West 34th Street Development

555 West 34th Street
New York, New York
Block 706, Lot 1

BCP Site #C231049

REMEDIAL ACTION WORK PLAN

Prepared For:
Meushar 34th Street, LLC
c/o The Moinian Group
530 Fifth Avenue, Suite 1800
New York, NY 10036
FLS Project Number: 10090-001

Submitted to:
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, 12th Floor
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June 2007

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Professional Engineer's Certification

I, Arnold F. Fleming, certify that this Remedial Action Work Plan was prepared under my direct supervision.

REMEDIAL ACTION WORK PLAN
(RAWP)
West 34th Street Development
New York, NY

Brownfield Site
C231049

June 2007

It is a violation of New York State Law for any person, unless acting under the direction of a licensed professional engineer or land surveyor, to alter any item in any way. If an item bearing the seal of an engineer or land surveyor is altered, the altering engineer or land surveyor shall affix to the item his seal and notation "altered by" followed by his signature and the date of such alteration, and a specific description of the alteration.

_____ _____

Date

Arnold F. Fleming, P.E.
NYS Professional Engineer
License Number 050411

1.0 INTRODUCTION

Pursuant to the Brownfield Cleanup Agreement fully executed as of February 21, 2007, between Meushar 34th Street, LLC and the New York State Department of Environmental Conservation (NYSDEC), and on behalf of the Applicant, Arnold F. Fleming, P.E./Fleming-Lee Shue, Inc. (collectively FLS) has prepared the following Remedial Action Work Plan (RAWP) for the parcel of land known as the "West 34th Street Development" (hereafter referred to as "the Site"). The legal description of the Site is Block 706, Lot 1 (555 West 34th Street). The Site is located on the western portion of the city block bounded by West 34th Street to the south, 11th Avenue to the west and West 35th Street to the north, in the borough of Manhattan, City of New York, New York. A Site Location Map and a Site Plan are included as Figures 1 and 2, respectively. The RAWP is written in compliance with the Division of Environmental Remediation (DER) Draft Brownfield Cleanup Program (BCP) Guide and DER-10, Sections 4 and 5.

1.1 Site Description and Proposed Development

The Site consists of a two story building, which was last operated by Verizon as part of their installation and maintenance division. The Amtrak Empire Line is present beneath the northwest corner of the site (Figure 2) within an easement. The western bulkhead wall of the basement reflects the presence of the track.

The Applicant intends to demolish the existing Site structure in order to both create access for the construction of the 34th Street station of the No. 7 subway extension and construct a high-rise mixed-use building.

The No. 7 line tunnel will be located within the bedrock zone outside the site boundaries. The subway tunnel waiting area will be constructed under 11th Avenue starting approximately 90 feet below grade (ft-bg), which is approximately 60 feet into bedrock. Access for construction will be provided through a 38 feet by 24 feet shaft located within the Site's boundaries. The shaft will extend to a depth of approximately 120 feet below grade (approximately 90 feet into rock), proceeding west to the location of the subway tunnel and the 34th Street Station. This shaft will be used to remove rock from the tunnel and waiting area beyond the Site, as well as to bring in construction materials to construct the tunnel and station. The subway station, which will contain the main entrance and ticketing level, will be present on-Site to a depth of approximately 40 feet below grade with a portion approximately 50 feet below grade to allow for escalator operation. This is approximately 10 to 20 feet into bedrock. Proposed development plans for the No. 7 station are included in Attachment A.

Due to the construction of the No. 7 line station, the proposed building will be constructed approximately seven years after the Site excavation is completed. Details of the proposed building are based on the results of two zoning studies of the Site. The

proposed 79-story building will occupy the entire Site, as well as the adjacent Lot 55, with a footprint of approximately 46,900-square feet. One to two below-grade floors will be constructed for parking, storage or mechanical rooms. The first floor will likely include lobbies, retail, loading docks and entrances to the No. 7 line ticketing level. Parking entry or mechanical use may also be present on the first floor. The upper floors are contemplated to be used for a combination of office, residential, hotel, retail, parking and support spaces. The bulkhead wall separating the basement from the Amtrak line will remain. Proposed development plans for the mixed-use building are under development. The anticipated use is mixed use with residential included in the development.

The Site appears on the City of New York Department of City Planning Zoning Map 8b. According to this map, the property is designated C6-3, which is designated as a general central commercial district. The New York City Department of Environmental Protection (NYCDEP) has placed an "e" designation on this Site. Development of an "e" designation site requires NYCDEP approval prior to issuance of a permit by the New York City Department of Buildings (NYCDOB).

The parcel of land was previously zoned for general commercial use and was rezoned as part of a larger, City-led, rezoning project for the Hudson Yards District in Manhattan, New York. The Site is located within the Large-Scale Plan Sub-district in the Four Corners Sub-area. The rezoning was designed to allow the area to be developed for commercial and residential uses. The Hudson Yards District Rezoning was completed in January 2005.

1.2 Purpose and Goal of RAWP

The purpose of this RAWP is to describe the proposed remedy of removing all soil from the surface down to bedrock, including urban fill and native soils, from the Site. This proposed remediation would also remove the source of the on-Site petroleum-contaminated groundwater identified in remedial investigations of the Site, as summarized in Section 2.3.

