This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

Volume 15, Sheet 69
Volume 15, Sheet 70
Volume 15, Sheet 71
Volume 15, Sheet 72
This Certified Sanborn Map combines the following sheets. Outlined areas indicate map sheets within the collection.

Volume 15, Sheet 69
Volume 15, Sheet 70
Volume 15, Sheet 71
Volume 15, Sheet 72
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Volume 15, Sheet 69
Volume 15, Sheet 70
Volume 15, Sheet 71
Volume 15, Sheet 72
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Volume 15, Sheet 69
Volume 15, Sheet 70
Volume 15, Sheet 71
Volume 15, Sheet 72
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- Volume 15, Sheet 70
- Volume 15, Sheet 71
- Volume 15, Sheet 72
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- Volume 15, Sheet 69
- Volume 15, Sheet 70
- Volume 15, Sheet 71
- Volume 15, Sheet 72
Appendix C

Community Participation Plan (CPP)
New York State Department of Environmental Conservation

Brownfield Cleanup Program

Citizen Participation Plan
for
1960-1982 Webster Avenue

1960-1982 Webster Avenue
Bronx, NY 10454

January 2015
# Contents

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**Note:** The information presented in this Citizen Participation Plan was current as of the date of its approval by the New York State Department of Environmental Conservation. Portions of this Citizen Participation Plan may be revised during the site’s investigation and cleanup process.
1. What is New York’s Brownfield Cleanup Program?

New York’s Brownfield Cleanup Program (BCP) works with private developers to encourage the voluntary cleanup of contaminated properties known as “brownfields” so that they can be reused and developed. These uses include recreation, housing, and business.

A brownfield is any real property that is difficult to reuse or redevelop because of the presence or potential presence of contamination. A brownfield typically is a former industrial or commercial property where operations may have resulted in environmental contamination. A brownfield can pose environmental, legal, and financial burdens on a community. If a brownfield is not addressed, it can reduce property values in the area and affect economic development of nearby properties.

The BCP is administered by the New York State Department of Environmental Conservation (NYSDEC) which oversees Applicants that conduct brownfield site investigation and cleanup activities. An Applicant is a person who has requested to participate in the BCP and has been accepted by NYSDEC. The BCP contains investigation and cleanup requirements, ensuring that cleanups protect public health and the environment. When NYSDEC certifies that these requirements have been met, the property can be reused or redeveloped for the intended use.

For more information about the BCP, go online at: http://www.dec.ny.gov/chemical/8450.html.

2. Citizen Participation Activities

Why NYSDEC Involves the Public and Why It Is Important

NYSDEC involves the public to improve the process of investigating and cleaning up contaminated sites, and to enable citizens to participate more fully in decisions that affect their health, environment, and social well being. NYSDEC provides opportunities for citizen involvement and encourages early two-way communication with citizens before decision makers form or adopt final positions.

Involving citizens affected and interest in site investigation and cleanup programs is important for many reasons. These include:
• Promoting the development of timely, effective site investigation and cleanup programs that protect public health and the environment;

• Improving public access to, and understanding of, issues and information related to a particular site and that site’s investigation and cleanup process;

• Providing citizens with early and continuing opportunities to participate in NYSDEC’s site investigation and cleanup process;

• Ensuring that NYSDEC makes site investigation and cleanup decisions that benefit from input that reflects the interests and perspectives found within the affected community; and

• Encouraging dialogue to promote the exchange of information among the affected/interested public, State agencies, and other interested parties that strengthens trust among the parties, increases understanding of site and community issues and concerns, and improves decision-making.

This Citizen Participation (CP) Plan provides information about how NYSDEC will inform and involve the public during the investigation and cleanup of the Site identified above. The public information and involvement program will be carried out with assistance, as appropriate, from the Applicant.

Project Contacts

Appendix A identifies NYSDEC project contact(s) to whom the public should address questions or request information about the site’s investigation and cleanup program. The public’s suggestions about this CP Plan and the CP program for the Site are always welcome. Interested people are encouraged to share their ideas and suggestions with the project contacts at any time.

Locations of Reports and Information

The locations of the reports and information related to the site’s investigation and cleanup program also are identified in Appendix A. These locations provide convenient access to important project documents for public review and comment. Some documents may be placed on the NYSDEC website. If this occurs, NYSDEC will inform the public in fact sheets distributed about the Site and by other means, as appropriate.

Site Contact List

Appendix B contains the site contact list. This list has been developed to keep the community informed about, and involved in, the site’s investigation and cleanup process. The site contact list will be used periodically to distribute fact sheets that provide updates about the status of the
project. These will include notifications of upcoming activities at the Site (such as fieldwork), as well as availability of project documents and announcements about public comment periods. The site contact list includes, at a minimum:

- Chief executive officer and planning board chairperson of each county, city, town and village in which the Site is located;
- Residents, owners, and occupants of the Site and properties adjacent to the Site;
- The public water supplier which services the area in which the Site is located;
- Any person who has requested to be placed on the site contact list;
- The administrator of any school or day care facility located on or near the Site for purposes of posting and/or dissemination of information at the facility;
- Location(s) of reports and information.

The site contact list will be reviewed periodically and updated as appropriate. Individuals and organizations will be added to the site contact list upon request. Such requests should be submitted to the NYSDEC project contact(s) identified in Appendix A. Other additions to the site contact list may be made at the discretion of the NYSDEC project manager, in consultation with other NYSDEC staff as appropriate.

**CP Activities**

The table at the end of this section identifies the CP activities, at a minimum, that have been and will be conducted during the site’s investigation and cleanup program. The flowchart in Appendix D shows how these CP activities integrate with the site investigation and cleanup process. The public is informed about these CP activities through fact sheets and notices distributed at significant points during the program. Elements of the investigation and cleanup process that match up with the CP activities are explained briefly in Section 5.

- **Notices and fact sheets** help the interested and affected public to understand contamination issues related to a site, and the nature and progress of efforts to investigate and clean up a site.

- **Public forums, comment periods and contact with project managers** provide opportunities for the public to contribute information, opinions and perspectives that have potential to influence decisions about a site’s investigation and cleanup.

The public is encouraged to contact project staff at any time during the site’s investigation and cleanup process with questions, comments, or requests for information.
This CP Plan may be revised due to changes in major issues of public concern identified in Section 3 or in the nature and scope of investigation and cleanup activities. Modifications may include additions to the site contact list and changes in planned citizen participation activities.

*Technical Assistance Grant*

NYSDEC must determine if the Site poses a significant threat to public health or the environment. This determination generally is made using information developed during the investigation of the Site, as described in Section 5.

If the Site is determined to be a significant threat, a qualifying community group may apply for a Technical Assistance Grant (TAG). The purpose of a TAG is to provide funds to the qualifying group to obtain independent technical assistance. This assistance helps the TAG recipient to interpret and understand existing environmental information about the nature and extent of contamination related to the site and the development/implementation of a remedy.

An eligible community group must certify that its membership represents the interests of the community affected by the Site, and that its members’ health, economic well-being or enjoyment of the environment may be affected by a release or threatened release of contamination at the Site.

For more information about TAGs, go online at [http://www.dec.ny.gov/regulations/2590.html](http://www.dec.ny.gov/regulations/2590.html)

Note: The table identifying the citizen participation activities related to the site’s investigation and cleanup program follows on the next page:
<table>
<thead>
<tr>
<th>Citizen Participation Requirements (Activities)</th>
<th>Timing of CP Activity(ies)</th>
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<tbody>
<tr>
<td><strong>Application Process:</strong></td>
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<tr>
<td>• Prepare site contact list</td>
<td>At time of preparation of application to participate in the BCP.</td>
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<td>• Establish document repositories</td>
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<tr>
<td>• Publish notice in Environmental Notice Bulletin (ENB) announcing receipt of application and 30-day public comment period</td>
<td>When NYSDEC determines that BCP application is complete. The 30-day public comment period begins on date of publication of notice in ENB. End date of public comment period is as stated in ENB notice. Therefore, ENB notice, newspaper notice, and notice to the site contact list should be provided to the public at the same time.</td>
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<tr>
<td>• Publish above ENB content in local newspaper</td>
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<tr>
<td>• Mail above ENB content to site contact list</td>
<td></td>
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<tr>
<td>• Conduct 30-day public comment period</td>
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<tr>
<td><strong>After Execution of Brownfield Site Cleanup Agreement:</strong></td>
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<tr>
<td>• Prepare Citizen Participation (CP) Plan</td>
<td>Before start of Remedial Investigation</td>
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<tr>
<td><strong>Before NYSDEC Approves Remedial Investigation (RI) Work Plan:</strong></td>
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<tr>
<td>• Distribute fact sheet to site contact list about proposed RI activities and announcing 30-day public comment period about draft RI Work Plan</td>
<td>Before NYSDEC approves RI Work Plan. If RI Work Plan is submitted with application, public comment periods will be combined and public notice will include fact sheet. Thirty-day public comment period begins/ends as per dates identified in fact sheet.</td>
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<tr>
<td>• Conduct 30-day public comment period</td>
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<tr>
<td><strong>After Applicant Completes Remedial Investigation:</strong></td>
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<tr>
<td>• Distribute fact sheet to site contact list that describes RI results</td>
<td>Before NYSDEC approves RI Report</td>
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<td><strong>Before NYSDEC Approves Remedial Work Plan (RWP):</strong></td>
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<tr>
<td>• Distribute fact sheet to site contact list about proposed RWP and announcing 45-day public comment period</td>
<td>Before NYSDEC approves RWP. Forty-five day public comment period begins/ends as per dates identified in fact sheet. Public meeting would be held within the 45-day public comment period.</td>
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<tr>
<td>• Public meeting by NYSDEC about proposed RWP (if requested by affected community or at discretion of NYSDEC project manager)</td>
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<tr>
<td>• Conduct 45-day public comment period</td>
<td></td>
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<tr>
<td><strong>Before Applicant Starts Cleanup Action:</strong></td>
<td>Before the start of cleanup action.</td>
</tr>
<tr>
<td><strong>After Applicant Completes Cleanup Action:</strong></td>
<td>At the time NYSDEC approves Final Engineering Report. These two fact sheets are combined if possible if there is not a delay in issuing the COC.</td>
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3. Major Issues of Public Concern

There are no major issues of public concern as they are related to the Site. Additional major issues of public concern may be identified during the course of the site’s investigation and cleanup process.

The Site is located in an Environmental Justice Area. Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.

The Site is located in an area with a large Hispanic-American population. Therefore, all future fact sheets will be translated into Spanish. Also, there may be noise or odor impacts with regards to the cleanup of the Site.

The Applicant has completed a Scoping Sheet for the Major Issues of Public Concern, which will help them better understand the community surrounding the Site. Because of the high percentage of Potential Environmental Justice Areas in New York City, the Scoping Sheet is a particularly valuable tool in this region.

The Scoping Sheet will provide the Applicant with opportunity to further understand the demographics surrounding the BCP site. In addition, the Applicant will need to understand how truck traffic patterns involving the site remediation, will affect the community.

4. Site Information

Appendix C contains a map identifying the location of the site.

Site Description

The Site is located at 1960-1982 Webster Avenue in the Tremont section of the Bronx, NY and is identified as Block 3028 and Lots 1, 6, 7, 8, 48 and 75 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 59,292-square feet and is bounded by 1984 Webster Avenue, a warehouse to the north, East 178th Street and beyond by commercial and residential properties to the south, Park Avenue and beyond by MTA Metro North railway lines to the east, and Webster Avenue and beyond by commercial and residential properties to the west. Currently,
the Site is improved with an unoccupied one-story and partial two-story steel framed masonry block structure on lot 48 which was last occupied several years ago by a Western Beef Supermarket. No additional permanent structures or other pertinent Site features exist on the property.

History of Site Use, Investigation, and Cleanup

The City Directory listing for the Site revealed a service station and parts department, Studebaker Corporation of America, Park Avenue Auto Body Company Inc., and G Auto Bodies on the Site in 1927 and 1940. A review of Sanborn Fire Insurance Maps from 1901 and 1915 identified the parcels to have formerly contained a number of private dwellings (residences), retail stores, patent office, painter, paint shop, wagon house, and stable. The Sanborn map also indicated the southern and western portions of the Site maintained seven residential dwellings and retail stores. According to the City Directory listing, said retail stories included: Lane Curtin Company, Luminiere Manufacturing Company Lamps and Shades, Premier Lamp Company Inc., Federal Hook and Eye Corporation, and Ladin Harry Company Lamps and Shades. Lots 6, 7, 8, and 75 were shown to have been improved with two-story residences until 1981.

The following assessments and investigations have been performed for the Site:

1. ERM performed a Remedial Investigation with NYC Office of Environmental Restoration approval in September 2013:

   • Conducted a Site inspection to identify Areas of Concern (AOCs) and physical obstructions (i.e. underground storage tanks, structures, buildings, etc.) An AOC is described as any existing or former location at a site where contaminants are known or suspected to have been discharged which is considered a source area. These include locations where contaminants were generated, manufactured, refined, transported, stored, handled, treated, disposed or where they have or may have migrated;

   • Conducted a geophysical survey of the paved parking lot and grassed area surrounding the building using a T-W6 metal detector and a cart mounted ground-penetrating radar (GPR) unit;
- Installed 7 soil borings across the southern and northwestern portion of the Site, and collected 14 soil samples for chemical analysis from the soil borings to evaluate soil quality;

- Installed 4 groundwater monitoring wells across the southern and northwestern portion of the Site and collected 4 groundwater samples for chemical analysis to evaluate groundwater quality; and

- Installed 5 soil vapor probes across the southern and northwestern portion of the Site and collected 5 samples for chemical analysis.

**Summary of Environmental Findings**

The stratigraphy of the Site, from the surface down, consists of 5 to 8 feet of historic fill material underlain by native brown silty sand. Chemical analyses of soil, groundwater and soil vapor indicates exceedance of standards in all three media. Restricted residential and protection of groundwater standards were exceeded on both proposed tax lots. Contaminants that exceed one or more of these criteria in soil included metals and polycyclic aromatic hydrocarbons (PAHs) to depths up to 14 feet below grade.

Groundwater analytical results also indicate exceedance of standards for metals, one chlorinated Volatile Organic Compound (VOC) (Tetrachloroethene), one Semi Volatile Organic Compound (SVOC) (Bis (2-etylhexyl)phthalate) and one pesticide (Dieldrin). Groundwater impacts are found on both proposed tax lots.

Soil Vapor analyses indicate the presence of chlorinated solvents (Tetrachloroethene, Trichloroethene and 111 Trichloroethene) at levels over 100 times the New York State Department of Health (NYSDOH) guidance values. In addition various other hydrocarbons and Freon compounds were found at elevated levels in soil vapor. The distribution of soil vapor impacts is throughout both proposed tax lots.
Results from each of these environmental media are discussed in more detail in the findings section below.

2. A Phase I Environmental Site Assessment was conducted in August 2013, by ERM to identify any potential environmental concerns resulting from past and present usage of the Site and neighboring properties. The Phase I ESA identified historic operations/use concerns and the NYC Department of Planning “e”-designation listing as recognized environmental conditions (RECs) at the Site.

3. A Phase II Investigation was performed by Taylord Environmental Inc. (Taylord) in March, 2013. Taylord was contracted by Gary Frederic, LLC, to perform a Phase II Environmental Site Assessment at the Site. The purpose of this investigation was to illustrate that the Site is clean and further recommend that the spill number (Spill # 1214265) associated with the Site be closed as a result of this investigation’s findings.

Spill Case Number 1214265 was reported by DT Consulting Services, Inc. (DT), in January 2013. The spill was reported when DT staff encountered impacted soils at the SB-13 soil boring. Visual, olfactory and PID evidence of petroleum contaminated soils were observed by DT staff. The purpose of the Phase II Investigation was to verify the observations made by DT staff, delineate the plume, and find the source of petroleum contamination.

Taylord concluded and recommended the following:

- Taylord found evidence of petroleum contaminated soils. The impacted area ranged from approximately 14’ to 15’ below grade, which corresponded to the static groundwater table. Two boring locations showed the impacted area less than six inches in thickness, at the same depth of the static groundwater table.

- Petroleum impacted soils were not found in the upper soil horizons anywhere on Site.
• Laboratory analysis of representative soil samples, collected from the portion of the borings that exhibited the highest Photo Ionization Detector (PID) reading (generally at approximately 14 feet), showed concentrations of target analytes that were below the NYSDEC Guidance Values (CP-51).

• One Underground Storage Tank (UST) was found by DT. The UST was located in the northeastern portion of the Site. Soil sampling completed by DT in the vicinity of the UST showed no evidence of petroleum-impacted soils.

• It was the opinion of Taylord that petroleum-impacted soils found on the southwestern portion of the Site originated from an off-site source. This opinion was based on the absence of petroleum-impacted soils in the upper soil horizons and the potential for on-site migration from the south-southwest.

• Taylord recommended no further actions for petroleum-impacted soils found in the southwestern portion of the Site. This recommendation was based on representative soil samples collected during the Taylord Investigation and the DT investigation. It was the opinion of Taylord that impacted soils found at approximately 14 feet below grade will continue to be remediated by natural attenuation.

4. ERM was provided with only the laboratory data package from a Remedial Investigation Report (RIR) performed by DT Consulting Services, Inc. (DT), in January, 2013.

5. A Phase I Environmental Site Assessment performed by Team Environmental Consultants, Inc. in December of 2012 for the Site. This report identified the following recommendations to address issues of potential environmental concern:

• Potentially significant residual subsurface contamination issues associated with historic site use as a lamp manufacturing business; and
• Identified presence of three roof level vent pipes possibly associated with inactive underground motor fuel storage tanks.

5. Investigation and Cleanup Process

Application

The Applicant has applied for and been accepted into New York’s Brownfield Cleanup Program as a Volunteer. This means the Applicant was not responsible for the disposal or discharge of the contaminants or whose ownership or operation of the Site took place after the discharge or disposal of contaminants. The Volunteer must fully characterize the nature and extent of contamination on-site, and must conduct a qualitative exposure assessment, a process that characterizes the actual or potential exposures of people, fish and wildlife to contaminants on the Site and to contamination that has migrated from the Site.

The Applicant in its Application proposes that the site will be used for restricted purposes.

To achieve this goal, the Applicant will conduct cleanup activities at the Site with oversight provided by NYSDEC. The Brownfield Cleanup Agreement executed by NYSDEC and the Applicant sets forth the responsibilities of each party in conducting these activities at the Site.

Remedy Selection

When the investigation of the Site has been determined to be complete, the project likely would proceed in one of two directions:

1. The Applicant may recommend in its investigation report that no action is necessary at the Site. In this case, NYSDEC would make the investigation report available for public comment for 45 days. NYSDEC then would complete its review, make any necessary revisions, and, if appropriate, approve the investigation report. NYSDEC would then issue a Certificate of Completion (described below) to the Applicant.

or

2. The Applicant may recommend in its investigation report that action needs to be taken to address site contamination. After NYSDEC approves the investigation report, the Applicant may then develop a cleanup plan, officially called a Remedial Work Plan. The Remedial Work Plan describes the Applicant’s proposed remedy for addressing contamination related to the Site.

When the Applicant submits a proposed Remedial Work Plan for approval, NYSDEC would announce the availability of the proposed plan for public review during a 45-day public comment period.
Cleanup Action

NYSDEC will consider public comments, and revise the draft cleanup plan if necessary, before approving the proposed remedy. The NYSDOH must concur with the proposed remedy. After approval, the proposed remedy becomes the selected remedy.

The Applicant may then design and perform the cleanup action to address the site contamination. NYSDEC and NYSDOH oversee the activities. When the Applicant completes cleanup activities, it will prepare a Final Engineering Report (FER) that certifies that cleanup requirements have been achieved or will be achieved within a specific time frame. NYSDEC will review the report to be certain that the cleanup is protective of public health and the environment for the intended use of the site.

Certificate of Completion

When NYSDEC is satisfied that cleanup requirements have been achieved or will be achieved for the Site, it will approve the FER. NYSDEC then will issue a Certificate of Completion (COC) to the Applicant. The COC states that cleanup goals have been achieved, and relieves the Applicant from future liability for site-related contamination, subject to certain conditions. The Applicant would be eligible to redevelop the Site after it receives a COC.

Site Management

Site management is the last phase of the site cleanup program. This phase begins when the COC is issued. Site management may be conducted by the Applicant under NYSDEC oversight, if contamination will remain in place. Site management incorporates any institutional and engineering controls required to ensure that the remedy implemented for the Site remains protective of public health and the environment. All significant activities are detailed in a Site Management Plan.

An institutional control is a non-physical restriction on use of the Site, such as a deed restriction that would prevent or restrict certain uses of the property. An institutional control may be used when the cleanup action leaves some contamination that makes the site suitable for some, but not all uses.

An engineering control is a physical barrier or method to manage contamination. Examples include: caps, covers, barriers, fences, and treatment of water supplies.

Site management also may include the operation and maintenance of a component of the remedy, such as a system that is pumping and treating groundwater. Site management continues until NYSDEC determines that it is no longer needed.
Appendix A
Project Contacts and Locations of Reports and Information

Project Contacts

For information about the site’s investigation and cleanup program, the public may contact any of the following project staff:

**New York State Department of Environmental Conservation (NYSDEC):**

John Grathwol  
Project Manager  
NYSDEC  
Division of Environmental Remediation  
625 Broadway  
Albany, NY 12233  
Tel: (518) 402-9767  
Email: john.grathwol@dec.ny.gov

Thomas V. Panzone  
Regional Citizen Participation Specialist  
One Hunters Point Plaza  
47-40 21st Street  
Long Island City, NY 11101  
Tel: (718) 482-4953  
Email: Thomas.panzone@dec.ny.gov

**New York State Department of Health (NYSDOH):**

Stephanie Selmer  
Project Manager  
NYSDOH  
Empire State Plaza  
Corning Tower, Room 1787  
Albany, NY 12237  
Email: BEEI@health.ny.gov

**Locations of Reports and Information**

The facilities identified below are being used to provide the public with convenient access to important project documents:

Tremont Library  
1866 Washington Avenue  
Bronx, NY 10457  
NYSDEC Region 2  
One Hunters Point Plaza  
47-40 21st Street  
Long Island City, NY 11101  
Attn: Jane O’Connell  
Hours: Monday through Friday 9:00 AM to 5:00 PM  
(Call for appointment)
Appendix B Site Contact List
<table>
<thead>
<tr>
<th>Site Name: 1960 Webster Avenue</th>
<th>Site Address</th>
<th>City</th>
<th>State</th>
<th>Zip</th>
<th>Site Name (County)</th>
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<tr>
<td>1960 Webster Avenue (Bronx)</td>
<td>1960 Webster Avenue</td>
<td>Bronx</td>
<td>NY</td>
<td>10457</td>
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<tr>
<td>Site Name: 1960 Webster Avenue Site</td>
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Site Location Map
1960-1982 Webster Avenue
Bronx, NY 10457

Legend

Property Boundary

Source: Google Earth Pro

Environmental Resources Management
Appendix C
Appendix D– Brownfield Cleanup Program Process

1. Application Complete
   - 30-Day Comment Period (Fact Sheet ENB, Newspaper)
   - Notify Applicant of Acceptance and Send BCA for Signature
   - Execute BCA
   - Develop RI Work Plan Including CP Plan

2. NYSDEC Approves Investigation Report
   - NYSDEC Makes Significant Threat Determination if Not Already Made
   - Complete Investigation and Submit Report
   - Approve RI Work Plan
   - Complete Investigation and Submit Report
   - NYSDEC Review/Approval of Alternatives Analysis
   - Significant Threat Site?
     - Yes
       - NYSDEC Selects Proposed Remedy
       - Applicant Selects Proposed Remedy
     - No

3. NYSDEC Approves Investigation Report
   - NYSDEC Approves Investigation Report
   - Develop Remedial Work Plan with Alternatives Analysis
   - NYSDEC Finalizes Remedial Work Plan
   - Issue Construction Notice (Fact Sheet)
   - Issue Engineering Report Fact Sheet

4. Public Meeting (Optional)
   - NYSDEC Finalizes Remedial Work Plan
   - Issue Construction Notice (Fact Sheet)
   - Complete Construction
   - Submit Engineering Report with all Certifications

5. Approve Engineering Report
   - Issue Engineering Report Fact Sheet
   - Approve Engineering Report
   - Issue Certificate of Completion
   - Any ICs or ECs?
     - Yes
       - Issue IC/EC Notice (Fact Sheet) Within 10 Days
       - Issue IC/EC Notice (Fact Sheet) Within 10 Days
       - Is Site Management Required?
         - Yes
           - Operate, Monitor and Maintain Remedy; Complete any Annual IC/EC Certifications
           - Is Site Management Required?
             - Yes
               - Issue IC/EC Notice (Fact Sheet) Within 10 Days
             - No
               - Issue IC/EC Notice (Fact Sheet) Within 10 Days
             - Is Site Management Required?
               - Yes
                 - Issue IC/EC Notice (Fact Sheet) Within 10 Days
               - No
                 - Issue IC/EC Notice (Fact Sheet) Within 10 Days

6. PROJECT COMPLETE
   - Operate, Monitor and Maintain Remedy; Complete any Annual IC/EC Certifications
   - Is Site Management Required?
     - Yes
       - Issue IC/EC Notice (Fact Sheet) Within 10 Days
     - No

Note: CP Activities are in Bold

Key:
- BCA = Brownfield Cleanup Agreement
- CP = Citizen Participation
- EC = Engineering Control
- ENB = Environmental Notice Bulletin
- IC = Institutional Control
- RI = Remedial Investigation
Appendix D

Health and Safety Plan (HASP)
HEALTH AND SAFETY PLAN (HASP)

1960-1982 Webster Avenue
Bronx, New York

August 2014

Project Number: 0261877

Prepared for:

Mountco Construction and Development Corp.
700 White Plains Road, Suite 363, Scarsdale, NY

and

Common Ground Community II HDFC
505 Eighth Avenue, 5th Floor, New York, NY

Prepared by:

ERM Consulting & Engineering Inc.
105 Maxess Road, Suite 316
Melville, NY 11747
HEALTH AND SAFETY PLAN (HASP)

Ernie Rossano
Project Director

Karen Pickering
Project Manager

Paulina Gravier
Project Health and Safety Coordinator

Edyta Korczynska
Field Team Leader

Brice Lynch
Site Safety Officer
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9.0 SITE CONTROL MEASURES
  9.1 EXCAVATION

10.0 DECONTAMINATION PROCEDURES
  10.1 PERSONNEL DECONTAMINATION

11.0 CONFINED SPACE ENTRY PROCEDURES

12.0 SPILL CONTAINMENT PROGRAM

13.0 SITE COMMUNICATION

14.0 COMMUNICATION AND REVIEW OF SITE-SPECIFIC HEALTH AND SAFETY PLAN

15.0 EMERGENCY RESPONSE PLAN
  15.1 PERSONNEL ROLES AND LINES OF AUTHORITY
  15.2 EMERGENCY ALARMS
  15.3 REPORTING EMERGENCIES
  15.4 EMERGENCY CONTACTS
  15.5 INCIDENT INVESTIGATIONS
  15.6 DIRECTIONS TO NEAREST HOSPITAL
  15.7 EMERGENCY DRILLS

16.0 SAFETY EQUIPMENT

17.0 CERTIFICATION OF FAMILIARITY WITH PLAN BY SITE PERSONNEL

LIST OF TABLES
1 Summary of Chemical Hazards for Chemicals of Concern
2 Site-Specific and Task-Specific Hazards and Control Strategies
3 Personal Protection Equipment Requirements
4 Emergency Drill Frequency

LIST OF ATTACHMENTS
1 Job Hazard Analysis Form
2 Community Air Monitoring Plan (CAMP)
3 Daily Safety Meeting
4 Project Sign-in Sheet
5 Incident Report
6 Hospital Route Map and Directions
1.0 INTRODUCTION

This Construction Health and Safety Plan (CHASP) has been developed by ERM for construction activities at 1960-1982 Webster Avenue in Bronx, New York (the Sites). The procedures set forth in this CHASP are designed to reduce the risk of exposure to chemical substances and physical or other hazards that may be present. The procedures described herein were developed to comply with Occupational Safety and Health Administration (OSHA) Regulations 29 CFR Part 1910.1025.

The recommended health and safety guidelines within this CHASP will be modified if future information changes the activities to be performed or the characterization of the area in which work is to be performed.

1.1 HEALTH AND SAFETY POLICY STATEMENT

ERM considers the health, safety, and well being of its employees to be of unconditional importance. Reflecting that concern, it is the policy of management to support the implementation of the Health and Safety Program. The proper resources (financial and human resources) are provided to ensure operation of a comprehensive program. The following policies will be employed:

- Prevention of occupational illnesses, accidents, resulting personal hardship, and financial loss takes precedence in the conduct of our business. Objectives of the Health and Safety Program include the identification of and the elimination or control of all hazards to personnel, products, equipment, and facilities.

- The active participation and involvement of all levels of management are essential to the success of the program. The Health and Safety Program Manager (HSPM) directs, reviews, and evaluates Health and Safety Program activities. The HSPM reports directly to the President of ERM.

- All levels of supervision are responsible for maintaining safe working conditions, instructing each subordinate in proper health and safety practices, and enforcing health and safety program specifications. In addition, each supervisor is responsible for discussing the specifications of the CHASP with each employee, and verifying that each employee understands/complies with health and safety directives.

- All employees have personal responsibility to conscientiously follow health and safety procedures, and to notify the project manager of potential or existing hazards to worker health or safety, so that they may be corrected prior to initiation or continuation of work.
Safe conduct is a condition of employment. Disregard for company safety rules are a serious infraction, and disciplinary action will be taken as outlined in this Section.

1.2 ERM PROJECT PERSONNEL AND RESPONSIBILITIES

ERM Project Director (PD):
Ernie Rossano
Responsible for all work and conducts ultimate Quality Assurance/Quality Control (QA/QC) overview.

ERM Project Manager (PM):
Karen Pickering
Manages day-to-day activities; reports to PD.

ERM Project Health and Safety Coordinator:
Paulina Gravier
Directs development of CHASP; provides technical advice on health and safety issues.

ERM Site Safety Officer (SSO):
Brice Lynch
Responsible for implementation of CHASP; reports to PD and PM
2.0 FIELD ACTIVITIES

2.1 SITE WORK

The objective of this CHASP is to identify any hazards that pose a threat to personnel and property. The scope of work covered under this CHASP is comprised of the following tasks:

*Demolition and Construction Activities:*

The existing 42,400 square foot building on-Site will be demolished and construction will begin on the proposed building.

*Soil Excavation:*

Areas identified during the Phase II ESA investigation containing elevated levels of analytes will be excavated and contaminated soils will be shipped off-site.
HAZARD IDENTIFICATION AND CONTROL

3.0

3.1 HAZARD IDENTIFICATION PROCESS

Prior to initiating any new project activity or when there is a change in site conditions, the Site Safety Officer (SSO) will assist project team members in completing a Job Hazard Analysis (JHA). A copy of the JHA form is presented in Attachment 1.

3.1.1 Chemical Hazards

Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the risk. Inhalation and skin contact are the most common routes of entry. Chemicals can be introduced into the body by ingestion when chemicals present on the hands are transferred to food or cigarettes.

Based on historical soil and groundwater sampling, the chemicals of concern may be encountered at the site are listed in Table 1 along with pertinent health and safety information.

3.1.2 Heavy Machinery / Equipment

All site employees must remain aware of those site activities that involve the use of heavy machinery. Repertory protection and protective eyewear must be worn frequently during site activities. The protective equipment significantly reduces peripheral vision of the wearer; therefore, it is essential that the employees at the site exercise extreme caution during operation of equipment and machinery to avoid physical injury to themselves or others.

3.1.3 Vehicular Traffic

All employees will be required to wear a fluorescent safety vest at all times while on site. In addition, supplemental traffic safety equipment use can be exercised when warranted by specific tasks. Supplemental equipment can be items such as cones, flags, barricades, and/or caution tape. Drivers of waste transportation vehicles will only exit vehicles in designated areas within the Support Zone. During this time, drivers will only be allowed to inspect the placement of waste loads and cover their trailers.

3.1.4 Site-Specific/Task-Specific Hazards and Control Strategies

The hazards and control strategies associated with planned work activities are summarized in Table 2. During the mobilization phase of a specific work task, the project team can quickly review the hazards and control strategies by locating the task or activity to be performed on the table. Hazards that are
common to all activities performed at the site at listed first. The hazards listed for a particular task or activity includes the common hazards.
4.0 PERSONAL PROTECTIVE EQUIPMENT

The level of PPE selected for a task is based on the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, splashes of liquids or other direct contact with material due to work being done.
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better identified.

In addition to summarizing the general PPE requirements for tasks performed at the site, Table 3 also serves as the written certification that the PPE Hazard Assessment has been conducted.

4.1 RESPIRATORY PROTECTION

The type of respiratory protection required will be based on the results of ambient air monitoring, the results of any models used to predict ambient air concentrations, and the professional judgment of either the SSO or the Project Health and Safety Coordinator.

