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Shaw® Shaw Environmental & Infrastructure, Inc.

July 13, 2005

Mr. Koon S. Tang, P.E.
Section Chief
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
47-40 21st Street
Long Island City, New York, 11101-5407

Re: Revision of Remedial Investigation Work Plan (RI WP) for the Former Metro North Property – Mott Haven Campus, located at 672 Concourse Village West, Bronx, NY.
LLW Number: 033485
Job Number: 20610

Dear Mr. Tang:

Pursuant to our meeting with the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) on May 17, 2005 and on behalf of the New York City School Construction Authority (SCA), Shaw Environmental and Infrastructure (Shaw) has revised the RI WP for the site (Former Metro North Property – Mott Haven Campus), located at 672 Concourse Village West, Bronx, New York for your review and concurrence. The original RI WP was previously submitted by URS Corporation in January 2005. The revisions in the RI WP are based on NYSDEC's and NYSDOH's correspondence, dated March 30, 2005 (see attached) and subsequent communication between the NYSDEC, NYSDOH, SCA, and Shaw.

Listed below please find Shaw's response to NYSDEC's comments; in the same order as the March 30, 2005 correspsondence:

1. Section 2.2.3 Surface and Subsurface Soil Samples was revised to be consistent with NYSDEC's comments. A more flexible work plan was implemented to allow for the delineation of the contamination in the northwest corner of the property and to assess any potential historic releases of contaminants based on the site's past use. In addition to the borings in the original RIWP, a total of thirteen additional soil borings were advanced to delineate contamination, including two additional soil borings north of OU-1 under the primary school 156, six additional soil borings in the northwest corner of OU-1, and two additional soil borings in the location of the former building foot print (paint shop and machine shop).

2. The Unknown Underground Conduit: As requested by the NYSDEC, a soil boring was advanced in the vicinity of the unknown underground conduit and a portion of the unknown underground conduit will be excavated to identify its purpose/use and to assess any potential discharge from this conduit.
3. Section 2.2.4 Test Pits was revised to incorporate NYSDEC's comments. If there was visual evidence of contamination in the test pits, the excavated material was drummed for final disposal. Pictures were taken at each test pits and all PID readings and observations were logged and will be submitted as part of the final RI report. As requested by the NYSDEC, three additional test pits were excavated at the southern debris pile. In addition, at least one soil sample was collected from each test pit located at the fill mounds and two ballast piles at the site to characterize the soils for final disposal. It should be noted that the debris mounds and ballast piles will be removed and disposed of off-site in accordance with applicable disposal requirements.
4. Section 2.2.5 Groundwater Investigation was revised to incorporate NYSDEC's comments. Six additional groundwater monitoring wells were installed in the northwest corner of the site, including the area under the existing school PS156. All groundwater monitoring wells were surveyed for true groundwater elevation calculation.
5. Soil Gas Survey: As discussed and agreed upon with the NYSDEC and NYSDOH, the soil gas survey was modified. A total of 16 soil gas samples were collected from the most contaminated area (northwest corner) of the site to assess the potential for the presence of VOCs in soil gas and methane gas in this area. The impacted soils in the northwest corner of the property will be removed and disposed of off-site, which makes soil gas data in this area unnecessary. A comprehensive soil and groundwater investigation was performed to fully characterize the site and identify any potential areas of concern that require remedial action.
6. Incorrect Analytical Methods in Table A2-2 were revised to incorporate NYSDEC's comments. The analytical methods for the groundwater matrix are consistent with the analytical methods for the soil matrix.

Listed below please find Shaw's response to NYSDOH's comments; in the same order as the March 30, 2005 correspsondence:

1. Section 1.1 and 1.3: The revised RI WP does not intend to suggest that petroleum compounds are the only contaminants of concern. The RI included a comprehensive investigation of soil and groundwater across the entire property. Soil and groundwater were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), Metals, PCBs, Cyanide, Pesticides, and Herbicides to fully assess the site.
2. Section 1.3: Previous sampling results are summarized in Tables and Figures contained in URS's Phase II Environmental Site Investigation (ESI) Report. A copy of the complete Phase II ESI Report was submitted to the NYSDEC in November 2004.
3. Figure A2-2: The shaded area in the northwest corner of the site, displayed in Figure A2-2, represents the Area of Excavation. Shaw amended Figure A2-2 to include the description in the legend.

4. Figures A1-3 and A2-2: As requested by the NYSDOH, the information included in Figures A1-3 and A2-2 was separated by previous and proposed sampling locations. Figures A1-3 displays the previous Phase II sampling locations. Figure A2-2 was amended by Shaw to reflect the proposed RI sampling locations.
5. The SCA intends to cover all exposed soil areas with 2 feet of acceptable clean fill cover to address potential exposure regarding the metals or polycyclic aromatic hydrocarbons (PAHs) across the site.
6. Section 2.2.2: As discussed with the NYSDOH, soil gas samples were collected from a depth of one foot above the groundwater table, where the groundwater level was five feet or less below the surface.
7. Section 2.2.2: As requested by the NYSDOH, the methodology of the soil gas survey is described in detail in Section 2.2.2 of the revised RI WP.
8. Section 2.2.2: As discussed with the NYSDOH, tracer gas was used at all soil gas sampling locations, where the depth to groundwater was five feet or less below the surface. The tracer gas was used as described in the NYSDOH document "*Guidance for Evaluating Soil Vapor Intrusion in The State of New York*", 2005.
9. Soil gas samples were analyzed to a detection limit of 1 microgram per cubic meter. As discussed with the NYSDOH, one-hour regulators were used to fill the summa canisters with soil gas for the VOC and methane analysis.
10. Section 2.2.3 (Second Bullet) was revised by Shaw. The second bullet should state "*For vertical delineation in the northwest area of the Site…*"
11. Section 2.2.4: As requested by the NYSDOH, the number of soil samples collected from the nine test pits excavated in the fill mounds is specified in the revised RI WP. At least one soil sample was collected from each test pit.
12. Section 2.2.4: As discussed with the NYSDEC, the two Geoprobe® borings were advanced in lieu of the previously proposed test pits (TP-17 and TP-18) in the northwest corner of the property. Soil samples were collected for laboratory analysis to further characterize and delineate contamination.
13. The community air monitoring plan included in Shaw's Health and Safety Plan is consistent with NYSDOH Generic Community Air Monitoring Plan.

Please feel free to call if you have any questions or concerns regarding this document.

Sincerely,

SHAW ENVIRONMENTAL AND INFRASTRUCTURE

Stephan B. Meurer

Stephan B. Meurer
Senior Project Geologist

cc: Lee Guterman (NYSSCA)
Amar Nagi (NYSDEC)
Denise D'Ambrosio (NYSDEC, Tarrytown)
Julia Guastella (NYSDOH)

REVISED REMEDIAL INVESTIGATION WORKPLAN

FORMER METRO NORTH PROPERTY
672 CONCOURSE VILLAGE WEST
BRONX, NEW YORK 10451

Prepared for:

NEW YORK CITY SCHOOL CONSTRUCTION AUTHORITY
30-30 THOMSON AVENUE
LONG ISLAND CITY, NY 11101-3045

Prepared by:

URS Corporation
201 Willowbrook Boulevard
Wayne, NJ 07470

January 20, 2005

Revised by:

Shaw Environmental & Infrastructure, Inc.

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July 13, 2005

REVISED REMEDIAL INVESTIGATION WORKPLAN

FORMER METRO NORTH PROPERTY
672 CONCOURSE VILLAGE WEST
BLOCK 2443, LOT 78
BRONX, NEW YORK 10451

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EXECUTIVE SUMMARY

The New York City School Construction Authority (NYCSCA) is conducting a Remedial Investigation (RI) associated with the proposed new school site located at 672 Concourse Village West, Bronx, New York (hereinafter referred to as the "Site"). One lot comprises the Site and is identified as Block 2443, Lot 78 on the Bronx tax assessor's map. This property was a former rail yard and is currently vacant. There are no existing buildings on the property.

NYCSCA will conduct this RI under a Brownfields Site Cleanup Agreement with the New York State Department of Environmental Conservation (NYSDEC). To that end, this Remedial Investigation Work Plan (RIWP) has been prepared to define the scope and schedule of all RI field activities and report generation. For the purposes of this investigation the Site is divided into two Operable Units. Operable Unit 1 (OU-1), is comprised of the northern portion of Lot 78 on which the new schools and athletic field will be constructed. Operable Unit 2 (OU-2) is comprised of the southern portion of lot 78, the laydown area for the proposed bridge to be constructed by the New York City Department of Transportation (NYC DOT).

This revised RIWP has been prepared based on the results of the Phase I Environmental Site Assessment (ESA), conducted in July 2001, and the Phase II Environmental Site Investigation (ESI), conducted in August 2001, for the Former Metro North Site as well as the comments of the NYSDEC correspondence, dated March 30, 2005, and subsequent communication between the New York State Department of Health (NYSDOH), NYSDEC, and NYCSCA.

The proposed revised RIWP Scope of Work includes:

- A geophysical survey;
- The collection of 16 soil gas samples in the northwest corner of the property (OU-1) to determine if volatilization of subsurface contamination presents a potential concern for future structures;
- The advancement of twenty-six soil borings, two under the primary school 156, twenty-two in OU-1 (two soil borings will be advanced in lieu of excavating two test pits at the northwest corner of OU-1) and two in OU-2, to characterize potential areas of environmental concern;
- Sampling of the railroad ballast piles;
- Sampling via test pits of the two soil mounds in OU-1 to characterize soils for final disposal;

- The installation and sampling of eleven on-site overburden groundwater monitoring wells, nine in OU-1 and two in OU-2, to further characterize groundwater contamination identified in the Phase II ESI, and to further define groundwater flow direction by undertaking water level measurements;
- The installation and sampling of four off-site upgradient overburden monitoring wells, two under the primary school 156 and two along Concourse Village West in the sidewalk, to evaluate the potential for off-site contamination impacting OU-1;
- Data validation and tabulation; and,
- RI report.

These tasks will supplement the information obtained from the analysis of ten soil borings, ten test pits, eleven surficial soil samples, and five groundwater screening samples in the previously undertaken Phase II Environmental Site Investigation of OU-1. This Revised RIWP submission includes the scope of work and schedule for the RI, as well as the associated Quality Assurance Project Plan, Field Sampling Plan, and Health and Safety Plan.

PART A – REMEDIAL INVESTIGATION WORK PLAN

1.0 INTRODUCTION

The New York City School Construction Authority (NYCSCA) is conducting a Remedial Investigation (RI) associated with the proposed new school site located at 672 Concourse Village West, Bronx, New York (hereinafter referred to as the "Site") identified as Block 2443, Lot 78 on the Bronx tax assessor's map. The Remedial Investigation (RI) for this Site will be performed under a Brownfields Site Cleanup Agreement between the NYCSCA and the New York State Department of Environmental Conservation (NYSDEC). The Remedial investigation will be conducted for two distinct Operable Units, OU-1 and OU-2. OU-1 includes the northern parcel, is the future location of 4 new public schools and associated athletic field. OU-2, the southern parcel, is the laydown area for a proposed bridge to be constructed by the New York City Department of Transportation (NYC DOT) south of the proposed school site. Both OU-1 and OU-2, the Site, are within the boundaries of Lot 78. The metes and bounds of OU-1 and OU-2 are presented in Appendix A.

This revised RIWP has been prepared based on the results of the Phase I Environmental Site Assessment (ESA) (July 2001) and Phase II Environmental Site Investigation (ESI) (August 2001) as well as the comments of the NYSDEC correspondence, dated March 30, 2005, and subsequent communication between the NYSDOH, NYSDEC, and NYCSCA. This revised RIWP summarizes the ESA and ESI and presents a detailed scope of work and schedule for conducting the RI.

The revised Scope of Work for the OU-1 RI includes:

- A geophysical survey;
- A soil gas survey;
- Advancing twenty-two soil borings on-site (two soil borings will be advanced in lieu of excavating two test pits at the northwest corner) and two soil borings off-site under the primary school 156 as well as collection of subsurface soil samples at each boring location;
- Excavation and sampling of nine test pits in the on-site soil mounds, three in the northern soil mound and six in the southern fill mound;
- Sampling of the railroad ballast piles;

- The installation of nine on-site monitoring wells with one round of synoptic water level measurements and one round of groundwater sampling; and,
- The installation of four off-site upgradient monitoring wells with one round of synoptic water level measurements and one round of groundwater sampling.

These tasks will supplement the information obtained from the analysis of ten soil borings, ten test pits, eleven surficial soil samples, and five groundwater screening samples in the Phase II ESI.

The revised Scope of Work for the OU-2 RI includes:

- A geophysical survey;
- Advancing two soil borings and collection of soil samples at each boring location; and,
- The installation of two on-site monitoring wells with one round of synoptic water level measurements and one round of groundwater sampling (note: The synoptic water level measurements will include OU-1 and OU-2).

This revised RIWP submission includes the RI Work Plan (Work Plan) in Part A, the Quality Assurance Project Plan (QAPP) in Part B, the Field Sampling Plan (FSP) in Part C, and the Health and Safety Plan (HASP) in Part D.

1.1 Site Description and History

Site Description: OU-1 and OU-2

The Site (OU-1 and OU-2) is a vacant lot located at 672 Concourse Village West, Block 2443, Lot 78, in the South Bronx, New York. Figure A1-1 shows the location of the Site. Figure A1-2 shows the layout of the Site and the surrounding land use. OU-1 and OU-2 are depicted in Figure A2-1

The adjacent properties include Primary School No. 156 and Intermediate School No. 151 to the north; New York and Harlem Railroad to the east; New York and Harlem Railroad and Cardinal Hayes High School to the south; and apartment buildings, Herk Elevators, Live Poultry and Nationwide Warehouse to the west.

The Site is located in a topographic depression. The properties to the north and west are approximately 30 feet higher than the OU-1 Site. To the north, Primary School No. 156 and Intermediate School No. 151 are constructed on 30 foot-high concrete columns. The properties and Concourse Village West to the west are separated from the OU-1 Site by a 30-foot-high retaining wall. The properties to the south are at approximately the same elevation as the OU-1 Site. To the east of the OU-1 Site, the ground again rises to approximately 20 feet above the OU-1 Site.

Historical fire insurance maps and aerial photographs for the Site and surrounding properties were reviewed to identify historical land use. The maps spanned the years from 1891 to 1996. The maps show that the Site was a railyard in 1891, with a machine shop, paint area and carpenter shop located toward the west side of the property. An electrical warehouse was present on the Site in 1908. The buildings on-site were demolished sometime between 1951 and 1977 and the Site was then left undeveloped until present day.

A site inspection was performed as part of a Phase I Environmental Site Assessment (ESA) in July 2001. At the time of the initial site inspection Metro North was using the southern portion of OU-1 for storage. Metro North stored small sections of rail track, plastic used to wrap electrical conduit, gravel, and other miscellaneous new material. Workers at the OU-1 stated that the stored materials were to be removed by Metro North. The area used by Metro North was relatively flat and the soil was brown to black sand with one-inch diameter gravel. This area was clear of brush and weeds.

There were two large mounds of fill in OU-1. The mounds ranged in height from approximately four (4) to twelve (12) feet above the mean ground surface elevation. These mounds have been present on OU-1 for many years; some areas of the mounds have trees. New debris was evident in areas; the debris consisted of roadway millings, concrete, and metal. Other miscellaneous debris was apparent on the western side of the OU-1. Litter was found on the northern side of OU-1.

The presence of remnant power line supports indicates that power lines may have traversed OU-1 in the past. No power lines were apparent at the time of the site inspection. During the site inspection, a pressure valve, apparently no longer in use, was noted extending from the ground in the center of the property. The valve appeared to be a pressure valve for water or steam. The base piping associated with the valve was insulated; this insulation was identified as suspect asbestos-containing material. On the ground, with both ends buried near the pressure valve, was two-inch pliable black plastic tubing labeled Metro North. This type of tubing was noted throughout this area.

To the west of OU-1 along the wall, there were two pipelines noted. The use of these pipelines was unknown. Also along this wall were several electrical conduits and meters, which appeared not to have been maintained and were, therefore, inoperable.

In the center of OU-1 there was a twelve-foot by twelve-foot concrete pad in poor condition. To the west of this pad within ten feet was a metal one-foot square recessed box. There was no access to open the box and the depth of the box could not be determined. To the east of this pad was concrete debris and a storage tank, estimated at 3,000-gallons. This tank had been cut open, apparently as part of removal activities, and there was no evidence of product in the tank or in the vicinity of the tank. The source of the tank was unknown.