The physical location and associated easement rights of the Amtrak railroad track limit the remediation activities that will occur in the northwestern portion of the Site. Removal of all soil and groundwater in this area will be conducted approximately two years after the soil in the area east of the bulkhead wall is removed. Although removal of any contaminated soil beneath the Amtrak railroad track is not possible, the track is believed to be constructed into bedrock. Drawings prepared by Parsons Brinckerhoff (PB) indicate that the base of the railroad track is located below the inferred depth of bedrock based on geotechnical borings conducted for the No. 7 subway line extension. Therefore, all contaminated soil would be removed from the Site, including soils within the easement. Side views of this area of the Site are included as the first and third drawings, Numbers AR-50240 and AR-50231, respectively, in Attachment A.

The proposed excavation across the Site will extend to a minimum of 40 feet below grade (ft-bg) in order to prepare the site for the No. 7 subway station and construction shaft. Bedrock has been encountered between 13 and 40 ft-bg, but most likely extends deeper at the western part of the Site. The remedial action entails excavating to bedrock across the Site.

Site preparation for the construction of the No. 7 subway station will occur concurrently with the remediation east of the bulkhead wall. On the eastern portion of this area, after the remedial excavation has been completed, some bedrock will be removed, crushed on-Site and used to bring the western portion of this area up to the foundation grade for the subway station. As detailed above the cut into bedrock will be approximately 10 to 20 feet to allow for the subway station and the escalator operations. The bedrock surface will be inspected by a representative of FLS before the bedrock is used for construction grading. Rock crushing for grading will be done under a dust suppression program.

Groundwater is located between 17 and 32 ft-bg, so dewatering will be required to allow the contaminated soil/fill excavation and the subsequent construction of the basement. Based on the similar depths to both groundwater and bedrock, the perceived groundwater table may be perched groundwater.

The Remedial Investigation (RI) of the Site, summarized in Section 2.3, indicated that up to 17 feet of soil on the Site is urban fill. The fill consists of brown, black grey and tan sands with some silts, gravel, concrete, brick fragments, rocks and cinders. A number of the fill constituents exceed regulatory guidance levels and the fill material will be removed entirely from the Site. At the groundwater level, there is petroleum contamination remaining from the historic use of the Site for fueling operations and the operation of a hydraulic elevator.

Any off-Site migration of contaminants identified in Site groundwater will be addressed by a Supplemental Remedial Investigation. Because remediation of the Site will draw off-Site groundwater into the excavation, the off-Site conditions will be established after all source soils have been removed and groundwater stabilizes during subway construction.

All soil will be removed from the Site; therefore, all contaminated soils (urban fill, petroleum-contaminated urban fill and native soil) will be removed from the Site. Groundwater will be treated by the construction dewatering system that will lower the groundwater level to the bottom of the excavation for the access shaft, estimated at approximately 30 feet below grade. Any groundwater generated by dewatering will be treated prior to discharge to the New York City sewers under a permit from and in accordance with the requirements of NYCDEP.

At completion of the remediation east of the bulkhead wall, the Site will be turned over to the MTA for subway construction. The access shaft and the horizontal shaft leading to the tunnel under 11th Avenue will be completed as part of the construction of the building. Approximately two years after the commencement of remediation activities, the

Applicant will remove all soil and groundwater within the Amtrak easement. This schedule reflects the time needed to gain approval from Amtrak to work within the easement. An access agreement will address the schedule, work-to-be-performed, insurance, site-specific Health and Safety Plan, etc. This agreement is expected to take one to one-and-a-half years to obtain. Following the removal of the soil and groundwater, the Applicant will drill caissons within the easement to support the future building. These caissons need to be installed prior to the drilling of the tunnel under 11th Avenue to avoid damage to the tunnel.

1.3 Summary of Historical Documentation and Reports

FLS reviewed available documentation regarding historical environmental and geotechnical investigations at the Site. The following reports regarding 555 West 34th Street were available for review:

- Phase I Environmental Site Assessment, prepared by Parsons Brinckerhoff, dated June 8, 2004.
- Phase I Environmental Site Assessment, prepared by EnviroTrac, Ltd., dated June 28, 2004.
- Subsurface Investigation Report, prepared by EnviroTrac, Ltd., dated September 9, 2005.
- Underground Storage Tank Removal Report, prepared by EnviroTrac, Ltd., dated March 9, 2006.
- Phase II Environmental Site Investigation Report, prepared by Parsons Brinckerhoff, dated April 2006.

The following Site description presents the results of the Site investigations contained in these reports.

2.0 SITE BACKGROUND

The Site is located very close to the original shoreline of the Hudson River, which was just across what is now 11th Avenue; however, the Hudson River has since been filled in to the West Side Highway. The Site has been developed with a variety of commercial, residential, and manufacturing facilities since approximately 1890.

2.1 Geology

The Site is mapped on the *40074-G1 Weehawken, NJ-NY* Quadrant 7.5 Minute Topographic Map, published by the United States Geological Survey (USGS) (Figure 1). Review of the topographic map revealed that the site is located approximately 20 feet above sea level (ft-msl, USGS).

The following geologic information was obtained from EnviroTrac, Ltd. (EnviroTrac) and PB.

The generalized subsurface profile consists of fill overlying sand and silt deposits, with bedrock at depths between 5 and 24 feet below grade (ft-bg). Descriptions of each soil stratum are given below.