As required by 29 CFR 1910.134, Respiratory Protection, a cartridge change-out schedule will be developed if it is necessary to upgrade to Level C based on either the results of ambient air monitoring, the results of any models used to predict ambient air concentration; or the professional judgment of the Project Health and Safety Coordinator. A community air monitoring plan (CAMP) can be found in Attachment 2. At a minimum, new respirator cartridges must be placed on the respirator at the beginning of the shift and after lunch.
5.0 HEAT AND COLD STRESS

5.1 HEAT STRESS

The timing of these activities may be such that heat stress may pose a threat to the health and safety of Site personnel. Acclimation periods and work/rest regimens will be implemented as necessary so that personnel do not suffer adverse effects from heat stress. Heat stress, if necessary, will be monitored in accordance with the American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) for Heat Stress or equivalent when the temperature is greater than 80°F. The following work/rest regimen will be utilized:

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<th>Temp °F</th>
<th>Work-Rest Regimen</th>
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<tr>
<td>80</td>
<td>Work Break Every 2 hours.</td>
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<tr>
<td>82</td>
<td>75% Work - 25% Rest, each hour.</td>
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<tr>
<td>85</td>
<td>50% Work - 50% Rest, each hour.</td>
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<tr>
<td>88</td>
<td>25% Work - 75% Rest, each hour.</td>
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<tr>
<td>90</td>
<td>Delay work until cooler temperatures prevail.</td>
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</table>

Special clothing and an appropriate diet and fluid intake will be recommended for all Site personnel to further reduce these temperature-related hazards. A good rule of thumb to prevent dehydration from heat stress is that fluid intake should equal fluid loss from the body, which can be accomplished through frequent small intakes of water. Potable water and/or a drink substitute (i.e., Gatorade) will be available for employee consumption.

5.2 COLD STRESS

The timing of investigative or remediation activities may be such that cold stress may also present a threat to the health and safety of Site employees. Work/rest schedules, with rest in a warming shelter, will be implemented as necessary to reduce adverse effects from cold exposure. Cold stress, if necessary, will be monitored in accordance with the ACGIH TLV for Cold Stress or equivalent. The addition of wind speed and the resulting wind chill will be considered when determining an appropriate work/rest schedule and appropriate clothing.

Site personnel will be encouraged to consume water to avoid dehydration. Potable water and/or a drink substitute (i.e., Gatorade) shall be available for employee consumption. Workers will wear adequately insulated clothing to limit exposure to cold.
6.0 SAFE WORK PRACTICES AND STANDARD OPERATING PROCEDURES

6.1 GENERAL SITE PROVISIONS

6.1.1 Smoking and Eating Areas

Smoking will only be allowed in designated areas. Upon mobilization at the site, the SSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate termination.

Upon mobilization at the site, the SSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition.

6.1.2 Temporary Facilities

This project will not require any temporary facilities.

6.1.3 Standard Operating Procedures

The following standard operating procedures will be adhered to at all times.

- All personnel entering the site must check in with the SSO.
- All individuals entering the site must demonstrate to the SSO that they have been adequately trained as defined in Section 8.0.
- All individuals must be familiar with emergency communication methods and how to summon emergency assistance.
- Use of alcoholic beverages before, during operations, or immediately after hours is absolutely forbidden. Alcohol can reduce the ability to detoxify compounds absorbed into the body as the result of minor exposures and may have negative effects with exposure to other chemicals. In addition, alcoholic beverages will dehydrate the body and intensify the effects of heat stress.
- Horseplay of any type is forbidden.
- All unsafe conditions will be immediately reported to the SSO, who will document such conditions in the field log. The SSO will be responsible for ensuring that the unsafe condition is correctly as quickly as possible.
- Smoking, matches, and lighters are only allowed in the designated smoking area.
Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.

6.2 **SAFE WORK PRACTICES**

6.2.1 **Ergonomics**

Ergonomic risk factors include repetitive motion, force, awkward posture, and vibration. The key to preventing ergonomic injuries is education of personnel relative to the hazards and risk factors and implementation of proper controls and work practices.

Several tasks associated with this project have the potential to cause back injuries, if proper lifting techniques are not followed. Site workers should not lift objects that are beyond their physical capabilities and the use of mechanical devices such as forklifts is encouraged. In addition, when shoveling, site workers should not twist their backs while moving materials with the shovel. The proper technique is to move the feet.

Proper lifting techniques are summarized below.

- Place feet, shoulder-width apart, with toes pointing slightly out.
- Bend at your knees keeping back straight.
- Get a good grip on the object and pull object close to your body.
- Tighten abdominal muscles.
- Keep your head up, looking forward, and lift with your legs while maintaining a straight back.
- Keep load close to your body and ensure your view is not obstructed.
- If one end of the load is heavier than the other, the heavier end should be closest to your body.
- Move your feet to relocate the object as opposed to twisting your back.
- When placing the object down, bend your knees and use your leg muscles while keeping your back straight.

6.3 **PRE-DRILLING/PRE-EXCAVATION AND PROBING PROTOCOL**

Prior to mobilizing to the field, the Contractor will be responsible for ensuring the following issues have been adequately addressed:

- Contacting One-Call or equivalent to identify underground pipelines, utility lines, and fiber optic cable.
• Contacting appropriate municipality to identify underground and sewer lines.
• Contacting posted pipeline companies.

6.4  **FALL PROTECTION**

This project does not involve working from heights more than six feet above grade.

6.5  **WEATHER RELATED EVENTS**

Weather related events that may impact fieldwork include, but are not limited to, rain, snow, and thunder/lightning. The SSO will be responsible for determining what site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until 15 minutes have elapsed from the last clap of thunder/flash of lightning.

During rain, lightning/thunder events, site workers should seek shelter in either a building or vehicle.

6.6  **SOIL EXCAVATION/ TANK REMOVAL**

Excavation risk factors include collapse of excavation side walls, working with heavy machinery; manual handling of materials; working in proximity to traffic; electrical hazards from overhead and underground power-lines; and underground utilities, such as natural gas.

Trench protection (e.g. sloping of side walls, shoring) is required on all excavation greater than 5 feet deep in order to protect against collapse.

At no time during this project shall any employee or subcontractor enter into an open excavation. All excavations should be secured with fencing at the end of every work shift to protect against accidental entry in to an excavation.

6.7  **NIGHT WORK**

This project will not involve activities being performed at night.

6.8  **NOISE**

Employees performing any noisy task, such as but not limited to, operating heavy equipment, drilling, using power tools, or employees working within 20 feet of the person performing the task will wear hearing protection consisting of either earplugs or earmuffs. Personnel operating a drilling rig or standing within 20 feet of a drilling rig during operation will also wear hearing protection.
7.0  EMPLOYEE TRAINING

All employees and subcontractors working on-site, who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors and management responsible for the site will receive training meeting the requirements of 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER) before they are permitted to engage in any job task. Employees will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility. All site workers will receive training that, at a minimum, covers the following:

- Names of personnel and alternates responsible for site safety and health;
- Safety, health and other hazards present on the site;
- Use of PPE;
- Safe use of engineering controls and equipment on the site; and
- Medical surveillance requirements including recognition of symptoms and signs that might indicate overexposure to hazards.

7.1  SUBCONTRACTOR TRAINING

The SSO will verify that subcontractor personnel have received all appropriate training as required by this CHASP prior to their arriving on-site. Verification will consist of reviewing written training documentation such as copies of training certificates or cards. Copies of the written training documentation will be retained in the project file. Subcontractor personnel will not be allowed to work at the site unless said training documentation is available.

7.2  DAILY TAILGATE SAFETY MEETING

A tailgate safety meeting will be conducted each morning. The daily safety meeting meetings will include awareness concerns such as special concerns regarding health and safety, pollution prevention or a discussion of recent incidents or safety observations. Issues such as any changes to the CHASP will be addressed daily. The meetings will include a discussion of what tasks will be completed that day and how those tasks will be conducted safely. The meetings will be documented on the Daily Safety Meeting form found in Attachment 3.
8.0 MEDICAL SURVEILLANCE

All ERM employees are enrolled in a medical surveillance program. All employees receive an initial medical examination and consultation prior to assignment to any job site. In addition, employees receive an annual medical examination, a medical examination upon termination of employment, and a medical examination when the employee exhibits signs or symptoms relating to possible overexposure to hazardous substances or when an injury or exposure above published exposure limits has occurred in an emergency situation.

Additional medical surveillance should be provided for employees who:

- Are or may be exposed to hazardous substances or health hazards at or above published exposure levels for these substances for 30 days or more a year;
- Wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134, Respiratory Protection; and
- Are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.
9.0  SITE CONTROL MEASURES

9.1  EXCAVATION

The soil excavation and surrounding area will be considered the work zone. Excavations will take place in different area and new work zones will be delineated by the SSO. All work zones around open excavations will be bounded by orange snow fence and secured at the end of the work shift to prevent accidental entry into the area. The SSO will ensure that no one enters the work zone without the proper training and requirements. No persons including ERM employee or subcontractors will be allowed to enter any open excavations. All personnel entering the Work Zone will sign the project sign-in sheet in Attachment 4. Furthermore, all ERM personnel and subcontractor will sign-in at the start of each workday and sign-out at the end of each workday.
10.0 DECONTAMINATION PROCEDURES

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All site personnel should limit contact with contaminated soil, groundwater or equipment in order to reduce the need for extensive decontamination.

10.1 PERSONNEL DECONTAMINATION

The following decontamination procedures will be utilized:

- Clean rubber boots with water.
- Remove all PPE and dispose of the PPE in the designated drums.
- Wash hands and any skin that may have come in contact with affected soil or groundwater with moistened disposable towels, such as baby wipes, or soap and water.
11.0  CONFINED SPACE ENTRY PROCEDURES

Entry into permit-required confined spaces is not anticipated or permitted.
12.0 SPILL CONTAINMENT PROGRAM

If project activities involve the use of drums or other containers, the drums or containers will meet the appropriate DOT regulations and will be inspected and their integrity assured prior to being used or moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be over packed into an appropriate container.

In the event of an unexpected release of hydraulic fluid, engine oil, gasoline or diesel fuel, the release material will be absorbed with sorbent pads, which will be placed in a designated drum for disposal. Impacted soil will be excavated and placed on plastic sheeting and covered until characterization and/or disposal can be arranged.
13.0 SITE COMMUNICATION

Cell phones will be used for communication between the project team and the client and office.
14.0 COMMUNICATION AND REVIEW OF SITE-SPECIFIC HEALTH AND SAFETY PLAN

An initial review of the site-specific CHASP will be held either prior to mobilization or after mobilization but prior to commencing work at the site to communicate CHASP details and answer questions to individuals working at the site. Daily tailgate safety meetings will be held each morning to review work practices for the day and to discuss safety issues. Any new hazard or safety information will be disseminated at the daily tailgate safety meeting or as needed throughout the day.
15.0 EMERGENCY RESPONSE PLAN

This section describes possible contingencies and emergency procedures to be implemented at the site.

15.1 PERSONNEL ROLES AND LINES OF AUTHORITY

The SSO has primary responsibility for site evacuation and notification in the event of an emergency situation. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve the evacuation of personnel from the site area and ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. If the SSO is not available, the ERM Project Geologist/Engineer will assume these responsibilities. Subcontractors are responsible for assisting the SSO in their mission within the parameters of their scope of work.

15.2 EMERGENCY ALARMS

Because of the small work area and mobility of work areas, an emergency evacuation plan and meeting place will be decided upon based on the final drilling or sampling locations.

15.3 REPORTING EMERGENCIES

All, including any late developing or aggravated injuries, must receive prompt medical attention. For non-life threatening injuries or illnesses site workers should be transported to the hospital. For life threatening injuries or illnesses, the local emergency responders should be contacted via 911.

The SSO is responsible for reporting all injuries, illnesses, fires, spills/releases, property damage or near misses to the following individuals.

- Injured/involved employee’s supervisor
- ERM Project Manager
- ERM Partner-In-Charge
- ERM Project Health and Safety Consultant
- Client Contact
15.4  **EMERGENCY CONTACTS**

In case of an emergency, the SSO will contact the following as appropriate.

<table>
<thead>
<tr>
<th>Title/Name</th>
<th>Phone Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERM Project Director</td>
<td>Work: 631-756-8900</td>
</tr>
<tr>
<td>Ernie Rossano.</td>
<td>Mobile: 516-250-1429</td>
</tr>
<tr>
<td>Project Manager</td>
<td>Work: 631-756-8900</td>
</tr>
<tr>
<td>Karen Pickering</td>
<td>Mobile: 631-241-0149</td>
</tr>
<tr>
<td>Site Safety Officer/ Geologist</td>
<td>Work: 631-756-8900</td>
</tr>
<tr>
<td>Brice Lynch</td>
<td>Mobile: 631-219-6819</td>
</tr>
<tr>
<td>Project Health and Safety Coordinator</td>
<td>Work: 212-447-1900</td>
</tr>
<tr>
<td>Paulina Gravier</td>
<td>Mobile: 484-802-5243</td>
</tr>
<tr>
<td>Local Emergency Responders – all services</td>
<td>Phone: 911</td>
</tr>
<tr>
<td>Hospital:</td>
<td>Phone: 718-518-5540</td>
</tr>
<tr>
<td>Bronx Lebanon Hospital</td>
<td></td>
</tr>
<tr>
<td>1276 Fulton Avenue</td>
<td></td>
</tr>
</tbody>
</table>

15.5  **INCIDENT INVESTIGATIONS**

An ERM Incident Form, Attachment 5, will be completed and forwarded to the Project Manager within 24 hours of an incident. All incidents will be investigated in a timely manner. The SSO and/or the Project Manager will schedule the investigation and include project supervision (ERM, subcontractors, and client), the injured/involved employee(s) and the Project Health and Safety Coordinator. Root cause analysis will be performed to assess the apparent cause and identify corrective measures to be implemented to prevent re-occurrence. The last page of the Incident Form is used to document the investigation.

15.6  **DIRECTIONS TO NEAREST HOSPITAL**

The nearest hospital is Bronx Lebanon Hospital. A map and directions to the medical facility is located in Attachment 6.

**Bronx Lebanon Hospital**  
**1276 Fulton Avenue**  
(718)-518-5540

15.7  **EMERGENCY DRILLS**

In accordance with HAZWOPER Standard emergency response plans will be rehearsed regularly as part of the overall training program for site operations. The frequency of this drill (rehearsal) is outlined on Table 4. All drills will be documented on the Emergency Drill Evaluation Form found in Table 4. Drills do not need to be elaborate. A tabletop scenario during the daily safety meeting is an adequate drill.
16.0 SAFETY EQUIPMENT

A first aid kit containing first aid items for minor incidents only and a fire extinguisher is maintained in each ERM Northeast vehicle. If you are driving a personal vehicle or a rental vehicle, please rent a first aid kit and fire extinguisher from the equipment room.
### 17.0 CERTIFICATION OF FAMILIARITY WITH PLAN BY SITE PERSONNEL

By signing below, your signature certifies that you have read, understand and will abide by the contents of this CHASP.

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Company</th>
<th>Date</th>
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</table>
ATTACHMENT 1

Job Hazard Analysis
JOB HAZARD ANALYSIS

Required for those field projects that do not require a HASP (see Project Safety Evaluation Checklist). JHAs also are used to supplement HASPs.

Prior to conducting fieldwork a Job Hazard Analysis must be completed and reviewed with all members of the Project Team. At the time of site mobilization, the job Hazard Analysis will be verified and reviewed again with the Project Team at the beginning of each day as fieldwork continues.

<table>
<thead>
<tr>
<th>Client:</th>
<th>W.O.#</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Name:</td>
<td></td>
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<tr>
<td>Location:</td>
<td></td>
</tr>
<tr>
<td>ERM Project Director:</td>
<td>Date:</td>
</tr>
<tr>
<td>ERM Project Manager:</td>
<td>Revision No.:</td>
</tr>
<tr>
<td>ERM Project Team:</td>
<td></td>
</tr>
<tr>
<td>Subcontractors:</td>
<td></td>
</tr>
</tbody>
</table>

Field Work Description

NOTE: For any hazards that are not applicable for your task, mark the left hand column with N/A. Do not leave any hazards blank.

<table>
<thead>
<tr>
<th>Hazard Identification</th>
<th>Describe Hazard Control (appropriate for site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Location/Setting:</td>
<td>☐ Industrial facility  ☐ Commercial area  ☐ Urban area  ☐ Residential area  ☐ Undeveloped/vacant  ☐ Lone worker</td>
</tr>
</tbody>
</table>

☐ Chemicals at site List or attach separate page:
☐ MSDS or chemical information available to project team for each chemical (required)  ☐ PPE (see PPE Section)  ☐ Exposure monitoring  ☐ Decontamination: Specify methods:

☐ Chemicals ERM will take to site  ☐ Attach copies of MSDSs for all chemicals to en to clients site.

☐ Dust-Describe source  ☐ PPE (see PPE Section)  ☐ Exposure monitoring (see monitoring section)  ☐ Dust suppression

☐ Confined Space  Coordinator ERM Health and Safety for assistance
<table>
<thead>
<tr>
<th>Hazard Identification</th>
<th>Describe Hazard Control (appropriate for site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Slips (Wet Surface), Trips and Falls</td>
<td>☐ Clean/ dry surfaces</td>
</tr>
<tr>
<td>☐ fall less than 6 feet</td>
<td>☐ Barricade the unsafe area</td>
</tr>
<tr>
<td>☐ fall more than 6 feet</td>
<td>☐ Eyes on path</td>
</tr>
<tr>
<td></td>
<td>☐ Relocate the work area</td>
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<tr>
<td></td>
<td>☐ Use alternate route</td>
</tr>
<tr>
<td></td>
<td>☐ Use a construction platform</td>
</tr>
<tr>
<td></td>
<td>☐ Tie-off to equipment</td>
</tr>
<tr>
<td></td>
<td>☐ Move work to ground level</td>
</tr>
<tr>
<td></td>
<td>☐ Fall restraint, guardrails, short lanyard</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Electrical Shock</td>
<td>☐ Area around electrical equipment dry</td>
</tr>
<tr>
<td></td>
<td>☐ Energy isolation or Lock-out/Tag-out (LOTO)</td>
</tr>
<tr>
<td></td>
<td>☐ Grounding</td>
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<tr>
<td></td>
<td>☐ GCFI</td>
</tr>
<tr>
<td></td>
<td>☐ Shielding on equipment</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Combustible materials, Fire, Explosion</td>
<td>☐ Remove combustible materials</td>
</tr>
<tr>
<td></td>
<td>☐ Relocate work</td>
</tr>
<tr>
<td></td>
<td>☐ Isolation/ LOTO</td>
</tr>
<tr>
<td></td>
<td>☐ Area air monitoring</td>
</tr>
<tr>
<td></td>
<td>☐ PPE/ Flame Retardant Clothing (FRC) (See PPE Section)</td>
</tr>
<tr>
<td></td>
<td>☐ Fire watch</td>
</tr>
<tr>
<td></td>
<td>☐ Fire extinguisher available</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>☐ Heat/Cold Stress</td>
<td>☐ Work/Rest regimen</td>
</tr>
<tr>
<td></td>
<td>☐ Task rotation, shared tasks</td>
</tr>
<tr>
<td></td>
<td>☐ Source of cool water/electrolyte replacement drinks</td>
</tr>
<tr>
<td></td>
<td>☐ Ventilation</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Noise - Describe source</td>
<td>☐ PPE (see PPE Section)</td>
</tr>
<tr>
<td></td>
<td>☐ Relocate work</td>
</tr>
<tr>
<td></td>
<td>☐ Control noise source</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Lighting/ Visibility</td>
<td>☐ Adequate for task</td>
</tr>
<tr>
<td></td>
<td>☐ Nighttime considerations</td>
</tr>
<tr>
<td></td>
<td>☐ PPE (see PPE Section)</td>
</tr>
<tr>
<td></td>
<td>☐ Safety cones</td>
</tr>
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<td></td>
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</tr>
<tr>
<td>☐ Lifting, Pulling, Pushing, Repetitive Motion</td>
<td>☐ Get equipment designed for the job</td>
</tr>
<tr>
<td></td>
<td>☐ Proper technique</td>
</tr>
<tr>
<td></td>
<td>☐ Smaller, lighter loads</td>
</tr>
<tr>
<td></td>
<td>☐ Prepared for &quot;unexpected release&quot;</td>
</tr>
<tr>
<td></td>
<td>☐ Move feet to turn with load</td>
</tr>
<tr>
<td></td>
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<tr>
<td>☐ Airborne/Flying Material</td>
<td>☐ Cover/Shield source</td>
</tr>
<tr>
<td></td>
<td>☐ PPE (see PPE Section)</td>
</tr>
<tr>
<td></td>
<td>☐ Positioning</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Rotating/Moving Equipment and Pinch Points</td>
<td>☐ Energy isolation, Lock-out/Tag-out (LOTO)</td>
</tr>
<tr>
<td></td>
<td>☐ Guarding, barricading</td>
</tr>
<tr>
<td></td>
<td>☐ No loose clothing</td>
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<tr>
<td></td>
<td>☐ Positioning</td>
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<tr>
<td>☐ Sharp Objects</td>
<td>☐ Guarding</td>
</tr>
<tr>
<td></td>
<td>☐ PPE (see PPE Section)</td>
</tr>
<tr>
<td></td>
<td>☐ Positioning</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>☐ Falling Objects</td>
<td>☐ Secure objects</td>
</tr>
<tr>
<td></td>
<td>☐ Guarding, covers</td>
</tr>
<tr>
<td></td>
<td>☐ PPE (see PPE Section)</td>
</tr>
<tr>
<td></td>
<td>☐ Barricading</td>
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<td></td>
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</tr>
<tr>
<td>☐ Hazards from others working in</td>
<td>☐ Communication: Specify Method</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>☐ Hazards to other working in vicinity</td>
<td>☐ Communication: Specify Method</td>
</tr>
<tr>
<td>Hazard Identification</td>
<td>Describe Hazard Control (appropriate for site)</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>☐ Environmental Spill</td>
<td>☐ Containment</td>
</tr>
<tr>
<td></td>
<td>☐ Waste Plan</td>
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<td></td>
<td>☐ Waste containers</td>
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<tr>
<td></td>
<td>☐ Other</td>
</tr>
<tr>
<td>☐ Overhead lines/subsurface lines</td>
<td>☐ Spotter</td>
</tr>
<tr>
<td></td>
<td>☐ Verify clearance with client</td>
</tr>
<tr>
<td></td>
<td>☐ One-Call</td>
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<tr>
<td></td>
<td>☐ Mark line</td>
</tr>
<tr>
<td>☐ Site-specific training required</td>
<td>☐ Specify training requirement</td>
</tr>
<tr>
<td>☐ Client-specific safety procedure/policy required?</td>
<td>☐ Specify client specific safety procedure or policy (attach a copy)</td>
</tr>
<tr>
<td>☐ Client permit required?</td>
<td>☐ Specify method for obtaining permit:</td>
</tr>
<tr>
<td>☐ Subcontractor on-site</td>
<td>☐ Obtain proof of required (including site-specific) training</td>
</tr>
<tr>
<td></td>
<td>☐ Obtain proof of required (including site-specific) medical surveillance</td>
</tr>
<tr>
<td>☐ Other Hazards</td>
<td>☐ Description:</td>
</tr>
</tbody>
</table>

**Exposure Monitoring**

The following equipment will be used to monitor personnel exposure:

<table>
<thead>
<tr>
<th>Emergency Plan required for every site job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method of obtaining assistance</td>
</tr>
<tr>
<td>Evacuation Route</td>
</tr>
<tr>
<td>Prevailing wind direction</td>
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<tr>
<td>Emergency call list</td>
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</tr>
<tr>
<td>Emergency assembly area</td>
</tr>
</tbody>
</table>
# Emergency Plan

<table>
<thead>
<tr>
<th>First aid equipment availability</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest Medical Assistance</td>
<td>Direction or attach map:</td>
</tr>
<tr>
<td>Address:</td>
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<tr>
<td>Phone Number:</td>
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</tr>
</tbody>
</table>

Personal Protective Equipment Required (Check boxes to indicate PPE requirements)

- [ ] Field clothes (long or short sleeve shirt, long pants)
- [ ] Disposable coveralls: specify type _____________________________________________________________________________________________
- [ ] High visibility or reflective vests
- [ ] Flame Retardant Clothing
- [ ] Hard-hat
- [ ] Steel toe boots/shoes
- [ ] Disposable shoe covers
- [ ] Respiratory Protection
  - [ ] Half-face cartridge respirator, cartridge type: _________________________________________________
  - [ ] Cartridge change frequency ______________________________________________________________
  - [ ] Other respirator type
- [ ] Gloves: specify type(s)

- [ ] Hearing protection: specify type(s)

- [ ] Eye Protection: specify type

PPE Hazard Assessment Certified by:
(Note: PPE can be certified by any knowledgeable staff member) Date: ______

Project team (including subcontractors) has seen, been briefed and understand the contents of this job Hazard Analysis.

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
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ATTACHMENT 2

Community Air Monitoring Plan (CAMP)
INTRODUCTION

The objective of the Community Air Monitoring Plan (CAMP) is to focus on potential community exposures related to migration of chemicals beyond the boundary of the Site where investigative work will be undertaken (e.g., nearby residences, public).

COMMUNITY AIR MONITORING PLAN

This CAMP has been developed in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP) as well as the National Ambient Air Quality Standards (NAAQS) developed by the Environmental Protection Agency (EPA). The intent of the CAMP is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne releases of COPCs as a direct result of investigative and remedial work activities. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

Based on the NYSDOH guidance document, the CAMP includes requirements for continuous real-time air monitoring for total volatile organic compounds (VOCs), and particulates (PM-10) for select remedial activities. Real-time monitoring will be conducted at the perimeter of the work area, which may also be defined as the exclusion zone, and will include one upwind and one downwind monitoring location. Real-time monitoring will occur during activities that disrupt impacted media from the Site or adjacent sidewalk areas. The definition of activities that disrupt such impacted media is as follows:

- Ground intrusive activities include the installation of soil borings or monitoring wells and the soil/groundwater sampling.

The objective of the monitoring is to confirm that work area activities do not result in a sustained (i.e., 15 minute average) release of volatile organic compounds (VOCs) and particulates beyond the work area boundary above levels established herein. Upwind and downwind locations of the work area boundary will be determined using a wind sock. Depending on the remedial activity, perimeter monitoring will involve real-time total particulate and VOC measurements. Additional monitoring may also be conducted under any of the following circumstances:
• Change in ambient levels of hazardous constituents as indicated by the sense of smell and PID readings;
• Changes in the physical appearance of the soil or groundwater; and/or
• When new hazardous substances are encountered.

The remainder of this CAMP discusses the associated actions related to this monitoring plan as well as monitoring frequency and data reporting.

**VOC Monitoring, Response Levels, Actions**

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis. Upwind concentrations should also be measured on a continuous basis.

Ambient air monitoring will be conducted using direct-reading real-time instruments. The continuous total VOC perimeter monitoring will be performed using a portable, direct-reading photoionization detector (e.g., RAE MiniRAE 2000 PID) or a flame ionization detector (FID). The instrumentation used for perimeter monitoring will be used to calculate a running 15-minute average concentration. The PID lamp voltage of to be used for this Site is 11.7 eV.

Direct reading instrumentation will be calibrated daily per manufacturer’s instructions. Cylinders of the appropriate calibration gas (e.g., isobutylene) will be required for fieldwork lasting longer than one day. The monitoring location, date, time, weather conditions, activities performed and the 15 minute interval readings in ppm shall be recorded.

The VOC response levels and actions are as follows:

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

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

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

**Particulate Monitoring, Response Levels, and Actions**

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

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

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

**MITIGATIVE MEASURES**

Potential mitigative measures to control airborne levels may include, but are not limited to, the following:

- Water spraying and/or other dust suppression techniques
- Soil gas control techniques
- Ventilation techniques to provide dilution and/or isolation of VOCs
- Personal protective equipment (worker exposures)
- Administrative controls

**DOCUMENTATION AND RECORDKEEPING**

All 15-minute readings will be recorded and available for personnel and management to review. Instantaneous readings, if any, used for decision purposes will also be recorded. Sampling data will be evaluated daily and a summary report will be generated weekly. The summary report shall include equipment type, serial number, calibration results, flow rates, sampling locations, sampling dates, sampling times, sampling results in the required units, and corrective actions implemented based on any threshold level exceedances.

A copy of any laboratory analytical results will be kept on-site along with any datalogged results as well as by the Project Manager at ERM.
ATTACHMENT 3

*Daily Safety Meeting Form*
# Daily Safety Meeting Form

<table>
<thead>
<tr>
<th>Date of Safety Meeting</th>
<th>Name of Meeting Facilitator</th>
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<tbody>
<tr>
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</tbody>
</table>

## Topics Discussed

<table>
<thead>
<tr>
<th>Safety Concerns and Action Plan to Correct</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Company</th>
<th>Employee Number</th>
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</thead>
<tbody>
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</tbody>
</table>
ATTACHMENT 4

Project Sign-in Sheet
# PROJECT SITE SIGN-IN FORM

**Site:** 1960-1982 Webster Avenue, Bronx, NY  
**Date:**

<table>
<thead>
<tr>
<th>Employee</th>
<th>Company</th>
<th>Time In</th>
<th>Time Out</th>
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<tbody>
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ATTACHMENT 5

ERM Incident Reporting Form
**ERM INCIDENT REPORT FORM**

<table>
<thead>
<tr>
<th>Client Name:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date and Time of Incident:</td>
<td></td>
</tr>
<tr>
<td>Type of Incident:</td>
<td></td>
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<tr>
<td>Location of Incident:</td>
<td></td>
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<tr>
<td>Employee:</td>
<td></td>
</tr>
<tr>
<td>Employee Job Title:</td>
<td></td>
</tr>
<tr>
<td>Specific Job At Time of Incident:</td>
<td></td>
</tr>
<tr>
<td>Level of Protection Worn at Time of Exposure:</td>
<td></td>
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<tr>
<td>Summary of What Occurred:</td>
<td></td>
</tr>
</tbody>
</table>

**Actions Taken To Correct Situation (Engineering, PPE, etc.):**

| Employee Signature: |   |
| Site Safety Officer: |   |
| ERM Project Manager: |   |
| Time and Date of Report: |   |

*Please return completed forms to the Health and Safety Program Manager*
ATTACHMENT 6

Hospital Route Map and Directions
Directions to 1276 Fulton Ave, Bronx, NY 10456
1.7 mi – about 7 mins
1960 Webster Ave, Bronx, NY 10457

