DRAFT REMEDIAL ACTION WORK PLAN
FOR
FORMER METRO NORTH PROPERTY (MOTT HAVEN)
at
672 CONCOURSE VILLAGE WEST
BRONX, NEW YORK 10451

SCA LLW NO.: 033485
SCA CONTRACT NO.: C000009228
SCHOOL DISTRICT: 78
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NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY

Prepared by:

Shaw Shaw Environmental & Infrastructure, Inc.

Shaw Environmental & Infrastructure
Engineering of New York, P.C.
4 Commerce Drive South
Harriman, New York 10926
Phone: 845-492-3100
Fax: 845-492-3101
August Arrigo, P.E.

Prepared for:

New York City School Construction Authority

30-30 Thomson Avenue
Long Island City, NY 11101-3045
Phone: 718-472-8602
Fax: 718-472-8500
Attn: Lee Guterman

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EXECUTIVE SUMMARY

Shaw Environmental and Infrastructure, Inc (Shaw) has been retained by the New York City School Construction Authority (SCA) to prepare a Remedial Action Work Plan (RAWP) for the former Metro North site located at 672 Concourse Village West, Bronx, New York (hereafter referred to as the "Site"). The Site consists of Block 2443/Lot 78 on the Borough of Bronx tax assessor's map.

Administratively, the Mott Haven site is being addressed under the Brownfield Cleanup Program Act (BCP) Agreement between the New York State Department of Environmental Conservation (NYSDEC) and SCA. The BCP area represents the area of the Site where remedial activities are proposed, and which are described in this RAWP.

Shaw completed site investigation activities between March and September 2005. These investigative activities were completed as two separate phases. The Remedial Investigation activities, completed pursuant to the NYSDEC approved RIWP (July 2005), were performed between March and August 2005. A Supplemental Investigation (SI) was performed to the north and west of the Site to identify off-site contamination which may be impacting the Mott Haven Site. These SI activities were based on a Scope of Work (SOW) presented to NYSDEC and New York State Department of Health (NYSDOH) on July 14, 2005.

The findings of the RI identified soil and groundwater contamination above NYSDEC Recommended Soil Cleanup Objectives (RSCOs) and groundwater quality standards, specifically associated with volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The most elevated VOC and SVOC compounds detected include benzene, toluene, ethylbenzene, and xylenes (BTEX), and the polynuclear aromatic hydrocarbons or PAHs (e.g. naphthalene, chrysene, benzo(a)anthracene, benzo(a)pyrene, phenanthrene). The highest organic contaminant detected was naphthalene. The most significant contamination identified was generally confined to the northwestern portion of the Site, as well as upgradient and off site, at a depth corresponding to the top of the zone of saturation (water table).

Remedial Action Objectives (RAOs) have been established to ensure that all proposed site remedies are protective of human health and the environment. The RAOs proposed for the BCP area are:

- Ensure that on-site contaminant concentrations in soil and groundwater and soil gas do not pose unacceptable risks to school occupants;
- Achieve cleanup of VOCs and SVOCs to RSCOs as per TAGM 4046; and
- Maintain existing groundwater quality at the downgradient property line.

To achieve the above remedial action objectives, the following remedial actions are proposed to be completed at the Site:

- A hydraulic barrier will be constructed along the northern and western boundaries of the BCP area to prevent contaminated groundwater from entering the Mott Haven Site.
- Contaminated soil (approximately 300 ft x 125 ft x 12 ft deep) will be removed from the BCP area.
- The excavated BCP area will be restored with clean backfill.
- Engineering controls, consisting of a vapor membrane barrier and passive sub slab depressurization system (SSDS) will be incorporated beneath the school as an added safeguard against the possibility of residual soil vapors migrating into the school building.
- Institutional controls (Environmental Easement) will also be implemented to ensure that deed restrictions and engineering controls remain in place.

An evaluation of the proposed remedy demonstrates that it will be fully protective of human health and the environment. The selected remedy utilizes source removal as the primary means of remediating the site; source removal is the primary goal of the BCP. The selected remedy also utilizes institutional (environmental easements, deed restrictions) and engineering controls. Engineering controls include a hydraulic barrier along the northern and western sides of the BCP area to prevent contaminated groundwater from entering the BCP area. As an added safeguard, a vapor barrier and passive SSDS beneath the school will prevent any potential residual VOC vapors from entering the school.

Verification that remedial action objectives have been met will be accomplished through confirmatory soil sampling (following excavation) and groundwater monitoring for a period of 2 years following implementation of the barrier walls.

1.0 INTRODUCTION

Shaw Environmental and Infrastructure, Inc (Shaw) has been retained by the New York City School Construction Authority (SCA) to prepare a Remedial Action Work Plan (RAWP) for the former Metro North site located at 672 Concourse Village West, Bronx, New York (hereafter referred to as the "Site"). The Site consists of Block 2443/Lot 78 on the Borough of Bronx tax assessor's map (**Figure 1**). **Figure 2** is a site location map.

Administratively, the Mott Haven site is being addressed under the Brownfield Cleanup Program Act (BCP) Agreement between the New York State Department of Environmental Conservation (NYSDEC) and SCA. **Figure 3** delineates the BCP area. The BCP area represents the area of the Site where remedial activities are proposed, and which are described in this RAWP.

The purpose of this RAWP is to describe the remedy for the BCP area. The implementation of the remedy will make the BCP area suitable for use as a public school.

1.1 Existing Site Conditions

The Site is a vacant lot located in a topographic depression. According to the United States Geological Survey (USGS) 7.5-minute Quadrangle Map, *Central Park, NY-NJ*, dated 1995, the approximate elevation of the Site is 20 feet above mean sea level. The properties to the west and east are approximately 30 feet higher in elevation than the Site. An approximate 30-foot high stone or concrete retaining wall borders the site to the west.

The properties immediately to the north, including two public schools (PS156 and IS151), are constructed on a concrete deck approximately 30 feet above the Site. The properties to the south are at approximately the same elevation as the Site. The Site topography gently slopes to the east. The site is relatively flat except for four debris mounds which range in height from approximately 4 to 12 feet above ground surface. These mounds have been present at the Site for many years as evidenced by 30-foot tall trees growing from the mounds. Generally, the fill mounds consist of demolition debris (e.g. concrete, brick) and sand and silt fill materials. These debris mounds are to be removed from the site under a separate construction contract and are not part of this RAWP. **Figure 4** depicts the existing physical characteristics of the Site.

1.2 Historic Site Conditions and Surrounding Land Use

A review of historical records (Sanborn Fire Insurance maps) shows that much of the Site operated as a rail yard from prior to 1891 to approximately 1975. The Sanborn maps show that the Site contained many tracks with a machine shop, carpenter shop, paint area, offices and storage areas. The tracks extended at least 1000 feet beyond the northern boundary of the Site.

Properties in the vicinity of the Site and adjacent to the Site are potential sources of contamination to the Site. Of particular significance relative to the contamination identified on the Site, was the historical presence of a gasoline service station and a manufactured gas plant (MGP) in the upgradient area northwest of the Site. The exact location of the MGP relative to the Site cannot be determined from the Sanborn maps. The URS Phase I ESA indicated that an auto repair shop and gasoline filling station were historically located at the southwestern corner of East 156th Street and Sheridan Avenue/Concourse Village West, adjacent to and immediately west of the Site. By 1977 the filling station was no longer depicted on the map, but the auto repair shop remained. The URS Phase I ESA report indicated that the MGP operated from prior to 1891 to 1946.

Further details about the historic site conditions and surrounding land use, including a review of the Sanborn Maps are found in the Remedial Investigation (RI) Report.

2.0 SUMMARY OF REMEDIAL INVESTIGATION

The following is a summary of the Remedial Investigation completed at the Site. Specific details and findings of the investigation activities can be found in the RI Report which is the companion document to this RAWP.

Shaw completed site investigation activities between March and September 2005. These investigative activities were completed as two separate phases. The Remedial Investigation activities, completed pursuant to the NYSDEC approved RIWP (July 2005), were performed between March and August 2005. A Supplemental Investigation (SI) was performed to the north and west of the Site to identify off-site contamination which may be impacting the Mott Haven Site. These SI activities were based on a Scope of Work (SOW) presented to NYSDEC and New York State Department of Health (NYSDOH) on July 14, 2005.

Pursuant to the RIWP and the Supplemental Investigation SOW, the following activities were conducted: geophysical investigations; installation of twenty-three (23) soil gas points / implants and collection of soil vapor samples; installation of forty-seven (47) soil borings; excavation of nine (9) test pits; installation of twenty (20) groundwater monitoring wells; installation of eight (8) bedrock soil borings; site reconnaissance on surrounding properties; laboratory analysis of soil gas, soil and groundwater samples; and permeability tests to assess the hydraulic characteristics of the shallow aquifer beneath the Site.

2.1 Findings

The findings of these investigations are summarized as follows:

- Groundwater flows in a southeasterly direction. The depth to groundwater ranges from approximately 4.5 to 30 feet (ft) below grade surface (bgs) across the Mott Haven Site and areas to the north and the west; the differences in depth to groundwater are attributable to the topographic elevation changes in the investigation area (the properties immediately west of the Site are approximately 30 feet higher in elevation relative to the Site).

- Groundwater seepage velocity is estimated to be approximately 10 feet/year across the Site.

- Volatile organic compounds (VOCs) were detected in soil samples collected across the Site and off-site. Several of these VOCs exceed their Recommended Soil Cleanup Objectives (RSCOs). Compounds that exceeded their applicable RSCOs include: benzene, toluene, ethylbenzene and xylenes (BTEX), naphthalene, isopropylbenzene, acetone, and methylene chloride. BTEX compounds are usually associated with lighter petroleum products similar to gasoline and naphthalene is associated with MGP wastes.

- Several soil samples (both on and off-site) had SVOCs that exceed the applicable RSCOs. These compounds include: Benzo(a)anthracene, chrysene, benzo(a)pyrene, dibenzofuran, phenanthrene, fluoranthene, pyrene, benzo(b)fluoranthene, benzo(k)fluroanthene, indeno(1,2,3-cd)pyrene,

dibenzo(a,h)anthracene, butylbenzylphthalate, naphthalene, 2-methylnaphthalene, and phenanthrene. Most of these compounds are associated with heavier petroleum products similar to manufactured gas plant (MGP) waste.

- Metals above the RSCOs were encountered in all of the soil borings, tests pits and debris piles; most metal concentrations exceed USA Eastern Background Standards. This Site is located in an urban setting and the observed concentrations are considered to be indicative of background conditions and not related to Site contamination.

- There were no herbicides detected in any of the soil borings. Aroclor-1260 and Arcolor-1254 were the only PCBs detected in soil (six soil borings in the southern portion of the Site, and one soil boring [SB-45] in the BCP area). Only two locations, SB-22 and SB-45, had detections for pesticides. All detections were below pertinent RSCOs.

- The highest concentrations of VOCs in groundwater were detected in samples from the northwest corner of the Site, as well as off site (to the northwest and upgradient of the Site). Several VOCs (acetone, cis-1,2-dichloroethene, naphthalene, benzene, toluene, ethylbenzene, xylenes, isopropylbenzene, N-propylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, sec-butylbenzene, p-isopropylbenzene, n-butylbenzene, tetrachloroethene and vinyl chloride) were detected in excess of the applicable groundwater quality standards upgradient and in the northwest corner.

- The highest concentrations of SVOCs in groundwater were observed in the northwest corner of the Site and off site (northwest and upgradient of the Site). The SVOCs detected above the applicable groundwater standards include: naphthalene, butylbenzylphthalate, bis(2-ethylhexyl)phthalate, phenol and acenaphthene.

- A number of metal constituents were detected above the groundwater quality standards in the samples collected. These included antimony, arsenic, barium, beryllium, cadmium, chromium, iron, lead, magnesium, manganese, and nickel. These detections are considered to be associated with background conditions typical of urban settings.

- There were no detections for PCBs or pesticides in the groundwater samples. 2,4-Dichlorophenoxyacetic acid (2,4-D) was the only herbicide detected, but all detections were below the groundwater quality standard.

- Methane was detected in all of the soil gas samples collected. Elevated methane levels were observed in samples collected from the northwest corner of the Site. Organic silt with root fibers was observed in soil borings in close proximity to the northwest corner, indicating that the elevated methane results may be attributable to decomposition of the organic matter and/or the adsorbed hydrocarbon impacts observed in this area.

- VOCs were detected in all of the soil gas samples collected. The most elevated VOC soil gas concentrations were observed in samples collected from the northwest corner of the Site.

