Remedial Action Work Plan

West 19th Street Development Site New York, New York

Georgetown West 19th Street Development, LLC
New York, New York

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engineers, scientists, economists

Certification Statement

I, Frederick J. Kirschenheiter, as a licensed Professional Engineer in the State of New York, to the best of my knowledge and based on my inquiry of the persons involved in preparing this document under my direction, certify that, in my professional opinion, the Remedial Action Work Plan for the West 19th Street Development Site located in the Borough of Manhattan New York, was completed in general accordance with the Voluntary Agreement (VCA) (Index No. W2-0948-03-02) between the New York State Department of Environmental Conservation (NYSDEC) and the Georgetown 19th Street Development, LLC.

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1. Introduction

1.1 General

This Remedial Action Work Plan (RAWP) describes the remedial actions and final remedial design components for the West 19th Street Development Site (site). The approximately 0.7-acre site is located in Block 690, Lot 12 and Lot 54, between West 18th and West 19th Streets and 10th and 11th Avenues in the Borough of Manhattan, New York City (Figures 1 and 2). The development site is one parcel of numerous parcels that comprise the West 18th Street Gas Works Site, which is currently under a Voluntary Agreement (VCA) between the New York State Department of Environmental Conservation (NYSDEC) and the Consolidated Edison Company of New York, Inc., effective August 25, 2002. The development site is the subject of a VCA between NYSDEC and the Georgetown 19th Street Development, LLC (Georgetown) effective March 13, 2003. This RAWP has been prepared by Blasland, Bouck & Lee, Inc., (BBL) at the request of Georgetown, in accordance with the VCA between NYSDEC and Georgetown.

1.2 Site Description

The site consists of a two-story brick structure that serves as a mid- to long-term truck parking garage and a small fenced vacant lot in the southwestern part of the property. The site is bounded to the south by 18th Street, to the west by 10th Avenue and the Miller Highway (Westside Highway), to the north by 19th Street, and to the east by commercial enterprises along 19th Street and another truck parking garage along 18th Street. Surrounding the site lies a mix of urban commercial, residential, and light industrial properties. Chelsea Piers entertainment center is located across the Miller Highway and the Hudson River is approximately 200 feet to the west.

The site geology consists of urban fill material, silty sands with some gravel, and clayey silt with varying amounts of organic content. Groundwater at the site is encountered at depths between 6 and 8 feet. The shallow groundwater flow direction appears to be toward the northeast. There are no municipal or private wells within one mile of the site. Public water is supplied by the City of New York but is not obtained locally. Furthermore, the Hudson River is not a source of potable water for the City of New York.

1.3 Site History

Historic fire insurance and city ward maps (Sanborn Fire Insurance maps (Sanborns) from 1895, 1904, 1921, 1950, 1969, 1975, 1979, 1980, 1983, 1985, 1987, 1988, and 1991 through 1997 and City Ward maps from 1885 and 1902) show that the site was used as a storage area for the Manhattan Gas Company Works/Consolidated Gas Company Works (a manufactured gas plant (MGP) referred to as the Manhattan/Consolidated MGP) between 1895 and 1921, followed by use as a wagon yard and auto garage to its present use as a truck parking garage. Three 1,000 gallon underground storage tanks (USTs) associated with the auto garage were noted on the 1969 through 1996 Sanborn maps.

Historically, surrounding the site were gas holders associated with the Manhattan/Consolidated MGP, a marble works, a biscuit factory, and various auto/motor freight/truck services to the north; gas holders, a coal yard, and a pipe yard associated with the Manhattan/Consolidated MGP, a filling station, a spring water company, a wagon yard, an auto repair shop, and an auto garage to the east; a retort house, a purifying house, and other

facilities (e.g. laboratory, condensers, scrubbers) associated with the Manhattan/Consolidated MGP, a doll factory, a packing box factory, an electric power company, and an auto parking lot to the south; and kilns associated with a pottery factory to the west. The Manhattan/ Consolidated gas companies are predecessor companies to the Consolidated Edison Company of New York, Inc.

1.4 Previous Investigations

Two previous investigations have been performed at the site: a preliminary site investigation and a Phase II site investigation. The following summarizes the results of these previous investigations.

1.4.1 Preliminary Investigation

The preliminary site investigation was performed in October 2002 by BBL to assess whether MGP and/or petroleum-related constituents were present in soil and groundwater at concentrations that would require remediation. The preliminary site investigation included a regulatory record review and the collection of eight soil samples and four groundwater samples from eight soil borings at the site. The regulatory record review indicated that five 550-gallon tanks containing unleaded gasoline were closed and removed from the site in January 1992.

The eight soil borings, B-1 through B-8, ranged in depth from 12 to 20 feet below the concrete floor surface of the parking garage (Figure 3). Subsurface soils observed included urban fill followed by gravelly sands with some silt, and a clayey silt layer. Saturated soils (groundwater) were encountered in the borings at depths between 7 and 8 feet. Non-aqueous phase liquids (NAPLs) were not observed in any of the borings. Odors ranging from slight to strong and elevated photoionization (PID) readings were observed at all borings.

The soil and groundwater samples were analyzed for target compound list (TCL) volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The primary VOCs detected in soil and groundwater included benzene, ethylbenzene, toluene, and xylenes (BTEX). The primary SVOCs detected in the soil and groundwater included phenolic compounds and polycyclic aromatic hydrocarbons (PAHs).

In the soil samples obtained during the preliminary site investigation, individual BTEX, PAH, and/or phenolic constituent concentrations, total VOC concentrations, and/or total SVOC concentrations exceeded the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 guidance values for soil (soil guidance values). In the groundwater samples obtained during the preliminary site investigation, individual BTEX, PAHs, or phenolic constituent concentrations exceeded the NYSDEC Technical Operating Guidance Series (TOGS) 1.1.1 criteria for groundwater (groundwater criteria).

Additional information regarding the preliminary site investigation is provided in the Preliminary Site Investigation Report (BBL, November 2002).

1.4.2 Phase II Site Investigation

The Phase II site investigation conducted pursuant to the VCA was performed in March 2003 by BBL and consisted of boring installations, monitoring well installations, soil and groundwater sampling and analysis, and hydrogeologic testing. Fifteen test borings (B-9 through B-20 and A-1, A-2, and A-3, Figure 3) were completed at the site to delineate the horizontal and vertical extent of impacted soils observed during the preliminary site

investigation, to delineate the presence of the clayey silt unit, and to confirm initial observations that NAPLs are not present at the site. Four groundwater-monitoring wells (MW-10, MW-13, MW-14, and MW-19, Figure 3) were installed to assess impacts to shallow groundwater, to determine the direction of groundwater flow, and to determine hydrogeologic properties of the groundwater flow system beneath the site. Groundwater levels and hydraulic conductivity properties were measured at the monitoring wells. Fifty-two soil samples and four groundwater samples were collected and analyzed for TCL VOCs and SVOCs. In addition, twelve soil samples were analyzed for polychlorinated biphenyls (PCBs), pesticides, and Target Analyte List (TAL) metals.

As in the preliminary site investigation, material indicative of urban fill (silty sand with debris) was typically encountered just below the concrete floor slab of the existing building at the site. Saturated soils (groundwater) were encountered in the borings at depths between 6 to 8 feet. Sands with varying amounts of silt and gravel were present between the overlying fill described above and a black, organic, clayey silt unit. This clayey silt unit was observed at depths ranging from approximately 11 to 18 feet on the 18th Street side of the site and at depths ranging from approximately 24 to 28 feet on the 19th Street side of the site. The thickness of the clayey silt unit increases from west to east. The clayey silt unit was not encountered at borings A-3 and B-18.

Odors ranging from slight to strong and elevated PID readings were observed at the borings. Possible NAPLs were observed at borings B-10 (6 to 10 feet), B-18 (23.5 to 26 feet), B-19 (26 feet), A-1 (23 feet), A-2 (22 to 24 feet), and A-3 (26 feet). Ash-like material (ALM) was also observed at borings B-18 (23 to 24 feet), A-1 (23 and 24 feet), A-2 (22 and 24 feet), and A-3 (25.5 and 27.5 feet).

In-situ hydraulic conductivity testing was performed at each well using the slug method of water displacement. Estimated hydraulic conductivity ranged from 8.49 x 10-5 centimeters per second (cm/sec) to 6.41 x 10-4 cm/sec. Groundwater appears to be flowing from the southwest to the northeast. Based on the proximity to the Hudson River, this is probably a localized groundwater flow condition.

Prior to the in-situ hydraulic conductivity tests, when the wells were monitored for the presence of dense or light NAPL, each monitoring well was found to contain a tar-like dense NAPL (DNAPL). The DNAPL thinly coated the interface probe sporadically; therefore, an accurate depth to or thickness of the DNAPL could not be recorded. Because of these observations, the wells were subsequently monitored for the presence of NAPLs. A tar-like DNAPL, measuring 0.44 feet in thickness, was observed only at MW-10. DNAPL was not measured in the other wells during the second monitoring event.

The primary constituents detected in soil during the Phase II site investigation include BTEX, PAHs, and phenolic constituents. Soils containing BTEX, PAHs and phenolic constituent concentrations above NYSDEC soil guidance values were detected from the near surface to a depth of approximately 31 feet. As in the preliminary investigation, the highest concentrations of PAHs were typically detected in the same soil samples as the highest concentrations of BTEX.

PCBs were not detected in the soil samples analyzed. Pesticides dieldrin, endrin, and 4, 4'- DDT were detected at concentrations well below their respective soil guidance values. The TAL metals, arsenic, beryllium, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, and zinc, exceeded their respective soil guidance values in one or more of the soil samples analyzed during the Phase II site investigation.

The primary constituents detected in the groundwater include BTEX, PAH, and phenolic constituents. Individual BTEX, phenolic, and/or PAH constituent concentrations above the groundwater criteria were detected in all the groundwater samples obtained during the Phase II site investigation.

Additional information regarding the Phase II site investigation is provided in the Site Investigation Report (BBL, June 2003).

1.5 Summary of Environmental Conditions

This section provides a summary of environmental conditions at the site based on the results of the previous investigations. Impacted subsurface soils, defined as soils with NAPLs, staining, odors, and/or elevated PID meter screening (>50 parts per million [ppm]) in conjunction with total VOCs and SVOCs at concentrations greater than NYSDEC's soil guidance values contained in TAGM 4046, are present throughout the site as summarized in the table below.

Boring	Field Observations	Analytical Observations	Estimated Impacted Area (Note 1)
B-9	Odors and elevated PID readings from 5 to 11 feet.	11-11.5 feet - PAHs > 500 ppm	5 to 11.5+ feet
B-10	Elevated PID from 4 to 14 feet. Possible NAPL from 6 to 10 feet. NAPL in well (screened from 7 to 17 feet). Based on logs, NAPL likely originates from above 10 feet.	6.5-7 ft BTEX >10 ppm PAHs >500 ppm 7-7.5 ft BTEX >10 ppm PAHs >500 ppm	4 to 14 feet
B-11	Elevated PID to 8 to 10 feet	11.5-12 ft BTEX >10 ppm PAHs >500 ppm	8 to 12+ feet
B-12	Elevated PID from 6 to 8 feet.	5.5-6 ft PAHs >500 ppm 7.5-8 ft BTEX >10 ppm PAHs >500 ppm	6 to 8 feet
B-13	Elevated PID at 15 feet. NAPL in well (screened from 7 to 17 feet). Based on logs, NAPL likely originates around 15+ feet.	27-27.5ft BTEX > 10 ppm	15+feet 27-27.5 feet
B-14	Elevated PID from 6 to 8 feet and from 15 to 22 feet. NAPL in well (screened from 6 to 16 feet). Based on logs, NAPL likely originates from greater than 15 feet. Based on analytical results, NAPLs could originate @ 4-4.5 feet.	4-4.5 ft PAHs >500 ppm 16-16.5ft BTEX >10 ppm PAHs >500 ppm	4 to 8 feet, 15 to 22 feet
B-15	Elevated PID at 22.5 feet.	22-22.5 ft BTEX >10 ppm PAHs >500 ppm	22-22.5 feet
B-16	Elevated PID to 16 to 22.5 feet, at 24 feet and at 26 feet. Odor from 16 to 18+ feet.	16.5-17 ft BTEX >10 ppm PAHs >500 ppm 26-26.5 ft BTEX >10 ppm PAHs >500 ppm	16 to 26.5+ feet
B-17	Elevated PID from 7 to 9 feet.		NA
B-18	Elevated PID from 5 to 14 feet and 20 to 26+ feet Odors from 6 to 10 feet and 20 to 23.5 feet. Sheen from 20 to 23.5 feet. NAPL from 23.5 to 26 feet.	24.5-25 ft BTEX >10 ppm PAHs >500 ppm	5 to 14 feet 20 to 26+ feet
B-19	Elevated PID from 0 to 12 feet and 16 to 29 feet. Black staining from 7 to 12 feet. NAPL in well (screened from 7-17 feet). Based on logs, NAPL likely originates from 7 to 12 feet. Black staining and possible NAPL at 26 feet.		7 to 12 feet, 16.5+ to 29 feet
B-20	Elevated PID from 5.5 to 12 feet and 19.5 to 28+ feet. Odor from 18 to 28 feet.	21.5-22 ft BTEX >10 ppm PAHs >500 ppm 26.5-27 ft BTEX >10 ppm PAHs >500 ppm	5.5 to 12 feet, 19.5 to 28+feet

N/A= not applicable
Note 1: Estimate based on soil boring observations and analytical results.

Impacted soils were observed above 15 feet throughout the site except in the eastern portion of the center of the site (i.e. near B-13, B-15, and B-16). Impacted soils below 15 feet were observed in the center and northern portions of the site. No impacted soils were observed at B-17 in the center of the site. In general, the soils with a larger proportion of NAPLs contained higher BTEX and PAH concentrations. The NAPL at the site was generally observed above the clayey silt layer and the clayey silt layer appears to mitigate the downward migration of NAPLs at the site.

Surface soils were not evaluated since it is anticipated that the existing surface soils will be removed for site development.

Impacted groundwater, defined as groundwater with BTEX, PAH, and /or phenolic constituent concentrations greater than the NYSDEC TOGS 1.1.1 criteria for groundwater, was observed throughout the site. The greatest impacts were observed at monitoring well MW-10, which also contained NAPLs.

The available analytical data indicate that the primary constituents of concern (COCs) in soil and groundwater at the site are BTEX, PAHs, and phenolic constituents. The types and patterns of the BTEX, PAHs, and phenolic constituents detected indicate the presence of primarily MGP by-product tars, which are mixed at some locations with petroleum products that appear to be in the light to mid-distillate ranges.

There are no municipal or private wells within one mile of the site. Public water is supplied by the City of New York from a source upstate. The Hudson River is not a source of potable water for the City of New York. Therefore, there are no complete pathways for drinking water.

The site is presently used as a mid- to long-term truck-parking garage. Local residents and parking garage workers/users are not considered likely receptors, because a building, which has a six-inch thick concrete floor slab, covers the site. Foreseeable use includes the demolition of the existing structure and the construction of a new commercial building. The most likely present and future human receptors for the site are subsurface workers, who may be exposed to impacted soil and/or groundwater as a result of remediation or construction activities. Potential remediation and construction worker exposures to soil and ground water would be mitigated through the required Occupational Safety & Health Administration (OSHA) training and appropriate health and safety procedures and protocols. Future commercial building users would not be considered likely receptors provided appropriate engineering controls are in place.

1.6 Summary of Remedy

The proposed remediation includes excavation and offsite disposal of impacted soils from 15 to 18 feet below ground surface (bgs), hydraulic control measures, engineering controls for the lowermost building level, and institutional controls (i.e., Exhibit E of the VCA between the NYSDEC and Georgetown).

The proposed excavation depths are 18 feet over approximately 15 to 20 percent of the site area along the northern perimeter to accommodate building utilities and 15 feet throughout the remainder of the site to accommodate one parking level (Figure 4). In addition to this primary excavation to 15 to 18 feet, several additional minor excavations are anticipated for the installation of elevator pits, basement drainage systems, utility conduit banks, and pile caps. These additional excavations may, depending on final design details and actual construction conditions, extend a few feet deeper than the primary excavation depths of 15 to 18 feet. Soil excavation procedures will require consideration of excavating saturated soils and stabilizing of structures adjacent to the proposed excavation. Hydraulic control measures (e.g., watertight sheeting) will remain in place to serve as a barrier to limit the migration of remaining onsite contamination offsite after remediation. The sheeting left in place will be keyed into the clayey silt layer. Following soil excavation activities, select fill will be installed to provide a surface for installation of an impermeable gas vapor membrane (barrier membrane) and a working surface at the base of the excavation for installation of foundation pile caps. The select fill will mitigate contact by remediation and construction workers with residual contamination beneath the base of the excavation. The barrier membrane will be selected based on compatibility with site contaminants. In addition to physical barriers, fresh air will be supplied and venting installed to the parking level and utility room that would provide additional controls in the unlikely event of breaches to the barrier membrane, building

foundation, and structural slab. A dedicated garage ventilation system will be provided for the subsurface parking level. The system will consist of a supply and exhaust fan that are interlocked and capable of providing a minimum of 6 air changes per hour. In addition, each mechanical/utility room will be supplied with a dedicated ventilation/exhaust fan system providing 2 air changes per hour.