Fill
Fill material was encountered in twenty-three of a total twenty-five borings conducted at the Site. The fill consists of brown, black grey and tan sands with some silts, gravel, concrete, brick fragments, rocks and cinders. The fill thickness ranges from about five to seventeen feet.

Sand and Silt
Sand was generally encountered below the fill with some instances of silts and clay. The sand layer consists of brown, reddish brown, black and grey, coarse to fine sand with varying amounts of silt and clay. The thickness of the native Holocene epoch soils ranged from 0 to 32 feet. In one geotechnical boring, PE-19, completed by PB in 2003, this layer was considered to be fill material by the geologist.

Bedrock
Bedrock was encountered in each boring. Bedrock consisted of wide-fractured, hard mica schist with some layers of pegmatite and amphibolite. Bedrock was found at depths ranging from about 13 to 40 ft-bg. In the one geotechnical boring, the bedrock was reported as weathered to 59 ft-bg. Core recoveries ranged from 96 to 100 percent, averaging 99.6 percent. Rock Quality Designation (RQD) values ranged from 80 to 100 percent, averaging 97 percent, indicating good to excellent quality rock. As expected, bedrock appears to be shallowest at the east end of the Site and slopes downward to the west toward the Hudson River.

2.2 Hydrogeology

The Site-specific hydrogeologic information was obtained from EnviroTrac's Subsurface Investigation Report, dated September 9, 2006 and PB's Phase II Environmental Site Investigation, dated April 2006. Further discussion of groundwater monitoring conducted as part of this RI is provided in Section 4.2.

General Hydrology

Groundwater is generally contained within the unconsolidated geologic materials and the fractured bedrock. The upper surface of the groundwater reservoir is marked by the groundwater-table surface, which fluctuates seasonally in response to precipitation events, local usage demands and tidally along the shorelines. Based on similar depths measured to both groundwater and bedrock, the groundwater detected in the unconsolidated zone may be perched water and not reflective of the true groundwater-table surface.

In most locations throughout Manhattan, the configuration of the water-table surface generally follows the local topography. Groundwater generally flows from areas of higher to lower topographic elevation or from inland areas to the shorelines. The topography of the Site dips from the west to the east; however, the Site topography has been altered to line up with the bridge structure that supports 11th Avenue. Therefore, the topography of the Site cannot be used to determine the groundwater flow direction. The bedrock at the Site is a better indicator of the original topography at the Site. As detailed in Section 2.1, the bedrock slopes westward towards the Hudson River. The topography of the surrounding area also slopes towards the Hudson River. Therefore, the groundwater flow direction, on average, beneath the Site can be inferred to flow in a westerly direction towards the Hudson River. Underground utilities, such as sewer, water and steam pipes, and other subsurface manmade objects may locally impede and redirect the natural groundwater flow, or if the water or sewer lines leak, may cause localized mounding of the groundwater-table.

Groundwater flow directions were measured as part of the EnviroTrac Phase II as flowing to the west towards the Amtrak tunnel locally and the Hudson River generally.

Infiltration of incident precipitation to the water table in the project area is likely minimal due the extensive paving and structures that cover most of the ground surface. The vast majority of incident precipitation drains to City combined sewers and eventually to the North River wastewater treatment plant that serves this area of the City, or directly to tidal surface waters during overflow events. Rainwater that does infiltrate the ground percolates downwards towards the water table, where it enters the groundwater reservoir and flows towards the Hudson River.

Groundwater in the New York City area is not used as a potable (drinking) water source. New York City residents receive their drinking water supply from surface reservoirs located in upstate New York.

Site Groundwater Elevations

EnviroTrac and PB measured groundwater at depths between 17 and 32 ft-bg. Due to the altered Site topography, depth-to-water measurements do not accurately represent the Site groundwater elevations. Groundwater table elevations, which account for changes in Site topography, vary approximately 20 feet across the Site. One monitoring well, MW-4, appears to have an anomalously low reading which may be due to groundwater depression or a measurement error (e.g., an incorrect survey reading). The groundwater table elevations vary approximately 13 feet across the Site. The groundwater table elevations confirm that the net groundwater flow is generally towards the west and northwest.

Surface Water

No surface water bodies exist on the Site. The closest surface water body is the Hudson River, located approximately 1,100 feet west of the Site.

2.3 Previous Investigations

Previous Site investigations performed by PB and EnviroTrac are summarized below. These investigations have also been detailed in FLS' Remedial Investigation Report (RIR).

2.3.1 PB Investigations

In a June 8, 2004 Phase I Environmental Site Assessment (ESA), PB identified three types of recognized environmental conditions (RECs) at the Site:

1. Historic uses of the Site and surrounding sites that may have impacted the subsurface environment. Based on historic Sanborn Fire Insurance maps, PB identified the following uses of the Site as RECs: unknown type of factory, a garage (with buried gasoline tanks), a blacksmith, a welding facility and a motor freight station. The following uses on surrounding properties were identified as RECs: a factory, a machine shop, a U.S. Post Office with buried gasoline tanks, a motor freight station and a Federal Express facility with fuel oil and gasoline tanks across 34th Street; a paper imaging company and an iron works adjacent to the east of the Site; and a foundry, multiple factories, a garage with buried gasoline tanks and a used auto parts facility across 35th Street.

