meeting with the Health and Safety Manager to discuss the Subcontractor Safety Requirements and must attend the Weekly Subcontractor Coordination Meeting.

- Responsible for ensuring that their lower tier contractors comply with project safety requirements.
- Must make frequent and regular inspections of their work areas and activities and ensure hazards that are under their control are corrected immediately and all other hazards are reported to the Construction Manager's Project Manager and Health and Safety Manager.
- Must report all work related injuries, regardless of severity, to the Construction Manager's Project Manager and the Health and Safety Manager within 24 hours after they occur.

2.4 Emergency Coordinator

- The Emergency Coordinator or his on-site designee will implement the emergency response procedures whenever conditions at the Site warrant such action.
- The Emergency Coordinator or his on-site designee will be responsible for assuring the evacuation, emergency treatment, emergency transport of C&S personnel as necessary, and notification of emergency response units (refer to phone listing in the beginning of this HASP) and the appropriate management staff.

2.5 Site Workers

- Report any unsafe or potentially hazardous conditions to the Health and Safety Manager.
- Maintain knowledge of the information, instructions, and emergency response actions contained in the HASP.
- Comply with rules, regulations, and procedures as set forth in this HASP, including any revisions that are instituted.
- Prevent unauthorized personnel from entering work Site.

SECTION 3 - PERTINENT SITE INFORMATION

3.1 Site Location and General History

The Moyer Carriage Lofts Site (Site) is located at 1714 North Salina Street in the City of Syracuse, Onondaga County, New York. The Site includes five brick and block buildings which account for approximately 204,964 square feet of gross building space. The buildings were constructed sometime before 1892 until 1956. The Site is approximately 2.12 acres in size, which includes a parking lot along the northwestern side of the Site buildings. The buildings are currently vacant and in a distressed condition.

The Site is located in the Syracuse North Side community. The Site is located within the Hiawatha - Lodi (Hi-Lo) Brownfield Opportunity Areas (BOA). The site is bounded to the north by Park Street, to the south by North Salina Street, east by Wolf Street, and west by Exchange Place. Properties surrounding the Site are commercial and industrial facilities.

Figure 1 shows the location of the Site and Figure 2 shows the Project Area and Site Boundaries.

Site History and Suspect Recognized Environmental Conditions

The Property has been used for industrial and commercial purposes since it was first developed prior to 1892 as the Moyer Carriage Factory (a.k.a. Moyer Automobile Company). Site operations included carriage and vehicle manufacturing. Between 1912 and 1958, the Site was home to the Porter Cable Company for use as a tool manufacturing facility. From 1958 to 2012, the Site was owned and operated by Penfield Mattress Company. Site operations included machining, plating as well as parts and equipment cleaning. In 2012, the Site was purchased by G&K Trucking, LLC. The site is currently unoccupied and only partially used for material storage.

The soil across the Site generally consists of historic fill extending to two feet bgs. Consistent with historic fill found in cities in the Northeast US, this historic fill contains SVOC and metal contamination, as shown in recent sampling. No discrete contamination layer was observed within the fill, and therefore, the extent of contamination within the fill material is difficult to identify due to its heterogeneous nature. The latitudinal extent of the fill appears to comprise nearly the entire extent of the exposed Site, which is approximately 0.83 acres (36,500 square feet) or 2,704 cubic yards of material.

In addition to impacts identified within the historic fill, there is a potential for petroleum related impacts in the soil surrounding the abandoned 10,000-gallon USTs. There is also a potential for historic fill to be present beneath the building footprint. Impacts related to historic fill beneath the building footprint and abandoned tanks will be documented as part of the Remedial Investigation.

Impacts to groundwater will be documented as part of the Remedial Investigation.

SECTION 4 - HAZARD ASSESSMENT AND HAZARD COMMUNICATION

Hazards to workers during site work include typical construction-related hazards such as slip-trip-fall, equipment malfunction, faulty electrical grounding, and heat/cold/excessive noise exposure. In addition to those typical construction-related hazards, there is also the potential for chemical exposures associated with environmental conditions. The most likely routes of chemical exposure during site work tasks include skin adsorption and inhalation of airborne dust particles.

It is difficult to draw a correlation between the concentrations of contaminants found in one media and the potential for exposure to these contaminants to site workers. However, their potential presence indicates that the potential for exposure to these compounds exist, and the requirements for protective measures and monitoring of exposure is based on this potential.

SECTION 5 – TRAINING

5.1 Site-specific Training

Training will be provided that specifically addresses the activities, procedures, monitoring, and equipment for the Site operations prior to going on site. Training will include familiarization with Site and facility layout, known and potential hazards, and emergency services at the Site, and details all provisions contained within this HASP. This training will also allow Site Workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

5.2 Safety Briefings

C&S project personnel will be given briefings by the HSO on a daily or as needed basis to further assist Site Workers in conducting their activities safely. Pertinent information will be provided when new operations are to be conducted. Changes in work practices must be implemented due to new information made available, or if Site or environmental conditions change. Briefings will also be given to facilitate conformance with prescribed safety practices. When conformance with these practices is not occurring or if deficiencies are identified during safety audits, the project manager will be notified.

SECTION 6 – ZONES

Four types of Site activity zones are identified for the Brownfield investigation activities, including the Exclusion Zone, Contamination Reduction Zone, Remediation Zone and the Support Zone. Prior to commencement of field work a further definition of where these zones will be set up will be established.

6.1 Exclusion Zone

The area where the unexpected condition is discovered would be considered the Exclusion Zone (EZ). All excavation and handling of contaminated materials generated as a result of the discovery of an unexpected condition would take place within the EZ. This zone will be clearly delineated by hay bales, jersey barriers, and/or similar methods. Safety tape may be used as secondary delineation within the EZ. The zone delineation markings may be opened in areas for varying lengths of time to accommodate equipment operation or specific construction activities. The Site Safety Manager/Director may establish more than one EZ where different levels of protection may be employed or where different hazards exist. Site Workers will not be allowed in the EZ without:

- A buddy (co-worker);
- Appropriate PPE in accordance with OSHA regulations;
- Medical authorization; and
- Training certification in accordance with 29 CFR 1910.120.

6.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) will be established between the EZ and the property limits. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of Site equipment. The CRZ will be used for general Site entry and egress, in addition to access for heavy equipment and emergency support services. Site Workers will not be allowed in the CRZ without:

- A buddy (co-worker);
- Appropriate PPE in accordance with OSHA regulations;
- Medical authorization; and
- Training certification in accordance with 29 CFR 1910.120.

In addition, the CRZ will include a Site Worker Cleaning Area that will include a field wash station for Site Workers, equipment, and PPE to allow Site Workers to wash their hands, arms, neck, and face after exiting areas of grossly contaminated soil or hazardous materials. All Site Workers will be required to pass through the Site Worker Cleaning Area and wash their hands and remove any loose fill and soils from their clothing and boots prior to exiting the CRZ.

6.3 Remediation Zone

A Remediated Zone (RZ) will be established in portions of the Site where the remediation has been completed and only general construction work will be performed. Setup of the RZ will consist of implementing several measures designed to reduce the risk of workers' exposure and prevent non-trained workers from entering the non-remediated zone. Non-trained workers will work only in areas where the potential for exposure has been minimized by removal of all hazardous materials. The remediated zone will then be separated from the non-remediated zone by installing and maintaining temporary plywood or other construction fences along the boundary between the two zones. If potentially impacted material is uncovered in the RZ, all non-trained workers will be removed and the Site Safety Manager/Director will assess the potential risks. If, at any other time, the risk of exposure increases while non-trained workers are present in the RZ, the non-trained workers will be removed. At all times, when non- trained workers are present in the RZ, air monitoring for the presence of VOCs will be conducted in the RZ, as well as at the fence line of the non-remediated zone.

6.4 Support Zone

The Support Zone (SZ) will be an uncontaminated area that will be the field support area for the Site operations. The SZ will contain the temporary project trailers and provide for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated equipment or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples. Meteorological conditions will be observed and noted from this zone, as well as those factors pertinent to heat and cold.

SECTION 7 - PERSONAL PROTECTIVE EQUIPMENT

7.1 General

The level of protection to be worn by field personnel will be defined and controlled by the HSO. Depending upon the type and levels of material present or anticipated at the site, varying degrees of protective equipment will be needed. If the possible hazards are unknown, a reasonable level of protection will be taken until sampling and monitoring results can ascertain potential risks. The levels of protection listed below are based on USEPA Guidelines. A list of the appropriate clothing for each level is also provided.

Level A protection must be worn when a reasonable determination has been made that the highest available level of respiratory, skin, eye, and mucous membrane protection is needed. It should be noted that while Level A provides maximum available protection, it does not protect against all possible hazards. Consideration of the heat stress that can arise from wearing Level A protection should also enter into the decision making process. Level A protection includes:

- Open circuit, pressure-demand self-contained breathing apparatus (SCBA)
- Totally encapsulated chemical resistant suit
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level B protection must be used when the highest level of respiratory protection is needed, but hazardous material exposure to the few unprotected areas of the body (e.g., the back of the neck) is unlikely. Level B protection includes:

- Open circuit, pressure-demand SCBA or pressure airline with escape air bottle
- Chemical protective clothing: Overalls and long sleeved jacket; disposal chemical resistant coveralls; coveralls; one or two piece chemical splash suit with hood
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level C must be used when the required level of respiratory protection is known, or reasonably assumed to be, not greater than the level of protection afforded by air purifying respirators; and hazardous materials exposure to the few unprotected areas of the body (e.g.., the back of the neck) is unlikely. Level C protection includes:

- Full or half face air-purifying respirator
- Chemical protective clothing: Overalls and long-sleeve jacket; disposable chemical resistant coveralls; coveralls; one or two piece chemical splash suit
- Gloves, inner (surgical type)
- Gloves, outer, chemical protective
- Boots, chemical protective

Level D is the basic work uniform. It cannot be worn on any site where respiratory or skin hazards exist. Level D protection includes:

- Safety boots/shoes
- Safety glasses
- Hard hat with optional face shield

Note that the use of SCBA and airline equipment is contingent upon the user receiving special training in the proper use and maintenance of such equipment.