To summarize, soil and groundwater contamination was detected at concentrations above NYSDEC RSCOs and groundwater quality standards, specifically associated with VOCs and SVOCs. The most elevated VOC and SVOC compounds detected include BTEX, and the polynuclear aromatic hydrocarbons or PAHs (e.g. naphthalene, chrysene, benzo(a)anthracene, benzo(a)pyrene, phenanthrene). The highest organic contaminant detected was naphthalene. The most significant contamination

identified was generally confined to the northwestern portion of the Site as well as upgradient and off site, at a depth corresponding to the top of the zone of saturation (water table).

Figure 5 depicts the highest concentrations of total VOCs in soil borings across the Site, **Figure 6** depicts the naphthalene concentrations detected in soil samples across the Site, and **Figure 7** depicts the total benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations detected in groundwater samples across the Site.

2.1.1 Sources of Contamination and Contamination Distribution

The contamination of Site soils and groundwater with VOCs and SVOCs can be attributed to two (2) upgradient sources of contamination: a historic manufactured gas plant (MGP) identified in the area northwest of the Site and a historic gasoline service station located west of the Site.

Two types of waste were generally produced by MGPs, purifier waste and coal tar. The purifier waste was generated from removal of contaminants from the gas prior to storage and distribution. This waste usually contains high levels of cyanide compounds. Insignificant detections of cyanide at the Site indicate that only small quantities of purifier waste were produced or disposed during plant operations. Coal tar waste was a dark-colored liquid with a viscosity similar to light oil, which was often sold off to be used in other products. The coal tar contained high levels of SVOCs (in particular PAHs) including naphthalene, which is considered to be a "signature compound" of coal tar. While VOCs such as BTEX are also present in MGP waste, these constituents are a minor component compared to the SVOC fraction. In addition, VOCs tend to dissipate/degrade quickly, leaving heavier SVOCs behind, naphthalene in particular.

Figure 6 depicts the distribution of naphthalene detected in the soil, showing concentrations generally an order of magnitude higher than the RSCO of 13,000 ppb. Evidence of coal tar was observed principally in the northwest area both in the BCP area (SB-45) and off site (SB-47, SB-48), extending more than 300 feet upgradient to the northwest, off Site in the area of MW-18. A soil sample from MW-18 exhibited a concentration of naphthalene (220,000 ppb) which besides SB-45 (on Site) was the highest naphthalene concentration detected during these investigations.

In review of the historical Sanborn maps it is noted that areas adjacent to the MGP plant to the south and east were occupied by railroad tracks. As such, it is reasonable to assume that any purposeful and significant dumping of coal tar wastes would not have occurred near or on the tracks (which would have interfered with rail operations) but would most likely have taken place off site, as evidenced by the high concentrations of naphthalene (and other SVOCs) detected in MW-18; the coal tar related contamination was observed approximately 25 ft bgs with fill material above it. The Langan Engineering Retaining Wall Evaluation Report (Langan, 2005) states that the retaining wall was likely constructed at the same time that the rail yard was established. However, the coal tar related contamination observed in the MW-18 soil boring suggests that the retaining wall was constructed sometime after the MGP was in operation

(the MGP was built prior to 1891). Since MW-18 is located upgradient of the retaining wall, this waste disposal could have occurred prior to construction of the retaining wall when the area northwest of the Site and in the vicinity of MW-18 was presumably at a much lower and more comparable elevation to that of the Site, and therefore, more accessible. Assuming the retaining wall was constructed sometime after the MGP was in operation, deliberate off site dumping of coal tar wastes may have occurred upgradient, as supported by the high detection of naphthalene in MW-18. It is also noted that the Langan Engineering Retaining Wall Evaluation Report (Langan, 2005) shows that there is a coarse gravel material laid along the west side of the retaining wall. This material could be a preferred pathway for groundwater (and contamination) migration in a southerly direction adjacent to the wall.

Incidental spills and releases intrinsic in MGP operations and/or surface water transport of coal tar contaminated sediments from adjacent off site dumping (in the area around MW-18, for example) are the likely causes of the coal tar contamination seen in the northwest corner of the Site.

The presence of VOCs (specifically BTEX) in the northwest portion of the Site is likely related to the historic operation of a gasoline filling station/auto repair shop adjacent to and immediately upgradient of the Site which operated prior to the mid 1970's. Significant VOC contamination was identified in the groundwater beneath the area of the filling station/auto repair facility. **Figure 7** depicts the concentration of BTEX detected in the groundwater and confirms the likely source of the VOCs on the Site as the historic service station.

The groundwater contamination identified in the northwest corner of the Site is confined to this area and there has been no significant migration of VOC or SVOC contamination across the Site or off site. Low groundwater seepage velocities and long travel time for contamination to move across the Site, allow for natural attenuation of the VOCs. This natural attenuation has stabilized the historic VOC plume as evident by the low (below groundwater quality standards) or non detect BTEX concentrations in all of the monitoring wells along the downgradient side (south and east of the BCP area) of the Site. Because of their inherent low solubilities, SVOCs detected in the groundwater samples are not anticipated to migrate. As such, active groundwater remediation is not recommended for the Site.

3.0 REMEDIAL ACTION EVALUATION

Based on the investigations completed at the Site, and a review of the subsurface analytical data from the Site and adjacent contaminated properties, a remedial action strategy has been developed to make the Site suitable for use as a public school. As a central component of the remedial action strategy, a Public Health Exposure Assessment has been prepared based on the nature and extent of contamination identified during the RI activities. The Exposure Assessment includes a discussion of fate and transport of the contamination identified at the Site within the context of potential exposure pathways to on site workers, occupants of the new school and off site residents and individuals. Potential exposure routes on site will be mitigated by the remedy that will be implemented for the Site as described below. Off site migration of site related contaminants is not significant. Accordingly, no exposure to off-site residents and individuals is documented. The Public Health Exposure Assessment was included in the RI document as Appendix H.

The proposed remedial action objectives and the specific remedial strategies are described below.

3.1 Remedial Action Objectives

Remedial Action Objectives (RAOs) have been established to ensure that all proposed site remedies are protective of human health and the environment. The RAOs provide the basis on which to evaluate the effectiveness of the Site remedy. VOCs and SVOCs are present in soil and groundwater in excess of RSCOs and Part 703 groundwater quality standards. Accordingly, the RAOs proposed for the Site are:

1. **Ensure that on-site contaminant concentrations in soil and groundwater and soil gas do not pose unacceptable risks to school occupants**.
   Since there is no use of groundwater at the Site and no other potential for school occupants to contact subsurface contaminants, there will be no exposure to groundwater or soil. The most significantly contaminated soil will be removed as part of the remedy, thereby removing the source of the soil gas vapors. Also, as an added safeguard, a vapor barrier and passive SSDS beneath the school will prevent any potential residual VOC vapors from entering the school.

2. **Achieve cleanup of VOCs and SVOCs to RSCOs as per TAGM 4046**
   The proposed remedy will remove the soil concentrations of VOCs and SVOCs to the extent practical and replace it with clean backfill that meets the TAGM criteria.

3. **Maintain existing groundwater quality at the downgradient property line.**
   The RI groundwater data demonstrate that there is significant upgradient BTEX contamination migrating onto the Site, but natural attenuation has stabilized the groundwater plume and there is no significant contamination migrating beyond the downgradient site boundary. Implementation of the remedy, which includes redirecting contaminated groundwater from upgradient sources

around the footprint of the proposed school campus, will not result in significant contamination migrating beyond the downgradient site boundary.

3.2 Remedial Actions

To achieve the remedial action objectives outlined above, the following remedial actions are proposed to be completed at the site.

- A hydraulic barrier will be constructed along the northern and western boundaries of the BCP area to prevent contaminated groundwater from entering the Mott Haven Site.
- Contaminated soil (approximately 300 ft x 125 ft x 12 ft deep) will be removed from the BCP area.
- The excavated BCP area will be restored with clean backfill.
- Engineering controls, consisting of a vapor membrane barrier and passive sub slab depressurization system (SSDS) will be incorporated beneath the school as an added safeguard against the possibility of residual soil vapors migrating into the school building.

3.2.1 Hydraulic Barrier Wall

The main purpose of the hydraulic barrier wall is to prevent upgradient contaminated groundwater from entering the BCP area and to minimize the amount of dewatering during excavation. As shown on **Figure 7**, contaminated groundwater originating from an upgradient source is migrating onto the site. To effectively redirect this groundwater, a hydraulic barrier will be constructed along the northern and western boundaries of the site. **Figures 8** and **9** present a plan view and a cross section, respectively, of the hydraulic barrier along the northern boundary of the BCP area. The length and depth of the hydraulic barrier corresponds to the BCP area and the area of excavation of contaminated soil. Specific details of the hydraulic barrier are provided in Chapter 5.

As indicated, the hydraulic barrier will redirect groundwater from the excavation area. As upgradient groundwater encounters the hydraulic barrier it will initially be redirected to the east and south along the northern and western hydraulic barrier walls, respectively. Migration will then assume a southeasterly flow component consistent with the regional groundwater flow. Limited groundwater mounding is anticipated along the wall. However, while mounding will increase the hydraulic gradient and seepage velocities adjacent to and immediately upgradient of the wall, the lack of mobility of SVOCs, and natural attenuation of VOCs (as described in the RI) should result in no appreciable impact to downgradient groundwater quality (i.e., stabilized plume), and no off site migration of contamination.

Groundwater quality will be monitored annually downgradient of the hydraulic barriers and at the downgradient property line for two years following implementation of the barrier walls, to confirm that there are no changes in the existing groundwater quality. An annual monitoring frequency has been

selected because of the low groundwater seepage velocity (10 ft/year across the Site). Two new monitoring wells will be used to assess water quality beyond the hydraulic barriers. In addition, monitoring wells MW-5, MW-3, and MW-11 will be monitored at the downgradient property line to confirm that there are no changes in the existing groundwater quality. All groundwater monitoring samples will be analyzed for VOCs.

3.2.2 Soil Excavation

Contaminated soil (approximately 300 ft x 125 ft x 12 ft deep) will be removed from 3 distinct sections of the BCP area (**Figure 10**). Prior to excavation, temporary sheet piling will be installed on the eastern and southern perimeters of each section, which, along with the upgradient hydraulic barrier wall, will completely enclose the excavation area. Soils will be excavated and removed to elevations of 9.3 Borough President of Bronx Datum (BPBD) in Section 1, elevation 14.5 BPBD in Section 2, and elevation 10.0 BPBD in Section 3. The depth of excavation for each of the sections is well below the depth interval of the highest VOC and SVOC contamination levels. In addition, the areal limits of the excavation fully encompass the most contaminated zones. **Figures 5**, **6**, and **7** summarize the highest detections of total VOCs, naphthalene, and BTEX, respectively, characterized during the RI. Accordingly it is anticipated that the vast majority of the contaminant mass will be removed as a result of the excavation activities. Confirmatory sampling will be completed at the final excavation depths to determine if any remaining soils exceed RSCOs. Upon the completion of removal of the contaminated soil from each of the 3 sections, the excavations will be backfilled with clean fill and the temporary sheet piling will be removed. Details of the soil excavation program are provided in Chapter 5.

While it is possible that some residual soil contamination (exceeding RSCOs) may remain in the excavation, this contamination will be well below the surface and there will be no potential for direct contact, and therefore no risk to Site occupants.

3.2.3 Vapor Barrier and Passive Sub Slab Depressurization System

The RI described the distribution of VOCs and methane in soil gas. The most elevated detections were observed in the northwest corner of the Site corresponding to the area of the highest soil and groundwater contamination and the BCP area. (Methane may also be attributable, at least in part to the natural organic characteristics of the soil.)

Redirecting the upgradient contaminated groundwater from entering the BCP area, and excavating the vast majority of the contaminated soils (as well as the native organic deposits) will mitigate concerns of vapor emissions from the subsurface. However, as an added safeguard, a vapor barrier and passive sub slab depressurization system will be installed beneath the school. The vapor barrier will be an impermeable liner that will be installed beneath the entire foot print of the school. Beneath the liner a passive SSDS will be constructed consisting of a gravel layer with perforated PVC installed within the gravel. The passive SSDS will provide a preferential pathway for any residual soil vapors to migrate away

from the school and will eliminate the potential for any accumulation of residual soil vapors beneath the school. Additional details of the vapor barrier and passive SSDS are provided in Chapter 5.

4.0 ALTERNATIVE ANALYSIS AND REMEDY SELECTION

The goal of the remedy selection process is to select a remedy that is fully protective of human health and the environment based on the intended future land use of the BCP area. Two key issues that will be considered during the remedy selection are:

1. Source Removal – As specified in Section 4.3 (1) of the BCP Guide, source removal should be the goal of all BCP remedies. Source removal and control measures include (ranked most preferable to least preferable);

    - Removal and/or treatment – All free product and/or grossly contaminated soil shall be removed and/or treated to the greatest extent possible;
    - Containment – Any source remaining after removal shall be contained to the greatest extent possible;
    - Elimination of exposure – Exposure to any source remaining after removal shall be eliminated through additional measures including the elimination of volatilization into buildings to the greatest extent possible ; and
    - Treatment of source at the point of exposure – Including well head treatment or the management of volatile contamination within buildings shall be considered as a measure of last resort.