2. Open spills identified by review of the state databases (NY Spills/LTANKS), which may have impacted the Site. The following five sites are located upgradient of and close to the Site and have a confirmed release of petroleum:
   - **538 West 34th Street**

- 534 West 34th Street
- 432 10th Avenue
- **436 10th Avenue** (Amoco station)

The two bolded properties also appeared on the Resource Conservation and Recover Information System (RCRIS) for Generators and Transporters.

In addition, PB identified an underground storage tank (UST) at 527 West 34th Street, which was reported to be leaking and which may not have been removed in compliance with NYSDEC regulations.

3. Storage tanks located at the Site. PB was not given full access to the Site; however, evidence of two 2,900-gallon capacity tanks containing unleaded gasoline was identified. In addition, four possible former remote fill ports were identified. Because these tanks were not listed in the Petroleum Bulk Storage (PBS) database, it is probable that they are not in compliance with NYSDEC regulations.

PB recommended a program of soil and groundwater sampling to determine if any of the RECs affected the Site. The PBS database was updated by EnviroTrac after removing the USTs in January 2006.

Subsequent to PB's Phase I ESA, additional environmental investigations were conducted by EnviroTrac, as detailed in Section 2.3.2, below. PB conducted soil and groundwater sampling in September and November 2005. PB detailed the sampling in an April 2006 Phase II Environmental Site Investigation Report. The findings of the remedial investigation sampling are summarized in Section 2.3.3. Additional information regarding the remedial investigation soil and groundwater sampling is included in FLS's RIR.

2.3.2 EnviroTrac Investigations

In a June 28, 2004 Phase I ESA, EnviroTrac identified six recognized environmental conditions (RECs) on the Site:

1. Soil and groundwater sampling was recommended in the area of the in-ground hydraulic piston associated with a truck elevator.

2. Eight 550 gallon underground storage tanks (USTs) of unknown contents had been closed in place by Lexicon Environmental Associates (Lexicon) in 1996. While residual contamination was present in the post-excavation samples, NYSDEC closed the spill.

The residual contamination is summarized in Lexicon's Underground Storage Tank Closures report, dated March 27, 1996 (not reviewed by FLS) EnviroTrac reports that semi-volatile organic compounds (SVOCs) were detected above the

NYSDEC Toxicity Characteristic Leaching Procedure (TCLP) Alternative Guidance Values for fuel oil contaminated soils. Lexicon also removed two leaking 4,000 gallon gasoline USTs and approximately 105 tons of contaminated soil. Post-excavation samples indicated that all gasoline-contaminated soil was removed from this area.

3. An active spill associated with the installation of a soil boring by the New York City Transit Authority.

The soil boring identified in REC 4 is a geophysical boring, PE-19, installed by PB in 2003 (not in association with the Phase I ESA or Phase II investigation).

4. A geophysical survey and subsurface investigation were recommended to investigate USTs shown on historical Sanborn Fire Insurance maps in the southeast corner of the Site.

The review of the Sanborn Fire Insurance maps also indicated multiple commercial uses, as well as residential use, at the Site. The maps are dated from 1890 to 1996. Commercial uses included a building materials facility, a wagon house, a hay and feed company, the Fleischman Company, a garage, a blacksmith and welding company, a laundry, an electrical supply, general warehousing facilities, the Empire Carriers Corporation and the New York Telephone Company, which was later renamed Verizon (the current tenant).

5. The NYSDEC Petroleum Bulk Storage sites database contained incorrect data on the Site. In addition, two 2,000 gallon capacity USTs were reportedly removed from the Site, but the location is unknown.

The database incorrectly listed only five 550-gallon USTs. As summarized in Lexicon's March 27, 1996 Underground Storage Tank Closures report, eight 550-gallon USTs were removed from the Site. In addition, EnviroTrac states that the listed installation date, June 1, 1994, is incorrect. The correct installation date is not noted in the EnviroTrac report. The PBS database was updated by EnviroTrac after removing the USTs in January 2006.

6. Possible presence of lead-based paint (LBP), asbestos-containing materials (ACMs) and polychlorinated biphenyls (PCBs).

Based on the recommendations in their Phase I ESA, EnviroTrac conducted a geophysical survey of the Site, as well as a soil and groundwater sampling program. The results of these activities are detailed in EnviroTrac's September 9, 2005 Subsurface Investigation Report. The geophysical survey did not indicate the presence of any USTs in the southeastern corner of the Site. However, a sub-cellar was located which housed an out-of-service boiler and an oil-water separator. Approximately 75 gallons of liquids were removed from the oil-water separator when it was cleaned out. The findings of the remedial investigation

sampling are summarized in Section 2.3.3. Additional information regarding the remedial investigation soil and groundwater sampling is included in FLS's RIR.

EnviroTrac's March 9, 2006 Underground Storage Tank Removal Report details the removal of two 3,000 gallon gasoline USTs as well as the appurtenant dispensers and remote fill ports. The remote fill ports associated with the previously-removed leaking 4,000 gallon gasoline USTs were also removed. Elevated levels of benzene were detected in one post-excavation sample west of the 3,000 gallon USTs. Excavations conducted to remove the remote fill ports were extended to remove associated contaminated soil. With the exception of SVOCs associated with fill material, not petroleum contamination, elevated levels of contaminants were not present.