7.2 Personal Protective Equipment – Site Specific

Level D with some modification will be required when working in the work zone on this Site. In addition to the basic work uniform specified by Level D protection, Nitrile gloves will be required when contact with soil or ground water is likely. Hearing protection will be worn when power equipment is used to perform subsurface investigation work. An upgrade to a higher level (Level C) of protection may occur if determined necessary by the HSO.

SECTION 8 - MONITORING PROCEDURES

8.1 Monitoring During Site Operations

All Site environmental monitoring should be accompanied by periodic meteorological monitoring of appropriate climatic conditions.

8.1.1 Drilling Operations – Monitoring Well Installation, Subsurface Borings, and Test Pit Excavations

Monitoring will be performed by the HSO or drilling observer during the conduct of work. A photoionization detector (PID) equipped with a 10.0 eV lamp will be utilized to monitor for the presence of volatile organic vapors within the breathing zone, the borehole, and subsurface samples upon their retrieval. Drill cuttings and excavation spoils will also be monitored by use of the PID. The PID will be field checked for calibration accuracy three times per day (morning, lunch, and end of day. If subsurface conditions warrant, a combustible gas indicator (CGI) with oxygen alarm may also be used to monitor the borehole for the presence of combustible gases. Similar monitoring of fluids produced during well development will also be conducted.

8.1.2 Remedial Measures

During Remedial Measures (RM), monitoring will be performed during excavation and sampling operations when C&S personnel are within the work zone. Although historical information previously obtained at the Site indicates low level of volatile organic vapors and compounds, a photoionization detector (PID) will be used during subsurface activities. If RM is performed, the, the remedial contractor will be required to employ dust control practices during work.

8.2 Action Levels

If readings on the PID exceed 10 ppm for more than fifteen minutes consecutively, then personal protective equipment should be upgraded to Level C. The air purifying respirator used with Level C protective equipment must be equipped with organic vapor cartridges. If readings on the explosive gas meter are within a range of 10%-25% of the LEL then continuous monitoring will be implemented. Readings above 25% of the LEL indicate the potential for an explosive condition. Sources of ignition should be removed and the Site should be evacuated.

8.3 Personal Monitoring Procedures

Personal monitoring shall be performed as a contingency measure in the event that VOC concentrations are consistently above the 10 ppm action level as detected by the PID. If the concentration of VOCs is above this action level, then amendments to the HASP must be made before work can continue at the Site.

SECTION 9 – COMMUNICATIONS

A phone will be located on Site to be utilized by personnel conducting investigation and remedial efforts. Cell phones will be the primary means of communicating with emergency support services/facilities.

SECTION 10 - SAFETY CONSIDERATIONS FOR SITE OPERATIONS

10.1 General

Standard safe work practices that will be followed include:

- Do not climb over/under drums, or other obstacles.
- Do not enter the work zone alone.
- Practice contamination avoidance, on and off-site.
- Plan activities ahead of time, use caution when conducting concurrently running activities.
- No eating, drinking, chewing or smoking is permitted in work zones.
- Due to the unknown nature of waste placement at the Site, extreme caution should be practiced during excavation activities.
- Apply immediate first aid to any and all cuts, scratches, abrasions, etc.
- Be alert to your own physical condition. Watch your buddy for signs of fatigue, exposure, etc.
- A work/rest regimen will be initiated when ambient temperatures and protective clothing create a potential heat stress situation.
- No work will be conducted without adequate natural light or without appropriate supervision.
- Task safety briefings will be held prior to onset of task work.
- Ignition of flammable liquids within or through improvised heating devices (barrels, etc.) or space heaters is forbidden.
- Entry into areas of spaces where toxic or explosive concentrations of gases or dust may exist without proper equipment is prohibited.
- Any injury or unusual health effect must be reported to the Site health and safety officer.
- Prevent splashing or spilling of potentially contaminated materials.
- Use of contact lenses is prohibited while on site.
- Beards and other facial hair that would impair the effectiveness of respiratory protection are prohibited if respiratory protection is necessary.
- Field crew members should be familiar with the physical characteristics of investigations, including:
  - Wind direction in relation to potential sources
  - Accessibility to co-workers, equipment, and vehicles
  - Communication
  - Hot zones (areas of known or suspected contamination)
  - Site access
  - Nearest water sources
- The number of personnel and equipment in potentially contaminated areas should be minimized consistent with site operations.

10.2 Field Operations

10.2.1 Intrusive Operations

The HSO or designee will be present on-site during all intrusive work, e.g., drilling operations, excavations, trenching, and will provide monitoring to oversee that appropriate levels of protection and safety procedures are utilized by C&S Engineers, Inc., personnel. The use of salamanders or other equipment with an open flame is prohibited and the use of protective clothing, especially hard hats and boots, will be required during drilling or other heavy equipment operations.

10.2.2 Excavations and Excavation Trenching

Guidance relating to safe work practices for C&S employees regarding excavations and excavating/trenching operation is presented in **Appendix A** of this HASP.

SECTION 11 - DECONTAMINATION PROCEDURES

Decontamination involves physically removing contaminants and/or converting them chemically into innocuous substances. Only general guidance can be given on methods and techniques for decontamination. Decontamination procedures are designed to:

- Remove contaminant(s).
- Avoid spreading the contamination from the work zone.
- Avoid exposing unprotected personnel outside of the work zone to contaminants.

Contamination avoidance is the first and best method for preventing spread of contamination from a hazardous site. Each person involved in site operations must practice the basic methods of contamination avoidance listed below. Additional precautions may be required in the HASP.

- Know the limitations of all protective equipment being used.
- Do not enter a contaminated area unless it is necessary to carry out a specific objective.
- When in a contaminated area, avoid touching anything unnecessarily.
- Walk around pools of liquids, discolored areas, or any area that shows evidence of possible contamination.
- Walk upwind of contamination, if possible.
- Do not sit or lean against anything in a contaminated area. If you must kneel (e.g., to take samples), use a plastic ground sheet.
- If at all possible, do not set sampling equipment directly on contaminated areas. Place equipment on a protective cover such as a ground cloth.
- Use the proper tools necessary to safely conduct the work.

Specific methods that may reduce the chance of contamination are:

- Use of remote sampling techniques.
- Opening containers by non-manual means.
- Bagging monitoring instruments.
- Use of drum grapplers.
- Watering down dusty areas.

Equipment which will need to be decontaminated includes tools, monitoring equipment, and personal protective equipment. Items to be decontaminated will be brushed off, rinsed, and dropped into a plastic container supplied for that purpose. They will then be washed with a detergent solution and rinsed with clean water. Monitoring instruments may be wrapped in plastic bags prior to entering the field in order to reduce the potential for contamination. Instrumentation that is contaminated during field operations will be carefully wiped down. Heavy equipment, if utilized for operations where it may be contaminated, will have prescribed decontamination procedures to prevent contaminant materials from potentially leaving the Site. On-site contractors, such as drillers or backhoe operators, will be responsible for decontaminating all construction equipment prior to demobilization.

SECTION 12 – DISPOSAL PROCEDURES

All discarded materials, waste materials, or other objects shall be handled in such a way as to reduce or eliminate the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated materials, e.g., clothing, gloves, etc., will be bagged or drummed as necessary and segregated for proper disposal. All contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with regulatory provisions. All non-contaminated materials shall be collected and bagged for appropriate disposal. Investigation derived waste will be managed consistent with the work plan for this Site and DER-10 Technical Guidance for Site Investigation and Remediation dated May 2010.

SECTION 13 - EMERGENCY RESPONSE PROCEDURES

As a result of the hazards at the Site, and the conditions under which operations are conducted, there is the possibility of emergency situations. This section establishes procedures for the implementation of an emergency plan.

13.1 Emergency Coordinator

Emergency Coordinator: .... Jordan Berti ....Cell Phone: (315) 657-6202

The Emergency Coordinator or his on-site designee will, in concert with the Volunteer, will implement the emergency response procedures whenever conditions at the Site warrant such action. The Emergency Coordinator or his on-site designee will be responsible for assuring the evacuation, emergency treatment, emergency transport of C&S personnel as necessary, and notification of emergency response units (refer to phone listing in the beginning of this HASP) and the appropriate management staff.

13.2 Evacuation

In the event of an emergency situation, such as fire, explosion, significant release of toxic gases, etc., all personnel will evacuate and assemble in a designated assembly area. The Emergency Coordinator or his on-site designee will have authority to contact outside services as required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The Emergency Coordinator or his on-site designee must see that access for emergency equipment is provided and that all ignition sources have been shut down once the emergency situation is established. Once the safety of all personnel is established, the Fire Department and other emergency response groups will be notified by telephone of the emergency.

13.3 Potential or Actual Fire or Explosion

Immediately evacuate the Site and notify local fire and police departments, and other appropriate emergency response groups, if LEL values are above 25% in the work zone or if an actual fire or explosion has taken place.