1. Head **southwest** on **Webster Ave** toward **E 178th St**
   - go 0.1 mi
   - total 0.1 mi

2. Turn left onto **E Tremont Ave**
   - About 1 min
   - go 0.3 mi
   - total 0.4 mi

3. Turn right onto **3rd Ave**
   - About 4 mins
   - go 1.2 mi
   - total 1.6 mi

4. Turn left onto **E 168th St**
   - go 404 ft
   - total 1.7 mi

5. Take the 1st left onto **Fulton Ave**
   - Destination will be on the right
   - go 410 ft
   - total 1.7 mi

1276 Fulton Ave, Bronx, NY 10456

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2013 Google

Directions weren’t right? Please find your route on maps.google.com and click “Report a problem” at the bottom left.
TABLES
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Published Exposure Limit</th>
<th>Routes of Exposure</th>
<th>Target Organs</th>
<th>Signs/Symptoms of Exposure (Acute versus Chronic Effects)</th>
<th>First Aid &amp; Emergency Response</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chemical Name</strong>: Benzene</td>
<td>1 ppm (OSHA PEL)</td>
<td>Inhalation Skin absorption Ingestion Skin or eye contact</td>
<td>Eyes, skin, respiratory system, bone marrow, blood and central nervous system.</td>
<td>Acute: Irritation eyes, skin, nose, throat, respiratory system, nausea, dizziness, staggered gate, headache, anorexia, Chronic: leukemia</td>
<td>Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention</td>
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<tr>
<td>CAS: 71-43-2</td>
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<tr>
<td>Vapor Pressure: 75 mmHg</td>
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<tr>
<td><strong>Chemical Name</strong>: Xylene</td>
<td>100 ppm (OSHA PEL)</td>
<td>Inhalation Skin absorption Ingestion Skin or eye contact</td>
<td>Eyes, skin, blood, respiratory system, heart, liver,</td>
<td>Acute: headache, fatigue, nausea, flatulence, irritation of eyes nose and throat, visual disturbance Chronic:</td>
<td>Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention do not induce vomiting</td>
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<tr>
<td>CAS: 1330-20-7</td>
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<tr>
<td>Vapor Pressure: 7 - 9 mmHg</td>
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<tr>
<td><strong>Chemical Name</strong>: Napthalene</td>
<td>10 ppm (OSHA PEL)</td>
<td>Inhalation Skin absorption Ingestion Skin or eye contact</td>
<td>Eyes, nose, throat, skin, blood, liver, kidneys, central nervous system</td>
<td>Acute: salivation, vomiting, fever, abdominal pain, labored breathing, Chronic: liver and kidney damage</td>
<td>Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention</td>
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<tr>
<td>CAS: 91-20-3</td>
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<td>Vapor Pressure: 0.8 mmHg</td>
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<tr>
<td>Chemical Name: 2 Methyl Naphthalene</td>
<td>Published Exposure Limit 1 (8-hour TWA 2)</td>
<td>Routes of Exposure</td>
<td>Target Organs</td>
<td>Signs/Symptoms of Exposure (Acute versus Chronic Effects)</td>
<td>First Aid &amp; Emergency Response</td>
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<tr>
<td>Chemical Name: 2 Methyl Naphthalene</td>
<td>None -</td>
<td>Skin absorption, ingestion, Skin or eye contact</td>
<td>Eye and Skin irritation.</td>
<td>Acute: Irritation eyes, skin, mucous membrane, dermatitis, headache, narcosis, coma</td>
<td>Flush skin/eyes with water. Administer artificial respiration if no breathing. If ingested seek medical attention.</td>
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<td>CAS: 75-35-4</td>
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<td>Vapor Pressure: .068 mmHg</td>
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<tr>
<td>Chemical Name: Ethyl Benzene</td>
<td>(OSHA PEL) 100 ppm</td>
<td>Inhalation, ingestion, skin and/or eye contact.</td>
<td>Eyes, skin, respiratory system, central nervous system</td>
<td>Acute: Irritation eyes, skin, mucous membrane, dermatitis, headache, narcosis, coma</td>
<td>Eye: Irrigate immediately. Skin: Soap/Flush promptly. Breathing: Respiratory Support. Ingestion: Medical attention immediately.</td>
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<td>CAS: 100-41-4</td>
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<td>Vapor Pressure: 7 mmHg</td>
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<td>Ionization Potential: 8.76 eV</td>
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<tr>
<td>Chemical Name: MTBE</td>
<td>200 ppm (OSHA PEL)</td>
<td>Inhalation, Skin adsorption, ingestion, Skin or eye contact.</td>
<td>Headaches, nausea, dizziness, irritation of the nose or throat, and sense of confusion.</td>
<td>Acute: Headaches, nausea, dizziness, irritation of the nose or throat, and sense of confusion. Chronic: Carcinogen</td>
<td>Eye: Irrigate immediately. Skin: Soap wash promptly. Breathing: Respiratory support. If ingested seek medical attention immediately.</td>
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<td>CAS: 1634-04-4</td>
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<td>Vapor Pressure: 245 mmHg</td>
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<td>Ionization Potential: 9.24 eV</td>
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<tr>
<td>Chemical Name: Toluene</td>
<td>200 ppm (OSHA PEL)</td>
<td>Inhalation, Skin adsorption, ingestion, Skin or eye contact.</td>
<td>Eyes, skin, respiratory system, liver, kidneys, central nervous system.</td>
<td>Acute: Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, laceration (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.</td>
<td>Eye: Irrigate immediately. Skin: Soap wash promptly. Breathing: Respiratory support. If ingested seek medical attention immediately.</td>
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<td>CAS: 108-88-3</td>
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<td>Vapor Pressure: 21 mmHg</td>
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<tr>
<td>Chemical</td>
<td>Published Exposure Limit 1 (8-hour TWA 2)</td>
<td>Routes of Exposure</td>
<td>Target Organs</td>
<td>Signs/Symptoms of Exposure (Acute versus Chronic Effects)</td>
<td>First Aid &amp; Emergency Response</td>
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<tr>
<td>PCBs</td>
<td>1 mg/m³ (OSHA PEL)</td>
<td>Inhalation, Skin adsorption, Ingestion, Skin or eye contact</td>
<td>Eyes, skin, respiratory system, liver, kidneys, central nervous system.</td>
<td>Acute: lesions, rashes, and burning eyes and skin Chronic: toxic effects on the liver</td>
<td>Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support If ingested seek medical attention immediately</td>
</tr>
<tr>
<td>Dieldrin</td>
<td>.25 mg/m³ (OSHA PEL)</td>
<td>Inhalation, Skin adsorption, Ingestion, Skin or eye contact</td>
<td>Central nervous system, liver, kidneys, skin</td>
<td>Acute: Headaches, dizziness, nausea, vomiting, sweating, tonic convulsions, coma Chronic: carcinogenic</td>
<td>Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support If ingested seek medical attention immediately</td>
</tr>
<tr>
<td>Lead</td>
<td>TWA: 0.03 (mg/m³) NIOSH</td>
<td>Inhalation, Skin adsorption, Ingestion, Skin or eye contact</td>
<td>blood, kidneys, central nervous system (CNS)</td>
<td>Chronic: Developmental Toxicity, possible mutagenic effect</td>
<td>Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Move to fresh Air Respiratory support If ingested seek medical attention immediately Do not induce vomiting</td>
</tr>
<tr>
<td>Chromium</td>
<td>TWA: 0.5 (mg/m³) NIOSH</td>
<td>Inhalation, skin or eye contact</td>
<td>Kidneys, lungs, liver, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage</td>
<td>Acute: skin (irritant) eye contact (irritant) Chronic: sneezing, redness of the throat, asthma, cough, polyps, chronic inflammation. Effects on the nose include irritation, ulceration, and perforation of the nasal septum. Inflammation and ulceration of the larynx may also occur. Chronic exposure may cause liver and kidney damage.</td>
<td>Eye: Irrigate immediately Skin: Soap wash promptly, seek Medical attention Breathing: Move to fresh Air Respiratory support If ingested seek medical attention immediately Do not induce vomiting</td>
</tr>
</tbody>
</table>
| Chemical Name: Barium  
CAS: 7440-39-3 | Published Exposure Limit 1  
(8-hour TWA) | Routes of Exposure | Target Organs | Signs/Symptoms of Exposure  
(Acute versus Chronic Effects) | First Aid & Emergency Response |
|----------------|------------------|------------------|---------------|---------------------------------|--------------------------------|
|                 | 0.5 mg/m³  
(OSHA PEL) | Eyes, skin and  
inhalation | smooth muscles,  
heart, intestines,  
vascular construction and  
bladder | Accute effects: Can cause  
irritation to the nose, throat, and  
upper respiratory tract. Causes  
severe irritation of the mouth,  
throat, and esophagus.  
Chronic Effects: Severe irritation  
or burns. | Eye: Irrigate immediately  
seek medical attention  
Skin: Soap wash promptly, seek Medical attention  
Breathing: Move to fresh Air  
Respiratory support  
If ingested seek medical attention immediately  
Do not induce vomiting |

| Chemical Name: Beryllium  
CAS: 7440-41-7 | Published Exposure Limit 1  
(8-hour TWA) | Routes of Exposure | Target Organs | Signs/Symptoms of Exposure  
(Acute versus Chronic Effects) | First Aid & Emergency Response |
|----------------|------------------|------------------|---------------|---------------------------------|--------------------------------|
|                 | 0.002 mg/m³  
(OSHA PEL) | Inhalation | Lungs, heart | Acute: may irritate eyes or skin  
Chronic: prolonged exposure may  
cause serious lung disease | Eye: Irrigate immediately  
seek medical attention  
Breathing: Move to fresh Air  
Respiratory support  
Ingested: drink large volume  
of water  
Induce vomiting |

**NOTES:**
1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. TWA = time weighted average.
3. ppm – parts of contaminant per million parts of air.
Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.
**TABLE 2**
**SITE-SPECIFIC AND TASK-SPECIFIC HAZARDS AND CONTROL STRATEGIES**
1960-1982 Webster Avenue, Bronx, NY

<table>
<thead>
<tr>
<th>Task/Activity</th>
<th>Hazards</th>
<th>Control Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>All activities at site Level D PPE</td>
<td>Poisonous plants</td>
<td>• Identify suspect plants</td>
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<td>• Vegetation control at or below ankle height by having client mow/weed-eat path and work area</td>
</tr>
<tr>
<td></td>
<td>Non-stinging insects</td>
<td>• Appropriate protective clothing disposable Tyvek™ coveralls, thin nitrile gloves, disposal boots, tape at wrists and ankles</td>
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<tr>
<td></td>
<td>Stinging insects</td>
<td>• Barrier cream for uncovered skin</td>
</tr>
<tr>
<td></td>
<td>Thunder/Lightning</td>
<td>• Wash exposed body parts and equipment thoroughly after work in highly-vegetated areas</td>
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<td></td>
<td>• Insect repellant</td>
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<tr>
<td></td>
<td></td>
<td>• Survey work area for presence of nests</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eliminate nests</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• If drilling, cease work following first indication of thunder/lightning</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Shelter in buildings or vehicles not underneath trees or near drilling equipment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Begin work after 15 minutes has elapsed from last thunder/lightning</td>
</tr>
<tr>
<td>Drilling</td>
<td>Heavy equipment movement</td>
<td>• Personnel maintain eye contact with operators when near the rig.</td>
</tr>
<tr>
<td></td>
<td>Dropped equipment, slip, trip or fall.</td>
<td>• Hard hats, steel-toe safety shoes and safety glasses worn during equipment operation,</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>• Hearing protectors with proper noise reduction rating</td>
</tr>
<tr>
<td>Completion and development of</td>
<td>Splashing of chemical in</td>
<td>• Safety glasses; chemical-resistant suits (as determined necessary by SSO)</td>
</tr>
<tr>
<td>groundwater well</td>
<td>groundwater</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 3
PERSONAL PROTECTION EQUIPMENT REQUIREMENTS
1960-1982 Webster Avenue, Bronx, NY

<table>
<thead>
<tr>
<th>PPE Level</th>
<th>Ensemble Components</th>
<th>Anticipated Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level D</strong></td>
<td>• Long pants and shirt with sleeves</td>
<td>All activates unless otherwise directed by the SSO, PM, and Project Manager and Project Health and Safety Coordinator.</td>
</tr>
<tr>
<td></td>
<td>• Steel-toed footwear</td>
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<tr>
<td></td>
<td>• Safety glasses with molded side shields or goggles.</td>
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</tr>
<tr>
<td></td>
<td>• Hard hat if potential for head injury or falling debris is possible/or client requirement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• General purpose work gloves if task does not involve water or wet materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Hearing protection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• High visibility traffic vest when in traffic areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.</td>
<td></td>
</tr>
<tr>
<td><strong>Modified Level D</strong></td>
<td>Level D and the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Disposal Tyvek coveralls</td>
<td>Any of the above-referenced tasks in which there is moderate potential for skin contact</td>
</tr>
<tr>
<td></td>
<td>• Steel-toed rubber boots or disposal boot covers over shoes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Thin nitrile gloves</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Green nitrile gloves over thin nitrile gloves when primary gloves may tear or puncture</td>
<td></td>
</tr>
<tr>
<td><strong>Level C</strong></td>
<td>Level D or Modified Level D and the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Half-face air purifying respirator with combination organic vapor/high efficiency particular air (HEPA) cartridges</td>
<td>Any of the above-referenced tasks in which there is moderate potential for skin contact with constituents and data indicating need for respiratory protection.</td>
</tr>
<tr>
<td></td>
<td>Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.</td>
<td>No upgrade to Level C without approval from Project Manager and Project Health and Safety Coordinator.</td>
</tr>
<tr>
<td><strong>Level B</strong></td>
<td>Not anticipated to be required</td>
<td>Tasks requiring Level B PPE are not anticipated during this project. If Level B PPE is needed, as determined by the SSO and/or the Project Health and Safety Consultant, the HASP will be revised.</td>
</tr>
<tr>
<td><strong>Level A</strong></td>
<td>Not anticipated to be required</td>
<td>Tasks requiring Level A PPE are not anticipated during this project. If Level A PPE is needed, as determined by the SSO and/or the Project Health and Safety Consultant, the HASP will be revised.</td>
</tr>
<tr>
<td>Project Duration</td>
<td>Drill Frequency</td>
<td></td>
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<tr>
<td>------------------------------------</td>
<td>-----------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Less than 30 days</td>
<td>None, cover during review/sign-off of HASP</td>
<td></td>
</tr>
<tr>
<td>Greater than one month but less than one year</td>
<td>Once</td>
<td></td>
</tr>
<tr>
<td>Greater than one year</td>
<td>Annually</td>
<td></td>
</tr>
</tbody>
</table>
Appendix E

Resumes of Key Personnel
Mr. Ernest Rossano is an Associate Partner within ERM based in Melville, New York. He has 27 years of varied hydrogeologic experience, including 3 years as a Project Manager for the United States Geological Survey, Water Resources Division on Long Island. His experience includes the design of monitoring well networks for volatile organics, hydrocarbons, and collection of basic hydrogeologic parameters; seismic, downhole geophysical, and sample log analysis and correlation; supervision and analysis of pump tests in confined and unconfined strata; numerical modeling of ground water flow and solute transport; and management of large scale remedial investigations and remedial actions. His experience includes work in unconsolidated sediments and in fractured rock environments. Mr. Rossano has extensive experience with the New York State Brownfield Cleanup Program, which includes the successful completion of several projects in the New York City area.

Mr. Rossano is also an acting board member for the New York City Brownfield Partnership, whose mission is to provide benefits to the communities they serve by working to redevelop Brownfield areas in New York City.

Registrations & Professional Affiliations
- Certified Professional Geologist
- National Ground Water Association
- American Institute of Professional Geologists
- Association of Ground Water Scientists & Engineers

Fields of Competence
- Management of ground water pollution investigations
- Analysis of surface and ground water flow systems
- Surface and subsurface water quality monitoring
- In-situ permeability testing
- Infiltration testing
- Stratigraphic analysis, correlation and interpretation
- Multi-media sampling
- Tank removal and associated soils assessment
- Aquifer test analysis
- Ground water modeling
- Fate & Transport modeling
- Applied geophysics
- Municipal water supply
- Soil Vapor Extraction
- Air Sparging
- Bioventing/Biosparging
- Design & Installation of Horizontal Wells
- Construction Management
- Data Management using GIS Systems

Education
- M.S. Hydrogeology, State University of New York at Stony Brook, 1992
- B.S. Geology, Southampton College, New York, 1984
Key Projects

Water Quality
Long Island, New York
Comparison of major land use with the overall water quality of Long Island, New York.

Management and Supervision of Monitoring Well Network
Management and supervision of monitoring well network using over 1,000 wells. Correlation of data for use in USGS-published annual reports.

Stream gauging and surface water
Long Island, NY
NASQAN and NAWQA
Stream gauging and surface water sampling on Long Island for the USGS National Stream Quality Accounting Network (NASQAN) and National Water Quality Assessment (NAWQA) programs.

Supervision of Field Activities
Supervision of field activities including aquifer testing, test borings, well installation, recovery well construction, soil vapor and ground water sampling, and data evaluation.

Design and Installation of a Static Hydrocarbon Recovery System
Design and installation of a static hydrocarbon recovery system using 29 wells to recover more than 450,000 gallons of product.

Supervision of Tank Removal
Supervision of tank removal and subsequent soils evaluation for contamination.

Design and Installation of Municipal Supply Well
Design and installation of a municipal supply well yielding more than 1,000 gallons per minute. Supervised all aspects of well construction and acceptance testing.

Three-Dimensional Ground Water Flow Model
New Jersey
Three-dimensional ground water flow model of New Jersey Coastal Plain deposits, to determine recovery well locations and rates, and feasibility of recharging treated effluent.

Pilot Testing of Soil Vapor Extraction
Pilot testing of soil vapor extraction and air sparging at several sites with varied hydrogeologic settings.

Pilot Testing of Bioventing and Biosparging
Pilot testing of bioventing and biosparging in glacial outwash deposits in New York.

PM for Design, Construction, and Operation of 4000 scfm Air Sparge and 6200 scfm Soil Vapor Extraction System
Project Manager for the design, construction and operation of a 4000 scfm air sparge and 6200 scfm soil vapor extraction system consisting of 181 vertical and three horizontal sparge wells and 33 vertical and 1 horizontal soil vapor extraction wells. Provided direct construction management supervision for installation of four horizontal wells averaging 1100 feet in length. As project manager was responsible for construction management of above ground treatment system components.

Constructed a Transport Model of Hydrocarbons in Glacial Terrain
Regional scale three-dimensional flow and solute transport model of hydrocarbons in glacial terrain in New York used to negotiate favorable cleanup criteria for the client.

Constructed a Flow and Transport Model of Chlorinated Solvent Plume
Long Island, NY
Flow and transport model of a chlorinated solvent plume on Long Island, New York. Constructed a model involving the movement of groundwater and chlorinated solvents in highly permeable glacial sediments. This model utilized the MT3D code and site-specific decay rates to demonstrate fate and transport.

Constructed a Flow and Transport Model of Chlorinated Solvent Plume
East Rutherford, New Jersey
Flow and transport model of a chlorinated solvent plume in East Rutherford, New Jersey. Constructed a model involving the movement of ground water and chlorinated solvents in overburden sediments and wetland areas. This model utilized the RT3D code and site-specific decay rates to develop a Classification Exception Area and demonstrate monitored natural attenuation.
Site Decommissioning and Remedial Investigation
New York
Managed a site decommissioning and remedial investigation for a large defense industry client. Investigation results indicated significant chromium contamination in soil and ground water and led to inclusion in the New York State Voluntary Cleanup Program. Sediment and surface water samples were collected from multiple locations in the East River as part of the remedial investigation. Additional investigation and remediation are pending NYSDEC review. Chosen remedial methods were excavation and in situ stabilization/reduction. As project manager was responsible for construction management aspect of implementing the remedial strategy.

Database Setup and Management for Remedial Investigation Projects
Database setup and management for multiple large remedial investigation projects using GIS/Key. Database outputs include geologic and chemical cross sections, isoconcentration maps, graphs, data tables, and statistical analysis. Exports from databases have been used in ground water flow and solute transport modeling.

Management of ISRA Project
Management of a large ISRA project on a site contaminated with metals and chlorinated solvents. Key aspects of this project include; litigation support, active ground water remediation, off site plume delineation, ground water monitoring, data management and soil remediation.

Brownsfield Projects
New York City
Principal in charge of multiple Brownfield projects in New York City area including two sites in the Bronx that were managed from the initial stage supporting the Brownfield Program application through the issuance of Certificates of Completion. The two Bronx, NY properties were remediated prior to redevelopment as mixed income housing. Both sites had known underground storage tanks and it was suspected that additional tanks were likely present based on past operations. One site had an open spill case with significant free-phase gasoline contamination. Previous investigations had revealed that both sites contained “urban fill” contaminated with volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), heavy metals, and PCBs. Groundwater was impacted by VOCs, SVOCs, and metals. ERM completed a thorough remedial investigation, a remedial design, a qualitative risk assessment, remedial design including bid specifications and drawings. Specifications included the need for underpinning several multiple story buildings, sheeting and shoring and dewatering. The excavation plan required a combination of sidewall sloping, sheet pilings, underpinning and tiebacks for structural support. In accordance with the Brownfield’s cleanup program, a comprehensive community participation plan was prepared and fact sheets produced for the various elements of the project.
Mr. Mohlin has more than 18 years of environmental engineering consulting experience with emphasis on remediation of contaminated soil and groundwater, remedial investigations, feasibility studies, operation of remedial systems, industrial and domestic wastewater treatment, and air emission permitting and control. He is experienced in conducting pilot studies to evaluate the feasibility of soil and groundwater treatment systems using: air sparging, soil vapor extraction, ozonation, carbon adsorption, chemical precipitation, filtration, and dissolved air flotation. He has also performed several vapor intrusion investigations, as well as pilot tested and designed mitigation systems.

Mr. Mohlin has prepared designs for air sparging, soil vapor extraction, groundwater treatment, and vapor intrusion mitigation systems. He has also prepared industrial air emissions surveys and the corresponding air permit applications, and performed construction oversight during remediation projects.

Mr. Mohlin is continuously involved in engineering oversight of several remediation systems, including those utilizing air stripping, UV peroxidation, soil vapor extraction, air sparging, metals removal, carbon adsorption, multiphase extraction, and catalytic oxidation. Oversight includes system trouble-shooting, constant air and water quality testing and evaluation of results, management of operation subcontractors, maintenance operations, preparation of reports, and design of system upgrades.

Registrations & Professional Affiliations
- Registered Professional Engineer in New York State
- American Society of Civil Engineers
- American Academy of Environmental Engineers

Fields of Competence
- Management of site investigation and remediation projects
- Design and engineering support of soil, groundwater, and wastewater treatment systems
- Design and operations of air sparging, soil vapor extraction, and other remediation systems
- Vapor intrusion investigation and mitigation
- Soil and groundwater remediation pilot studies
- Industrial wastewater treatment
- Development of feasibility studies
- Hazardous waste management
- Regulatory permitting and compliance for air and water
- Air quality engineering
- Construction oversight
- Health and safety monitoring

Education
- M.S. Environmental Engineering, Polytechnic University, New York, 1997
- B.S. Environmental Engineering, Florida Institute of Technology, 1993
- 40 hour OSHA 1910.120 Health and Safety Training
- Computer Aided Drafting, 50-hour Course, Island Drafting and Technical Institute, 2001
Key Projects

Groundwater Treatment System
Designed a 50-gpm groundwater treatment system for a former MGP site to remove metals and BTEX, using equalization, metals precipitation, UV peroxidation, and pH adjustment. Specified equipment and prepared an equipment layout. Developed a pipe arrangement. Calculated necessary head for pumps, and specified pumps. Determined process logic and prepared control narrative. Designed upgrades to the treatment plant consisting of ion exchange and carbon adsorption unit processes. Currently, managing long-term operation of this system and the groundwater monitoring program.

DNAPL Remediation Project
Managed a DNAPL remediation project using in-situ soil mixing with permanganate and cement. Designed and evaluated bench-scale testing program. Prepared drawings and design specifications. Provided oversight and managed $2.7M remediation contract.

PCE Plume Investigation
Served as Project Manager for the investigation of a groundwater PCE plume in a residential/commercial neighborhood. Investigation techniques included vertical profile borings using Hydropunch groundwater sampling, indoor air sampling, and sub-structure soil vapor sampling. Presented at public meeting and prepared Feasibility Study and Site Management Plan to address the plume.

Site Investigation and Remediation
Managed $3M of site investigation and remediation at two large petrochemical research facilities in NJ. Investigated soil impacts beneath two large buildings using horizontal drilling techniques. Conducted soil excavation, sediment removal (including obtaining wetland permits), enhanced MNA, and vapor intrusion investigations.

Sub-Slab Depressurization System Design
Designed multiple sub-slab depressurization systems for large commercial operations in New York.

Vapor Intrusion Evaluation
Evaluated the extent of vapor intrusion at seven homes in France, and proposed mitigation options. Building constraints included: heated floor slabs, 300+ year old home, multiple basement levels, and limited interior access.

Sub-Slab Vapor Mitigation System
Designed a sub-slab vapor mitigation system consisting of a spray-applied vapor barrier with recovery of sub-slab vapors using wind-driven ventilators.

Industrial Wastewater Stream Evaluation
Served as Project Manager for the evaluation of an industrial wastewater stream prior to shutdown of a production line. Reviewed raw materials, flow rates, and existing data, and predicted future wastewater characteristics. Recommended changes to the existing treatment process. Prepared a request to the local POTW for a modification in pretreatment limits, and provided justification for the change in limits.

Wastewater Analysis
As Project Manager, evaluated the unexpected presence of acetone in the wastewater of a vitamin manufacturer, and determined the source of the acetone.

Remedial Investigation
Served as Project Manager for remedial investigation report and feasibility study for urban site in NY with PCBs, metals, and SVOCs in soil and groundwater. Also managed the design for the removal of 4,000 cy of impacted soil.

Remedial Investigation
Served as Project Manager for the remedial investigation of the property of an active airport. Developed scope of work and coordinated project team to perform soil borings, groundwater sampling, well installation, and test pit installation. Prepared a remedial investigation report based on the results.
**Industrial Wastewater Treatment Process Design**  
Served as Project Manager for designing and constructing upgrades to an industrial wastewater treatment process to remove excess lint and powder from the water. Utilized an inline filter press with continuous recycle and an industrial vibrator on the existing clarifier.

**Remedial Action Work Plan**  
Served as Project Manager for the development and implementation of a Remedial Action Work Plan for two former petroleum research facilities to address soil and groundwater, and the subsequent remediation activities, including: soil excavation, monitored natural attenuation, enhanced biodechlorination, soil capping, and soil mixing.

**Contaminated Soil Remediation Pilot Study**  
As Project Engineer, performed extensive pilot study for remediation of contaminated soil and groundwater at a major gasoline terminal. The study included operation of a soil vapor extraction/air sparging system and a catalytic oxidizer. Performed sampling of soil, soil vapor, and groundwater. Involved in the conceptual-level and full-scale designs of the soil vapor extraction/air sparging system. Pilot study included computer modeling to estimate remedial clean-up time.

**Wastewater System Support**  
Served as Project Engineer for engineering support for the water and wastewater systems for two summer camps in remote locations. Collected monthly compliance samples, recommended treatment system upgrades, performed sampling for Microscopic Particulate Analysis, and prepared application for a new drinking water supply well.

**Soil Excavation H&S Oversight**  
Assisted Health and Safety Officer and Field Engineer to provide site health and safety and engineering oversight of a $7,000,000 soil excavation.

**In-Situ Water Treatment Analysis**  
As Project Engineer, evaluated the feasibility of using an in-situ iron treatment wall for the removal of chlorinated VOCs from groundwater. Developed a conceptual design for a wall that is 15 feet deep and 600 feet long.

**Air Emissions Survey**  
Served as Project Engineer responsible for air emissions survey of a manufacturing facility with over 30 separate processes and emission points. The survey included an evaluation of each process such that mass balances could be used to calculate the emissions of each raw material. The emissions were then used to determine the potential annual impact and the short-term impact. These impacts were compared with guidance concentrations in order to determine the need for air emission controls. The resulting survey was used for the preparation of New York State applications for a permit to operate.

**Wastewater Plant Support**  
As Project Engineer, determined the capability of a domestic wastewater plant to accommodate an increased flow. Then, evaluated the potential and ultimately recommended the use of the treated domestic wastewater (i.e., “gray water”) in an industrial cooling system. Assisted in the design of a gray water reuse system.

**EPA hazard Ranking System Scoring**  
As Project Engineer, completed EPA Hazard Ranking System scoring for a site in Puerto Rico contaminated with mercury.
Ms. Pickering has 8 years of experience as a geologist in the environmental consulting field focusing on site remediation services. Ms. Pickering currently manages several SIR projects out of the Melville office. Field experience includes ground water, soil, and rinsate, sampling, monitoring well installation, multi-level well installation, installation of vertical profile wells, logging of soil and bedrock, subsurface and indoor air sampling, oversight of underground storage tank removals, and oversight of various remediation and construction activities.

Before joining ERM, Ms. Pickering worked as a Geology lab assistant, where she prepared lab work and assisted introductory students. She was also a research student at the University of Mary Washington and participated in the identification of precipitates found at Acid Mine Drainage contaminated stream in Contrary Creek, Virginia. Her research consisted of, but was not limited to:

- Measuring field parameters such as pH, temperature, specific conductivity, and total alkalinity

Ms. Pickering presented her findings at the Summer Science Research Symposium.

**Registrations & Professional Affiliations**
- 40-hour Health and Safety Certification
- 10-hour OSHA Construction Training
- ExxonMobil Loss Prevention System-Certified

**Fields of Competence**
- Site assessment and remediation
- Geologic and hydrogeologic correlation, analysis, interpretation, and assessments
- Soil and ground water investigations
- Air quality investigations and monitoring
- Health and safety site officer
- Field management

**Education**
- Bachelor of Science in Geology, May 2006, University of Mary Washington, Fredericksburg, Virginia

**Languages**
- English, native speaker
- Spanish, beginner

**Honors & Awards**
- Completed Summer Science Research Program identifying/evaluating the effects of Acid Mine Drainage in streams
Key Projects
Ms. Pickering has diversified experience working on projects such as Becton Dickinson, Genesco, Long Island Jewish Medical Center, Alcan Packaging, ExxonMobil, Invensys, GDC Properties, Morgan Carbon Americas, Phipps Houses, Alcan Packaging, Steel Equities, Kraft, BICC, Borinquen Court, Delta, United, Northville Industries and Honeywell.

Ms. Pickering serves as a project manager for the Edgewater College Point site overseeing semi-annual ground water sampling activities and vapor intrusion sampling. Responsibilities include interpretation of laboratory data, report writing, and overseeing ground water and vapor intrusion sampling events.

Field Team Leader for Becton Dickinson ISRA project. Contaminants of concern at the facility included chlorinated volatile organic compounds (VOCs). Responsibilities included interpretation of laboratory data and report writing. Investigative activities included sampling of ground water, soil, soil vapor, sub-slab and indoor air, as well as overseeing installation of soil borings and monitoring wells. Ms. Pickering was also responsible for logging of soils throughout the site and composing geologic cross-sections with the soil classification data. A vapor intrusion investigation was also conducted which involved contacting and arranging access to off-site residences and businesses to sample indoor air and sub-slab air.

Ms. Pickering served as the Field Team Leader for a Remedial Investigation for Morgan Chemical Products located in Irvington, New Jersey. Ms. Pickering provided oversight of rotosonic drilling through bedrock and installation and abandonment of monitoring wells. She was also responsible for carrying out soil gas and air sampling, as well as multiple rounds of low-flow ground water sampling events.

Ms. Pickering also served as a Field Team Leader for a Freon Investigation for Long Island Jewish Medical Center. Office responsibilities included writing Monthly Progress Reports and Reports of Findings and Ground Water Flow and Contour Maps. She oversaw multiple vertical profile borings on and off-site, as well as monitoring well installations. She also serves as the Field Team Leader for ground water sampling activities and vapor intrusion investigation activities at the site.

Ms. Pickering also held the role of Health and Safety Site Officer for a Phipps Houses Remediation and Construction Management project. The project, located in Bronx, NY, included oversight of hazardous waste remediation, dewatering, stabilization and solidification, decontamination, drilling, and mass excavation. She was also responsible for implementing the Community Air Monitoring Plan (CAMP) for the entire site.
Mr. Coenen has 19 years of general analytical chemistry experience, 6 years of analytical laboratory experience, and 13 years of environmental consulting experience, including analytical data validation, sampling and analysis programs, quality assurance programs, technical support, laboratory audits, and QA oversight for fixed laboratory and field analysis. Mr. Coenen has knowledge of numerous analytical methodologies and experience in data validation of analytical data package deliverables for adherence to USEPA CLP and non-CLP, NYSDEC ASP, and NJDEP protocols. He is proficient with GIS/Key environmental management software and has operated a mobile gas chromatograph laboratory used to test soil and water samples for quick-turn volatile analysis.

Mr. Coenen is an expert in GIS Solutions GIS\Key software, and has implemented the system’s cutting edge data management protocols and processes for numerous large and small scale site investigation and remediation projects throughout the United States.

GIS\Key is a comprehensive, environmental data management and reporting tool. The software suite includes specific modules for storing and presenting Chemistry, Geology, Hydrology, NPDES, and Radiology data.

**Fields of Competence**
- Analytical data review and validation
- Environmental Database Management (GIS/Key)
- Laboratory Subcontractor Management
- Analytical protocols for pollutants by USEPA methodologies
- Methods of analysis of organic and inorganic parameters
- Review and preparation of QA/QC plans
- Field analytical techniques
- Multi-Media Sampling

**Education**
- 8-Hour OSHA Annual Refresher Training, 1999 - current
- 40-Hour OSHA [29 CFR 1910.120 (e) (2)] Health and Safety Training, 1998
- Rutgers University/Cook College - NJDEP Using GIS for Environmental Evaluations, October 1999
- Computer Aided Drafting, 50-Hour Course, Island Drafting and Technical Institute, 1998
- Immunoassay Testing Training Program, Strategic Diagnostics Inc., 1998
- B.S. Chemistry, University of Michigan, 1991

**Languages**
- English, native speaker
- Knowledge of German and Spanish
Key Projects

Environmental Data Management: Contaminated Site Management

Data validation for numerous projects located in New York, New Jersey, California, Connecticut, Illinois, Iowa, Indiana, Maryland, Massachusetts, Michigan, Pennsylvania, Rhode Island, and Wisconsin, involving evaluation of aqueous, soil, sediment, leachate, and air samples analyzed by USEPA Contract Laboratory Protocols, State Protocols and numerous methodologies for organic, inorganic, wet chemistry parameters, TPH, and various other analyses.

Reviewed sampling and laboratory chemical data for adherence to New Jersey Department of Environmental Protection protocols and New York State Department of Environmental Conservation on numerous projects. Also constructed electronic deliverables for submission to NJDEP and NYSDEC in required electronic formats.

Database construction & management for numerous investigations utilizing GIS/Key software. Compiled field and laboratory data and generated result summary tables, contours, isopleths, contaminant plume maps, cross-sections, and boring logs.

Prepared numerous Sampling and Analysis Plans (SAPs) and Quality Assurance Project Plans (QAPPs) for adherence to state and federal guidelines.

Project Manager responsible for the coordination and performance of a major hydrogeologic investigation for an ISRA site (NJDEP Site Remediation) in East Rutherford, NJ. Conducted an extensive volatile organic compound plume delineation, a vapor intrusion investigation, installation of an extensive ground water monitoring well network, ground water sampling.

Quality Assurance Officer responsible for review of all data collected at several sites including the former Brooklyn Navy Yard Industrial Park, several NYSDEC Standby Contract Projects, Sherwin Williams Superfund Site, Hydrite Chemical Company in Waterloo, Iowa.

Project management and technical support for Special Analytical Services required to delineate low-level PAH contamination at a Superfund Site. This included method development and validation of a Selected Ion Monitoring (SIM) GC/MS technique.

Utilized Immunoassay test kits for field measurement of PCB contamination at the former Brooklyn Navy Yard, Brooklyn, New York. Performed data validation of all field analytical samples and off-site laboratory samples and compared off-site results to test kits.

Conducted subsurface investigations with a Geoprobe. Performed various field tests.

Supervision of tank removal and subsequent soils evaluation for contamination.
Ms. Edyta Korczynska is an Environmental Engineer within ERM based in Melville. She has five years of experience in the field of site remediation, remedial system design, PBS/CBS design, groundwater and soil investigation and regulatory compliance.