2.3.3 Conclusions from Previous Investigations

As detailed in FLS' RIR, soil and groundwater sampling was conducted by PB and EnviroTrac. Soil sampling indicated that elevated levels of petroleum-related volatile organic compounds (VOCs) are present in the area of the hydraulic piston associated with the truck elevator and in the area of the removed gasoline USTs. Soil sampling also indicated that SVOCs and metals typical of historic fill material are present at concentrations above NYSDEC standards. Low levels of pesticides were also detected.

Groundwater samples collected from temporary and permanent monitoring wells in these two areas, as well as a monitoring well located in the sidewalk north of the Site, contained elevated levels of petroleum-related VOCs and SVOCs. Fill-related SVOCs and metals were also detected in groundwater samples collected from the Site. The detected concentrations of metals may be biased high as the samples were not filtered and metals can be bound with silt.

2.4 Proposed Soil and Groundwater Sampling

In order to more completely delineate soil and groundwater contamination detected both on- and off-Site, one groundwater monitoring well in the sidewalk northeast of the Site, as shown on Figure 4. During installation of the monitoring well, one soil sample will be collected from the location of highest suspected contamination, based on visual, olfactory and photionization detector (PID) readings. At least two weeks after installation of the monitoring well, it will be developed and sampled.

The soil sample will be collected for the following parameters:

- Target Compound List (TCL) Volatile Organic Compounds (VOCs)
- TCL Semivolatile Organic Compounds (SVOCs)
- Polychlorinated biphenyls (PCBs)

- TCL Metals
- TCL Pesticides

The groundwater sample will be collected for the following parameters:

- TCL VOCs
- TCL SVOCs
- PCBs
- TCL Metals
- TCL Pesticides

Both soil and groundwater sampling will be conducted in accordance with the Quality Assurance/Quality Control (QA/QC) – Field Sampling Plan, included as Appendix B. This includes sampling procedures and blank and duplicate samples

3.0 REMEDY SELECTION

As per NYSDEC's DER-10, Section 4.1, the goals of the Remedial Action (RA) are to protect public health and the environment and to remove the source of contamination to the extent feasible. When selecting the proposed RA for the Site, the following criteria are also considered: the intended use of the Site; the cost-effectiveness of the remedy; the implementability of the remedy; community acceptance of the plan; and the short and long-term effectiveness of the remedy. Because the proposed development would eliminate all of the contamination identified in the Remedial Investigation Report (RIR), no alternatives analysis is presented.

3.1 Remedy Selection

The selected remedy for the soil and groundwater are as follows:

Soil	Excavation
Groundwater	No Action/Construction Dewatering

According to the NYSDEC Draft BCP Guidance, source removal should be the goal of all BCP remedies. The remedial action selected for soil beneath the building footprint satisfies that goal.

While excavation below the Amtrak Empire Line is not feasible, based on information obtained from geotechnical borings, the track is likely constructed into the bedrock, and, therefore, contaminated soil would not be present beneath the track.

For groundwater contaminant plumes, the remedial goal of the BCP is to prevent plume migration from the boundaries of the Site to the extent practicable. This will be achieved through complete source removal and construction dewatering.

3.2 Institutional Controls/Engineering Controls (ICs/ECs)

All contaminated soils and groundwater will be removed from the Site, thereby requiring no institutional or engineering controls.

4.0 PROPOSED REMEDIAL ACTION

As per NYSDEC's DER-10, Section 4, the goals of the RA are to protect public health and the environment and to remove the source of contamination to the extent feasible. The proposed RA was chosen to meet these goals, as well as to bring the Site into compliance with NYSDEC Standards, Criteria and Guidance (SCG). Source removal will be accomplished across the Site via excavation and proper disposal of all contaminated soils and the removal and treatment of the groundwater.

4.1 Proposed Site-Specific Soil Cleanup Objectives

The site-specific soil cleanup objectives (SSSCOs) proposed for the Site will be the Unrestricted Use Soil Cleanup Objectives (UUSCOs) listed in Table 375-6.8(a) of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (NYCRR).

4.2 Proposed Groundwater Cleanup Objectives

The cleanup objectives for Site groundwater are the NYSDEC Class GA standards for groundwater on the Site. The groundwater contaminants of concern are petroleum-related VOCs and SVOCs [benzene, toluene, ethylbenzene and xylenes (BTEX); methyl tertiary-butyl ether (MTBE); naphthalene; 2-methylnaphthalene; 1,2-dichlorobenzene and 1,2,4-trimethylbenzene]. The following metals may also be contaminants of concern: antimony, beryllium, cadmium, chromium, lead, selenium and thallium; however, the samples were not filtered and the exceedances were most likely due to metals bound to the silt and not dissolved metals.

4.3 Scope of RAWP

The proposed scope of the soil remediation is removal of all soil beneath the entire Site down to bedrock. To accomplish this remediation in a safe manner, the following methods will be used:

1) Classification of soils for disposal,
2) Installation of sheeting and shoring,
3) Excavation of contaminated fill,
4) Dewatering,
5) Site management, and
6) Reporting.

Groundwater beneath the building will be treated and disposed of off-Site through a construction dewatering program.