13.4 Environmental Incident (spread or release of contamination)

Control or stop the spread of contamination if possible. Notify the Emergency Coordinator and the Project Manager. Other appropriate response groups will be notified as appropriate.

13.5 Personnel Injury

Emergency first aid shall be applied on-site as necessary. Then, decontaminate (en route if necessary) and transport the individual to nearest medical facility if needed. The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. The directions to the hospital are shown in Section 1 of this HASP and a map is shown in **Attachment A**.

13.6 Personnel Exposure

- *Skin Contact*: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, and then provide appropriate medical attention. Eyes should be thoroughly rinsed with water for at least 15 minutes.
- *Inhalation*: Move to fresh air and/or, if necessary, decontaminate and transport to emergency medical facility.
- *Ingestion*: Decontaminate and transport to emergency medical facility.
- *Puncture Wound/Laceration*: Decontaminate, if possible, and transport to emergency medical facility.

13.7 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work can continue without sacrificing the health and safety of field workers.

13.8 Incident Investigation and Reporting

In the event of an incident, procedures discussed in the Medical Emergency/Incident Response Protocol, presented in **Appendix B** of this HASP, shall be followed.

SECTION 14 - COMMUNITY RELATIONS

14.1 Community Health and Safety Plan

14.1.1 Community Health and Safety Monitoring

As part of the site work, three general types of efforts are scheduled, including, non-intrusive reconnaissance tasks, sampling or monitoring tasks (monitoring point sampling), and intrusive tasks (test trenching, subsurface borings, monitoring well installation). During completion of general reconnaissance and sampling or monitoring tasks, potential for health and safety risks to off-site landowners or the local community are not anticipated.

During completion of intrusive efforts at or adjacent to the Site, health and safety monitoring efforts will be concentrated on the area or areas in which intrusive efforts are being completed. Since the air pathway is the most available and likely avenue for the release of potential contaminants to the atmosphere at or near the Site, in addition to limiting public or community access to the areas in which intrusive efforts are completed, health and safety measures will primarily consist of monitoring the air pathway for worker exposure.

14.1.2 Community Air Monitoring Plan

Efforts will be taken to complete field work in a manner which will minimize the creation of airborne dust or particulates. Under dry conditions, work areas may be wetted to control dust. During periods of extreme wind, intrusive field work may be halted until such time as the potential for creating airborne dust or particulate matter as a result of investigation activities is limited. Periodic monitoring following the guidelines of the site's Community Air Monitoring Plan (see Appendix C of the RIWP) will be implemented during all non-intrusive Site investigation activities, including surface soil and sediment sampling, and collection of groundwater samples from groundwater monitoring wells.

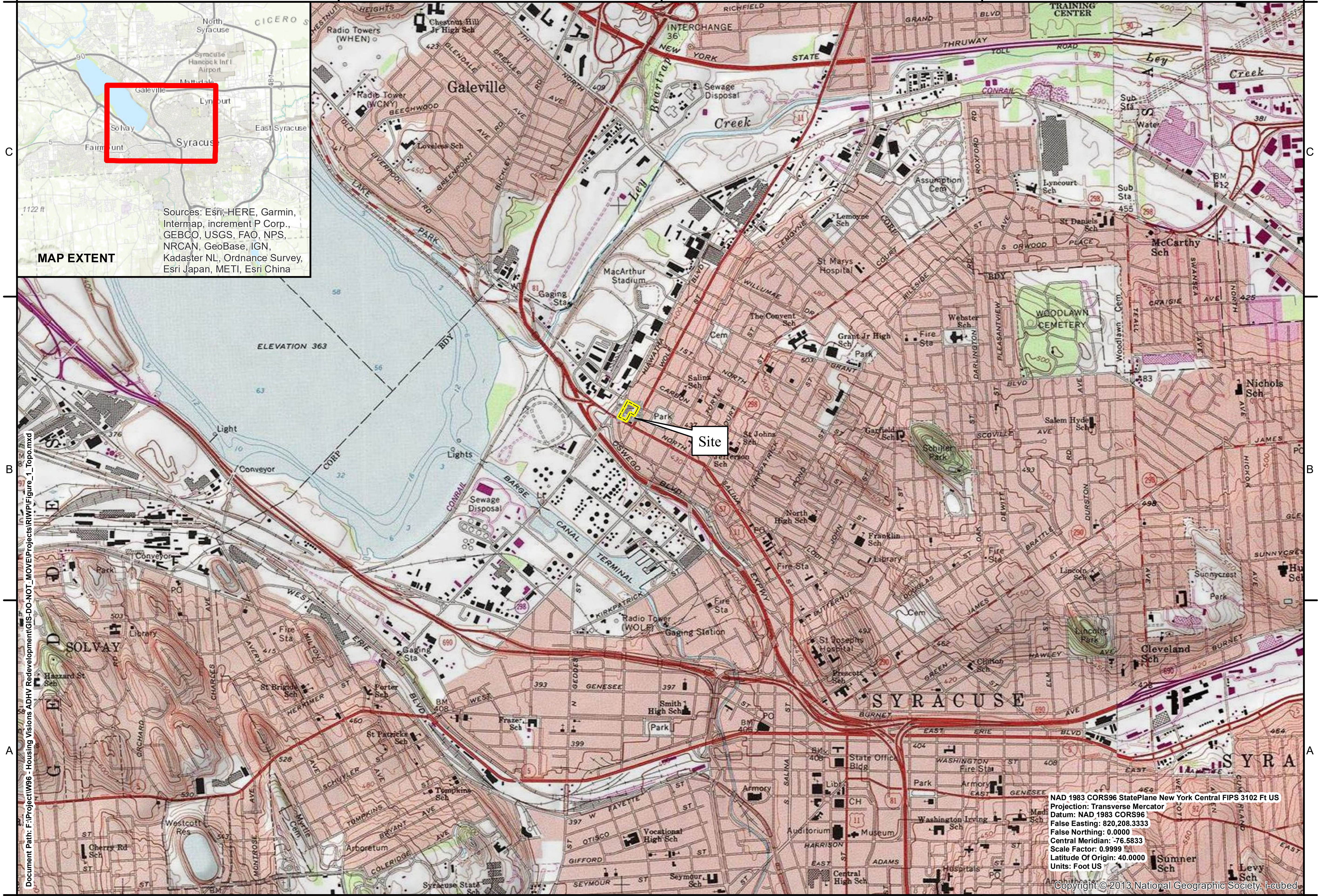
During completion of Site investigation, a community air monitoring plan meeting the requirements of the site's Community Air Monitoring Plan will be implemented for the duration of intrusive activities. These additional air monitoring activities will include establishment of background conditions, continuous monitoring for volatile organic compounds and/or particulates at the downwind work area (exclusion zone) perimeter, recording of monitoring data, and institution and documentation of Response Levels and appropriate actions in accordance with NYSDOH guidance.

SECTION 15 - AUTHORIZATIONS

Personnel authorized to enter the Site while operations are being conducted must be approved by the HSO. Authorization will involve completion of appropriate training courses, medical examination requirements, and review and sign-off of this HASP. No C&S personnel should enter the work zone alone. Each site visitor should check in with the HSO or Project Manager prior to entering the work zones.

FIGURE 1

SITE LOCATION MAP



C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, New York 13212
Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

N

0 2,000 Feet

1 inch = 2,000 feet

Brownfield Cleanup Program
Remedial Investigation Work Plan (RIWP)
for
Moyer Carriage Lofts
Syracuse, Onondaga County, New York