There are three areas on the site, each of which poses potential environmental concerns. In the southern area of the site, there was a pile of railroad ballast consisting of varying grades of small-diameter stone. Paint storage was not observed during the site inspection. Historically paint has been stored on the Site in unknown quantities. The former machine shop and rail operations suggest that petroleum products were formerly used and stored on the Site. While the Site is not listed in the NY UST/AST database, and no USTs were depicted on the Historical Fire Insurance Maps, a suspect UST was identified in the center of the Site.

An additional site visit was conducted on November 4, 2004 and verified that the site conditions, as described above, have not changed since the Phase I and Phase II were respectively conducted in July and August 2001.

1.2 Physical Setting

1.2.1 Topography (OU-1 and OU-2):

According the United States Geological Survey (USGS) 7.5 Minute Quadrangle Map, Central Park, New York – New Jersey, dated 1965 (photorevised 1979) the elevation of the Site is approximately 20 feet above mean sea level. The Site is generally flat and depressed relative to properties immediately to the north, west, and east. A portion of the topographic map showing the Site location is included as Figure A1-1.

OU-2 is currently used for the storage of electrical wiring and piping.

1.2.2 Geology (OU-1 and OU-2):

Regional:

Bedrock in the New York City area consists of crystalline metamorphic rocks, which are Precambrian and lower Paleozoic in age. There are three predominant rock formations in the Bronx - the Fordham Gneiss, the Manhattan Schist, and Inwood Marble. These rocks crop out mainly in the Bronx and Manhattan, so that the soil overburden in these areas tend to be relatively thin. Soils overlying these rocks consist of typically unsorted Pleistocene glacial material (till and moraine deposits) and recent stream and swamp deposits. In the New York City area, the glacial deposits are thinnest in the Bronx.

Pleistocene glaciation occurred about 10,000 years ago and resulted in the dominant topographic pattern in the Bronx. Softer rocks like the Inwood Marble and localized areas of faults or joints were sculpted by ice to form valleys. The rocks more resistant to erosion and sculpting, such as the Fordham Gneiss and Manhattan Schist, form prominent ridges in the area. The general structural grain in the area is to the northeast. These are no major fault zones documented in the area of the site.

Based on the results of the Phase II ESI, the depth ot bedrock at the Site ranges from 4 to greater than 15.5 feet below grade surface (bgs). During the Phase II ESI, shallow refusal was encountered in three Geoprobe® borings. Two of these borings were in the center of the Site and the third was at the southern property boundary. These areas were subsequently investigated by test pit excavation and bedrock was recorded at elevations ranging from 4 to 5.5 feet bgs. In all of the other seven Geoprobe® borings, no refusal/bedrock was encountered at depths of up to 15.5 feet bgs.

1.2.3 Site Soil (OU-1 and OU-2)

The soils at the Site are covered with vegetative growth over most of the Site. However, to the south of the Site, the soil appeared to be brown to black medium to fine sand with some silt and gravel. The area is considered urban and no natural soils are present at the Site with Site soils consisting of fill material.

1.2.4 Hydrogeology (OU-1 and OU-2):

Data collected during the Phase II Environmental Site Investigation of OU-1 indicate that the depth to groundwater varies from four to eleven feet below ground surface. Overburden groundwater flow direction, based on temporary piezometers, appears to be from northwest to southeast. Estimated ground water levels and/or flow directions may vary due to seasonal fluctuation in precipitation, geology, underground structures, or dewatering operations and seasonal fluctuation in precipitation.

The closest surface water body is the Harlem River located approximately 2,500 feet to the west and approximately one mile to the south. The topographic map and EDR Radius Report did not show tidal or freshwater wetlands at or near the Site. According to the EDR Radius Report, the closest wetlands are located along the Harlem River.

Based on the Phase II ESI the presumed overburden ground water flow direction is from northwest to southeast. Similarly, the presumed depth to overburden groundwater is 4 to 11 feet below ground surface. Estimated ground water levels and/or flow directions may vary due to seasonal fluctuation in precipitation, geology, underground structures, or dewatering operations and seasonal fluctuation in precipitation.

1.3 Previous Investigations

Previous environmental studies include a Phase I ESA prepared by URS for the NYC SCA (July 2001) and a Phase II Environmental Site Investigation (ESI), also prepared by URS for the NYC SCA (August 2001); copies of both reports were provided to NYSDEC on November 22, 2004. The Phase I ESA or Phase II ESI encompassed OU-1 entirely and the majority of OU-2.

Phase I ESA:

As discussed in Section 1.1, the Phase I ESA reported that the Site was a rail yard prior to 1891 and also contained facilities designated as a machine shop, carpenter shop, paint area, offices, shops and storage areas prior to 1977. The Site is not listed in the NY UST/AST database and USTs were not depicted in the Historical Fire Insurance Maps. However, a suspect UST was identified in the center of the Site. Surficial fill material was observed at the Site as evidenced by two soil mounds. In the southeastern area of the site, there was a pile of railroad ballast consisting of varying grades of small-diameter stone. Although, historically, paint had been stored on Site in unknown quantities, no paint storage was observed during the site inspection. The former machine shop and rail operations suggest that petroleum products were formerly used and stored at the Site.

As part of the Phase I ESA, potential off-site sources of contamination were evaluated that could potentially affect the Site. Two filling stations have been located approximately a quarter mile to the west and a quarter mile to the east since before 1935. Of the two filling stations, only the property to the east is listed in the UST database with four tanks. A third filling station was located at the corner of East 156th Street and Sheridan Avenue, but was only depicted on the 1951 map. The Morgan Steam Laundry was located to the west of the site from sometime before 1935 until sometime before 1977.

Five sites listed in the NY Spills/LUST database are upgradient of the Site. Three of these sites have been remediated to NYSDEC criteria and are not considered environmental concerns. Of the remaining two, one LUST site is located to the east of the Site at 364 East 155th Street; a second LUST site is located east of the Site at 304 East 156th Street. These sites are reported to have contaminated the groundwater and are considered recognized environmental conditions because contaminated groundwater from these sites could flow beneath the site.

The historical review indicated several potential environmental concerns in the surrounding areas. A gas plant was located immediately to the northwest of the property from sometime before 1891 to 1946. The gas plant is not listed in the NYSDEC Manufactured Gas Plant Database. (Telecon: S. Kota–URS with D. Walsh–NYSDEC Region 2, November 12, 2004.) NYSDEC reportedly has no record or indication of a gas plant at or in the vicinity of the Site. (Telecon: S. Kota–URS with B. Schick–NYSDEC (Albany), December 14, 2004.)

Phase II ESI:

In order to better define areas of potential environmental concern associated with the Site and potential off-site sources as identified in the Phase I ESA, URS performed a Phase II ESI on the Site. The Phase II ESI (Figure A1-3) consisted of the following activities:

Geophysical Survey

A geophysical survey was undertaken to determine the location of a suspected underground storage tank (UST) and underground utilities at selected subsurface sampling locations, and to determine the presence or absence of track rails beneath the surface materials covering the Site.

The geophysical survey did not identify the footprint of the former buildings previously existing at the Site, nor did it indicate the presence of an UST. Other geophysical findings included: the location of piping from the pressure valve to the south, where it terminated under the southern debris mound; underground piping near the southern property boundary; and the location of a sewer line on the eastern side of the property running in a northwest/southeast direction with two manholes. The diameter of the sewer line could not be determined from the geophysical survey.

Surface Soil Samples

Surficial soil samples were collected to further assess and delineate RECs identified during the Phase II ESI. Surface soil samples were collected from 0-6 inches bgs at 11 locations (see Figure A1-3 for all sample locations). The results of the surficial soil samples indicated the presence of SVOCs throughout the Site. Most of the SVOCs detected were reported at concentrations below the NYSDEC Recommended Soil Cleanup Objectives (RSCOs). All of the surficial soil sampling locations, however, contained PAHs at concentrations that exceeded the RSCOs. The compounds and range in concentrations reported in the surficial soils were: benzo(a)anthracene 570 µg/kg to 15,000 µg/kg; chrysene 700 µg/kg to 17,000 µg/kg; benzo(b)fluoranthene 1,100 µg/kg to 13,000 µg/kg; benzo(k)fluoranthene 1,200 µg/kg to 13,000 µg/kg; benzo(a)pyrene 680 µg/kg to 15,000 µg/kg; and, dibenzo(a,h)anthracene 44 µg/kg to 400 µg/kg.

All surficial soil sampling locations reported metals at concentrations that exceeded the Eastern USA Background Levels, ranging from 2 to 3 times the applicable criteria. Surface soils were not analyzed for VOCs.

Soil Borings

Soil borings were completed to investigate the potential for petroleum or chemical leakage to the ground from the former machine shop and paint shop, and from the surrounding properties identified during the Phase I ESA. Borings were advanced at 10 locations to depths ranging from 2 feet to 15.7 feet bgs using a direct push Geoprobe® to evaluate subsurface soil conditions (Figure A1-3). Eleven soil samples were collected at seven of the ten locations utilizing this method. In areas where borehole drilling was terminated at a shallow depth due to refusal, test pits were excavated.

The results of the analytical testing of the perimeter soil boring samples did not indicate the presence of VOCs at concentrations exceeding the RSCOs with the exception of boring PZ-2 located in the northwest portion of the Site. In PZ-2, between 3-4 feet bgs, the results indicate the presence of benzene at 6,000 µg/kg, toluene at 110,000 µg/kg, ethylbenzene at 170,000 µg/kg, and total xylenes at 1,500,000 µg/kg. These concentrations are substantially above the RSCOs. The soil sample collected at this location from 10 feet to 11 feet bgs was in compliance with the RSCOs indicating that the vertical extent of VOC contamination had been delineated in this area.

All of the samples analyzed reported the presence of low levels of SVOCs. The most significant levels of SVOCs reported at concentrations that exceeded the RSCOs were associated with the subsurface soils at boring PZ-2. The analytical results for the soil sample collected from 3 feet to 4 feet bgs indicated the presence of naphthalene at 72,000 µg/kg, 2-methylnaphthalene at 57,000 µg/kg, benzo(a) anthracene at 4,300 µg/kg, chrysene at 4,600 µg/kg, benzo(b)fluoranthene at 2,700 µg/kg, benzo(k)fluoranthene at 2,400 µg/kg, and benzo(a)pyrene at 4,300 µg/kg. These concentrations are substantially above the RSCOs. However, soil sample collected at this location from 10 feet to 11 feet bgs, did not detect SVOC concentrations (non-detect concentrations) above the RSCOs indicating that the vertical extent of SVOC contamination had been delineated in this area.

The analytical results of the perimeter boring soil samples indicated the presence of some TAL metals in the subsurface soils at concentrations that exceeded the Eastern USA Background Levels. The analytical results also indicated that the metals exceedances occur at a higher frequency and concentration in the near surface soils rather than with soil samples collected at depth.

Test Pits

Ten test pits were excavated to characterize the subsurface soils and the contents of two large debris mounds and to investigate for the presence of a suspected UST (Figure A1-3). The test pits were also used to determine if the track rails had been removed or left in place and covered with fill.

The test pits did not indicate the presence of an UST. Excavated material consisted of dry, fine to coarse sand, gravel, and cobbles, with construction and demolition debris fill material. No evidence of organic vapors was detected except for one recording of 16 ppm in TP-5 located in the northwest portion of the Site.

In test pit SB-17, excavated at the original soil boring SB-7 located near the center of the Site, buried railroad ties were encountered and a strong odor of creosote was detected. There appeared to be a slight sheen on the water.

Groundwater Flow Direction

Three temporary piezometers were installed in a triangular arrangement at the eastern, northwestern and southwestern boundaries of the Site to determine the apparent direction of groundwater flow (Figure 4; Phase II ESI Report). A location survey of the piezometers was performed and referenced to an arbitrary datum established at the Site. The groundwater flow was found to trend to the southeast.

Groundwater Quality

Groundwater quality screening was performed at the perimeter and near the center of the Site by collecting groundwater samples at five locations (Figure A1-3). The perimeter samples were collected from piezometers PZ-1, PZ-2, and PZ-3 and from soil boring SB-3. A groundwater quality screening sample was also collected from test pit SB-17 where buried railroad ties exhibiting a strong creosote odor and sheen on the groundwater were observed.

The highest concentrations of VOC contamination were reported in the northwest corner of the Site at piezometer location PZ-2. The analytical results of the groundwater sample collected at this location report high concentrations of benzene at 17,000 micrograms per liter (µg/l), toluene at 180 µg/l, ethylbenzene at 370 µg/l, and total xylenes at 1,580 µg/l. In addition, the chlorinated VOC 1,1,2-trichlorethane was reported at 12 µg/l.

The analytical results from PZ-1, which is positioned along the eastern boundary of the Site and provides an assessment of groundwater quality migrating from the Site, indicate the presence of three chlorinated VOCs in the groundwater. Only two of these compounds, vinyl chloride (7.7 µg/l) and cis1,2-dichloroethene (25 µg/l) exceeded the groundwater criteria of 2 µg/l and 5 µg/l, respectively. The analytical results of the groundwater samples collected along the northern property boundary (SB-3) and at test pit SB-17 indicated the absence of VOCs at concentrations that exceeded the groundwater criteria.

Data Validation

URS has conducted an independent data validation of the Phase II ESI analytical results. Based on this data validation, the laboratory analytical data are deemed usable and, as noted in Appendix A, are in compliance with the modified NYSDEC Category A Data Deliverables Format.

The scope of work for the RI, presented in the next section, was developed based on the Phase II ESI analytical results, and was designed to supplement these Phase II data for all media.

2.0 SCOPE OF WORK

The NYCSCA is conducting an RI at the Former Metro North Site in the South Bronx, New York. The revised scope of the RI for OU-1 and OU-2 will be described separately below.

The Scope of Work of the revised RIWP for OU-1 includes:

- Geophysical survey;
- The collection of 16 soil gas samples in the northwest corner of the property to determine if volatilization of subsurface contamination presents a potential concern for future structures;
- The advancement of twenty-two soil borings on-site (two soil borings will be advanced in lieu of excavating two test pits at the northwest corner) and two soil borings off-site under the primary school 156 to further characterize potential areas of environmental concern;
- Sampling via test pits of the two soil mounds on the Site to characterize soils for final disposal;
- Sampling of the railroad ballast piles;
- The installation and sampling of nine on-site overburden groundwater monitoring wells to further characterize groundwater contamination identified in the Phase II ESI and to verify groundwater flow direction by taking water level measurements;
- The installation and sampling of four off-site upgradient overburden monitoring wells to evaluate the potential for off-Site contamination impacting the Site;
- Data validation and tabulation; and,
- The preparation of a comprehensive RI report including both OU-1 and OU-2.

As discussed in Section 1.3 of this Revised Work Plan, eleven surficial soil samples were collected and analyzed in the Phase II ESI. The location of these samples is presented in Figure A1-3. The extent of the Phase II ESI surficial soil sampling and analyses is sufficient for evaluating the Site material and, therefore, no additional surficial soil samples are included in the RI scope of work for OU-1.

The Scope of Work of the revised RIWP for OU-2 includes:

- Geophysical survey;
- The advancement of two soil borings to characterize surface and subsurface soil conditions at the OU-2 Site;
- The installation and sampling of two on-site overburden groundwater monitoring wells to determine if groundwater contamination is present and to verify groundwater flow direction by taking water level measurements;
- Data validation and tabulation; and,
- The preparation of a comprehensive RI report including both OU-1 and OU-2.

2.1 Task 1 – Scoping and revised RI Work Plan

This section describes all proposed tasks associated with the RI at the Former Metro North Site. In developing this revised RIWP, the RIWP submitted in January 2005 was revised to incorporate the comments of the NYSDEC/NYSDOH correspondence, dated March 30, 2005, as well as subsequent communication between the NYSDOH, NYSDEC, and NYCSCA.

2.1.1 Revised RI Work Plan

This revised RI Work Plan includes the RI Scope of Work and the associated Quality Assurance Project Plan (QAPP), Field Sampling Plan (FSP), and Health and Safety Plan (HASP).

A Citizens Participation Plan (CPP) will also be prepared in accordance with NYSDEC requirements. This document will be submitted under separate cover.

2.2 Task 2 – Implementation

The field program for OU-1 and OU-2 will commence with:

- Conducting geophysical survey;
- Establishing the soil gas survey grid and implementing the soil gas survey;
- Advancing soil borings and collecting surface and subsurface soil samples;
- Excavation of test pits in the soil mounds (OU-1 only) (note: no test pits will be excavated in the OU-2);

- Installing and developing monitoring wells; and,
- Purging and sampling the monitoring wells (including water level measurements).