2. Plume Stabilization – A goal of the BCP is to prevent further migration of a plume of groundwater contamination.

4.1 Contaminants of Concern and Extent of Contamination

The contaminants of concern (COC) for the BCP area include VOCs and SVOCs. The principal VOCs involved are the BTEX compounds related to a potential gasoline release, and the principal SVOCs are PAHs related to wastes generated by a former MGP, both located in the general upgradient area northwest of the Site. Naphthalene in particular is considered a "signature compound" of MGP operations.

4.1.1 Groundwater

The highest concentrations of BTEX were detected upgradient of the BCP area as shown on **Figure 7** with significant concentrations also detected in monitoring wells within the BCP area. No significant concentrations of BTEX were detected in any of the monitoring wells downgradient of the BCP area. The highest naphthalene concentrations were detected in the monitoring wells upgradient of the Site (MW-18, 1400 micrograms per liter [µg/L]; MW-15, 1600 µg/L; and MW-14 950 µg/L) and in on-site monitoring wells within the BCP area (MW-7, 1300 µg/L and MW-12, 2500 µg/L). Naphthalene was not detected in any of the monitoring wells downgradient of the BCP area.

4.1.2 Soil

The highest concentrations of VOCS in soil were detected in samples from soil borings upgradient (MW-18) of the BCP area and soil borings located within the BCP area. Soil samples were not collected for analysis from the upgradient monitoring well locations that had the highest BTEX concentrations in the groundwater. The highest SVOC concentrations were detected in soil samples from the borings upgradient approximately 300 feet to the northwest (MW-18) of the BCP area and soil borings located within the BCP area. This is exemplified on **Figure 6** which shows the naphthalene concentrations detected in soil. The highest naphthalene concentration, 220,000 micrograms per kilogram, was detected in samples from both MW-18 and MW-12. The highest concentrations of both the VOCs and SVOCs in the BCP area were in samples collected from the approximate depth of the water table (4 to 6 ft. bgs); the shallow (0 to 3 ft. bgs) and deeper (>10 ft. bgs) soil samples had significantly lower concentrations.

4.2 Alternative Analysis

To date, no soil cleanup objectives have been developed for the BCP under Title 14. Therefore, the alternative analysis, as specified in Section 4.1 (3) of the BCP Guide, will consider an unrestricted use scenario, also referred to as Track 1 and a proposed restricted use scenario based on site-specific information and land use, also referred to as Track 4. The alternative analysis will evaluate each remedy with the following nine criteria:

- Protection of Human Health and the Environment;
- Standards, Criteria, & Guidance;
- Long-term Effectiveness & Permanence;
- Reduction of Toxicity, Mobility, or Volume;
- Short-term Effectiveness & Impacts;
- Implementability;
- Cost Effectiveness;
- Community Acceptance; and
- Land Use.

4.2.1 Track 1

The Track 1 remedy, as specified by Section 4.6 (2) of the BCP Guide, must allow the BCP area to be developed for any use; i.e., restrictions on the use of the BCP area will not be permitted. Reliance upon institutional and engineering controls to address exposure and meet the RAOs for the BCP area is not allowed (the BCP Guide does allow one exception; however, those conditions do not apply to this BCP area).

It is not possible to implement a Track 1 remedy for the BCP area because there is an upgradient source of VOC-contaminated groundwater that will continue to flow onto the BCP Area (recontaminating the BCP area) without the implementation of engineering controls to abate the VOC-contaminated groundwater. Therefore, there is no remedy that can satisfy the Track 1 requirements, and, therefore, there is no alternative to analyze.

4.2.2 Track 4 – Hydraulic Barrier/Soil Removal/Vapor Barrier/Passive Sub Slab Depressurization System

The approved land use for the BCP area is a public school campus. The proposed remedy will provide full protection of the public health and environment. The proposed remedy includes:

- **Hydraulic Barrier** - This will be constructed along the northern and western boundaries of the BCP area. The hydraulic barrier along the western portion of the BCP area will be a jet grout wall with a dual purpose: 1.) to perform as a hydraulic barrier; and 2.) to provide adequate structural support to the foundation of the existing retaining wall located on the western side of the BCP area. The hydraulic barrier on the northern BCP area boundary will be a Waterloo Barrier® or equivalent sheet-pile wall. The hydraulic barrier will redirect groundwater from flowing into the BCP area and provide excavation protection during the soil removal (see below).

- **Soil Removal** - Removal of significantly contaminated soil from within three sheet-pile lined excavation sections (**Figure 10**) which constitute the BCP area (disposal of these materials is expected to be in an appropriately permitted off-site disposal facility). The sheet-piling is required to provide structural support of the adjacent soils during excavation and to control infiltration of groundwater into the excavation areas. Each section will be dewatered (water table at 5 ft bgs) and excavated from within an enclosed structure (with treatment of all vapors that are generated) to prevent fugitive emission of VOCs into the surrounding environment during the removal action.

- **Vapor Barrier** – The vapor barrier will be an impermeabable liner that will be installed beneath the entire foot print of the school.

- **Passive Sub Slab Depressurization System** - Beneath the vapor barrier will be a passive sub slab depressurization system consisting of a gravel layer with perforated PVC installed within the gravel. The passive SSDS will provide a preferential pathway for any residual soil vapors to migrate away from the school and will eliminate the potential for any accumulation of residual soil vapors beneath the school.

The proposed remedy also includes a groundwater monitoring program (see Section 3.2.1) to monitor and assess groundwater quality conditions. The evaluation of the proposed remedy, based on the nine criteria previously discussed, is presented below.

4.2.2.1 Protection of Human Health and the Environment

The proposed remedy is fully protective of human health and the environment. The key component to this remedy is the removal, and proper off-site disposal, of more than 26,000 tons of VOC and SVOC contaminated soil from the top 10 to 13 ft bgs of the entire BCP area. As previously stated, source removal is the primary goal of the BCP. Once removed, the contaminated soil will no longer pose a human health or environmental threat in the BCP area. Similarly, the dewatering operation will purge all of the contaminated groundwater from within the top 13 ft of the BCP area plus some additional volume of contaminated groundwater that will mostly be originating from upgradient of the Site.

The Public Health Exposure Assessment, presented in Appendix H of the RI Report, identifies several potential exposure pathways based on the approved land use:

- On-site construction workers could be exposed to contaminants in surface and subsurface soils via incidental ingestion, dermal contact, and inhalation of particles and vapors during routine construction activities, and to site-related contaminants in groundwater via incidental ingestion, dermal contact, and inhalation of vapors; and

- On-site school employees and students could be exposed to site-related contaminants in surface soil via incidental ingestion, dermal contact, and inhalation of particles and vapors, and to site-related contaminants in subsurface soil and groundwater via vapor intrusion into the future school buildings and subsequent inhalation of vapors.

The potential exposure pathways for construction workers will be primarily eliminated by the removal of the contaminated soil, the redirection of contaminated groundwater flowing into the BCP area from an upgradient source, and further mitigated by the development and implementation of appropriate site-specific health and safety practices. The surface soil potential exposure pathway for on-site school employees and students will be eliminated in the BCP area by the soil removal action, subsequent placement of clean backfill, and hydraulic barrier to redirect upgradient groundwater flow (from an upgradient source) from the BCP area. The subsurface soil and groundwater potential exposure pathway to on-site employees and students will be eliminated by the soil removal and dewatering actions. However, as an added safeguard, a vapor barrier and passive sub slab depressurization system will be installed beneath the school to prevent the potential for VOC vapors to enter the school.

There is also the potential health risk related to the implementation of the remedy itself. The public will not be exposed to either incidental ingestion or dermal contact because the BCP area will be secured by

means of fencing or some other physical barrier. A community air monitoring program (CAMP) will be implemented throughout the entire remedial action. The CAMP will call for the monitoring of VOCs, dust particulates, and other related vapors during construction activities. The CAMP will specify monitoring protocol and limits which trigger either additional monitoring, or, if necessary, shut down of the construction activities until the source of vapors is identified and a means to control the vapors has been established. In addition, since the VOC and SVOC contaminants at the BCP area can be both a potential health risk and create nuisance odors, all of the excavation activities will be completed within enclosed structures with treatment of all vapors expelled from the structures. This will significantly reduce, if not eliminate, the release of any harmful vapors.

The proposed remedy will be fully protective of human health and the environment based on the proposed land use.

4.2.2.2 Standards, Criteria, and Guidance

The following standards and criteria may apply to the proposed remedy:

1. 29 CFR Part 1910.120 – Hazardous Waste Operations and Emergency Response
2. 6 NYCRR Part 175 – Special Licenses and Permits – Definitions and Uniform Procedures
3. 6 NYCRR Part 371 – Identification and Listing of Hazardous Wastes (November 1998)
4. 6 NYCRR Part 372 – Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities (November 1998)
5. 6 NYCRR Subpart 374-1 – Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities (November 1998)
6. 6 NYCRR Subpart 374-3 – Standards for Universal Waste (November 1998)
7. 6 NYCRR Part 376 – Land Disposal Restrictions
8. 6 NYCRR Parts 700-706 – Water Quality Standards (June 1998)
9. 6 NYCRR Part 750 through 758 – Implementation of NPDES Program in NYS ("SPDES Regulations").

The following guidance may apply to the proposed remedy:

1. TAGM 4013 – Emergency Hazardous Waste Drum Removal/Surficial Cleanup Procedures (March 1996)
2. TAGM 4031 – Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites (October 1989)
3. TAGM 4032 – Disposal of Drill Cuttings (November 1989)
4. TAGM 4046 – Determination of Soil Cleanup Objectives and Cleanup Levels (January 1994)
5. TAGM 4059 – Making Changes to Selected Remedies (May 1998)
6. Citizen Participation in New York's Hazardous Waste Site Remediation Program: A Guidebook (June 1998)

7. TOGS 1.1.1 – Ambient Water Quality Standards & Guidance Values and Groundwater Effluent Limitations
8. TOGS 1.3.8 – New Discharges to Publicly Owned Treatment Works
9. Air Guide 1 – Guidelines for the Control of Toxic Ambient Air Contaminants
10. Solidification/Stabilization and its Application to Waste Materials

The proposed remedy will comply, as applicable, to the above standards, criteria, and guidance (SCGs) through specific language within the specifications presented in Section 5. The one guidance that may not be met is TAGM 4046 (RSCOs). The proposed remedy specifies that the excavations will be terminated at specific elevations, depending upon the individual sections to be excavated. These specified elevations have been based on the data collected during the RI program. While it is possible that some residual soil contamination (exceeding RSCOs) may remain in the excavation, this contamination will be well below the surface, there will be no potential for direct contact, and the proposed remedy will still be fully protective of human health and the environment.

4.2.2.3 Long-term Effectiveness and Permanence

The source removal action will permanently remove the vast majority of the significantly contaminated soils. This action will be both permanent and 100 percent effective relative to the BCP area. The risk from the soil remaining below the specified excavation depths (may have low concentrations of either VOCs and/or SVOCs, some exceeding the corresponding RSCOs) is considered to be insignificant. These low concentrations of contaminants, particularly the VOCs, may produce some residual vapors beneath the school. However, as an added safeguard, both the vapor barrier and the passive SSDS will eliminate this exposure pathway in the event that minor concentrations of vapors are formed.

The dewatering operation will remove all of the contaminated groundwater within the top 10 ft of the BCP area and the hydraulic barrier will prevent VOC-contaminated groundwater from flowing into the BCP area. The jet grout wall along the western side of the BCP area will have a minimum hydraulic conductivity of 1.0×10^{-5} centimeters per second (cm/sec). The average hydraulic conductivity of the shallow aquifer at the BCP area is 1.4×10^{-4} cm/sec, a full order of magnitude higher than the jet grout wall. The lower hydraulic conductivity of the jet grout wall will redirect nearly all of the upgradient groundwater to the south and around the BCP area. The very minor volume of groundwater that does move through the jet grout wall will have very little, if any, measurable impact on the groundwater quality in the BCP area. The Waterloo Barrier® has a minimum hydraulic conductivity of 1.0×10^{-7} cm/sec which is generally considered impermeable. The jet grout wall and Waterloo Barrier® have no operation or maintenance requirements and are permanently placed in the subsurface.

The proposed remedy will have a permanent and very effective long-term impact on protecting human health and the environment.