Impacted soil removed from the excavation may require dewatering, stabilization and/or blending prior to transportation and disposal. Impacted soils would be disposed of at a low temperature thermal desorption (LTTD) facility or other acceptable treatment/disposal facility based on characterization sampling. Water removed from the excavation would either be transported to an appropriate facility for offsite disposal or be pretreated in accordance with the appropriate permitting requirements prior to discharge to the sewer system (either onsite or offsite). Further details regarding the proposed remedy are provided in Section 3.

1.7 Contemplated Use

The contemplated use of the site is a commercial office building with one parking level and a utility room bebw grade.

1.8 Project Objectives

The objective of the proposed remediation is to fulfill Georgetown's requirements under VCA with NYSDEC by excavating impacted soil from the site to allow for the construction of a commercial building and to obtain the assignable release and covenant not to sue from the NYSDEC as provided under Exhibit C of the VCA between NYSDEC and Georgetown, effective March 13, 2003.

2. Engineering Evaluation of the Remedy

2.1 General

This section presents a comparative analysis of two potential site remedial alternatives as requested by NYSDEC. The "no action" alternative was not evaluated as part of this comparative analysis, as this would not meet the project objectives.

- The preferred remedial alternative identified in Section 1.6: Alternative A – Soil Removal to 15 to 18 feet Below Grade with Select Additional Removal; and
- An alternate remedial alternative: Alternative B – Soil Removal above the Clayey Silt Layer.

Presented below is a technical description of the remedial alternatives. The comparative analysis of these two alternatives comprises the remainder of this section.

2.2 Technical Descriptions of Remedial Alternatives

This section presents a technical description of each of the two site remedial alternatives.

2.2.1 Alternative A – Soil Removal to 15 to 18 Feet Below Grade with Select Additional Soil Removal

The remedial components of Alternative A are as follows:

- Excavate soil to a depth from 15 up to 18 feet bgs, as shown on Figure 4;
- Excavate soil for elevator pits, basement drainage systems, utility conduit banks, and pile caps;
- Offsite disposition of excavation spoils (approximately 16,600 cubic yards [CY] of in-place soil) at a LTTD facility or other permitted treatment/disposal facility;
- Isolation of remaining impacted soil and groundwater via watertight steel sheeting barrier walls keyed into the clayey silt layer, barrier membrane, and concrete foundation walls at the sides of the excavation and barrier membrane, and a structural slab at the base of the excavation;
- Implementation of building specific engineering controls including, but not limited to, a venting system/fresh air circulation system for the lowermost building level; and
- Implementation of institutional controls to protect future site users as set forth in Exhibit E of the VCA between NYSDEC and Georgetown, effective March 13, 2003.

2.2.2 Alternative B – Soil Removal Above the Clayey Silt Layer

Alternative B includes all of the remedial components of Alternative A, with the following modification:

- Excavate soil to a depth from 15 to 30 feet bgs;
- Offsite disposition of excavation spoils (approximately 23,500 CY of in-place soil) at a LTTD facility or other permitted treatment/disposal facility; and
- Importation, placement, and compaction of approximately 7,000 CY of backfill material to bring excavation up to grade for the building construction.

The reminder of this section presents a comparative analysis of the two potential site remedial alternatives. For National Oil and Hazardous Substances Contingency Plan (NCP) compliance, each of the two remedial alternatives is evaluated against each other in consideration of the NCP criteria.

2.3 Comparative Analysis of the Site-Wide Remedial Alternatives

This section presents a comparative analysis of the two potential site remedial alternatives; Alternative A – Soil Removal to 15 to 18 feet Below Grade with Select Additional Removal and Alternative B – Soil Removal above the Clayey Silt Layer. This comparative analysis identifies advantages and disadvantages of each alternative relative to each other and with respect to seven of the NCP criteria. The eighth criteria, community acceptance, will be evaluated by the NYSDEC. The seven criteria are:

- Protection of human health and the environment;
- Compliance with standards, criteria, and guidance (SCGs);
- Short-term effectiveness & impacts;
- Long-term effectiveness & permanence;
- Reduction of toxicity, mobility, or volume;
- Implementability; and
- Cost.

2.4 Protection of Human Health and the Environment

Both remedial alternatives would be protective of human health and the environment. Both alternatives effectively mitigate exposure to COCs by site users and the public by removing contamination, isolating the remaining contamination, and establishing institutional controls as previously discussed in Section 1.6. For both alternatives, potential risks to site users would be mitigated by installing permanent sheeting, a barrier membrane, and a structural slab/foundation walls to isolate remaining impacted soil outside the remediated area

(i.e. the impacted soils below the excavation base and the remainder of the former MGP) and establishing institutional and engineering controls. Although more impacted soil would be removed in Alternative B, the remaining impacted soil in Alternative A is deep and will be covered by a barrier membrane and a structural slab. Therefore, the remaining soil will not pose potential risks to human health and the environment. The removal of shallow impacted soil and the isolation measures provide protection for human health and the environment and would be similar for both Alternatives A and B. In addition, the declaration of covenants and restrictions (Exhibit E of the VCA) will provide the final mechanism for the protection of human health by prohibiting the use of groundwater, restricting the land use to commercial or industrial, and by requiring institutional and engineering controls.

During subsurface work for remedial purposes (e.g., excavation of subsurface soil) and other construction purposes (installation of geotechnical borings and dewatering wells, excavation for pile caps), subsurface workers may be exposed to COCs in soil and groundwater. Potential worker exposure to soil and groundwater during remedial activities will be mitigated through the required OSHA training and appropriate health and safety protocols. Potential environmental exposures will be mitigated by engineering controls.

2.5 Standards, Criteria, and Guidance (SCG)

The following chemical, action, and location specific SCGs were identified for the site:

- NYSDEC Guidance on Determination of Soil Cleanup Objectives and Cleanup Levels – TAGM #4046;
- New York State Groundwater Quality Standards – 6 Official Compilation of NY State Codes, Rules and Regulations (NYCRR) Part 703;
- NYSDEC Ambient Water Quality Standards and Guidance Values – TOGS 1.1.1;
- OSHA General Industry Standards – 29 (Code of Federal Regulations) CFR Part 1910;
- OSHA Safety and Health Standards – 29 CFR Part 1926;
- OSHA Recordkeeping, Reporting, and Related Regulations – 29 CFR Part 1904;
- Resource Conservation and Recovery Act (RCRA) – Preparedness and Prevention – 40 CFR Part 264 Subpart C;
- RCRA – Contingency Plan and Emergency Procedures – 40 CFR Part 264 Subpart D;
- Identification and Listing of Hazardous Wastes – 40 CFR Part 261 and 6 NYCRR Part 371;
- NYSDEC Management of Coal Tar Waste and Coal Tar Contaminated Soils TAGM #4061;
- NYS Waste Transporter Permits – NYCRR Part 364;
- NYS Solid Waste Management Requirements – 6 NYCRR Part 360 and Part 364;
- Local Building Permits;

- New York State Department of Transportation (NYSDOT) Road Permits;

- Clean Water Act – 33 USC 466 Section 404; and

- New York City Department of Environmental Protection (NYCDEP) Sewer Use Permit.

For Alternative A, the removal of the upper 15 to 18 feet of soil and the additional soil removed for the installation of elevator pits, basement drainage systems, utility conduit banks, and pile caps would meet chemical SCGs. Remaining impacted soil below 15 to 18 feet in the northern to middle portions of the site would not meet the chemical SCGs. Action and location specific SCGs would be met through permitting and site-specific health and safety measures. For Alternative B, the removal of impacted soil above the clayey silt would meet chemical SCGs. Deeper impacted soils within and below the clayey silt will not meet the chemical SCGs. Action and location specific SCGs would be met through permitting and site-specific health and safety measures.

Although not a regulation, NYSDEC's TAGM 4046 serves as guidance for establishing soil cleanup objectives. The soil cleanup objectives contained in TAGM 4046 are based on either reduction of potential human health risks (via exposure to soil) or protection of groundwater quality. Both remedial alternatives meet the intent of TAGM 4046 by mitigating potential risks to human health via soil exposure and by protecting groundwater quality through isolation of remaining constituents. For both remedial alternatives, mitigating potential risks to human health via soil exposure would be accomplished by soil removal and isolation (installing permanent watertight steel sheeting, barrier membrane, structural slab, and foundation walls). For both remedial alternatives the protection of groundwater would be addressed by installing permanent steel sheeting, a barrier membrane, and a structural slab to isolate the site media from the surrounding area. In addition, the construction of the buildings structural slab and foundation walls will mitigate, to the extent practicable, the infiltration of precipitation into the underlying soils.

During the remediation, the site Contractors will be required to comply with applicable OSHA and RCRA health, safety, reporting, and contingency procedures; New York City permits procedures; NYSDOT road permit procedures; procedures for discharges to NYCDEP sewers/publicly owned treatment works; TAGM 4061, and procedures discussed below.

The remediation will comply with TAGM 4061, which provides guidance for the management of coal tar waste and impacted soil from former MGPs. Under this guidance, coal tar waste and soil impacted by coal tar waste may be conditionally excluded from the requirements of 6 NYCRR Parts 370 through 374 and Part 376 and 40 CFR 261 when such wastes and soil solely exhibit the characteristic of a hazardous waste due to benzene toxicity and are permanently thermally treated. The soil proposed for excavation does not appear to contain significant quantities of purifier wastes, any listed or characteristic wastes, or other incompatible material for thermal treatment.

- Solid waste management requirements under 6 NYCRR Parts 360 and 364 will be followed for the:

- Soil excavation and storage at the point of generation;

- Transportation to the treatment facility or unit;

- Handling and storage prior to treatment at the facility;

- LTTD treatment or other acceptable treatment/disposal; and

- Management of treated materials.

A 6 NYCRR Part 364-permitted transporter will transport the excavated soil to the treatment/disposal facility.

2.6 Short-Term Effectiveness and Impacts

For both alternatives, potential short-term impacts would be associated with the remediation activities and increased vehicular traffic. Excavation and handling of soil may pose potential risks to onsite workers through direct contact with impacted media, generation of nuisance odors and organic vapors, and risks associated with the depth of excavation. Excavation and handling of soil may pose risks to the surrounding community through generation of nuisance odors, dust and organic vapors resulting from disturbance of soil and mobilization of impacted material offsite by workers and vehicles. Other potential impacts to the community could include construction-related noise and construction-related vehicular traffic. Potential short-term worker exposure to COCs resulting from remediation activities would be mitigated through the proper selection and use of personal protective equipment (PPE), conducting air monitoring activities, and implementing engineering controls (e.g., dust suppression, vapor suppression). Potential short-term exposure to the community would be mitigated through conducting air monitoring activities, implementing engineering controls and decontamination procedures to minimize the potential for offsite migration of the constituents beyond site perimeters, implementing appropriate security procedures, and maintaining a temporary fence to restrict unauthorized/uncontrolled access. Potential environmental impacts would be mitigated through the use of engineering controls, such as erosion control procedures.

Implementation of Alternative B would likely result in potentially higher exposures of the community and onsite workers to site constituents in comparison with Alternative A, because Alternative B involves more extensive disturbance of the site media (i.e., deeper excavation of the soil and more truck traffic (over 400 additional trips) for soil disposition and backfill activities). The additional time period for completing remedial excavation activities associated with implementation of Alternative B compared to Alternative A is estimated at seven months, or over double the time for which potential vapor migration may occur. The additional seven months increases the duration for potential short-term impacts to workers and the community.

2.7 Long-Term Effectiveness and Permanence

The removal and subsequent disposition of 16,600 and 23,500 in-place cubic yards of impacted soil for Alternative A and Alternative B, respectively, would provide long-term effectiveness and permanence. The permanent watertight sheeting, barrier membrane, structural slab/foundation walls, and engineering controls would be effective to mitigate potential impacts associated with remaining constituents. In addition, the declaration of covenants and restrictions (Exhibit E of the VCA) will provide the final mechanism for long-term effectiveness by prohibiting the use of groundwater, restricting the land use to commercial or industrial, and by requiring institutional and engineering controls.

2.8 Reduction of Toxicity, Mobility, or Volume

Both alternatives would permanently reduce the toxicity and volume of constituents present in soil by removing impacted soils and treating those soils at a LTTD facility or other acceptable facility offsite. Volume and mobility reduction would be realized upon soil excavation, while toxicity reduction would occur upon offsite

LTTD treatment or other acceptable treatment. Alternative B reduces the toxicity of 6,900 additional in-place cubic yards of soil compared to Alternative A. Both remedial alternatives equally reduce the mobility of remaining constituents through the use of permanent steel sheeting which will isolate the site media and the subsequent construction of the barrier membrane, and structural slab/foundation walls which will mitigate, to the extent practicable, the infiltration of precipitation into the underlying soils.

2.9 Implementability

Both alternatives offer a technically feasible approach that can be implemented using available remedial contractors. Alternative A can be implemented using standard construction equipment (hydraulic excavators). Alternative B may require specialized construction equipment to facilitate the greater depth of excavation (clamshell excavators or other specialized equipment). Construction methods for both remedial alternatives are developed and are not anticipated to require further technical development prior to implementation.

Both alternatives contain uncertainties associated with excavation at and near a former MGP site (e.g., abandoned piping, NAPL) and within an urban setting (adjacent buildings, utilities, limited site space, roadways). Alternative A could be implemented with fewer uncertainties than Alternative B. The additional uncertainties associated with implementation of Alternative B (as compared with Alternative A) are related to the additional depth of excavation and additional duration of remediation activities. The additional depth of excavation associated with Alternative B will require more extensive sheeting/shoring and soil dewatering activities. The additional duration of excavation activities associated with Alternative B may result in project delays beyond the seven additional months estimated for Alternative B in comparison to Alternative A (e.g., due to inclement weather).

The administrative feasibility of Alternative B would require the handling and dewatering of an additional 6,900 in-place cubic yards of soil compared to Alternative A. The handling and dewatering of soil and the management of water generated throughout the remediation activities in a limited work area, pose additional considerations during implementation, which could result in additional project delays.

Alternative B, therefore, includes more uncertainties than Alternative A. Thus, while both alternatives could be implemented as both rely on available technologies during implementation, Alternative B places greater reliance on dealing with potential uncertainties by using project planning, engineering controls, and contingency planning. This creates the greater likelihood of additional project delays.

2.10 Cost

A summary of the estimated cost for the remedial alternatives is presented below. Detailed cost estimates for the remedial alternatives are provided in Table 1 and Table 2. Please note that these costs are order of magnitude engineering cost estimates.

Remedial Alternative	Estimated Cost
Alternative A – Soil Removal to 15 to 18 feet Below Grade with Select Additional Removal	$11,500,000
Alternative B – Soil Removal above the Clayey Silt Layer	$20,500,000

2.11 Summary of the Comparative Analysis

A summary of the comparative analysis is presented in the table below.

Evaluation Criteria	Findings
Protection of Human Health and the Environment	• Both remedial alternatives would require institutional and engineering controls. • Both remedial alternatives would be protective of human health and the environment.
Standards, Criteria, and Guidance	• Both remedial alternatives could be implemented in a matter that complies with the applicable SCGs.
Short-Term Effectiveness and Impacts	• Alternative B has more potential short-term risks than Alternative A. However, the short-term risks posed by both alternatives could be effectively mitigated. • The timeframe required to complete Alternative B would be 7 months longer than Alternative A.
Long-Term Effectiveness and Permanence	• Both alternatives would effectively mitigate potential direct human contact and biota exposure to COCs that would remain in the soils.
Reduction of Toxicity, Mobility, or Volume	• Both remedial alternatives would reduce the toxicity, mobility, and volume of constituents in the soil. • Both remedial alternatives reduce the mobility of COCs that would remain in the soils.
Implementability	• Both remedial alternatives could be implemented using proven technologies and available remedial contractors. • Alternative B may require specialized contractor equipment to facilitate greater depth of excavation. • Additional excavation activities for Alternative B pose additional administrative considerations during implementation and could result in further project delays.
Cost	• Alternative A is $11,500,000 while Alternative B is $20,500,000. As such, Alternative A is the more cost effective remedy that meets the Project Objectives.

3. Project Plans and Specifications

3.1 General

This section presents a description for the preferred remedial action that will be conducted at the site. The following remedial action and related activities will be conducted:

- Remediation Contractor procurement;
- Mobilization/site preparation;
- Site security;
- Commercial building foundation piles;
- Soil removal;
- Air monitoring;
- Water management;
- Equipment decontamination and residual waste management;
- Transportation and disposal;
- Post-removal activities; and
- Demobilization.