PROJECT NO:	W96.001.002
DATE:	September 2020
SCALE:	AS SHOWN
DRAWN BY:	JTB
DESIGNED BY:	JTB
CHECKED BY:	MLW

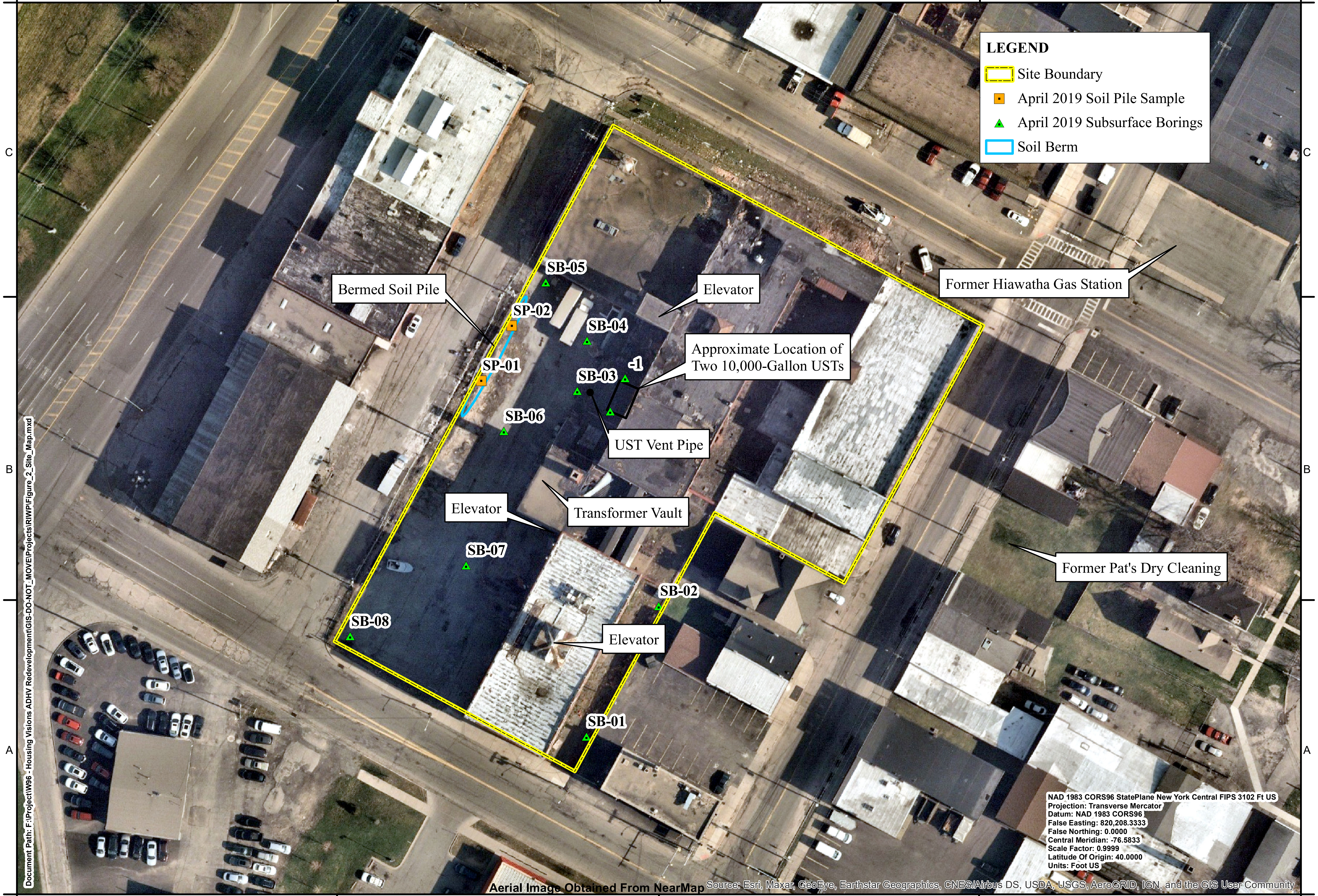
Modified: 9/14/2020 @ 12:33:27 PM

SITE LOCATION

Figure 1

FIGURE 2

SITE MAP



C&S Engineers, Inc.
499 Col. Eileen Collins Blvd.
Syracuse, New York 13212
Phone: 315-455-2000
Fax: 315-455-9667
www.cscos.com

N

0 50 Feet
1 inch = 60 feet

Brownfield Cleanup Program
Remedial Investigation Work Plan (RIWP)
for
Moyer Carriage Lofts
Syracuse, Onondaga County, New York

PROJECT NO:	W96.001.002
DATE:	March 2021
SCALE:	AS SHOWN
DRAWN BY:	JTB
DESIGNED BY:	JTB
CHECKED BY:	MLW

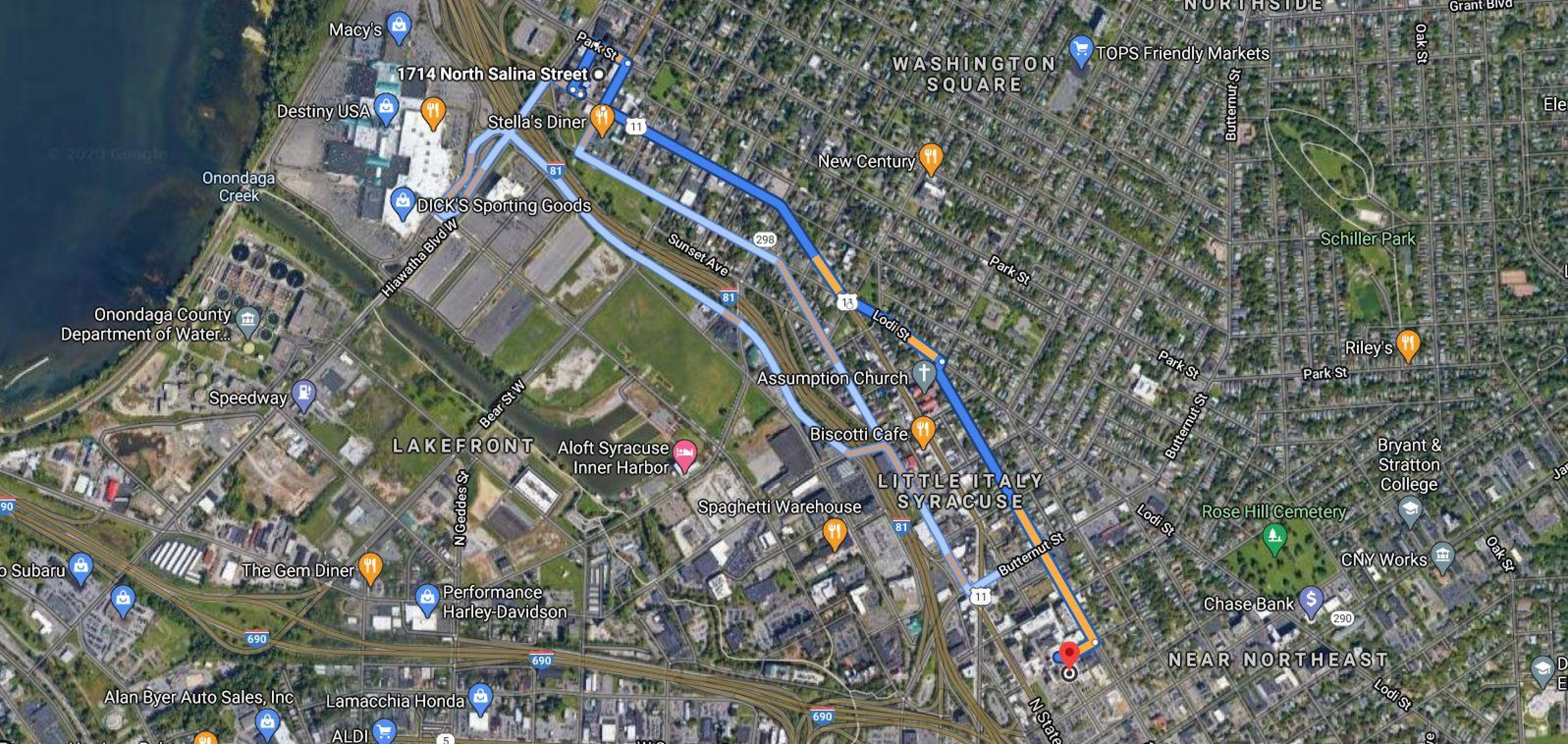
Modified: 3/12/2021 @ 7:26:20 AM

SITE MAP

Figure 2

ATTACHMENT A

MAP TO HOSPITAL


NORTHSIDE
Grant Blvd
Macy's
1714 North Salina Street
Park St
TOPS Friendly Markets
WASHINGTON SQUARE
Oak St
Destiny USA
Stella's Diner
11
© 2020 Google
New Century
Butternut St
Onondaga Creek
81
DICK'S Sporting Goods
Hiawatha Blvd W
Sunset Ave
298
Park St
Schiller Park
Onondaga County Department of Water...
81
11
Lodi St
Riley's
Park St
Park St
Assumption Church
Speedway
Bear St W
Biscotti Cafe
Butternut St
Bryant & Stratton College
LAKEFRONT
Aloft Syracuse Inner Harbor
N Geddes St
LITTLE ITALY SYRACUSE
Lodi St
Rose Hill Cemetery
Spaghetti Warehouse
81
Butternut St
CNY Works
Oak St
The Gem Diner
Performance Harley-Davidson
Chase Bank
11
290
690
690
NEAR NORTHEAST
Lodi St
Alan Byer Auto Sales, Inc
Lamacchia Honda
690
N State
ALDI
5

APPENDIX A

EXCAVATION / TRENCHING GUIDELINE

C&S ENGINEERS, INC. HEALTH & SAFETY GUIDELINE #14
EXCAVATION/TRENCHING OPERATIONS

TABLE OF CONTENTS

C&S ENGINEERS, INC.
EXCAVATION/TRENCHING OPERATIONS

1.0 PURPOSE

To establish safe operating procedures for excavation/trenching operations at C&S work sites.

2.0 SCOPE

Applies to all C&S activity where excavation or trenching operations take place.

3.0 DEFINITIONS

Excavation — Any manmade cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation.

Trench — A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

4.0 RESPONSIBILITY EMPLOYEES

Employees — All employees must understand and follow the procedures outlined in this guideline during all excavation and trenching operations.

Health and Safety Coordinator/Officer (HSC/HSO) - The HSC/HSO is responsible for ensuring that these procedures are implemented at each work site.

5.0 GUIDELINES

5.1 Hazards Associated With Excavation/Trenching

The principal hazards associated with excavation/trenching are:

- Suffocation, crushing, or other injury from falling material.
- Damage/failure of installed underground services and consequent hazards.
- Tripping, slipping, or falling.
- Possibility of explosive, flammable, toxic, or oxygen-deficient atmosphere in excavation.

5.2 Procedures Prior to Excavation

1. Underground Utilities

   - Determine the presence and location of any underground chemical or utility pipes, electrical, telephone, or instrument wire or cables.
   - If the local DigSafely NY is unable to locate private/domestic or plant utilities, then an independent utility locating service must be contacted and mobilized to the site.
   - Identify the location of underground services by stakes, markers or paint.
   - Arrange to de-energize or isolate underground services during excavation. If not possible, or if location is not definite, method of excavation shall be established to minimize hazards by such means as:

     a) Use of hand tools in area of underground services.
     b) Insulating personnel and equipment from possible electrical contact.
     c) Use of tools or equipment that will reduce possibility of damage to underground services and hazard to worker.