4.2.2.4 Reduction of Toxicity, Mobility or Volume

The proposed remedy significantly reduces the volume of VOC and SVOC contaminants within the BCP Area. The removal of approximately 26,000 tons of soil includes the vast majority of the significantly contaminated soil identified within the BCP area. Consequently, the toxicity of the VOC and SVOC contaminated soil is effectively eliminated (the contaminants are removed from the BCP area), and the mobility of the VOC and SVOC contaminants is no longer an issue (also because the contaminants have been removed from the BCP area). Concurrent to the soil removal action, the dewatering operation will remove all of the contaminated groundwater from within the top 13 ft of the BCP area. Consequently, the toxicity of the VOC and SVOC contaminated groundwater is effectively eliminated (the contaminants are removed from the BCP area), and the mobility of the VOC and SVOC groundwater contaminants is no longer an issue (also because the contaminants have been removed from the BCP area).

The ability of the upgradient VOC-contaminated groundwater to impact the BCP area has been significantly reduced by the jet grout wall and Waterloo Barrier®. These barriers have no operation or maintenance requirements and will continue to divert contaminated groundwater away from the BCP area indefinitely.

4.2.2.5 Short-term Effectiveness

The potential short-term adverse impacts and risks of the proposed remedy are well defined:

- Risk to workers during the implementation of the proposed remedy from incidental ingestion, dermal contact, and vapor inhalation from a combination of contaminated soil and groundwater; and

- Risk to the local public from vapor or dust inhalation (vapors released during the excavation process).

There is no risk to the local public from incidental ingestion or dermal contact because the BCP area will have some form of physical barrier (i.e., chain link fence) to keep them away from the BCP area. Risk to workers during the implementation of the proposed remedy will be mitigated by the development and use of site-specific health and safety practices. These practices will include, but not be limited to, wearing appropriate personal protective equipment (PPE) and monitoring of the ambient air quality to assess the need for using air-purifying respirators (APRs).

Risk to the local public from vapor or dust inhalation as well as any nuisance odor will be mitigated by completing all of the excavation and backfilling activities within a confined temporary structure. This temporary structure will maintain a negative pressure on the inside so that outside air will flow into the structure. This will be accomplished with a vacuum system that will pump air out of the structure through

a treatment system that will remove particulates (i.e., dust) and any VOC and SVOC vapors, as well as nuisance odors. As that treated, clean air is pumped out of the structure, fresh air is brought into the structure. This system will also help maintain good air quality within the temporary structure for the workers. Also, as described in Section 4.2.2.1, a CAMP will be implemented to monitor the air quality at the Site to assure that no harmful vapors are being released from the Site.

4.2.2.6 Implementability

The technical feasibility for implementing this proposed remedy is high. The soil removal program is straight forward and utilizes standard construction techniques. The Waterloo Barrier® and jet grout hydraulic barrier have been used on other contaminated sites. The use of a jet grout hydraulic barrier has been proposed for use as part of a remedy at the Phelps Dodge Class 2 Inactive Hazardous Waste Site in Queens, New York; the proposed remedy has been accepted by the NYSDEC. The vapor barrier and passive SSDS are standard engineering controls that are implemented to mitigate soil vapor concerns.

4.2.2.7 Cost

The total capital and operational costs for the proposed remedy is approximately $10,062,000 (exclusive of the grout wall along the western side of the BCP area). A detail cost breakdown for the proposed remedy is provided below. The operation and maintenance (O&M) costs assumes the only O&M is an annual groundwater monitoring program for 2 years that will run concurrently with the remedial work.

Item	***Total***
Capital Costs	$7,397,000
Engineering Design & Permitting	$1,730,000
O&M	$20,000
Contingency	$915,000
Total	**$10,062,000**

4.2.2.8 Community Acceptance

Pursuant to the BCP Agreement, a Citizen Participation Plan has been developed to educate the public regarding the proposed remedy and to facilitate community acceptance of the clean up and development of the Site.

4.2.2.9 Land Use

The Site will be developed into a public school campus (land use already approved by the NYSDEC). An Environmental Easement will be established to ensure all institutional controls (i.e., deed restriction) and engineering controls remain in place. As demonstrated above, the proposed remedy will be fully protective of this approved land use.

4.3 Remedy Selection

The selected remedy, which utilizes a hydraulic barrier, source removal, vapor barrier, and passive sub slab depressurization system, will be fully protective of human health and the environment. The remedy utilizes source removal as the primary means of remediating the site; source removal is the primary goal of the BCP. The selected remedy utilizes environmental easements which ensure that deed restrictions and engineering controls remain in place. Engineering controls include a hydraulic barrier along the northern and western sides of the BCP area to prevent contaminated groundwater from entering the BCP area and the Mott Haven Site. As an added safeguard, a vapor barrier and passive SSDS beneath the school will prevent any potential residual VOC vapors from entering the school.

5.0 REMEDIAL ACTION DESIGN

The following sections present the remedial action design for the Site. Detailed technical specifications and contract drawings will be provided under separate cover and constitute part of the RAWP.

5.1 Soil Remediation

The following provides a description of the soil remediation program.

Hydraulic Barrier Wall

A hydraulic barrier will be constructed along a portion of the northern and western boundaries of the BCP area. As shown in **Figure 8**, the hydraulic barrier located along the western portion of the BCP area will consist of a jet grout wall extending from the northwest corner of the BCP area approximately 450 linear feet southwards along the western boundary. The jet grout wall will have a dual purpose: 1.) to perform as a hydraulic barrier; and 2.)to provide adequate foundation to the existing retaining wall located on the western side of the Site. The hydraulic barrier located on the northern BCP area boundary will consist of a Waterloo Barrier® or equivalent extending approximately 150 linear feet along the northern boundary of the BCP area beginning at the northwest corner.

These hydraulic barriers will minimize dewatering during excavation, provide excavation protection during the soil removal, and, in the long term, foundation support for the structures and building on the adjacent properties. The hydraulic barriers will also redirect upgradient groundwater from flowing into the BCP area, in particular, into areas of the BCP beneath the footprint of the proposed structure.

5.1.1 Soil and Material Removal

Contaminated soil (approximately 300 ft x 125 ft x 12 ft deep) will be removed from the BCP area. Disposal of these materials is expected to be in an appropriately permitted off-site disposal facility.

Removal of the impacted soil will be from within three excavation sections. As shown in **Figure 10**, the three sections are located in the northwest corner of the Site, and make up the BCP area. Section 1 measures 150 linear feet in the east-west direction and 100 linear feet in the north-south direction. Sections 2 and 3 each measure 125 linear feet in the east-west direction and 100 linear feet in the north-south direction. Prior to initiating the removal of soil from within each of these sections, temporary sheet-piling will be installed around the cell perimeter, utilizing the permanent hydraulic barriers located on the northern and western boundaries of the BCP area, and an enclosed structure will be constructed over the excavation area. The sheet-piling is required to provide structural support of the adjacent soils during excavation and to control infiltration of groundwater into the excavation areas. Conducting each excavation from within an enclosed structure will prevent fugitive emission of volatile compounds and

dust into the surrounding environment during the removal action. Soil will be removed from within Sections 1, 2, and 3 to an elevation of 9.3, 14.5, and 10.0 BPBD, respectively.

Upon completion of the removal of soil from each of the three sections, the sections will be backfilled to an approximate elevation of 22 feet BPBD and the temporary sheet piling will be removed.

5.2 Detailed Technical Performance Requirements

Technical performance requirements were developed to ensure that each component of the remedial design meets or exceeds the remedial action objectives described in Section 3.1. The following sections will describe the technical performance requirements developed for each component of the remedial design.

5.2.1 Site Controls

Where needed, site controls will be installed that restrict public access to the site where remedial work will be performed. The western perimeter consists of a 13 to 20-foot retaining wall with a chain-link fence along the top. Along the north and east there exists chain-link fencing. Temporary fencing will need to be installed along the south side on the adjacent property. In addition, the physical features, namely, the rail road corridor along the east side of the property will discourage access. To restrict access during remedial activities, warning tape may be used at certain locations such as open excavations, cleaning areas, stockpile areas, etc. For the duration of removal activities, a sign-in/sign-out sheet will be maintained for the site. All on-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 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 around all open excavations and other potentially dangerous areas;
- Utilization of temporary relocatable structures to restrict access to the remedial action work areas;
- Parking heavy equipment in a designated area each night and removing keys;
- Maintaining an organized work area, including proper storage of all tools and equipment;
- Conducting a daily security review; and
- 24-hour security guard.

Work and staging areas will be maintained on site. No off-site storage of contaminated materials will be allowed. The selected contractor will be required to submit a site layout and traffic control plan that will address site security.

5.2.2 Erosion and Sediment Controls

Specific erosion and sedimentation control measures for the removal activities will be implemented in accordance with NYS requirements and approved site permits. Additionally, certain operational and management practices will be implemented throughout the project to provide an additional measure of erosion and sedimentation control. These operational measures include use of enclosures (all soil excavation and handling, as well as all backfilling operations will be completed within enclosed structures that will eliminate any erosion or sediment movement away from the BCP area, i.e., all contained within the enclosures); wetting any on-site access roads; use of gravel roads; installing truck wash pads, and vehicle entrances. At minimum, a sediment and erosion control plan will be developed. Given that the expected disturbance area will be greater than 1 acre, a SPDES and NOI permit will need to be filed. Typical control measures that are included in these plans and permits are geotextile fencing and hay bales along the edge of the roads, around stockpiles, and areas to be disturbed. The erosion and sedimentation control measures and procedures will be maintained for the duration of the project until such time that site restoration activities have provided a final or temporary surface cover (as appropriate) in all areas. For the duration of the project, the erosion and sedimentation control measures will be inspected each workday and maintained.

5.2.3 Air and Dust Control

During all remedial activities air and dust emissions will be monitored and controlled to protect the surrounding environment from exposure to airborne contaminants. Temporary structures such as that provided by Sprung Structures, Inc. (or approved equal) will be required before any excavation activities are undertaken. The temporary tent-like structures are constructed of metal beams and trusses and a strong reinforced fabric. The structures are secured to the ground surface and a negative air pressure system will be installed and operated to prevent the release of vapors and dust. The air system will include a filtration system to lower air emissions to meet federal, state and local requirements. Outside the structures, perimeter monitoring will be conducted to verify compliance (i.e., CAMP).

Within the structure, vapor and dust will be monitored for worker protection. A site-specific HASP will be developed and implemented. The HASP will address worker protection by setting the monitoring criteria, action levels and protective equipment. Air and dust hazards to workers are volatile and semi-volatile organic vapors, carbon monoxide, dust, and methane.

5.2.4 Protection of Adjacent Structures

During implementation of the proposed remedial action, protection of structures located on adjacent properties will be achieved through monitoring of settlement and vibration and by modifying remedial construction activity accordingly. The following performance criteria shall be utilized in assessing the impact of remedial construction on settlement and vibration of adjacent structures:

- Settlement threshold: Proceed with caution if settlement of 0.01 foot is measured. Stop and implement action if 2 consecutive positive readings are noted.
- Vibration threshold: Proceed with caution when readings of 0.5 inches per second peak particle velocity are recorded. Stop and implement corrective measures when velocity exceeds 1.0 inch per second.

5.2.5 Hydraulic Barriers

Two types of permanent hydraulic barriers will be utilized in this remedial design: a jet grout wall along the western boundary of the BCP area, and a Waterloo Barrier® sheet-pile wall or approved equal along the northern boundary of the BCP area.

The proposed jet grout wall will extend from the building subgrade level (elevation 22 feet BPBD) to an elevation of -8 BPBD, for a total height of 30 feet. The barrier will be truncated if bedrock or decomposed rock is encountered before that level. The barrier will have a maximum hydraulic conductivity through a 24-inch-wide zone of $1x10^{-5}$ cm/sec. This is the minimum in-place hydraulic conductivity that can be consistently achieved for the various soil types present at the Mott Haven Campus site.

The Waterloo Barrier® sheet-pile wall or approved equal will be installed along the northern BCP boundary to a depth necessary to allow excavation within Section 1 to an elevation of 10 feet BPBD (a minimum of 20 ft bgs). The maximum hydraulic conductivity of the sheet-pile wall shall be 1×10^{-7} cm/sec. The maximum allowable deflection of the sheet-pile wall shall be no more than 1-inch.

5.2.6 Temporary Sheet Piling

Temporary sheet piling will be installed around the remaining perimeter of Sections 1, 2, and 3, and tied into the permanent hydraulic barriers located on the northern and western boundaries of the BCP area. This temporary sheet piling will be installed to a depth necessary to allow excavation within Sections 1, 2 and 3 of elevation 9.3, 14.5, and 10.0 BPBD, respectively. The maximum allowable deflection of the temporary sheet piling shall be no more than 2-inches (typical). After installing the clean backfill, the temporary sheet piling will be removed.