A description of the remedial action activities is presented below.

3.2 Remediation Contractor Procurement

Georgetown will select a Remediation Contractor to implement the remediation activities. The Remediation Contractor will work in conjunction with the overall Construction Contractor for the site. The specific responsibilities of the Remediation Contractor (and subcontractors) and the Construction Contractor (and subcontractors) related to remediation activities will be identified in the Site Operations Plan. For purposes of this RAWP, certain remedial activities will be assigned to the Remediation Contractor/Construction Contractor until specific responsibilities are determined. The selected Remediation Contractor will prepare submittals, as required, for review, as appropriate from the NYSDEC and the New York State Department of Health (NYSDOH) prior to mobilization to the site (e.g., Site Operation Plan; site-specific Health and Safety Plan (HASP); Community Air Monitoring Plan, and Soil Erosion and Sedimentation Control Plan. The Construction Contractor will be required to submit a task-specific HASP for incorporation into the Remediation Contractor's site-specific HASP), identifying control mechanisms to mitigate potential hazards associated with any work tasks they are retained to complete (e.g., watertight sheeting installation, pile installation, etc.).

3.2.1 Pre-Remediation Submittals

The Remediation Contractor will prepare and submit detailed plans and other documents to NYSDEC and NYSDOH for review as required by the VCA. These submittals are anticipated to include the following:

- Site Operations Plan (SOP);
- Site Health and Safety Plan (HASP);
- Community Air Monitoring Plan (CAMP);
- Construction Quality Assurance Plan (CQAP);
- Erosion and Sedimentation Control Plan;
- Records/record drawings;
- Waste (soils and water) disposal information (including disposal facilities, testing requirements, permitting requirements, and pretreatment requirements, if necessary); and
- Disposal transportation routes from the site to each disposal facility (including description of containers and covers, modes of transportation, permitting requirements, and expected frequency and schedule of transportation (e.g., trucks per day).

Site Operations Plan

The SOP will provide detailed procedures for the site operations and construction activities to be implemented for the completion of the remediation. Site remediation activities will include the following:

- Work schedule;
- Site security;
- Mobilization and site preparation;
- HASP, CAMP, CQAP, and other plan preparation;
- Installation of steel sheet piling;
- Traffic control;
- Excavation sequencing;
- Methods for material handling;
- Staging area development;
- Methods for dewatering/stabilizing soil;

- Dewatering liquid collection, pretreatment (if applicable), and disposal;
- Unanticipated subsurface obstructions;
- Waste handling and disposal;
- Offsite transportation plan;
- Disposal facility (ies);
- Coordination for piles and pile caps;
- Select fill installation;
- Vapor barrier installation;
- Equipment decontamination and residual waste management;
- Odor control;
- Site demobilization;
- Final engineering report; and
- Organizational chart of key personnel, including subcontractors and resumes of key personnel.

The Remediation Contractor will submit the SOP to the NYSDEC and NYSDOH at least twenty days prior to site remediation activities.

Site Health and Safety Plan

The Remediation Contractor will be responsible for the preparation of the overall site-specific HASP that covers the remediation efforts as set forth in Section 3 of this RAWP. Each party performing work on site will comply with the overall site-specific HASP and will prepare their own task-specific HASP for their organization, which will be consistent with the overall site-specific HASP. Each task-specific HASP must meet the minimum requirements established in the site-specific HASP and 29 CFR 1910 and 1926. Each party will also agree in writing to abide by requirements set forth in the site-specific HASP. The Remediation Contractor will submit the overall site-specific HASP and the subcontractor's and Construction Contractor's task-specific HASPs (which will be consistent with the overall HASP) to NYSDEC and NYSDOH at least twenty days prior to site remediation activities.

Community Air Monitoring Plan

This plan will provide the real-time air monitoring procedures for VOCs and particulates in accordance with the NYSDOH Generic Community Air Monitoring Plan. The Community Air Monitoring Plan (CAMP) is further discussed in Section 5 of the RAWP. The Remediation Contractor will submit the CAMP to the NYSEC and NYSDOH at least 20 days prior to site remediation activities.

Construction Quality Assurance Plan

The Remediation Contractor will be responsible for the preparation of the CQAP, which will include the construction quality assurance/quality control (QA/QC) procedures for the remediation activities. The CQAP is further discussed in Section 6 of this RAWP. The Remediation Contractor will submit the CQAP to the NYSDEC and NYSDOH at least twenty days prior to site remediation activities.

Erosion and Sedimentation Control Plan

This plan will identify measures that may be implemented by the Remediation Contractor/Construction Contractor to minimize erosion and sedimentation during remediation activities. Measures will include physical methods to control and/or divert surface water flows and to limit the potential for erosion and migration of site soils. Soil stockpiling, dust control, maintenance, and removal procedures associated with erosion control measures will also be provided in this plan. The Erosion and Sedimentation Control Plan is further discussed in Section 6 of this RAWP. The Remediation Contractor will submit the Erosion and Sedimentation Control Plan to the NYSDEC and NYSDOH at least 20 days prior to site remediation activities.

3.3 Mobilization/Site Preparation

Prior to commencing the remediation, the Remediation Contractor/Construction Contractor will perform mobilization and site preparation activities. Descriptions of mobilization and site preparation activities are provided below. The exact methods used by the Remediation Contractor/Construction Contractor will be specified in the SOP.

The following mobilization/site preparation activities will be required to be conducted by the Remediation Contractor/Construction Contractor:

- Identifying the location of all aboveground and underground utilities (e.g., power, gas, water, sewer, telephone, etc.), equipment, and structures (as necessary to implement the remediation);

- Mobilizing necessary remediation personnel, equipment, and materials to the site;

- Clearing the areas that could obstruct/limit the soil excavation activities;

- Constructing a stabilized construction entrance consisting of a clean gravel roadway will be installed at or near the site exit, which takes into consideration the site setting and site perimeter;

- Constructing materials staging area(s) for overall management and dewatering, stabilizing, and staging of excavated material. At a minimum, the staging area(s) will be bermed and lined with a 30 mil low-permeability liner that will slope to a collection sump. In addition, precautions to protect the integrity of the liner will be required such as the installation of a drainage/soil layer and/or geotextiles over the liners;

- Constructing an equipment decontamination pad for trucks, equipment, and personnel that come into contact with impacted materials during remedial activities. At a minimum, the decontamination pad will have a 30 mil low-permeability liner, be bermed and sloped to a collection sump to contain and collect fluids, and have side walls to mitigate, to the extent practicable, errant overspray, especially when decontaminating large equipment;

- Installing erosion and sedimentation control measures in accordance with the provisions of the Soil Erosion and Sediment Control Plan;

- Conducting site preparation activities including demolition of the existing building and building foundations, removing select soil above the groundwater table, and grading the site for foundation pile driving;

- Installing a groundwater extraction system and associated piping to draw down the groundwater table prior to soil removal in accordance with the water management procedures within the SOP;

- Construction of either an onsite water management system and associated piping connections (if applicable) to the sewer system for subsequent discharge to the NYCDEP sewer system or an offsite groundwater management area for staging water prior to offsite disposal in accordance with the water management procedures within the SOP;

- Abandoning groundwater monitoring wells located at the site that lie within the excavation that are not to be utilized as part of the water management system;

- Installing and maintaining temporary fencing or other temporary barriers to limit unauthorized access to the areas where remediation activities will be conducted; and

- Installing underpinning piles (i.e., a small diameter foundation pile that is grouted in-place similar to a soil boring) beneath/adjacent to the existing building foundation to the east to stabilize and maintain the integrity of the adjacent structure's foundation.

3.4 Site Security

Access to the site will be restricted by perimeter fencing that will surround the work area. To further limit access and augment site security during the remediation activities, additional measures will be required. These will include the following during performance of the project:

- Security at the site (including the excavation, staging, handling, decontamination, and storage areas) will be maintained during both work and nonwork hours. The level of site security will be dependent on the activities being performed and location of activities; however, the following security measures will be implemented: perimeter fencing, temporary fencing and/or barriers, warning tape, maintenance of sign-in/sign-out sheets, and implementation of safe work practices. Descriptions of site security measures are provided below. The exact methods used by the Remediation Contractor/Construction Contractor will be specified in the SOP;

- Perimeter Fencing - At a minimum, the site work area will be enclosed with a perimeter security fence, to control access for nonauthorized personnel. Access gates will provide ingress and egress access to the site. A perimeter fence will be installed around the remediation area consisting of an 8-foot high plywood fence, or equivalent;

- Temporary Fencing - The perimeter fence will be supplemented by temporary construction fencing as needed to delineate and secure areas of the ongoing remediation activities. Such temporary fencing would likely be 4 feet high, constructed of high-density polyethylene (HDPE), and orange (other fencing

configurations of equivalent performance would be considered). At a minimum, the following areas will be subject to this requirement:

- Areas where soil removal, stockpiling (if applicable), or loading for offsite transport occurs;
- Areas designated as health and safety zones;
- Areas utilized for personal or equipment cleaning activities; and
- Any areas where the remediation activities may cause a disruption to the normal vehicular or pedestrian traffic.

- Posting of Warning Tape and Signs - To restrict access during remediation activities, warning tape may be installed at certain locations, such as open excavations, cleaning areas, and stockpile areas;

- Sign-In/Sign-Out Sheet - For the duration of remediation activities, a sign-in/sign-out sheet will be maintained for the site at the site trailer. All site personnel and site visitors will be required to sign in upon entering the site and sign out upon leaving;

- Implementation of Safe Work Practices - Implementation of safe work practices will provide for additional site security during remediation. Safe work practices that will contribute to overall site security include the following:

  - Maintaining temporary construction fencing and signage around all open excavations and other potentially dangerous areas;
  - Parking heavy equipment in a designated area each night and removing keys;
  - Maintaining an organized work area, including maintaining access roads, proper storage of all tools and equipment;
  - Conducting a daily security review and health and safety meetings; and
  - Maintaining covers on staging areas and associated sumps.

3.5 Commercial Building Foundation Piles

Following removal of select soil above the groundwater table, it is currently anticipated that the foundation piles will be installed by the Remediation Contractor or the Construction Contractor retained for building construction and that after installation of the piles, the Remediation Contractor/ Construction Contractor will conduct the remainder of the excavation. Closed end round steel pipe piles with pointed tips will be driven through subsurface soils, prior to excavation activities, to provide support for the proposed commercial structure. It has been documented (Hayman, et al., 1993)[1] that when cylindrical section piles are driven in the subsurface soil, the lateral pressure generated seals the annular space between the pile and the surrounding soil mitigating a preferential pathway for fluid migration. Following soil excavation activities, the Remediation Contractor/Construction Contractor will install the pile caps. The actual sequencing of excavation and foundation pile installation may be modified based upon the Remediation Contractor/ Construction Contractor final design and/or SOP.

[1] Hayman, J.W., Adams, R.G. Foundation piling as a potential conduit for DNAPL migration. Proceedings of the Air and Waste Management Association Meeting, Denver, CO, June 13-18, 1993.

3.6 Soil Excavation

The following activities will be required as part of the soil excavation activities. The exact methods used will be specified in the SOP.

3.6.1 Watertight Steel Sheeting

Watertight sheeting will be installed by the Remediation Contractor/Construction Contractor to facilitate the soil excavation activities. The design of the steel sheeting installation, including requirements for pre-drilling and/or trenching, for this particular application shall consider several factors, including the limits, depth, and configuration of the removal area (relative to the surrounding grade), the nature of the subsurface materials, the position of the water table, and other site conditions. The design of the steel sheeting required to support the excavation will be in compliance with applicable state, federal, and local regulations, including but not limited to OSHA 29 CFR 1926 Subpart P.

Watertight steel sheeting such as the Waterloo Barrier, Sevenson Seal System, or an equivalent system will be installed around the excavation limits (Figure 4) for the purpose of:

- Providing shoring of the excavation sidewalls during soil excavation activities;
- Providing separation of the site from the surrounding subsurface areas;
- Minimizing the potential for the migration of MGP constituents, either onto or away from the site; and
- Minimizing the amount of groundwater infiltration into the excavation to facilitate the dewatering activity.

Conceptually, this corrosion-resistant watertight steel sheeting would contain bentonite grout sealed interlocking panels. The sheeting will extend into the clayey silt unit. The depth to which it will extend into the unit will depend on structural and engineering requirements. This sheeting will remain in place following soil excavation activities.

3.6.2 Soil Excavation Method and Approach

Following watertight steel sheeting installation around the limits of excavation and the installation of foundation piles (pending finalization of the SOP), soil will be excavated to depths of 15 to 18 feet bgs, and transported offsite for disposal. Soil removal at the site will be conducted to pre-determined elevations to facilitate construction of the proposed commercial building. Additional soil excavations will also be conducted for the installation of elevator pits, basement drainage systems, utility conduit banks, and pile caps and may extend a few feet deeper than the primary excavation depths of 15 to 18 feet. No verification sampling will be conducted following completion of soil excavation activities. The estimated horizontal limit and vertical extent of soil to be removed is shown on Figure 4. Actual elevations will be provided in the SOP.

Soil excavation will generally be conducted using conventional hydraulic excavation equipment. In areas where underground utilities, piping, or other structures are located, the soil excavation may be conducted by hand. Excavation of impacted subsurface soils will require the removal of soil from below the historic groundwater table (6 to 8 feet bgs) and therefore hydraulic controls will be required to manage groundwater in the previously

saturated soil. Water that accumulates in the excavation areas will be extracted and contained as part of the excavation dewatering process as described in Section 3.8. Soil excavation activities that occur beneath the historic groundwater table and occur at depths greater than 4 feet will require excavation reinforcement (such as sheeting) prior to initiating soil excavation. Excavation and shoring/sheeting activities in the vicinity of the adjacent offsite building and/or other structures will be conducted in a manner that protects the integrity of these structures.

Soil excavated from above the groundwater table will generally not require dewatering. However, soil excavated from below the groundwater table will likely require dewatering and possibly stabilization. Dewatering of excavated materials, if needed to meet disposal requirements, will be performed in accordance with the requirements of the disposal facility. Soil dewatering/stabilization requirements are described in Subsection 3.6.3. Water management requirements for soil excavation activities are described in Section 3.8.

Odor/vapor and dust monitoring and control action levels will be specified in the overall site HASP prepared by the Remediation Contractor. At a minimum, odor/vapor and dust controls will be initiated when work area action levels, as presented in the HASP, or perimeter action levels as specified in the CAMP are exceeded.

Odor/vapor and dust control of the excavation and excavated materials, if necessary, will be obtained through one or more of the following methods:

- Foam suppression using chemical masking and/or encapsulation;
- Water spray;
- Cover excavation and/or soil in staging area(s) with ultraviolet resistant polyethylene plastics at least 5-mil thick;
- Minimize extent of excavation areas; and/or
- Methods selected by the Remediation Contractor.

Air monitoring is further discussed in Section 3.7.

3.6.3 Soil Dewatering/Stabilization

Due to the limited space available at the site, soils will be direct loaded, to the extent practicable, in a manner that minimizes the potential for inadvertent releases to the environment, unsafe conditions for onsite personnel, and delays or complications in project implementation. However, excavated soil containing free liquids, if any, may require dewatering prior to offsite transportation and disposition as specified by the treatment/disposal facility. In general, excavated soil that contains free liquid may be dewatered using gravity drainage at onsite or permitted offsite staging area(s) and/or stabilized with other materials. Methods to be implemented during soil dewatering/stabilization activities will be further discussed in the SOP.

If an offsite staging area is to be used, the Remediation Contractor is required to obtain all permits necessary and comply with all applicable federal, state, and local regulations for transportation and staging of materials at the offsite location. Air monitoring will be conducted at offsite staging areas, if applicable, in accordance with methods specified in Section 3.7.

Following gravity dewatering, the paint filter test (USEPA SW-846 Method 9095) and/or visual observation may be used to determine if excavated soil contains free liquids. If excavated soil still contains free liquids, additional stabilizing agent will be mixed with the excavated material to reduce moisture content. Gravity dewatering and/or stabilizing operations will be conducted in one or more dedicated staging areas constructed at location(s) selected by the Remediation Contractor. If staging areas are constructed, they will meet the following minimum requirements:

- The excavated soil will be placed onto a 30 mil low-permeability liner of sufficient strength and thickness to prevent puncture during use. The placement and/or removal of soil into the staging area will not involve any equipment or procedures that may jeopardize the integrity of the underlying low-permeability liner;

- The staging area will be continuously covered with a properly anchored membrane, except while soil is actively being placed, stabilized, or removed. This membrane will be maintained for the duration of staging activities;

- A perimeter berm will be constructed around the staging area to contain water that has drained from the staged soils and to mitigate the potential for surface water run-on to come in contact with the staged soils;

- The staging area will be sloped and equipped with a sump to collect water that has drained from the stockpiled soils. The sump will be constructed in accordance with the description provided in Section 3.8 for groundwater diversion/excavation dewatering. Drained water will be removed from the sump, as required, and handled in accordance with Section 3.8;

- Stabilizing operations may be conducted within the staging area, but only if the integrity of the low-permeability liner and perimeter berm is maintained throughout the work. Stabilizing operations include the addition of a stabilization agent such as quick lime or cement to soils by some type of mechanical mixing (i.e., pug mill, backhoe, etc.). Stabilizing operations may also be conducted after the soil has been loaded into lined rolloffs for offsite disposition provided the integrity of the liner is maintained; and

- The staging area will be inspected daily and noted deficiencies will be promptly addressed.