**Remedial System Design and Operation** – Participated in designing, installing and managing remedial systems such as UV treatment plant, SVE/AS, ozone injection system to remediate contaminated groundwater and soil. Conducted detailed analytical investigation of subsurface conditions to determine feasibility of remedial systems, conducted pilot test, associated reporting and obtained NYSDEC permits.

**PBS Design and Construction Oversight** - Prepared and managed PBS design permit submittal plans, documents and ‘As-Built’ plans for USTs/ASTs State Regulatory Agencies permits. Prepared cost estimates, developed technical specifications for bid documents, conducted pre bid meetings with contractors and clients, prepared bid evaluation. Completed shop drawing reviews, provided construction oversight and processed contractor’s claim payments.

**Numerous UST & AST Removals** – Provided oversight during the removal of USTs and ASTs. Remediated affected soils from around USTs and dispenser islands while working with NYSDEC Case Managers. Prepared closure reports and obtained spill case closures where spills occurred.

**UIC Compliance Work** – Prepared workplans in accord with the USEPA Consent Order, worked with USEPA Case Managers, completed UIC investigative and remedial activities, prepared closure reports and obtained USEPA UIC site closures.

**Professional Affiliations & Registrations**
- Engineer in Training (EIT)

**Fields of Competence**
- Remedial Systems Design and Operation
- PBS and CBS Design and Construction Oversight
- Petroleum UST/AST Closure Assessments
- Groundwater Investigations
- Soil Investigations
- Soil Vapor Investigations
- UIC Compliance Work
- Preparation of Term Contracts
- Preparation of Engineering Bid Documents
- Regulatory Compliance
- Septic System Design
- Irrigation Well System Design
- Construction Oversight
- Preparation of SPCC and SWPPP
- Health and Safety Audits

**Education**
- Master’s Degree, Environmental Engineering, Manhattan College, New York, 2013
- Master’s Degree, Mechanical Engineering in Environmental Protection, Krakow, Poland, 2001
- Certificate in Geoenvironmental Engineering, Manhattan College, New York, 2010
- A.A.S Degree, Accounting, Borough of Manhattan Community College, New York City, 2005

**Languages**
Edyta Korczynska

- Polish, native speaker
- Fluent in English
- Fluent in Spanish

CBS Design and Compliance – Assisted various clients to comply with NYSDEC and local regulatory agencies CBS regulations including: design of ASTs, drum storage, numerous AST/UST registrations, tightness testing and removals.

Irrigation Well System Design – Prepared design drawings for irrigation well and associated distribution system. Developed technical specification for maintenance contract.

Cost Estimate Preparation – Prepared complex cost estimates for replacement of four (4) 2,000 gallon USTs and upgrade of associated supply and return piping system in a power plant.

Septic System Design – Prepared design permit submittal plans for septic system, conducted land survey and developed technical specification for bid documents. Handled all aspects of shop drawing reviews, claims for payments, contractor negotiations out of scope work and justified change orders.

Stormwater Management and Design - Designed stormwater runoff hydrodynamic separators and catch basins inserts for one of the municipalities in Long Island in order to meet USEPA’s ‘Clean Water Act’ requirements. Conducted stormwater sampling and created SWPPP for NYSDEC SPDES permits.

SPDES Permit Compliance – Assisted clients from various industries in SPDES permit compliance. Prepared and maintained SWPPP plans, conducted benchmark sampling, completed ACR, NOI, NOIT, DMRs and other documentation.

Asbestos Removal Oversight – Provided oversight during asbestos abatement, set up and conducted air sampling and maintained project records. Reviewed job specifications, inspected work site and conferred with contractors to evaluate project.

Preparation of Term Contracts - Assisted in preparing term contracts for municipalities to retain a driller, UST removal contractor, laboratory, functionality testing, tightness testing, gasoline supply, diesel supply and drywell-cleaning firms. Contracts written for 2-3 years. Created and presented cost analysis and comparison sheets to validate bid awards.

Road Construction Design and Oversight - Assisted in design of the roadways and parking lot paving projects including drainage, bearing capacity, concrete curbing and sidewalk design. Provided oversight of all aspects of roadway and parking lot installations. Handled all aspects of shop drawing reviews, claims for payments, contractor negotiations out of scope work and justified change orders.

Environmental Health and Safety Audits – Conducted EHS compliance audits for municipal and private clients to comply with OSHA, NYSDEC and local regulatory agencies regulations. Conducted employee HAZCOM training and prepared written plans.

Groundwater Sampling - Performed quarterly and annual sampling of monitoring wells at sites with petroleum and PCE/TCE contamination. Process involved bailing out a calculated volume of water to extract a water sample representative of true subsurface conditions. Illustrated BTEX, MTBE, Naphthalene, PCE/TCE concentrations.

Subsurface Investigation – Supervised subsurface investigation utilizing various drilling method. Conducted
soil and groundwater sampling to secure soil and groundwater data. Prepared progress and closure reports.

Fuel Centralization Plan - Co-authored fuel centralization master plan for large Long Island municipality, which has established a nine year town wide petroleum UST consolidation and upgrade/replacement program.
Mr. Brice Lynch is a consultant within ERM based in Melville, NY. He has two years of experience in the field of environmental consulting industry specializing in Geology.

His experience has dealt with groundwater, soil and air sampling events at spill and superfund sites, field parameter measurements, monitoring well installation, soil logging, air rotary drilling, mud rotary drilling, bedrock coring, construction oversight and operations and maintenance of remediation systems.

**Professional Affiliations & Registrations**
- 40-hour Health and Safety Certification (OSHA)

**Fields of Competence**
- Site assessment and remediation
- Groundwater investigations
- Soil investigations
- Remediation system design, construction, maintenance and oversight
- Health and safety site officer

**Education**
- Bachelor of Science, Geology, Stony Brook University, United States, 2010

**Languages**
- English, native speaker
- Spanish, beginner
**Key Projects**

**Remediation System Operation and Maintenance,**
**Groundwater and Air Sampling, Uniondale, NY**
Performed regular operation and maintenance on SVE/AS-Air Sparge System, Ozone System, quarterly groundwater and air sampling.

**Quarterly Sampling Events, Various Sites, Nassau County, NY**
Prepared and conducted groundwater sampling events at various sites for relevant analytes.

**Monitoring Contamination, Merrick, NY**
Field parameter measurements and product recovery of hydraulic oil and gasoline at contaminated site.

**New Castle, Westbury, NY**
Prepared and conducted quarterly groundwater sampling events and remedial system installation.

**Data management, Uniondale, NY**
Inputted data using EQuIS software in order to develop an interpret trend plots of contamination over time.

**Steel Equities, Leviton, NY**
Health and Safety Officer for Remedial Investigation.
Performed oversight of mud rotary drilling.

**Beckton Dickenson, East Rutherford, NJ**
Prepared and conducted quarterly groundwater sampling events.

**BICC, New Brunswick, NJ**
Prepared and conducted quarterly groundwater sampling events. Mud rotary and Air rotary bedrock coring and FLUTE FACT liner installation oversight and sampling.
Appendix F

Quality Assurance Project Plan (QAPP)
QUALITY ASSURANCE
PROJECT PLAN (QAPP)

1960-1982 Webster Avenue
Bronx, New York

August 2014

Prepared for:

Mountco Construction and Development Corporation
700 White Plains Road, Suite 363
Scarsdale, NY 10583

And

Common Ground Community II HDFC
505 Eighth Avenue, 5th floor
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1.0 PURPOSE AND OBJECTIVES

1.1 Purpose

This Quality Assurance Project Plan (QAPP) was prepared for the Remedial Action (RA) Work Plan (WP) for the site located at 1960-1982 Webster Avenue in Bronx, NY (the Site). It is intended to set forth guidelines for the generation of reliable data by measurement activities, such that data generated are scientifically valid, defensible, comparable and of known precision and accuracy.

This QAPP contains a detailed discussion of the quality assurance and quality control (QA/QC) protocols to be utilized by Environmental Resources Management (ERM) and laboratory personnel. The RA sampling program and relevant field/laboratory QA/QC requirements are summarized in Tables C-1 through C-6.

1.2 Definitions

The parameters that will be used to specify data quality objectives, and to evaluate the analytical system performance for all analytical samples are precision, accuracy, representativeness, completeness, and comparability (PARCC). Definitions of these and other key terms used in this QAPP are provided below.

- **Accuracy** - the degree of agreement of a measurement with an accepted reference value. Accuracy is generally reported as a percent recovery, and calculated as:

\[
\frac{\text{Measured Value}}{\text{Accepted Value}} \times 100
\]

- **Analyte** - the chemical or property for which a sample is analyzed.

- **Comparability** - the expression of information in units and terms consistent with reporting conventions; the collection of data by equivalent means; or the generation of data by the same analytical method. Aqueous samples will be reported as μg/l, solid samples will be reported in units of ug/kg or mg/kg, dry weight.

- **Completeness** - the percentage of valid data obtained relative to that which would be expected under normal conditions. Data are judged valid if they meet the stated precision and accuracy goals.
**Duplicate** - two separate samples taken from the same source by the same person at essentially the same time and under the same conditions that are placed into separate containers for independent analysis. Duplicate samples are intended to assess the effectiveness of equipment decontamination, the precision of sampling efforts, the impacts of ambient environmental conditions on sensitive analyses (e.g., volatile organics analysis (VOA)), and the potential for contaminants attributable to reagents or decontamination fluids. Identifying such potential sources of error is essential to the success of the sampling program and the validity of the environmental data. Each QC sample is described below. As a minimum, each set of ten or fewer field samples will include a trip blank, a duplicate, and one sample collected in a sufficient volume to allow the laboratory to perform a matrix spike.

**Field Blanks** - field blanks (sometimes referred to as “equipment blanks” or “sampler blanks”) are the final analyte-free water rinse from equipment decontamination in the field and are collected at least one during a sampling episode. If analytes pertinent to the project are found in the field blank, the results from the blanks will be used to qualify the levels of analytes in the samples. This qualification is made during data validation. The field blank is analyzed for the same analytes as the sample that has been collected with that equipment.

**Precision** - a measure of the agreement among individual measurements of the sample property under prescribed similar conditions. Precision is generally reported as Relative Standard Deviation (RSD) or Relative Percent Difference (RPD). Relative standard deviation is used when three or more measurements are available and is calculated as:

\[
RSD = \frac{\text{Standard Deviation}}{\text{Arithmetic Mean}} \times 100
\]

Relative percent difference is used for duplicate measurements and is calculated as:

\[
RPD = \frac{\text{Value 1} - \text{Value 2}}{\text{Arithmetic Mean}} \times 100
\]

**Quality Assurance (QA)** - all means taken in the field and inside the laboratory to make certain that all procedures and protocols use the same calibration and standardization procedures for reporting results; also, a program which integrates the quality planning, quality assessment, and quality improvements activities within an organization.

**Quality Control (QC)** - all the means taken by an analyst to ensure that the total measurement system is calibrated correctly. It is
achieved by using reference standards, duplicates, replicates, and sample spikes. In addition, the routine application of procedures designed to ensure that the data produced achieve known limits of precision and accuracy.

- **Replicate** - two aliquots taken from the same sample container and analyzed separately. Where replicates are impossible, as with volatile organics, duplicates must be taken.

- **Representativeness** - degree to which data represent a characteristic of a set of samples. The representativeness of the data is a function of the procedures and caution utilized in collecting and analyzing the samples. The representativeness can be documented by the relative percent difference between separately collected, but otherwise identical sample volumes.

- **Trip Blanks** - trip blanks are samples that originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic samples. One trip blank should accompany each cooler containing volatile organics; it will be stored at the laboratory with the samples, and analyzed with the sample set. Trip blanks are only analyzed for VOCs.

### 1.3 Data Quality Objectives

#### 1.3.1 Overall Data Quality Objectives

Data Quality Objectives (DQO) are quantitative and qualitative statements specifying the quality of the environmental data necessary to support the decision-making process to guide the RA and any subsequent corrective actions. DQO define the total uncertainty in the data that is acceptable for each specific activity during the RA. This uncertainty includes both sampling error and analytical error. Ideally, the prospect of zero uncertainty is the objective; however, the very processes by which data are collected in the field and analyzed in the laboratory contribute to the uncertainty of the data. It is the overall objective to keep the total uncertainty to a minimal level such that it will not hinder the intended use of the data.

To achieve the project DQO, specific data quality parameters such as detection limits, criteria for accuracy and precision, sample representativeness, data comparability and data completeness must be specified. The overall objectives are established such that there is a high degree of confidence in the measurements.

The parameters that will be used to specify data quality objectives and to evaluate the analytical system performance for soil and groundwater
samples are PARCC: precision, accuracy, representativeness, completeness, and comparability.

1.3.2 Field Investigation Data Quality Objectives

To permit calculation of precision and accuracy for the samples, blind field duplicate, field blanks, trip blanks, and matrix spike/matrix spike duplicate (MS/MSD) samples will be collected, analyzed, and evaluated.

Through the submission of field QC samples, the distinction can be made between laboratory problems, sampling technique considerations, sample matrix effects, and laboratory artifacts. To assure sample representativeness, all sample collection will be performed in strict accordance with the procedures set forth in this QAPP.

Precision will be calculated as RPD if there are only two analytical points and percent relative standard deviation (% RSD) if there are more than two analytical points. Blind field duplicate and MS/MSD sample analyses will provide the means to assess precision. The submission of field and trip blanks will provide a check with respect to accuracy and will monitor chemicals that may be introduced during sampling, preservation, handling, shipping, and/or the analytical process. In the event that the blanks are contaminated and/or poor precision is obtained, the associated data will be appropriately qualified.

Representativeness will be assured through the implementation of the structured and coherent RAWP of which this QAPP is a part. This RAWP has been designed so that the appropriate numbers of samples of each matrix and of each location of interest are obtained for analysis.

Ideally, 100% completeness is the goal. However, it must be recognized that unforeseen issues may result in the generation of some data that may not be acceptable for use. Therefore, a completeness target of 90%, as determined by the total number of usable data points versus the total number of data points measured, will be the realistic goal of this program.

Comparability is defined as the extent to which data from one data set can be compared to similar data sets. Comparability between data sets is often questionable due to issues such as different analytical methods used or inter-laboratory differences. In order that the data generated as part of this project remain comparable to any previously generated data or data to be generated in the future, currently published analytical methods have been identified for the analysis of the collected samples. These methods will be performed by an analytical laboratory with a demonstrated proficiency in the analysis of similar samples by the referenced methods. In addition, samples will be collected using documented procedures to ensure consistency of effort and reproducibility if necessary.
1.3.3 **Laboratory Data Quality Objectives**

The analytical laboratory will demonstrate analytical precision and accuracy by the analysis of various QC samples (i.e., laboratory duplicates, spike samples, matrix spike duplicates and laboratory control samples). Tables C-5 and C-6 present the relevant precision and accuracy criteria for the analytical parameters related to this RAWP. Precision, as well as instrument stability, will also be demonstrated by comparison of calibration response factors from the initial calibration to that of the continuing calibrations. Laboratory accuracy will be evaluated by the addition of surrogate and matrix spike compounds, and will be presented as percent recovery (%R). Precision will be presented as RPD, % RSD, or percent difference (%D), whichever is appropriate for the number and type of QC samples analyzed. Laboratory blanks can also be used to demonstrate the accuracy of the analyses and possible effects from laboratory artifact contamination.
2.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL

2.1 Equipment Maintenance

In addition to the laboratory analyses conducted during the course of this RA, field measurements will be collected for total volatile organics (air monitoring and soil sample screening), pH, conductivity, oxidation/reduction potential (ORP), dissolved oxygen (DO) and turbidity in groundwater. A maintenance, calibration, and operation program will be implemented to ensure that routine calibration and maintenance is performed on all field instruments. ERM’s equipment manager, the Quality Assurance Officer (QAO), and the field team members will administer the program. ERM’s equipment manager will perform the scheduled monthly and annual calibration and maintenance. Monthly and annual maintenance, calibration, and equipment operation will follow the procedures outlined in the manufacturer’s Operation and Field Manuals accompanying the respective instruments.

2.2 Equipment Calibration

Trained field team members will be familiar with the field calibration, operation, and maintenance of the equipment. They will perform field calibrations, checks, and instrument maintenance daily. The photoionization detector (PID) and AREA Rae will be calibrated on a periodic basis with isobutylene. A Dust Trak will be calibrated daily using provided calibration air. A trained team member will perform daily field checks and instrument maintenance prior to use. A trained team member using standard calibration solutions will calibrate the pH, conductivity, ORP, DO, turbidity and colorimetry meters. Field maintenance, calibration, and equipment operation will follow the procedures outlined in the manufacturer’s Operation and Field Manuals accompanying the respective instruments. All maintenance and calibration will be documented on an instrument-specific master calibration/maintenance form.

The Field Team Leader (FTL) will be responsible for keeping a master instrument calibration/maintenance form for each measuring device. Each form will include at least the following relevant information:

- Name of device and/or instrument calibrated;
- Device/instrument serial and/or identification (I.D.) number;
- Frequency of calibration;
- Date of calibration;
- Results of calibration;
• Name of person performing the calibration;
• Identification of the calibration standards; and
• Buffer solutions (pH meter only).

2.3 Equipment Decontamination

To minimize the potential for cross-contamination, all drilling and sampling equipment will be properly decontaminated prior to and after each use.

2.3.1 General Procedures

All heavy equipment will be decontaminated in a designated clean area. Sampling equipment and probes will be decontaminated in an area covered by plastic near the sampling location. All solvents and wash water used in the decontamination process will be collected and drummed for off-site disposal. All disposable sampling equipment will be properly disposed of in dry containers.

All well casing and screen will be steam cleaned, wrapped in clean polyethylene sheeting, and stored until the time of well construction.

Extraneous contamination and cross-contamination will be controlled by wrapping the sampling equipment with aluminum foil when not in use and changing and disposing of the sampler's gloves between samples. Decontamination of sampling equipment will be kept to a minimum in the field, and wherever possible, dedicated sampling equipment will be used. Personnel directly involved in equipment decontamination will wear appropriate protective equipment.

2.3.2 Heavy Equipment (drill rigs, etc.)

All drilling equipment and the back of the drilling rig will be decontaminated by steam cleaning prior to performance of the first boring/well installation and between all subsequent borings/well installations. This will include all hand tools, casing, augers, drill rods and bits, tremie pipe and other related tools and equipment. The steam cleaning equipment will be capable of generating live steam with a minimum temperature of $212^\circ$ F.

All water used during drilling and/or steam-cleaning operations will be from a potable source and so designated in writing. The drilling contractor is responsible for obtaining all permits from the local potable water purveyor and any other concerned authorities, and provision of any
requested back-flow prevention devices. The equipment will be cleaned
to the satisfaction of the ERM Hydrogeologist or FTL.

2.3.4 *Aqueous Sampling Equipment*

Factory pre-cleaned disposable bailers will be used during the RA. In the
event that field decontamination of reusable sampling equipment is
necessary, decontamination procedures will be as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove
  visual contamination;
- Generous tap water rinse; and
- Distilled and deionized (ASTM Type II) water rinse;
- 10% nitric acid rinse, followed by a distilled and deionized water rinse
  (metals only), or
- Methanol (pesticide grade) rinse (volatiles only);
- Total air dry; and
- Distilled and deionized water rinse.

The submersible sampling pumps that are placed in the borehole will be
decontaminated with an Alconox detergent rinse and by pumping
approximately 5 gallons of potable water through the pump. Since
dedicated new lengths of polyethylene tubing will be used for sampling
each well, the tubing will not be decontaminated. Unless otherwise
specified, the submersible pumps will be decontaminated prior to the
sampling the first well and between each subsequent well as follows:

- Potable water rinse.
- Alconox detergent and potable water scrub.
- Potable water rinse.
- Distilled/deionized water rinse.
- Wrap in aluminum foil, shiny side facing out.

2.3.5 *Meters and Probes*

All meters and probes that are used in the field (other than those used solely
for air monitoring purposes, e.g., oxygen meters, explosimeters, etc.) will be
decontaminated between uses as follows:

- Phosphate-free laboratory detergent solution;
- tap water;
• methanol rinse (at the FTL's discretion);
• deionized water (triple rinse).

A methanol rinse will be used if deemed necessary by the FTL.

### 2.4 Quality Assurance/Quality Control Sampling

The field sampling quality assurance-sampling program is summarized in Table C-1. Specific guidance regarding the collection of field and laboratory QA/QC samples is presented separately below.

#### 2.4.1 Field QA/QC Samples

**Trip Blanks**

The trip blank will be used to determine if any cross-contamination occurs between aqueous samples during shipment. The analytical laboratory will supply trip blanks as aliquots of distilled, deionized water that will be sealed in a sample bottle prior to initiation of each day of fieldwork. Glass vials (40 ml) with Teflon®-lined lids will be used for trip blanks. The sealed trip blank bottles will be placed in a cooler with the empty sample bottles and will be shipped to the site by the laboratory personnel. If multiple coolers are necessary to store and transport aqueous VOC samples, then each cooler must contain an individual trip blank. Trip blanks are analyzed for VOCs only.

**Field Blanks**

Field blanks will be collected to evaluate the cleanliness of soil and aqueous sampling equipment, sample bottles and the potential for cross-contamination of samples due to handling of equipment, sample bottles and contaminants present in the air. Field blanks will be collected at a frequency of one per decontamination event for each type of sampling equipment, and each media being sampled (e.g., a groundwater bailer for groundwater, and a hand auger for soil sampling), at a minimum of one per equipment type and/or media per day.

Field blanks will be collected prior to the occurrence of any analytical field-sampling event by pouring deionized or potable water over a particular piece of sampling equipment and into a sample container. The analytical laboratory will provide field blank water and sample jars with preservatives for the collection of all field blanks. Glass jars will be used for organic blanks. The field blanks as well as the trip blanks will accompany field personnel to the sampling location. The field blanks will
be analyzed for the same analytes as the environmental samples being collected that day and will be shipped with the samples taken.

Field blanks will be taken in accordance with the procedure described below:

- Decontaminate sampler using the procedures specified in the QAPP;
- Pour distilled/deionized water over the sampling equipment and collect the rinsate water in the appropriate sample bottles;
- The sample will be immediately placed in a sample cooler and maintained at a temperature of 4°C until receipt by the laboratory; and
- Fill out sample log, labels, and COC forms, and record in field notebook.

**Temperature Blanks**

The temperature blank will be used to determine the temperature of the samples within the cooler upon arrival at the analytical laboratory. A laboratory-supplied temperature blank will be an aliquot of distilled, deionized water that will be sealed in a sample bottle. The sealed temperature blank bottles will be placed in a cooler with the empty sample bottles and will be shipped to the site by the laboratory personnel. If multiple coolers are necessary to store and transport samples, then each cooler must contain an individual temperature blank.

### 2.4.2 Laboratory QA/QC

**Blind Field Duplicate Samples**

Aqueous blind field duplicate samples will be collected analyzed to check laboratory reproducibility of analytical data. Blind field duplicates will be collected from the soil borings.

Blind field duplicate samples will be collected at a frequency of at least 5% (one out of every 20 samples) of the total number of samples collected to evaluate the precision and reproducibility of the analytical methods. All blind field duplicate samples will be submitted to the analytical laboratory as a normal sample, however, will have a fictitious sample identification and fictitious time of sample collection. Each blind field duplicate will be cross-referenced to document which actual sample it is a blind field duplicate of in the field notes and on the master sample log.

**Matrix Spike/Matrix Spike Duplicate**
Additional environmental sample volume will be collected for use as MS/MSD samples at a frequency of at least 5% (one out of every 20 samples) of the total number of samples collected per matrix to evaluate the precision and reproducibility of the analytical methods. To ensure the laboratory has sufficient volume for MS/MSD analysis, triple sample volume must be submitted for aqueous organic extractable and volatile samples once per every 20 samples in a sample delivery group (SDG).

2.5 **Field Records**

Proper management and documentation of field activities is essential to ensure that all necessary work is conducted in accordance with the RAWP and QAPP in an efficient and high quality manner. Field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if necessary), making regular and complete entries in the field logbook, and the consistent use and completion of field management forms. Field management forms and field logbook will be used to document all field activities, as this documentation will support that the samples were collected and handled properly, making the resultant data complete, comparable and defensible. Field logbook procedures and field management forms are identified in the following sections.

2.5.1 **Field Logbook**

The sample team or individual performing a particular sampling activity will keep a weatherproof field notebook. Field notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during projects and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. In a legal proceeding, notes, if referred to, are subject to cross-examination and are admissible as evidence. The field notebook entries should be factual, detailed, and objective. All entries are to be signed and dated. All members of the field investigation team are to use this notebook, which will be kept as a permanent record. The field notebook will be filled out at the location of sample collection immediately after sampling. It will contain sample descriptions including: sample number, sample collection time, sample location, sample description, sampling method used, daily weather conditions, field measurements, name of sampler, and other site-specific observations. The field notebook will contain any deviations from protocol and why, visitor's names, or community contacts made during sampling, geologic and other site-specific information which may be noteworthy.

2.5.2 **Field Management Forms**
In addition to maintenance of a field logbook, the use of field management forms will supplement field logbook entries for all field activities associated with this project. Field management forms provide a regular format to record the relevant information for a particular field activity. Use of these forms will ensure that the field team consistently and completely records all pertinent data relative to a particular field activity on a regular basis. All forms, sample labels, custody seals and other sample documents will be filled out completely.

A list of forms and the associated activities for which each form could be potentially be completed is presented below.

<table>
<thead>
<tr>
<th>Form</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater Sampling Record</td>
<td>All permanent well sampling</td>
</tr>
<tr>
<td>Soil Boring Logs</td>
<td>All borings</td>
</tr>
<tr>
<td>Air Sampling Checklist</td>
<td>All air samples</td>
</tr>
<tr>
<td>Monitoring Well Construction Logs</td>
<td>All permanent well installations</td>
</tr>
<tr>
<td>Well Development Data Sheet</td>
<td>All well development efforts</td>
</tr>
<tr>
<td>Chain of Custody (COC) Form</td>
<td>All field sampling efforts</td>
</tr>
<tr>
<td>Laboratory Sample Bottle Request</td>
<td>All field sampling efforts</td>
</tr>
<tr>
<td>Sampling Equipment Checklist</td>
<td>All field sampling efforts</td>
</tr>
<tr>
<td>Daily Instrument Calibration Log</td>
<td>Every day a field instrument is used</td>
</tr>
<tr>
<td>Well Inspection Log</td>
<td>All permanent well sampling</td>
</tr>
</tbody>
</table>

Copies of each of these forms are provided at the end of this attachment.

2.6 Sample Preparation And Custody

2.6.1 Sample Identification

To provide for proper identification in the field, and proper tracking in the laboratory, all samples must be labeled in a clear and consistent fashion using the procedures and protocols described below and within the following subsections.

- Sample labels will be waterproof and have a pre-assigned, unique number that is indelible.
- Field personnel must maintain a field notebook. This notebook must be water resistant with sequentially numbered pages. Field activities will be sequentially recorded in the notebook.
The notebook, along with the COC form, must contain sufficient information to allow reconstruction of the sample collection and handling procedure at a later time.

Each sample will have a corresponding notebook entry which includes:

- Sample ID number;
- Well or other sample location and number;
- Date and time;
- Analysis for which sample was collected;
- Additional comments as necessary; and
- Samplers’ name.

Each sample must have a corresponding entry on a COC manifest.

The manifest entry for sampling at any one well is to be completed before sampling is initiated at any other well by the same sampling team.

In cases where the samples leave the immediate control of the sampling team (i.e., shipment via common carrier) the shipping container must be sealed.

Each sample collected will be designated by an alphanumeric code that will identify the type of sampling location and a specific sample designation (identifier). Location types will be identified by a two-letter code. Groundwater samples collected from the monitoring wells will begin with “MW”. Sub-slab air samples will begin with “SS”, indoor air samples from the basement will begin with “B”, samples from other floors although not anticipated would begin with “FF” for first floor, etc, and ambient air samples will begin with “AA”. Soil samples collected from the soil borings will begin with “SB”. The depth will also be added to soil samples if applicable. The specific sampling designation (identifier) will be identified using a two-digit number. Samples collected for waste characterization will begin with “WC”. For example, the first sample collected from the first soil boring at 5 feet will be identified as SB-01 (5).

In the case of QC samples such as field blanks, trip blanks and blind field duplicate samples, six digits will follow FB, TB and DUP respectively to represent the date (e.g., FB040112 would represent a field blank collected on 01 April 2012). For matrix spike/matrix spike duplicate samples, MS/MSD will be added following the applicable sample identification.

2.6.2 Sample Containers

- The analytical laboratory will provide all sample containers.
- If glass bottles are used, extra glass bottles will be obtained from the laboratory to allow for accidental breakage that may occur.

- If sample preservation is specified, the necessary preservatives will be placed in the sample bottles by the laboratory.

- The sample bottles will be handled carefully so that any preservatives are not inadvertently spilled.

A more detailed description of the sample containers to be utilized for this RI can be found in Tables C-2 through C-4.

### 2.6.3 Sample Preservation

**Sample Preservation**

Soil samples collected during the RA will be preserved by cooling to 4°C and maintained at this temperature until time of analysis. Groundwater samples for VOC analysis during the RA will be preserved by acidification to a pH of <2 using hydrochloric acid (HCl), cooled to 4°C, and maintained at this temperature until time of analysis. A more detailed description of the sample preservation to be utilized for this RA can be found in Table C-2.

- Immediately following collection of the samples, they will be placed in a cooler with “freezer-pacs” to maintain sample integrity. All volatile sample bottles to be filled to capacity with no headspace for volatilization. If necessary to meet a maximum recommended holding time, the samples are to be shipped by overnight courier to the laboratory.

- The shipping container used will be designed to prevent breakage, spills, and contamination of the samples. Tight packing material is to be provided around each sample container and any void around the “freezer-pacs”. The container is to be securely sealed, clearly labeled, and accompanied by a COC record. Separate shipping containers should be used for “clean” samples and samples suspected of being heavily contaminated. During winter months, care should be taken to prevent samples from freezing. Sample bottles will not be placed directly on “freezer-pacs”.

**Sample Holding Time**

- All samples will be shipped the same day they are obtained to the analytical laboratory.

- The samples must be stored at or near 4°C and analyzed within specified holding times.
The analytical laboratory will be a NYSDOH ELAP-certified laboratory, and conform to meeting specifications for documentation, data reduction, and reporting. The laboratory will follow all method specifications pertaining to sample holding times contained in the NYSDEC ASP (revised 2005) and/or as prescribed by the specific analytical method.

A more detailed description of the sample holding times to be utilized for this RA can be found in Table C-2. These holding times are consistent with NYSDEC ASP Exhibit I although technical holding times vary. The holding times for the air samples will be consistent with the method requirements and not the EPA Region 2 validation criteria.

**Sample Custody**

**Chain of Custody** - The primary objective of the sample custody procedures is to create an accurate written record that can be used to trace the possession and handling of all samples from the moment of their collection, through analysis, until their final disposition. All field-sampling personnel will adhere to proper sample custody procedures because samples collected during an investigation could be used as evidence in litigation. Therefore, possession of the samples must be traceable from the time each sample is collected until it is analyzed at the laboratory.

**Custody Transfer to Field Personnel** - The on-site hydrogeologist or the field personnel will maintain custody of samples collected during this investigation. All field personnel are responsible for documenting each sample transfer and maintaining custody of all samples until they are shipped to the laboratory. COC records will be completed at the time of sample collection and will accompany the samples inside the cooler for shipment to the selected laboratory.

Each individual who has the samples in their possession will sign the COC record. Preparation of the COC record is as follows:

- For every sample, the person collecting the sample will initiate the COC record in the field. Every sample will be assigned a unique identification number that is entered on the COC Record.
- The record will be completed in the field to indicate project, sampling team, etc.
- If the person collecting the sample does not transport the samples to the laboratory or deliver the sample containers for shipment, the first block for Relinquished By __________, Received By __________ will be completed in the field.
The person transporting the samples to the laboratory or delivering them for shipment will sign the record form as Relinquished By ____________.

If commercial carrier ships the samples to the laboratory, the original COC record will be sealed in a watertight container and placed in the shipping container, which will be sealed prior to being given to the carrier. The carbonless copy of the COC record will be maintained in the field file.

If the samples are directly transported to the laboratory, the COC will be kept in possession of the person delivering the samples.

For samples shipped by commercial carrier, the waybill will serve as an extension of the COC record between the final field custodian and the laboratory.

Upon receipt in the laboratory, the Sample Custodian or designated representative, will open the shipping containers, compare the contents with the COC record, and sign and date the record. Any discrepancies will be noted on the COC record.

If discrepancies occur, the samples in question will be segregated from normal sample storage and the field personnel immediately notified.

COC records will be maintained with the records for a specific project, becoming part of the data package.

Custody Transfer to Laboratory - All samples collected during the RA will be submitted to a NYSDOH ELAP-certified laboratory meeting specifications for documentation, sample login, internal chain of custody procedures, sample/analysis tracking, data reduction, and reporting. The laboratory will follow all specifications pertaining to laboratory sample custody procedures contained in the NYSDEC ASP (revised 2005).

In general, the following procedures will be followed upon sample receipt. The laboratory will not accept samples collected by project personnel for analysis without a correctly prepared COC record.

The first steps in the laboratory receipt of samples are completing the COC records and project sample login form. The laboratory Sample Custodian, or designee, will note that the shipment is accepted and notify the Laboratory Manager or the designated representative of the incoming samples.