Site characterization activities are described in the following sections, with environmental sampling/analysis summarized in Table A2-1 and analytical methods summarized in Table A2-2. Investigation locations are shown in Figures A2-1 through Figure A2-3. Twenty percent of the soil and groundwater analytical data (excluding TCLP and TPH) will be evaluated for usability, and all analytical data will be summarized and tabulated as described in the Quality Assurance Project Plan.

2.2.1 Buried Utility Identification (Geophysical Survey)

OU-1:

A geophysical survey was performed on the Site as part of the Phase II Investigation. This survey was used to determine if underground utilities or underground storage tanks were present as well as to assess the limits of the soil piles, etc. A supplemental geophysical investigation is proposed for this RI. This investigation will be limited to work required to assure that underground utilities are not present at locations where subsurface investigations are planned. Utilities in areas designated for intrusive activities will be cleared through the Underground Facilities Protection Organization (UFPO) as well as through a review of sewer maps from the New York City Department of Environmental Protection.

OU-2:

A geophysical investigation is proposed for this operable unit. This investigation will be limited to work required to assure that underground utilities are not present at locations where subsurface investigations are planned. Utilities in areas designated for intrusive activities will be cleared through the Underground Facilities Protection Organization (UFPO) as well as through a review of sewer maps from the New York City Department of Environmental Protection.

2.2.2 Soil Gas Survey

All soil gas points will be sampled using a truck-mounted Geoprobe® unit. To collect the soil gas sample, a 1-foot screen with a fitted drive point will be advanced to the requisite depth. The

Geoprobe® rods will then be retracted 3-4 inches to create a void. Polyethylene tubing (1/4 inch) will be attached to a stainless steel adaptor and the adaptor will be attached to the drive point to make a seal. The tubing will be sealed to the surface with a non-VOC containing material consisting of permagum grout or beeswax or equivalent. Prior to attaching the sample container, the drive point will be purged of 1-3 probe volumes to eliminate air within the tubing. The flow rate during purging will not exceed 0.2 liters/minute. Following purging, the tubing will be attached to a summa canister (for TO-15 and TO-3 analysis) fitted with a one hour flow regulator. Immediately after opening the summa canister, the initial vacuum (inches of mercury) will be noted. After one hour, the summa canister will be closed and the final vacuum noted. (The flow rate during sampling will not exceed 0.2 liters minute). The laboratory methods used to analyze for VOCs will achieve a detection limit of 1 microgram/cubic meter.

As discussed and agreed upon with the NYSDEC and NYSDOH, the soil gas survey will be modified. A total of 16 soil gas samples (SG-1, SG-9, SG-11, SG-19, SG-20, SG-21, SG-27, SG-28, SG-28, SG-29, SG-37, SG-38, SG-45, SG-46, SG-47, SG-49, and SG-54) will be collected from the most contaminated area (northwest corner) of the site to assess the potential for the presence of VOCs in soil gas and methane gas in this area. The impacted soils in the northwest corner of the property will be removed and disposed of off-site, which makes soil gas data in this area unnecessary. A comprehensive soil and groundwater investigation on the remainder of the site will be performed at the site to fully characterize the site and identify any potential areas of concern that require remedial action.

A 50-foot by 50-foot sampling grid will be established in the northwest portion of OU-1, to be able to evenly space the soil gas sampling locations in the northwest corner and for site orientation (placement and survey of soil borings, monitoring wells, and test pits at the site). The proposed soil gas sampling points area is shown on Figure A2-1 (Soil Gas Survey Sample Locations). Sampling points may be modified in the field due to the presence of obstructions (e.g., soil piles). For this investigation, it is anticipated that soil gas will be screened at 16 locations in the northwest corner of the property and 16 soil gas samples will be collected for laboratory analysis. In shallow groundwater areas, where the groundwater level is five feet or less below the surface, soil gas samples will be collected from a depth of one foot above the groundwater table. In areas, where the groundwater level is greater than five feet below the surface, soil gas samples will be collected from a depth of two to three feet above the groundwater table or refusal, whichever is shallower. Tracer gas will be used for at least 20% of all soil gas sampling locations. In addition, tracer gas will be used at all soil gas sampling locations, where the depth to groundwater is five feet or less below the surface. The tracer gas will be used as described in the NYSDOH document "*Guidance for Evaluating Soil Vapor Intrusion in The State of New York*", 2005. Samples submitted to the laboratory will be analyzed for the following:

- VOCs: analytical method TO-15
- Methane: analytical method TO-3 modified

A minimum of one (1) field duplicate sample will be collected for every twenty (20) field samples (total of 1), and one (1) trip blank will be analyzed per sample shipment to the laboratory (approximately 3 samples), for a total of approximately 20 samples. All laboratory analytical Quality Assurance and Data will be in accordance with NYSDEC Category A Data Deliverable format.

2.2.3 <u>Subsurface Soil Samples</u>

<u>OU-1:</u>

Twenty-two on-site soil borings and two off-site soil borings will be completed in OU-1 (soil boring series SB-20 and higher; Figure A2-2). The purpose of these borings is to further characterize the northwest area (the portion of the Site where the highest concentrations of petroleum constituents were detected). The borings will also further characterize the fill layer.

The table below summarizes the rationale for each of the eleven proposed borings of the original RIWP.

Soil Boring	**Rationale**
SB-20	Characterize northwest area (highest BTEX in soil on the Site)
SB-21	Evaluate subsurface conditions at eastern property boundary
SB-22	Characterize northwest area (highest BTEX in soil on the Site)
SB-23	Characterize northwest area (highest BTEX in soil on the Site)
SB-24	Evaluate subsurface conditions at eastern property boundary and potential impact of Northern Soil Mound
SB-25	Characterize northwest area (highest BTEX in soil on the Site)
SB-26	Characterize northwest area (highest BTEX in soil on the Site)
SB-27	Evaluate subsurface conditions at eastern property boundary and potential impact of Southern Soil Mound

Soil Boring	Rationale
SB-28	General fill characterization and evaluate potential impact of Southern Soil Mound
SB-29	Evaluate subsurface conditions at southern property boundary
SB-30	Evaluate subsurface conditions at southern property boundary

In addition to the borings of the original RIWP listed above, the NYSDEC requested additional soil borings to allow for the delineation of the contamination in the northwest corner of the property and to assess any potential historic releases of contaminants based on the site's past use. A total of thirteen additional soil borings will be advanced. Two additional soil borings will be advanced north of OU-1 under the primary school 156 to further characterize the northwest area, six additional soil borings will be advanced in the northwest corner of OU-1 to further characterize and delineate the previously identified impact, two additional soil borings will be advanced in the location of the former building foot print (paint shop and machine shop) to assess suspected points of discharge, one additional soil boring will be advanced in the eastern part of OU-1 near an unknown underground conduit to assess any potential discharge thereof, and two additional soil borings will be advanced in lieu of excavating two test pits at the northwest corner of the OU-1.

Each boring will be completed to a depth of approximately fifteen feet below grade, since separate geotechnical borings will be advanced to bedrock at this site to characterize the fill. Care will be taken to identify and avoid subsurface structures or utilities prior to advancing soil borings. For vertical delineation of contamination, soil samples will be field screened with a PID for instrument response or visible evidence of petroleum or other chemical contamination. Soil samples will be selected for analysis based on the following rationale:

- Soil samples will be taken from where the PID reading is the highest (or contamination is evident) and at the water table interface. If there is no visible evidence of petroleum or other chemical contamination and the PID readings do not suggest elevated volatile organic compounds, only one soil sample at the water table interface from the borehole will be collected; and,
- For vertical delineation in the northwest area of the Site or any other area where contamination is evident at the Site, one discrete sample will be collected from the depth at which no visible evidence of contamination is observed.

The one to three samples from each borehole will be analyzed for some or all of the following parameters:

- Target Compound List Volatile Organic Compounds plus the next 10 tentatively identified compounds (TCL VOC+10),
- TCL Semi-Volatile Organic Compounds plus the next 20 tentatively identified compounds (TCL SVOC+20),
- Target Analyte List (TAL) Metals + Cyanide
- Pesticides and Herbicides, and,
- PCBs.

In addition, soil samples that will be collected from one of the soil borings under primary school 156 and from the two soil borings that will be advanced in lieu of the two test pits in the northwest corner of OU-1 will be analyzed for toxic characteristics leaching procedure (TCLP) including RCRA characteristics and total petroleum hydrocarbons (TPH).

One (1) field duplicate sample will be collected for every twenty (20) field samples, and one rinsate blank will be collected per each decontamination event (if dedicated disposable sampling equipment is not used) for a total of 4 field QC samples (2 field duplicate and 2 field blank). The duplicate and field blank sample(s) will be analyzed for the suite of parameters listed above. Trip blanks for soils analysis are not required.

In addition to the soil borings, two grab samples will be collected, one grab sample will be collected from the ballast mound in the southeast corner of the Site and one grab sample will be collected from the soil pile southwest of the southern debris mound.

Twenty percent of all laboratory analytical Quality Assurance and Data (excluding TCLP and TPH) will be done in accordance with NYSDEC category B Data Deliverable format and eighty percent of all laboratory analytical Quality Assurance and Data will be done in accordance with NYSDEC category A Data Deliverable format. All TCLP and TPH laboratory analytical Quality and Assurance data will be done in accordance with NYSDEC category A Data Deliverable format.

OU-2:

Two soil borings will be completed in OU-2 (soil boring series SB-31 and higher; Figure A2-2). Subsurface soil samples will be collected at each location. The purpose of these borings is for site characterization and to determine if a fill layer is present.

The table below summarizes the rationale for each of the two proposed borings. SB-31 and SB-32 will not be advanced as proposed in the original RIWP submitted by URS in January 2005, due to the extent of the southern fill mound.

Soil Boring	Rationale
SB-33	Site characterization
SB-34	Site characterization

- Each boring will be completed to a depth of approximately fifteen feet, since separate geotechnical borings will be advanced to bedrock at this site to characterize the fill. Care will be taken to identify and avoid subsurface structures or utilities prior to advancing soil borings. For vertical delineation of contamination, soil samples will be field screened with a PID for instrument response or visible evidence of petroleum or other chemical contamination. Soil samples will be selected for analysis as described for OU-1.

The one to three samples from each borehole will be analyzed for:

- Target Compound List Volatile Organic Compounds plus the next 10 tentatively identified compounds (TCL VOC+10),
- TCL Semi-Volatile Organic Compounds plus the next 20 tentatively identified compounds (TCL SVOC+20),
- Target Analyte List (TAL) Metals + Cyanide
- Pesticides and Herbicides, and,
- PCBs.

One (1) field duplicate sample will be collected for every twenty (20) field samples, and one rinsate blank will be collected per each decontamination event (if dedicated disposable sampling equipment is not used) for a total of 2 field QC samples (1 field duplicate and one field blank). The duplicate and field blank sample(s) will be analyzed for the suite of parameters listed above. Trip blanks for soils analysis are not required.

Twenty percent of all laboratory analytical Quality Assurance and Data will be done in accordance with NYSDEC category B Data Deliverable format and eighty percent of al laboratory analytical Quality Assurance and Data will be in accordance with NYSDEC category A Data Deliverable format.

2.2.4 Test Pits

OU-1:

During the Phase II ESI, the two mounds were investigated by test pit excavations to determine their contents **(**Figure A1-3**)**. Encountered materials consisted of dry, fine to coarse sand, gravel, and cobbles. Construction and demolition debris fill material consisting of concrete, brick, cinders, ash, slag, glass, wood and other debris, such as tires, plastic, piping and other metals, and railroad ties was encountered. One test pit also contained metal plates, rebar, and steel piping.

The workplan was revised to accommodate the NYSDEC's request to excavate three additional test pits in the southern fill mound. As a result of this, a total of nine test pits (three in the northern fill mound and six in the southern fill mound) will be excavated in the mounds during the remedial investigation (Figure A2-2) and one to two soil samples will be collected and analyzed for the following:

- TCL VOC+10,
- TCL SVOC+20,
- TAL Metals + Cyanide
- Pesticides and Herbicides,
- PCBs,
- Full TCLP, including RCRA characteristics, and,
- Total petroleum hydrocarbons

The purpose of these test pits is to further visually assess the nature of the materials in the mounds to determine the feasibility of re-distributing the material across the Site and to collect additional information for classification of the material in the event the material must be excavated and disposed of at an approved off-site facility.

If visual contamination is present, the excavated material will be either drummed or placed on plastics for characterization and final disposal. Pictures will be taken at each test pit and PID readings will be collected and observations will be logged and submitted as part of the final RI Report.

As discussed with the NYSDEC, the two Geoprobe® borings will be advanced in lieu of the previously proposed test pits in the northwest corner of the property. Soil samples will be collected for laboratory analysis to further characterize and delineate contamination.

Twenty percent of all laboratory analytical Quality Assurance and Data (excluding TCLP and TPH) will be done in accordance with NYSDEC Category B Data Deliverable format and eighty percent of all laboratory analytical Quality Assurance and Data will be done in accordance with NYSDEC category A Data Deliverable format. All TCLP and TPH laboratory analytical Quality and Assurance data will be done in accordance with NYSDEC category A Data Deliverable format.

OU-2:

No test pits are proposed for OU-2.

2.2.5 Groundwater Investigation

The proposed groundwater investigation will include the installation of fifteen groundwater monitoring wells. Nine on-site and four off-site overburden wells will be installed in OU-1 and two on-site overburden wells will be installed in OU-1. The proposed groundwater monitoring well locations are shown on Figure A2-3.

OU-1:

The proposed groundwater investigation will include the installation of nine on-site overburden groundwater monitoring wells (MW-1 through MW-7, MW-12, and MW-13) and four off-site overburden groundwater monitoring wells (MW-8, MW-9, MW-14, and MW-15). No bedrock wells are proposed at this time due to the lack of information regarding shallow groundwater quality across the Site. Each monitoring well (except for MW-7 and MW-12 through MW-15) will be installed to a depth of at least five (5) feet below the water table surface and will be drilled with a truck-mounted drill rig, using minimum six (6)- inch inside diameter hollow stem augers. Monitoring wells MW-7 and MW-12 through MW-15 will be advanced with a Geoprobe®, using 3 1/4- inch inside diameter rods, to a depth of at least five (5) feet below the water table surface. Because soil borings were already advanced (Phase II ESI), or are proposed (in this revised Work Plan) in close proximity to the proposed monitoring wells, soil samples will not be collected for laboratory analysis from these borings.

Construction of the monitoring wells will consist of four (4) inch diameter (one (1) inch diameter for MW-7 and MW-12 through MW-15), threaded well casing with a minimum ten (10) feet of schedule ten (10) slot PVC screen with a fine grain filter pack sand (e.g., Morie #0) to minimize siltation during purging and sampling, depending on subsurface conditions. This screen will be set straddling the water table, generally seven feet (7') in (below) and three feet (3') out (above). The well annulus will be backfilled with fine grain sand to one (1) to two (2) feet above the top of the screen. A minimum of three (3) feet of bentonite chips or pellets will be placed above the sand and hydrated with clean water. A bentonite-cement slurry will be installed from the top of the bentonite seal to approximately one (1) to two (2) feet below grade. Well construction may be modified based on field observations due to a shallow water table. The surface completion will consist of a flush-to-grade, watertight and lockable well cover set into concrete.

The table below summarizes the rationale for each of the proposed groundwater monitoring wells.

Monitoring Well	Rationale
MW-1	Evaluate potential off-Site contamination impacting the Site and confirm results of initial groundwater sample (Phase II ESI)
MW-2	Determine whether southern soil mound has impacted the overburden groundwater
MW-3	Verify results of initial Phase II ESI groundwater sampling results
MW-4	Characterize downgradient limit of contamination in northwest corner area
MW-5	Determine whether northern soil mound has impacted the overburden groundwater and assess overburden groundwater quality at eastern property boundary
MW-6	Evaluate quality of groundwater entering Site at northern property boundary
MW-7	Evaluate elevated concentrations of BTEX in initial groundwater sample at northwestern property boundary
MW-8	Evaluate potential of off-site contamination impacting the Site and verify direction of groundwater flow.

Monitoring Well	Rationale
MW-9	Evaluate potential of off-site contamination impacting the Site and verify direction of groundwater flow.
MW-12	Evaluate elevated concentrations of BTEX in initial groundwater sample at northwestern property boundary
MW-13	Evaluate elevated concentrations of BTEX in initial groundwater sample at northwestern property boundary
MW-14	Evaluate potential of off-site contamination impacting the Site and verify direction of groundwater flow.
MW-15	Evaluate potential of off-site contamination impacting the Site and verify direction of groundwater flow.