3.7 Air Monitoring

An air-monitoring program will be established prior to, and will be implemented during site remediation activities to protect the health and safety of site workers and the surrounding community, address potential nuisance odors, and establish appropriate response protocols for potential emission source control. This effort will include both work area and perimeter air monitoring programs. The air monitoring activities will be conducted onsite and at offsite staging areas (if any), as appropriate. The onsite air monitoring program will be presented in the site specific HASP and the perimeter air monitoring program will be presented in the CAMP, to be prepared by the Remediation Contractor. The methods to control odors and/or vapors during remediation activities will be specified in the SOP, and may include the measures previously described in Section 3.6.2.

The work area/breathing zone air monitoring program will be implemented by employing direct-reading survey instruments to identify the appropriate level of PPE needed based on total organic vapor and particulate concentrations. Excavations will be monitored for total organic vapors, total particulate, lower explosive limit (LEL) (flammable vapors), oxygen, and hydrogen sulfide. Breathing zone personal sampling will be implemented for BTEX and PAHs in accordance with NIOSH Methods 1501 and 5515 respectively, to address and document potential full-shift exposures for personnel in the work areas.

A perimeter air-monitoring program will be established and will consist of air monitoring stations at the perimeter of the site. Perimeter monitoring will include use of hand held direct-reading survey instruments for total organic vapors and dedicated direct-reading survey instruments for particulate monitoring at each perimeter air monitoring sample station. Chemical specific air monitoring (Method TO-14 analysis using Summa canisters, or equivalent) will be conducted if perimeter action levels for VOCs are regularly exceeded, or nuisance odors are prevalent offsite. Prior to remediation, a chemical specific air sample will be obtained, analyzed, and used as a baseline sample. All air samples collected for analysis will be submitted to a NYSDOH Environmental Laboratory Approval Program- (ELAP) accredited laboratory.

Action levels will be established for the worker area/breathing zone and perimeter air-monitoring program to determine if health and safety protocols or construction technique modifications need to be performed to reduce odor/vapor or dust emissions from the site.

3.8 Water Management

During the soil excavation activities, surface water diversion methods and groundwater hydraulic controls will be implemented to minimize the amount of water that enters an excavation area.

Watertight sheeting alone may not effectively control vertical hydraulic gradients during excavation activities that could potentially create unstable geotechnical conditions. Therefore, an additional pressure-relief mechanism will be employed in combination with the steel sheeting to achieve acceptable vertical gradients during excavation. The Remediation Contractor/Construction Contractor may install groundwater extraction wells to lower the groundwater elevation to reduce pore water in soil and to control vertical hydraulic gradients during soil excavation activities. It will be the responsibility of the Remediation Contractor/Construction Contractor to monitor hydraulic gradients (e.g., installation and monitoring of piezometers) and take appropriate action to maintain the integrity of the excavation floor.

Surface water diversion methods may include (but are not limited to) channeling surface water flow around the soil excavation areas by excavating a temporary ditch, construction of berms, or installing piping to create a preferential flow path for the surface water around each excavation area.

During the soil excavation activities, groundwater (or surface water) that accumulates within the excavation area will be removed to assist in dewatering the soil and to facilitate sedimentation/erosion control. Groundwater (or surface water) that accumulates within an excavation area will be removed via pumping (to the extent practicable). To minimize the amount of soil being removed during pumping activities, a sump may be constructed within an excavation area using one of, or a combination of, the following techniques:

- Excavation of a sump and backfilling the sump with washed gravel and installing geotextile, as needed;
- Cutting perforations into a cylindrical object (i.e., a corrugated metal pipe or 55-gallon drum) and wrapping the perforated object with a non-woven geotextile fabric;
- Installing haybales and/or silt fence around the area that the water is being pumped from; and/or
- Methods selected by the Remediation Contractor/Construction Contractor.

Water generated as a result of the remediation activities will either be pretreated onsite and discharged to the NYCDEP sewer system in accordance with applicable permits or be collected for offsite disposition in accordance with applicable federal, state and local regulations as specified in Subsection 3.10.2. Water samples collected in accordance with the discharge permit requirements will be submitted to a NYSDOH ELAP-approved laboratory for analysis.

3.9 Equipment Decontamination and Residual Waste Management

Equipment cleaning will be utilized to prevent the transport of waste materials that may be present on the equipment used for remediation activities (e.g., excavators, loaders). The Remediation Contractor will select the methods and approach (as part of the SOP) for equipment decontamination activities. Specific equipment cleaning procedures will be required, at a minimum, to include the following:

- Each transport vehicle will be visually inspected before leaving the loading area. Accumulations of soil on the vehicle tires or other exterior surfaces will be removed manually or, if necessary, by using a high-pressure water and/or steam spray in the equipment cleaning area.

- Material handling equipment that has come into contact with waste-containing soils will be cleaned in the equipment cleaning area before it enters non-work areas, handles "clean" materials (e.g., backfill), or leaves the site. Equipment cleaning will likely be performed manually, utilizing a high-pressure water spray, and/or steam cleaning.

- Liquid materials, such as decontamination water (and other residual material collected during equipment decontamination), will be collected and containerized for off-site disposition and/or pretreated, if necessary, and discharged to the sewer system.

- A visual inspection of heavy equipment (e.g., excavators, loaders) will be performed following final equipment cleaning. If the visual inspection indicates waste materials remain, the equipment will be recleaned and reinspected.

- Following completion of water treatment activities the temporary water treatment system (if installed as part of the water management system) will be subject to cleaning. Any accumulated material will be removed, containerized and sampled for the required disposal parameters of the selected disposal facilities to determine appropriate disposition. The treatment system components will then be cleaned by high-pressure water spray or flushing. The wash water will be collected and containerized for appropriate disposal.

Residual wastes likely to be generated during excavation activities include used disposable equipment, PPE, sampling equipment, cleaning residuals, etc. These materials will be containerized as generated and staged for subsequent disposal by the Remediation Contractor in accordance with federal, state, and local requirements and the requirements specified in Section 3.9.4. If soil transport activities are in progress, residual materials may be included with the materials subject to offsite disposal. Characterization samples collected will be submitted to an ELAP-approved laboratory for analysis.

3.10 Transportation and Disposal

Due to the limited space available at the site, all soils will be direct loaded, to the extent practicable (subject to the limitations discussed in Section 3.6.3), in a manner that minimizes the potential for inadvertent releases to

the environment, unsafe conditions for onsite personnel, and delays or complications in project implementation. Ultimately, the removed soils will be transported to offsite facilities for appropriate treatment/disposal in accordance with applicable regulations for disposal.

In addition, groundwater will be extracted from the excavation areas as part of the excavation dewatering process. The extracted groundwater (as well as rainwater that contacts impacted soil and water generated as part of equipment cleaning) will be subject to pretreatment (as required) and discharged to the sewer system or containerized for offsite disposition. If the use of an offsite dewatering /stabilization location is required, transportation vehicles will be lined and materials will be sufficiently stabilized to prevent spillage or leakage during transportation.

The Remediation Contractor will identify the means and methods (as part of the SOP) for dewatering site soils so that such soils can be direct loaded and meet the disposal requirements, to eliminate to the extent practicable the need to stockpile soils onsite, and to control site odors. The Remediation Contractor will be required to prepare contingency plans (as part of the SOP) for soil dewatering/stabilization and soil stockpiling.

3.10.1 Disposition of Soils and Debris

Soil/fill or debris will be handled, loaded, transported, and disposed of at one or more permitted disposal facilities capable of accepting MGP-materials in a manner consistent with NYSDEC program policy, TAGM 4061, *Management of Coal Tar Waste and Coal Tar Contaminated Soils and Sediment from Former Manufactured Gas Plants*, dated January 11, 2002 (Appendix A). The final disposition of all soil/fill or visually impacted debris will be at a LTTD facility or other permitted treatment/disposal facility.

If direct loading of excavation spoils for offsite disposition is the proposed method in the SOP, the Remediation Contractor will conduct pre-excavation characterization sampling in accordance with the treatment/disposal facility (ies) requirements. Otherwise the Remediation Contractor will conduct excavation characterization sampling in accordance with the treatment/disposal facility (ies) requirements. Laboratory tests for characterization of the waste stream typically required at an LTTD facility include the following:

- Total petroleum hydrocarbons (TPH) by gas chromatograph/ photoionization device (GC/PID);
- Total VOCs, Method 8260;
- Total SVOCs, Method 8270;
- Total PCBs, Method 8082;
- Total metals (14), Method 6010B;
- Total cyanide, Method 9010; and
- Percent sulfur, Method D129-64.

While the soil disposal acceptance criteria may differ for various LTTD facilities, the following parameters are typical for LTTD facilities:

- Polycyclic aromatic hydrocarbons (PAHs) less than 3,000 part per million (ppm);

- Water content less than 15%;
- TPH feed requirements: approximately 14,500 ppm;
- Cyanide less than 1,300 ppm; and
- Sulfur less than 50,000 ppm.

Characterization samples collected will be submitted to an ELAP-approved laboratory for analysis.

The Remediation Contractor will perform all aspects of the transport and disposal of materials. Materials subject to offsite disposal will be transported via the selected and permitted transport mechanisms to the appropriate disposal facilities. The Remediation Contractor will be responsible for decontaminating and visually inspecting the disposal vehicles prior to leaving the site. Licensed haulers will perform all transport of materials in accordance with appropriate local, state, and federal regulations. Loaded vehicles leaving the site will be appropriately lined, tarped, manifested, and placarded in accordance with appropriate federal, state, local, and NYSDOT requirements (or other applicable transportation requirements).

3.10.2 Water

As part of the SOP, the Remediation Contractor will select the methods and approach for handling and disposition of water generated during the remedial activities. Methods may include containerization and subsequent offsite disposition or pretreatment followed by discharge to the sewer system for subsequent treatment at the local POTW. The Remediation Contractor will be required to obtain and comply with applicable permits required for disposition of wastewater generated during the remedial activities.

During dewatering operations, the discharge of collected water into the sewer system may require some type of pretreatment before discharge depending on the levels of constituents in the water intended to be discharged. The following constituent discharge limits represent typical monitoring parameters and associated daily maximum discharge criteria (except if noted); the exact discharge limitations will be specified in the NYCDEP-issued discharge permit.

Parameter	Criteria
Oil and Grease	15 mg/l
pH (range)	6.5 - 8.5 (daily average)
Benzene	0.01 mg/l
Toluene	0.01 mg/l
Xylenes (Total)	0.01 mg/l
Ethylbenzene	0.01 mg/l
Temperature	no more than 150 degrees F
Total Petroleum Hydrocarbons	no more than 50 mg/l
pH	no less than 5.0 and no greater than 11.0
Cadmium	no more than 2 mg/l
Chromium (hexavalent)	no more than 5 mg/l
Copper	no more than 5 mg/l
Cyanide (amenable)	no more than 0.2 mg/l

Parameter	Criteria
Lead	no more than 2 mg/l
Mercury	no more than 0.05 mg/l
Nickel	no more than 3 mg/l
Zinc	no more than 5 mg/l
Flash Point	no less than 140 degrees F
Oil and Grease	no limit
Molybdenum	no limit
Total Suspended Solids	no limit

3.10.3 NAPL

Free phase NAPL, if encountered, will be handled in accordance with TAGM 4061.

3.10.4 Miscellaneous Waste

Miscellaneous waste generated during the remediation activities may be classified as general refuse or remediation-related waste material.

General refuse (i.e., material that has not contacted any impacted site media) including, but not limited to, used disposable equipment, perimeter and temporary fencing will be managed as a nonhazardous waste and disposed of at a nonhazardous solid waste disposal facility.

Remediation-related materials that are either in, or come in contact with, impacted site materials during the remediation activities will be considered contaminated. This material may include ancillary wastes generated as a result of the remediation activities, including (but not limited to) materials used to construct the materials handling and dewatering/staging areas, decontamination pads, and PPE. The Remediation Contractor will be required to characterize the miscellaneous waste prior to offsite disposition at an acceptable facility based on waste characterization activities to be conducted by the Remediation Contractor.

3.10.5 Unanticipated Subsurface Obstructions/Conditions

Unanticipated subsurface obstructions such as old piles, large pieces of demolition debris, and USTs will be handled in accordance with any applicable federal, state, and local ordinances and regulations.

Old Piles and Demolition Debris

Unanticipated old piles and demolition debris within the excavation area will be processed (cut or broken into lengths or pieces suitable for offsite disposition in accordance with the selected disposal facilities requirements. If this construction and demolition (C&D) debris is not visually impacted, such debris will be disposed at a licensed C&D disposal facility. Otherwise the materials will be processed to meet the requirements of the receiving disposal facility. Any part of an old pile or demolition debris extending into the subsurface below the level of excavation will be cut off and capped, if necessary, to maintain the integrity of the barrier membrane.

Underground Storage Tanks

USTs encountered in the confines of the excavation will be handled in accordance with NYSDEC STARS Memo #1 Petroleum-Contaminated Soil and Guidance Policy requirements. Any separate phase petroleum encountered in soils at or near the bottom of the excavation will be handled in accordance with NYSDEC STARS Memo #1 Petroleum-Contaminated Soil and Guidance Policy requirements.

3.11 Post-Removal Activities

Following soil excavation activities, select fill will be placed over the site to provide a surface for installation of the barrier membrane. The select fill layer will also isolate the site media and provide a stable work surface for the Construction Contractor during installation of the foundation pile caps, structural slab, and foundation walls.

3.11.1 Installation of Vapor Barrier

As part of the selected remedial alternative, a barrier membrane will be installed to mitigate the potential migration of vapors associated with residual MGP waste in the subsurface soil. LIQUID BOOT®, may be used as the vapor barrier, based on compatibility with site contaminants and method of application. LIQUID BOOT® will be cold spray-applied (to a thickness based on membrane design activities) to four-ounce, non-woven geotextile to provide a membrane impermeable to vapors and moisture. Manufacturer's specifications are included as Appendix B. The Remediation Contractor may install an alternate equivalent barrier membrane.

The Remediation Contractor will provide detailed design and specifications of the selected vapor barrier in the SOP, including provisions for protecting and maintaining the integrity of the vapor barrier during remediation and construction activities. In addition, the barrier membrane design must consider utility and mechanical service connections that will penetrate the watertight steel sheeting and/or the structural slab and foundation walls to mitigate the potential for a preferential pathway for vapor migration. Design specifics of the utility corridor(s) will be presented in the SOP.

3.12 Demobilization

The Remediation Contractor/Construction Contractor shall be responsible for demobilizing all labor, equipment, and materials (not designated for offsite disposal) from the site and offsite properties (if applicable). The Remediation Contractor/Construction Contractor shall be required to decontaminate (in accordance with the SOP) all equipment and materials prior to removal from the site.

The Remediation Contractor/Construction Contractor shall also be responsible for performing any follow-up coordination and maintenance activities listed below.

- Restoring areas disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management area[s], access area), and any other areas identified by Georgetown;

- Removing any temporary access areas (whether onsite or offsite) and restoring the disturbed access areas to preremediation conditions as determined by Georgetown; and

- Removing sediment and erosion control measures and disposing of the materials in accordance with acceptable rules and regulations as a nonhazardous waste.

4. Institutional Controls

The declaration of covenants and restrictions (Exhibit E of the VCA between NYSDEC and Georgetown) will provide the following controls: prohibiting the use of groundwater, restricting the land use to commercial or industrial, and requiring the maintenance of the established institutional and engineering controls. Since a commercial building will be constructed on top of the remediation area, it is highly unlikely that future subsurface excavation activities will be conducted. Thus, a soil management plan for potential future excavations will not be necessary. The engineering controls that will be established as a part of the remediation and the building construction include: vapor barrier membrane, structural slab, building foundation walls, and sub level ventilation systems. Except for the building foundation itself and the ventilation system, all of the controls are beneath the building and confirmation of these controls would be counterproductive (i.e. would potentially compromise the intended isolation). In addition, any monitoring results outside the building would be outside the sheeting and would be difficult if not impossible to differentiate from impacts associated with the overall MGP. As such, the engineering controls will be monitored by inspecting the lower level of the building (i.e., the parking garage and the utility room) for any cracks from which water and vapors could emanate as a part of normal building maintenance (schedule to be determined). Cracks in the structural slab/foundation walls would be sealed as soon as practicable after they are detected. An annual certification will be submitted to NYSDEC that the building foundation is intact (including documentation of any repairs) and that the ventilation system is in operation.