Upon sample receipt, the laboratory Sample Custodian, or designee, will:

- Examine all samples and determine if proper temperature has been maintained during shipment. If samples have been damaged during shipment, the remaining samples will be carefully examined to determine whether they were affected. Any samples affected will also be
considered damaged. It will be noted on the COC record that specific samples were damaged and that the samples were removed from the sampling program. Field personnel will be notified as soon as possible that samples were damaged and that they must be resampled, or the testing program changed, and provide an explanation of the cause of damage.

- Compare samples received against those listed on the COC record.
- Verify that sample holding times have not been exceeded.
- Sign and date the COC record and attach the waybill to the COC record.
- Denote the samples in the laboratory sample log-in book which contains the following information:
  - Project identification number
  - Sample numbers
  - Type of samples
  - Date received in laboratory
  - Record of the verified time of sample receipt (VTSR)
  - Date put into storage after analysis is completed
  - Date of disposal.

The last two items will be added to the log when the action is taken.

- Notify the Laboratory Manager of sample arrival.
- Place the completed COC records in the project file.

The VTSR is the time of sample receipt at the laboratory. The date and time the samples are logged in by the Sample Custodian or designee, will agree with the date and time recorded by the person relinquishing the samples.

A typical COC can be found as Figure C-1.

2.6.4 Sampling Packaging and Shipping

Sample bottles and samples will either be delivered/picked up at the site daily by the analytical laboratory, or delivered/shipped via overnight courier. Once the samples have been collected, proper procedures for packaging and shipping will be followed as described below.

Packaging

Prior to shipment, samples must be packaged in accordance with current United States Department of Transportation (USDOT) regulations. All
necessary government and commercial carrier shipping papers must be filled out. The procedure below should be followed regardless of transport method:

- Samples will be transported in metal ice chests or sturdy plastic coolers (cardboard or Styrofoam containers are unacceptable).
- Remove previously used labels, tape, and postage from cooler.
- Ship filled sample bottles in same cooler in which empty bottles were received.
- Affix a return address label to the cooler.
- Check that all sample bottles are tightly capped.
- Check that all bottle labels are complete.
- Be sure COC forms are complete.
- Wrap sample bottles in bubble pack and place in cooler.
- Pack bottles with extra bubble pack, vermiculite, or Styrofoam “peanuts”. Be sure to pack the trip blank, if one is being submitted with the samples.
- Keep samples refrigerated in cooler with bagged ice or frozen cold packs. Do not use ice for packing material; melting will cause bottle contact and possible breakage.
- Separate and retain the sampler’s copy of COC and keep with field notes.
- Tape paperwork (COC, manifest, return address) in zipper bag to inside cooler lid.
- Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open cooler.
- Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

Shipping

Samples should arrive at the laboratory as soon as possible following sample collection to ensure that holding times are not exceeded. All samples must be hand delivered on the same day as sampling or sent via overnight courier. When using a commercial carrier, follow the steps below.

- Securely package samples and complete paperwork.
- Weigh coolers for air transport.
• Complete air bill for commercial carrier (air bills can be partially completed in office prior to sampling to avoid omissions in field). If necessary, insure packages.

• Keep customer copy of air bill with field notes and COC form.

• When coolers have been released to transporter, call receiving laboratory and give information regarding samplers’ names, method of arrival.

• Call the lab on day following shipment to be sure all samples arrived intact. If bottles are broken, locations can be determined from COC and resampled.

2.7 Analytical Laboratory

The data collected during the course of the RA activities will be used to determine the presence and concentration of certain analytes in soil, and groundwater.

All groundwater samples collected from the permanent monitoring wells as well as the soil samples collected during the RA will be submitted to Spectrum Analytical Laboratories located at 175 Metro Center Boulevard, Warwick, Rhode Island 02886. Spectrum Warwick is a NYSDOH ELAP-certified laboratory (Lab I.D. # 11522) meeting specifications for documentation, data reduction, and reporting. Air samples will be sent to Spectrum Analytical Laboratories located at 830 Silver Street, Agawam, Massachusetts 01001. Spectrum Agawam is a NSDOH ELAP-certified laboratory (Lab I.D. # 11840) meeting specifications for documentation, data reduction, and reporting.

2.8 Analytical Test Parameters

The RA will require the analysis of (not including quality assurance/quality control [QA/QC] samples) approximately 90 groundwater samples for VOCs by USEPA SW-846 Method 8260B, 40 groundwater samples for Permanganate via USEPA SW-846 Method 3665A, 18 soil samples for VOCs by USEPA SW-846 Method 8260B, 8 soil samples for SVOCs by USEPA SW-846 Method 8270C and 6 soil samples for Natural Oxidant Demand (NOD) by ASTM Method D-7262-10.

These analyses will be performed in accordance with United States Environmental Protection Agency (USEPA) “Test Methods for the Evaluation of Solid Waste, USEPA SW-846, Third Edition, September 1986, with revisions”.
Thirty-six air samples will be collected and analyzed for volatile compounds following “Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition 1997, EPA/625/R-96/010B”, Compendium Method TO-15, “Determination Of Volatile Organic Compounds (VOCs) In Air Collected In Specially-Prepared Canisters And Analyzed By Gas Chromatography/Mass Spectrometry (GC/MS)”.

2.9 Instrument Calibration

The frequency of laboratory instrument calibration and associated procedures for the specific analytical methods to be followed by the selected laboratory are specified in the individual USEPA analytical method procedures. The selected laboratory’s calibration schedule will adhere to all analytical method specifications.

2.10 Data Management and Reporting Plan

2.10.1 Data Use and Management Objectives

Data Use Objectives

The typical data use objectives for this RA are:

- Ascertaining if there is a threat to public health or the environment.
- Locating and identifying potential sources of impacts to soil or groundwater.
- Delineation of horizontal and vertical constituent concentrations, identifying clean areas, estimating the extent and/or volume of impacted soil and groundwater.
- Determining treatment and disposal options.
- Characterizing soil for on-site or off-site treatment.
- Formulating remediation strategies, and estimating remediation costs.

Data Management Objectives

The primary objective of proper data management is to ensure and document that all necessary work is conducted in accordance with the RAWP and QAPP in an efficient and high quality manner thereby maximizing the confidence in the data in terms of PARCC. Data management procedures not only include field and laboratory documentation, but also include how the information is handled after the conclusion of field investigation and laboratory analyses are completed. Data handling procedures include project file management, reporting,
usability analysis (review and validation) and use of consistent formats for
the final presentation of the data.

Project File Specifications

The ERM Project Manager in ERM’s Melville, New York, office location
will keep all project information in a central Project File maintained. The
Project File will be assigned a unique project number that will be clearly
displayed on all project file folders (including electronic files). Electronic
files will be maintained in a similarly organized Project File located on the
ERM Central Network system that is backed up on a weekly basis. Both
hard copy and electronic Project Files will contain, at a minimum copies or
originals of the following key project information:

- All correspondence including letters, transmittals, telephone logs,
  memoranda, and emails;
- Meeting notes;
- Technical information such as analytical data; field survey results, field
  notes, field logbooks and field management forms;
- Project calculations;
- Subcontractor agreements/contracts, and insurance certificates;
- Project-specific health and safety information/records;
- Access agreements;
- Project document output review/approval documentation; and
- Reports: Monthly Progress, Interim Technical, and Draft/Final
  Technical.

2.10.2 Reporting

Field Data

Field data will be recorded and reported by field personnel using
appropriate field data documentation materials such as the field logbook,
field management forms, and COC forms.

Good field management procedures include following proper chain of
custody procedures to track a sample from collection through analysis,
noting when and how samples are split (if necessary), making regular and
complete entries in the field logbook, and the consistent use and
completion of field management forms. Proper completion of these forms
and the field logbook are necessary to support the consequent actions that
may result from the sample analysis. This documentation will support
that the samples were collected and handled properly making the resultant data complete, comparable, and defensible.

**Laboratory Data**

The analytical results of all samples collected, as part of the RA will be reported following NYSDEC ASP 2005 specifications. All laboratory analytical data will be reported as NYSDEC Category B deliverables. The Category B data deliverables include all backup QA/QC documentation necessary to facilitate a complete validation of the data.

In addition, NYSDEC “Sample Identification and Analytical Requirement Summary” and “Sample Preparation and Analysis Summary” forms will be completed and included with each data package. The sample tracking forms are specified and supplied by the 2005 NYSDEC ASP.

The laboratory will also transmit the analytical data in an electronic format to minimize the chances of transposition errors in summarizing the data. The data will be transmitted in an electronic data deliverable (EDD) in GISKEY (most recent version) format and a PDF copy of each ASP deliverable.

**2.10.3 Data Validation**

All field and laboratory data will be reviewed, validated and qualified as necessary to assess data usability by direct comparison to the specified data quality objectives and/or procedures set forth in this QAPP. The data associated with the groundwater samples, the soil samples, and the waste characterization samples will not be validated or qualified unless a major issue is observed after the initial review of the results. The ERM QAO will determine this. Information that can be obtained includes comparison of results obtained from samples taken at the same location, and the identification of missing data points. Examination of the data at the end of the process allows for the assessment of data quality with respect to PARCC.

**Field Data Validation Protocol**

Field data generated in accordance with the project-specific RAWP will primarily consist of field temperature, pH, ORP, specific conductance data, data associated with soil boring advancement, monitoring well installation and development, and soil classification. This data will be validated by review of the project documentation to check that all forms specified in the Work Plan and this QAPP have been completely and correctly filled out and that documentation exists for the specified instrument calibrations. This documentation will be considered sufficient to provide that proper procedures have been followed during the field investigation.
Laboratory Data Validation Protocol

Data validation is the assessment of data quality with respect to method specifications and technical performance of the analytical laboratory. Analytical data packages will be examined to ensure that all specified lab components are included, all QA/QC specifications were performed or met, and the data use restrictions are well defined.

Summary documentation regarding QA/QC results will be completed by the laboratory using NYSDEC ASP forms and will be submitted with the raw analytical data packages (NYSDEC ASP Category B deliverables). Data validation will be performed to assess and document analytical data quality in accordance with the project data quality objectives. The data review will evaluate data for its quality and usability. This process will qualify results so that the end user of the analytical results can make decisions with consideration of the potential accuracy and precision of the data. For example, the results are acceptable as presented, considered estimated and qualified with a “J”, or rejected and not useable and therefore qualified with an “R”.

The validation of the organic analytical data will be performed according to the protocols and QC requirements of the analytical methods, the NYSDEC ASP, the National Functional Guidelines for Organic Data Review (October 1999), the USEPA Region II Data Review Standard Operating Procedure (SOP) HW-24, Revision 1, June 1999: Validating Volatile Organic Compounds by SW-846 Method 8260B, the USEPA Region II Data Review SOP Number HW-22, Revision 3, October 2006: Validating Semivolatile Organic Compounds by SW-846 Method 8270C, the USEPA Region II Data Review SOP Number HW-18, Revision 0, August 1994: Validating Canisters of Volatile Organics in Ambient Air, and the reviewer’s professional judgment.

The order in which the aforementioned guidance documents and/or criteria are listed does not imply a hierarchy of reliance on a particular document for validation. ERM will utilize all guidance documents and/or criteria relying on the most comprehensive reference sources to perform the most complete validation possible.

The data validation process will provide an informed assessment of the laboratory’s performance based upon contractual requirements and applicable analytical criteria. The report generated as a result of the data validation process will provide a base upon which the usefulness of the data can be evaluated by the end user of the analytical results.

During the validation process, it will be determined whether sufficient back-up data and QA/QC results are available so the reviewer may
conclusively determine the quality of data support laboratory submittals for sample results. Each data package will be checked for completeness and technical adequacy of the data. Upon completion of the review, the reviewers will develop a QA/QC data validation report for each SDG.

For the organic parameter analyses, the following items or criteria will be reviewed:

- Case narrative and deliverable compliance
- Holding times both technical and procedural and sample preservation (including pH and temperature)
- Surrogate Compound recoveries, summary and data
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) results, recoveries, summary and data
- Blank Spike Sample (BSS) recoveries
- Method blank summary and data
- Gas Chromatography (GC)/Mass Spectroscopy (MS) tuning and performance
- Initial and continuing calibration summaries and data
- Internal standard areas, retention times, summary and data
- Blind Field Duplicate sample results
- Field Blank results
- Trip Blank results
- Organic analysis data sheets (Form I)
- GC/MS chromatograms, mass spectra and quantitation reports
- Quantitation and detection limits
- Qualitative and quantitative compound identification

After the Summary Reports are prepared for each SDG, the validator will prepare a Data Usability Report (DUSR). The DUSR will be prepared according to the guidelines established by Division of Environmental Remediation Quality Assurance Group and will review the following:

- Is the data package complete as defined under the requirements for the NYSDEC ASP Category B or USEPA CLP deliverables?
- Have all holding times been met?
- Do all the QC data: blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls and sample data fall within the protocol required limits and specifications?
• Have all of the data been generated using established and agreed upon analytical protocols?

• Does an evaluation of the raw data confirm the results provided in the data summary sheets and qualify control verification forms?

• Have the correct data qualifiers been used?

Once the data package has been reviewed and the above questions asked and answered the DUSR proceeds to describe the samples and the analytical parameters. Data deficiencies, analytical protocol deviations, and quality control problems are identified and their effect on the data is discussed. The DUSR shall also include recommendations on resampling/reanalysis. All data qualifications must be documented following the NYSDEC ASP 2005 Rev. Guidelines.

2.10.4 Data Presentation Formats

Project data will be presented in consistent formats for all letters, Progress Reports, Interim Technical Reports, and Draft/Final Technical Reports. All data will be submitted to the NYSDEC in EQuIS Electronic Data Deliverable (EDD) format consistent with the requirements outlined by the NYSDEC. General specifications are described below.

**Data Records**

The data record will generally include one or more of the following:

• Unique sample or field measurement code;
• Sampling or field measurement location and sample or measurement type;
• Sampling or field measurement raw data;
• Laboratory analysis ID number;
• Property or component measured; and
• Result of analysis (e.g., concentration).

**Tabular Displays**

The following data will generally be presented in tabular displays:

• Unsorted (raw) data;
• Results for each medium or for each constituent monitored;
• Data reduction for statistical analysis;
• Sorting of data by potential stratification factors (e.g., location, soil layer/depth, topography, etc.); and

• Summary data.

**Graphical Displays**

The following data will be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

• Sample locations and sampling grid;

• Boundaries of sampling area;

• Areas where additional data are necessary;

• Constituent concentrations at each sample location;

• Geographical extent of impacts;

• Constituent concentration levels, averages, minima and maxima;

• Changes in concentration in relation to distance from the source, time, depth or other parameters;

• Features affecting intramedia transport; and

• Potential receptors.

### 2.11 Performance Audits

#### 2.11.1 Field Audits

During field activities, the ERM QAO may accompany sampling personnel into the field to verify that the sampling program is being properly implemented and to detect and define problems so that corrective action can be taken. All findings will be documented and provided to the ERM Project Manager and FTL.

#### 2.11.2 Laboratory Audits

The NYSDOH ELAP certified laboratory that has satisfactorily completed performance audits and performance evaluation samples will be used for all sample analysis. The results of the most recent performance audits and performance evaluations will be made available upon request. ERM may perform a laboratory audit if warranted.
2.11.3 Corrective Actions

The laboratory utilized for this project will meet the specifications for corrective action protocols typical for performing contract laboratory services. Laboratory corrective action may include instrumentation maintenance, methods modification, cross contamination/carry over issues, sample tracking practices, laboratory information management (LIMs), etc.

Prior to mobilization for the field investigation, a meeting may be scheduled among representatives of ERM and the laboratory to discuss general corrective action approach and establish procedures to ensure good and timely communications among all parties during the investigation. New procedures will be put into effect as appropriate.
TABLES
### TABLE C-1
**SAMPLE TOTAL SUMMARY**

<table>
<thead>
<tr>
<th>Media</th>
<th>AOC</th>
<th>Analytical Parameters</th>
<th>Number of Samples</th>
<th>Blind Field Duplicates</th>
<th>MS/MSD Pairs</th>
<th>Trip Blanks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>UST</td>
<td>VOCs and SVOCs</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Notes:**
1. Duplicates are generally collected at a minimum frequency of five percent (1 per 20 field samples). More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
2. MS/MSD Pairs (two samples) will be collected at a minimum frequency of five percent (1 per 20 field samples). More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
3. Trip Blanks will be collected at the rate of one per aqueous sample shipment when VOCs are collected where applicable.
### TABLE C-2

**DETAILED SUMMARY OF SOIL SAMPLING PROGRAM**

**SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES, AND CONTAINERS**

<table>
<thead>
<tr>
<th>Analytical Parameters</th>
<th>Analytical Method Reference</th>
<th>Sample Preservation</th>
<th>Holding Time</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCL VOCs</td>
<td>SW-846 8260 + 10 TICs</td>
<td>Cool 4°C</td>
<td>10 days</td>
<td>1 – 4 oz. glass jar</td>
</tr>
<tr>
<td>TCL SVOCs</td>
<td>SW-846 8270 + 20 TICs</td>
<td>Cool 4°C</td>
<td>5 days / 40 days</td>
<td>2 – 8 oz. glass jar</td>
</tr>
</tbody>
</table>

**Notes:**

1. Holding times are from Validated Time of Sample Receipt (VTSR). Technical holding times vary. VOC and TAL Inorganic holding times are days after VTSR until analysis; SVOC, Pesticide, and PCB holding times are days after VTSR until extraction / days from extraction to analysis; Inorganics holding times are days after VTSR until analysis. TCLP holding times are days after VTSR until leaching / days from leaching until extraction (if required) / days from extraction until analysis.

2. As specified by Spectrum Analytical Inc., Warwick RI and Alpha Woods Hole Laboratories, Westborough, MA.
<table>
<thead>
<tr>
<th>Target Compound List</th>
<th>CAS Number</th>
<th>Soil Reporting Limits (ug/kg)</th>
<th>Aqueous Reporting Limits (ug/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dichlorodifluoromethane</td>
<td>75-71-8</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Chloromethane</td>
<td>74-87-3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Vinyl chloride</td>
<td>75-01-4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Bromomethane</td>
<td>74-83-9</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Chloroethane</td>
<td>75-00-3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Trichlorofluoromethane</td>
<td>75-69-4</td>
<td>5</td>
<td>5</td>
</tr>
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<td>1,1-Dichloroethene</td>
<td>75-35-4</td>
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<td>5</td>
</tr>
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<td>1,1,2-Trichloro-1,2,2-trifluoroethane</td>
<td>76-13-1</td>
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<td>5</td>
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<tr>
<td>Acetone</td>
<td>67-64-1</td>
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<td>5</td>
</tr>
<tr>
<td>Carbon disulfide</td>
<td>75-15-0</td>
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<td>5</td>
</tr>
<tr>
<td>Methyl acetate</td>
<td>79-20-9</td>
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<td>5</td>
</tr>
<tr>
<td>Methylene chloride</td>
<td>75-09-2</td>
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<tr>
<td>trans-1,2-Dichloroethene</td>
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<td>5</td>
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<td>Methyl tert-butyl ether</td>
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<td>2-Butanone</td>
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<td>Bromochloromethane</td>
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<td>Chloroform</td>
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<td>1,1,1-Trichloroethane</td>
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<td>Cyclohexane</td>
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<td>Carbon tetrachloride</td>
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<td>Benzene</td>
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<td>1,4-Dioxane</td>
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<td>100</td>
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<td>Trichloroethene</td>
<td>79-01-6</td>
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<tr>
<td>Methylcyclohexane</td>
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<td>5</td>
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<td>1,2-Dichloropropene</td>
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<td>Bromodichloromethane</td>
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<tr>
<td>4-Methyl-2-pentanone</td>
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<tr>
<td>Tetrachloroethene</td>
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<td>Dibromochloromethane</td>
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<td>1,2-Dibromoethane</td>
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### TABLE C-3 (continued)

**VOLATILE TARGET COMPOUND LIST (TCL) AND REPORTING LIMITS**

<table>
<thead>
<tr>
<th>Target Compound List</th>
<th>CAS Number 1</th>
<th>Soil Reporting Limits (µg/kg) 2</th>
<th>Aqueous Reporting Limits (µg/l) 2</th>
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<tbody>
<tr>
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<td>o-Xylene</td>
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<td>m,p-Xylene</td>
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<td>Styrene</td>
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<td>Bromoform</td>
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<td>Isopropylbenzene</td>
<td>98-82-8</td>
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<td>1,1,2,2-Tetrachloroethane</td>
<td>79-34-5</td>
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<td>1,2,4-Trichlorobenzene</td>
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<td>1,2,3-Trichlorobenzene</td>
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**Notes:**
2. As specified by Spectrum Analytical Inc., Warwick RI.
### TABLE C-4

**SEMIVOLATILE TARGET COMPOUND LIST (TCL) AND REPORTING LIMITS**

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<th>Aqueous Reporting Limits (ug/l)</th>
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<td>Bis(2-chloroethyl) ether</td>
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<td>2-Chlorophenol</td>
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<td>4-Methylphenol</td>
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### TABLE C-4 (continued)
#### SEMIVOLATILE TARGET COMPOUND LIST (TCL) AND REPORTING LIMITS

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<th>Target Compound List</th>
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<th>Soil Reporting Limits (ug/kg) 2</th>
<th>Aqueous Reporting Limits (ug/l) 2</th>
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### Notes:
2. As specified by Spectrum Analytical Inc., Warwick RI.
TABLE C-5
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY VOLATILE ANALYSES

<table>
<thead>
<tr>
<th>Matrix</th>
<th>QC Compounds</th>
<th>Surrogate Accuracy (% R)</th>
<th>Blind Field Duplicate Precision (RPD)</th>
<th>Method Blanks</th>
<th>MS/MSD Accuracy (% R)</th>
<th>MS/MSD Precision (RPD)</th>
<th>BS/BSID Accuracy (% R)</th>
<th>BS/BSID Precision (RPD)</th>
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<td>60-125</td>
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<td>Blind Field Duplicate Precision (RPD)</td>
<td>Method Blanks</td>
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<td>MS/MSD Precision (RPD)</td>
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TABLE C-5 (continued)

ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY
VOLATILE ANALYSES

Notes:
1. As specified by Spectrum Analytical Inc., Warwick RI.

QC = Quality Control; % R = Percent Recovery; RPD = Relative Percent Difference; MS = Matrix Spike; MSD = Matrix Spike Duplicate; RL = Reporting Limit
**TABLE C-6**

**ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY SEMIVOLATILE ANALYSES**

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<th>Surrogate Accuracy (% R)(^i)</th>
<th>Blind Field Duplicate Precision (RPD)</th>
<th>Method Blanks</th>
<th>MS/MSD Accuracy (% R)(^i)</th>
<th>MS/MSD Precision (RPD)(^i)</th>
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<td>≤ RL for all other compounds.</td>
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ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY SEMIVOLATILE ANALYSES

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### TABLE C-6 (continued)
**ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY SEMIVOLATILE ANALYSES**

<table>
<thead>
<tr>
<th>Matrix</th>
<th>QC Compounds</th>
<th>Surrogate Accuracy (% R)</th>
<th>Blind Field Duplicate Precision (RPD)</th>
<th>Method Blanks</th>
<th>MS/MSD Accuracy (% R)</th>
<th>MS/MSD Precision (RPD)</th>
<th>BS/BSD Accuracy (% R)</th>
<th>BS/BSD Precision (RPD)</th>
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<tr>
<td>Soil (continued)</td>
<td>Butylbenzylphthalate</td>
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<td>3,3'-dichlorobenzidine</td>
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<td>Benzo(a)anthracene</td>
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<td>Chrysene</td>
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<td>Bis(2-ethylhexyl) phthalate</td>
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<td>Di-n-octylphthalate</td>
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<td>Benzo(b) fluoranthene</td>
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<td>Dibenzo(a,h) anthracene</td>
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<td>Benzo(g,h,i) perylene</td>
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<td>2,3,4,6-Tetrachlorophenol</td>
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<td></td>
<td>2-fluorobiphenyl</td>
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<td>2,4,6-tribromophenol</td>
<td>40-125</td>
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**Notes:**
1. As specified by Spectrum Analytical Inc., Warwick RI.

QC = Quality Control; % R = Percent Recovery; RPD = Relative Percent Difference; MS = Matrix Spike; MSD = Matrix Spike Duplicate; RL = Reporting Limit
FIGURES
# Chain of Custody Record

**Special Handling:**
- □ Standard TAT - 7 to 10 business days
- □ Rush TAT - Date Needed:

- □ All TAT's subject to laboratory approval.
- □ Min. 24-hour notification needed for rushes.
- □ Samples disposed of after 60 days unless otherwise instructed.

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<tr>
<th>1=NO₂SO₃</th>
<th>2=HCl</th>
<th>3=H₂SO₄</th>
<th>4=HNO₃</th>
<th>5=NaOH</th>
<th>6=Ascorbic Acid</th>
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<tr>
<td>DW=Drinking Water</td>
<td>GW=Groundwater</td>
<td>WW=Wastewater</td>
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<tr>
<td>O=Oil</td>
<td>SW=Surface Water</td>
<td>SO=Soil</td>
<td>Sl=Sludge</td>
<td>A=Air</td>
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<tr>
<td>X1=</td>
<td>X2=</td>
<td>X3=</td>
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**Containers:**

- G=Grab
- C=Composite

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**Analyses:**

- Preservative
- # of VOA Vials
- # of Amber Glass
- # of Clear Glass
- # of Plastic

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<td>□ Provide CT DEP RCP Report</td>
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<tr>
<td>□ No QC</td>
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<tr>
<td>□ Other</td>
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- State specific reporting standards:

- Fax results when available to (______) ____________________
- E-mail to ____________________
- EDD Format: ____________________

**Condition upon receipt:**
- □ Food
- □ Arsenic
- □ °C

**Relinquished by: **

**Received by: **

**Date: **

**Time: **

175 Metro Center Boulevard • Warwick, RI 02886-1755 • 401-732-3400 • Fax 401-732-3499 • www.mitkem.com
FIGURE C-2
EXAMPLE CUSTODY SEAL

CHAIN OF CUSTODY SEAL

ERM®
Appendix G

Construction Quality Assurance Project Plan
(CQAPP)
CONSTRUCTION QUALITY ASSURANCE PROJECT PLAN

1960-1982 Webster Avenue
Bronx, New York

December 2014

Prepared for:
Mountco Construction and Development Corporation
700 White Plains Road, Suite 363
Scarsdale, NY 10583

And
Common Ground Community II HDFC
505 Eight Avenue 5th Floor
New York, NY 10018

Prepared by:
Environmental Resources Management.
105 Maxess Road, Suite 316
Melville, NY 11747
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1.0 INTRODUCTION AND PROJECT DESCRIPTION

1.1 INTRODUCTION

This Construction Quality Assurance Project Plan (CQAPP) has been developed as part of the Remedial Action Workplan (RAWP) for the Webster Avenue Brownfield site (NYSDEC Site No. C203075) located on 1960-1982 Webster Avenue, Bronx County New York. ("Site".) The CQAPP has been prepared on behalf of Mountco Construction and Development Corporation and Common Ground Community II HDFC, volunteers in the Brownfield Cleanup Program (BCP) in accordance with the requirements of NYSDEC.

The BCP requires the submission of a CQAPP, in conjunction with the other Remedial Design Plans for the use of NYSDEC and its representatives, other regulatory personnel having jurisdiction, and the Remedial Engineer. All construction activities to be performed by the Contractor during Site remediation are completely defined in the final RAWP.

1.2 PROJECT DESCRIPTION SUMMARY

The Site is located at 1960-1982 Webster Avenue in the Tremont section in Bronx, New York and is identified as Block 3028 and Lots 1, 6, 7, 8, 48 and 75 on the New York City Tax Map. The Site is 59,292-square feet and is bounded by 1984 Webster Avenue, a warehouse to the north, East 178th Street and beyond by commercial and residential properties to the south, Park Avenue and beyond by MTA Metro North railway lines to the east, and Webster Avenue and beyond by commercial and residential properties to the west. Currently, the Site is improved with an unoccupied one-story and partial two-story steel framed masonry block structure on lot 48 which was last occupied several years ago by a Western Beef Supermarket. No additional permanent structures or other pertinent Site features exist on the property. The RAWP for the site calls for:

1. Preparation of a Community Participation Plan and performance of all required BCP Citizen Participation activities according to an approved Citizen Participation Plan (CPP);
2. Performance of a Community Air Monitoring Program for particulates and volatile organic carbon compounds;
3. Establishment of Track 4 Soil Cleanup Objectives (SCOs);
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas;
5. Excavation and removal of soil/fill exceeding Track 4 – Restricted Residential Use SCOs. Entire property will be excavated to a depth of two feet, and a small portion of the property will be excavated down to approximately 12-14
feet for a basement in one of the proposed buildings, footings and elevator pits;

6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site;

7. Removal of underground storage tanks (if encountered in the two anomalies identified during geophysical investigation, or any other locations) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations;

8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities;

9. Demarcation of residual soil/fill;

10. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations;

11. Installation of a vapor barrier system beneath the building slab and behind foundation sidewalls below grade. The sub-slab vapor barrier will consist of a 46 mil high density polyethylene (HDPE) designed to provide a barrier against water, moisture, and gas. A 60 mil HDPE membrane will be applied to vertical foundation walls.;

12. Installation of an active Sub Slab Depressurization System in one of the buildings;

13. Construction and maintenance of an engineered composite cover consisting of two feet of clean fill in all landscaped areas, hard cover in the form of concrete or asphalt pavement over parking lot areas, and the building slab;

14. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations;

15. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations;

16. Submission of a Final Engineering Report (FER) that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP;

17. Submission of an approved Site Management Plan (SMP) in the FER for long-term management of residual contamination, including plans for maintenance, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency; and

18. Establishment of Engineering Controls and Institutional Controls described in this RAWP; a requirement that management of these controls must be in compliance with an approved SMP; and Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in
accordance with the SMP; and (4) higher level of land usage without NYSDEC approval.

1.3  
**Construction Quality Assurance Project Plan Summary**

This CQAPP outlines the approach to quality assurance during construction activities at the Site. The following sections present the plan for implementation of the remedial action (RA) for the Site, a proposed methodology for performing the RA, quality assurance methods to verify the effectiveness of the remedial action, the lines of responsibility during the RA, a detail of construction oversight, and the submission of required documentation to NYSDEC. A summary of each of these sections is outlined below.

**Section 2.0: Remedial Construction Plan:**

The Remedial Construction Plan contains a general plan for Contractor site mobilization, surveying, stockpiling of clean soil, soils exceeding criteria, and soils exhibiting RCRA hazardous characteristics. Section 2.0 also describes the transportation and disposal methods. Finally, the potential Contractor’s project organization, as well as any quality control methods to be performed by the Contractor are included in this section.

**Section 3.0: Construction Oversight:**

This Section defines the scope of work for the Remedial Engineer performing the construction oversight, as well describing the organization of oversight personnel. Construction oversight will be provided by a team of individuals with specific responsibilities. Field personnel will include; the Site Superintendent, Site Safety Officer, and other field personnel, subordinate to the Remedial Engineer, as necessary to oversee and inspect the work.

**Section 4.0: Documentation Required by NYSDEC**

The documentation and submittal reviews for NYSDEC review are defined in this section. The Remedial Engineer will coordinate the submittals and comments by NYSDEC with the Contractor.

**Section 5.0: Role of Regulatory Agencies**

NYSDEC will provide oversight of the project to implement the selected remedy documented in the RAWP.

**Section 6.0: Remedial Action Construction Schedule**
The Remedial Action Construction Schedule estimates the overall construction schedule and duration of each phase of the work with detailed task break down by area.
2.0 REMEDIAL CONSTRUCTION PLAN

The Remedial Construction Plan includes plans necessary for; preparation of the Site prior to the RA; installation of the necessary site improvements for implementation of the work plan; and the sequence of work to be performed in achieving the remedial goals and objectives. The sequence of work will detail a general approach for performing the excavation, stockpiling and sampling of excavated soils, transporting and disposing of impacted soils, and site restoration. This sequence of work is not intended to limit the Contractor from their own means and methods for performing the work, or developing innovative methods subject to approval by the Remedial Engineer, Mountco Construction and Development Corporation, Common Ground Community HDFC. and NYSDEC.

2.1 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site.

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

- RAOs for Environmental Protection
  - Remove the source of ground or surface water contamination.

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

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.2 CONSTRUCTION DRAWINGS

Construction drawings were produced by CookFox Architects, LLP as part of this remediation.

2.3 CONSTRUCTION OVERVIEW

The Site has been divided into a number of sub-areas. Each sub area will be cleared of debris and grubbed of brush, trees and other vegetation necessary to perform the soil excavation.

As necessary, the Contractor will install temporary entrances to facilitate soil removal while maintaining the Site as dust free as possible. The Contractor will identify and call to the attention of the Remedial Engineer any variation in the design drawings, regardless of impacts to the scope of work, prior to excavation of Site soils.

2.4 SEQUENCE OF WORK

This section details the proposed sequence of work starting with the necessary temporary Site improvements (roadways, soil stockpile area(s), soil erosion control methods), clearing and grubbing of areas requiring excavation, performing Site surveys, means for performing excavation, remediation of subsurface features, transportation and disposal, performing onsite stabilization of soils exhibiting RCRA hazardous characteristics (optional), and performing confirmatory sampling.