The locations of MW-8 and MW-9 (Figure A2-3) are both in sidewalks adjacent to active roadways and so will require permits from the City. These locations, therefore, are tentative, subject to the approval of the necessary agencies.

One round of groundwater samples will be collected from each well and will be analyzed for the following:

- TCL VOC+10
- TCL SVOC+20
- Pesticides/Herbicides
- PCBs
- TAL Metals + Cyanide

OU-2:

The proposed groundwater investigation will include the installation of two on-site overburden groundwater monitoring wells (MW-10 and MW-11) at the two southernmost soil boring locations in OU-2. No bedrock wells are proposed at this time due to the lack of information regarding shallow groundwater quality across the Site. The proposed on-site groundwater monitoring well locations are shown on Figure A2-3. Each monitoring well will be installed to a depth of at least five (5) feet below the water table surface and will be drilled with a truck-mounted drill rig, using minimum six (6)- inch inside diameter hollow stem augers. Continuous split-spoon samples will be collected to confirm proper well screen placement. Soil samples for laboratory analysis will not be collected from these borings.

Construction of each well will consist of four (4) inch diameter, threaded well casing with a minimum ten (10) feet of schedule ten (10) slot PVC screen with a fine grain filter pack sand (e.g., Morie #0) to minimize siltation during purging and sampling, depending on subsurface conditions. This screen will be set straddling the water table, generally seven feet (7') in (below) and three feet (3') out (above). The well annulus will be backfilled with fine grain sand to one (1) to two (2) feet above the top of the screen. A minimum of three (3) feet of bentonite chips or pellets will be placed above the sand and hydrated with clean water. A bentonite-cement slurry will be installed from the top of the bentonite seal to approximately one (1) to two (2) feet below grade. Well construction may be modified based on field observations due to a shallow water table. The surface completion will consist of a flush-to-grade, watertight and lockable well cover set into concrete.

Monitoring Well	**Rationale**
MW-10	Evaluate potential for impact from OU-1 and general site characterization.
MW-11	Evaluate potential for impact from OU-1 and general site characterization.

One round of groundwater samples will be collected from each well and will be analyzed for the following:

- TCL VOC+10
- TCL SVOC+20
- Pesticides/Herbicides
- PCBs
- TAL Metals + Cyanide

In addition to the groundwater samples that will be collected from the groundwater monitoring wells, two groundwater samples will be collected from soil borings in the northwest corner to further delineate the extent of the previously identified groundwater impact.

<u>OU-1 and OU-2 (QA/QC Samples):</u>

One (1) field duplicate sample will be collected for every twenty (20) field samples, and one rinsate blank will be collected per each decontamination event (if dedicated disposable sampling equipment is not used) for a total of 2 field QC samples (1 field duplicate and one field blank). These samples will be analyzed for the parameter list presented above. One trip blank per sample shipment will be collected. Assuming four days of field sampling, 4 trip blanks will be generated. Trip blanks will be analyzed for TCL VOC +10. Two of the groundwater samples from OU-1 will also be analyzed for New York City Sewer Discharge Parameters. Twenty percent of all laboratory analytical Quality Assurance and Data will be done in accordance with NYSDEC category B Data Deliverable format (except for sewer discharge data) and eighty percent of all laboratory analytical Quality Assurance and Data will be done in accordance with NYSDEC category A Data Deliverable format.

2.2.6 Sample Location Survey

Upon completion of the RI, the fifteen monitoring wells will be surveyed for horizontal and vertical coordinates by a licensed NYS surveyor. Soil boring locations and test pit locations will be determined by manual measurements from the Site grid system developed for the soil gas survey. The surveyed and measured locations will be plotted on the existing base map.

2.2.7 Data Validation and Tabulation

Shaw proposes to use Chemtech, Mountainside, NJ to analyze all samples. Chemtech is a certified New York State Department of Health Environmental Laboratory Accreditation Program (ELAP) CLP-laboratory. Shaw will validate data received from Chemtech and prepare a Data Usability Summary Report (DUSR). The DUSR will be developed from a full NYSDEC ASP Category B package. Upon validation, all sample results will be grouped by media (e.g., soil, groundwater) and will be tabulated.

2.2.8 Decontamination/Investigation-Derived Waste

Some of the field equipment will be disposable and will not require decontamination. If decontamination is required, it will be carried out by washing with Alconox and rinsing with deionized water. Equipment will be kept in a clean environment prior to sampling. If a portable pump is necessary for well sampling, the pump will be properly decontaminated prior to sampling, and in between well sampling events. Heavy equipment (drill rig) will be decontaminated via steam cleaning on the decontamination pad. A sump pit will be located at the low point of the pad. All discarded equipment (latex gloves, trowels, paper towels, etc.) will be drummed in accordance with applicable requirements. Decontamination water, soil cuttings, and purge water will be drummed for off-site disposal. URS will coordinate the on-site handling and storage of investigation-derived waste (IDW), including transport and off-site disposal.

2.2.9 Documentation

All field activities will be documented in a field logbook. This logbook will provide a record of activities conducted at the Site. All entries will be signed and dated at the end of each day of fieldwork. The field logbook will include the following: date and time of all entries, names of all personnel on Site, weather conditions (temperature, precipitation, etc.), location of activity, and description of activity.

In addition, URS will complete the following standard field forms:

- Test Boring Log
- Monitoring Well Construction Details
- Well Purging/Development Logs
- Field Sampling Sheets
- Chain-of-Custody Records

2.2.10 Standards, Criteria, and Guidance

Soil and groundwater analytical results will be compared to the following:

Soil Guidance Values (SGVs)

Soils analytical results will be compared to the Recommended Soil Cleanup Objectives (RSCOs), published in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, "Determination of Soil Cleanup Levels," December 20, 2000. The RSCOs will be used for assessment of soils potentially impacted by former activities on the Site other than storage of virgin petroleum products and analyzed for the TCL VOCs, SVOCs, pesticides, PCBs, herbicides, and TAL metals. Eastern USA Background Concentrations of metals (from TAGM HWR-94-4046) will be used to assess the metals concentrations in soils.

Waste Characterization

All samples from the Soil Mound test pits in OU-1 will be characterized for disposal or reuse using TCLP for RCRA characteristically hazardous material. One sample from a soil boring in OU-1 will be characterized in the same manner.

Ambient Groundwater Quality Standards and Guidance Values

Groundwater data will be compared to New York State Ambient Water Quality Standards and Guidance Values, as set forth in the NYSDEC Division of Water Technical Operational Guidance Series (TOGS) number 1.1.1, "Ambient Water Quality Standards and Guidance Values," June 1998. Ambient water quality standards are enforceable standards as set forth in the regulations. Where ambient water quality standards do not exist, ambient water quality guidance values will be used for comparison to the groundwater results.

2.3 Task 3 – Remedial Investigation Reporting

After completing the Site investigation, an RI report will be prepared which summarizes the field activities, analytical testing/results, and findings of the RI program. A summary of the nature and extent of contamination in all media investigated will be included. Copies of field data, analytical test results, and other relevant information will be included. An on Site Qualitative Exposure Assessment will be performed if the data from the RI indicates that SCG's have been exceeded. The report will be consistent with the requirements outlined in Draft DER-10, Technical Guidance for Site Investigation and Remediation, December 2002, sub-section 3.1.4.

2.4 Task 4 – Coordination with Other Agencies/Authorities

The New York City Department of Transportation is planning to construct a bridge to the south of the Site and is planning to utilize the OU-2 area for construction staging purposes. The RI for OU-1 and OU-2 will be performed concurrently. NYCSCA will coordinate with NYCDOT throughout the RI phase as well as the subsequent phase for any potential remediation activities.

3.0 PROJECT SCHEDULE

Figure A3-1 presents the project schedule dates and deliverables due dates for the Former Metro North RI being conducted by the NYCSCA.

4.0 STAFFING PLAN/KEY PERSONNEL

The proposed management plan and key personnel for this project are shown below. The responsibilities of each project position are described below.

- Project Director (August Arrigo) will be responsible for assuring the availability of resources, overall project performance, and representing Shaw in all contractual matters.

- Project Manager (Michael Sherwood / Stephan Meurer) will be responsible for technical and financial management of the project, and for overall coordination and review of component work activities. The Project Manager will serve as the initial and primary contact throughout the project.

- Project Quality Assurance (QA) Officer (Steve Goldberg), will ensure that all project deliverables undergo a thorough QA review by senior staff members who are qualified and experienced in appropriate disciplines.

- Project Work Plans and Scoping (Michael Sherwood / Stephan Meurer), will be responsible for the development and implementation of the Work Plans. Other approved staff members will be utilized on an as-needed basis.

TABLES

Table A2-1
Sample Analytical Summary
Former Metro North Remedial Investigation

Operating Unit	Sample Identification	Media	VOCs	SVOCs	PAHs	Pesticides/ Herbicides	PCBs	Metals + Cyanide	TPH	TCLP	RCRA Chara	Methane	NYC Sewer Discharge Parameters
OU1	TP-11	Soil	X	X		X	X	X	X	X	X		
OU1	TP-12	Soil	X	X		X	X	X	X	X	X		
OU1	TP-13	Soil	X	X		X	X	X	X	X	X		
OU1	TP-14	Soil	X	X		X	X	X	X	X	X		
OU1	TP-15	Soil	X	X		X	X	X	X	X	X		
OU1	TP-16	Soil	X	X		X	X	X	X	X	X		
OU1	TP-19	Soil	X	X		X	X	X	X	X	X		
OU1	TP-20	Soil	X	X		X	X	X	X	X	X		
OU1	TP-21	Soil	X	X		X	X	X	X	X	X		
OU1	SB-20A	Soil	X	X		X	X	X	Note 4	Note 1	Note 1		
OU1	SB-21A	Soil	X	X		X	X	X					
OU1	SB-22A	Soil	X	X		X	X	X					
OU1	SB-22B	Soil	X	X		X	X	X					
OU1	SB-22C	Soil	X	X		X	X	X					
OU1	SB-23A	Soil	X	X		X	X	X					
OU1	SB-24A	Soil	X	X		X	X	X					
OU1	SB-25A	Soil	X	X		X	X	X					
OU1	SB-25B	Soil	X	X		X	X	X					
OU1	SB-25C	Soil	X	X		X	X	X					

Table A2-1
Sample Analytical Summary
Former Metro North Remedial Investigation

Operating Unit	Sample Identification	Media	VOCs	SVOCs	PAHs	Pesticides/ Herbicides	PCBs	Metals + Cyanide	TPH	TCLP	RCRA Chara	Methane	NYC Sewer Discharge Parameters
OU1	SB-25AA	Soil	X	X		X	X	X					
OU1	SB-25AB	Soil	X	X		X	X	X					
OU1	SB-26A	Soil	X	X		X	X	X					
OU1	SB-27A	Soil	X	X		X	X	X					
OU1	SB-28A	Soil	X	X		X	X	X					
OU1	SB-29A	Soil	X	X		X	X	X					
OU1	SB-30A	Soil	X	X		X	X	X					
OU1	SB-30B	Soil	X	X		X	X	X					
OU1	SB-30A	Soil	X	X		X	X	X					
OU-1	SB-35A	Soil	X	X		X	X	X					
OU-1	SB-36A	Soil	X	X		X	X	X					
OU-1	SB-37A	Soil	X	X		X	X	X					
OU1	SB-41A	Soil	X	X		X	X	X					
OU1	SB-42A	Soil	X	X		X	X	X					
OU1	SB-43A	Soil	X	X		X	X	X					
OU-1	SB-44A	Soil	X	X		X	X	X					
OU-1	SB-44B	Soil	X	X		X	X	X					
OU-1	SB-44C	Soil	X	X		X	X	X					
OU-1	SB-45(TP17)A	Soil	X	X		X	X	X	X	X	X		
OU-1	SB-45(TP17)B	Soil	X	X		X	X	X	X	X	X		
OU-1	SB-45(TP17)C	Soil	X	X		X	X	X					

Table A2-1
Sample Analytical Summary
Former Metro North Remedial Investigation

Operating Unit	Sample Identification	Media	VOCs	SVOCs	PAHs	Pesticides/ Herbicides	PCBs	Metals + Cyanide	TPH	TCLP	RCRA Chara	Methane	NYC Sewer Discharge Parameters
OU-1	SB-46(TP18)A	Soil	X	X		X	X	X	X	X	X		
OU-1	SB-46(TP18)B	Soil	X	X		X	X	X	X	X	X		
OU-1	SB-46(TP18)C	Soil	X	X		X	X	X					
OU-1	SB47A	Soil	X	X		X	X	X					
OU-1	SB-47B	Soil	X	X		X	X	X					
OU-1	SB-47C	Soil	X	X		X	X	X					
OU-1	SB-48A	Soil	X	X		X	X	X					
OU-1	SB-48B	Soil	X	X		X	X	X					
OU-1	SB-48C	Soil	X	X		X	X	X					
OU-1	SB-49A	Soil	X	X				X					
OU-1	SB-49B	Soil	X	X				X					
OU-1	SB-49C	Soil	X	X				X					
OU2	SB-33A	Soil	X	X		X	X	X					
OU2	SB-34A	Soil	X	X		X	X	X					
OU1	B-1	Ballast (3)	X	X		X	X	X	X	X	X		
OU1	B-2	Ballast	X	X		X	X	X	X	X	X		
OU1	MW-1	GW	X	X		X	X	X					X (2)
OU1	MW-2	GW	X	X		X	X	X					

Table A2-1
Sample Analytical Summary
Former Metro North Remedial Investigation

Operating Unit	Sample Identification	Media	VOCs	SVOCs	PAHs	Pesticides/ Herbicides	PCBs	Metals + Cyanide	TPH	TCLP	RCRA Chara	Methane	NYC Sewer Discharge Parameters
OU1	MW-3	GW	X	X		X	X	X					
OU1	MW-4	GW	X	X		X	X	X					
OU1	MW-5	GW	X	X		X	X	X					
OU1	MW-6	GW	X	X		X	X	X					
OU1	MW-7	GW	X	X		X	X	X					X (2)
OU1	MW-8	GW	X	X		X	X	X					
OU1	MW-9	GW	X	X		X	X	X					
OU1	MW-12	GW	X	X		X	X	X					
OU1	MW-13	GW	X	X		X	X	X					
OU1	MW-14	GW	X	X		X	X	X					
OU1	MW-15	GW	X	X		X	X	X					
OU1	GWSB-37	GW	X	X		X	X	X					
OU1	GWSB-42	GW	X	X		X	X	X					
OU2	MW-10	GW	X	X		X	X	X					
OU2	MW-11	GW	X	X		X	X	X					
OU1	16 Samples	Soil Gas	X									X	

Table A2-1
Sample Analytical Summary
Former Metro North Remedial Investigation

Note 1: In addition to SB-45 (TP-17) & SB-46 (TP-18), two subsurface soil sample will be analyzed for TCLP and RCRA Characteristics

Note 2: NYC Sewer Discharge Parameters: pH (range), total suspended solids, cadmium, copper, lead, mercury, nickel, zinc, total nitrogen, PCBs, benzene, toluene, ethylbenzene, xylene, MTBE, naphthalene, tetrachloroethylene, flash point, non-polar material, carbonaceous biochemical demand, chromium VI, temperature.