4.4 Soil Classification and Disposal

Up to 40 feet of soil on the Site is a mixture of urban fill and native sand and silt. This includes all soil above bedrock. Soil excavation will be conducted under the Soil Management Plan (SMP, see Appendix A). After excavating to bedrock, the preparation of the Site, including construction of the access shaft for the 34th Street station of the No. 7 subway line extension and installation of building caissons within the Amtrak easement, will be conducted as part of the construction of the building.

For disposal purposes, all soils to be removed from the site will be classified as petroleum-contaminated to facilitate the excavation and meet the Subway construction schedule.

Based on the RIR, there should not be any hazardous soil found on-Site. Disposing of all of the soils as petroleum-contaminated will allow direct load-out of Site soils. A manifest system will be used to track all soils leaving the Site. The manifests will identify the details of the truck and driver and the disposal facility(ies).

The eight 550-gallon USTs and appurtenant lines, as well as any other underground tanks or other previously unidentified contaminant sources found during on-Site remedial excavation or development related construction, will be removed and decommissioned in accordance with the methodologies outlined in DER-10 [Section 5.5].

The soils within the Amtrak easement will be removed after the removal of the soils from the rest of the site due to Site constraints and the time necessary to obtain Amtrak approval to remove the soil while maintaining the tunnel structure. It is anticipated that these soils will be removed after the rest of the site is under development by the MTA, approximately 2 years after commencement of the remediation. As detailed above, this schedule is necessary to obtain an access agreement from Amtrak. These soils will be removed down to bedrock.

Once an area has been excavated, DER-10 [Section 5.4(a)2ii(2)] requires post-excavation soil samples to be collected at the following intervals: sidewall samples to be collected from the perimeter of the excavation at 30-foot intervals and samples from the base of the excavation to be collected every 900 square feet. However, post-excavation samples can not be collected from bedrock or the tunnel walls. Based on the proposed development, the base of the excavation and portions of the sidewalls will be composed of bedrock. Therefore, samples from the base of the excavation will not be collected. Sidewall samples will be collected from the soil present above the bedrock. The excavation will extend to the property border in every direction and therefore, sidewall samples will be taken from the soil immediately off-Site.

Post-excavation sidewall samples will be collected from the location exhibiting the highest PID reading to evaluate the highest concentration of contaminated soil, if any, that will remain at the exterior boundary of the Site excavation. In the event that elevated PID readings are not recorded, the sidewall samples will be collected immediately above the bedrock interface, as RI sampling indicated that the soil immediately above the bedrock contained the highest concentration of contaminants.

Photos will be taken of each post-excavation sample location to record the visible condition of the sidewall. Category B deliverables will be provided for all post-excavation samples.

Sampling will be conducted in accordance with the Quality Assurance/Quality Control (QA/QC) – Field Sampling Plan, included as Appendix B.

NYSDEC will inspect each grid after it has been excavated to bedrock. After a grid has been inspected, contaminated soil will not be staged in that grid. In the event that contaminated soil is staged in an already inspected grid, the NYSDEC will be notified and the grid will be reinspected after the contaminated soil has been removed from that grid.

4.5 Installation of Sheeting, Shoring and Underpinning

H-Beams (soldier beams) and lagging will be installed along the northern and southern property lines defined by 35th and 34th Streets, respectively. The lagging will be constructed of either timber or concrete. The soldier beams will be tied back into bedrock where necessary. The adjacent six-story residential building to the east, 539 West 34th Street, will be underpinned with a pit and concrete pier system. The underpinning system will be installed below the existing foundation walls. The bulkhead wall separating the current basement from the Amtrak line is assumed to be tied into bedrock and will not require sheeting or shoring.

Any petroleum-contaminated soil that is encountered while installing the sheeting, shoring, or underpinning will be segregated and stockpiled for later removal and proper disposal. Stockpiling is likely for these soils because of the small volumes anticipated.

4.6 Site Operations Plan

The Site Operations Plan (SOP) will be finalized once the contractor is selected and the site access needs are established. The SOP will describe storm water management, equipment access, groundwater management, construction dewatering, the Community Air Monitoring Plan (CAMP, see Appendix C), the Health and Safety Plan (HASP, see Appendix D) and a construction schedule. The majority of these documents are also

included as appendices to this report. A summary of the sections of SOP is included below:

4.6.1 Storm Water Management

The entire Site is currently occupied with buildings. Therefore, infiltration of incident precipitation to the water table in the project area is minimal. Precipitation flows to the New York City combined sewer system.

Site demolition and initial excavation will remove the existing buildings and storm sewer system. Rain water and construction-generated water will infiltrate the fill material and soils below the Site until it reaches groundwater. During demolition and initial excavation activities, prior to disconnecting the sewer connection, the contractor will provide an inlet screen made of staked hay bales wrapped in silt fencing around the sewer inlets. This will prevent any excavated soil from entering the City's combined sewer system. A Sedimentation and Erosion Control Plan is included as Appendix E.

It is anticipated that the dewatering system will consist of perimeter well points placed outside the site boundaries but within the sheeting and shoring. The well points would be connected to a header to collect the water and direct it to a treatment system as required by the NYCDEP. The treatment system would be designed to meet the requirements of the NYC Sewer Use Ordinance. Once the construction dewatering system is operational, rain water and construction-generated water entering the Site will infiltrate down to the groundwater and then be pumped into the City's combined sewer system under an NYCDEP dewatering discharge permit. Dewatering is discussed below.