2. Identify Excavation Area — Areas to be excavated shall be identified and segregated by means of barricades, ropes, and/or signs to prevent access of unauthorized personnel and equipment. Suitable means shall be provided to make barriers visible at all times.
3. Surface Water Provide means of diverting surface water from excavation.
4. Shoring/Bracing — Shoring or bracing that may be required for installed equipment adjacent to the excavation shall be designed by a competent person.
5. Structural Ramps — Structural ramps that are used solely by employees as a means of access to or egress from the excavation shall be designed by a competent person.

5.3 Procedures For Doing The Excavation

1. **Determine the need for shoring/sloping** — the type of soil will establish the need for shoring, slope of the excavation, support systems, and equipment to be used. The soil condition may change as the excavation proceeds. Appendices A, B, C, D, E, and F of the OSHA Excavation Regulation, 29 CFR 1926 Subpart P, are to be used in defining shoring and sloping requirements.

2. **Mobile equipment** — For safe use of mobile industrial equipment in or near the excavation, the load carrying capacity of soil shall be established and suitable protection against collapse of soil provided by the use of mats, barricades, restricting the location of equipment, or shoring.

3. Excavated material (spoil) shall be stored at least two (2) feet from the edge of the excavation.

4. All trench (vertical sides) excavations greater than five (5) feet deep shall be shored.

5. The excavation shall be inspected daily for changes in conditions, including the presence of ground water, change in soil condition, or effects of weather such as rain or freeze. A safe means of continuing the work shall be established based on changes in condition. Typically test trench excavations made as part of an environmental subsurface nvestigation are made and backfilled the same day.

6. Appropriate monitoring for gas, toxic, or flammable materials will be conducted to establish the need for respiratory equipment, ventilation, or other measures required to continue the excavation safely.

7. Adequate means of dewatering the excavation shall be provided by the contractor as required.

8. A signal person shall be provided to direct powered equipment if working in the excavation with other personnel.

9. A signal person shall be provided when backfilling excavations to direct powered equipment working in the excavation with other personnel.

10. Warning vests will be worn when employees are exposed to public vehicular traffic.

11. Employees shall stand away from vehicles being loaded or unloaded, and shall not be permitted underneath loads handled by lifting or dragging equipment.

12. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available if hazardous atmospheric conditions exist or may be expected to develop. The specifics will be determined by the HSC/HSM.

13. Walkways or bridges with standard guardrail shall be provided where employees or equipment are required or permitted to cross over excavations.

5.4 Entering the Excavation

No C&S Engineers, Inc., employee shall enter an excavation which fails to meet the requirements of Section 5.3 of this guideline.

6.0 REFERENCES

29 CFR 1926, Subpart P - Excavations

7.0 ATTACHMENTS

29 CFR 1926 Subpart P - Appendices A, B, F

- **Part Number:** 1926
- **Part Title:** Safety and Health Regulations for Construction
- **Subpart:** P
- **Subpart Title:** Excavations
- **Standard Number:** 1926 Subpart P App A
- **Title:** Soil Classification

(a) Scope and application - (1) Scope. This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets for requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) Application. This appendix applies when a sloping or benching system is designed in accordance with the requirements set fo 1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for exca designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum shoring is designed in accordance with appendix D. This Appendix also applies if other protective systems are designed and selec from data prepared in accordance with the requirements set forth in 1926.652(c), and the use of the data is predicated on the us classification system set forth in this appendix.

(b) Definitions. The definitions and examples given below are based on, in whole or in part, the following; American Society for T Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System; The U.S. Department of Agriculture (US Textural Classification Scheme; and The National Bureau of Standards Report BSS-121.

"Cemented soil" means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

"Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

"Dry soil" means soil that does not exhibit visible signs of moisture content.

"Fissured" means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

"Granular soil" means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

"Layered system" means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

"Moist soil" means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

"Plastic" means a property of a soil which allows the soil to be

deformed or molded without cracking, or appreciable volume change.
"Saturated soil" means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane.
"Soil classification system" means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.
"Stable rock" means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.
"Submerged soil" means soil which is underwater or is free seeping.
"Type A" means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:
(i) The soil is fissured; or
(ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
(iii) The soil has been previously disturbed; or
(iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
(v) The material is subject to other factors that would require it to be classified as a less stable material.
"Type B" means:
(i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
(ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
(iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.
(iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
(v) Dry rock that is not stable; or
(vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.
"Type C" means:
(i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
(ii) Granular soils including gravel, sand, and loamy sand; or
(iii) Submerged soil or soil from which water is freely seeping; or
(iv) Submerged rock that is not stable, or
(v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.
"Unconfined compressive strength" means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.
"Wet soil" means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) Requirements - (1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent perso Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) Basis of classification. The classification of the deposits shall be made based on the results of at least one visual and at least (analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other reco(methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Depart Agriculture textural classification system.

(3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of thi shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify prc properties, factors, and conditions affecting the classification of the deposits.

(4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each laye classified individually where a more stable layer lies under a less stable layer.

(5) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any w changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumst

(d) Acceptable visual and manual tests. - (1) Visual tests. Visual analysis is conducted to determine qualitative information regarc excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil take samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the amounts of the particle sizes. Soil that is primarily composed of fine-grained material material is cohesive material. Soil composec of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does nc clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tens could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of m ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground s and to identify previously disturbed soil.

(v) Observed the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slop the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water see the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the s the excavation face.

(2) Manual tests. Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil a provide more information in order to classify soil properly.

(i) Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohe material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch be held on one end without tearing, the soil is cohesive.

(ii) Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is g combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clu only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps wh break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the s considered unfissured.

(iii) Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive so
test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designatior "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure).") Type A soils with an unconfined compre: strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great eff soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molde finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practical excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influe flooding), the classification of the soil must be changed accordingly.

(iv) Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetron using a hand-operated shearvane.

(v) Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesi and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.5 six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil ha cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the t pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cc fissures. If they pulverize easily into very small fragments, the material is granular.

Next Standard (1926 Subpart P App B)

Regulations (Standards - 29 CFR) - Table of Contents

- **Part Number:** 1926
- **Part Title:** Safety and Health Regulations for Construction
- **Subpart:** P
- **Subpart Title:** Excavations
- **Standard Number:** 1926 Subpart P App B
- **Title:** Sloping and Benching

(a) ***Scope and application***. This appendix contains specifications for sloping and benching when used as methods of protecting working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective is to be performed in accordance with the requirements set forth in § 1926.652(b)(2).

(b) ***Definitions***.

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phen the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slu material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the fa excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site condi protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) ***Requirements*** -- (1) ***Soil classification***. Soil and rock deposits shall be classified in accordance with appendix A to subpart I 1926.

(2) ***Maximum allowable slope***. The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of tl appendix.

(3) ***Actual slope***. (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occur slope shall be cut back to an actual slope which is at least ½ horizontal to one vertical (½H:1V) less steep than the maximum allo slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person sh determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with § 1926.651(i).

(4) ***Configurations***. Configurations of sloping and benching systems shall be in accordance with Figure B-1.

TABLE B-1
MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)(1) FOR EXCAVATIONS LESS THAN 20 FEET DEEP(3)
STABLE ROCK TYPE A (2) TYPE B TYPE C	VERTICAL (90°) 3/4:1 (53°) 1:1 (45°) 1 ½:1 (34°)

Footnote(1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angle: rounded off.

Footnote(2) A short-term maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feed (3.67 m) or l depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).

Footnote(3) Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

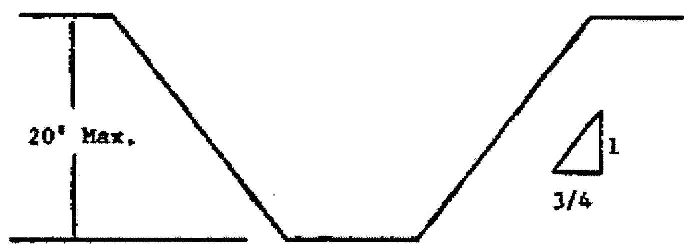
Figure B-1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

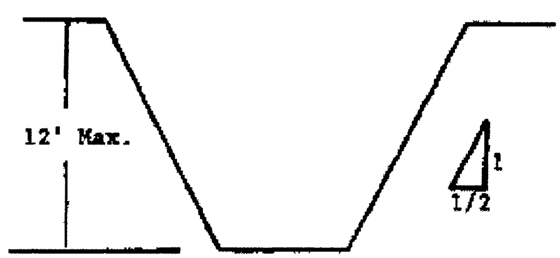
B-1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



SIMPLE SLOPE -- GENERAL

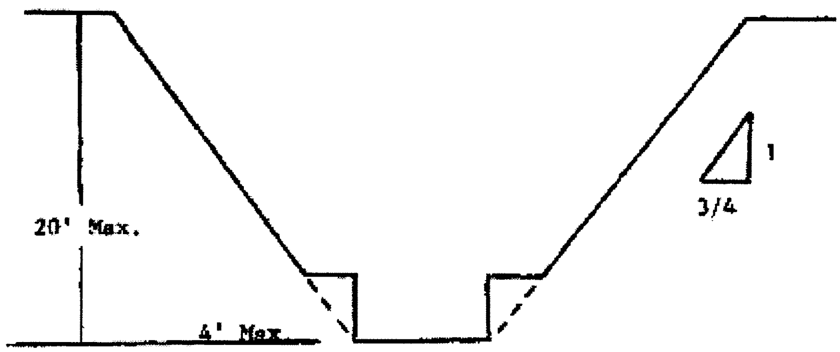
Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have maximum allowable slope of ½:1.