5.2.7 Removal Activities

Contaminated soil (approximately 300 ft x 125 ft x 12 ft deep) will be removed from three sections in the BCP area. **Figures 8** and **10** present the location, extent and depth of the section excavations.

A contractor's excavation plan will be developed that will address the details to meet the technical requirements of the project. These requirements are:

- To design and install temporary and permanent sheeting to protect completed work and existing structures and ensure worker safety;
- To design and install the above sheeting to support the control of groundwater into the excavations during the removal action work;
- To erect over each cell a relocatable temporary structure with a negative pressure air system that meets work safety codes and air emission requirements;
- To excavate potentially contaminated soil to the extent and depth required on **Figure 10**;
- To detail a means to dry any saturated soil, such as using gravity drying pads, adding kiln cement or other material to stabilize the water, so that it meets disposal or transport requirements; and
- To install clean (by TAGMs 4046) backfill material into the sections.

5.2.8 Groundwater Control

The excavations in the three Sections described above will penetrate approximately seven to ten feet below the observed water table. Each Section will be dewatered in advance of the excavation to reduce the volume of water in the excavated soil and to provide a solid bottom to place clean backfill material. The contractor will be required to submit a Dewatering Plan presenting the method by which the excavations will be dewatered that will show the location of all pumps, sumps, pipelines, sediment filters, sedimentation basins, and other necessary equipment. The plan will also include a list of the products to be used for dewatering. The piping materials, route to discharge, and the location of the storage tanks will be included in the plan. Dewatering of each Section will maintain the saturation zone at least one foot below the bottom of the excavation. The contractor will be responsible for the disposal of all liquids generated by the dewatering operation. The contractor will be required to obtain all necessary permits (and any sampling and analysis necessary for those permits) to either transport and dispose of the liquids or treat and discharge (to the sanitary sewer) the liquids.

5.2.9 Backfill of Excavation Areas

All backfilling operations (the means, methods, and sequence for backfill placement and equipment) will be detailed in the Excavation Plan that will be submitted by the contractor as part of the Contract Bid package.

All backfill material will be imported and consist of certified clean soil or aggregate. The contractor will provide the following for each source of backfill material:

- Laboratory analytical reports from a qualified testing laboratory certifying that the soil is clean and suitable for use per NYS TAGM requirements;
- Classification, according to NYSDOT Standard Specifications for Coarse Aggregate size designation 1A or 1; and
- Laboratory compaction curve according to ASTM D 1557.

The imported backfill material shall be free of organic materials, loam, wood, ash, or other objectionable materials which may be decomposable, compressible, or which cannot be properly compacted.

5.3 Remediation Schedule

The work schedule will be Monday through Saturday with the maximum period of operation being two 8-hour work shifts each day.

5.4 Vapor Barrier and Passive Sub Slab Depressurization System

The following section describes the vapor barrier and passive SSDS that will be installed beneath the school.

System components include an 18-inch gas permeable aggregate layer with 6-inch Schedule 80 slotted PVC piping network below a fluid applied soil gas vapor barrier which is protected between two geotextiles. The PVC piping network will transition to 6-inch carbon steel pipe below the slab of the school at 6 building penetrations and continue as risers through the roof which vent to the atmosphere. The vapor barrier will be applied horizontally to create a continuous vapor barrier beneath the entire footprint of the school with durable seals to every footing, pier and penetration to ensure a single membrane layer. All horizontal application of the vapor barrier will be on top of the placed gas permeable aggregate and immediately below the poured slab.

6.0 SUMMARY AND CONCLUSIONS

Shaw Environmental and Infrastructure, Inc (Shaw) has been retained by the New York City School Construction Authority (SCA) to prepare a Remedial Action Work Plan (RAWP) for the former Metro North site located at 672 Concourse Village West, Bronx, New York (hereafter referred to as the "Site"). The Site consists of Block 2443/Lot 78 on the Borough of Bronx tax assessor's map.

Administratively, the Mott Haven site is being addressed under the Brownfield Cleanup Program Act (BCP) Agreement between the New York State Department of Environmental Conservation (NYSDEC) and SCA. The BCP area represents the area of the Site where remedial activities are proposed, and which are described in this RAWP.

Shaw completed site investigation activities between March and September 2005. These investigative activities were completed as two separate phases. The Remedial Investigation activities, completed pursuant to the NYSDEC approved RIWP (July 2005), were performed between March and August 2005. A Supplemental Investigation (SI) was performed to the north and west of the Site to identify off-site contamination which may be impacting the Mott Haven Site. These SI activities were based on a Scope of Work (SOW) presented to NYSDEC and New York State Department of Health (NYSDOH) on July 14, 2005.

The findings of the RI identified soil and groundwater contamination above NYSDEC Recommended Soil Cleanup Objectives (RSCOs) and groundwater quality standards, specifically associated with volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The most elevated VOC and SVOC compounds detected include benzene, toluene, ethylbenzene, and xylenes (BTEX), and the polynuclear aromatic hydrocarbons or PAHs (e.g. naphthalene, chrysene, benzo(a)anthracene, benzo(a)pyrene, phenanthrene). The highest organic contaminant detected was naphthalene. The most significant contamination identified was generally confined to the northwestern portion of the Site, as well as upgradient and off site, at a depth corresponding to the top of the zone of saturation (water table).

Remedial Action Objectives (RAOs) have been established to ensure that all proposed site remedies are protective of human health and the environment. The RAOs proposed for the BCP area are:

- Ensure that on-site contaminant concentrations in soil and groundwater and soil gas do not pose unacceptable risks to school occupants;
- Achieve cleanup of VOCs and SVOCs to RSCOs as per TAGM 4046; and
- Maintain existing groundwater quality at the downgradient property line.

To achieve the above remedial action objectives, the following remedial actions are proposed to be completed at the Site:

- A hydraulic barrier will be constructed along the northern and western boundaries of the BCP area to prevent contaminated groundwater from entering the Mott Haven Site.

- Contaminated soil (approximately 300 ft x 125 ft x 12 ft deep) will be removed from the BCP area.
- The excavated BCP area will be restored with clean backfill.
- Engineering controls, consisting of a vapor membrane barrier and passive sub slab depressurization system (SSDS) will be incorporated beneath the school as an added safeguard against the possibility of residual soil vapors migrating into the school building.
- Institutional controls (Environmental Easement) will also be implemented to ensure that deed restrictions and engineering controls remain in place.

An evaluation of the proposed remedy demonstrates that it will be fully protective of human health and the environment. The selected remedy utilizes source removal as the primary means of remediating the site; source removal is the primary goal of the BCP. The selected remedy also utilizes institutional (environmental easements, deed restrictions) and engineering controls. Engineering controls include a hydraulic barrier along the northern and western sides of the BCP area to prevent contaminated groundwater from entering the BCP area. As an added safeguard, a vapor barrier and passive SSDS beneath the school will prevent any potential residual VOC vapors from entering the school.

Verification that remedial action objectives have been met will be accomplished through confirmatory soil sampling (following excavation) and groundwater monitoring for a period of 2 years following implementation of the barrier walls.

7.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Shaw has prepared this Remedial Action Work Plan for the Former Metro North Property located at 672 Concourse Village West Site in Bronx, New York.

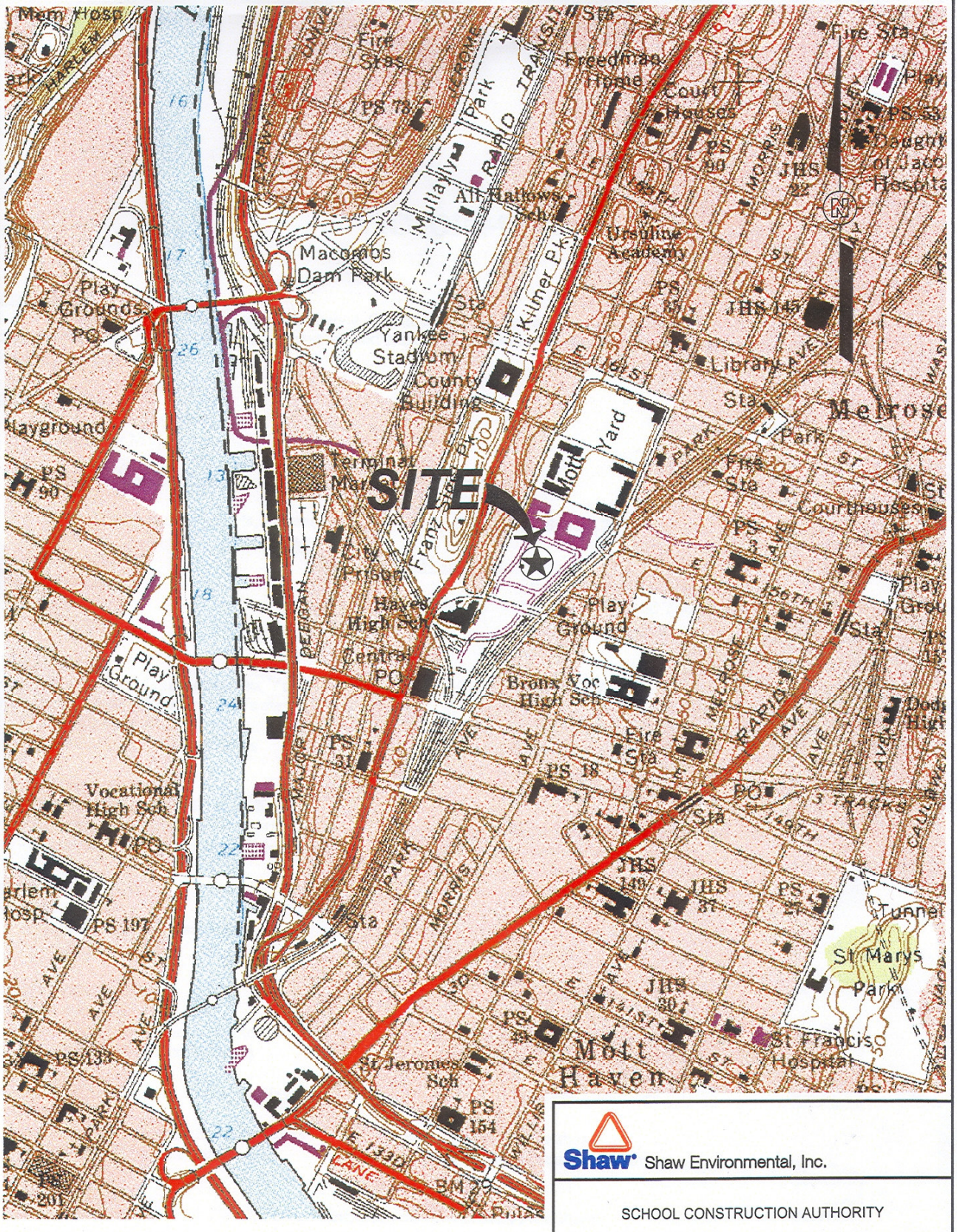
Shaw Environmental & Infrastructure, Inc.

Curtis Kraemer, P.G.
Senior Geologist

Steven P. Goldberg, Ph.D., CPG
Senior Project Manager

August Arrigo, P.E.
Senior Engineer
License No. 070843

FIGURES



NOT TO SCALE

REFERENCE:

BASE MAP SOURCR: www.nysgis.state.ny.us

OFFICE	DATE	DESIGNED BY	DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
ALBANY, NY	10/13/05	H. FARIELLO	S. SHKOLNIK			114926A3

Shaw Environmental, Inc.