5. Health and Safety Plans

This section presents the anticipated health and safety plans to be in place for establishing safe working conditions at the site and protection for the community.

Health and Safety Plan

The Remediation Contractor will prepare the site-specific HASP to provide a mechanism for establishing safe working conditions at the site, where safety organization, procedures, and PPE requirements will be established based on an analysis of potential site-related hazards. The site-specific HASP, at a minimum, will meet the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65). The HASP will include, but will not be limited to, the components described below.

- Identification of Key Personnel - Identification of the onsite and offsite health and safety personnel responsible for the implementation of health and safety procedures. All onsite personnel involved in the activities will be required to maintain OSHA 40-hour hazardous waste training (29 CFR 1910.120 and 29 CFR 1926.65) and the corresponding 8-hour refresher course update.

- Training - A description of health and safety training requirements for supervisory and onsite personnel will be presented. Training requirements will include attending an initial site orientation prior to engaging in any onsite activities.

- Medical Surveillance - A description of appropriate medical examinations required for supervisory and onsite personnel to conduct the tasks associated with the performance of the remedy will be presented. Associated tasks may include the following: working with chemicals, heavy lifting, using respiratory protection, using PPE and conducting hazardous substance operations in accordance with 29 CFR 1910.120 and 1926.65.

- Site Hazards - A description of chemical and physical hazards associated with the site will be presented in the HASP. In addition, a discussion of identifying and mitigating foreseeable chemical and physical hazards associated with the work will be presented. Foreseeable chemical and physical hazards may include, but will not be limited to, hazards associated with exposure to constituents of concern, heavy equipment operation, site conditions, weather, biological hazards, materials handling, and work around excavated areas and water.

- Work Zones - A description of the work zones that will be established during the remedy will be presented. The work zones will be preliminarily delineated on a site plan that depicts the designation of zones including: (1) Exclusion Zones; (2) Contamination Reduction Zones; and (3) Support Zones. The level of personal protection required for each work zone will be specified.

- Personal Safety Equipment and Protective Clothing - The HASP will identify personal safety equipment and protective clothing to be used and available onsite. This will include identification of expected levels of protection for the work, and the action levels for personal protective equipment upgrades. Also included will be a respiratory protection program that meets the requirements of 29 CFR 1910.134, which establishes specific requirements for any respirator use.

- Air Monitoring Plan - An air-monitoring plan that identifies air-monitoring requirements on site and at the site perimeter for site-specific constituents of concern. The air-monitoring plan may contain requirements

for personnel monitoring and will present trigger concentrations for site-specific constituents of concern that will require corrective action.

- Equipment Cleaning - The methods and procedures for decontamination of personnel, vehicles, and equipment will be described.

- Confined Space Entry - The HASP will describe procedures for confined space entry in accordance with OSHA's Permit-Required Confined Space Standard (29 CFR 1910.146). In addition, requirements for Confined Space Entry Training for all authorized personnel in accordance with 29 CFR 1910.146 will be presented.

- Material Safety Data Sheets - Material Safety Data Sheets (MSDSs) for all materials to be brought on site, as well as constituents that are expected to be encountered in the course of remediation, will be presented as an attachment or appendix to the HASP.

- Excavation Safety - Excavation and trenching safety procedures as specified in 29 CFR 1926 Subpart P including, but not limited to soil classification, excavation inspections, protective systems, and designated competent persons will be discussed.

- Procedures and Programs - Standard operating procedures and safety programs as required by applicable sections of Section 1910 of 29 CFR 1910 and 29 CFR 1926.

- Contingency Plan - The HASP will also contain a contingency plan to be implemented in the event of various emergency or nonroutine events. The contingency plan will set forth procedures for addressing spill prevention and emergency response procedures, odor control, emergency vehicular access/egress, evacuation, emergency notification and contacts, and emergency medical procedures.

Community Air Monitoring Plan

The Remediation Contractor will prepare a CAMP to provide monitoring and protection for the community not directly involved in the remediation activities from organic vapors and dust. The CAMP will be prepared in conformance with NYSDEC/NYSDOH requirements and include the following components described below.

- Identification of potential offsite receptors adjacent to the remediation site.

- Location of perimeter sampling stations.

- Real time perimeter VOC monitoring field methods.

- Real time perimeter particulate monitoring field methods.

- Chemical specific air monitoring (Method TO-14 analysis using Summa canisters, or equivalent) will be conducted if perimeter action levels for VOCs are regularly exceeded, or nuisance odors are prevalent offsite.

- Laboratory analytical methods for personnel and confirmation samples.

- VOC and particulate action levels.

- Contingency procedures if action levels are exceeded.
- Documentation procedures.
- Field quality control procedures.
- Laboratory quality control procedures.

6. QA/QC Plans

This section presents the anticipated quality assurance/quality control procedures to be in place for ensuring the remediation activities are conducted in general conformance with this RAWP.

Construction Quality Assurance Plan

The Remediation Contractor will prepare a CQAP that will describe the site-specific components of construction quality to provide for remedy construction that meets the remediation objectives and specifications. The CQAP will include a program for construction observation and testing to assess whether the remedy construction is performed in accordance with the design specifications. The CQAP will include the following components described below.

- Responsibilities and authorities of the organizations and key personnel involved in the design and construction of the remedy.

- The qualifications of the quality assurance personnel who demonstrate that they possess the training and experience necessary to fulfill project-specific responsibilities.

- The observations and tests that will be used to monitor construction and the frequency of performance of these activities.

- The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for implementing corrective measures as addressed in the plans and specifications.

- Requirements for project coordination meetings between Georgetown, the Remediation Contractor, the Construction Contractor, and other involved parties.

- Description of the reporting requirements for quality assurance activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation.

- Description of the final documentation retention provisions.

The CQAP will provide a detailed description of the observation activities that will be used to monitor construction quality and confirm that remedy construction is in conformance with the remediation objectives and specifications.

Erosion and Sedimentation Control Plan

The Remediation Contractor/Construction Contractor will prepare an Erosion and Sedimentation Control Plan to minimize erosion and sedimentation during remediation activities. The plan will be in conformance with the requirements presented in New York State Guidelines for Urban Erosion and Sediment Control and at a minimum will include the following sections.

- Erosion and Sedimentation Control Methods: Methods will be identified and may include silt fences, straw bale dikes, and perimeter dikes/swales. The proposed methods must be installed and utilized in accordance with the New York Guidelines for Urban Erosion and Sediment Control.

- Stabilized Construction Entrance: Stabilized construction entrances will be installed at all locations designated for remediation traffic entering and exiting the site to minimize the amount of site soils tracked onto public roadways. At a minimum, the stabilized construction entrance will include a 6-inch layer of crushed stone underlain by geotextile.

- Erosion and Sedimentation Control Practices: Work practices to limit soil erosion and sedimentation will be identified and may include the use of impermeable covers, the use of berms, and/or work stoppage or changes during precipitation or snow melt events.

- Soil Stockpiling: In the event soil is stockpiled at the site, methods to control storm water runoff such as covers and berms will be identified.

- Dust Control: Methods to detect and control particulates will be identified for exposed excavations and soil stockpiles (if any).

- Maintenance of Temporary Erosion Controls: Provisions to maintain, inspect, and repair erosion control measures will be identified.

- Removal of Temporary Erosion Controls: Provisions to remove, clean, and/or dispose of erosion control measures will be identified.

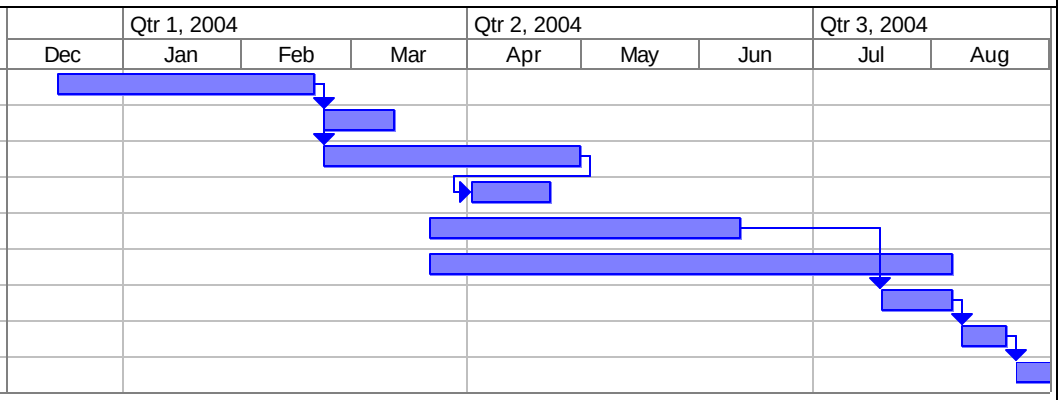
7. Schedule

A preliminary schedule for implementation of the remediation activities is included on the following page. The actual schedule will be presented in the SOP.

West 19th Street Development Site
Georgetown 19th Street Development, LLC
Manhattan, New York

Soil Removal 15 to 18 feet Below Grade with Select Additional Removal

ID	Task Name	Duration
1	Plans, Mobilization, and Site Preparation	10 wks
2	Install Foundation Piles	3 wks
3	Install Watertight Steel Sheeting	10 wks
4	Install Groundwater Extraction System	3 wks
5	Soil Removal	12 wks
6	Soil Handling and Disposition	20 wks
7	Install Pile Caps	3 wks
8	Install Barrier Membrane	2 wks
9	Demobilization	2 wks



Project: Preliminary_Schedule_RAWP_
Date: Fri 3/26/04

8. Reporting

A final engineering report and certification of completion will be submitted to NYSDEC following implementation of the RAWP. The final engineering report will include:

- A description of the remedial actions performed;
- A description of the changes to the remedial design;
- Sampling and monitoring results;
- A copy of the applicable Remediation Contractor records and "as-built" drawings showing changes made during construction;
- Groundwater pumping rates and water levels;
- Groundwater treatment data; and
- Soil disposition data and information.

A Professional Engineer registered in New York State, the Remediation Engineer, will provide certification that the construction was completed in substantial conformance with the approved RAWP, and/or approved field changes. This certification will be appropriately signed and stamped.

9. Project Organization

This section presents the anticipated project organization and associated roles, including key personnel, descriptions of duties, and lines of authority in the management of the RAWP. Information regarding the organizations/personnel and their associated responsibilities is provided below.

NYSDEC

NYSDEC will serve as the lead regulatory agency for this remediation. The NYSDEC project manager will be Mr. Joseph Moloughney, P.E., who will be responsible for providing and coordinating regulatory oversight and direction.

NYSDOH

The New York State Department of Health (NYSDOH) will work closely with NYSDEC and will provide input from a health and safety perspective. The primary contact for NYSDOH will be Ms. Dawn Hettrick, P.E.

Georgetown

Georgetown will be responsible for implementing the voluntary cleanup of the site. General responsibilities of Georgetown are set forth in the VCA. To assist in the remediation implementation Georgetown will contract a Remediation Contractor and a Construction Contractor. The specific responsibilities and relationship of the Remediation Contractor (and subcontractors) and the Construction Contractor (and subcontractors) to meet the VCA and the RAWP requirements will be determined by Georgetown.

Remediation Contractor

The Remediation Contractor selected for this project will provide services associated with sheeting installation, soil removal and disposal, groundwater dewatering and disposal, air monitoring, emergency spill response services (if necessary), and management of waste transport and disposal. The Remediation Contractor will coordinate remediation efforts with the general construction efforts performed the Construction Contractor.

The Remediation Contractor may retain various subcontractors for the purposes of completing the project, if necessary. Remediation Contractor and subcontractor responsibilities will be set forth in the SOP.

Remediation Engineer

The Remediation Engineer selected for this project will provide full-time engineering observation services for the duration of the remedial activities to document the remedial activities are conducted in accordance with this RAWP and associated plans submitted by the Remediation Contractor. The Remediation Engineer will be responsible for certifying the construction was completed in substantial conformance with the approved RAWP, and/or approved field changes. In addition to oversight and final engineering certification, the Remediation Engineer may prepare and/or review remedial plans such as the SOP, HASP, CAMP, CQAP, Erosion and Sedimentation Control Plan, and other appropriate plans.

Analytical Laboratory

A NYSDOH-certified laboratory will provide analytical services required for this project. The laboratory will be provided with the necessary information to complete the QAPP and will follow the procedures required in the QAPP.

Offsite Disposal Facilities

The excavated materials will be transported to and disposed of at licensed disposal facilities due to the presence of MGP contamination. The disposal facilities used must be licensed to accept MGP-contaminated soils and materials. Transportation to these facilities will be via legally permitted (such as permits required in NYCRR Part 364 and NYCRR Part 360) and NYSDEC-acceptable methods.

Construction and demolition debris from the existing building at the site will be segregated and disposed of separately prior to remediation activities. Construction and demolition debris that is visually uncontaminated per 6 NYCRR Part 360-7 will be taken to a licensed construction and demolition (C&D) facility.

Table 1

Cost Estimate – Soil Removal to 15 to 18 feet Below Grade with Select Additional Removal

BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

Table 1

West 19th Street Development Site
Manhattan, New York

Cost Estimate A - Soil Removal to 15 to 18 Feet Below Grade with Select Additional Removal

Item #	Description	Estimated Quantity	Unit	Unit Price	Cost
1	Mobilization/Demobilization	1	LS	$50,000.00	$50,000.00
2	Install Temporary Fencing	500	LF	$25.00	$12,500.00
3	Construct and Remove Equipment Decontamination Pad	1	LS	$20,000.00	$20,000.00
4	Steel Sheeting Installation	23,500	SF	$80.00	$1,880,000.00
5	Groundwater Extraction Well Installation	320	LF	$200.00	$64,000.00
6	Groundwater Extraction Operation	1	LS	$78,000.00	$78,000.00
7	Water Disposition	890,000	Gallon	$0.50	$445,000.00
8	Soil Excavation	16,600	CY	$80.00	$1,328,000.00
9	Vapor Suppression	1	LS	$14,000.00	$14,000.00
10	Soil Disposition	29,850	ton	$110.00	$3,283,500.00
11	Vapor Barrier	1	LS	$235,000.00	$235,000.00
12	Miscellaneous Waste Disposal	1	LS	$15,000.00	$15,000.00
				Total Capital Cost	$7,425,000.00
				Administration and Engineering (25%)	$1,856,250.00
				Contingency (30%)	$2,227,500.00
				Estimated Cost for Alternative	**$11,508,750.00**
				Rounded to	**$11,500,000.00**

Notes:

1. Mobilization/demobilization cost estimate includes mobilization and demobilization of all labor, equipment and materials necessary to excavate, transport and dispose offsite the impacted soil in the excavation areas.
2. Install temporary fencing cost estimate includes all labor, equipment and materials necessary to install 8-feet high plywood fencing adjacent to West 18th Street, West 19th Street, and 11th Avenue.
3. Construct and remove equipment decontamination pad cost estimate includes all labor, equipment and materials necessary to construct and remove a 30 by 60 foot decontamination pad and appurtenances. The decontamination pad would consist of 20 mil high density polyethylene (HDPE) sheeting with a six inch gravel drainage layer placed over the HDPE liner, surrounded by a one-foot high berm, and sloped to a collection sump for the collection of decontamination water.
4. Steel sheeting installation cost estimate includes all labor, equipment and materials necessary to install watertight steel sheeting around the excavation area to a maximum depth of 38 feet (i.e., 10 feet into the clayey silt). This cost estimate assumes pre-drilling will be required to facilitate installation of steel sheeting. Cost estimate assumes approximately 800 LF of sheeting will be required to encompass the excavation area. This cost estimate does not provide costs for additional sheeting/shoring that may be required to support trenching and excavation activities.
5. Groundwater extraction well installation cost estimate includes all labor, equipment and materials necessary install temporary groundwater wells every 50 feet around the excavation, to a maximum depth of 20 feet below grade. It is assumed that the groundwater extraction wells will not pump nonaqueous phase liquid (NAPL).
6. Groundwater extraction operation cost estimate includes cost to conduct dewatering activities during soil removal activities.