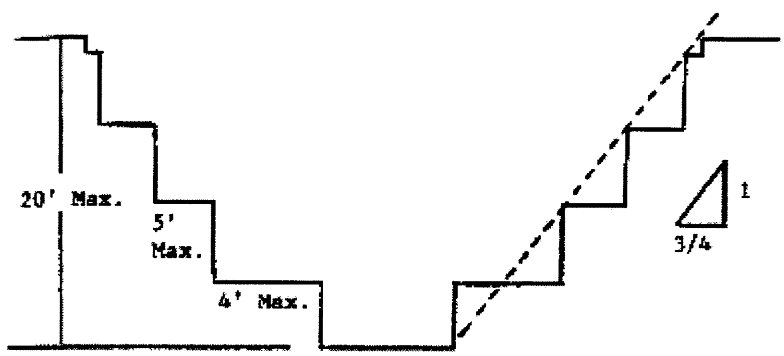
SIMPLE SLOPE -- SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4 to 1 and maximum bench dimens

follows:

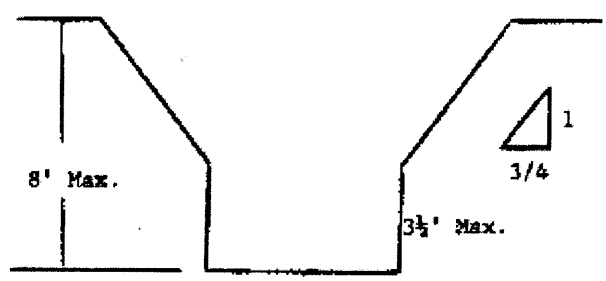


SIMPLE BENCH



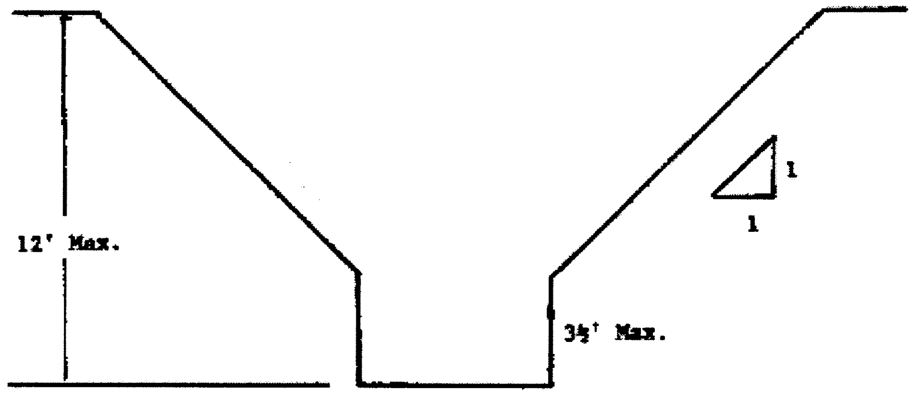
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical sid
feet.



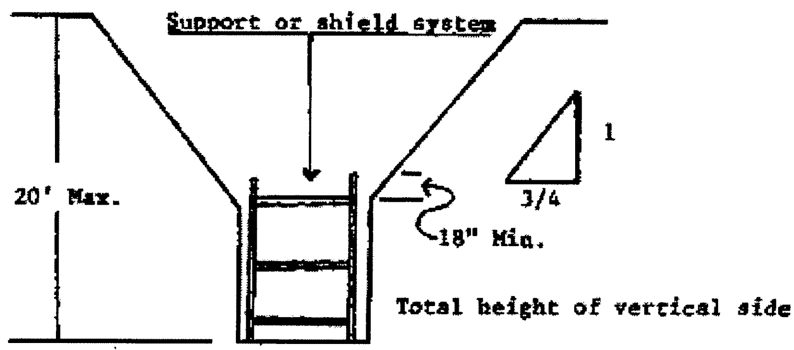
UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 8 FEET IN DEPTH)

All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a r
allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 12 FEET IN DEPTH)

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maxii allowable slope of ¾:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

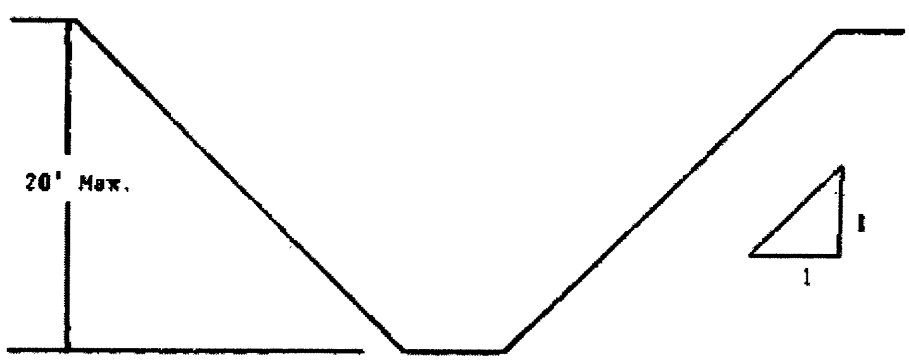


SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other opt permitted under § 1926.652(b).

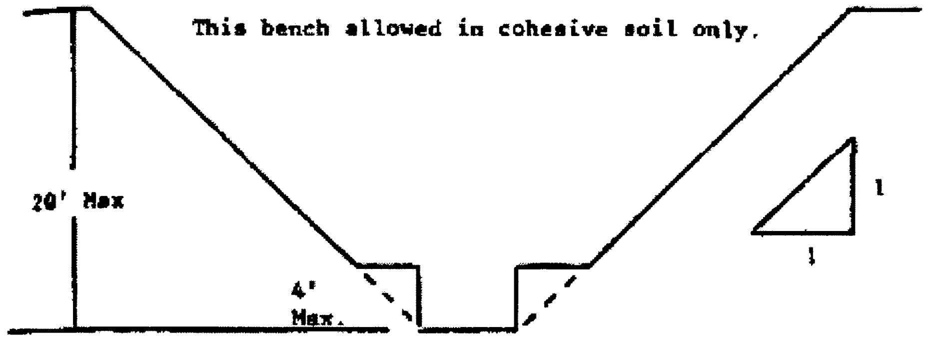
B-1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

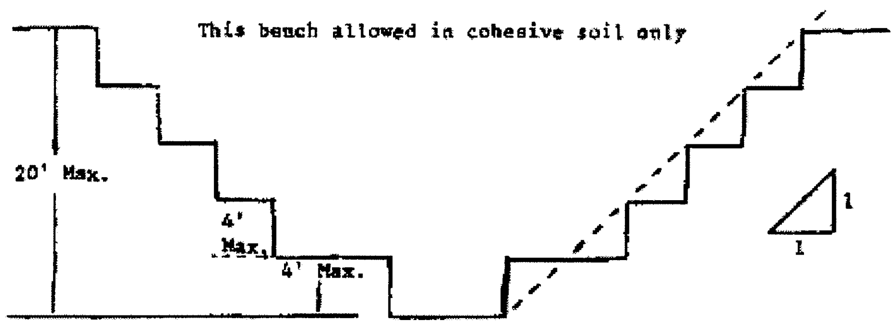


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions

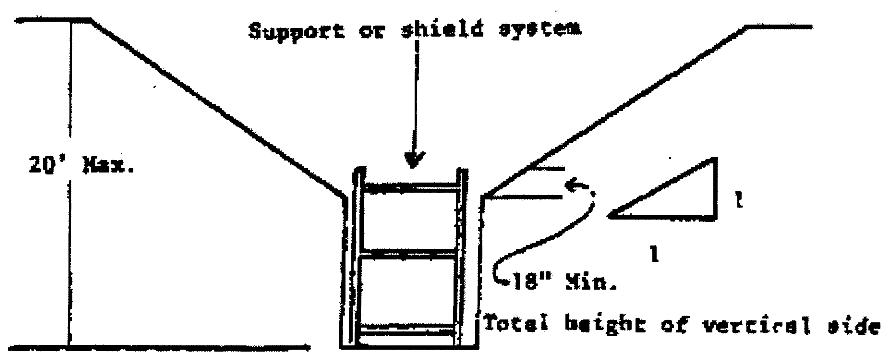


SINGLE BENCH



MULTIPLE BENCH

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at le inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

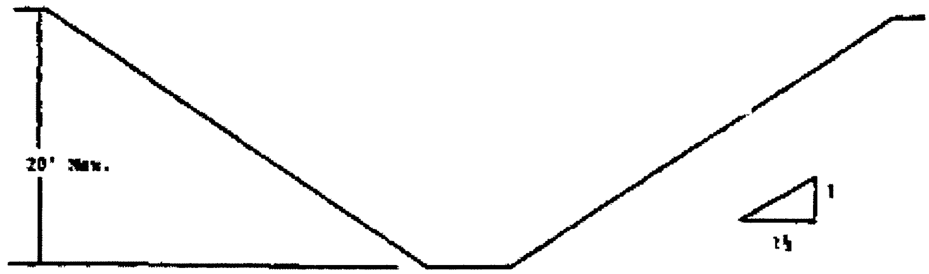


VERTICALLY SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

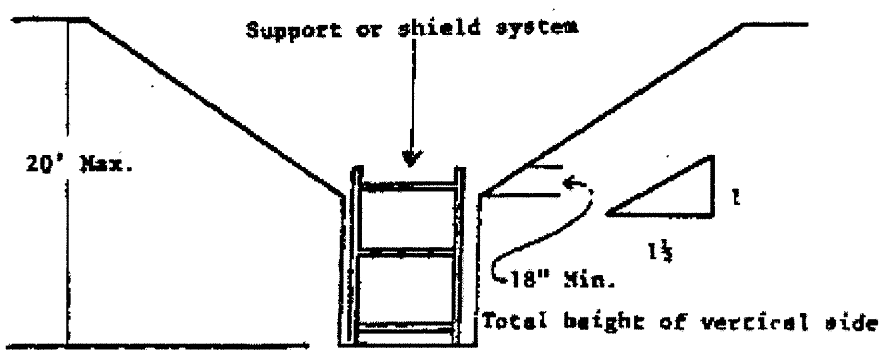
B-1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



SIMPLE SLOPE

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at le inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.