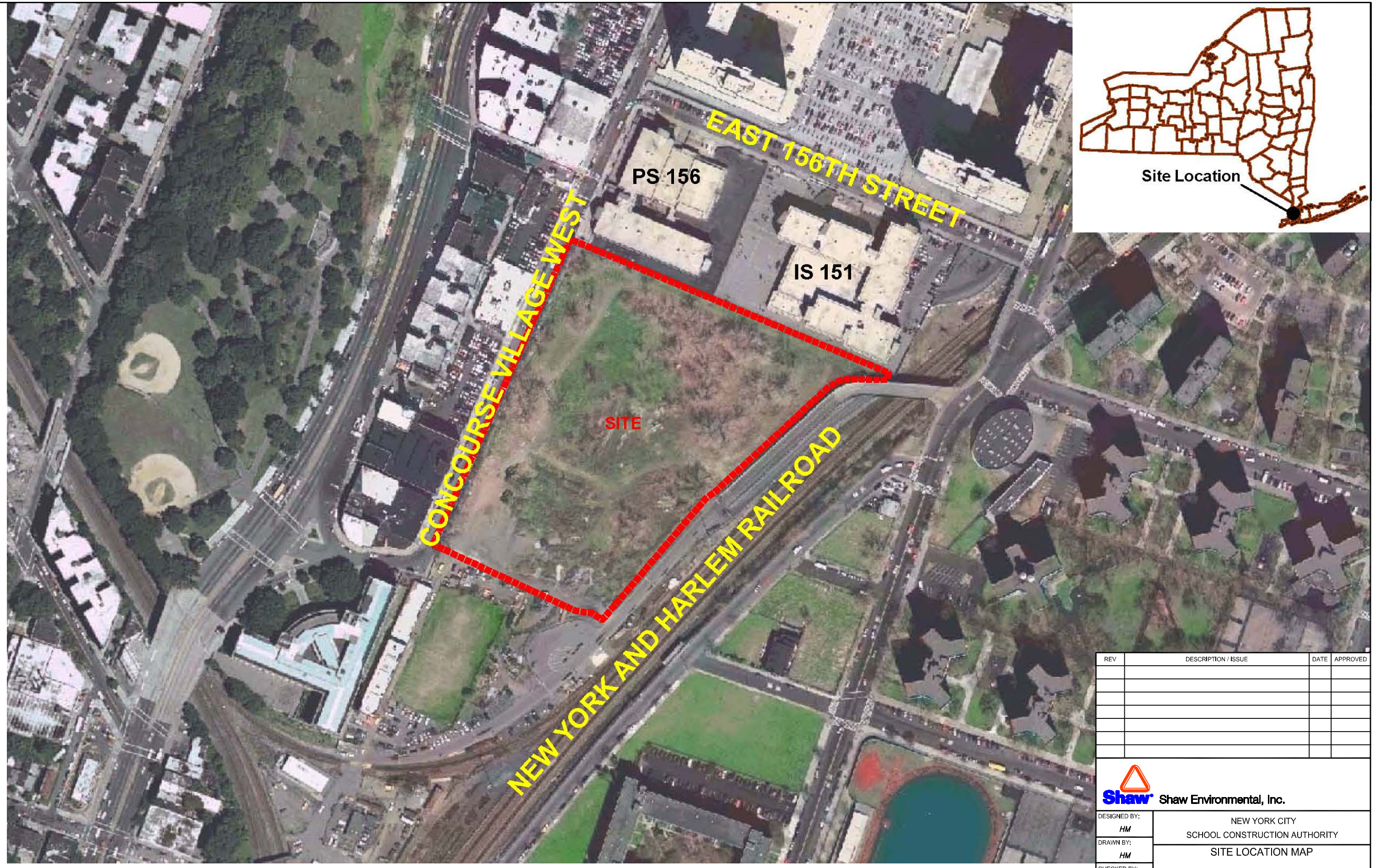
SCHOOL CONSTRUCTION AUTHORITY

FIGURE 1
SITE VICINITY MAP

FORMER METRO NORTH PROPERTY
672 CONCOURSE VILLAGE WEST, BRONX, NY

L:\project\114926\114926A3.dwg
Plot Date/Time: 10/13/05 11:57am
Plotted by: Samuil.Shkolnik

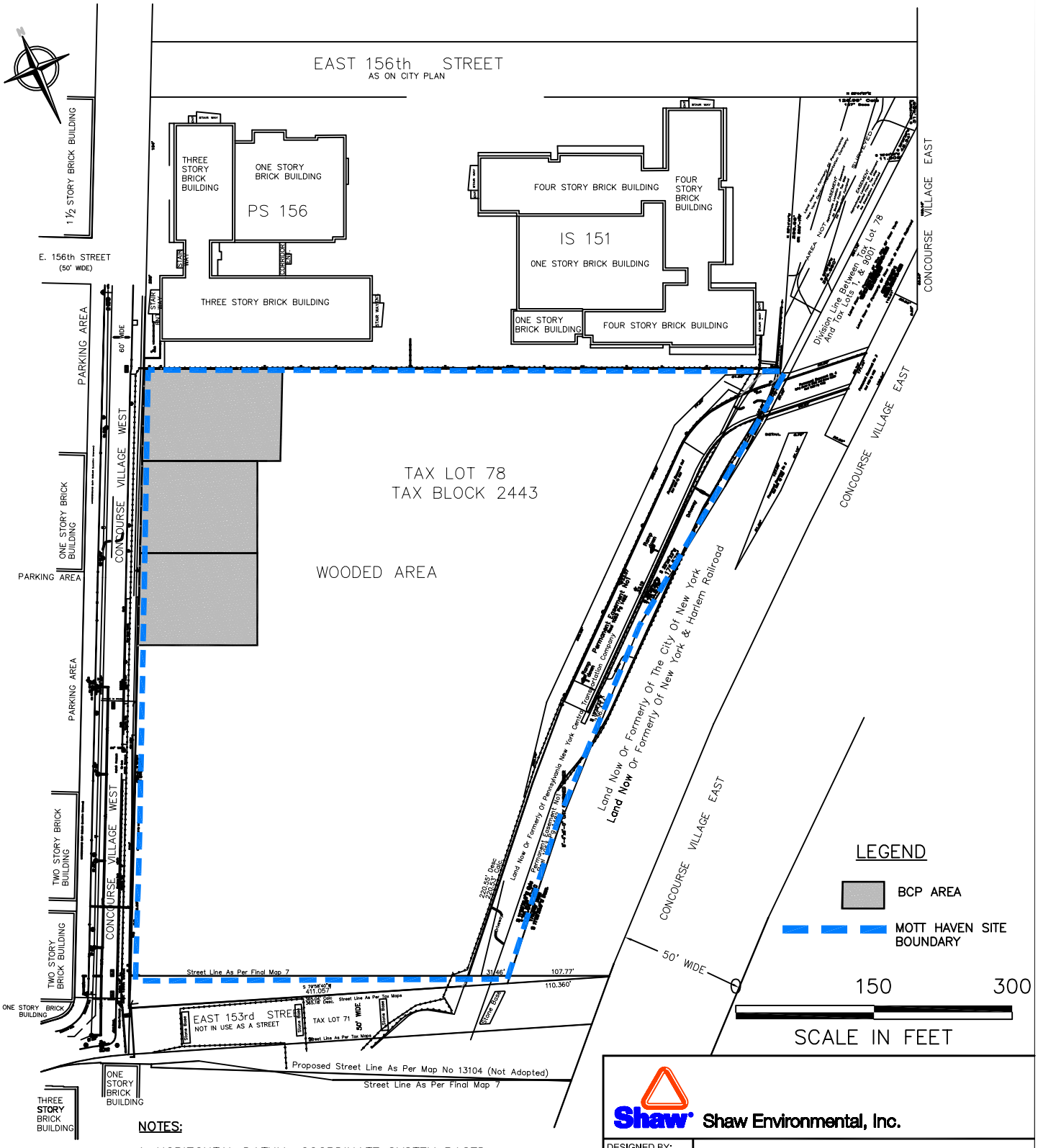
Xref: .
Image: 040073G8



REV	DESCRIPTION / ISSUE	DATE	APPROVED

Shaw Environmental, Inc.

DESIGNED BY: HM	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY			
DRAWN BY: HM	SITE LOCATION MAP MOTTHAVEN SITE BOROUGH OF THE BRONX			
CHECKED BY:				
APPROVED BY:	DATE: 11/15/05	SCALE: NTS	DRAWING NO.	FIGURE 2



NOTES:

1. HORIZONTAL DATUM: COORDINATE SYSTEM BASED UPON PUBLISHED COORDINATES OF EXISTING WELLS AND MH AT CP 802
2. VERTICAL DATUM: QUEENS BOROUGH PRESIDENT'S DATUM WHICH IS 2.725 FT ABOVE U.S. COAST AND GEODETIC SURVEY DATUM, SANDY HOOK, NJ (NGVD 29)

Shaw Environmental, Inc.

DESIGNED BY: HF/CK	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY			
DRAWN BY: R.T./SSH	SITE PHYSICAL CHARACTERISTICS			
CHECKED BY:	FORMER METRO NORTH PROPERTY 672 CONCOURSE VILLAGE WEST, BRONX, NY			
APPROVED BY:	DATE: 10/26/05	SCALE: AS SHOWN	DRAWING NO. 114926B83	FIGURE 3

OFFICE: New York, NY | DRAWING NUMBER: 114926

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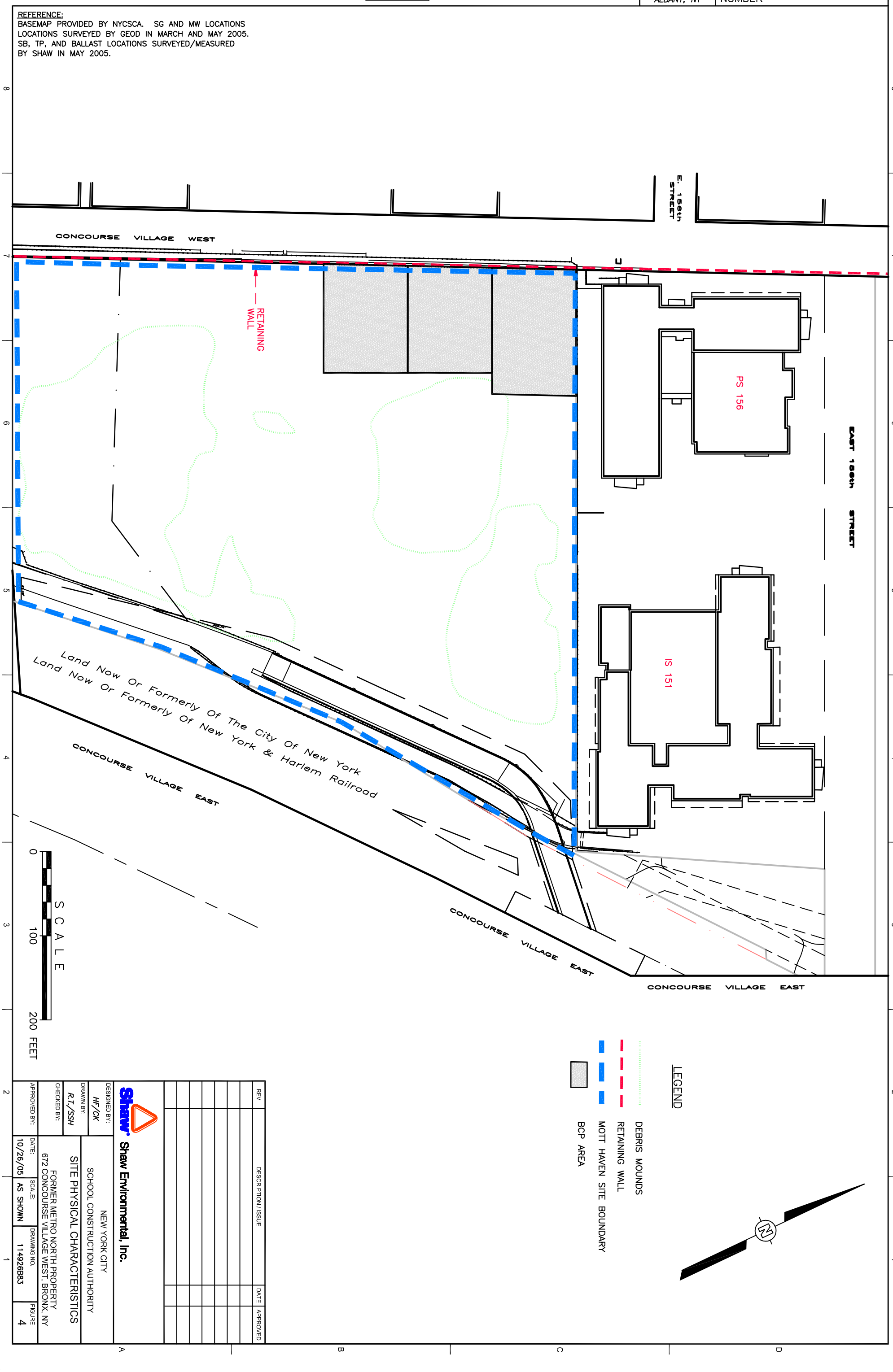
OFFICE	DRAWING NUMBER
ALBANY, NY	114926B83

REFERENCE:
BASEMAP PROVIDED BY NYCSCA. SG AND MW LOCATIONS LOCATIONS SURVEYED BY GEOD IN MARCH AND MAY 2005. SB, TP, AND BALLAST LOCATIONS SURVEYED/MEASURED BY SHAW IN MAY 2005.



REV	DESCRIPTION / ISSUE	DATE	APPROVED

Shaw. Shaw Environmental, Inc.