Note 3: Ballast sample is from RR ballast mound in southeast corner of Site (labeled "Gravel & Ballast")

Note 4: The subsurface soil sample that will be analyzed for TCLP will also be analyzed for TPH

TABLE A2-2

ANALYTICAL METHODS SUMMARY

FORMER METRO-NORTH SITE

Parameter	Method Number / Reference[1]	Estimated Number of Samples	QA/QC Samples		
			Duplicates	Rinse Blanks	Trip Blanks
IA. Groundwater					
Target Compound List (TCL) Volatiles + TICs	SW 8260	17	1	1	4
TCL Semivolatiles + TICs	SW 8270	17	1	1	None
TCL Pesticides/Herbicides/PCBs	SW 8081/8151/8082	15	1	1	None
Target Analyte List (TAL) Metals (total) plus Cyanide	SW 6010, 7471, 9012	17	1	1	None
Sewage Discharge Criteria					
II. Surface & Subsurface Soils[1]					
TCL Volatiles + TICs	SW 8260	45	3	3	None
TCL SVOC + TICs	SW 8270	45	3	3	None
TCL Pesticides/Herbicides/PCBs	SW 8081/8151/8082	42	3	3	None
TAL Metals (total) plus Cyanide	SW 6010, 7471, 9012	45	3	3	None
Full TCLP	SW-846, 1311	6	None	None	None
III. Test Pits/Ballast Piles[1]					
TCL Volatiles + TICs	SW 8260	11	1	1	None
TCL SVOC + TICs	SW 8270	11	1	1	None
TCL Pesticides/Herbicides/PCBs	SW 8081/8151/8082	11	1	1	None
TAL Metals (total) plus Cyanide	SW 6010, 7471, 9012	11	1	1	None
Full TCLP	SW846, 1311	11	None	None	None
IV. Soil Gas					
VOC	TO-15	16	1	None	3
Methane	TO-3 Modified	16	1	None	3

TABLE A2-2

ANALYTICAL METHODS SUMMARY

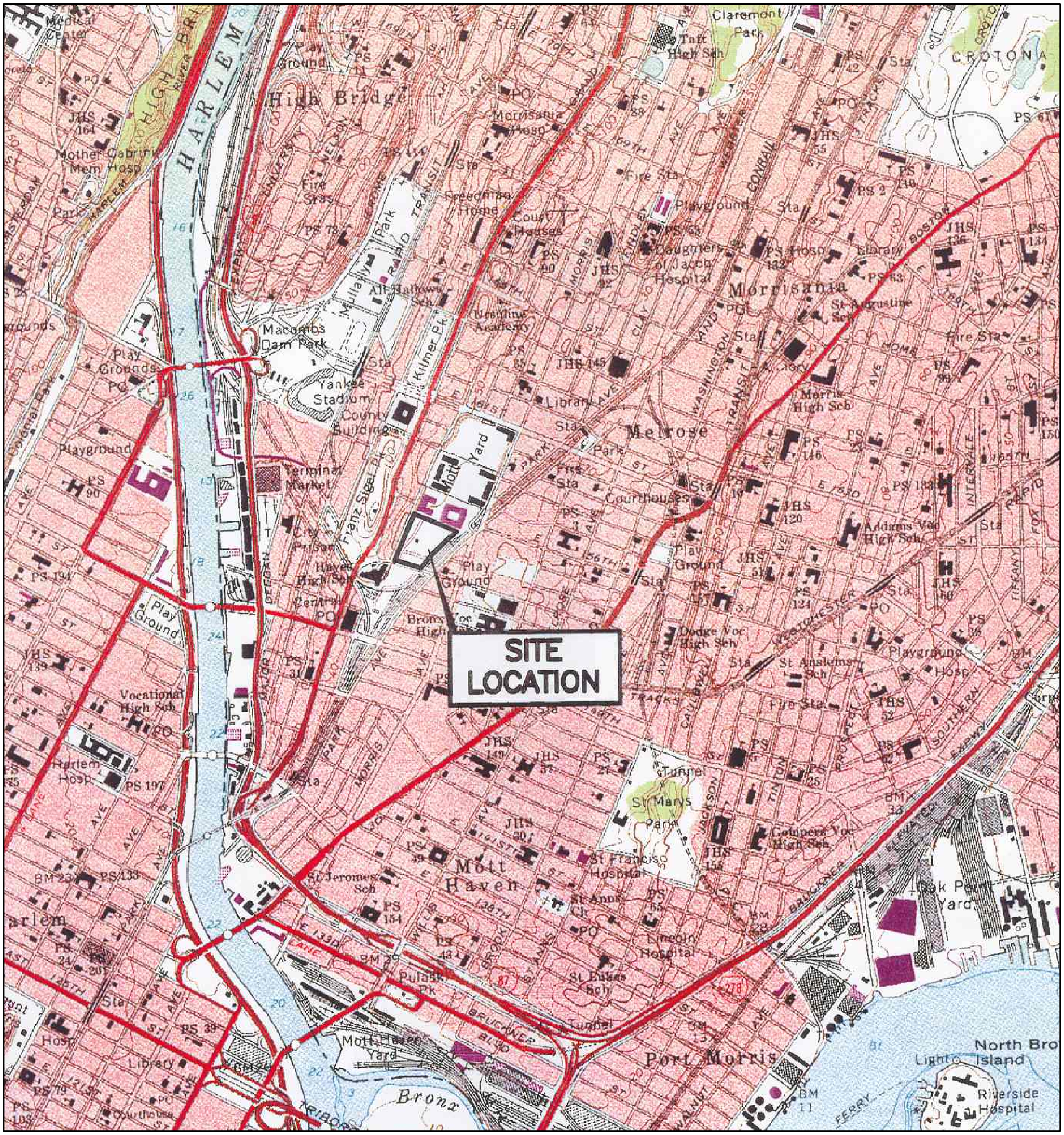
FORMER METRO-NORTH SITE

Parameter	Method Number / Reference[1]	Estimated Number of Samples	QA/QC Samples		
			Duplicates	Rinse Blanks	Trip Blanks
V. NYCDEP Sewer Effluent Analysis					
PH (range)	EPA 150.1	2	None	None	None
Total Suspended Solids	EPA 160.2	2	None	None	None
Cadmium	SW 6010	2	None	None	None
Copper	SW 6010	2	None	None	None
Lead	SW 6010	2	None	None	None
Mercury	SW 7471	2	None	None	None
Nickel	SW 6010	2	None	None	None
Zinc	SW 6010	2	None	None	None
Total Nitrogen	EPA 351	2	None	None	None
PCB=s (total)**	SW 8082	2	None	None	None
Benzene	SW 8260	2	None	None	None
Ethylbenzene	SW 8260	2	None	None	None
MTBE (Methyl-Tert-Butyl-Ether)	SW 8260	2	None	None	None
Naphthalene	SW 8260	2	None	None	None
Perc (Tetrachloroethylene)	SW 8260	2	None	None	None
Toluene	SW 8260	2	None	None	None
Xylenes (Total)	SW 8260	2	None	None	None
Flash Point	EPA 1020A	2	None	None	None
Non-polar material	EPA 1664A	2	None	None	None
CBOD (Carbonaceous Biochemical Oxygen Demand)	EPA 5210B	2	None	None	None
Chromium (VI)	EPA 7196A	2	None	None	None
Temperature		2	None	None	None
Other					

NOTES:
[1]EPA Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (SW-8216)

TO – Toxic Organics
TIC – Tentatively Identified Compounds
NIOSH – National Institute for Occupational Health and Safety

FIGURES



0 2000 4000

SCALE (FEET)

PREPARED BY:
URS CORPORATION
WAYNE, NJ

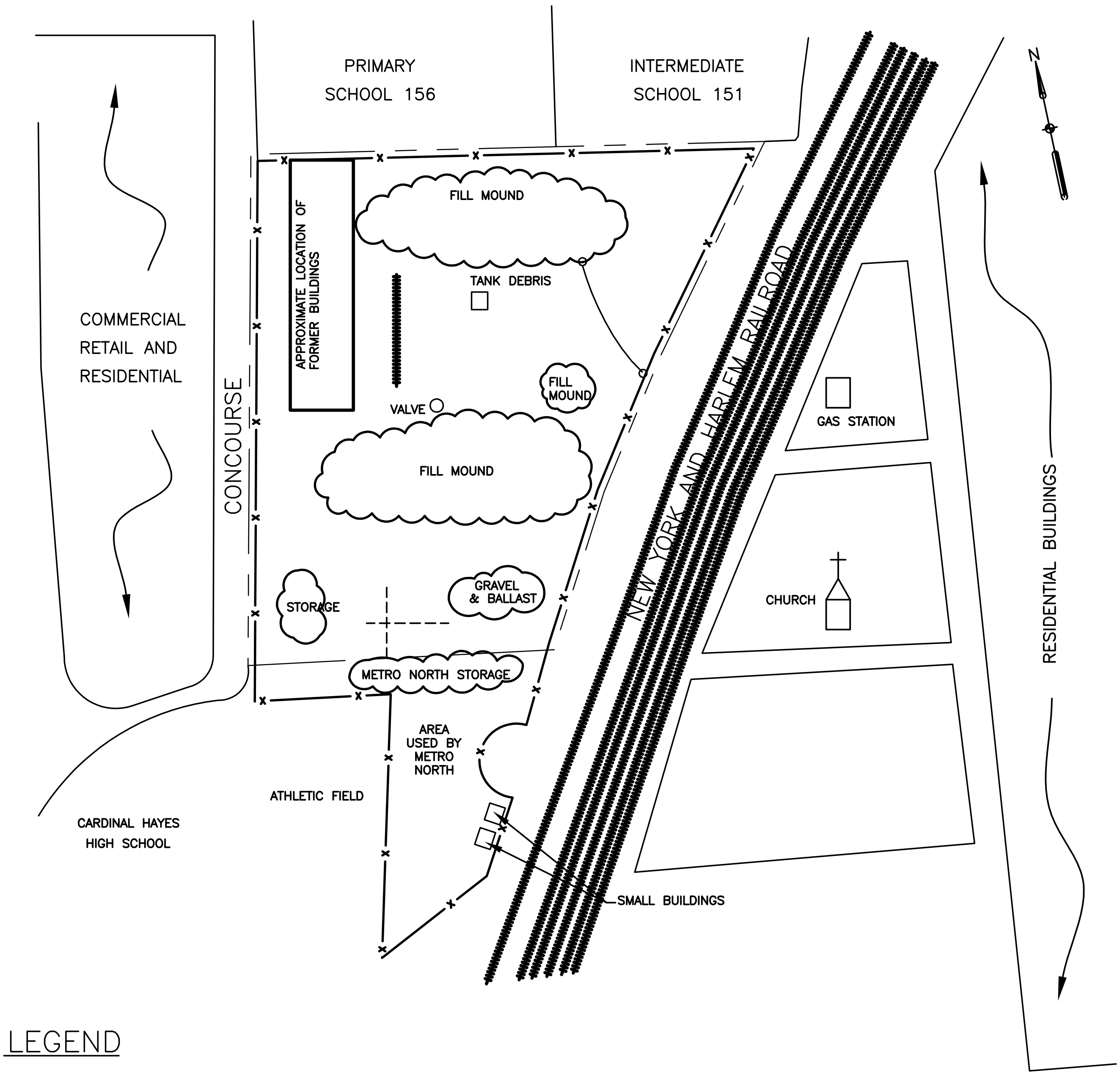
N

FIGURE A1–1 SITE LOCATION MAP

SITE:	**FORMER METRO NORTH** **672 CONCOURSE VILLAGE WEST** **BRONX, NY 10451**
CLIENT:	**SCHOOL CONSTRUCTION AUTHORITY**
PROJECT #:	**47–01E04046.00/00018**
SCALE:	**AS SHOWN**

MAP SOURCE:

U.S.G.S. 7.5 MINUTE SERIES QUADRANGLE OF CENTRAL PARK, N.Y.–N.J., DATED 1965, PHOTOREVISED 1979.



LEGEND

- PROPERTY LINE
- UNDERGROUND SEWER LINE WITH MANHOLES
- SUSPECTED LOCATION OF UNDERGROUND UTILITIES INFERRED FROM GEOPHYSICAL SURVEY
- SECTION OF RAILROAD TRACK EMBEDDED IN CONCRETE

SITE FEATURES MAP

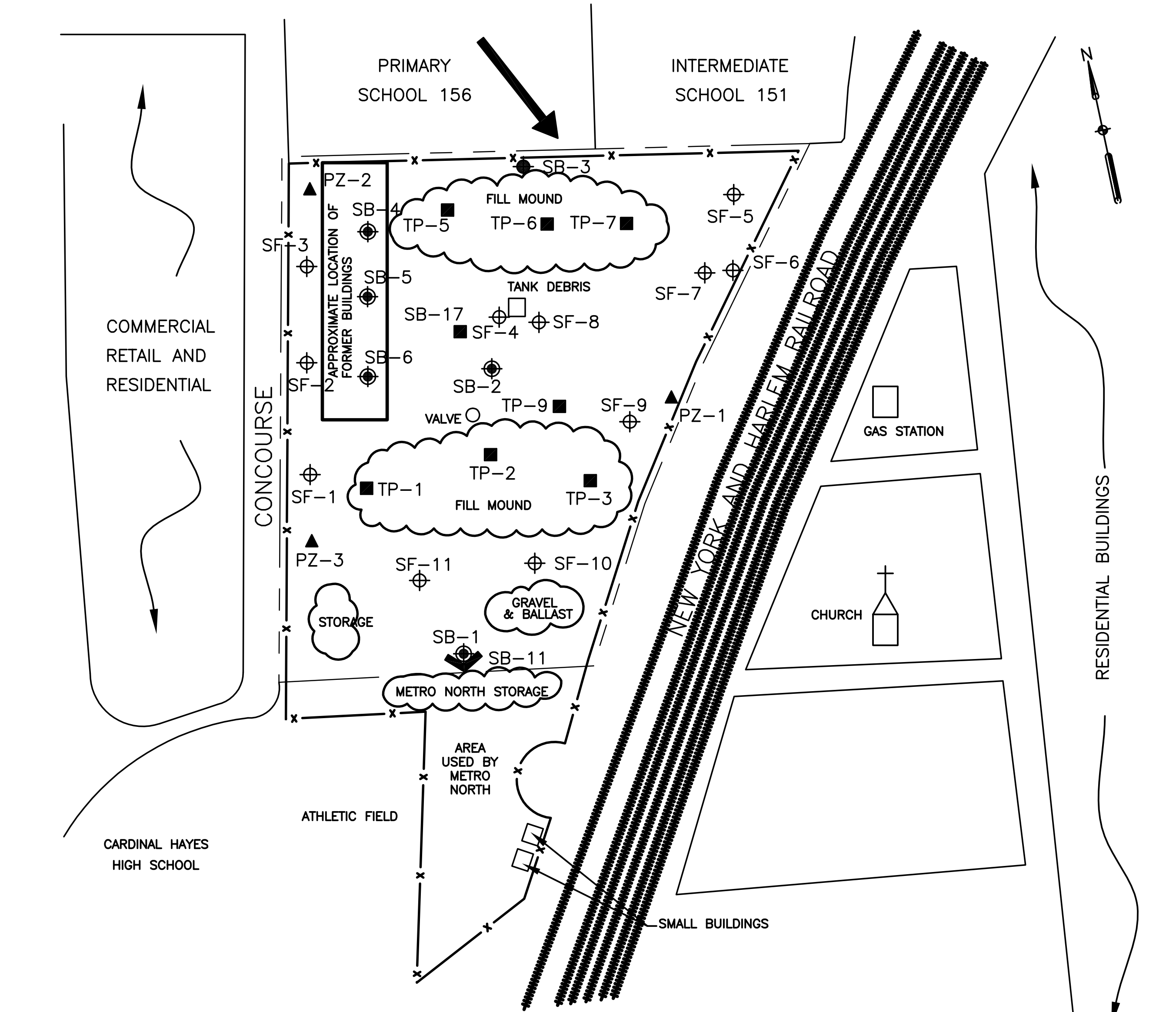
0 100 200 400
SCALE (FEET)

CLIENT:	**SCHOOL CONSTRUCTION AUTHORITY**
SITE:	**FORMER METRO NORTH PROPERTY BLOCK 2443 LOT 78 BRONX, NY 10451**
PROJECT #:	**47-01E04046.00/00015**

**PREPARED BY:
URS CORPORATION
WAYNE, NJ**

SCALE: AS SHOWN
DRAWN BY: J.L.