4.6.2 Equipment Access

A single truck entrance will be used for access to the Site for earth-moving equipment and dump trucks. Most likely, the entrance will be located in the northwest corner of the Site on 35th Street. The truck entrance will have a ramp incorporated to bring the equipment from bedrock grade to surrounding grade. To prevent soil from being deposited on public streets, this entrance will be provided with a truck washing station to clean adhered soil from exiting trucks.

The following design guidelines will be used for construction of the truck washing station:

- a rectangular area approximately 10-feet wide by 20-feet long,
- a minimum of 6 inches of ¾-inch crushed stone to remove any loose soil or mud before the trucks depart the Site, and
- a wheel wash and a power washer to rinse excess soil from the trucks and truck tires.

A detail of the truck washing station is included in the Sediment and Erosion Control Plan (Appendix E). The location of the truck entrance, ramping details and materials storage locations will be provided once the final construction documents are completed and contractors selected. According to the New York City Department of Transportation's (NYCDOT) 2007 Truck Route Map, both 34th Street and 11th Avenue are truck through-routes adjacent to the Site. South of the Site, 11th Avenue is a local truck route, as is 10th Avenue. A copy of the NYCDOT truck routes is provided on Figure 3. Trucks may enter the Site by traveling north on 10th Avenue and turning onto 35th Street. Trucks may exit the Site by turning south onto 11th Avenue from 35th Street. The transporter name, address, state permit number, driver name, license number and truck number will be recorded for trucks entering the Site as part of the manifest system described above.

4.6.3 Dewatering/Groundwater Management

Dewatering will occur during Site excavation and advancement of the sheeting and shoring beyond the depth to groundwater. The dewatering system, once in operation, will be used as necessary to maintain a dry excavation.

Details of any required treatment system will be designed to meet the requirements of the NYCDEP for discharge to the city sewer system under a NYCDEP discharge permit. The discharge rate to the sewer will be calculated by the dewatering contractor. Treatment requirements will be determined by the NYCDEP as part of the permit process.

The groundwater discharge will be monitored a minimum of one time per day for the presence of free-phase product and sampled in accordance with the city permit requirements.

In conjunction with the installation of the building foundation, a waterproofing/vapor barrier will be installed at the Site to mitigate groundwater from entering the building when constructed.

4.6.4 Community Air Monitoring

The Community Air Monitoring Plan (CAMP) for the Site, included in Appendix C, entails continuous upwind and downwind perimeter monitoring during remediation-phase ground-intrusive activities, including the activities performed under this RAWP. At both the upwind and downwind end of the Site, air monitoring will include real-time air monitoring for dust/aerosol using dedicated air monitoring stations placed at the beginning of each day. A PID will be used to measure total VOC readings in the air in the upwind and downwind positions relative to the excavation operations, as well as the breathing space of the equipment operators, and the Site perimeter during the operations described above. The concentrations of VOCs detected in soil and groundwater does not

suggest significant airborne VOCs will be encountered. For non-intrusive activities, such as the collection of groundwater samples from monitoring wells or soil sampling for disposal characterization, periodic monitoring will be conducted.

4.6.5 Site Security Plan

Security of the Site during remediation is necessary to prevent any unauthorized access to and disturbance of the Site. The security measures will serve multiple purposes – to prevent any vandalism/theft at the Site, to prevent exposure of people to Site contamination and to prevent unauthorized vehicles and equipment from entering the Site.

A secure fence will be erected along the perimeter of the Site. 24-hour security personnel will monitor and control access to the Site through a gate specifically designated as the Site entrance. The security personnel will be positioned on the Site in a way that allows the best practicable monitoring of the Site perimeter.

The Contractor is will be responsible to install and maintain all Site security measures in accordance with all applicable regulations.

5.0 REPORTING

5.1 Progress Reports

The Applicant's representative will provide the NYSDEC Site Manager with weekly e-mail progress reports on the Site activities. The weekly progress report will present the status of Site remedial or construction activities and the anticipated work for the next week. If there are any major problems or unforeseen event that occur which may require a deviation from the RAWP, then the NYSDEC Site Manager will be notified by email daily. Photos will be taken of Site activities and sent to the NYSDEC Site Manager on a weekly basis. The NYSDEC Site Manager will be notified in advance of all meetings regarding the remediation at the Site.

All project-related materials will be provided in the proper format. Digital submittals will include PDF format files for all documents. Data in tabular format will also be submitted in active source files format (such as Excel) to enable direct evaluation by the NYSDEC.

5.2 Final Remediation Report

After completion of the RAWP, a Final Engineers Report will be prepared, which includes the compilation of all information provided in the weekly reports for the entire time period of the operation of the RAWP. Additionally, copies of the documentation relating to off-Site transportation of wastes will be included. The contents of the Remediation Report will include:

- Records of all material removed from the Site, including excavated soil, solid waste, and fluids.
- Documentation associated with the disposal of the aforementioned materials, which shows the requisite approvals for receipt of the materials.
- Bill of lading system or equivalent for the off-Site transportation of non-hazardous wastes and soil.
- Waste manifests for the transportation of petroleum-contaminated soils.
- Post-excavation sampling results and documentation.
- Community Air Monitoring Plan results.
- Quality Assurance Project Plan results.
- Community Participation Plan and Fact Sheets.
- Clean Fill Certification, if required.
- Laboratory analysis of soils, groundwater and soil gas collected as part of the project.
- Data Usability Summary Reports.
- Photographic documentation of the remediation.
- Tank Closure Documentation, if required.