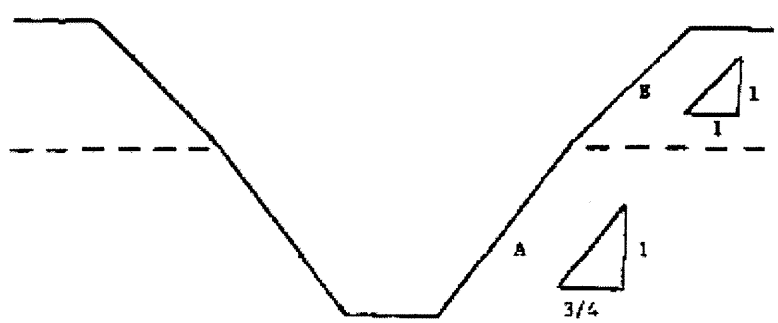


VERTICAL SIDED LOWER PORTION

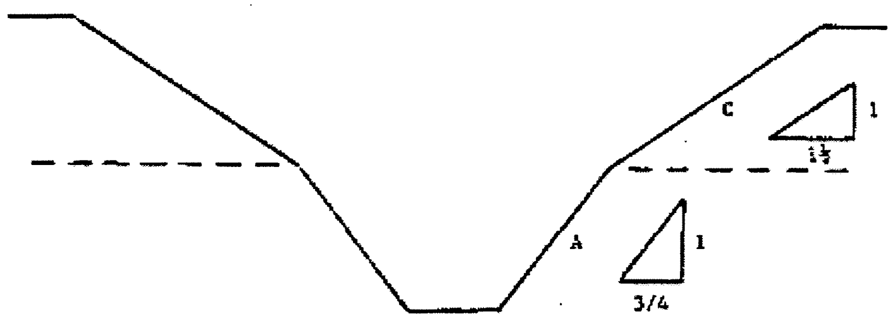
3. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

B-1.4 Excavations Made in Layered Soils

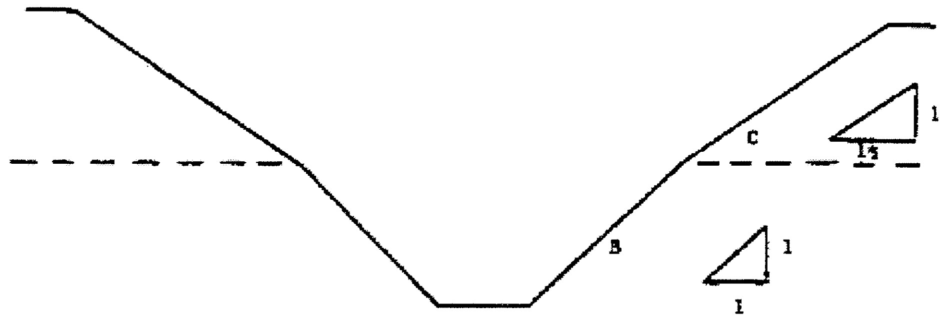
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth b



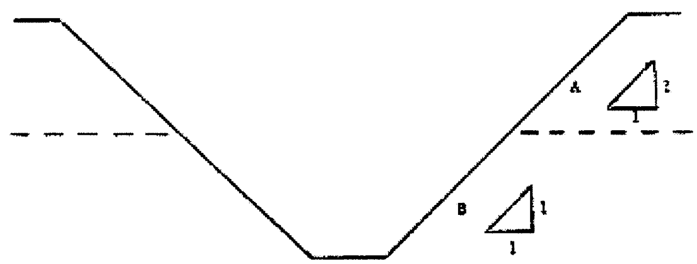
B OVER A



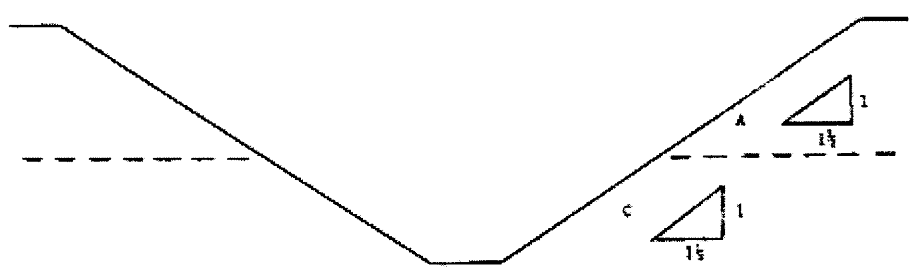
C OVER A



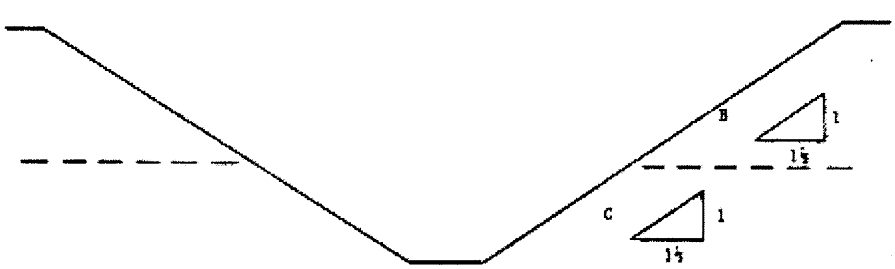
C OVER B



A OVER B



A OVER C



B OVER C

2. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

Next Standard (1926 Subpart P App C)

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UNITED STATES DEPARTMENT OF LABOR

Occupational Safety & Health Administration

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- **Part Number:** 1926
- **Part Title:** Safety and Health Regulations for Construction
- **Subpart:** P
- **Subpart Title:** Excavations
- **Standard Number:** 1926 Subpart P App F
- **Title:** Selection of Protective Systems

The following figures are a graphic summary of the requirements contained in subpart P for excavations 20 feet or less in depth. Pro systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance wit 1926.652(b) and (c).

Is the excavation more than 5 feet in depth?

NO

Is there potential for cave-in?

YES

Is the excavation entirely in stable rock?

NO

Excavation may be made with vertical sides.

YES

YES

Excavation must be sloped, shored, or shielded.

NO

Sloping selected.

Shoring or shielding selected.

Go to Figure 2

Go to Figure 3

FIGURE 1 - PRELIMINARY DECISIONS

Sloping selected as the method of protection

Will soil classification be made in accordance with Sec. 1926.652(b)?

YES

Excavation must comply with one of the following three options:

Option 1:

Sec. 1926.652(b)(3) which requires Appendices A and B to be followed

Option 2:

Sec. 1926.652(b)(3) which requires other tabulated data (see definition to be followed.

Option 3:

Sec. 1926.652(b)(4) which requires the excavation to be designed by a registered professional engineer.

NO

Excavations must comply with Sec. 1926.652(b)(1) which requires a slope of 1 1/2 H:1V (34 deg.).

FIGURE 2 - SLOPING OPTIONS

Shoring or shielding selected as the method of protection.

Soil Classification is required when shoring or shielding is used. The excavation must comply with one of the following four options:

Option 1

Sec. 1926.652(c)(1) which requires Appendices A and C to be followed (e.g. timber shoring).

Option 2

Sec. 1926.652(c)(2) which requires manufacturers data to be followed (e.g. hydraulic shoring, trench jacks, air shores, shields).

Option 3

Sec. 1926.652(c)(3) which requires tabulated data (see definition) to be followed (e.g. any system as per the tabulated data).

Option 4

Sec. 1926.652(c)(4) which requires the excavation to be designed by a registered professional engineer (e.g. any designed system).

FIGURE 3 - SHORING AND SHIELDING OPTIONS

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APPENDIX B

GUIDANCE ON INCIDENT INVESTIGATION

AND REPORTING

3. Following the treatment and care of the injured employee, the emergency coordinator or his on-site designee and the project manager will initiate the completion of the first injury report. The Health & Safety Manager will assist.

Project Manager

1. Upon notification of a personal injury or illness on the job site, will notify C & S Engineers, Inc, President and Corporate Legal and C&S Companies Health and Safety Manager.
2. Will report to the worksite to initiate the first injury report.
3. Will report to the treatment facility to check on the well being of the injured employee. The project manager will ensure that the treatment facility is aware that this is a workers compensation case.
4. Will assist the Health and Safety Manager in the analysis of the incident.