FIGURE
A1-2



LEGEND

- PROPERTY LINE
- SOIL AND GROUNDWATER SAMPLE LOCATION
- SURFACE SOIL SAMPLE LOCATION
- SUBSURFACE SOIL SAMPLE LOCATION
- TEMPORARY PIEZOMETER LOCATION
- TEST PIT LOCATION
- DIRECTION OF GROUNDWATER FLOW

PHASE II SAMPLING LOCATION PLAN

0 100 200 400

SCALE (FEET)

CLIENT: **SCHOOL CONSTRUCTION AUTHORITY**

SITE: **FORMER METRO NORTH PROPERTY**
BLOCK 2443 LOT 78
BRONX, NY 10451

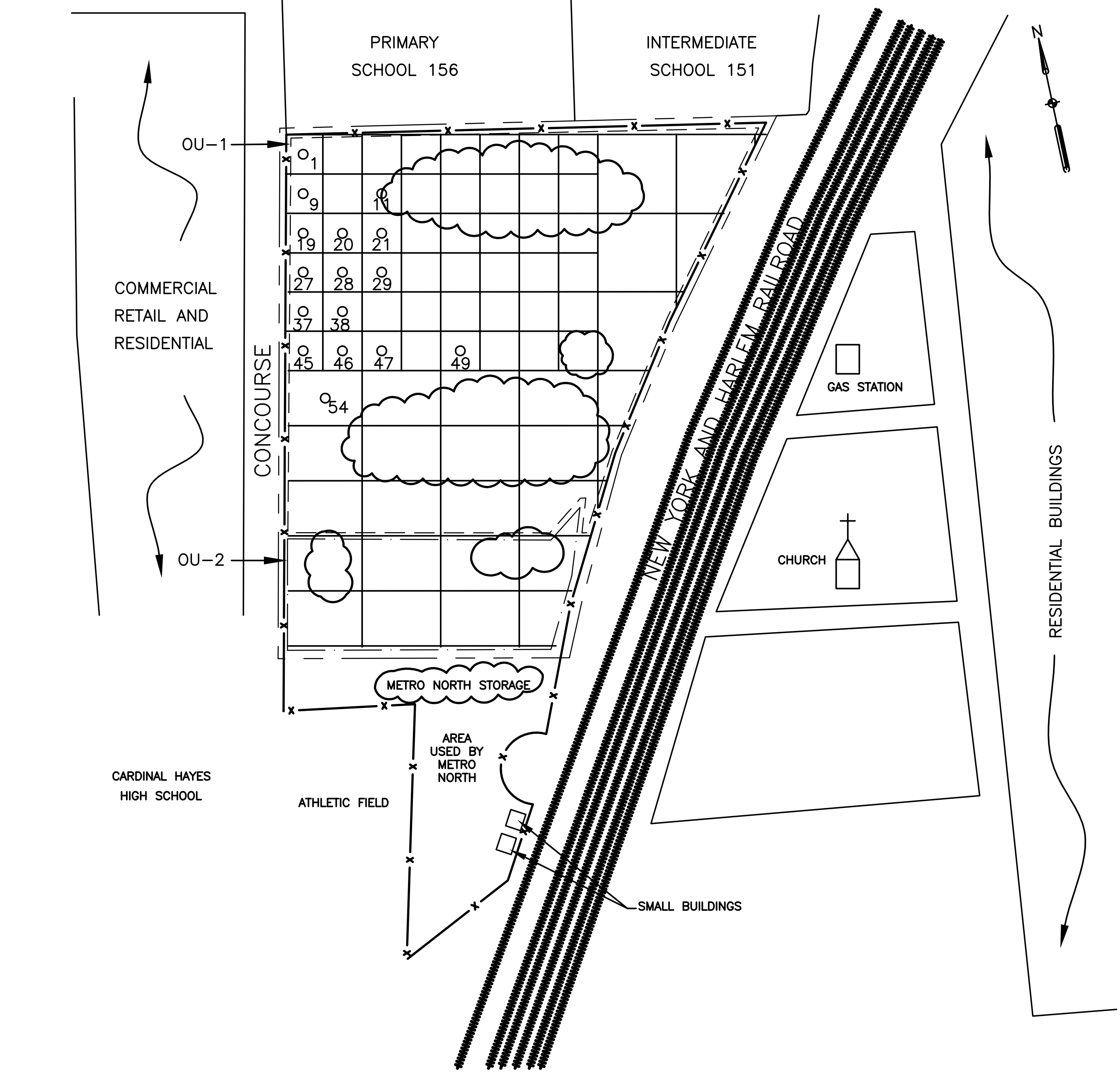
PREPARED BY:
URS CORPORATION
WAYNE, NJ

PROJECT #: **47-01E04046.00/00018**

SCALE: AS SHOWN

DRAWN BY: J.L.

FIGURE A1-3

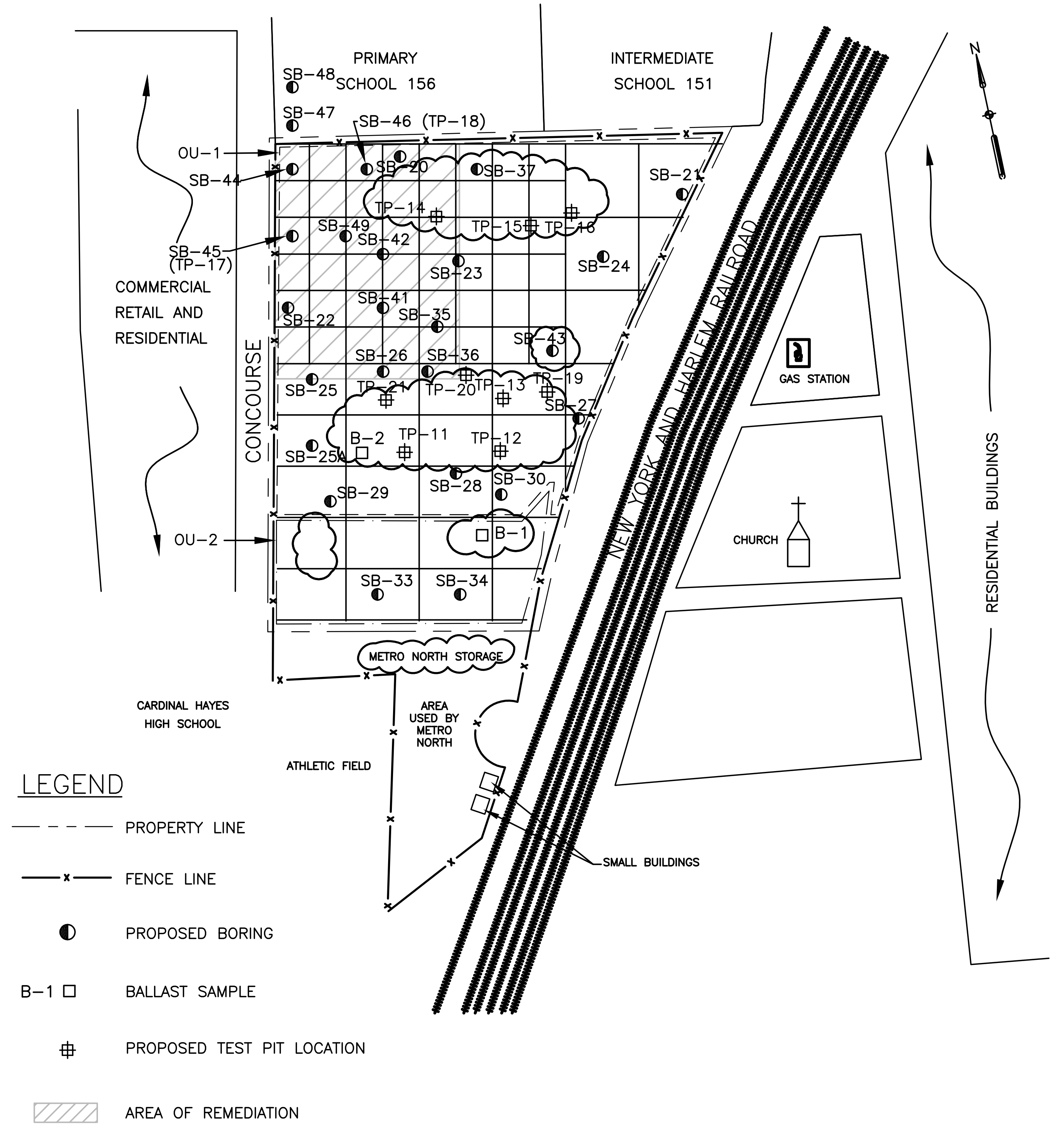


LEGEND

- PROPERTY LINE
- FENCE LINE
- SOIL GAS SURVEY SAMPLE LOCATION
- MOUNDS

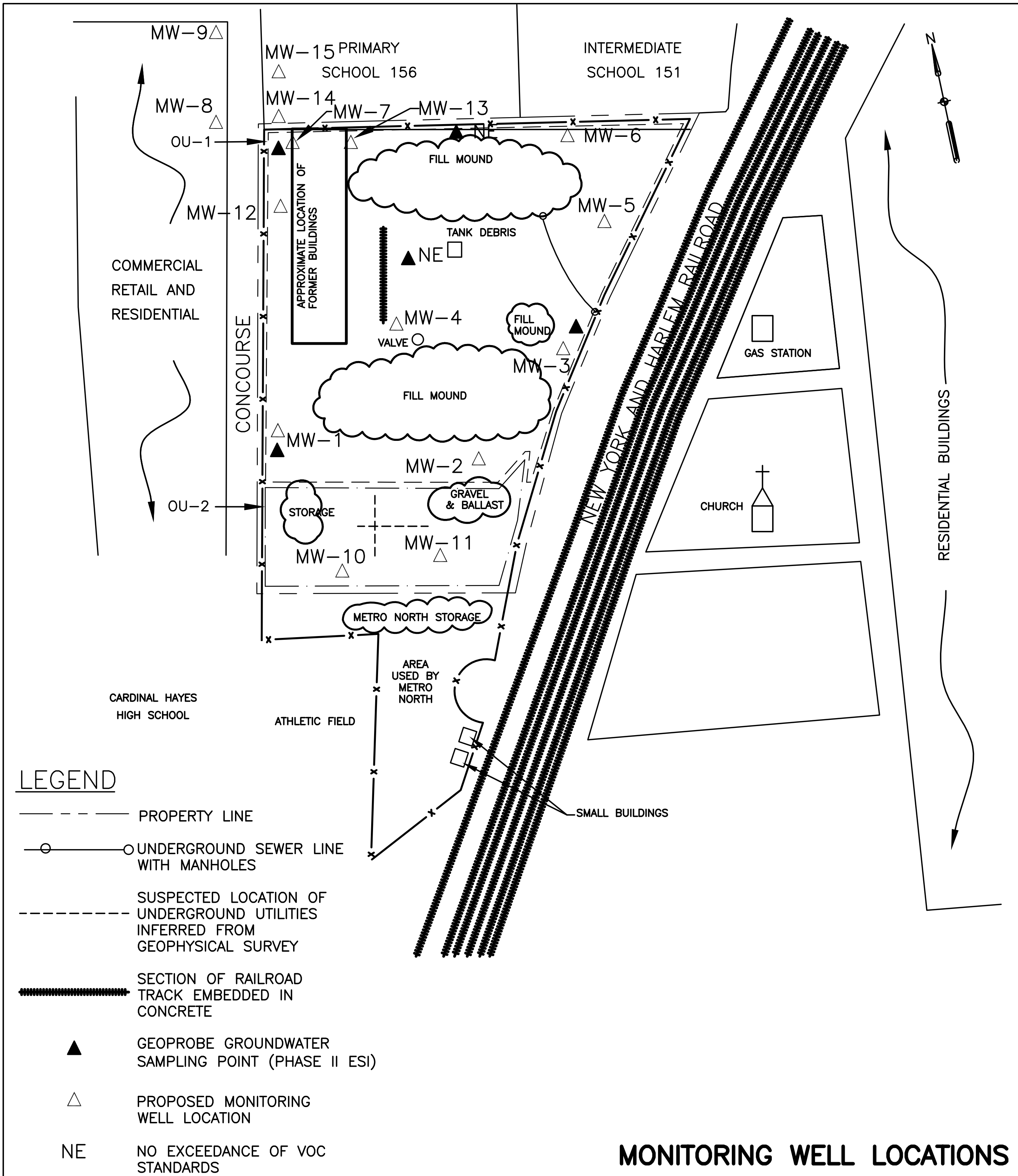
SOIL GAS SURVEY SAMPLE LOCATIONS

CLIENT:	**SCHOOL CONSTRUCTION AUTHORITY**	**PREPARED BY:** **URS CORPORATION** **WAYNE, NJ** **REVISED BY:** **Shaw E & I, Inc.** **NEW YORK, NY**
SITE:	**FORMER METRO NORTH PROPERTY** **BLOCK 2443 LOT 78** **BRONX, NY 10451**	
PROJECT #:	**47-01E04046.00/00018**	SCALE: NONE DRAWN BY: J.L./R.T. — FIGURE A2-1



SUBSURFACE SOIL, TEST PIT, AND BALLAST SAMPLE LOCATIONS

CLIENT:	**SCHOOL CONSTRUCTION AUTHORITY**	**PREPARED BY:** **URS CORPORATION** **WAYNE, NJ** **REVISED BY:** **Shaw E & I, Inc.** **NEW YORK, NY**
SITE:	**FORMER METRO NORTH PROPERTY** **BLOCK 2443 LOT 78** **BRONX, NY 10451**	
PROJECT #:	**47-01E04046.00/00018**	SCALE: NONE DRAWN BY: J.L./R.T. FIGURE A2-2

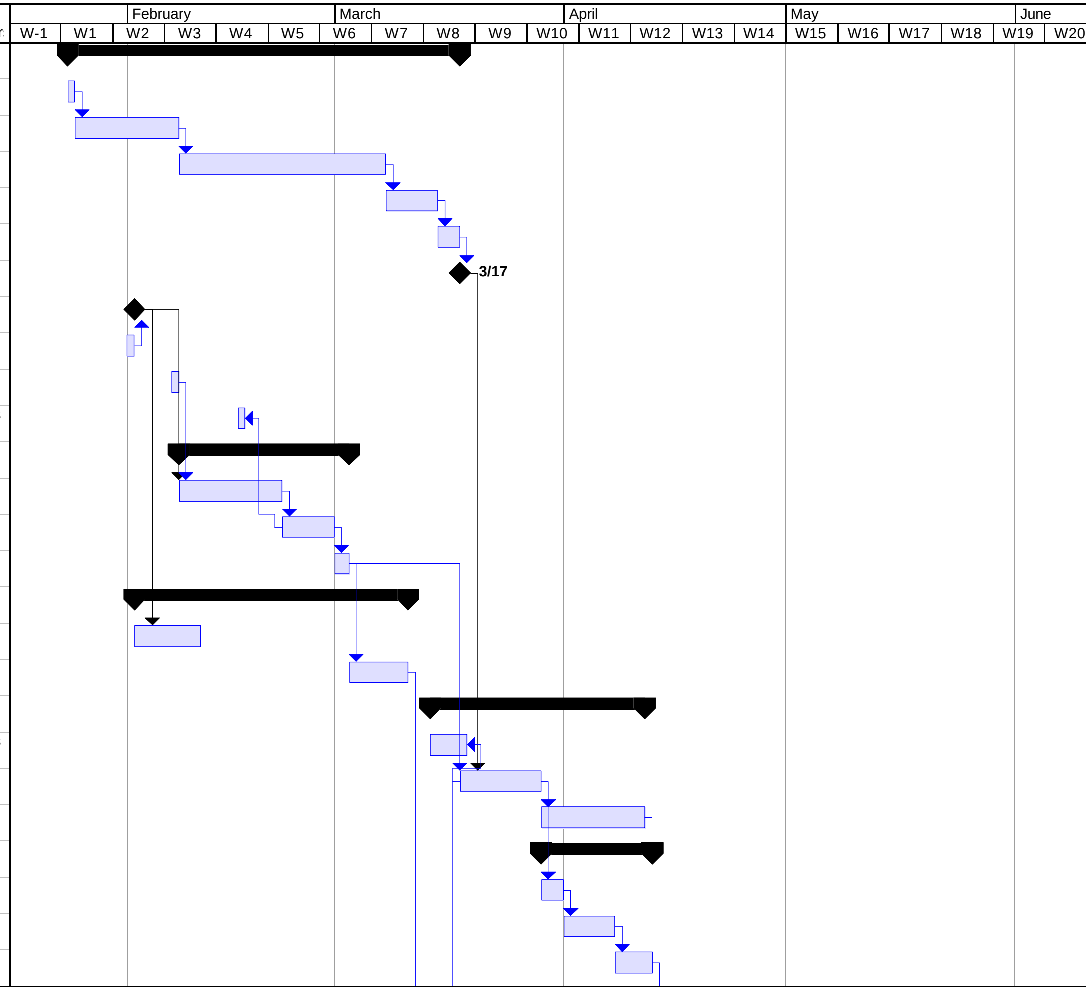


MONITORING WELL LOCATIONS

CLIENT:	**SCHOOL CONSTRUCTION AUTHORITY**	**PREPARED BY:** **URS CORPORATION** **WAYNE, NJ**
SITE:	**FORMER METRO NORTH PROPERTY** **BLOCK 2443 LOT 78** **BRONX, NY 10451**	**REVISED BY:** **Shaw E & I, Inc.** **NEW YORK, NY**
PROJECT #:	**47-01E04046.00/00018**	SCALE: NONE DRAWN BY: J.L./R.T.
		FIGURE A2-3