Table 1

West 19th Street Development Site
Manhattan, New York

Cost Estimate A - Soil Removal to 15 to 18 Feet Below Grade with Select Additional Removal

7. Water disposition cost estimate includes all labor, equipment and materials necessary to transport and dispose of water as a hazardous waste, due to the presence of benzene and other constituents of concern, at the DuPont Environmental Treatment Chambers Works site in Deepwater, New Jersey. Additional cost will be incurred for water with total suspended solids (TSS), total organic carbon (TOC), and/or metals greater than 1%. This cost estimate does not include cost associated with characterization sampling that may be required by the disposal facility. The volume of water identified was calculated assuming 14 feet of saturated soil would be encountered with a porosity of 40% and a specific yield of 20%. This estimated volume of water assumes maintenence pumping will generate 2,000 gallons of water per day. This estimated volume of water to be treated does not include decontamination water and assumes no recharge will occur during the excavation activities. This cost does not include demurrage for transportation vehicles.
8. Soil excavation cost estimate includes all labor, equipment and materials necessary to excavate 16,600 in-place cubic yards of material (excavation from 15 to 18 feet below grade with additional excavation in select areas). For estimating purposes, it is assumed the volume of excavated soil will expand 20% through handling.
9. Vapor suppression cost estimate includes labor, equipment, and materials necessary to apply vapor suppression to the excavation area. The cost estimate was based on the assumption that the excavation area would be covered with suppressant a total of seven times.
10. Soil disposition cost estimate includes all labor, equipment and materials necessary to transport and dispose of 29,850 tons of excavated soil (approximately 19,900 cubic yards of excavated material assumed to weigh 1.5 tons/cubic yard) at Environmental Soil Management, Inc. (ESMI).
11. Vapor barrier cost estimate includes labor, equipment and materials necessary to install a water/vapor barrier under the concrete pad and on the side walls of the excavation. This cost estimate is based on a vendor quote to apply LIQUID BOOT®, to a thickness of 60 dry mils, to four-ounce nonwoven geotextile fabric (approximately 3,200 square yards).
12. Miscellaneous waste disposal cost estimate is based on disposal of personal protective equipment (PPE), disposable equipment and/or equipment that can not be decontaminated, and materials generated as a result of the soil removal activities.
13. Administration and engineering cost estimate includes costs for permitting, predesign investigation, and design activities.
14. This cost estimate does not include costs associated with structural analysis of adjacent building foundations and/or structures that may be undermined during excavation activities.
15. This cost estimate does not include costs associated with stabilization of soil that may require dewatering prior to offsite transportation and disposal.
16. This cost estimate does not include cost associated with project delays resulting from unforeseen conditions (i.e., inclement weather, natural disasters, unforeseen field conditions, etc.).
17. This cost estimate is based on the best available information regarding the anticipated scope of this scenario. Changes in the cost elements are subject to to occur as a result of additional information and data collected during the engineering design of the selected remedial scenario. This is an order of magnitude engineering cost estimate that is expected to be within -30 to + 50 percent of the actual scenario cost.
18. This cost estimate is based on 2003 dollars and Blasland, Bouck & Lee, Inc.'s past experience and vendor estimates.

Table 2

Cost Estimate – Soil Removal to above the Clayey Silt Layer

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers, scientists, economists

Table 2

West 19th Street Development Site
Manhattan, New York

Cost Estimate B - Soil Removal Above the Clayey Silt

Item #	Description	Estimated Quantity	Unit	Unit Price	Cost
1	Mobilization/Demobilization	1	LS	$60,000.00	$60,000.00
2	Install Temporary Fencing	500	LF	$25.00	$12,500.00
3	Construct and Remove Equipment Decontamination Pad	1	LS	$20,000.00	$20,000.00
4	Steel Sheeting Installation	60,000	SF	$80.00	$4,800,000.00
5	Groundwater Extraction Well Installation	560	LS	$200.00	$112,000.00
6	Groundwater Extraction Operation	1	LS	$185,000.00	$185,000.00
7	Groundwater Storage Tanks	1	LS	$18,000.00	$18,000.00
8	Water Disposition	1,450,000	Gallon	$0.50	$725,000.00
9	Soil Excavation	23,500	CY	$80.00	$1,880,000.00
11	Vapor Suppression	1	LS	$28,000.00	$28,000.00
12	Soil Disposition	42,300	ton	$110.00	$4,653,000.00
13	Select Fill Importation	7,000	CY	$20.00	$140,000.00
14	Fill Placement, Compaction, and Grading	7,000	CY	$30.00	$210,000.00
15	Vapor Barrier	1	LS	$235,000.00	$235,000.00
16	Miscellaneous Waste Disposal	1	LS	$25,000.00	$25,000.00
				Total Capital Cost	$13,103,500.00
				Administration and Engineering (25%)	$3,275,875.00
				Contingency (30%)	$3,931,050.00
				Total Estimated Cost for Alternative	**$20,310,425.00**
				Rounded to	**$20,500,000.00**

Notes:

1. Mobilization/demobilization cost estimate includes mobilization and demobilization of all labor, equipment and materials necessary to excavate, transport and dispose offsite the impacted soil in the excavation areas.
2. Install temporary fencing cost estimate includes all labor, equipment and materials necessary to install 8-feet high plywood fencing adjacent to West 18th Street and West 19th Street.
3. Construct and remove equipment decontamination pad cost estimate includes all labor, equipment and materials necessary to construct and remove a 30 by 60 foot decontamination pad and appurtenances. The decontamination pad would consist of 20 mil high density polyethethylene (HDPE) sheeting with a six inch gravel drainage layer placed over the HDPE liner, surrounded by a one-foot high berm, and sloped to a collection sump for the collection of decontamination water.
4. Steel sheeting installation cost estimate includes all labor, equipment and materials necessary to install watertight steel sheeting around the excavation area to a maximum depth of 60 feet (i.e., 2 times the excavation depth of 30 feet). This cost estimate assumes pre-drilling will be required to facilitate installation of steel sheeting. This cost estimate provides cost for sheeting/shoring to support the corresponding excavation depths (i.e., 16, 24, 30 feet). Additional sheeting/shoring may be required to support trenching and excavation activities.
5. Groundwater extraction well installation cost estimate includes all labor, equipment and materials necessary install temporary groundwater wells every 50 feet around the excavation, to a maximum depth of 35 feet below grade. It is assumed that the groundwater extraction wells will not pump nonaqueous phase liquid (NAPL).
6. Groundwater extraction operation cost estimate includes cost to conduct dewatering activities during soil removal activities.

Table 2

West 19th Street Development Site
Manhattan, New York

Cost Estimate B - Soil Removal Above the Clayey Silt

7. Water disposition cost estimate includes all labor, equipment and materials necessary to transport and dispose of water as a hazardous waste, due to the presence of benzene and other constituents of concern, at the DuPont Environmental Treatment Chambers Works site in Deepwater, New Jersey. Additional cost will be incurred for water with total suspended solids (TSS), total organic carbon (TOC), and/or metals greater than 1%. This cost estimate does not include cost associated with characterization sampling that may be required by the disposal facility. The volume of water identified was calculated assuming a maximum of 20 feet of saturated soil would be encountered with a porosity of 40% and a specific yield of 20%. This estimated volume of water assumes maintenence pumping will generate 2,000 gallons of water per day. This estimated volume of water to be treated does not include decontamination water and assumes no recharge will occur during the excavation activities. This cost does not include demurage for transportation vehicles and does not include cost for onsite storage.

8. Soil excavation cost estimate includes all labor, equipment and materials necessary to excavate 23,500 in-place cubic yards of material. For handling purposes, it is assumed the volume of excavated soil will expand 20% through handling.
9. Vapor suppression cost estimate includes labor, equipment, and materials necessary to apply vapor suppression to the excavation area. The cost estimate was based on the assumption that the excavation area would be covered with suppressant a total of fourteen times.
10. Soil disposition cost estimate includes all labor, equipment and materials necessary to transport and dispose of 42,300 tons of excavated soil (approximately 28,200 cubic yards of material assumed to weigh 1.5 tons/cubic yard) at Environmental Soil Management, Inc. (ESMI).
11. Select fill importation cost estimate includes all labor, equipment and materials necessary to import 7,000 cubic yards of select fill.

12. Fill placement, compaction, and grading cost estimate includes all labor, equipment and materials necessary to place, compact and grade 7,000 cubic yards of select fill in the center and northern excavation area to an elevation of 15 to 18 feet below grade.

13. Vapor barrier cost estimate includes labor, equipment and materials necessary to install a water/vapor barrier under the concrete pad and on the side walls of the excavation. This cost estimate is based on a vendor quote to apply LIQUID BOOT®, to a thickness of 60 dry mils, to four-ounce nonwoven geotextile fabric (approximately 3,200 square yards). This cost estimate assumes the vapor barrier will be installed in one continuous effort.
14. Miscellaneous waste disposal cost estimate is based on disposal of personal protective equipment (PPE), disposable equipment and/or equipment that can not be decontaminated, and materials generated as a result of the soil removal activities.

15. Administration and engineering cost estimate includes costs for permitting, predesign investigation, and design activities.
16. This cost estimate does not include costs associated with structural analysis of adjacent building foundations and/or structures that may be undermined during excavation activities.
17. This cost estimate does not include costs associated with stabilization of soil that may require dewatering prior to offsite transportation and disposal.
18. This cost estimate does not include cost associated with project delays resulting from unforeseen conditions (i.e., inclement weather, natural disasters, unforeseen field conditions, etc.).
19. This cost estimate is based on the best available information regarding the anticipated scope of this scenario. Changes in the cost elements are subject to to occur as a result of additional information and data collected during the engineering design of the selected remedial scenario. This is an order of magnitude engineering cost estimate that is expected to be within -30 to + 50 percent of the actual scenario cost.
20. This cost estimate is based on 2003 dollars and Blasland, Bouck & Lee, Inc.'s past experience and vendor estimates.

Figures

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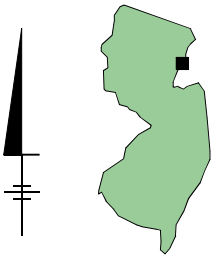
engineers, scientists, economists

REFERENCE: BASE MAP USGS 7.5 MIN. QUADS., JERSEY CITY, AND WEEHAWKEN, NJ - NY, 1967.

2000' 0 2000'

Approximate Scale: 1" = 2000'



Area Location

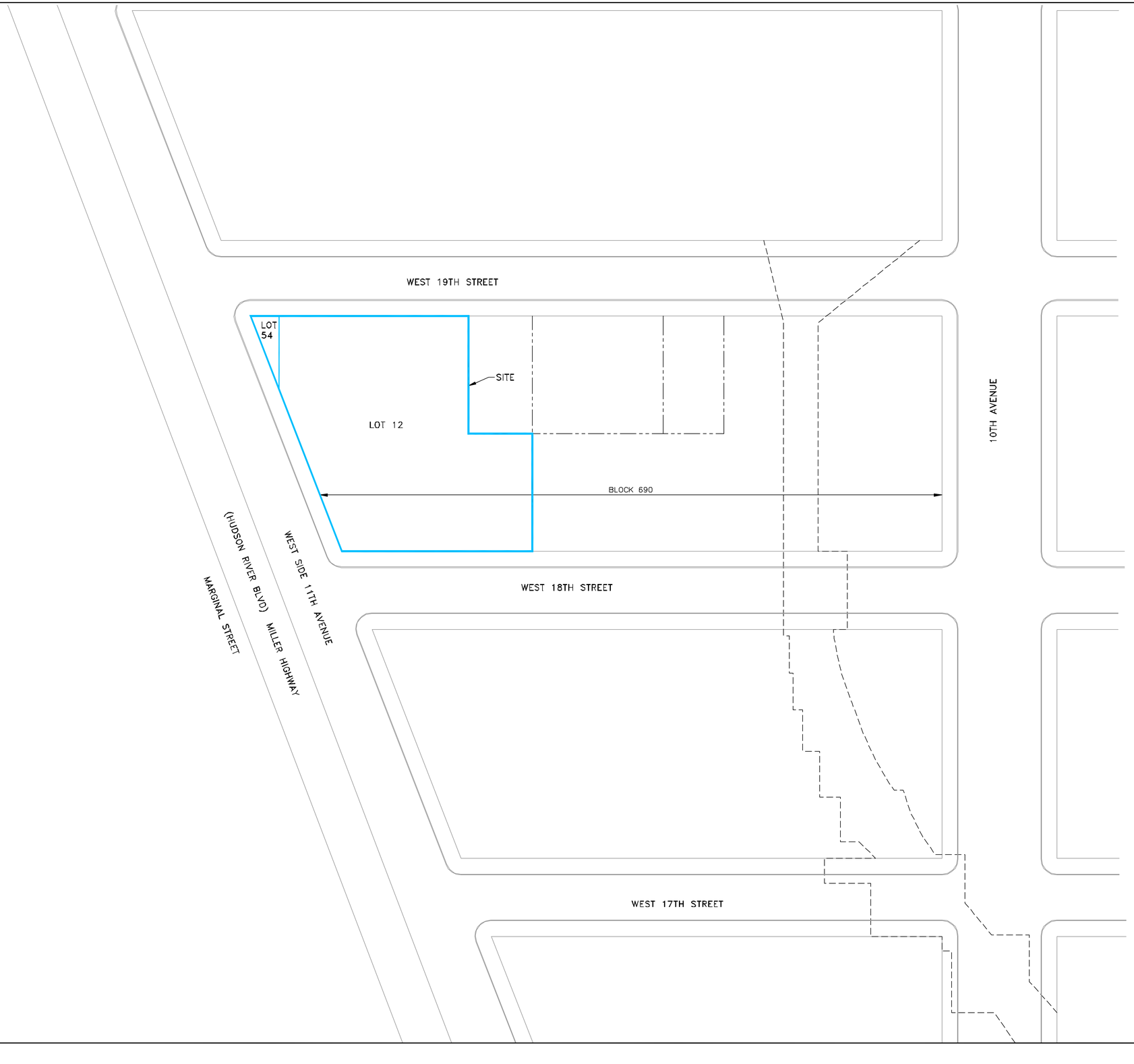
WEST 19TH STREET DEVELOPMENT SITE
NEW YORK, NEW YORK
REMEDIAL ACTION WORK PLAN

SITE LOCATION MAP

BBL® BLASLAND, BOUCK & LEE, INC. engineers & scientists

FIGURE 1

08/25/03 SYR-D85-LBR, DJH
27410001/27410n01.cdr



NOTE:

1. THIS FIGURE WAS CREATED FROM SANBORN MAPS FROM THE SANBORN LIBARY, LLC AND BOROUGH OF MANHATTAN TAX MAP.

0 40' 80'
GRAPHIC SCALE

WEST 19TH STREET DEVELOPMENT SITE
NEW YORK, NEW YORK
REMEDIAL ACTION WORK PLAN

SITE MAP

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FIGURE
2

X: 27410X01.DWG
L: ON=*, OFF=REF
P: PAGESET/PLT-DL2B
12/10/03 SYR-85-DJP SDL RCB
27410001/27410C01.DWG

LEGEND:

- SOIL BORING LOCATION (OCTOBER 2002)
- SHALLOW BORING (MARCH 2003)
- DEEP BORING (MARCH 2003)
- DELINEATION BORING (MARCH 2003)
- SHALLOW MONITORING WELL

NOTES:

1. THIS FIGURE WAS CREATED FROM SANBORN MAPS FROM THE SANBORN LIBARY, LLC AND BOROUGH OF MANHATTAN TAX MAP.
2. BORING LOCATIONS ARE APPROXIMATE AND ARE BASED ON FIELD LOCATION BY TAPE AND MEASURE FROM FIXED POINTS.