Health & Safety Manager

1. Upon notification of the personal injury will determined if it is necessary to report to the treatment facility or the accident site, depending on the nature of the injuries and the circumstances of the accident.
2. Will report to the worksite to begin a root cause analysis investigation of the accident. The investigation may include interview of witnesses, field crew , and project manager, the photographing of the scene, reconstruction of the accident scene, using test instruments and taking measurements. The Health and Safety Manager may draw diagrams from the information learned.
3. The Health and Safety Manager will work with the owner/client as necessary to investigate the accident.
4. The Health & Safety manager will ensure that the site is safe to resume work.
5. The Health & Safety Manager shall initiate the New York State Compensation form requirements (C-2) and forward a copy of the C-2 to the C & S Engineers, Inc. controller for transmittal to the Compensation Carrier within 8 hrs of notification of the incident or by the end of the next business day.
6. The Health and Safety manager, upon completion of the investigation, will provide the Project Manager with a written investigative report (copy to the President)
7. The accident will be reviewed at the next Project Managers meeting with the intent to prevent further or similar events on other projects.
8. The Health & Safety Manager will assess the incident to determine OSHA record ability and make record if necessary on the OSHA 300 form, within five working days.

Incident Response

1.0 PURPOSE

To prevent the occurrence of accidents on C&S Engineers, Inc., work sites and to establish a procedure for investigation and reporting of incidents occurring in, or related to C&S work activities.

2.0 SCOPE

Applies to all incidents related to C&S Engineers, Inc. work activities.

3.0 DEFINITIONS

Accident - An undesired event resulting in personal injury and/or property damage, and/or equipment failure.

Fatality - An injury or illness resulting in death of the individual.

Incident - Any occurrence which results in, or could potentially result in, the need for medical care or property damage. Such incidents shall include lost time accidents or illness, medical treatment cases, unplanned exposure to toxic materials or any other significant occurrence resulting in property damage or in "near misses."

Incidence Rate - the number of injuries, illnesses, or lost workdays related to a common exposure base of 100 full-time workers. The rate is calculated as:

$$N/EH \times 200{,}000$$

N = number of injuries and illnesses or lost workday cases; EH = total hours worked by all associates during calendar year. 200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

Injury - An injury such as a cut, fracture, sprain, amputation, etc. which results from a work accident or from a single instantaneous event in the work environment.

Lost Workday Case - A lost workday case occurs when an injured or ill employee experiences days away from work beginning with the next scheduled work day. Lost workday cases do not occur unless the employee is effected beyond the day of injury or onset of illness.

Recordable Illness - An illness that results from the course of employment and must be entered on the OSHA 300 Log and Summary of Occupational Injuries and Illnesses. These illnesses require medical treatment and evaluation of work related injury. For example, dermatitis, bronchitis, irritation of eyes, nose, and throat can result from work and non-work related incidents.

Recordable Injury - An injury that results from the course of employment and must be entered on the OSHA 300 Log and Summary of Occupational Injuries and Illnesses. These injuries require medical treatment; may involve loss of consciousness; may result in restriction of work or motion or transfer to another job; or result in a fatality.

Near Miss - An incident which, if occurring at a different time or in a different personnel or equipment configuration, would have resulted in an incident.

4.0 RESPONSIBILITIES

Employees - It shall be the responsibility of all C&S Engineers, Inc. employees to report all incidents as soon as possible to the HSC, regardless of the severity.

Human Resources - has overall responsibility for maintaining accident/ incident reporting and investigations according to current regulations and recording injuries/ illness on the OSHA 300 log, and posting the OSHA 300 log.

Emergency Coordinator - It is the responsibility of the Emergency Coordinator to investigate and prepare an appropriate report of all accidents, illnesses, and incidents occurring on or related to C&S Engineers, Inc. work. The Emergency Coordinator shall complete Attachment A within 24 hours of the incident occurrence.

Health and Safety Manager (HSM) - It is the responsibility of the HSM to investigate and prepare an appropriate report of all lost time injuries and illnesses and significant incidents occurring on or related to C&S Companies. The HSM shall maintain the OSHA 300 form.

Project Managers (PM) - It shall be the PM's responsibility to promptly correct any deficiencies in personnel, training, actions, or any site or equipment deficiencies that were determined to cause or contribute to the incident investigated.

5.0 GUIDELINES

5.1 Incident Investigation

The Project Manager will immediately investigate the circumstances surrounding the incident and will make recommendations to prevent recurrence. The HSM shall be immediately notified by telephone if a serious accident/ incident occurs. The incident shall be evaluated to determine whether it is OSHA recordable. If the incident is determined to be OSHA 300 recordable, it shall be entered on the OSHA 300 form.

The Project Manager with assistance from the HSM must submit to the office an incident report form pertaining to any incident resulting in injury or property damage.

5.2 Incident Report

The completed incident report must be completed by the Project Manager within 12 hours of the incident and distributed to the HSM, and Human Resources. This form shall be maintained by Human Resources for at least five years for all OSHA recordable cases. This form serves as an equivalent to the OSHA 101 form.

5.3 Incident Follow-up Report

The Incident Follow-Up Report (Attachment B) shall be distributed with the Incident Report within one week of the incident. Delay in filing this report shall be explained in a brief memorandum.

5.4 Reporting of Fatalities or Multiple Hospitalization Accidents

Fatalities or accidents resulting in the hospitalization of three or more employees must be reported to OSHA verbally or in writing within 8 hours. The report must contain 1) circumstances surrounding the accident(s), 2) the number of fatalities, and 3) the extent of any injuries.

5.5 OSHA 300A Summary Form

Recordable cases must be entered on the log within six workdays of receipt of the information that a recordable case has occurred. The OSHA log must be kept updated to within 45 calendar days.

OSHA 300 forms must be updated during the 5 year retention period, if there is a change in the extent or outcome of an injury or illness which affects an entry on a log. If a change is necessary, the original entry should be lined out and a corrected entry made on that log. New entries should be made for previously unrecorded cases that are discovered or for cases that initially weren't recorded but were found to be recordable after the end of the year. Log totals should also be modified to reflect these changes.

5.5.1 Posting

The log must be summarized at the end of the calendar year and the summary must be posted from February 1 through May 31.

5.6 OSHA 300A

Facilities selected by the Bureau of Labor Statistics (BLS) to participate in surveys of occupational injuries and illnesses will receive the OSHA 300A. The data from the annual summary on the OSHA 300 log should be transferred to the OSHA 300A, other requested information provided and the form returned as instructed by the BLS.

5.7 Access to OSHA Records

All OSHA records (accident reporting forms and OSHA 300 logs) should be available for inspection and copying by authorized Federal and State government officials.

Employees, former employees, and their representatives must be given access for inspection and copying to only the log, OSHA No. 300, for the establishment in which the employee currently works or formerly worked.

6.0 REFERENCES

29 CFR Part 1904

7.0 ATTACHMENTS

Attachment A - Incident Investigation Form
Attachment B - Incident Follow-Up Report
Attachment C - Establishing Recordability

ATTACHMENT A

INCIDENT INVESTIGATION FORM

Accident investigation should include:

Location: ____

Time of Day: ____

Accident Type: ____

Victim:____

Nature of Injury:____

Released Injury:____

Hazardous Material:____

Unsafe Acts:____

Unsafe Conditions:____

Policies, Decisions:____

____

Personal Factors:____

____

Environmental Factors:____

____

____

ATTACHMENT B

Date ____

Foreman: ____

INCIDENT FOLLOW-UP REPORT

Date of Incident: ____

Site:____

Brief description of incident: __________________________________

____

____

____

____

Outcome of incident: ____

____

____

____

Physician's recommendations: _____________________________________

____

____

____

Date the injured returned to work:________________________________

Project Manager Signature: _______________________________________

Date: ____

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

ATTACHMENT C

ESTABLISHING RECORDABILITY

1. Deciding whether to record a case and how to classify the case.

Determine whether a fatality, injury or illness is recordable.

A fatality is recordable if:

- Results from employment

An injury is recordable if:

- Results from employment and
- It requires medical treatment beyond first aid or
- Results in restricted work activity or job transfer, or
- Results in lost work day or
- Results in loss of consciousness

An illness is recordable if:

- It results from employment

2. Definition of "Resulting from Employment"

Resulting from employment is when the injury or illness results from an event or exposure in the work environment. The work environment is primarily composed of: 1) The employer's premises, and 2) other locations where associates are engaged in work-related activities or are present as a condition of their employment.

The employer's premises include company rest rooms, hallways, cafeterias, sidewalks and parking lots. Injuries occurring in these places are generally considered work related.

The employer's premises EXCLUDES employer controlled ball fields, tennis courts, golf courses, parks, swimming pools, gyms, and other similar recreational facilities, used by associates on a voluntary basis for their own benefit, primarily during off work hours.

Ordinary and customary commute, is not generally considered work related.

Employees injured or taken ill while engaged in consuming food, as part of a normal break or activity is not considered work related. Employees injured or taken ill as the result of smoking, consuming illegal drugs, alcohol or applying make up are generally not considered work related. Employee injured by un authorized horseplay is generally not considered work related, however, an employee injured as a result of a fight or other workplace violence act, may be considered work related.

Associates who travel on company business are considered to be engaged in work related activities all the time they spend in the interest of the company. This includes travel to and from customer contacts, and entertaining or being entertained for purpose of promoting or discussing business. Incidents occurring during normal living activities (eating, sleeping, recreation) or if the associate deviates from a reasonably direct route of travel are not considered OSHA recordable.

3. Distinction between Medical Treatment and First Aid.

First aid is defined as any one-time treatment, and any follow up visit for the purpose of observation, of minor scratches, cuts, burns, splinters, etc., which do not ordinarily require medical care. Such one time treatment, and follow up visit for the purpose of observation, is considered first aid even though provided by a physician or registered professional personnel.

Medical Treatment (recordable)

a) They must be treated only by a physician or licensed medical personnel.

b) They impair bodily function (i.e. normal use of senses, limbs, etc.).

c) They result in damage to physical structure of a non superficial nature (fractures).

d) They involve complications requiring follow up medical treatment.