2.4.1 Temporary Site Improvements:

**Field Office**
Office space for the Contractor and Remedial Engineer shall be located at the Site. The office space shall be equipped with electric, telephone, fax, cable Internet service including wireless router, and potable water. Additional requirements for the Field Office are specified in the Technical Specifications.
Roadways
Temporary access roads will be routed such that they will not interfere with the excavation of contaminated soils. The temporary roadways shall be constructed by removing the top soil (~6”) installing non-woven geotextile the full width (20ft) of the roadway followed by the placement and compaction of 8” of crusher-run. Details concerning the construction of temporary roadways are shown on the Construction Drawings and in the Technical Specifications.

Construction Zone Exit Pad
This will include the construction of entrance and exit pads from non-paved to paved areas, to limit tracking of Site soils outside the contamination reduction zones. The construction zone exit pad will be constructed using #2 crushed stone and shall be a minimum of 8-inches thick. The construction zone exit pad will be constructed in accordance with the New York Standards and Specifications for Erosion and Sediment Control, and detailed on the Construction Drawings and in the technical specifications. The number and location of construction zone exit pads will be determined by the Contractor, and included in the Contractor’s Work Plan.

Decontamination Pad
The Contractor will be responsible for the construction of a truck and equipment decontamination pad. All construction equipment exiting the contamination reduction zone must first be decontaminated regardless if the equipment has come in contact with contaminated materials.

Soil Stockpile Areas
Soil staging areas shall be constructed as shown on the contract drawings or in alternative configuration(s) as approved by the Remedial Engineer. The soil staging areas shall be constructed to allow sufficient area for multiple segregated piles or windrows of soils. Separate stockpile locations shall be prepared for soils above the performance standard, and soils exhibiting RCRA hazardous characteristic.

Storage areas for the impacted soils and soils exhibiting RCRA hazardous characteristics shall be constructed on the existing concrete slabs, formerly used as building slabs, as shown on the Drawings. Temporary storage bins may be constructed using concrete barriers (jersey barriers) as sidewalls. The storage area shall be covered at all times to the extent practicably. The Contractor will have the alternative for building a structural cover for the stockpile of soils exhibiting RCRA hazardous characteristics, to eliminate the need to maintain temporary polyethylene cover(s) and to minimize the effects of precipitation and subsequent management of storm water run-off.
Soil and Sediment Erosion Control Methods

Soil Erosion Control measure will be installed around areas that have been cleared and grubbed, active excavations, and soil stockpiles. Soil and sediment erosion control methods will be as described in the New York Standards and Specifications for Erosion and Sediment Control. The erosion control methods will include silt fences, straw bales, temporary swales, and other best management practices. Because the project disturbance area is greater than one (1) acre, coverage under the SPDES General Permit for Stormwater Discharges from Construction Activities.

2.4.2 Clearing and Grubbing

The Contractor shall be responsible for clearing and removing all brush and trees that impact the sequence of work. The cleared vegetative material shall be chipped/mulched and stockpiled on Site at a locations approved by the Remedial Engineer. Vegetative material that is in contact with impacted soils shall be stockpiled separately and sampled prior to offsite disposal. Clearing and grubbing will be performed in stages, to limit the extent of bare areas requiring erosion control and/or dust suppression.

After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. A similar survey will be prepared following placement of clean fill material to document placement of a two-foot cover.

The Surveyor shall layout the limits of each excavation, delineating cut-lines for clean cutback soils, soils above clean-up (non-hazardous) and soils expected to be hazardous shown on the Drawings. Since all soil from 0-2 feet will be excavated and removed from the site, these areas will not require endpoint sampling. The contractor will also be responsible for surveying the actual excavated limits after post excavation sample results have confirmed excavation has been performed to clean soil. The progress of excavation shall be periodically surveyed and included in the Contractor’s progress drawings.

The Surveyor shall be employed at sufficient time for redefining the excavation limits or limits of contamination, re-establishing off sets, and to develop as-built drawings

2.4.3 Soil Excavation

The Site has been divided into a number of sub areas. Each sub area will be cleared of debris, grubbed and cleared of vegetative material prior to excavation of soils. After the vegetative cover has been removed, the sub
areas shall be surveyed and the limits of excavation marked out, as described above.

For sub areas with impacted soils present at depths to 9 feet below grade, excavation will start at the center of each sub area and will be advanced vertically to the approximate depth and horizontally to the limits of impact, as defined on the Construction Drawings and marked out by the surveyor. Once the limits of impacted soil are reached, as defined by the survey, the excavation/windrowing of eligible clean soil will be performed and the sidewalls will be cut back at a minimum of one-foot vertical to one-foot horizontal slope. Soils removed by the sidewall cutbacks from these excavations will be windrowed into stockpiles in proximity to the sub area of origin as proposed clean backfill material. These soils will be sampled per the RAWP. The sampling of cutback soils will achieve two objectives; 1) serve as confirmation of the horizontal limits of excavation, and 2) provide verification needed for use as backfill material. If sampling of clean cutback soil indicates further impact of constituents above the performance standards in the horizontal direction, additional soils will be removed and windrowed from the sidewall of sub-area of origin and sampled. This process will continue in each 5-ft elevation level until soils exhibit concentrations for constituents below the performance standard.

For sub areas that require the removal of clean overburden; excavation will be performed to the prescribed depth below grade and to the limits of excavation as shown on the drawings, including sidewall stabilization of one foot vertical to one foot horizontal. The proposed clean overburden and sidewall cutback soils will be windrowed into stockpiles as proposed clean backfill material, pending confirmation sampling, as previously described. Excavation in these sub areas will precede in this method until the impacted layer is reached.

After excavation has been performed to the prescribed depth and soils are stockpiled as described above, the area will be re-surveyed to delineate cut-lines for the next excavation that will be conducted through the next 5-foot interval. Soils shown on the Construction Drawings as clean overburden and soil removed as excavation cutback soils will be stockpiled separately as proposed backfill, pending confirmation sampling.

2.4.4 Subsurface Features

Should any subsurface feature (such as unknown USTs) be encountered during excavation the remedial approach for subsurface features and USTs is as follows:
1. Locate and uncover subsurface features and USTs and trace any connecting pipes.

2. Sample (aqueous and/or solid) from subsurface features and USTs for waste characterization, as necessary.

3. Determine if subsurface features and USTs contain liquids or solids in excess of criteria.

4. Remove liquid and solid contents with concentrations of constituents above criteria from subsurface features via Vacuum or equivalent method.

5. Confirmation samples shall be collected from remediated subsurface features to confirm cleanup (i.e., if impacted media is present)

6. Disposal of subsurface feature and UST contents according to results of characterization sampling.

7. Access and clean USTs if necessary, rendering UST vapor free, and remove USTs identified. Removal of petroleum product will be performed in accordance with 6NYCRR Part 611. After UST is removed, it shall be recycled and/or disposed of in accordance with 6NYCRR Part 611. If impacted soil is present, soil samples will be collected from the UST excavation sidewalls and excavation bottom following the frequency in DER-10 Section 5.5, and compared to the performance standards for verification of subsurface feature remediation.

8. Verify and document UST closure following removal with NYSDEC.

9. Backfill UST excavations to grade following closure confirmation sampling.
2.4.5 **Transportation and Disposal**

Soils that are excavated, as shown on the Contract Drawings, or determined to be above criteria, but not a RCRA characteristic hazardous waste, by confirmatory sampling shall be disposed at a RCRA Subtitle D permitted TSDF. On-site soil that exhibit RCRA hazardous waste characteristics will be disposed of at a RCRA Subtitle C TSDF.

Upon award of the contract, the Contractor shall submit each disposal facility for review and approval by the Remedial Engineer and NYSDEC. The Contractor will be responsible for coordinating the means and methods of transportation and disposal, as well as procuring all associated permits.

All soils exhibiting RCRA hazardous characteristics shall be removed from the site within 90 days of excavation and properly disposed of at a RCRA Subtitle C permitted TSDF.

2.4.6 **Storm Water Management**

Due to the size of the excavations a chance exists for the accumulation of storm water within excavations during the soil removal action. Best management practices, as outlined in the New York Standards and Specifications for Erosion and Sediment Control, will be used to prevent the inflow of stormwater into such excavations. If necessary, excavations that fill with water may be pumped dry. If the sequence of work warrants, the contractor will pump all water from the excavation into the frac tank with additional treatment prior to discharge.

The contractor will be responsible for acquiring all permits related to excavation dewatering.

2.4.7 **On-Site Soil Stabilization (Optional)**

On-site stabilization of soils with hazardous characteristics may be performed prior to offsite disposal. Soils shown on the Construction Drawings, and any stockpiled soils with sample results exhibiting hazardous characteristics may be stabilized to meet certain performance criteria prior to its removal for land disposal at an off-site Subtitle D TSDF. The Contractor will submit for approval the stabilization method to be used, as well as the results of a treatability study documenting the feasibility of the solidification/stabilization method. The stabilization method shall (at a minimum) determine the ability of solidification to meet TCLP requirements and determine the optimum ratio of solidification agent to soil. The Contractor will also perform any tests that may be required by the receiving TSDF.
**Post Excavation Confirmation Sampling**

Post-excavation sampling is not deemed necessary for this project as the upper two feet of soil will be excavated across the Site. If deemed necessary for excavation in a specific area, post excavation confirmation samples will be collected when the extents of soil removed, in the vertical or horizontal direction, have been reached and it is anticipated that soils with concentrations below the site cleanup levels have been encountered.

During excavation, once the horizontal limits of soil removal, as shown on the drawings, are reached for each elevation, sufficient soils will be removed for slope stability of the excavation sidewalls. This cutback soil will be windrowed in proximity to the excavation and sampling will be performed to verify the horizontal limits of removal have been met and the soil is eligible to be reused as backfill material.

Post excavation samples will only be collected from the sidewall and bottom of the excavation once the vertical limit of soil removal have been achieved as detailed in the Construction Drawings. Bottom excavation samples will not be collected if the bottom of excavation elevation coincides with the elevation of groundwater. Soils below the elevation of groundwater will not be excavated or sampled and will be addressed in Remedial Element III (onsite and offsite groundwater), and as such not part of this Remedial Design.

The RAWP details further the post excavation sampling. The data collected during the course of the Remedial Action at the Site will be used to confirm that the various components of the Remedial Action have been properly implemented. Therefore, the data must be sufficiently accurate to determine whether performance standards have been achieved.

**2.5 CONSTRUCTION QUALITY ASSURANCE OBJECTIVES**

The three quality assurance objectives for the construction of the Remedial Design are:

1. To ensure that all construction activities are implemented in accordance with the ROD, Order (and SOW), and Remedial Design; which includes the Construction Drawings, Specifications, CQAPP, RAWP, T&D and a HASP. These construction activities include but are not limited to:
   - the use of appropriate construction practices, means, methods and techniques;
• the use of materials of construction as required by the final Drawings and Specifications or as commonly accepted in the construction industry;

• the use of specified or approved testing methods to ensure that all earthwork activities are performed and/or installed as required by the Remedial Design;

• the use of specified or approved sampling and analytical methods and procedures, and quality assurance protocols as required by the Drawings, Specifications and RAWP; and

• the preparation of documentation (as outlined in the CQAPP) to track and identify that all activities related to the construction of the Remedial Design are conducted in accordance with the Remedial Design Contract Documents.

2. To ensure that all Site activities are implemented safely, in accordance with the ROD, Order (and SOW), and Remedial Design documents (including the Drawings, Specifications, and plans). These activities include but are not limited to:

• the implementation of appropriate OSHA requirements during construction activities;

• the implementation of all applicable federal and state requirements when personnel are working on-Site in areas of potential exposure to the chemicals of concern; and

• the execution of proper Site-specific health and safety measures to prevent the injury of individuals at or near the Site who are not directly involved with the construction activities being conducted.

3. To ensure that the constructed Remedial Design functions in accordance with the intent of the ROD, Order (and SOW), and the Remedial Design, and meets the performance standards established for the Site.

The following Contractor personnel will have specific duties regarding the quality assurance of the construction.

**Project Director**

The Contractor’s project director is responsible for the overall direction of the implementation of the RA. The responsibilities of the Contractor’s project director generally include administrative review and interaction with the Remedial Engineer. The Contractor’s project director is also
responsible for overseeing the construction activities, schedule and budget maintenance.

**Project Manager**

The Contractor’s project manager is responsible for general administration of the contract to carry out implementation of the RA. The Contractor’s project manager will supervise and direct the construction of the Remedial Design competently and efficiently, devoting such attention there to and applying such skills and expertise as may be necessary to perform the construction in accordance with the Contract Documents. The Contractor’s project manager will be responsible for the means, methods, techniques, sequences and procedures of construction except as otherwise specified in the Contract Documents, and is responsible for ensuring that the finished Work complies accurately and completely with the Contract Documents.

The responsibilities of the Contractor’s project manager will include providing technical guidance and resolution of technical issues, schedule and budget maintenance, and review of project deliverables.

**Superintendent**

The Contractor will have on-Site at all times during the RA, a competent superintendent. The Contractor’s Superintendent will not be replaced without written notice to and approval from the Remedial Engineer. The superintendent will be the Contractor's representative at the Site and will have authority to act on behalf of the Contractor. The Contractor’s superintendent will act as directed by and under the supervision of the Contractor’s project manager. The Contractor’s superintendent will be the main contact between the Contractor and the Remedial Engineers Resident Project Representative regarding all on-Site Work. The Contractor selected to perform the RA will determine the specific duties and responsibilities of the Contractor’s superintendent.

The Contractor’s superintendent may also be the Contractor's Site safety representative or another individual may be selected for the Site safety role.
3.0 CONSTRUCTION OVERSIGHT

The implementation of the RA at the Site will require the Volunteer to select a Remedial Engineer to oversee the construction, and perform inspection and certification services, as well as other Construction Quality Assurance Tasks. The Remedial Engineer will perform the construction oversight in accordance with the CQAPP and the General Conditions of the Specifications. The Remedial Engineer will have a number of people associated with these tasks.

The Remedial Engineer will oversee the construction and will ensure that all provisions of the construction Contract Documents (the "Contract" or the "Work") are enforced. The Remedial Engineer will have no authority to order additional work to be performed or to alter any term or condition of the Contract, including technical provisions, and will have no authority to waive or lessen any requirement of the Contract.

The Remedial Engineer will staff the project with the following Staff members:

- Resident Project Representative (RPR) with overall responsibility for overseeing daily construction activities and measurement and daily logging of contractors work efforts;

- Site Safety Officer (SSO) with responsibility for ensuring that all Work at the Site is performed in accordance with the HASP; and

- Additional construction inspectors, technicians, and clerks as needed.

The qualifications and specific roles and responsibilities of the personnel who will perform these construction oversight activities are set forth in the contract documents. The remainder of this section describes the construction oversight activities that will be implemented by the Remedial Engineer during the RA. These activities are:

- Observation, inspection and certification of the Contractor's work;

- Implementation of the HASP (including remedial air monitoring elements);

- Confirmatory sampling and monitoring as outlined in the RAWP; and

- Preparation of documentation and record keeping including measurement (of quantities), daily logging and as-built drawings.
• Perform Independent Quality Assurance of the Remedial Action including field performance testing.

3.1 PROJECT ORGANIZATION AND RESPONSIBILITY

General project responsibilities, management structure and roles for the Remedial Engineer and key personnel titles have been established based on previous approaches and experiences on similar projects.

Project Manager

The Project Manager will be responsible for general administration of the contract to implement the Remedial Action. The CQAPP related responsibilities of the project manager include:

• supervision of field and office support staff;

• interfacing with the Contractor's project director;

• ensuring that all requirements of the RAWP are being followed in the field;

• responding to technical questions from field and laboratory oversight personnel;

• making visits to the Site to observe progress and quality of the Contractor's and Remedial Engineer's work;

• supervision of field and office support staff;

• interfacing with the Contractor's project director;

• ensuring that all requirements of the HASP are being followed in the field;

• overseeing coordination of construction contracts and the Site remediation contract requirements;

• responding to technical questions from field and laboratory oversight personnel;

• ensuring that the completed work of the Contractor conforms to the requirements of the RAWP;

• disapproving or rejecting Work of the Contractor which does not conform to the requirements of the RAWP or accepted construction practices;
• issuing interpretations and clarifications of the RAWP and receiving and approving change orders as necessary;

• reviewing shop drawings submitted by the Contractor and evaluating and determining acceptability of substitute materials proposed by the Contractor;

• requiring special inspections or testing and reviewing all certificates of inspections or testing required by the RAWP or other rules or laws;

• reviewing the Contractor's applications for payment and recommending payments to the Contractor;

• reviewing the Contractor's final completion documents and performing final inspection to determine if the Contractor's Work is complete and in accordance with the RAWP.

• approving the preparation of the Record ("As-Built") Documents;

• preparation of the Final Remedial Engineering Report; and

• preparation of monthly progress reports, review of invoices to the Owner and budget tracking.

Site Superintendent

The Site Superintendent will be the lead site representative provided by the Remedial Engineer to ensure that the Work is performed in accordance with the approved Remedial Action submittals. He or she will be the main contact between Remedial Engineer and the Contractor regarding all on-Site Work, and will act as directed by and under the supervision of the project manager. The Site Superintendent will be on-Site when construction activities associated with the RA are being performed, and will oversee daily construction activities. The duties and responsibilities of the Site Superintendent related to the CQAPP will include:

• supervision of the field support staff;

• assuring that all field team members are familiar with the RAWP and HASP, as appropriate;

• overseeing sampling activities and ensuring that approved sampling and QA/QC methods and protocols are followed, and that pertinent sampling information is obtained, including the appropriate logging and documentation of these activities;
• overseeing the proper collection, preservation, packaging, documentation and chain of custody samples until released to another party for transport to the analytical laboratory;

• evaluating samples furnished at the Site by the Contractor;

• assisting the project manager in executing his responsibilities as outlined above.

• inspection of the Contractor's Work to determine if the Work is proceeding in accordance with the requirements of the RAWP;

• disapproval or rejection of the Contractor's Work which does not conform to the requirements of the RAWP;

• forwarding interpretations and clarifications of the RAWP from the Remedial Engineer to the Contractor;

• maintaining orderly files of Contract Documents, meeting minutes, submittals and other construction correspondence;

• maintaining a daily log and completing daily reports which will include but may not be limited to the following information:
  – a summary of work performed by the Contractor each day;
  – conditions at the Site;
  – instructions given to the Contractor;
  – field problems encountered and resolution;
  – all personnel on-Site including employees of the Contractor, subcontractor(s) and Remedial Engineer and visitors to the Site;
  – all equipment on-Site and equipment used that day;
  – all materials or equipment delivered to the Site;
  – preliminary (i.e., unverified) quantities of pay items placed;
  – field tests performed and results;
  – Quality of the Work including identification of any materials or Work which do not conform to the requirements of the Contract Documents;
  – References to surveys made that day, if any;
  – Unusual occurrences or accidents;
- Events that have an impact on the performance of the Work;
- Observation of Contractor's compliance with the HASP;
- The daily activities of each of the Remedial Engineer's own forces in terms of locations where the Contractor's Work was inspected, items of Work inspected, results of such inspections and similar data;
- Results of follow-up inspections of previously reported deficiencies; and
- Any other project-related events not identified above.

- Running Site construction progress meetings (once every two weeks) and preparation of meeting minutes;
- Evaluating samples furnished at the Site by the Contractor;
- Advising the Remedial Engineer's project manager if special inspections or testing are required and reviewing all certificates of inspections or testing required by the Contract Documents or other rules or laws;
- Reviewing Contractor's applications for payment with Contractor before forwarding to project manager;
- Performing final inspection to determine if the Contractor's Work is complete and in accordance with the Contract Documents;
- Interfacing with on-Site regulatory personnel; and
- Assisting the project manager in executing his responsibilities as outlined above.

The Site Superintendent will interface closely with the Remedial Engineer, and SSO, as well as on-Site regulatory personnel and the Remedial Design support team, as appropriate.

**Quality Assurance Officer**

The Quality Assurance Officer (QAO) reports to the Project Director and is responsible for the development and implementation of this QAPP. The project QAO holds a B.S. in Chemistry and has received their 40-hr OSHA and subsequent 8-hr OSHA refresher training. The QAO will review sampling procedures and certify that the data was collected and analyzed using the appropriate procedures. In addition, the QAO or their designee may conduct periodic field and sampling audits, interface with the analytical laboratory to make requests and resolve problems, and develop a project specific data usability report (DUSR). The QAO will also oversee
the data validator who will be responsible for auditing and validating all analytical data generated during the RA as described herein.
Remedial Engineer

The Remedial Engineer is a registered professional engineer licensed by the State of New York. The Remedial Engineer will have primary direct responsibility for implementation of the remedial program for the Site (NYSDEC BCA Index No. C203056-05-11 Site No. C203056). The Remedial Engineer will certify in the Final Engineering Report that the remedial activities were observed by qualified environmental professionals under [his/her] supervision and that the remediation requirements set forth in the Remedial Action Work Plan and any other relevant provisions of ECL 27-1419 have been achieved in full conformance with that Plan. Other Remedial Engineer certification requirements are listed later in this RAWP.

The Remedial Engineer will coordinate the work of other contractors and subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, emergency spill response services, import of back fill material, and management of waste transport and disposal. The Remedial Engineer will be responsible for all appropriate communication with NYSDEC and NYSDOH.

The Remedial Engineer will review all pre-remedial plans submitted by contractors for compliance with this Remedial Action Work Plan and will certify compliance in the Final Remediation Report.

The Remedial Engineer will provide the certifications listed in Section 10.1 in the Final Engineering Report.

Health and Safety Coordinator

The health and safety coordinator is responsible for:

- Administering and tracking the Site employee's health monitoring program and other mandated OSHA record keeping (OSHA 200 and 101 Forms);
- Implementation of the HASP prepared for the RA;
- Providing industrial hygiene/OSHA/safety guidelines for all appropriate Remedial Engineer activities (e.g., selection, maintenance, use of protective gear; use of dangerous equipment, etc.)
- Developing procedures that facilitate project planning and implementation; and
- Conducting all required training programs.
Site Safety Officer

The Remedial Engineer’s Site Safety Officer (SSO) will have the following duties:

- Ensure that the Remedial Engineer's field team members have completed the health and safety training required by the HASP;

- Ensure that the Contractor's field team members have submitted documentation confirming the completion of the health and safety training required by the HASP;

- Observe all construction activities to determine whether work at the Site is being conducted in accordance with the HASP;

- Perform dust monitoring and be responsible for the Contractor's health and safety where the potential exposure to chemical hazards exists;

- Oversee the performance of all Site perimeter air monitoring;

- Have authority to stop work if Site conditions exceed allowable limits (as identified in the HASP) and, as appropriate, will assume certain sampling responsibilities;

- Coordinate with the Owner’s Project Coordinator, the Remedial Engineer’s health and safety coordinator, project manager, and Site Superintendent, the Contractor’s superintendent, and the emergency responder, as appropriate in the event problems arise; and

- Coordinate with emergency response personnel;

- Maintain a daily log.

As described in the HASP, the SSO will oversee the performance of full time environmental monitoring, including particulate monitoring. The SSO will be responsible for the Contractor’s health and safety associated only with potential exposure to OSHA contaminants. All other guidelines and requirements of the HASP and OSHA (i.e., construction safety) must be implemented and performed by the Contractor. The SSO will not be responsible for full-time supervision of the Contractor's compliance with these construction safety requirements, but will notify the Contractor's site superintendent, Remedial Engineer’s project manager and Site Superintendent, and the Owner’s Project Coordinator if deficiencies are observed.
**Field Support Team**

The Remedial Engineer’s field support team will consist of construction inspectors, and field technicians as required by the Site Superintendent and SSO.

**Office Support Team**

The Remedial Engineer’s office support team will consist of the project engineer, data validator, staff engineer(s), word processing and drafting/CADD support as required by the project manager.

**Laboratory Subcontractor(s)**

The analytical laboratory subcontractor is responsible for supplying properly cleaned and prepared glassware and analyte-free water for field use, and for analysis of all samples collected during the implementation of the RA and for completion of chain-of-custody forms for all samples. The laboratory is also responsible for following analytical and quality control procedures outlined in this RAWP and for interfacing with the data validator to ensure data meets the RA data quality objectives.

### 3.2 OBSERVATION AND INSPECTION OF CONTRACTOR’S WORK

The Remedial Engineer is responsible for observing inspecting, and documenting the Work of the Remedial Contractor. In addition to the responsibilities stated for each member of the project oversight team, the Remedial Engineer’s responsibilities include:

- Observation and inspection of the Contractor's Work to determine if the Work is proceeding in accordance with the requirements of the Remedial Design Contract Documents;

- Disapproving or rejecting Work performed by the Contractor which does not conform to the requirements of the Contract Documents;

- Reviewing Shop Drawing submittals to ensure that materials and equipment to be provided by the Contractor meet the requirements of the Contract Documents and to determine acceptability of substitute materials proposed by the Contractor;

- Informing Contractor if special inspections or testing are required, overseeing the performance of special inspections or testing ordered by the PRP and, and reviewing all certificates of inspection or testing results required by the Contract Documents or other rules or laws;
• Observing Contractor's stabilization performance (if onsite stabilization is performed) and waste disposal characterization sampling and testing activities and ensuring that approved and/or specified methods are followed, and that all sampling and testing activities are logged and documented appropriately (refer to the RAWP.);

• Overseeing the Contractor’s coordination of off-Site transportation and disposal of all Site media;

• Issuing interpretations and clarifications of the Contract Documents (including field orders);

• Performing inspections to determine if Contractor's work meets the requirements for substantial completion in accordance with the Contract Documents;

• Reviewing Contractor's final completion documents and performing final inspection to determine if, and ensure that, Contractor's work is complete and conforms to the requirements of the Contract Documents; and

• Serving as liaison for the Owner with authorized regulatory personnel on all matters, including but not limited to, progress of Work, Contractor performance, regulatory sampling activity and/or disputes pertaining to the requirements of the Contract Documents and actual work.

The Remedial Engineer (except for its own activities and those of its subcontractors) will not have control of, and will not be responsible for, Contractor’s construction means, methods, sequences, or safety precautions and programs in connection with the work, for the acts or omissions of the Contractor, or for the failure of the Contractor to carry out work in accordance with the Contract Documents. However, the Remedial Engineer will observe and review completion of the project by the Contractor, will require the Contractor to conform to the requirements of the Contractor's Contract Documents and will report to the Owner any deviations by the Contractor, of which the Remedial Engineer becomes aware.

3.3 IMPLEMENTATION OF THE HEALTH AND SAFETY CONTINGENCY PLAN

The HASP conforms to the applicable Occupational Safety and Health Administration (OSHA) and NYSDEC requirements including, but not
limited to, 29 C.F.R. § 1910.120, and was prepared to ensure the protection of persons at and in the vicinity of the Site during remedial activities.

A SSO will be on Site at all times during remedial activities involving potentially contaminated media, who will ensure that the HASP is being followed by the Contractor and authorized on-Site personnel. The SSO will oversee the performance of Work by the Contractor when the potential exposure of on-Site personnel to OSHA contaminants exists. The SSO will perform monitoring to ensure that: (1) exposures of on-Site personnel to potential releases of contaminants generated by construction activities are minimized; and (2) airborne particulates containing Site related constituents are not released beyond the Site boundary as a result of Work activities at the Site. Refer to the RAWP and HASP for identification of specific responsibilities of the SSO.

The Contractor must adhere to all guidelines and requirements of the HASP and all other authorized personnel on-Site at all times. As described in the HASP, the SSO will oversee the performance of full time environmental monitoring, including particulate monitoring. The SSO will also monitor the Contractor’s compliance with their own Site Specific Health and Safety Plan associated only with potential exposure to OSHA contaminants. All other guidelines and requirements of the HASP and OSHA (i.e., construction safety) must be implemented and performed by the Contractor. The SSO will not be responsible for full-time supervision of the Contractor’s compliance with these construction safety requirements, but will notify the Contractor’s Site superintendent, Remedial Engineer’s project manager and RPR, if deficiencies are observed.

The Remedial Engineer will be authorized by the Owner to issue stop work orders, if in the Remedial Engineer’s opinion, the Contractor is violating the HASP, OSHA regulations, any other applicable regulations concerning safety, or is otherwise conducting work in an unsafe, unhealthy or environmentally unsound manner.

3.4 CONFIRMATORY SAMPLING AND MONITORING

Confirmatory Sampling and Monitoring is included in the RAWP. The RAWP addresses the sampling methods and analytical procedures to be used for confirmatory sampling of Site soil, and subsurface structures, as applicable, as well as quality assurance protocols to be followed for all sampling and analytical procedures.

The Remedial Engineer will perform all confirmatory sampling, monitoring and analytical work in accordance with the RAWP. The
Remedial Engineer, on behalf of the PRP, to perform the required analytical work for all samples, will retain a laboratory.

3.5 **PREPARATION OF DOCUMENTATION AND RECORD KEEPING**

This section identifies the documentation that will be prepared, and records that will be collected and maintained by the Remedial Engineer during implementation of the RA. The records will describe essential work elements such as methods of construction, daily activities and the quality and quantity of materials excavated or used and of the work performed. The specific types of records that the Remedial Engineer will prepare and/or maintain are:

- Daily logs (including safety logs);
- Submittal log;
- Material delivery records;
- Material shipment records;
- Survey records;
- Change orders;
- Accident reports;
- Miscellaneous documents; and
- Punch list.

The work associated with the preparation and/or maintenance of these records and documents is described in the following sections. The final format of the record keeping system will be selected before construction activities are initiated. All records will be available on-Site for review by NYSDEC during implementation of the RA.

**Daily Logs**

The Site Superintendent, assisted by members of the field support team, will maintain a daily log that will include the following information:

- Conditions at the Site;
- All personnel on Site, including employees of Contractor, subcontractor(s), Remedial Engineer, and NYSDEC and other Government Agencies representatives and regulatory oversight contractors;
• Visitors to the Site;

• All equipment on Site and equipment used that day;

• All materials or equipment delivered to the Site;

• References to and documentation of surveys and field tests made that day, if any;

• Instructions given to the Contractor;

• Summary of work performed by Contractor each day, including progress of Site remediation activities (e.g., areas of excavation completed);

• Approximate quantities of pay items (e.g., volume of Soil excavated, and transported);

• The daily activities of the Remedial Engineer’s on-Site personnel including identification of locations where the Contractor’ Work was inspected, items of Work inspected, results of such inspections and similar data;

• Identification of any materials or work which does not conform to requirements of the Contract Documents;

• Unusual occurrences, accidents and other events that have an impact on the performance of the work;

• Field problems encountered and resolution;

• Results of follow-up inspections of previously reported deficiencies; and

• Any other pertinent daily project-related events not identified above.

The SSO will maintain a separate daily site safety log for health and safety activities. The daily site safety log will include:

• Conditions at the Site;

• Topic of Site safety tailgate meeting, if any;

• Details of daily safety inspections;

• Work area and perimeter air monitoring data; and
• Personal protective equipment information.

The daily logs will be kept in the field office/trailer and no entries will be deleted. The RPR and SSO will keep their daily logs current and will sign and date each day’s log, and initial each page. At the completion of the construction phase, the logs will be incorporated into the project files.

The Contractor will also be required to prepare a daily log for submission to the Remedial Engineer at the end of each day. The log will summarize the work completed each day and will identify the number of workers on-site working for the Contractor and each subcontractor (broken down by craft), and the major equipment items on Site. The Contractor’s daily report will also identify dates of commencement and completion of all aspects of the work, and will be maintained at the Site.

3.5.1 Submittal Log

The Remedial Engineer will have the responsibility for performing and coordinating the review of all submittals (e.g., work plans, Shop Drawings, etc.). The Remedial Engineer will receive, log, review, and distribute all Contractor submittals required by the Specifications. A submittal log will be established and maintained using a spreadsheet program such as Excel. All submittals will be assigned a tracking number based on the Specification reference. The submittal log will include a description of the submittal and will identify the submittal review status, key milestone dates (e.g., received, reviewed, due and return dates), identification of the reviewer(s) and any appropriate comments/remarks. A current submittal log will be available for review at the Site and will also be distributed with the monthly progress report.

3.5.2 Material Delivery Records

The Contractor will be required to submit copies of material delivery records to the Remedial Engineer for all materials delivered to the Site. The Remedial Engineer will maintain a file of these records and, if the specifications require that the material to be used on the Project be certified by an outside testing laboratory prior to delivery, the Contractor will be required to submit this certification to the Remedial Engineer before the material is delivered to the Site. The Remedial Engineer will keep this information on file at the Site.

3.5.3 Transportation and Disposal

Copies of all documents required for transport and disposal of materials off-Site will be maintained on file at the Site. These documents will include hazardous manifest and non-hazardous bills of ladings, and "Land Disposal Notification and Certification Forms" (LDR Forms) if
necessary. The Remedial Engineer will compare the quantity of materials shipped off-Site to the quantities identified in the Contractor’s applications for payment. Copies of each manifest or bill of lading and any LDR form will be available for review by NYSDEC at the Site.

3.5.4 Survey Records

The contract documents require that the Contractor employ a New York licensed surveyor who will lay out the locations of all Work and who will perform all surveying required by the Contract Documents. Use of a licensed surveyor will ensure that the Contractor has conducted all Work items to the limits established on the Drawings. Surveys are also necessary to determine the quantity of Work performed by the Contractor, and to document the final location of all Work. Survey information will be used for payment purposes and preparation of record drawings.