0 20' 40'
GRAPHIC SCALE

WEST 19TH STREET DEVELOPMENT SITE
NEW YORK, NEW YORK
REMEDIAL ACTION WORK PLAN

BORING LOCATION MAP

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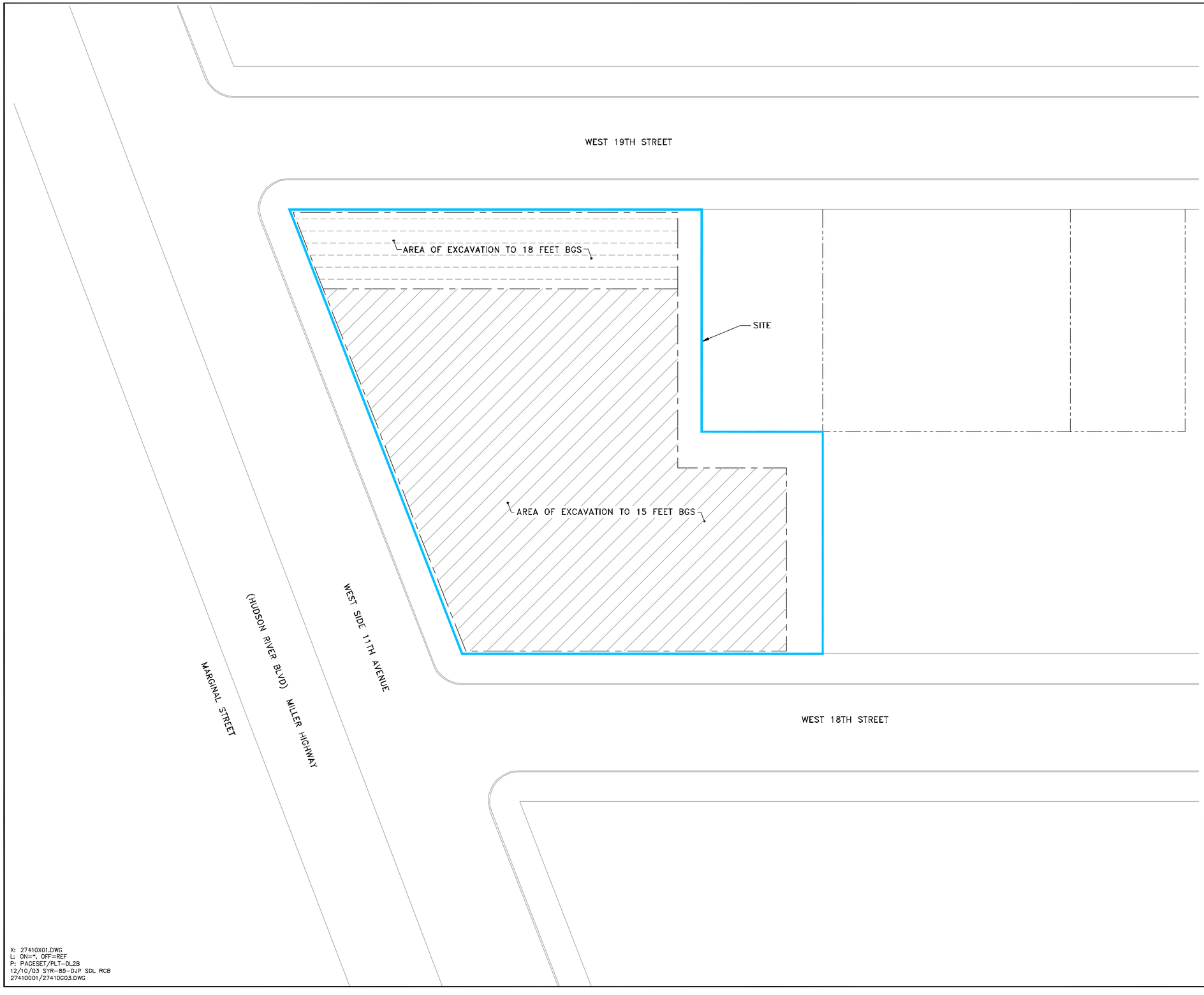
FIGURE
3

X: 27410X01.DWG
L: ON=*, OFF=REF
P: PAGESET/PLT-DL2B
12/10/03 SYR-85-DJP SDL RCB
27410001/27410G02.DWG



LEGEND:

- SITE BOUNDARY
- EXCAVATION LIMITS
- EXCAVATION AREA TO 15 FEET BGS
- EXCAVATION AREA TO 18 FEET BGS

NOTES:

1. THIS FIGURE WAS CREATED FROM SANBORN MAPS FROM THE SANBORN LIBARY, LLC AND BOROUGH OF MANHATTAN TAX MAP.
2. ALL LOCATIONS ARE APPROXIMATE.
3. AREA OF EXCAVATION TO 15 FEET BELOW GROUND SURFACE (BGS) ENCOMPASSES APPROXIMATELY 21,000 SQUARE FEET.
4. AREA OF EXCAVATION TO 18 FEET BELOW GROUND SURFACE (BGS) ENCOMPASSES APPROXIMATELY 5,000 SQUARE FEET.
5. IN ADDITION TO THE PRIMARY EXCAVATION TO 15 TO 18 FEET BELOW GROUND SURFACE, SEVERAL ADDITIONAL MINOR EXCAVATIONS ARE ANTICIPATED FOR THE INSTALLATION OF ELEVATOR PITS, BASEMENT DRAINAGE SYSTEMS, UTILITY CONDUIT BANKS, AND PILE CAPS THAT MAY EXTEND A FEW FEET DEEPER THAN THE PRIMARY EXCAVATION DEPTH OF 15 TO 18 FEET.

0 20' 40'
GRAPHIC SCALE

WEST 19TH STREET DEVELOPMENT SITE
NEW YORK, NEW YORK
REMEDIAL ACTION WORK PLAN

LIMITS OF SOIL REMOVAL

BLASLAND, BOUCK & LEE, INC.
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FIGURE
4

X: 27410X01.DWG
L: ON=*, OFF=REF
P: PAGESET/PLT-DL2B
12/10/03 SYR-85-DJP SDL RCB
27410001/27410G03.DWG

Appendices

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Appendix A

TAGM 4061
Management of Coal Tar Waste and Coal Tar Contaminated Soil and Sediment

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New York State Department of Environmental Conservation

*** Proceed to Guidance Document | Contact the Division of Environmental Remediation ***

This document is a facsimile of an original Technical and Administrative Guidance Memorandum (TAGM) issued by the New York State Department of Environmental Conservation, Division of Environmental Remediation (formerly the Division of Hazardous Waste Remediation). This facsimile was reformatted for the Internet but maintains as much as possible of the original document. Changes were made to headers, footnote locations, paging, etc. to facilitate Internet delivery. Unless otherwise noted, none of these changes revise the content of the original TAGM.
This document was developed to provide Department staff with guidance on how to ensure compliance with statutory
and regulatory requirements, including case law interpretations, and to provide consistent treatment of similar situations. This document may also be used by the public to gain technical guidance and insight regarding how the department staff may analyze an issue and factors in their consideration of particular facts and circumstances. This guidance document is not a fixed rule under the State Administrative Procedure Act section 102(2)(a)(i).
Furthermore, nothing set forth herein prevents staff from varying from this guidance as the specific facts and circumstances may dictate, provided staff's actions comply with applicable statutory and regulatory requirements. This document does not create any enforceable rights for the benefit of any party.
Many procedures used by the Division of Environmental Remediation are undergoing revision as a result of our continual efforts to improve program implementation. In many cases, previously issued guidance documents are no longer completely consistent with current practice, but are provided here in their original form until final revisions are issued. Users of the posted guidance documents are urged to contact the Division of Environmental Remediation.

THE DEC POLICY SYSTEM

New York State
Department of Environmental
Conservation

PROGRAM POLICY | **PROGRAM ID: DER - 4 TAGM 4061**

Title: MANAGEMENT OF COAL TAR WASTE AND COAL TAR CONTAMINATED SOILS AND SEDIMENT FROM FORMER MANUFACTURED GAS PLANTS ("MGP"s)

Issuing Authority:

Name: Susan Taluto

Title: Deputy Commissioner, Water & Environmental Remediation

Susan Taluto /S/ — 11/30/01
Signature — Date

Name: Carl Johnson

Title: Deputy Commissioner, Air & Waste Management

Carl Johnson /S/ — 12/03/01
Signature — Date

Issuance Date:
January 11, 2002

Originating Unit:

Division of Environmental Remediation

Technology Section

Phone: (518) 402-9756

Latest Review Date (Office Use):

Abstract: This guidance outlines the criteria wherein coal tar waste and soils and sediment that have been contaminated with coal tar waste from former manufactured gas plants (MGPs) only exhibiting the toxicity characteristic for benzene (D018) may be conditionally excluded from the requirements of 6 NYCRR Parts 370 -374 and 376 when they are destined for permanent thermal treatment. This is an amended version of the document effective on September 13, 2001. The only modification is to the Responsibility Section. Additions are underlined and deletions are stricken.

I. PURPOSE (Back)

This guidance memorializes an exercise of enforcement discretion, effective immediately, with regard to the conditional exclusion of soils, sediments, and waste contaminated with coal tar from the site of former Manufactured Gas Plants ("MGPs") which exhibit the toxicity characteristic for benzene (D018) from New York State's hazardous waste management regulatory program. The intent of this exercise is to facilitate the permanent treatment of these materials in an environmentally sound manner.

This change will be proposed as part of the next rulemaking which includes 6 NYCRR Part 371. This Enforcement Directive supersedes Program Policy DER - 3 (TAGM 4060) entitled "Management of Soil and Sediment Contaminated with Coal Tar From Former Manufactured Gas Plants." Specifically, that guidance allows for the decharacterization of coal tar contaminated soil and sediment which exhibit the D018 hazardous characteristic, that were destined for thermal treatment. That guidance did not allow for the decharacterization of coal tar that failed the D018 hazardous characteristic, requiring that it be managed as a hazardous waste.

II. BACKGROUND (Back)

Historically, MGP contaminated soils, sediments or waste were regulated as hazardous if they exhibited a hazardous waste characteristic. On April 21, 2000, a court decision (*Association of Battery Recyclers Inc. vs. United States Environmental Protection Agency* - April 21, 2000) vacated the use of the Toxicity Characteristic Leaching Procedure (TCLP) test to determine if, under federal law, MGP waste and contaminated soils exhibited a characteristic of hazardous waste. The United States Environmental Protection Agency (USEPA) has not challenged the decision and has clarified its position in a letter to Vectren Corporation, dated October 19, 2000, and a memo to USEPA Senior Resource Conservation and Recovery Act (RCRA) personnel. These documents acknowledge that the TCLP test cannot be used to determine if MGP waste, contaminated soil, or contaminated sediment exhibits a characteristic of a hazardous waste and since these materials typically do not exhibit any other hazardous characteristic, they will unlikely be classified as a hazardous waste under the federally administered program.

USEPA also acknowledged that many states have regulations that are broader in scope than the federal regulations, and may regulate MGP wastes as hazardous under their own state requirements.

The *Battery Recyclers* case does not directly affect New York's hazardous waste management regulatory program since its program derives from state, not federal, law. However, USEPA has authorized the State program to be administered in lieu of the federal RCRA program. New York's hazardous waste management regulatory program currently uses TCLP to determine if MGP contaminated soil exhibits a characteristic of a hazardous waste.

The Department of Environmental Conservation (DEC) recognizes that mixing of soil or sediment occurs through the normal consolidation of contaminated soil or sediment from various portions of a site during the course of remedial activities or in the course of normal earthmoving and grading activities, and does not consider this to be a form of impermissible dilution. However, mixing cannot be allowed to merely dilute the hazardous constituents into a larger volume so as to lower the constituent concentration in order to avoid treatment.

III. Policy (Back)

Applicability

This guidance applies to former MGP sites being remediated under the oversight of the DEC, either through a Consent Order, Voluntary Cleanup Agreement or State funded project, in instances where soil or sediment contaminated with coal tar related residuals will be thermally treated (as in a combustion boiler unit or in a thermal desorber) at an off-site (including out-of -state) facility permitted to receive non-hazardous contaminated soil or at an on-site facility. This guidance does not apply to coal tar contaminated materials which contain significant quantities of purifier wastes or any quantity of other hazardous wastes. A significant quantity of purifier waste is defined as any quantity that would cause the MGP site remediation waste mixture, sent for thermal treatment, to contain in excess of 3.5 % sulfur by weight. Other hazardous waste includes listed hazardous wastes and wastes exhibiting a characteristic of a hazardous waste except for MGP related remediation waste exhibiting the Toxicity Characteristic for benzene. MGP site remediation waste meeting the

applicability requirements that are being sent out of state must comply with the rules and regulations of the receiving state.

Requirements

A. Management of Soil/Sediment: Management of MGP site remediation waste meeting the applicability requirements, that is under DEC oversight is not subject to the DEC's hazardous waste management regulatory program {6 NYCRR Parts 370 to 374 and 376} if that soil or sediment is thermally treated at a facility permitted to receive non-hazardous contaminated soil or sediment. The following activities are exempt from the hazardous waste management requirements, however they continue to be subject to the solid waste management requirements {6NYCRR Parts 360 and 364}:

a. Excavation and storage at the point of generation;
b. Transportation to the thermal treatment facility or unit;
c. Handling and storage prior to thermal treatment at the facility;
d. Thermal treatment; and
e. Management of treated materials.

Materials transported off-site, and are stored outside the shipping container at locations other than the site of generation or the treatment facility, must be placed on an impervious surface such as asphalt, concrete or other impervious material and covered with plastic or other impervious material. Storage at the treatment facility must be in compliance with the facility's permit.

MGP site remediation waste meeting the applicability requirements can be mixed with coal fines, carbon, onsite soil, sediment or other materials deemed necessary to facilitate and ensure proper operation of the final treatment technology as approved by the DEC.

There must be a demonstration that MGP site remediation wastes do not contain a significant quantity of purifier wastes, do not contain any listed waste or do not exhibit a characteristic of a hazardous waste (except for

TCLP benzene) and are not otherwise incompatible with proper and effective thermal treatment. Soil or sediment which contains discernable amounts of purifier material must be tested for hazardous characteristic of reactivity, total cyanides and sulfur.

B. Permit Requirements: No solid waste management permit is required for the thermal treatment of coal tar contaminated soil or sediment from a former MGP site by a corporate entity acting pursuant to a Consent Order or a Voluntary Cleanup Agreement, provided that the thermal treatment occurs either at that site or at another former MGP site owned by the same corporate entity and provided that the applicable substantive regulatory requirements are met. Coal tar contaminated soil or sediment may also be transported to a facility for thermal treatment which has received a permit to accept this type of contaminated material. Coal tar contaminated soil or sediment must be transported by a 6 NYCRR Part 364 permitted transporter.

C. Land Disposal Restrictions: Coal tar contaminated materials which meet the applicability requirements and the respective treatment residuals are not subject to the LDRs.

IV. Responsibility (Back)

The person(s) remediating the site is(are) responsible for complying with all applicable regulations. This includes the LDRs if the materials are not destined for permanent thermal treatment. The Project Manager assigned to oversee the remediation of the former MGP site, is responsible for reviewing and accepting any demonstration that the materials are being managed in accordance with this policy. The Project Manager's supervisor must concur with the Project Manager's determination.

Appendix B

LIQUID BOOT®
Manufacturer Specifications

BBL®
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

SECTION 07100
LIQUID BOOT®
FLUID APPLIED WATERPROOFING
VERSION 2.3

(Note: These Specifications may have changed. Visit our website at www.liquidboot.com or call LBI Technologies, Inc. at (714) 384-0111 for most recent version)

PART 1 - GENERAL

1.01 DESCRIPTION -
General and Supplementary Conditions and Division 1 - General Requirements applies to this section. Provide fluid applied waterproofing as indicated, specified and required.

A. Work in this section - principal items include:
1. Fluid applied waterproofing on buildings, planter and site retaining walls.
2. Between slab waterproof membrane.

B. Related work not in this section:
1. Excavation and backfilling.
2. Parge coat on masonry to receive waterproof membrane.
3. Mortar beds or concrete toppings over waterproof membranes.
4. Latex waterproofing.
5. Damp-proofing.
6. Flashing and sheet metal.
7. Joint sealers.
8. Soil sterilant.
9. Drainage

1.02 QUALITY ASSURANCE -
A. Waterproofing contractor/applicator shall be trained and approved by waterproof membrane manufacturer, LBI Technologies, Inc. (LBI).

B. A pre-installation conference shall be held prior to application of waterproof membrane to assure proper substrate and installation conditions, to include contractor, applicator, architect/engineer and special inspector (if any).

1.03 SUBMITTALS - (Refer to section 01300 for procedures)
A. Project Data - Submit manufacturer's product data and installation instructions for specific application.

B. Samples - Submit representative samples of the following for approval:
1. Waterproof membrane material.
2. Protection Board and/or Protection Mat.
3. Prefabricated Drainage Mat.
4. Geotextiles.

1.04 DELIVERY, STORAGE AND HANDLING -
Deliver materials to site in original unbroken packages bearing manufacturer's label showing brand, weight, volume and batch number. Store materials at site in strict compliance with manufacturer's instructions. Do not allow materials to freeze in containers.

1.05 JOB CONDITIONS -

A. Protect all adjacent areas not to be waterproofed. Where necessary, apply masking to prevent staining of surfaces to remain exposed wherever membrane abuts to other finish surfaces.

B. Perform work only when existing and forecasted weather conditions are within manufacturer's recommendations for the material and product used.

C. Minimum clearance of required for application of product:
- 90 degree spray wand – 2 feet.
- Conventional spray wand – 4 feet.

D. Ambient temperature shall be within manufacturer's specifications. (Greater than +32°F/+0°C).

E. All plumbing, electrical, mechanical and structural items to be under or passing through the waterproof membrane shall be positively secured in their proper positions and appropriately protected prior to membrane application.

F. Waterproof membrane shall be installed before placement of reinforcing steel. When not possible, all exposed reinforcing steel shall be masked by General Contractor prior to membrane application.