If, as anticipated, a Track I remediation is achieved, no Site Management Plan (SMP) will be required. However, if a Track I remediation is not achieved, a SMP will be prepared to specify future soil handling requirements, operations and maintenance procedures and Site Use Restrictions, if necessary. An Environmental Easement will also be prepared if a Track I remediation is not achieved, which will contain any engineering and/or institutional controls.

6.0 Costs and Schedule

Estimated costs for remediation are provided in Table 1. A preliminary schedule for implementation of remedial activities is presented on page 20.

Table 1
Estimated Remediation Costs
West 34th Street Site

Engineering Costs	**Quantity**	**Units**	**Unit Rate**	**Cost**
Remedial Investigation	1	LS	$250,000	$250,000
Off-Site Investigation	1	LS	$65,000	$65,000
In-situ Disposal Characterization	1	LS	$185,000	$185,000
Preparation of Plans/BCP Submittals	1	LS	$125,000	$125,000
Subcontractor Coordination	1	LS	$2,000	$2,000
Post-Excavation Sampling	1	LS	$20,000	$20,000
Reporting				
Progress Reports	1	LS	$25,000	$25,000
Final Remediation Report	1	LS	$25,000	$25,000
Permitting	1	LS	$25,000	$25,000
Subtotal Engineering Costs				$722,000
Construction and Remediation Costs				
Admin & Mobilization	1	LS	$30,000	$30,000
Bonds	1	LS	$50,000	$50,000
Site Prep and Restoration	1	LS	$200,000	$200,000
Site Management and Security	1	LS	$400,000	$400,000
Health & Safety monitoring + PID / Dust Monitor	110	DAY	$1,300	$143,000
CAMP Implementation + PID/Dust Monitor	110	DAY	$1,300	$143,000
Sheeting and Shoring (includes tiedowns/tiebacks) and Underpinning	1	LS	$1,200,000	$1,200,000
Closeout and Demobilization	1	LS	$30,000	$30,000
Excavation including Transportation and Disposal				

General Earth Excavation - Machine (CY)	34957	CY	$35	$1,223,495
Excavation - Rubble / Existing foundations (CY)	3885	CY	$125	$485,625
Transport and dispose of petroleum-contaminated material	52436	TON	$54	$2,831,544
Table 1, continued				
Dewatering (Includes WP Installation, Electricity, Hardware, Wastewater Treatment, and Temporary Sewer Connection)	5	MO	$15,000	$75,000
Waterproofing				
F/I Preprufe 300 for slabs	44438	SF	$8	$355,504
F/I Waterproofing face walls	16900	SF	$12.50	$211,250
F/I Damproofing	61338	SF	$3.50	$214,683
F/I Waterstop	845	LF	$10	$8,450
Subtotal Construction and Remediation Costs				$7,601,551
Subtotal - All Costs				$8,323,551
20% contingency				$1,664,710
TOTAL				$9,988,261

West 34th Street Development
Preliminary Schedule of Remediation and Construction Activities

Activity	Duration (months from start/year)																								
Month:	1	2	3	4	5		9	10	11	12	1		6		11	12	1	2	3	4		10	11	12
Year:	1	1	1	1	1	..	2	2	2	2	3	..	3	…	7	7	8	8	8	8	..	9	9	9
Total Months:	1	2	3	4	5		31	32	33	34	35		42		71	72	73	74	75	76		94	95	96
Excavation (East of Bulkhead Wall)																								
Supplemental Remedial Investigation																								
Construction Dewatering if necessary																								
Construction of No. 7 Subway Station																								
Excavation (West of Bulkhead Wall, in Amtrak Easement)																								
Installation of Caissons, in Amtrak Easement																								
Anticipated Certificate of Completion																								
Construction of Foundation for Proposed Mixed-Use Building																								
Install Moisture/Vapor Barrier																								
Construction of Mixed-Use Building																								
Reporting [1]																								

[1] Monthly reporting will continue through receipt of the Certificate of Completion

7.0 GLOSSARY

BCP	Brownfield Cleanup Program
BTEX	benzene, toluene, ethylbenzene and xylenes
CAMP	Community Air Monitoring Program
DER	Division of Environmental Remediation
ft-bg	feet below grade
ft-msl	feet relative to mean sea level
HASP	Health and Safety Plan
ICs/ECs	Institutional Controls/Engineering Controls
MTBE	methyl tertiary-butyl ether
NYCDEP	New York City Department of Environmental Protection
NYCDOT	New York City Department of Transportation
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAHs	poly-aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PID	photoionization detector
RA	Remedial Action
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RIR	Remedial Investigation Report
SCG	standards, criteria and guidance
SMP	Site Management Plan
SOP	Site Operations Plan
SSSCOs	Site-specific soil cleanup objectives
SVOCs	semi-volatile organic compounds
TCLP	toxicity characteristic leachate procedure
VOCs	volatile organic compounds