The performance of all surveys will be the responsibility of the Contractor. The Remedial Engineer will maintain copies of all surveys conducted during the project. The Contractor will be required to show all applicable survey information on the record drawings to be submitted at the end of the project.

3.5.5 Changes In Work

Written Amendment, Work Change Directive, or Change Order may authorize addition, deletion or revision in the Contract Documents, scope of work, or an adjustment in the contract price or times. Management of such changes will be the responsibility of the Remedial Engineer. Change orders requested or proposed by the Contractor will be reviewed to determine if it is additional work which is not included in the scope of work of the Contract Documents. Changes in work will only be considered as a result of one of the following criteria:

- Differing Site condition;
- Error or omission in plans or specifications;
- Change instituted by regulatory agency or the PRP;
- Field emergency; and
- Other factors affecting time of completion not under control of Contractor.

The Remedial Engineer will provide recommendations on change order requests by the Contractor to the Owner. All change orders issued by the PRP will be consistent with the scope of the remedy selected in the ROD.
In the event a proposed change order covers work outside the scope of the remedy selected in the ROD, it will also be subject to NYSDEC approval prior to authorization by the Owner. Copies of each change order will be forwarded to the Owner and will be available for review by NYSDEC upon request.

3.5.6 Accident Reports

NYSDEC’s on-Site representative will be immediately notified of any accidents at the Site. If the NYSDEC, or NYSDEC’s designated representative, is not on-Site, NYSDEC will be notified by telephone.

Accident reports will be generated by the Remedial Engineer as soon as possible and no later than one week after an incident resulting in injury to humans or a release of contamination has occurred. Accident reports will contain a description of the injury or release, the current status of the situation and the steps taken, or planned to be taken, in response to the accident.

Copies of each injury related accident report will be forwarded to the PRP and will be available on-Site for review by NYSDEC. Accident reports regarding releases of potentially contaminated materials will be prepared and distributed in accordance with the "Notification Requirements" sections of the Contingency Plan.

3.5.7 Punch List

When the Work is considered ready for its intended use (approximate 95 percent of the Work has been completed), the project will be considered substantially complete, and the Remedial Engineer will develop a punch list. The punch list will be used to identify all deficiencies in work items that must be corrected or work items that must be completed before the project is complete and the final payment can be made to the Contractor.

The Contractor will be given a specific length of time to complete or correct the items. At the end of this period, the Remedial Engineer will inspect the work in general and the punch list items in particular. If all items are acceptable, the Remedial Engineer will approve final payment and closeout of the Contract. If there are still items that are deficient or outstanding, the Remedial Engineer will generate an updated punch list and the process repeated until all work items are completed in accordance with the Contract Documents. Copies of each punch list will be forwarded to the Owner and will be available on-Site for review by NYSDEC.

3.5.8 Miscellaneous Documents
Copies of meeting minutes, shop drawings, submittals, applications for payment and other construction documents and correspondence will be maintained in orderly files on-Site.
4.0 PREPARATION OF DOCUMENTATION FOR NYSDEC

In addition to the documentation and records which will be prepared and/or collected and maintained by the Remedial Engineer during construction, the RAWP requires that certain construction related reports or documents be prepared and submitted to NYSDEC. These documents include:

- Written identification of all proposed contractors for the Remedial Action;
- Written notification of any off-Site shipment of waste material to an out-of-state waste management facility;
- Progress reports;
- A Final Engineering Report.

4.1 OFF-SITE SHIPMENT OF WASTES

The identity and location (State) of the disposal facilities that will receive materials from the Site will be determined following the award of the Contract. NYSDEC will be provided with this information as soon as practicable after the award of the Contract and before any Site media are shipped off-Site.

In accordance with the Order, prior to any off-Site shipment of Hazardous Substances from the Site to an out-of-state waste management facility, written notification will be provided to the appropriate state environmental official in the receiving facility’s state and to the NYSDEC Remedial Project Manager of such shipment of Hazardous Substances.

The above referenced notification will be provided as soon as practicable after the award of the Contract, but in no case less than fourteen (14) days before the Hazardous Substances are actually shipped. This notification requirement does not apply to any off-Site shipments when the total volume of all such shipments does not exceed 10 cubic yards.

The following information will be included in the written notification, where available:

- The name and location of the facility to which the Hazardous Substances is to be shipped;
- The type and quantity of the Hazardous Substances to be shipped;
• The expected schedule for the shipment of the Hazardous Substances; and

• The method of transportation.

The state in which the planned receiving facility is located will be notified of major changes in the shipment plan, such as a decision to ship the waste material to another facility within the same state, or to a facility in another state, or of a significant change in volume or shipment schedule.

4.2 PROGRESS REPORTS

Written progress reports will be submitted monthly to NYSDEC. Progress reports will continue to be submitted on a monthly basis in the same format, during construction activities until NYSDEC notifies the Owner otherwise.

4.3 FINAL ENGINEERING REPORT

Following completion of the RA and attainment of the performance standards, a Final Engineering Report (FER) will be prepared and submitted to NYSDEC. The report will be submitted to NYSDEC for approval within 45 working days of NYSDEC’s determination that the Remedial Action is complete.

The purpose of the report is to document the activities that occurred to implement the Remedial Action selected for the Site. The FER provides documentation that the Remedial Action has met its objectives (Performance Standards) as well as summary information for subsequent inclusion in any close out reports to be prepared by NYSDEC.

The elements that will be included in the FER include:

• Introduction;
• Chronology;
• Performance standards and construction quality control;
• Construction activities;
• Final inspection;
• Certification that remedy is operational and functional;
• Summary of Project costs
It is anticipated that the following appendices will also be incorporated into the FER:

- Monthly progress reports;
- Minutes of project progress meetings;
- Key project memoranda;
- Results of sampling activities conducted during construction; and
- Record ("As-Built") drawings.

In the Final Engineering Report, a registered professional engineer and a representative of Owner will certify that the Remedial Action has been completed in full satisfaction of the requirements of the BCP.

The FER will include record drawings signed and stamped by a registered professional engineer. The record drawings will contain all recorded construction information, and will reflect changes to the final engineering Drawings and Specifications in order to respond to actual field conditions, or other modifications that were made during the remediation phase of the project. The record drawings will show all applicable survey information generated during construction of the Remedial Design.
5.0 ROLE OF REGULATORY AGENCIES

NYSDEC and its representatives will have access to the Site at all times. It is anticipated that there will be a NYSDEC representative on-Site during certain phases of the remedial action.

All authorized visitors to the Site must be thoroughly familiar with the HASP and will have full responsibility for compliance with the HASP. All authorized visitors will be required to sign a Site entry log as well as an acknowledgment that they have read the HASP.

As described in the HASP, the SSO will oversee the performance of full time environmental monitoring, including particulate monitoring. The SSO will be responsible for all authorized visitors’ health and safety associated only with potential exposure to OSHA contaminants. All other guidelines and requirements of the HASP and OSHA (i.e., construction safety) are the responsibility of the visitor. The Remedial Engineer will not be responsible for full-time supervision of authorized visitors. The RPR and/or SSO will document any non-compliant incidents in the daily logs and will notify the Remedial Engineer’s project manager and Site Superintendent, and Owner’s Project Coordinator of any such incidents.
6.0 REMEDIAL ACTION CONSTRUCTION SCHEDULE

The contractor will be required to submit a construction schedule as part of the submittal package. A preliminary schedule is presented as Figure 12 of the RAWP to show the approximate duration of the project.

The number of days within which, or the dates by which, the Work is to be substantially completed and also completed and ready for final payment will be set forth in the Agreement between the Owner and the selected Contractor.
Appendix H

Soil/Materials Management Plan (SoMP)
Soil/Materials Management Plan
Webster Avenue
Bronx, New York

February 2015

Prepared for:
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1.0 INTRODUCTION AND PURPOSE

This Soil Management Plan (the “SoMP”) establishes policies and procedures for the management of soils during remedial work at the Webster Avenue site.

This SoMP identifies responsibilities, defines the activities to assess intrusive projects and specifies how to respond to environmental conditions encountered during these intrusive activities.

A schematic of the SoMP procedure is provided as Figure 1. The SoMP is intended to be a guide for the Owner, Owner’s consultant, and contractors involved in performing intrusive activities, specifically how to approach, soil removal, manage waste and ready the site for the proposed development.
2.0 DEFINITION OF KEY TERMS

The following terms are defined as follows:

Intrusive Soil Activities – Any scope of work that involves the penetration of ground that encounters soil that subsequently results in one or more of the following activities: 1) soil handling; 2) stockpiling; 3) loading or unloading; 4) transport; 5) relocation; and/or, 6) off-site disposition (disposal or reuse) which can result in direct exposure.

Suspect Soil – Soil that exhibits visual discoloration, olfactory (odor) evidence, elevated real time readings using a photo ionization detector (PID or equivalent) and/or evidence of debris or waste disposal.

Discolored/Odorous Soil – Soil that is distinguishable from surrounding soils due to contrasts in color or hue and/or may also exhibit an odor that is distinguishable from ambient conditions.

Elevated PID (or equivalent) readings – Real time PID readings that exceed background, upwind concentrations and are sustained for at least one (1) minute.

Contaminated Soil – soils which contain constituents at concentrations above 6 NYCRR Part 375 guideline levels.

Clean Soil - soils which do not contain constituents at concentrations above 6 NYCRR Part 375 guideline levels.

Relocated Soil – non-hazardous soils which contain constituents at concentrations above 6 NYCRR Part 375 guideline levels or at background levels that the NYSDEC will allow to be placed in another onsite location under established regulatory restrictions.
3.0 RESPONSIBILITIES

Appropriate soil management responsibilities for intrusive soil activities at the Site will belong to the Owner or the Contractor performing the work. The responsibilities for each are identified below:

3.1 OWNER RESPONSIBILITIES

- Project initiation and initial project location determination;
- Notifying NYSDEC (if required) if project area is within an area of known contaminated soil or in a new area that contains contaminated soil;
- Provide, and hold the Contractor accountable for compliance with general excavation requirements (SoMP); and
- Add institutional controls in the form of an environmental easement at the conclusion of project if soils remain in place above the unrestricted use criteria.

3.2 CONTRACTOR RESPONSIBILITIES

- Implement general excavation guidelines and alert Owner if additional suspect or contaminated soil is encountered;
- Implement the SoMP in a manner that conforms to the requirements set forth herein;
- Coordinate the staging, placement or removal of excavated, contaminated soil; and

3.3 OWNER’S CONSULTANT RESPONSIBILITIES

- Conduct testing as appropriate of soil excavated from areas of contaminated or suspect soil and compare to 6 NYCRR Part 375 unrestricted use criteria to determine if the remedial goals have been met and whether or not excavated soil can be reused on the site.
4.0 SOIL/MATERIALS MANAGEMENT PLAN

4.1 SOIL SCREENING METHODS

Visual, olfactory and PID soil screening and assessment will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material (Residual Contamination Zone). Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during the remedy and during development phase, such as excavations for foundations and utility work, prior to issuance of the COC.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. This information will be provided on maps in the Final Engineering Report.

Screening will be performed by qualified environmental professionals. Resumes will be provided for all personnel responsible for field screening (i.e. those representing the Remedial Engineer) of invasive work for unknown contaminant sources during remediation and development work.

4.2 STOCKPILE METHODS

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Soil stockpiles will be continuously encircled with silt fences. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Water will be available on-site at suitable supply and pressure for use in dust control.
4.3 MATERIALS EXCAVATION AND LOAD OUT

The Remediation Engineer or a qualified environmental professional under his/her supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The Applicant and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan. The Remediation Engineer will be responsible for inspecting the contractors’ execution of the work performed under this plan and notifying the owner of deficiencies. The owner will be responsible for stopping work if deficiencies are not corrected in a timely fashion.

The presence of utilities and easements on the Site has been investigated by the Remedial Engineer. It has been determined that no impediment to the planned work under this Remedial Action Work Plan is posed by utilities or easements on the Site.

Loaded vehicles leaving the Site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-Site. The Remediation Engineer will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the Site until the remedial construction is complete.

Locations where vehicles enter or exit the Site shall be inspected daily for evidence of off-Site sediment tracking.

The Contractor will be responsible for ensuring that all egress points for truck and equipment transport from the Site will be clean of dirt and other materials derived from the Site during Site remediation and development. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

The Owner will ensure that Site development activities will not interfere with, or otherwise impair or compromise, remedial activities proposed in the Remedial Action Work Plan.

Each hotspot and structure to be remediated (USTs, vaults and associated piping, transformers, etc.) will be removed and end-point remedial
performance sampling completed before excavations related to Site development commence proximal to the hotspot or structure.

Development-related grading cuts and fills will not be performed without NYSDEC approval and will not interfere with, or otherwise impair or compromise, the performance of remediation required by this plan. Mechanical processing of historical fill and contaminated soil on-Site is prohibited.

All primary contaminant sources (including but not limited to tanks and hotspots) identified during Site Characterization, Remedial Investigation, and Remedial Action will be surveyed by a surveyor licensed to practice in the State of New York. The survey information will be shown on maps to be reported in the Final Engineering Report (FER).

4.4 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

All trucks loaded with Site materials will exit the vicinity of the Site using only these approved truck routes. Truck transport routes are as follows:

For Trucks Heading East/North:
Head southwest 0.2 miles on Webster Avenue. Turn left onto East Tremont Avenue. In 0.3 miles, turn right onto 3rd Avenue. In 0.2 miles turn left onto Cross Bronx Expressway Service Road and take the ramp onto I-95 North.

For Trucks Heading West/South:
Head southwest 0.4 miles on Webster Avenue towards East 178th Street Head and turn right onto Ittner Place. Take interstate 95 South/Cross Bronx Expressway ramp to US 1 South/George Washington Bridge. Merge onto I-95 South/US 1 South.

Proposed in-bound and out-bound truck routes to the Site are shown in Figure 15 in the RAWP. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-Site queuing of trucks entering the facility; (d) limiting total distance to major
highways; (e) promoting safety in access to highways; and (f) overall safety in transport.
Trucks will be prohibited from stopping and idling in the neighborhood outside the project Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during Site remediation and development.

Queuing of trucks will be performed on-Site in order to minimize off-Site disturbance. Off-Site queuing will be prohibited.

Material transported by trucks exiting the Site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be washed prior to leaving the Site. Truck wash waters will be collected and disposed of off-Site in an appropriate manner.

4.5 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the Site will be treated as contaminated and regulated material and will be disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this Site is proposed for unregulated disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to NYSDEC’s Project Manager. Unregulated off-Site management of materials from this Site is prohibited without formal NYSDEC approval.

Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

The following documentation will be obtained and reported by the Remedial Engineer for each disposal location used in this project to fully demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter from the Remedial Engineer or BCP Applicant to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.
(including Site Characterization data); and (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These co-documents will be included in the Final Engineering Report.

Non-hazardous historic fill and contaminated soils taken off-Site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Historical fill and contaminated soils from the Site are prohibited from being disposed at Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).

Soils that are contaminated but non-hazardous and are being removed from the Site are considered by the Division of Solid & Hazardous Materials (DSHM) in NYSDEC to be Construction and Demolition (C/D) materials with contamination not typical of virgin soils. These soils may be sent to a permitted Part 360 landfill. They may be sent to a permitted C/D processing facility without permit modifications only upon prior notification of NYSDEC Region 2 DSHM. This material is prohibited from being sent or redirected to a Part 360-16 Registration Facility. In this case, as dictated by DSHM, special procedures will include, at a minimum, a letter to the C/D facility that provides a detailed explanation that the material is derived from a DER remediation Site, that the soil material is contaminated and that it must not be redirected to on-Site or off-Site Soil Recycling Facilities. The letter will provide the project identity and the name and phone number of the Remedial Engineer. The letter will include as an attachment a summary of all chemical data for the material being transported.

The Final Engineering Report will include an accounting of the destination of all material removed from the Site during this Remedial Action, including excavated soil, contaminated soil, historic fill, solid waste, and hazardous waste, non-regulated material, and fluids. Documentation associated with disposal of all material must also include records and approvals for receipt of the material. This information will also be presented in a tabular form in the FER.

Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the Final Engineering Report.

Hazardous wastes derived from on-Site will be stored, transported, and disposed of in full compliance with applicable local, State, and Federal regulations.
Appropriately licensed haulers will be used for material removed from this Site and will be in full compliance with all applicable local, State and Federal regulations.

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits utilizing normal regulatory standards of care. Sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the FER. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

4.6 MATERIALS REUSE ON-SITE

Currently there are no plans to reuse any excavated material on site. If there are any changes to this plan the chemical criteria for on-Site reuse of material will be submitted for approved by NYSDEC. The Remedial Engineer will ensure that procedures defined for materials reuse in this RAWWP are followed and that unacceptable material will not remain on-Site.

Acceptable demolition material proposed for reuse on-Site, if any, will be sampled for asbestos.

Concrete crushing or processing on-Site is prohibited.

Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the Site is prohibited for reuse on-Site. Contaminated on-Site material, including historic fill and contaminated soil, removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

4.7 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including dewatering fluids and truck wash, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Liquids discharged into the New York City sewer system will be addressed through approval by NYCDEP. Dewatered fluids will not be recharged back to the land surface or subsurface of the Site.

4.8 DEMARCATION
After the completion of soil removal and any other invasive remedial activities and prior to backfilling, a land survey will be performed by a New York State licensed surveyor. The survey will define the depth of excavation and top elevation of residual contaminated soils. A physical demarcation layer, consisting of orange snow fencing material or equivalent material will be placed on this surface to provide a visual reference. This demarcation layer will constitute the top of the ‘Residuals Management Zone’, the zone that requires adherence to special conditions for disturbance of contaminated residual soils defined in the Site Management Plan. The survey will measure the grade covered by the demarcation layer before the placement of cover soils, pavement and sub-soils, structures, or other materials. This survey and the demarcation layer placed on this grade surface will constitute the physical and written record of the upper surface of the ‘Residuals Management Zone’ in the Site Management Plan. A map showing the survey results will be included in the Final Remediation Report and the Site Management Plan. A similar survey will be prepared following placement of clean fill material to document placement of a two-foot cover.

4.9 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the Site will be approved by the Remedial Engineer and will be in compliance with provisions in this RAWP prior to receipt at the Site.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are listed in 6 NYCRR Part 375 Table 375-6.8(a): the lower of the PGWSCO and RRSCO (as summarized in DER-10 Appendix 5 and following the sampling frequency required in DER-10 Table 5.4(e)10 – copies of these tables are provided in Attachment 1 of this appendix. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved Remedial Action Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

Soils that meet ‘exempt’ fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this Remedial Action Work Plan should be construed as approval for this purpose.
Solid waste will not be imported onto the Site.

Trucks entering the Site with imported soils will be securely covered with tight fitting covers and fill materials stockpiled onsite will be protected from storm water erosion until installed.

4.10 STORMWATER POLLUTION PREVENTION

This section addresses the requirements of New York State Storm-Water Management Regulations including physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of Site soils, via wind or water. All work conducted under this Work Plan shall utilize erosion and sediment controls that are in conformance with requirements presented in the New York State Standards and Specifications for Soil Erosion and Sediment Control.

In general, the Contractor shall take all necessary measures to control erosion and sedimentation until the Site is restored and remedial activities and construction are complete. All soil erosion and sediment control practices shall be installed prior to any earth disturbance activities, and maintained until permanent protection is established in accordance to New York City and the NYS Standards and Specifications for erosion and sediment control. The Site shall at all times be graded and maintained such that all stormwater run-off is diverted to onsite excavations (where impacts to remedial and/or construction activities allow) or soil erosion and sediment control facilities such as catch basins, sediment basins or allowable discharge points (permitted sewer). At a minimum, silt fence shall be installed at the perimeter of the work area, prior to beginning earthwork activities. Hay bales and/or silt fence shall be placed at locations downgradient of earth work areas, to prevent soil from migrating to undisturbed areas of the Site.

Any disturbed area that will be left exposed for more than 30 days and not subject to construction traffic shall immediately receive a cover material. Exposed areas shall be limited to five (5) acres at any given time unless work in areas over this amount will be ongoing and controls have been proven to control stormwater at the site.

Inspection of temporary erosion control measures by the Contractor shall be frequent, and repair or replacement shall be made promptly and when directed by Department or Department’s Representative. If Contractor’s Work interferes with or requires relocation of any temporary erosion
control devices, the Contractor shall make all required changes and
relocations to the devices as needed or as directed by the Engineer.

At the conclusion of Work, no areas shall be left uncontrolled and shall be
covered or maintained by viable vegetative and/or protective stone
and/or geotechnical cover.

4.11 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant
sources are found during on-Site remedial excavation or development
related construction, sampling will be performed on product, sediment
and surrounding soils, etc. Chemical analytical work will be for full scan
parameters (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides
and PCBs). These analyses will not be limited to STARS parameters where
tanks are identified without prior approval by NYSDEC. Analyses will not
be otherwise limited without NYSDEC approval.

Identification of unknown or unexpected contaminated media identified
by screening during invasive Site work will be promptly communicated
by phone to NYSDEC’s Project Manager. These findings will be also
included in daily and periodic electronic media reports.

4.12 ODOR, DUST AND NUISANCE CONTROL PLAN

4.12.1 Odor Control Plan

Specific odor control methods to be used on a routine basis will include
limiting the area of open excavations and shrouding open excavations
with tarps or other covers when necessary. If nuisance odors are
identified, work will be halted and the source of odors will be identified
and corrected. Work will not resume until all nuisance odors have been
abated. NYSDEC and NYSDOH will be notified of all odor complaints
and of all other complaints about the project. Implementation of all odor
controls, including the halt of work, will be the responsibility of the
Owner’s Remediation Engineer, who is responsible for certifying the Final
Engineering Report.

All necessary means will be employed to prevent on- and off-Site
nuisances. At a minimum, procedures will include: (a) limiting the area of
open excavations; (b) shrouding open excavations with tarps and other
covers; and (c) using foams to cover exposed odorous soils. If odors
develop and cannot be otherwise controlled, additional means to
eliminate odor nuisances will include: (d) direct load-out of soils to trucks
for off-Site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-Site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

4.12.2 Dust Control Plan

Dust suppression will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-Site roads will be limited in total area to minimize the area required for water truck sprinkling.

4.12.3 Other Nuisances

A plan for rodent control will be developed and utilized by the contractor prior to and during Site clearing and Site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work and will conform, at a minimum, to NYCDEP noise control standards.
5.0 CONTRACTOR HEALTH AND SAFETY GUIDELINES

The Contractor performing soil intrusive activities shall perform all work in accordance with local, New York State, and federal regulations. Since the concentrations of constituents in subsurface soil are highly variable across the Site, precautions must be taken during all excavation activities and the Contractor is obliged to adhere to all applicable regulations that pertain to the planned intrusive activities. The Contractor must develop a Health & Safety Plan (HASP)¹ to cover all intrusive activities. At a minimum this HASP must contain the following:

- Potential hazard identification;
- Work zone monitoring (if required);
- Worker personal protective equipment (PPE - e.g. gloves, booties, and coveralls, etc.);

5.1 EMERGENCY EXCAVATIONS

When excavations must be performed on an emergency basis (e.g. to repair a water main break) in an area subject to this protocol, soil removal from such excavations must be handled as follows:

1) The excavated soil must be placed in either containers (drums) provided by chemical or waste operators or in a pile adjacent to the excavation. Contractor must utilize HASP requirements for known contaminated soils unless proven otherwise.

2) Soil stored in a pile must be placed on top of, and covered by, sheets of seamless polyethylene to prevent erosion or runoff from the pile.

3) The applicable Owner’s representative shall be contacted following an emergency excavation to initiate implementation of this SoMP protocol.

4) All records of the emergency action shall be maintained in compliance with all federal, state and local regulations. These records shall include, but not be limited to, quantity, soil quality and disposition of soil.

¹ 29 Code of Federal Regulations (CFR) 1910.120 and other relevant OSHA regulations applicable to excavation activities
Figure 1 - Process Outline: Soil Management Procedure

1. Proposed Intrusive Excavation Project
   - Known AOC? (Yes/No)
     - Yes: Notice Contractor of SMP
     - No: Provide Contractor with General Excavation Guidelines

2. Is Soil Suspect or Contaminated? (Yes/No)
   - Yes: Perform Testing
     - Soil Contains Constituents > Cleanup Levels
       - Implement HASP
       - Stockpile/Profiling
       - Off-Site Disposal
       - Relocation within AOC
       - Clean Backfill
   - No: Proceed with Excavation

3. Oversees Excavated Pursuant to Soil Management Plan
   - Soil Management, Segregation & Stockpiling

Updated 04/05/2012
Attachment 1
Appendix 5
Allowable Constituent Levels for Imported Fill or Soil
Subdivision 5.4(e)

Source: This table is derived from soil cleanup objective (SCO) tables in 6 NYCRR 375. Table 375-6.8(a) is the source for unrestricted use and Table 375-6.8(b) is the source for restricted use.

Note: For constituents not included in this table, refer to the contaminant for supplemental soil cleanup objectives (SSCOs) in the Commissioner Policy on Soil Cleanup Guidance. If an SSCO is not provided for a constituent, contact the DER PM to determine a site-specific level.

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Unrestricted Use</th>
<th>Residential Use</th>
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### Volatile Organic Compounds (continued)

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All concentrations are in parts per million (ppm)

NS = Not Specified

Footnotes:

1. The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the specific SCO for Hexavalent Chromium.
2. The SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.
3. For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.
4. This SCO is derived from data on mixed isomers of BHC.
Table 5.4(e)10
Recommended Number of Soil Samples for Soil Imported To or Exported From a Site

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<th>SVOCs, Inorganics &amp; PCBs/Pesticides</th>
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<td>100-200</td>
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<td>800-1000</td>
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<tr>
<td>&gt;1000</td>
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</table>

Add an additional 2 VOC and 1 composite for each additional 1000 Cubic yards or consult with DER
Appendix I

Remedial Cost Estimate
## Appendix J

### Remedial Activity Costs

1960-1982 Webster Avenue, Bronx, New York

### Track 2 Restricted Residential Cleanup

<table>
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<th>Description</th>
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<th>Cost Unit</th>
<th>Amount</th>
<th>Total</th>
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### Operating Costs

- **Discount Rate = 3.25%**

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- **PRESENT WORTH OVER 30 YEARS** $156,163
- **PRESENT WORTH OVER 30 YEARS** $0

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<tr>
<td>ESTIMATED TOTAL PROJECT COST</td>
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</table>

Soil excavation is assumed 8 ft over entire site 59,292 ft² x 8 ft = 17,568 yd³ to achieve unrestricted use soil cleanup objectives (SCO).

### Notes

- Soil excavation is 2 ft over entire site 59,292 ft² x 2 ft = 4,392 yd³ plus footings for building (from 2-10 ft) which are to be slab on grade: Park Ave (907 ft) + East 178th St (467 ft) = 1369 ft x (10-2) ft deep x 4 ft wide = 1623 yd³
- Discount rate of 3.25% obtained from following link (August 2014)


8/25/2014
Appendix J

Product Specs and Cut Sheets
SECTION 071326

SHEET MEMBRANE WATERPROOFING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

1.2 SECTION INCLUDES

A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the sheet membrane waterproofing as shown on the drawings and/or specified herein, including, but not necessarily limited to, the following:

1. Sheet membrane waterproofing for underslab conditions.
2. Sheet membrane waterproofing for foundation wall surfaces.

1.3 RELATED SECTIONS

A. Concrete - Section 033000.
B. Earthwork - Section 312000.

1.4 SUBMITTALS

A. Shop Drawings: Typical installation details, showing details at flashings, at terminations, at joints, at intersection of horizontal and vertical surfaces, and at penetrations in membrane system.

B. Samples - Submit

1. Membrane, 6" x 6" samples of each membrane.
2. 6" x 6" sample of flashing.
3. 6" x 6" sample of drainage board.

C. Manufacturer's Literature: Submit manufacturer's technical, safety data sheets, and installation literature for all materials of this Section. Submit Independent Test data indicating that membrane meets properties specified herein.

D. General Contractor's Certification: Submit per Article 1.7.
1.5 STORAGE OF MATERIALS

A. All materials shall be stored in their original tightly sealed containers or unopened packages; shall be clearly labeled with the manufacturer's name, brand name and number, and batch number of the material with expiration date where appropriate.

B. Materials shall be stored in a neat and safe manner so as not to exceed the allowable live load of the storage area.

C. Material shall be stored out of the weather in a clean, dry area.

D. Liquid materials, such as adhesives, thinners and primers, shall be stored in areas away from sparks, open flames and excessive heat.

1.6 JOB CONDITIONS

A. No application of waterproofing shall commence or proceed during inclement weather, or the threat of imminent precipitation.

B. All surfaces to receive the system shall be thoroughly dry and free of dew or frost.

C. Materials shall be stored until time of mixing at temperatures above 60 deg. F. to maintain a consistency suitable for mixing. Do no work below 40 deg. F.

D. Prior to and during application, all dirt and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air, or similar methods.

E. Surfaces not designated to receive the system shall be properly masked or otherwise protected against accidental spillage or application of the material to those areas.

1.7 WARRANTY

A. The manufacturer of the waterproofing system executed under this Section warrants the waterproofing system to be watertight and free from defects in materials and workmanship for a period of ten (10) years from date of acceptance of this Contract, and that he, at his own expense, repair and/or replace all other work which may be damaged as a result of such defective work, and which becomes defective during the warranty period.

B. Contractor’s Two Year Workmanship Warranty: Provide a written guarantee for all work of this Section, stating that if, within two years after the Date of Substantial Completion of the Work, any of the work is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so. The guarantee shall state that the Contractor shall bear all costs incurred by the Owner, including reasonable attorney’s fees, to enforce compliance with the obligations of this Guarantee, and will replace any material or system that requires repeated maintenance or repair to function effectively. The obligation of this Guarantee shall run directly to the Owner, and may be enforced by the Owner against the Contractor, shall survive the termination of the Contract and shall not be limited by Conditions other than this Contract.
1.8 QUALITY ASSURANCE

A. Preinstallation Conference: Approximately 2 weeks prior to scheduled commencement of waterproofing installation, meet at Project site with Waterproofing Installer; preparer of substrate to receive waterproofing; installers of other work in and around waterproofing that must precede, follow, or penetrate waterproofing (including Mechanical and Electrical Installers as applicable); Architect; Owner; and waterproofing manufacturer's representative to review materials, procedures, schedules, and other requirements and conditions related to installing waterproofing.

B. Qualifications of Subcontractors

1. Subcontractors: All work of this Section shall be performed by a subcontractor who is approved by the manufacturer of the waterproofing material.

2. Qualifications of Subcontractors: Subcontractors shall submit evidence of being bona fide waterproofing subcontractors, for a period of not less than five (5) years, and that they are approved by the manufacturer of the waterproofing material for the installation of the manufacturer’s material in accordance with the requirements of this Section.

   a. Subcontractor shall submit a letter from manufacturer of waterproofing material stating that subcontractor is approved by the manufacturer for the application of the waterproofing systems specified and accepted for use on the Project.

   b. Letter shall certify that the subcontractor has previously and satisfactorily applied the waterproofing systems specified herein on jobs of similar size and scope, under manufacturer’s supervision.

   c. Letter shall be on manufacturer’s letterhead and shall be signed by an officer of the company, not by a local sales representative.

C. Manufacturer’s Representative/Contractor’s Certification

1. Representative of the waterproofing material manufacturer shall be required to provide field instructions and supervision for the installation of the waterproofing systems at the start of the work of this Section.

2. The manufacturer’s representative shall be required to make sure that the workmen for waterproofing systems on the site of the Project are fully instructed and trained in the handling and application of all the materials, and shall see that all the materials are correctly installed.

3. Upon completion of the Installation, submit to the Architect written certification that the representative of the manufacturer of the waterproofing material has supervised the work of this Section and that all materials were correctly installed.

1.9 PROTECTION

A. Against Loads: Protect work of this Section against concentrated loads and any other loads or equipment that would damage the materials or work.

B. Against Traffic: Do not permit traffic on horizontally installed work of this Section, except for workmen doing the work, during the installation, and after the installation.
until membrane systems are covered with protective boards or with the specified finishing materials.

C. Against Damage: Protect vertically installed work of this section from damage by reinforcing and placement.
   1. Take and maintain necessary preventive measures to protect work of this Section from damage until Project is accepted.
   2. Rejection of Damaged Work
      a. Damaged materials or work will be rejected.
      b. Rejected materials or work must be immediately removed and replaced with new materials.

1.10 FIELD QUALITY CONTROL

A. Construction Traffic:
   1. Limit construction traffic over completed membrane.
   2. General Contractor shall provide 1/2 in. plywood protection layer, where construction traffic is unavoidable.

B. Inform Architect in writing on a daily basis of any of the following events. State specific location of each occurrence.
   1. Buckling to the Waterproofing and other deformations as a result of ground water events.
   2. Leakage through the finished waterproofing installation.
   3. Damage by other trades.

C. Provide Manufacturer’s Representative’s report (prior to backfill) stating that the waterproofing has been inspected and is acceptable and eligible for manufacturer’s warranty.

PART 2 PRODUCTS

2.1 WATERPROOFING MEMBRANE

A. Trade names used herein for membrane waterproofing are those of W.R. Grace. Other acceptable manufacturers include Sika, Greenstreak, Carlisle Coatings and Waterproofing, Henry Co. and Polyguard provided manufacturers noted substitute their equivalent products.