G. Expansion joints must be filled with a conventional waterproof expansion joint material.

H. Surface preparation shall be per manufacturer's specification.

1.06 PRODUCT WARRANTY -

LBI Technologies, Inc. (LBI) warrants its products to be free of defects. This warranty only applies when the product is applied by LBI Approved Applicators. As factors which affect the result obtained from this product -- including weather, equipment utilized, construction, workmanship and other variables -- are all beyond the manufacturer's control, LBI warrants only that the material conforms to its product specifications. Under this warranty LBI will replace at no charge any product not meeting these specifications within 12 months of manufacture, provided it has been applied in accordance with LBI written directions for use recommended as suitable for this product. Warranties are available for a longer period upon request and mutual written consent. This warranty is in lieu of any and all other warranties expressed or implied (including any implied warranty of merchantability or fitness for a particular use), and LBI shall have no further liability of any kind including liability for consequential or incidental damages resulting from any defects or delays caused by replacement or otherwise.

PART 2 - PRODUCTS

2.01 MATERIALS -

A. Fluid applied waterproofing system - LIQUID BOOT®; a single course, high build, polymer modified asphaltic emulsion. Water borne and spray applied at ambient temperatures. A minimum thickness of 80 dry mils, unless specified otherwise. Non-toxic and odorless. LIQUID BOOT® Trowel Grade has similar properties with greater viscosity and is trowel applied. Manufactured by LBI Technologies, Inc., Santa Ana, CA (714) 384-0111.

B. Fluid applied waterproofing physical properties:

WATERPROOFING	**TEST METHOD**	**VALUE**
Soil Burial	ASTM E154-88	Passed
Water Penetration Rate	ASTM D2434	$< 7.75 \times 10^{-9}$ cm/sec
Water Vapor Permeability	ASTM E96	0.24 perms
Water Vapor Transmission	ASTM E96	0.10 grains/h-ft^2
GAS VAPOR MEMBRANE	**TEST METHOD**	**VALUE**
Hydrogen Sulfide Gas Permeability	ASTM D1343	None Detected
Benzene, Toulene, Ethylene, Xylene, Gasoline, Hexane, Perchloroethylene	ASTM D543, D412, D1434 (tested at 20,000 ppm)	Passed in gas permeability and weight change
Sodium Sulfate (2% water solution)	ASTM D543, D412, D143	Passed in gas permeability and weight
Acid Exposure (10% H_2SO_4 for 90 days)	ASTM D543	Less than 1% weight change
Radon Permeability	Tested by US Dept. of Energy	Zero permeability to Radon (222Rn)
Bonded Seam Strength Tests	ASTM D6392	Passed
Micro Organism Resistance (Soil Burial) average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability	ASTM D4068-88	Passed
Methane Permeability	ASTM 1434-82	Passed
Oil Resistance Test average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability	ASTM D543-87	Passed
Heat Aging average tensile strength change, average tensile stress change, average elongation change, bonded seams	ASTM D4068-88	Passed
Dead Load Seam Strength	City of Los Angeles	Passed
Environmental Stress-Cracking	ASTM D1693-78	Passed
POTABLE WATER	**TEST METHOD**	**VALUE**
Toxicity Test	22 CCR 66696	Passed. CCR Bioassay—Flathead Minnow
Potable Water Containment	ANSI/NSF 61	NSF Certified for tanks > 300,000 gallons

GENERAL INFORMATION	TEST METHOD	VALUE
Coefficient of Friction (with geotextile both sides)	ASTM D5321	0.72
Cold Bend Test	ASTM D146	Passed. No cracking at –25°F
Freeze-Thaw Resistance (100 Cycles)	ASTM A742	Meets criteria. No spalling or disbondment
Accelerated Weathering and Ultraviolet Exposure	ASTM D822	No adverse effect after 500 hours
Hydrostatic Head Resistance	ASTM D751	Tested to 138 feet or 60 p.s.i
Elongation	ASTM D412	1,332% without reinforcement, 90% recovery
Elongation with 8oz. non-woven geotextile both sides	ASTM D751	100% (same as geotextile tested separately)
Tensile Strength	ASTM D412	58 p.s.i. without reinforcement
Tensile Strength with 8oz. non-woven geotextile both sides	ASTM D751	196 p.s.i. (same as geotextile tested separately)
Tensile Bond Strength to Concrete	ASTM D413	2,556 lbs/ft^2 uplift force
Puncture Resistance with 8oz. non-woven geotextile both sides	ASTM D4833	286 lbs. (travel of probe = 0.756 inches) (same as geotextile tested separately)
Flame Spread	ASTM E108	Class A with top coat (comparable to UL790)
Electric Volume Resistivity	ASTM D257	1.91 x 10^{10} ohms-cm

C. Agency Approvals –

- City of Los Angeles Research Report – RR 24860
  Approved for "LIQUID BOOT® Spray Applied Membrane for Below-Grade Waterproofing"
- United States Navy
  Approved for "LIQUID BOOT® for use World Wide to Waterproof Earth-Covered Steel Ammunition Storage"
- County of Kern Environmental Health Services Department
  Approved for "LIQUID BOOT® as a Methane Barrier"
- NSF International
  NSF/61 approved for "Potable Water Tank Liner"
- Canadian Construction Materials Board
  Approved for "Waterproofing and Dampproofing"
- County of Los Angeles Department of Public Works
  Approved for "LIQUID BOOT® Application as a Methane Gas Barrier"

D. Protection - On vertical surfaces, use: LIQUID BOOT® UltraShield P-100 or other protections as approved by the manufacturer, project architect or engineer.

On horizontal surfaces, use: LIQUID BOOT® UltraShield P-150 or other protections as approved by the manufacturer, project architect or engineer.

Due to the diverse jobsite conditions, all protection materials must be approved by the membrane manufacturer, including the use of the LIQUID BOOT â UltraShield products.

E. Prefabricated Drainage Mat – On vertical surfaces, use: LIQUID BOOT® UltraDrain 6200.

On horizontal surfaces, use: LIQUID BOOT® UltraDrain 9000

F. Adhesive system for LIQUID BOOT® UltraShield and LIQUID BOOT® UltraDrain : Use LIQUID BOOT® UltraGrip.

G. Geotextile - Typar 3401 non-woven geotextile, unless otherwise specified and approved by membrane manufacturer. The heat-rolled side shall be used as the application surface. Some projects may require a heavier geotextile (Typar 3631 or 3801).

J. Cold Joints, Cracks, and Form Tie Holes: Covered with Hardcast CRT 1602 Tape 3" wide.

PART 3 - EXECUTION

3.01 EXAMINATION -

All surfaces to be waterproofed shall be inspected and approved by the applicator at least one day prior to commencing work.

3.02 SURFACE PREPARATION -

Provide 24 inch minimum clearance out from surfaces to receive the waterproof membrane. The application surface shall be prepared and provided to the applicator in accordance with manufacturer's specifications listed below:

A. Concrete/Shotcrete/Masonry

Concrete surfaces shall be light broom finish or smoother, free of any dirt, debris, loose material, release agents or curing compounds. Fill all voids more than 1/4 inch deep and 1/4 inch wide. Masonry joints, cold joints, and form joints shall be struck smooth.

All penetrations shall be prepared in accordance with manufacturer's specifications. Provide a 3/4 inch minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. **Allow to cure overnight before the application of LIQUID BOOT®.**

All form ties holes must be completely grouted from the inside to outside of wall with non-shrink grout as approved by engineer.

All cracks or cold joints greater than 1/16 inch must be completely grouted with non-shrink grout as approved by engineer.

Install Hardcast reinforcing tape over all cold joints, cracks and form tie holes (after holes and cracks are grouted).

B. Dirt & Gravel

The sub-grade shall be moisture conditioned and compacted to a minimum relative compaction of 90 percent or as specified by civil/geotechnical engineer. The finished surface shall be smooth, uniform, free of debris and standing water. Remove all stones or dirt clods greater than 1/4 inch. (NOTE: Aggregate sub-bases shall be rolled flat). Final sub-grade preparation shall not precede the membrane application by more than 72 hours. All penetrations shall be prepared in accordance with manufacturer's specifications. All form stakes that penetrate the membrane shall be of rebar, which shall be bent over and left in the slab.

Trenches shall be cut oversize to accommodate waterproof membrane and protection course with perpendicular to sloped sides and maximum obtainable compaction. Adjoining grade shall be finish graded and compacted. Excavated walls shall be vertical or sloped back, free of roots and protruding rocks. Specific sub-grade preparation shall be designed by a qualified civil or geotechnical engineer.

If organic materials with potential for growth (ie: seeds or grasses) exist within the subbase, spray apply soil sterilant at the sterilant manufacturer's recommended rate.

C. Lagging

Lagging shall be held securely in place. All sharp edges and nails shall be removed or protected so as not to penetrate the membrane.

3.03 INSTALLATION -

3.03.10 INSTALLATION ON CONCRETE/SHOTCRETE/MASONRY

Follow the procedures below carefully.

A. Refer to section 3.03.40, "Sealing Around Penetrations", for procedures to seal around penetrations.

B. Provide a 3/4 inch minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. **Allow to cure overnight before the application of LIQUID BOOT®.**

C. Delineate a test area **on site** with a minimum dimension of 10 feet by 10 feet (3m by 3m). Apply LIQUID BOOT® to a

thickness of 80 mils and let it cure for **24 hours**. Observe for blisters. If minor or no blistering occurs, proceed to the next step. (See note regarding blisters). If significant blistering does occur, apply a thin (10 mil) tack coat of LIQUID BOOT® "A" side without catalyst to the entire concrete surface and allow to cure before proceeding. (See also information regarding blister repair).

D. Spray apply LIQUID BOOT® to an 80 mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.

E. Do not penetrate membrane. Keep membrane free of dirt and debris and traffic until a protective cover is in place. **It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.**

F. After membrane has cured and checked for proper thickness and flaws, install protection material pursuant to manufacturer's instructions.

NOTE: If water testing or inspection is to be performed, conduct before placing protection course.

NON-HORIZONTAL SURFACES: Spray on non-horizontal surfaces should begin at the bottom and work towards the top. This method allows the product to adhere to the surface before hitting catalyst runoff.

NOTE: Due to the nature of concrete as a substrate, it is normal for some blistering to occur. This is caused by either concrete's tendency to off-gas or water that is temporarily trapped between the concrete and the membrane. With time and the applied pressure of backfill or over-slab, blisters will absorb into the concrete without detriment to the membrane.

A small number of blister heads should be sampled and checked for proper membrane thickness. If the samples have the required membrane thickness (80 mils minimum), then the remaining blisters should not be punctured or cut. If the samples have less than the minimum 80 mils, then the area can either be resprayed to obtain the proper thickness, or the blisters can be cut out and the area resprayed or patched with LIQUID BOOT® Trowel Grade.

3.03.20 INSTALLATION ON DIRT SURFACES AND MUDSLABS

A. Roll out geotextile on sub-grade with the heat-rolled side facing up. Overlap seams a minimum of six inches (6"). Lay geotextile tight at all inside corners. Spray LIQUID BOOT® within the seam overlap to a thickness of 80 mils minimum.

Line trenches with geotextile extending at least six inches (6") onto adjoining sub-grade if slab and footings are to be sprayed separately. Overlap seams a minimum of six inches (6"). Lay geotextile tight at all inside corners. Spray LIQUID BOOT® within the seam overlap to a thickness of 80 mils minimum.

B. Refer to section 3.03.40, "Sealing Around Penetrations", for procedures to seal around penetrations.

C. Spray apply LIQUID BOOT® onto geotextile to an 80 mil minimum dry thickness. Increase thickness to 100 dry mils if shotcrete is to be applied directly to membrane. If a second coat is required, remove any standing water from the membrane before proceeding with the second application.

D. Do not penetrate membrane. Keep membrane free of dirt, debris and traffic until a protective cover is in place. **It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.**

E. After membrane has cured and checked for proper thickness and flaws, install protection material pursuant to manufacturer's instructions.

NOTE: If water testing or inspection is to be performed, conduct before placing protection course.

3.03.30 INSTALLATION ON LAGGING

A. Attach subsurface drain mat or, securely nail 8 oz. non-woven geotextile over lagging and soldier piles keeping geotextile tight to lagging wall. Overlap seams a minimum of six inches (6").

B. Roll out Typar geotextile vertically with the heat-rolled side facing out and staple to lagging using 3/8 long staples 12" on center. Overlap seams a minimum of six inches (6"). Spray LIQUID BOOT® within the seam overlap to a thickness of 80 mils minimum. Do not staple top layer of geotextile at overlap.

C. Refer to section 3.03.40, "Sealing Around Penetrations", for procedures to seal around penetrations.

D. Provide a 3/4 inch minimum cant of LIQUID BOOT®, or other suitable material as approved by manufacturer, at all horizontal to vertical transitions and other inside corners of 120° or less. **Allow to cure overnight before the application of LIQUID BOOT® membrane.**

E. Spray apply LIQUID BOOT® to a minimum thickness of 80 mils (100 mils if installing shotcrete walls). Remove any standing water.

F. Do not penetrate membrane. Keep membrane free of dirt and debris until concrete is in place. **It is the responsibility of the General Contractor to insure that the membrane and the protection system are not penetrated.**

3.03.40 SEALING AROUND PENETRATIONS

A. Clean all penetrations. All metal penetrations shall be sanded clean with emery cloth.

B. For applications requiring geotextile, roll out geotextile on sub-grade with the heat-rolled side facing up, overlapping seams a minimum of six inches (6"). Cut the geotextile around penetrations so that it lays flat on the sub-grade. Lay geotextile tight at all inside corners. Spray LIQUID BOOT® within the seam overlap to a thickness of 80 mils minimum.

C. At the base of penetration Install a minimum 3/4 inch thick membrane cant of LIQUID BOOT®, or other suitable material as approved by manufacturer. Extend the membrane at an 80 mil thickness three inches (3") around the base of penetration and up the penetration a minimum of three inches (3"). **Allow to cure overnight before the application of LIQUID BOOT® membrane. (SEE MANUFACTURER'S STANDARD DETAIL)**

D. Spray apply LIQUID BOOT® to an 80 mils minimum dry thickness around the penetration, completely encapsulating the collar assembly and to a height of one and one half inches (1 1/2") minimum above the membrane as described in 3.03.40 C above. Spray apply LIQUID BOOT® to surrounding areas as specified for the particular application. **(SEE MANUFACTURER'S STANDARD DETAIL)**

F. Allow LIQUID BOOT® to cure completely before proceeding to step "G".

G. Wrap penetration with polypropylene cable tie at a point two inches (2") above the base of the penetration. Tighten the cable tie firmly so as to squeeze the cured membrane collar.

3.04 FIELD QUALITY CONTROL -

Field Quality Control is a very important part of all LIQUID BOOT® applications. Applicators should check their own work for coverage, thickness, and all around good workmanship before calling for inspections.

Applicators and Inspectors should check membrane for holes, shadow shrinkage, and any other membrane damage when reviewing the membrane.

When thickness or integrity is in question the membrane should be tested in the proper manner as described below. However, over-sampling defeats the intent of inspections. Inspectors should always use visual and tactile measurement to guide them. Areas suspected of being too thin to the touch should be measured with the gauges to determine the exact thickness. With practice and by comparing tactile measurements with those of the gauges, fingers become very accurate tools.

3.04.10 ON CONCRETE/SHOTCRETE/MASONRY & OTHER HARD SURFACES

A. Membrane may be checked for proper thickness with a blunt-nose depth gauge. Record the minimum reading. Mark the test area for repair, if necessary.

B. If necessary, test areas are to be patched over with LIQUID BOOT® to an 80 mils minimum dry thickness, extending a minimum of one inch (1") beyond the test perimeter.

NOTE: Due to the nature of concrete as a substrate, it is normal for some blistering to occur. This is caused by either concrete's tendency to off-gas or by water temporarily trapped between the concrete and the membrane. With time and the applied pressure of backfill or over-slab, blisters will absorb into the concrete without detriment to the membrane.

A small number of blister heads should be sampled and checked for proper membrane thickness. If the samples have the required membrane thickness (80 mils minimum), then the remaining blisters should not be punctured or cut. If the samples have less than the minimum 80 mils, then the area can either be resprayed to obtain the proper thickness, or the blisters can be cut out and the area resprayed or patched with LIQUID BOOT® Trowel Grade.

3.04.20 ON DIRT AND OTHER SOFT SUBSTRATES

A. Samples may be cut from the membrane and geotextile sandwich to a maximum area of 2 square inches. Measure the thickness with a mil-reading caliper. Deduct the plain geotextile thickness to determine the thickness of LIQUID BOOT® membrane. Mark the test area for repair.

B. Voids left by sampling are to be patched with geotextile overlapping the void by a minimum of two inches (2"). Apply a thin tack coat of LIQUID BOOT® under the geotextile patch. Then spray or trowel apply LIQUID BOOT® to an 80 mils minimum dry thickness, extending at least three inches (3") beyond geotextile patch.

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