Figure A3-1
Estimated Schedule
Former Metro North Site

ID	Info	Task Name	Duration	Start	Finish	Predecessor
1		**Brownfields Application**	**39 days**	**Mon 1/24/05**	**Thu 3/17/05**	
2		Submittal of Application by SCA	1 day	Mon 1/24/05	Mon 1/24/05	
3		Application Deemed Administratively Complete by DEC	10 days	Tue 1/25/05	Mon 2/7/05	2
4		Public Comment Period	4 wks	Tue 2/8/05	Mon 3/7/05	3
5		DEC Summary Comments	5 days	Tue 3/8/05	Mon 3/14/05	4
6		DEC Approval of Application	3 days	Tue 3/15/05	Thu 3/17/05	5
7		DEC Approval of Workplan	0 days	Thu 3/17/05	Thu 3/17/05	6
8		Project Authorization by SCA	0 days	Tue 2/1/05	Tue 2/1/05	9
9		Property Survey Completed by SCA	1 day	Tue 2/1/05	Tue 2/1/05	
10		Property Survey delivered to URS	1 day	Mon 2/7/05	Mon 2/7/05	
11		Access Agreements/Notifications Completed by SCA	1 day	Wed 2/16/05	Thu 2/17/05	14SF-3 days
12		**Establish Grid**	**17 days**	**Tue 2/8/05**	**Wed 3/2/05**	
13		Mobilize surveyor	2 wks	Tue 2/8/05	Mon 2/21/05	8,10
14		Layout Grid (Contingent upon Site being clear of snow cover)	5 days	Tue 2/22/05	Mon 2/28/05	13
15		Layout soil boring and soil sampling locations	2 days	Tue 3/1/05	Wed 3/2/05	14
16		**Geophysical Survey (Utility Clearance)**	**27 days**	**Wed 2/2/05**	**Thu 3/10/05**	
17		Mobilization	7 days	Wed 2/2/05	Thu 2/10/05	8
18		Utility Clearances (Incudes One Call)	6 days	Thu 3/3/05	Thu 3/10/05	15
19		**Soil Gas Survey**	**21 days**	**Mon 3/14/05**	**Mon 4/11/05**	
20		Mobilization	5 days	Mon 3/14/05	Fri 3/18/05	21SF-5 days
21		Sample Collection	7 days	Fri 3/18/05	Mon 3/28/05	7,15
22		Analysis	2 wks	Tue 3/29/05	Mon 4/11/05	21
23		**Soil Mound Waste Classification (Test Pits)**	**11 days**	**Tue 3/29/05**	**Tue 4/12/05**	
24		Sample Collection	3 days	Tue 3/29/05	Thu 3/31/05	21
25		Sample Analysis	5 days	Fri 4/1/05	Thu 4/7/05	24
26		Data Validation	3 days	Fri 4/8/05	Tue 4/12/05	25

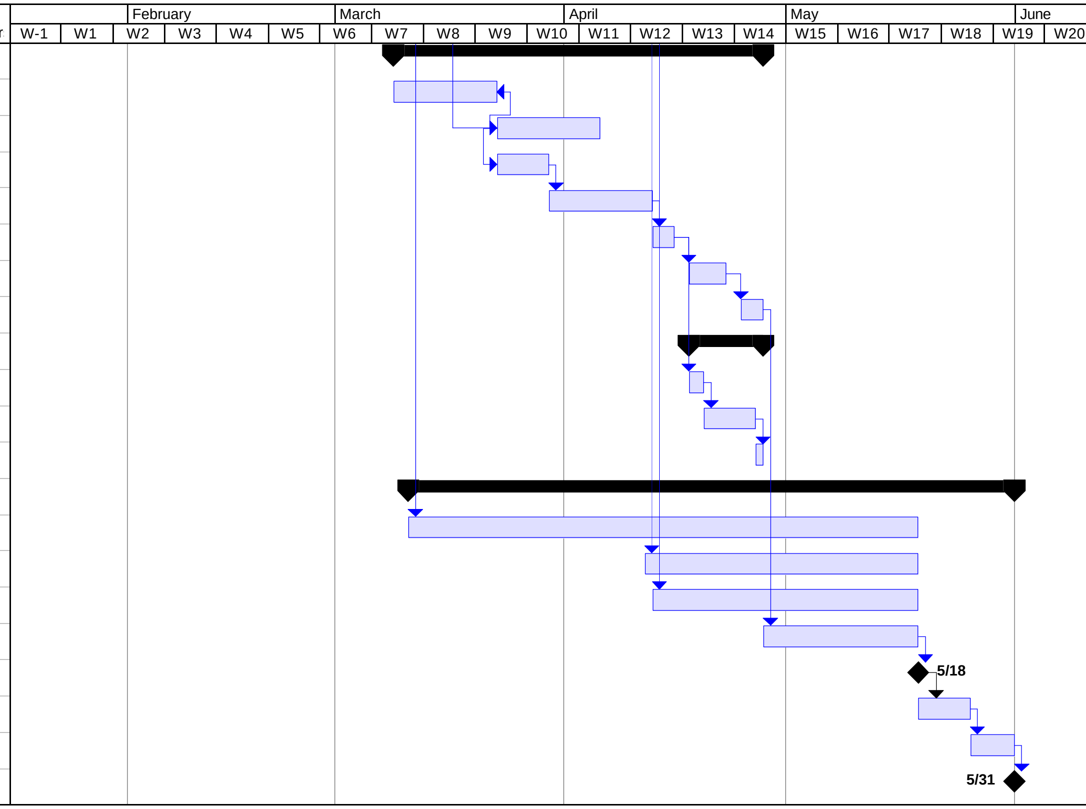


Project: Implementation schedule
Date: Mon 8/15/05

Task | Split | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Split | Rolled Up Milestone | Rolled Up Progress | External Tasks | Project Summary | External Milestone | Deadline

Figure A3-1
Estimated Schedule
Former Metro North Site

ID		Task Name	Duration	Start	Finish	Predecessor
27		**Soil and Groundwater Investigation**	**36 days**	**Wed 3/9/05**	**Wed 4/27/05**	
28		Driller Mobilization (including Sidewalk opening permit)	10 days	Wed 3/9/05	Wed 3/23/05	29SF
29		Soil Borings	10 days	Wed 3/23/05	Tue 4/5/05	21SS+3 days
30		Well Instalation and Well Development	5 days	Wed 3/23/05	Tue 3/29/05	29SS
31		Well Stabilization	2 wks	Wed 3/30/05	Tue 4/12/05	30
32		Monitoring Well Sampling	3 days	Wed 4/13/05	Fri 4/15/05	31
33		Sample Analysis	5 days	Mon 4/18/05	Fri 4/22/05	32
34		Data Validation	3 days	Mon 4/25/05	Wed 4/27/05	33
35		**Investigation-Derived Waste Management and Disposal**	**8 days**	**Mon 4/18/05**	**Wed 4/27/05**	
36		Waste Classification	2 days	Mon 4/18/05	Tue 4/19/05	32
37		Waste Analysis	5 days	Wed 4/20/05	Tue 4/26/05	36
38		Waste Load Out and Disposal	1 day	Wed 4/27/05	Wed 4/27/05	37
39		**Report Preparation**	**58 days**	**Fri 3/11/05**	**Tue 5/31/05**	
40		Geophysical Section	49 days	Fri 3/11/05	Wed 5/18/05	18
41		Soil Gas Survey Section	27 days	Tue 4/12/05	Wed 5/18/05	22
42		Soil Mound (Test Pit) Section	26 days	Wed 4/13/05	Wed 5/18/05	26
43		Soil and Groundwater Section	15 days	Thu 4/28/05	Wed 5/18/05	34
44		Draft Report Submittal	0 days	Wed 5/18/05	Wed 5/18/05	43
45		NYCSCA Review	1 wk	Thu 5/19/05	Wed 5/25/05	44
46		Report Revisions	4 days	Thu 5/26/05	Tue 5/31/05	45
47		Final Report Submission to NYSDEC	0 days	Tue 5/31/05	Tue 5/31/05	46



Project: Implementation schedule
Date: Mon 8/15/05

Task		Milestone		Rolled Up Split		External Tasks		Deadline	
Split		Summary		Rolled Up Milestone		Project Summary			
Progress		Rolled Up Task		Rolled Up Progress		External Milestone			

APPENDIX A
Metes and Bounds

The metes and bounds provided in this appendix refer to the entire property as currently configured. The Operable Units (OU-1 and OU-2) are depicted within the property boundaries on Figure 1.

LEGAL DESCRIPTION Metro North (Mott Haven) Property

LEGAL DESCRIPTION
Tax Block 2443 Tax Lot 78
Survey No. 57239

ALL that certain piece or parcel of land situate, lying and being in the Borough and County of The Bronx, City and State of New York being bounded and described as follows:

BEGINNING at a point on the northerly line of East 153rd Street (50 feet wide), as said street is shown on the Tax Maps of the City of New York, distant westerly as measured along the same, 110.360 feet from the corner formed by its intersection with the westerly line of Concourse Village East (formerly Park Avenue);

RUNNING THENCE South 79 degrees 58 minutes 40 seconds West, along the said northerly line of East 153rd Street, 411.057 feet to its intersection with the easterly line of Concourse Village West (formerly Sheridan Avenue);

RUNNING THENCE North 04 degrees 57 minutes 30 seconds West, along the easterly line of Concourse Village West, 694.177 feet to the southwesterly corner of that parcel of land described and designated as Parcel B in deed dated December 14, 1966 from The New York Central Railroad Company to The City of New York recorded in the Office of the Register of The City of New York in Bronx County in Record Liber 180 Page 251;

RUNNING THENCE North 83 degrees 44 minutes 07 seconds East, along the southerly line of those parcels of land designated as Parcels B and A in the aforementioned deed, 691.24 feet to a point;

RUNNING THENCE North 02 degrees 14 minutes 41 seconds West, along the easterly line of that parcel of land designated as Parcel A in the aforesaid deed, 295.66 feet to the southerly side of E 156th Street as shown on the City Plan;

RUNNING THENCE North 83 degrees 44 minutes 07 seconds East, along the southerly line of E 156th Street, 126.99 feet to the westerly line of Concourse Village East (formerly Morris Avenue);

RUNNING THENCE South 06 Degrees 15 minutes 53 seconds East along the westerly line of Concourse Village East (formerly Morris Avenue), 31.426 feet;

RUNNING THENCE South 20 degrees 58 minutes 23 minutes West, 42.34 feet to the division line between lands now or formerly of the Pennsylvania New York Central Transportation Company on the west and lands of The New York and Harlem Railroad Company on the east;

RUNNING THENCE along the division line between said lands, the following two courses and distances:

1. South 79 degrees 44 minutes 25 seconds West, 11.806 feet to a point;

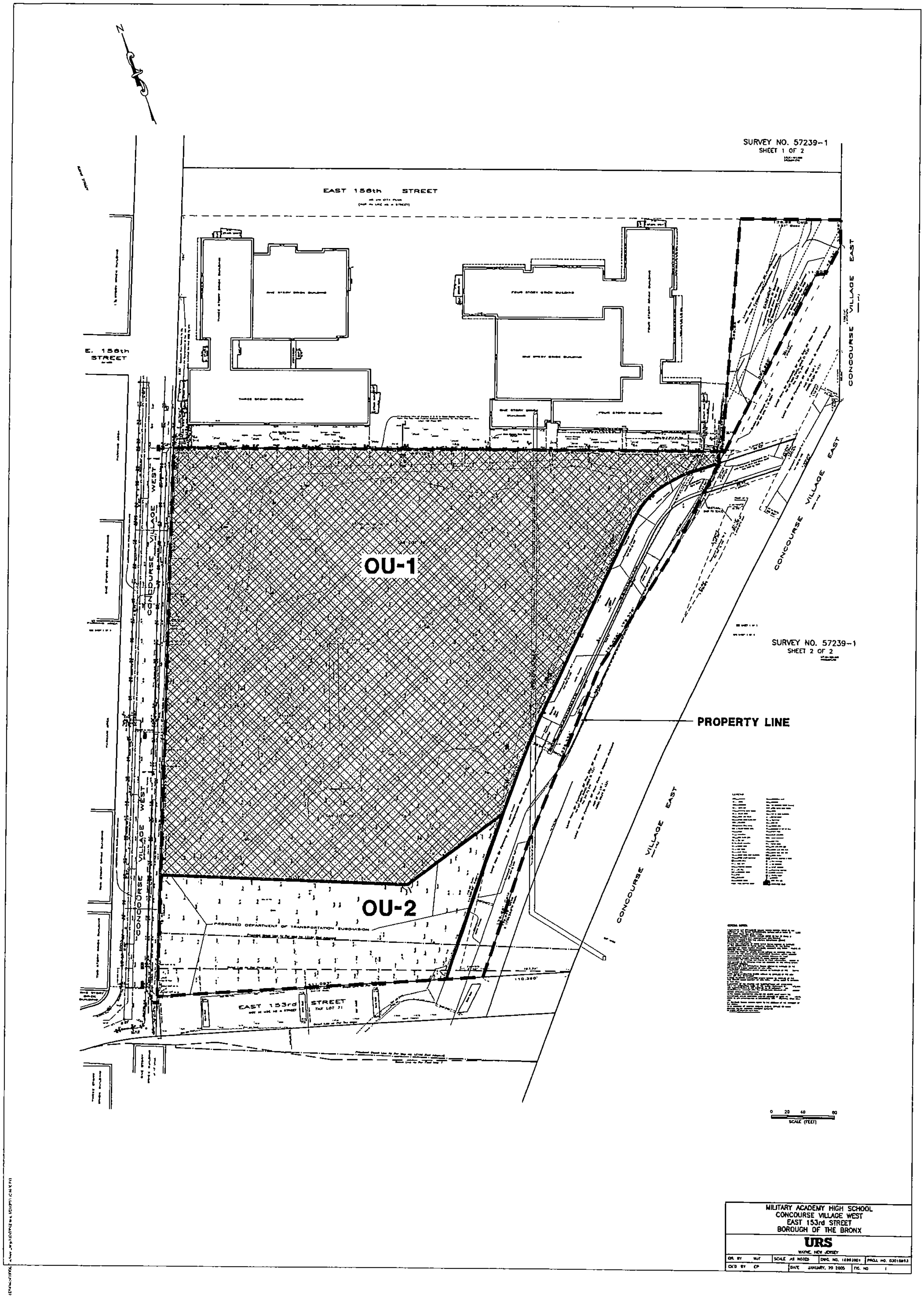
2. South 20 degrees 25 minutes 25 seconds West, 394.680 feet to a point;

RUNNING THENCE through lands now or formerly of Pennsylvania New York Central Transportation Company, the following three courses and distances:

1. South 25 degrees 26 minutes 23 seconds West, 175.578 feet to a point;

2. South 15 degrees 32 minutes 23 seconds West, 236.334 feet to a point;

3. South 11 degrees 56 minutes 25 seconds West, 179.66 feet to the point or place of BEGINNING.



SURVEY NO. 57239-1
SHEET 1 OF 2
EAST 158th STREET
E. 158th STREET
CONCOURSE VILLAGE WEST
CONCOURSE VILLAGE EAST
OU-1
OU-2
SURVEY NO. 57239-1
SHEET 2 OF 2
PROPERTY LINE
PROPOSED DEPARTMENT OF TRANSPORTATION SUBDIVISION
EAST 153rd STREET
MILITARY ACADEMY HIGH SCHOOL
CONCOURSE VILLAGE WEST
EAST 153rd STREET
BOROUGH OF THE BRONX
URS

PART B

QUALITY ASSURANCE PROJECT PLAN

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

Page No.

TABLES

B1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) is designed to provide an overview of QA/QC procedures and programs which will be adhered to during the RI activities as described in the RI Work Plan. It will give specific methods and QA/QC procedures for chemical testing of environmental samples obtained from the site. In addition, it will ensure the quality of the data produced during the RI. All samples will be analyzed at a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified laboratory.

The Shaw organizational structure for this project is described in Section A4.0 (Part A) of the RI Work Plan. It identifies the names of key project personnel. The URS QA/QC Officer is responsible for verifying that corporate QA procedures are followed. The Project Manager is responsible for verifying that QA procedures are followed in the field. This will provide for the valid collection of representative samples.

In addition to overall project coordination, the Project Manager will be responsible for overseeing both the analytical and field QA/QC activities. The ultimate responsibility for maintaining quality throughout the project rests with the Project Manager.

The analytical laboratory proposed to be used for the analysis of groundwater and soil samples shall be currently certified by NYSDOH ELAP for the appropriate categories (i.e., CLP). The laboratory QA Manager will be responsible for overseeing the quality control data generated.

B2.0 DATA QUALITY OBJECTIVES

B2.1 Background

Data quality objectives (DQOs) are qualitative and quantitative statements which specify the quality of data required to support the RI for the site. DQOs focus on the identification of the end use of the data to be collected. The project DQOs will be achieved utilizing the definitive data category, as outlined in *Guidance for the Data Quality Objectives Process,* EPA QA/G-4 (September 1994). All sample analyses will provide definitive data which are generated using rigorous analytical methods, such as reference methods approved by the U.S. Environmental Protection Agency (USEPA). A summary of the analytical methods to be used are presented in Table B2-1.