B. For accessible foundation wall waterproofing, provide "Bituthene 4000" sheet waterproofing membrane, 60 mils thick, and "Bituthene Liquid Membrane," 60 mils thick, for flashing, as manufactured by W. R. Grace or approved equal noted above.

C. At underslab conditions, provide adhesive coated HDPE Composite Sheet "Bituthene Preprufe 300R" system by W. R. Grace & Co. or approved equal noted above.

411 East 178th Street
071326-4
Sheet Membrane Waterproofing
D. At blind side waterproof condition, provide adhesive coated HDPE Composite Sheet "Bituthene Preprufe 160R" system by W. R. Grace & Co. or approved equal noted above.

E. HDPE membrane shall have a protective layer to protect the membrane from the weather and U.V. for up to 30 days before casting concrete against it.

F. Bituthene “4000” Conditioner: Latex/water based primer specifically formulated to provide adhesion of Bituthene Waterproofing Membranes.
   1. If water based primer does not provide sufficient adhesion to substrate, substitute Bituthane Primer B-2 solvent based primer.

G. Bituthene Elastomeric Mastic: Rubberized asphalt base mastic.

H. Tape: Double sided synthetic adhesive tape equal to "Preprufe LT" and "HC."

I. Protection Board: 1/4" thick semi-rigid protection board, "Bituthene Asphaltic Hardboard."

J. Bituthene Liquid Membrane: Two-component 100% solids trowel grade asphalt modified urethane.

K. "Hydroduct 220" Drainage Board/Composite: Prefabricated dimpled polystyrene drainage core with a non-woven filter fabric on one side and a polymer film on the reverse side by W.R. Grace.
   1. At horizontal applications, use "Hydroduct 660" by W.R. Grace.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where membrane waterproofing is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work. Starting of work implies acceptance of substrate.

3.2 PREPARATION OF SURFACES TO RECEIVE WATERPROOFING

A. Conform to the requirements of Bituthene Techletter No. BTL 82-02, published by W. R. Grace if using W.R. Grace products.

B. Earth or crushed stone substrates shall be compacted to produce an even, sound substrate. Loose aggregate, sharp protrusions and standing water shall be removed.

C. Conform to the requirements of Bituthene Techletter No. BTL 13, published by W.R. Grace, for "Forming Systems for Use with the Preprufe 160R Membrane" if using W.R. Grace products.
3.3 INSTALLATION

A. General: Conform to recommendations and published specifications of the manufacturer including environmental requirements and preparation requirements to receive waterproofing.

B. Foundation Walls (Accessible Walls)

1. General: The membrane, when in place must withstand a minimum static ground water pressure of 150 feet.

2. Priming: Application of primer shall be limited to what can be covered with Bituthene Waterproofing Membrane in a given work day. Primed areas not covered by membrane during the work day will be reprimed. Apply primer by spray, roller or brush at a rate of 250 - 350 sq. ft. per gallon. Roller shall be natural material such as lamb's wool, having a nap of approximately one inch. Primer shall be applied to a clean, dry, frost-free and dust-free surface. Sufficient primer must be used on the day surface to condition it to a dust-free state suitable for the application of Bituthene Waterproofing Membranes.

   a. Bituthene 4000 Surface Conditioner should not be applied below 40 deg. F. on vertical surfaces. Allow primer to dry 30 minutes. Conditioner is considered dry when the substrate returns to its original color.

   b. Re-prime areas that become dusty or dirty prior to membrane installation.

3. Membrane Installation: Apply Bituthene Waterproofing Membrane vertically in sections of 8' in length or less. On higher walls apply two or more sections with the upper overlapping the lower by a least 2-1/2". Press all membrane in place with heavy hand pressure or rollers during application.

4. Sealing Edges: Bituthene Waterproofing Membrane shall be applied over the edge of the slab or over the top of the foundation or parapet wall. If the membranes are terminated on the vertical surface, a reglet or counter flashing may be used or the membrane may be terminated directly on the vertical surface by pressing very firmly to the wall. Press edges with a metal or hardwood tool such as a hammer or knife handle. Apply a troweled bead of Bituthene Mastic to all vertical and horizontal terminations. Bituthene Liquid Membrane can be used as an alternative method at the General Contractor's option.

5. Sealing Seams: All edges and end seams must be overlapped at least 2-1/2". Apply succeeding sheets with a minimum 2-1/2" overlap and stagger end laps. Roll or press the entire membrane firmly and completely as soon as possible. Patch misaligned or inadequately lapped seams with Bituthene Membrane. Slit any fish mouths, overlap the flaps, and repair with a patch of Bituthene and press or roll in place. The edges of the patch shall be sealed with a troweling of mastic. Laps within 12" of all corners shall be sealed with a troweling of mastic.

6. Corner Forming: Outside corners must be free of sharp edges. Inside corners shall receive a fillet formed with Liquid Membrane, latex modified cement mortar equal to Daraweld C made by Grace mixed with cement mortar or epoxy mortar. Do not use fiber or wood cants. One of two methods may be used for treating corners at the General Contractor's option:
a. Apply Bituthene Liquid Membrane 6” in each direction from the corner and form a fillet with a minimum 3/4” face.
b. Install an 11" minimum strip of Bituthene Membrane centered on the corner. Install Bituthene Membrane over the treated inside and outside corners.

7. Over waterproofing, apply drainage composite board by adhering board to cured membrane using tape or adhesive per manufacturer’s recommendations; lap all edges 4” and conform to the following:

a. Install drainage layer directly over the membrane. Start at the low points on the wall and shingle all laps to the flow of water.
b. Splice drainage panels together by butting longitudinal edges of adjacent sheets and peeling back fabric to expose the cores of the panels. Install precut “lock strips” consisting of 4 dimple x 5 dimple sections of the drainage panel centered on the joint between the panels and spaced every 10 dimples along the length of the joint. Snap dimples of “lock strip” to dimples of each panel and reattach fabric over the panel joint.
c. Cut the core of the drainage panels around penetrations, and cut an “X” in the filter fabric and tape the fabric to the sides of the penetration.
d. Cover all terminal edges of the drainage composite with an integral fabric flap by tucking the fabric around the edge of the core and adhering the fabric to the bottom of the core.

3.4 INSTALLATION OF WATERPROOFING FOR BLINDSIDE WALLS AND BELOW GRADE UNDERSLAB WATERPROOFING

A. General: Install adhesive coated HDPE composite sheet according to waterproofing manufacturer's written instructions.

1. Install drainage layer directly over the membrane. Start at the low points on the wall and shingle all laps to the flow of water.

2. Splice drainage panels together by butting longitudinal edges of adjacent sheets and peeling back fabric to expose the cores of the panels. Install precut “lock strips” consisting of 4 dimple x 5 dimple sections of the drainage panel centered on the joint between the panels and spaced every 10 dimples along the length of the joint. Snap dimples of “lock strip” to dimples of each panel and reattach fabric over the panel joint.

3. Cut the core of the drainage panels around penetrations, and cut an “X” in the filter fabric and tape the fabric to the sides of the penetration.

4. Cover all terminal edges of the drainage composite with an integral fabric flap by tucking the fabric around the edge of the core and adhering the fabric to the bottom of the core.

B. Preparation

1. Surfaces to receive blind side membranes must be smooth and sound, with no gaps or voids in excess of 1/2 in. Earth and stone substrates must be compacted to produce an even, solid substrate. If required by membrane manufacturer, provide an additional layer of underlayment protection board over sharp or angular stone
substrates. Surfaces to receive waterproofing shall be thoroughly dry and free of
moisture.

2. General: Comply with manufacturer's instructions for preparing surface including
joint or crack treatment.

3. Apply primer to substrate surfaces at rate recommended by manufacturer of
primary waterproofing materials. Prime only area that will be covered by
waterproofing membrane in same working day. Reprime areas not covered by
waterproofing membrane within 24 hrs.

C. Wall Applications

1. Refer to manufacturer’s literature for complete installation instructions but not
limited to the following:

   a. Apply Hydroduct 220 Drainage Composite to a point 6" below grade line.
   Fasten Hydroduct 220 to the adjacent buildings foundation wall or soil
   retention system.

   b. Peel back bottom flap of filter fabric and place core behind discharge pipe.
   Wrap loose filter fabric over and around discharge pipe. Tuck excess filter
   fabric behind pipe. Fold excess filter fabric at top termination down between
   drainage composite and membrane.

   c. Apply membrane with the HDPE film facing the soil retention system or
   adjacent foundation. Remove the release liner and fasten membrane to
   Hydroduct drainage composite with large head nails or staples. All nail
   heads or staples must be covered with overlapping sheets of membrane.

   d. Apply succeeding sheets by overlapping the previous sheet 3 inches along
   the uncoated edge of the membrane.

   e. Overlap the ends of the membrane 3 inches. Apply Preprufe Tape centered
   over the end lap and roll firmly. Remove release liner.

   f. Seal all transition, penetrations, tie down bracing and other conditions with
   initial membrane layer plus manufacturer’s recommended accessory
   materials, prior to application of the full membrane.

   g. Concrete must be poured within 30 days of membrane application. Protect
   membrane until concrete pour.

   h. If membrane ties into a vertical membrane, leave an additional 12" flap of
   Preprufe membrane to tie into Bituthene membrane.

D. Underslab Applications

1. Apply Hydroduct 660 drainage composite board as recommended by manufacturer
over the compacted sub-grade.

2. Apply the membrane over the drainage composite board with the HDPE side
facing the drainage composite board and the treated white coating surface facing
the concrete to be poured. The membrane may be installed at any convenient
length. Apply succeeding sheets by overlapping previous sheets 3" along the self-
adhesive edge of the membrane. Remove the silicone coated release liner covering
the membrane and roll the side lap to assure a tight seal.
3.5 SEAM REINFORCEMENT FOR HDPE COMPOSITE SHEETS ONLY

A. Provide a 6 in. strip of modified bituminous sheet membrane (Bituthene 4000) centered behind all laps.

B. At locations where a salvage edge is not present and at end laps, lap sheets 6 in., apply a 1/8 in. thick by 6 in. wide application of liquid membrane between sheets, to provide a 6 in. wide seal.

C. Integration of old onto new pre-applied sheet membrane.
   1. Integration of Sheet Membrane onto Sheet Membrane that has been installed in excess of 30 days prior
      a. Lap sheets 12 in., apply a 1/8 in. thick by 12 in. wide application of fluid membrane between sheets, to provide a 12 in. wide seal at this location.
      b. Install Waterproofing Tape centered at edge of lap and roll firmly into place with an approved roller.
      c. Install additional Waterproofing Tape to cover white film that has been installed over 30 days prior.
   2. Repair of pre-applied sheet membrane
      a. Scratch on white coating exposing underlying black surface of Sheet Membrane. Install Waterproofing Tape at areas where the white coating of the membrane is damaged, including boot scuff marks and abrasions by rebar.
      b. Damage or Puncture of Sheet Membrane: Install Patch of short Membrane set in Liquid Membrane. Patch must extend 3 in. in every direction around extent of damaged area. Install Waterproofing Tape centered over the edge of the patch. If the damaged area does not have 5 in. of sound material around it, inject Liquid Membrane into puncture until Liquid Membrane backs out, and proceed with patch as space allows.

3.6 CLEAN-UP

A. Upon completion of the waterproofing system, the General Contractor shall remove all equipment, material and debris from the work and storage area, and leave those areas in an undamaged and acceptable condition.

END OF SECTION
PREPRUFE® 300R Plus & 160R Plus
Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

Description
Preprufe® 300R Plus & 160R Plus membranes are unique composite sheets comprising, a thick HDPE film, an aggressive pressure sensitive adhesive a weather resistant protective coating and an adhesive to adhesive seam overlap.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R Plus System includes:
- **Preprufe 300R Plus**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R Plus**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor™ ES**—waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers**—preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R Plus & 160R Plus membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be turned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene® self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

Advantages
- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered adhesive to adhesive watertight laps and detailing**
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **Easy roll/kick out installation**—reduces installation time and cost
- **Release Liner free**—expedites installation and reduces construction site waste
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack

Drawings are for illustration purposes only. Please refer to graceconstruction.com for specific application details.
Installation
The most current application instructions, detail drawings and technical letters can be viewed at graceconstruction.com. For other technical information contact your local Grace representative.
Preprufe Plus has colored zip strips at the top and bottom of the seam area on the edge of the roll. Both zip strips cover an aggressive adhesive. Once the yellow zip strip on the top of the membrane and the blue zip strip on the bottom of the membrane are removed, a strong adhesive to adhesive bond is achieved in the overlap area.

Substrate Preparation
All surfaces—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).
Horizontal—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.
Vertical—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

Membrane Installation
Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions <40°F (<4°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Plus Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe Plus LT data sheet for more information.
Horizontal substrates—Kick out or roll out the membrane HDPE film side to the substrate with the yellow zip strip facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave yellow and blue zip strips on the membrane until overlap procedure is completed. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with the blue zip strip on top of the yellow zip strip. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Roll firmly to ensure a watertight seal.

Roll ends and cut edges—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 2). Immediately remove tinted plastic release liner from the tape.

Details
Refer to Preprufe Field Application Manual, Section V Application Instructions or visit graceconstruction.com. This manual gives comprehensive guidance and standard details.

Membrane Repair
Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove tinted plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

Pouring of Concrete
Ensure the plastic release liner is removed from all areas of Preprufe Tape. It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete. Provide temporary protection from concrete over splash for areas of the Preprufe membrane that are adjacent to a concrete pour.

Removal of Formwork
Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems. A minimum concrete compressive strength of 1500 psi (10 N/mm²) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to Grace Tech Letter 17 for information on removal of formwork for Preprufe.
**Detail Drawings**

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at graceconstruction.com. For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

**Wall base detail against permanent shutter**

![Wall base detail diagram](image)

**Bituthene wall base detail (Option 1)**

1 of 8

**Bituthene wall base detail (Option 2)**

**Procor wall base detail (Option 1)**

**Procor wall base detail (Option 2)**

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1 Preprufe 300R Plus  
2 Preprufe 160R Plus  
3 Preprufe Tape  
4 Bituthene®  
5 Procor  
6 Bituthene Liquid Membrane  
7 Protection  
8 Hydroduct®  
9 Adcor ES  
10 Preprufe CJ Tape
Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical Value 300R Plus</th>
<th>Typical Value 160R Plus</th>
<th>Test Method</th>
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<tbody>
<tr>
<td>Color</td>
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<td>white</td>
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<tr>
<td>Thickness</td>
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<td>0.032 in. (0.8 mm)</td>
<td>ASTM D3767</td>
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<td>Lateral Water Migration Resistance</td>
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<td>Pass at 231 ft (71 m) of hydrostatic head pressure</td>
<td>ASTM D5385, modified^1</td>
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<tr>
<td>Low temperature flexibility</td>
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<td>Unaffected at -20°F (-29°C)</td>
<td>ASTM D1970</td>
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<td>231 ft (71 m)</td>
<td>ASTM D5385, modified^2</td>
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<tr>
<td>Elongation</td>
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<td>500%</td>
<td>ASTM D412, modified^3</td>
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<td>Tensile strength, film</td>
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<td>4000 psi (27.6 MPa)</td>
<td>ASTM D412</td>
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<td>Crack cycling at -9.4°F (-23°C), 100 cycles</td>
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<td>Unaffected, Pass</td>
<td>ASTM C836^4</td>
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<td>Puncture resistance</td>
<td>221 lbs (990 N)</td>
<td>100 lbs (445 N)</td>
<td>ASTM E154</td>
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<tr>
<td>Peel adhesion to concrete</td>
<td>5 lbs/in. (880 N/m)</td>
<td>5 lbs/in. (880 N/m)</td>
<td>ASTM D903, modified^5</td>
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<td>Lap peel adhesion at 72°F (22°C)</td>
<td>8 lbs/in. (1408 N/m)</td>
<td>8 lbs/in. (1408 N/m)</td>
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<td>Lap peel adhesion at 40°F (4°C)</td>
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<tr>
<td>Permeance to water vapor transmission</td>
<td>0.01 perms (0.6 ng/(Pa x s x m^2))</td>
<td>0.01 perms (0.6 ng/(Pa x s x m^2))</td>
<td>ASTM E96, method B</td>
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Footnotes:
1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
2. Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
3. Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
4. Concrete is cast against the Preprufe membrane and allowed to cure (7 days minimum)
5. Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
6. The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute at 72°F (22°C).

Specification Clauses

Preprufe 300R Plus or 160R Plus shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe. All Preprufe system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available. NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be lifted and carried by a minimum of two persons.

www.graceconstruction.com

For technical assistance call toll free at 866-333-3SBM (3726)

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In Canada, Grace Canada, Inc., 294 Clements Road, West, Ajax, Ontario, Canada L1S 3C6.
**BITUTHENE® SYSTEM 4000**
Self-adhesive HDPE waterproofing membrane with super tacky compound for use with patented, water-based System 4000 Surface Conditioner

**Description**
Bituthene® System 4000 is a 1.5 mm (1/16 in.) flexible, pre-formed waterproof membrane which combines a high performance, cross laminated, HDPE carrier film with a unique, super tacky, self-adhesive rubberized asphalt compound.

System 4000 Surface Conditioner is a unique, water-based, latex surface treatment which imparts an aggressive, high tack finish to the treated substrate. It is specifically formulated to bind site dust and concrete efflorescence, thereby providing a suitable surface for the Bituthene System 4000 Waterproofing Membrane.

Conveniently packaged in each roll of membrane, System 4000 Surface Conditioner promotes good initial adhesion and, more importantly, excellent permanent adhesion of the Bituthene System 4000 Waterproofing Membrane. The VOC (Volatile Organic Compound) content of this product is 100 g/L.

Architectural and Industrial Maintenance Regulations limit the VOC content in products classified as Architectural Coatings. Refer to Technical Letters at graceconstruction.com for most current list of allowable limits.

**Advantages**
- **Excellent adhesion**—special adhesive compound engineered to work with high tack System 4000 Surface Conditioner
- **Cold applied**—simple application to substrates, especially at low temperatures
- **Reduced inventory and handling costs**—System 4000 Surface Conditioner is included with each roll of membrane
- **Wide application temperature range**—excellent bond to self and substrate from 25°F (-4°C) and above

**Product Advantages**
- Excellent adhesion
- Cold applied
- Reduced inventory and handling costs
- Wide application temperature range
- Overlap security
- Cross laminated, high density polyethylene carrier film
- Flexible
- Ripcord

Drawings are for illustration purposes only. Please refer to graceconstruction.com for specific application details.
• **Overlap security**—minimizes margin for error under site conditions

• **Cross laminated, high density polyethylene carrier film**—provides high tear strength, puncture and impact resistance

• **Flexible**—accommodates minor structural movements and will bridge shrinkage cracks

• **Ripcord®**—this split release on demand feature allows the splitting of the release paper into two (2) pieces for ease of installation in detailed areas

### Use

Bituthene is ideal for waterproofing concrete, masonry and wood surfaces where in-service temperatures will not exceed 135°F (57°C). It can be applied to foundation walls, tunnels, earth sheltered structures and split slab construction, both above and below grade. (For above grade applications, see Above Grade Waterproofing Bituthene System 4000.)

Bituthene is \(\frac{3}{16}\) in. (1.5 mm) thick, 3 ft (0.9 m) wide and 66.7 ft (20 m) long and is supplied in rolls. It is unrolled sticky side down onto concrete slabs or applied onto vertical concrete faces primed with System 4000 Surface Conditioner. Continuity is achieved by overlapping a minimum 2 in. (50 mm) and firmly rolling the joint.

Bituthene is extremely flexible. It is capable of bridging shrinkage cracks in the concrete and will accommodate minor differential movement throughout the service life of the structure.

### Application Procedures

#### Safety, Storage and Handling Information

Bituthene products must be handled properly. Vapors from solvent-based primers and mastic are harmful and flammable. For these products, the best available information on safe handling, storage, personal protection, health and environmental considerations has been gathered. Material Safety Data Sheets (MSDS) are available at graceconstruction.com and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.

#### Surface Preparation

Surfaces should be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Concrete must be properly dried (minimum 7 days for normal structural concrete and 14 days for lightweight structural concrete).

If time is critical, Bituthene Primer B2 or Bituthene Primer B2 LVC may be used to allow priming and installation of membrane on damp surfaces or green concrete. Priming may begin in this case as soon as the concrete will maintain structural integrity. Use form release agents which will not transfer to the concrete.

Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane. Cure concrete with clear, resin-based curing compounds which do not contain oil, wax or pigment. Except with Bituthene Primer B2 or Bituthene Primer B2 LVC, allow concrete to thoroughly dry following rain. Do not apply any products to frozen concrete.

Repair defects such as spalled or poorly consolidated areas. Remove sharp protrusions and form match lines. On masonry surfaces, apply a parge coat to rough concrete block and brick walls or trowel cut mortar joints flush to the face of the concrete blocks.

#### Temperature

- Apply Bituthene System 4000 Membrane and Conditioner only in dry weather and when air and surface temperatures are 25°F (-4°C) or above.

- Apply Bituthene Primer B2 or Bituthene Primer B2 LVC in dry weather above 25°F (-4°C). (See separate product information sheet.)

#### Conditioning

Bituthene System 4000 Surface Conditioner is ready to use and can be applied by spray or roller. For best results, use a pump-type air sprayer with fan tip nozzle, like the Bituthene System 4000 Surface Conditioner Sprayer, to apply the surface conditioner.
Apply Bituthene System 4000 Surface Conditioner to clean, dry, frost-free surfaces at a coverage rate of 300 ft²/gal (7.4 m²/L). Coverage should be uniform. Surface conditioner should not be applied so heavily that it puddles or runs. **Do not apply conditioner to Bituthene membrane.**

Allow Bituthene System 4000 Surface Conditioner to dry one hour or until substrate returns to its original color. At low temperatures or in high humidity conditions, dry time may be longer.

Bituthene System 4000 Surface Conditioner is clear when dry and may be slightly tacky. In general, conditioning should be limited to what can be covered within 24 hours. In situations where long dry times may prevail, substrates may be conditioned in advance. Substrates should be reconditioned if significant dirt or dust accumulates.

Before surface conditioner dries, tools should be cleaned with water. After surface conditioner dries, tools should be cleaned with mineral spirits. Mineral spirits is a combustible liquid which should be used only in accordance with manufacturer’s recommendations. **Do not use solvents to clean hands or skin.**

**Corner Details**
The treatment of corners varies depending on the location of the corner. For detailed information on Bituthene Liquid Membrane, see separate product information sheet.

- **At wall to footing inside corners—**
  - **Option 1:** Apply membrane to within 1 in. (25 mm) of base of wall. Treat the inside corner by installing a ¼ in. (20 mm) fillet of Bituthene Liquid Membrane. Extend Bituthene Liquid Membrane at least 2½ in. (65 mm) onto footing, and 2½ in. (65 mm) onto wall membrane.
  - **Option 2:** Treat the inside corner by installing a ¼ in. (20 mm) fillet of Bituthene Liquid Membrane. Apply 12 in. (300 mm) wide strip of sheet membrane centered over fillet. Apply wall membrane over inside corner and extend 6 in. (150 mm) onto footing. Apply 1 in. (25 mm) wide troweling of Bituthene Liquid Membrane over all terminations and seams within 12 in. (300 mm) of corner.

- **At footings where the elevation of the floor slab is 6 in. (150 mm) or more above the footing, treat the inside corner either by the above two methods or terminate the membrane at the base of the wall. Seal the termination with Bituthene Liquid Membrane.**

**Joints**
Properly seal all joints with waterstop, joint filler and sealant as required. Bituthene membranes are not intended to function as the primary joint seal. Allow sealants to fully cure. Pre-strip all slab and wall cracks over ¼ in. (1.5 mm) wide and all construction and control joints with 9 in. (230 mm) wide sheet membrane strip.

**Application on Horizontal Surfaces**
(Nota: Preprufe® pre-applied membranes are strongly recommended for below slab or for any application where the membrane is applied before concreting. See Preprufe product information sheets.)

Apply membrane from the low point to the high point so that laps shed water. Overlap all seams at least 2 in. (50 mm). Stagger all end laps. Roll the entire membrane firmly and completely as soon as possible. Use a linoleum roller or standard water-filled garden roller less than 30 in. (760 mm) wide, weighing a minimum of 75 lbs (34 kg) when filled. Cover the face of the roller with a resilient material such as a ½ in. (13 mm) plastic foam or two wraps of indoor-outdoor carpet to allow the membrane to fully contact the primed substrate. Seal all T-joints and membrane terminations with Bituthene Liquid Membrane at the end of the day.

**Protrusions and Drains**
Apply membrane to within 1 in. (25 mm) of the base of the protrusion. Apply Bituthene Liquid Membrane 0.1 in. (2.5 mm) thick around protrusion. Bituthene Liquid Membrane should extend over the membrane a minimum of 2½ in. (65 mm) and up the penetration to just below the finished height of the wearing course.

**Vertical Surfaces**
Apply membrane in lengths up to 8 ft (2.5 m). Overlap all seams at least 2 in. (50 mm). On higher walls apply membrane in two or more sections with the upper overlapping the lower by at least 2 in. (50 mm). Roll all membrane with a hand roller.
Terminate the membrane at grade level. Press the membrane firmly to the wall with the butt end of a hardwood tool such as a hammer handle or secure into a reglet. Failure to use heavy pressure at terminations can result in a poor seal. A termination bar may be used to ensure a tight seal. Terminate the membrane at the base of the wall if the bottom of the interior floor slab is at least 6 in. (150 mm) above the footing. Otherwise, use appropriate inside corner detail where the wall and footing meet.

**Membrane Repairs**
Patch tears and inadequately lapped seams with membrane. Clean membrane with a damp cloth and dry. Slit fishmouths and repair with a patch extending 6 in. (150 mm) in all directions from the slit and seal edges of the patch with Bituthene Liquid Membrane. Inspect the membrane thoroughly before covering and make any repairs.

**Drainage**
Hydroduct® drainage composites are recommended for both active drainage and protection of the membrane. See Hydroduct product information sheets.

**Protection of Membrane**
Protect Bituthene membranes to avoid damage from other trades, construction materials or backfill. Place protection immediately in temperatures above 77°F (25°C) to avoid potential for blisters.

- On vertical applications, use Hydroduct 220 Drainage Composite. Adhere Hydroduct 220 Drainage Composite to membrane with Preprufe Detail Tape. Alternative methods of protection are to use 1 in. (25 mm) expanded polystyrene or ¼ in. (6 mm) extruded polystyrene that has a minimum compressive strength of 8 lbs/in.² (55 kN/m²). Such alternatives do not provide

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**System 4000 Surface Conditioner Sprayer**
The Bituthene System 4000 Surface Conditioner Sprayer is a professional grade, polyethylene, pump-type, compressed air sprayer with a brass fan tip nozzle. It has a 2 gal (7.6 L) capacity. The nozzle orifice and spray pattern have been specifically engineered for the optimum application of Bituthene System 4000 Surface Conditioner.

Hold nozzle 18 in. (450 mm) from substrate and squeeze handle to spray. Spray in a sweeping motion until substrate is uniformly covered.

Sprayer should be repressurized by pumping as needed. For best results, sprayer should be maintained at high pressure during spraying.

To release pressure, invert the sprayer and spray until all compressed air is released.

**Maintenance**
The Bituthene System 4000 Surface Conditioner Sprayer should perform without trouble for an extended period if maintained properly.

Sprayer should not be used to store Bituthene System 4000 Surface Conditioner. The sprayer should be flushed with clean water immediately after spraying. For breaks in the spray operation of one hour or less, invert the sprayer and squeeze the spray handle until only air comes from the nozzle. This will avoid clogging.

Should the sprayer need repairs or parts, call the maintenance telephone number on the sprayer tank (800-323-0620).
positive drainage to the system. If ¼ in. (6 mm) extruded polystyrene protection board is used, backfill should not contain sharp rock or aggregate over 2 in. (50 mm) in diameter. Adhere polystyrene protection board with Preprufe Detail Tape.

- In mud slab waterproofing, or other applications where positive drainage is not desired and where reinforced concrete slabs are placed over the membrane, the use of ¼ in. (6 mm) hardboard or 2 layers of ⅛ in. (3 mm) hardboard is recommended.

**Insulation**

Always apply Bituthene membrane directly to primed or conditioned structural substrates. Insulation, if used, must be applied over the membrane. Do not apply Bituthene membranes over lightweight insulating concrete.

**Backfill**

Place backfill as soon as possible. Use care during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added and compacted in 6 in. (150 mm) to 12 in. (300 mm) lifts.

For areas which cannot be fully compacted, a termination bar is recommended across the top termination of the membrane.

**Placing Steel**

When placing steel over properly protected membrane, use concrete bar supports (dobies) or chairs with plastic tips or rolled feet to prevent damage from sharp edges. Use special care when using wire mesh, especially if the mesh is curled.

**Approvals**

- City of Los Angeles Research Report RR 24386
- Miami-Dade County Code Report NOA 04-0114.03
- U.S. Department of Housing and Urban Development (HUD) HUD Materials Release 628E
- Bituthene 4000 Membranes carry a Underwriters’ Laboratory Class A Fire Rating (Building Materials Directory, File #R7910) when used in either of the following constructions:
  - Limited to noncombustible decks at inclines not exceeding ¼ in. (6 mm) to the horizontal 1 ft (0.3 m). One layer of Bituthene waterproofing membrane, followed by one layer of ½ in. (3 mm) protection board, encased in 2 in. (50 mm) minimum concrete monolithic pour.
  - Limited to noncombustible decks at inclines not exceeding ¼ in. (6 mm) to the horizontal 1 ft (0.3 m). One layer of Bituthene waterproofing membrane, followed by one layer of DOW Styrofoam PD Insulation Board [2 in. (50 mm) thick]. This is covered with one layer of 2 ft x 2 ft x 2 in. (0.6 m x 0.6 m x 50 mm) of concrete paver topping.

**Warranty**

Five year material warranties covering Bituthene and Hydroduct products are available upon request. Contact your Grace sales representative for details.

**Technical Services**

Support is provided by full time, technically trained Grace representatives and technical service personnel, backed by a central research and development staff.
Physical Properties for Bituthene 4000 Membrane

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical Value</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Dark gray-black</td>
<td></td>
</tr>
<tr>
<td>Thickness</td>
<td>1/16 in. (1.5 mm) nominal</td>
<td>ASTM D3767—method A</td>
</tr>
<tr>
<td>Flexibility, 180° bend over 1 in. (25 mm) mandrel at -25°F (-32°C)</td>
<td>Unaffected</td>
<td>ASTM D1970</td>
</tr>
<tr>
<td>Tensile strength, membrane, die C</td>
<td>325 lbs/in.² (2240 kPa) minimum</td>
<td>ASTM D412 modified¹</td>
</tr>
<tr>
<td>Tensile strength, film</td>
<td>5,000 lbs/in.² (34.5 MPa) minimum</td>
<td>ASTM D882 modified¹</td>
</tr>
<tr>
<td>Elongation, ultimate failure of rubberized asphalt</td>
<td>300% minimum</td>
<td>ASTM D412 modified¹</td>
</tr>
<tr>
<td>Crack cycling at -25°F (-32°C), 100 cycles</td>
<td>Unaffected</td>
<td>ASTM C836</td>
</tr>
<tr>
<td>Lap adhesion at minimum application temperature</td>
<td>5 lbs/in. (880 N/m)</td>
<td>ASTM D1876 modified²</td>
</tr>
<tr>
<td>Peel strength</td>
<td>9 lbs/in. (1576 N/m)</td>
<td>ASTM D903 modified³</td>
</tr>
<tr>
<td>Puncture resistance, membrane</td>
<td>50 lbs (222 N) minimum</td>
<td>ASTM E154</td>
</tr>
<tr>
<td>Resistance to hydrostatic head</td>
<td>210 ft (70 m) of water</td>
<td>ASTM D5385</td>
</tr>
<tr>
<td>Permeance</td>
<td>0.05 perms (2.9 ng/m²sPa) maximum</td>
<td>ASTM E96, section 12—water method</td>
</tr>
<tr>
<td>Water absorption</td>
<td>0.1% maximum</td>
<td>ASTM D570</td>
</tr>
</tbody>
</table>

Footnotes:
1. The test is run at a rate of 2 in. (50 mm) per minute.
2. The test is conducted 15 minutes after the lap is formed and run at a rate of 2 in. (50 mm) per minute at 40°F (5°C).
3. The 180° peel strength is run at a rate of 12 in. (300 mm) per minute.

Physical Properties for System 4000 Surface Conditioner

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvent type</td>
<td>Water</td>
</tr>
<tr>
<td>Flash point</td>
<td>&gt;140°F (&gt;60°C)</td>
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<tr>
<td>VOC* content</td>
<td>91 g/L</td>
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<tr>
<td>Application temperature</td>
<td>25°F (-4°C) and above</td>
</tr>
<tr>
<td>Freeze thaw stability</td>
<td>5 cycles (minimum)</td>
</tr>
<tr>
<td>Freezing point (as packaged)</td>
<td>14°F (-10°C)</td>
</tr>
<tr>
<td>Dry time (hours)</td>
<td>1 hour**</td>
</tr>
</tbody>
</table>

Footnotes:
* Volatile Organic Compound
** Dry time will vary with weather conditions

www.graceconstruction.com

For technical assistance call toll free at 866-333-3SBM (3726)