DESIGNED BY: HF/CK	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
DRAWN BY: R.T./SSH	SITE PHYSICAL CHARACTERISTICS
CHECKED BY:	FORMER METRO NORTH PROPERTY 672 CONCOURSE VILLAGE WEST, BRONX, NY
APPROVED BY:	DATE: 10/26/05 · SCALE: AS SHOWN · DRAWING NO.: 114926B83 · FIGURE: 4

OFFICE ALBANY, NY | DRAWING NUMBER 114926B56

EAST 156th STREET

E. 156th STREET

CONCOURSE VILLAGE WEST

CONCOURSE VILLAGE EAST

PS 156

IS 151

Land Now Or Formerly Of The City Of New York
Land Now Or Formerly Of New York & Harlem Railroad

MW-18 228,850 (27–29)
MW-19 6300 (4–5)
MW-9 146,040 (8–9)
MW-15 (SB-48) 219,820 (7–8)
MW-14 (SB-47) 209,010 (5–7) (DUP)
MW-8 233,790
MW-20 19.5 (17–19)
MW-21 354.1 (5–7)
MW-7 (SB-44)
MW-13 (SB-46) 148.3 (13–14)
MW-12 (SB-45) 46,800 (6–7)
NWSB
NWTB GRAB 92,530
MW-1
MW-10
MW-11
MW-2
MW-3
MW-4
MW-5
MW-6
MW-16 (PSB-20) 15.8 (6–7)
MW-17 (PSB-19)

PBSB-1 5350 (6–7)
PBSB-2 57,600 (7–8)
PBSB-3
PBSB-4 254 (4–6)
PBSB-5 19.1 (13–15)

PSB-1 5350 (6–7)
PSB-2 57,600 (7–8)
PSB-3 174.2 (5–7)
PSB-4 7.2 (10–12)
PSB-5 91.4 (6–7)
PSB-6 53.6 (11–12)
PSB-7 2010 (9–10)
PSB-8 186.6 (6–7)
PSB-9 6.2 (7–9)
PSB-10 3780 (4–6) (RE)
PSB-11 4.3 (6–7)
PSB-12 49.7 (11–12)
PSB-13 0 (9–11)
PSB-14 5.0 (7–8)
PSB-16 14.0 (6–7)
PSB-17 10.0 (5–10)
PSB-18 195.8 (11–13) (DUP)

SB-20 335.7 (14–16)
SB-21 0 (4–6)
SB-22 229,400 (6–8)
SB-23 53.4 (6–8)
SB-24 36 (6–8)
SB-25 399.5 (2–4)
SB-25A 1374.5 (6–8)
SB-26 16.4 (10–12)
SB-27 9.9 (14–16)
SB-28 2.9 (4–6)
SB-29 9.0 (4–6)
SB-30 7954.2 (6–8)
SB-33 28.5 (0–4)
SB-34 0 (6–8)
SB-35 8.5 (0–2)
SB-36 5.6 (2–4)
SB-37 44.2 (4–6)
SB-41 31.4 (4–6)
SB-42 72.1 (4–6)
SB-43 0 (2–4)
SB-49 75.7 (8–10)

26.2 (6–7)
42.9 (11–12)

LEGEND

- MONITORING WELL
- SOIL BORING
- SOIL BORING (12 TO 15 FEET) (PSB)
- BEDROCK SOIL BORING (PBSB)
- TEST PIT/BALLAST PILE
- BCP AREA
- PROPOSED FOOTPRINT OF SCHOOL
- MOTT HAVEN SITE BOUNDARY
- 195.8 (11–13) 195.8 ppb TVOCs at 11–13 ft bgs.

PS–PUBLIC SCHOOL.

IS–INTERMEDIATE SCHOOL.

NOTE:

TOTAL VOC CONCENTRATION SHOWN IS THE HIGHEST DETECTION IN THE BORING

REFERENCE:
BASEMAP PROVIDED BY NYCSCA. SG AND MW LOCATIONS LOCATIONS SURVEYED BY GEOD IN MARCH AND MAY 2005. SB, TP, AND BALLAST LOCATIONS SURVEYED/MEASURED BY SHAW IN MAY 2005.

SCALE 0 100 200 FEET

VERIFY SCALE 0 1"

REV	DESCRIPTION / ISSUE	DATE	APPROVED

Shaw Environmental, Inc.

DESIGNED BY: HF/SG	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
DRAWN BY: R.T./SSH	TOTAL VOCs IN SOIL
CHECKED BY:	FORMER METRO NORTH PROPERTY 672 CONCOURSE VILLAGE WEST, BRONX, NY
APPROVED BY:	DATE: 10/22/05 · SCALE: AS SHOWN · DRAWING NO. 114926B56 · FIGURE 5

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Image: .

OFFICE ALBANY, NY
DRAWING NUMBER 114926B84

EAST 156th STREET

E. 156th STREET

CONCOURSE VILLAGE EAST

CONCOURSE VILLAGE WEST

Land Now Or Formerly Of The City Of New York
Land Now Or Formerly Of New York & Harlem Railroad

MW-18 220000
MW-19
MW-9
MW-15 (SB-48) 120000
MW-14 (SB-47) 180000
MW-8 220000
MW-20 16
MW-21 96
MW-1
MW-10
MW-12 (SB-45)
MW-7 (SB-44)
MW-13 (SB-46)
MW-17 (PSB-19)
MW-16 (PSB-20)
MW-6
MW-5
MW-4
MW-3
MW-2 7900

PBSB-3 0
PSB-5 0
PSB-10 19
PSB-14 0
PSB-17 0
PSB-4 1.4
PSB-6 0
PSB-11 0
PSB-13 0
PSB-16 0
PBSB-4 3600
PSB-3 4700
PBSB-2 91
PSB-2 800
PSB-9 0
PSB-18 0
PSB-12 0
PBSB-1 5800
PSB-7 250
PSB-8 210
PSB-1 2400
PBSB-5 0
MW-16 (PSB-20) 7.4
SB-37 0
SB-20 4.7
SB-21 0
NWSB GRAB 7100
NWSB 27000
MW-13 (SB-46) 15
SB-49 28
SB-42 38
SB-23 0
SB-24 0
SB-22 32000
SB-41 6.8
SB-43 0
SB-26 0
SB-25 27
SB-35 2.5
SB-36 0
SB-27 0
SB-25A 5.7
SB-28 0
SB-30
SB-29 1.2
SB-33 0
SB-34 0
SB-11 0
BALLAST 1
BALLAST 2

5000
10000

LEGEND

- MONITORING WELL
- SOIL BORING
- SOIL BORING (12 TO 15 FEET) (PSB)
- BEDROCK SOIL BORING (PBSB)
- TEST PIT/BALLAST PILE
- PROPOSED FOOTPRINT OF SCHOOL
- MOTT HAVEN SITE BOUNDARY
- 250 NAPHTHALENE CONCENTRATION
- NAPHTHALENE CONTOUR (ppb) (DASHED WERE INFERRED)
- BCP AREA

SCALE
0 100 200 FEET

VERIFY SCALE 0 1"

Xref: .
Image: .

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Plot Date/Time: 11/09/05 02:25pm
Plotted by: Samuil.Shkolnik

REFERENCE:
BASEMAP PROVIDED BY NYCSCA. SG AND MW LOCATIONS LOCATIONS SURVEYED BY GEOD IN MARCH AND MAY 2005. SB, TP, AND BALLAST LOCATIONS SURVEYED/MEASURED BY SHAW IN MAY 2005.

REV	DESCRIPTION / ISSUE	DATE	APPROVED

Shaw Environmental, Inc.

DESIGNED BY: HF/CK	SCHOOL CONSTRUCTION AUTHORITY
DRAWN BY: R.T./SSH	NAPHTHALENE IN SOIL
CHECKED BY: D. STOLL	FORMER METRO NORTH PROPERTY 672 CONCOURSE VILLAGE WEST, BRONX, NY

APPROVED BY:	DATE:	SCALE:	DRAWING NO.	FIGURE
D. STOLL	11/09/05	AS SHOWN	114926B84	6

OFFICE ALBANY, NY

DRAWING NUMBER 114926B53

EAST 156th STREET

E. 156th STREET

CONCOURSE VILLAGE WEST

CONCOURSE VILLAGE EAST

CONCOURSE VILLAGE EAST

Land Now Or Formerly Of The City Of New York
Land Now Or Formerly Of New York & Harlem Railroad

MW-18 51

MW-19

MW-17 (PSB-19) 0

MW-16 (PSB-20) 0

MW-9 7793

MW-15 (SB-48) 2249

MW-14 (SB-47) 1670

MW-7 (SB-44) 9960

MW-13 (SB-46) 1527

MW-6 0

MW-8 30270

MW-12 (SB-45) 11360

10000

5000

1000

MW-5 0

MW-20 0

MW-4 0

MW-3 0

MW-21 0

MW-2 0

MW-1 2

MW-10 0

MW-11 0

N

LEGEND

- MONITORING WELL
- 1527 BTEX CONCENTRATION
- BTEX CONTOUR (ppb) (DASHED WERE INFERRED)
- PROPOSED FOOTPRINT OF SCHOOL
- MOTT HAVEN SITE BOUNDARY
- BCP AREA

SCALE

0 100 200 FEET

VERIFY SCALE 0 1"

REFERENCE:
BASEMAP PROVIDED BY NYCSCA. SG AND MW LOCATIONS LOCATIONS SURVEYED BY GEOD IN MARCH AND MAY 2005. SB, TP, AND BALLAST LOCATIONS SURVEYED/MEASURED BY SHAW IN MAY 2005.

REV	DESCRIPTION / ISSUE	DATE	APPROVED

Shaw Environmental, Inc.

DESIGNED BY: HF/CK	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY			
DRAWN BY: R.T./SSH	BTEX IN GROUNDWATER			
CHECKED BY:	FORMER METRO NORTH PROPERTY 672 CONCOURSE VILLAGE WEST, BRONX, NY			
APPROVED BY:	DATE: 10/21/05	SCALE: AS SHOWN	DRAWING NO. 114926B53	FIGURE 7

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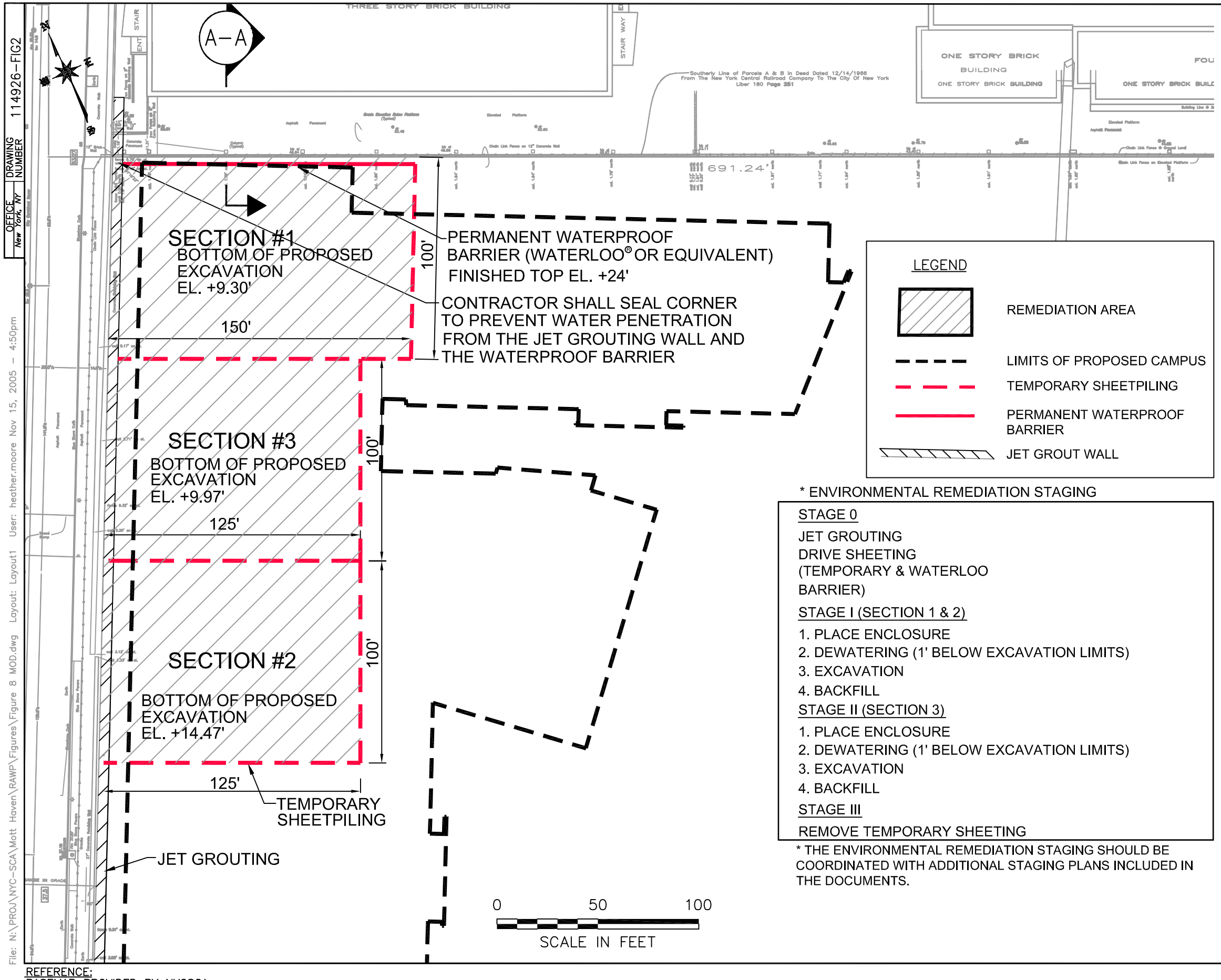
Plotted by: Samuli.Skolnik

OFFICE New York, NY | DRAWING NUMBER 114926-FIG2



LEGEND

- REMEDIATION AREA
- LIMITS OF PROPOSED CAMPUS
- TEMPORARY SHEETPILING
- PERMANENT WATERPROOF BARRIER
- JET GROUT WALL

* ENVIRONMENTAL REMEDIATION STAGING

STAGE 0

JET GROUTING
DRIVE SHEETING
(TEMPORARY & WATERLOO
BARRIER)

STAGE I (SECTION 1 & 2)

1. PLACE ENCLOSURE
2. DEWATERING (1' BELOW EXCAVATION LIMITS)
3. EXCAVATION
4. BACKFILL

STAGE II (SECTION 3)

1. PLACE ENCLOSURE
2. DEWATERING (1' BELOW EXCAVATION LIMITS)
3. EXCAVATION
4. BACKFILL

STAGE III

REMOVE TEMPORARY SHEETING

* THE ENVIRONMENTAL REMEDIATION STAGING SHOULD BE COORDINATED WITH ADDITIONAL STAGING PLANS INCLUDED IN THE DOCUMENTS.

NOTE

1. FOR SECTION A-A, SEE FIGURE 9
2. CONTRACTOR SHALL SET-UP TEMPORARY FACILITIES PER SECTION 01100 AND 02300.
3. CONTRACTOR SHALL ESTABLISH SITE CONTROLS PER SECTION 01011
4. CONTRACTOR SHALL ESTABLISH EROSION AND SEDIMENTATION CONTROLS PER SECTIONS 01100 AND 02120
5. CONTRACTOR SHALL ESTABLISH AIR AND DUST CONTROLS PER TAGM 4031 AND SECTIONS 02300 AND 02320
6. CONTRACTOR SHALL ABANDON ALL MONITORING WELLS WITHIN THE FOOTPRINT OF THE EXCAVATION AND PROTECT ALL OTHER PER SECTION 02610
7. CONTRACTOR SHALL ENSURE PROTECTION OF ADJACENT STRUCTURES BY MONITORING SETTLEMENT AND VIBRATION AS SPECIFIED IN SECTION 02255
8. CONTRACTOR SHALL INSTALL JET GROUT WALL ON WESTERN BOUNDARY OF SITE IN ACCORDANCE WITH SECTION (REFER TO LANGAN SPECIFICATION)
9. CONTRACTOR SHALL INSTALL WATERLOO® BARRIER SHEET PILE WALL ON NORTHERN BOUNDARY OF SITE IN ACCORDANCE WITH SECTION 02255
10. CONTRACTOR SHALL INSTALL TEMPORARY SHEET PILE WALLS IN ACCORDANCE WITH SECTION 02255
11. CONTRACTOR SHALL FURNISH MOBILE STRESSED MEMBRANE STRUCTURE IN ACCORDANCE WITH SECTION 02320
12. CONTRACTOR SHALL MAINTAIN WATER LEVEL WITHIN EXCAVATION AREAS AT AN ELEVATION EQUAL TO 1' BELOW BOTTOM OF EXCAVATION DURING ALL REMOVAL AND BACKFILL ACTIVITY IN ACCORDANCE WITH SECTION 02300 AND 02140
13. CONTRACTOR SHALL CONDUCT ALL SOIL REMOVAL AND HANDLING IN ACCORDANCE WITH SECTIONS 02300 AND 02310
14. CONTRACTOR SHALL TRANSPORT AND DISPOSE OF ALL EXCAVATED MATERIAL IN ACCORDANCE WITH SECTION 02091
15. CONTRACTOR SHALL BACKFILL EXCAVATIONS TO EL. 22' IN ACCORDANCE WITH SECTION 02300

REFERENCE:
BASEMAP PROVIDED BY NYCSCA

Shaw Environmental, Inc.

DESIGNED BY: HF/CK	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY			
DRAWN BY: R.T./SSH	SITE PHYSICAL CHARACTERISTICS			
CHECKED BY:	FORMER METRO NORTH PROPERTY 672 CONCOURSE VILLAGE WEST, BRONX, NY			
APPROVED BY:	DATE: 10/26/05	SCALE: AS SHOWN	DRAWING NO. 114926B83	FIGURE 8

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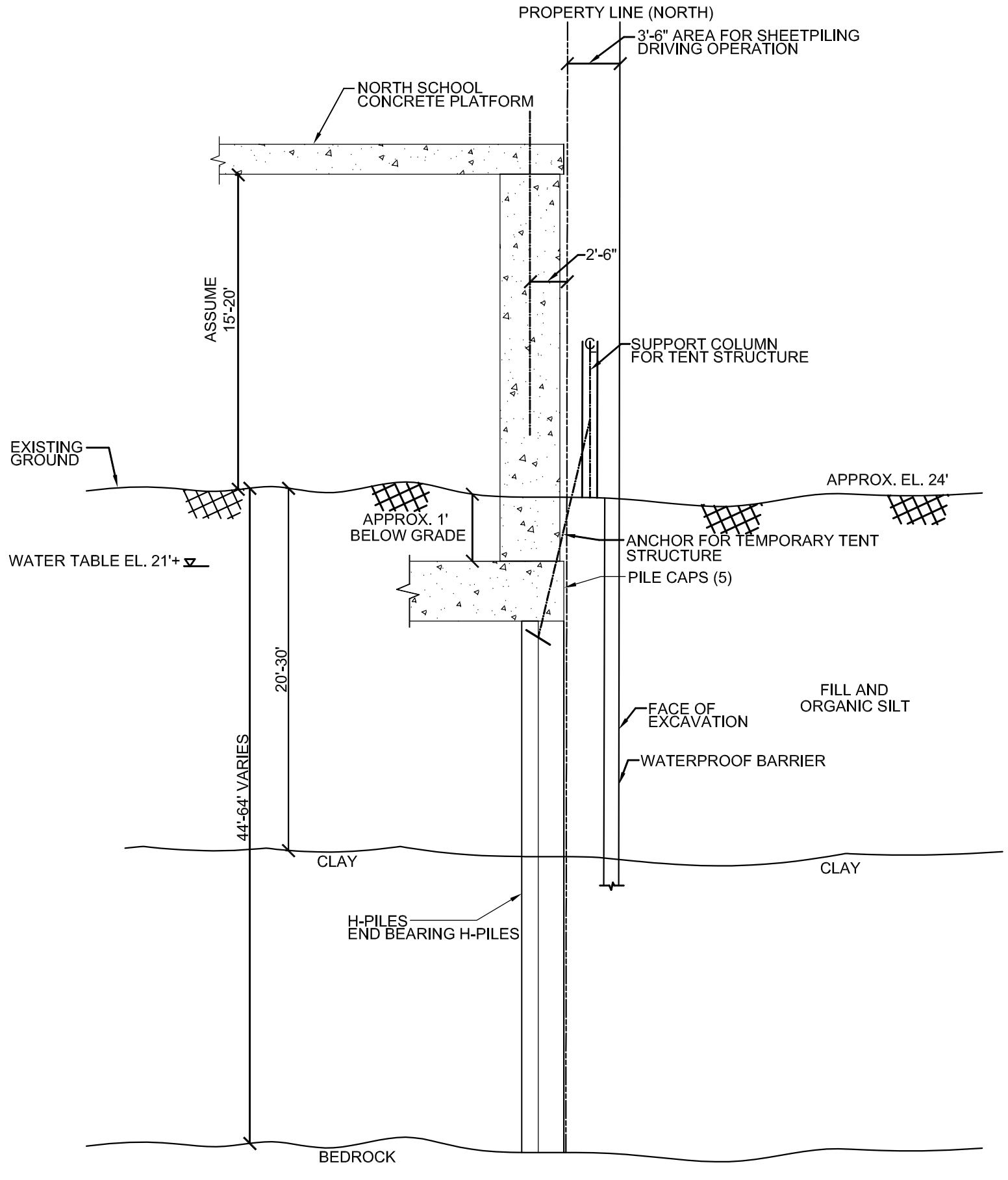

NOTES:

- AREA AVAILABLE FOR SHEETPILING DRIVING OPERATION IS 3'-6" SOUTH OF NORTH PROPERTY LINE
- DEPTH OF SHEET PILE SHALL BE DETERMINED BY CONTRACTOR
- WATERPROOF BARRIER DEPTH (WATERLOO® OR EQUIVALENT) SHALL BE DETERMINED BY CONTRACTOR. HOWEVER, BARRIER SHALL BE A MINIMUM OF 30' BELOW GRADE
- MAX PERMISSIBLE VERTICAL TOLERANCE (PLUMBNESS) 1/5" PER FOOT VERTICAL
- BOTTOM OF PROPOSED EXCAVATION EL.+9.3 (NORTH SIDE)-SECTION #1
- TENT STRUCTURE AND DETAILS SHOWN FOR CLARITY CONTRACTOR RESPONSIBLE FOR MEETING DESIGN AND FIELD CONDITIONS
- MAXIMUM ALLOWABLE DEFLECTION OF THE SHEETING SHALL BE 2" TYPICAL AND SHALL BE NO MORE THAN 1" ALONG THE NORTH SIDE FOR WATERPROOF BARRIER

NOTES:

1. REFER TO LANGAN GEOTECHNICAL REPORT FOR DATA ON SUBSURFACE CONDITIONS AND TOP OF ROCK CONTOURS.
2. REFER TO DRAWING 2 FOR PLAN.
3. THE 4TH AND 5TH PILE CAPS FROM THE NORTHWEST CORNER OF THE SITE EXTEND BEYOND THE PROPERTY LINE BY APPROXIMATELY 10-1/2" AND 3" RESPECTIVELY.
4. THE TOP OF THE WATERPROOF BARRIER SHALL BE CUT AT GRADE, BUT NO LESS THAN ELEVATION 24' TO ENSURE THAT IT EXTENDS ABOVE THE WATERTABLE.

0 100 200

SCALE IN FEET

SECTION A-A

Shaw Shaw Environmental, Inc.

DESIGNED BY: HF/CK	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY			
DRAWN BY: R.T./SSH	SITE PHYSICAL CHARACTERISTICS			
CHECKED BY:	FORMER METRO NORTH PROPERTY 672 CONCOURSE VILLAGE WEST, BRONX, NY			
APPROVED BY:	DATE: 10/26/05	SCALE: AS SHOWN	DRAWING NO. 114926B83	FIGURE 9

OFFICE New York, NY | DRAWING NUMBER 114926-FIG4

SECTION #1
BOTTOM OF PROPOSED EXCAVATION
EL. +9.30'

SECTION #3
BOTTOM OF PROPOSED EXCAVATION
EL. +9.97'

SECTION #2
BOTTOM OF PROPOSED EXCAVATION
EL. +14.47'

691.24'

150'
125'
100'

TAX LOT 78
TAX BLOCK 2443

REMEDIATION ELEVATION

RE=9.30'	SECTION #1
RE=9.97'	SECTION #3
RE=14.47'	SECTION #2

LEGEND

- REMEDIATION AREA
- LIMITS OF PROPOSED BUILDING
- RE=9.30' REMEDIATION ELEVATION (BPDB)

0 50 100
SCALE IN FEET

Shaw Environmental, Inc.

DESIGNED BY: HF/CK	NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
DRAWN BY: R.T./SSH	SITE PHYSICAL CHARACTERISTICS
CHECKED BY:	FORMER METRO NORTH PROPERTY 672 CONCOURSE VILLAGE WEST, BRONX, NY
APPROVED BY:	DATE: 10/26/05 · SCALE: AS SHOWN · DRAWING NO.: 114926B83 · FIGURE: 10

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