The project DQOs for data collected during this RI are:

- to further characterize the site and determine the nature and extent of contamination;
- to maintain the highest possible scientific/professional standards for each procedure be maintained; and,
- to assure the ultimate defensibility of the data produced during the RI.

Soil and groundwater analytical results will be compared to the applicable SCGs that are protective of human health and the environment. For the soil matrix, the SCG’s will be the NYSDEC’s Technical and Administrative Guidance Memorandum (TAGM) 4046: *Determination of Soil Cleanup Objectives and Cleanup Levels* (dated January 1994, revised). For the groundwater matrix, the SCG’s will be the NYSDEC’s Technical and Operational Guidance Series (TOGS) 1.1.1: *Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* (dated June 1998).

B2.2 QA Objectives for Chemical Data Measurement

In order to achieve the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness will be measured during offsite chemical analysis.

B2.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in field and/or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate (for organics) and matrix duplicates (for inorganics), which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision. RPD criteria must meet the method requirements identified in Table B2-1.

B2.2.2 Accuracy

Accuracy measures the analytical bias in a measurement system. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. Sampling accuracy may be assessed by evaluating the results of rinse and trip blanks. These data help to assess the potential concentration contribution from various outside sources. The laboratory objective for accuracy is to equal or exceeds the accuracy demonstrated for the applied analytical methods on samples of the same matrix. The percent recovery criterion is used to estimate accuracy based on recovery in the matrix spike/matrix spike duplicate and matrix spike blank samples. The spike and spike duplicate, which will give an indication of matrix effects that may be affecting target compounds, are also a good gauge of method efficiency. For VOC analysis surrogate recovery results will also be measured. Acceptable ranges of recovery are reported in the referenced methods identified in Table B2-1.

B2.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter which is most concerned with the proper design of the sampling program or subsampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives (i.e., determination of vertical and horizontal extent of contamination). The sampling procedures, as described in the Field Sampling Plan (Part C), have been selected with the goal of obtaining representative samples for the media of concern.

B2.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. A DQO for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units. Complete field documentation using standardized data collection forms will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representativeness, completeness, comparability) because only when precision and accuracy are known can data sets be compared with confidence. In order for data sets to be comparable, it is imperative that contract-required methods and procedures be explicitly followed.

B2.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is important that appropriate QA procedures be maintained to verify that valid data are obtained in order to meet project needs. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, URS project personnel will determine whether the deviations might cause the data to be rejected.

B3.0 SAMPLING LOCATIONS, CUSTODY, HOLDING TIMES, AND ANALYSIS

Sampling locations and procedures are discussed in Section A2.0 of the Work Plan. Procedures addressing field and laboratory sample chain-of-custody are presented in Section C8.0 of the FSP. Table B3-1 contains sample methods and container, preservation, and holding time requirements. All analyses will be performed in accordance with the NYSDEC Analytical Services Protocol, 6/2000 Edition.

Table B2-1 identifies the specific methods to be performed on the individual matrices. All holding times begin with validated time of sample receipt (VTSR) at the laboratory. The laboratory must meet the method required detection limits that are referenced within the methods listed in these tables.

B4.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing procedures, laboratory instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

B4.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered:

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from National Institute of Standards and Technology (NIST), or other reliable commercial sources to verify the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished according to the methods referenced in Table B2-1. All standards and standard solutions are to be formally documented (i.e., in a bound logbook) and should identify the supplier, lot number, purity/concentration, receipt/ preparation date, preparer's name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacturer specifications. Calibration is conducted with two Class AS" weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and they must be properly documented in permanently bound logbooks.

Refrigerators/Freezers – The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised and the integrity of the analytical samples is upheld.

Appropriate acceptance ranges (2 to 6° C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System - The laboratory must maintain a sufficient water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

B4.2 Laboratory Instruments

Calibration of instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet established quantitation limits. Each instrument for organic and inorganic analyses shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to methods specified in Table B2-1. In addition to the requirements stated within the analytical methods, the contract laboratory will be required to analyze an additional low level standard at or near the detection limits. In general, standards will be used that bracket the expected concentration of the samples. This will require the use of different concentration levels, which are used to demonstrate the instrument's linear range of calibration.

Calibration of an instrument must be performed prior to the analysis of any samples and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still calibrated. If the contract laboratory cannot meet the method required calibration requirements, corrective action shall be taken as discussed in Section B7.0. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

B5.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect sample matrix may have on data being generated. Two types of internal checks are performed and are described as batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the contract laboratory will be according to the specified analytical method and project specific requirements. Acceptable criteria and/or target ranges for these QC samples are presented within the analytical methods referenced in Table B2-1.

QC results that vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples including any project-specific QC will be analyzed are discussed below.

B5.1 Batch QC

Method Blanks - A method blank is defined as laboratory-distilled or deionized water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples - A matrix spike blank (MSB) sample is an aliquot of water spiked (fortified) with all the elements being analyzed for calculation of precision and accuracy to verify that the analysis that is being performed is in control. A MSB will be performed for each matrix and organic parameter only.

B5.2 Matrix-Specific QC

Matrix Spike Samples - An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD) are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix. MS/MSDs will be performed for all parameters listed in Table B2-1.

B5.3 Additional QC

Rinsate (Equipment) Blanks - A rinsate blank is a sample of laboratory demonstrated analyte-free water passed through and over the cleaned sampling equipment. A rinsate blank is used to indicate potential contamination from ambient air and from sample instruments used to collect and transfer samples. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The rinsate blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Rinsate blanks for nonaqueous matrices should be performed at a rate of 10 percent of the total number of samples collected throughout the sampling event. Rinse blanks will not be performed on samples (i.e., groundwater) where dedicated disposable equipment is used.

Trip Blanks - Trip blanks are not required for nonaqueous matrices. Trip blanks are required for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory-demonstrated analyte free water. These samples then accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the lab with the same set of bottles they accompanied to the field, and will be analyzed for volatile organic parameters. Trip blanks must be included at a rate of one per volatile sample shipment.

B6.0 CALCULATION OF DATA QUALITY INDICATORS

B6.1 Precision

Precision is evaluated using analyses of a field duplicate and/or a laboratory MS/MSD which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. RPD is used to evaluate precision by the following formula:

$$RPD = \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \times 100\%$$

where:

X_1 = Measured value of sample or matrix spike

X_2 = Measured value of duplicate or matrix spike duplicate

Precision will be determined through the use of MS/MSD analyses. RPD criteria for this project must meet the method requirements listed in Table B2-1.

B6.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed through the use of known and unknown QC samples and spiked samples. It is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to organic fractions (i.e., volatiles), and is calculated as follows:

$$Accuracy\ (\%R) = \underline{(X_s - X_u)} \times 100\%$$

K

where:

X_s = Measured value of the spike sample

X_u = Measured value of the unspiked sample

K = Known amount of spike in the sample

B6.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$\text{Completeness } (\%C) = \frac{(X_v - X_n)}{N} \times 100\%$$

where:

X_v = Number of expected valid measurements

X_n = Number of invalid measurements

N = Number of valid measurements expected to be obtained

B7.0 CORRECTIVE ACTIONS

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

B7.1 <u>Incoming Samples</u>

Problems noted during sample receipt shall be documented by the laboratory. The Shaw Project Chemist shall be contacted immediately for problem resolution. All corrective actions shall be documented thoroughly.

B7.2 <u>Sample Holding Times</u>

If any sample extraction and/or analyses exceed method holding time requirements, Shaw Project Chemist shall be notified immediately for problem resolution. All corrective actions shall be documented thoroughly.

B7.3 <u>Instrument Calibration</u>

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with method requirements. If any initial/continuing calibration standards exceed method QC limits, recalibration must be performed and, if necessary, reanalysis of all samples affected back to the previous acceptable calibration check.

B7.4 Reporting Limits

The laboratory must meet the method required detection limits listed in Table B2-1. If difficulties arise in achieving these limits due to a particular sample matrix, the laboratory must notify Shaw project personnel for problem resolution. In order to achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures in an attempt to retain the project required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, Shaw Project Chemist will be immediately notified so that appropriate corrective actions can be initiated.

B7.5 Method QC

All QC, including blanks, matrix spikes, matrix spike duplicates, surrogate recoveries, matrix spike blank samples, and other method-specified QC samples, shall meet the method requirements referenced in Table B2-1. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed and/or re-extracted/redigested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed and/or re-extracted/redigested, then reanalyzed at no cost to the Shaw. Shaw shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

B7.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review calculation and/or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

B8.0 DATA REDUCTION, VALIDATION, AND USABILITY

For all analyses, NYSDEC ASP Category B deliverable requirements will be employed for documentation and reporting of all data. The standard NYSDEC report forms will be completed by the analytical laboratory and included in the deliverable data packages.

B8.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either in a graphic or printed tabular format. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Data for water samples will be reported in concentrations of micrograms per liter (µg/L). Data for soils will be reported in concentrations of micrograms per kilogram (µg/kg) for organics and reported on a dry weight basis.

Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or USEPA sources. Data reduction will be performed by individuals experienced with a particular analysis and knowledgeable of requirements.

B8.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use. Data validation will be performed by environmental chemists under the supervision of the QA/QC Officer. All analytical samples collected will receive a limited data review. The data validation will be limited to a review of holding times, completeness of all required deliverables, review of QC results (surrogates, spikes, duplicates) and a 10% check of all samples analyzed to ensure they were analyzed properly. The methods referenced in Table B3-1 as well as the general guidelines presented in the following documents will be used to aide the chemist during the data review USEPA *Contract Laboratory Program (CLP) Organic Data Review, SOP Nos. HW-6, Revision #12, March 2001*. This document will be used with the following exceptions:

- Technical holding times will be in accordance with NYSDEC ASP, 6/00 edition, and

- Tentatively identified compounds (TICs) will be qualified by the analytical laboratory only

Where possible, discrepancies will be resolved by Shaw chemists (i.e., no letters will be written to laboratories). A complete analytical data validation is not anticipated. However, if the initial limited data audit reveals significant deviations and problems with the analytical data. URS may recommend complete validation of the data.

B8.3 Data Usability

Two sets of data usability tables will be submitted. One set of tables will be only detected values reported, which will be incorporated into the text of the RI report. The second set of tables will be a complete listing of the validated analytical results. These validation summary tables will be included in the Data Usability Summary Report (DUSR). The DUSR will obtain information regarding deviations, discrepancies and unusable data along with the validation summary tables.

B9.0 PREVENTIVE MAINTENANCE AND PERFORMANCE/SYSTEM AUDITS

B9.1 Preventative Maintenance

The laboratory is responsible for the maintenance of its analytical equipment. Preventive maintenance is provided on a regular basis to minimize down-time and the potential interruption of analytical work. Instruments are maintained in accordance with the manufacturer's recommendations. If instruments require maintenance, only trained laboratory personnel or manufacturer-authorized service specialists are permitted to do the work. Maintenance activities will be documented and kept in permanent logs. These logs will be available for inspection by auditing personnel.

B9.2 Performance/System Audits

Audits will include a careful evaluation of both field and laboratory quality control procedures and will be performed before or shortly after systems are operational. The audits will be conducted by an individual who is technically knowledgeable about the operation(s) under review. Performance audits are conducted by introducing control samples into the data production process. These control samples may include performance evaluation samples, field samples spiked with known amounts of analyte, and split field samples that are analyzed by two or more analysts within or outside the organization.

Systems audits are onsite qualitative inspections and reviews of the quality assurance system used by some part of or the entire measurement system. They provide a quantitative measure of the quality of the data produced by one section or the entire measurement process. The audits are performed against a set of requirements, which may be a quality assurance project plan or work plan, a standard method, or a project statement of work. The primary objective of the systems audits is to verify that the QA/QC procedures are being followed.

B9.2.1 <u>Performance and External Audits</u>

In addition to conducting internal reviews and audits, as part of its established quality assurance program, the laboratory is required to take part in regularly scheduled performance evaluations and laboratory audits from state and federal agencies. They are conducted as part of the certification process and to monitor the laboratory performance. The audits also provide an external quality assurance check of the laboratory and provide reviews and information on the management systems, personnel, standard operating procedures, and analytical measurement systems. Acceptable performance on evaluation samples and audits is required for certification and accreditation. The laboratory shall use the information provided from these audits to monitor and assess the quality of its performance. Problems detected in these audits shall be reviewed by the QA Manager and Laboratory Management, and corrective action shall be instituted as necessary.

B9.2.2 <u>Systems/Internal Audits</u>

As part of its quality assurance program, the Laboratory QA Manager shall conduct periodic checks and audits of the analytical systems. The purpose of these is to verify that the analytical systems are working properly, and that personnel are adhering to established procedures and documenting the required information. These checks and audits also assist in determining or detecting where problems are occurring.

The QA Manager periodically will submit laboratory control samples. These samples will serve to check the entire analytical method, the efficiency of the preparation method, and the analytical instrument performance. The results of the control samples are reviewed by the QA Manager who reports the results to the analyst and the Laboratory Director. When a problem is indicated, the QA Manager will assist the analyst and laboratory management in determining the reason and in developing solutions. The QA Manager will also recheck the systems as required.

REFERENCES

Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy, Revision 1, October 1989.

National Enforcement Investigations Center of USEPA Office of Enforcement. *NEIC Policies and Procedures.* Washington: USEPA.

New York State Department of Environmental Conservation (NYSDEC). 1995. *Analytical Services Protocol* (ASP), 10/95 Edition. Albany: NYSDEC.

USEPA. 1987. *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87-001, (OSWER Directive 9355.0-14). December. Cincinnati, OH: USEPA.

USEPA. 1994. *Guidance for the Data Quality Objective Process,* EPA QA/G-4. September. Washington: USEPA.

PART B

TABLES

TABLE B2-1

SUMMARY OF ANALYTICAL METHODS

FORMER METRO-NORTH SITE

Parameter	Method Number / Reference[1]	Estimated Number of Samples	QA/QC Samples		
			Duplicates	Rinse Blanks	Trip Blanks
IA. Groundwater					
Target Compound List (TCL) Volatiles + TICs	EPA 8260	17	1	1	4
TCL Semivolatiles + TICs	EPA 8270	17	1	1	None
TCL Pesticides/Herbicides/PCBs	SW 8081/8151/8082	15	1	1	None
Target Analyte List (TAL) Metals (total) plus Cyanide	SW 6010, 7471, 9012	17	1	1	None
Sewage Discharge Criteria					
II. Subsurface Soils[1]					
TCL Volatiles + TICs	SW 8260	45	3	3	None
TCL SVOC + TICs	SW 8220	45	3	3	None
TCL Pesticides/Herbicides/PCBs	SW 8081/8151/8082	42	3	3	None
TAL Metals (total) plus Cyanide	SW 6010, 7471, 9012	45	3	3	None
Full TCLP	SW-846, 1311	6	None	None	None
III. Test Pits[1]					
TCL Volatiles + TICs	SW 8260	11	1	1	None
TCL SVOC + TICs	SW 8270	11	1	1	None
TCL Pesticides/Herbicides/PCBs	SW 8081/8151/8082	11	1	1	None
TAL Metals (total) plus Cyanide	SW 6010, 7471, 9012	11	1	1	None
Full TCLP	SW-846, 1311	11	None	None	None
IV. Soil Gas					
VOC	TO-15	16	1	None	3
Methane	TO-3 Modified	16	1	None	3

V. NYCDEP Sewer Effluent Analysis					
PH (range)	EPA 150.1	2	None	None	None
Total Suspended Solids	EPA 160.2	2	None	None	None
Cadmium	SW 6010	2	None	None	None
Copper	SW 6010	2	None	None	None
Lead	SW 6010	2	None	None	None
Mercury	SW 7471	2	None	None	None
Nickel	SW 6010	2	None	None	None
Zinc	SW 6010	2	None	None	None
Total Nitrogen	EPA 351	2	None	None	None
PCB=s (total)**	SW 8082	2	None	None	None
Benzene	SW 8260	2	None	None	None
Ethylbenzene	SW 8260	2	None	None	None
MTBE (Methyl-Tert-Butyl-Ether)	SW 8260	2	None	None	None
Naphthalene	SW 8260	2	None	None	None
Perc (Tetrachloroethylene)	SW 8260	2	None	None	None
Toluene	SW 8260	2	None	None	None
Xylenes (Total)	SW 8260	2	None	None	None
Flash Point	EPA 1020A	2	None	None	None
Non-polar material	EPA 1664A	2	None	None	None
CBOD (Carbonaceous Biochemical Oxygen Demand)	EPA 5210B	2	None	None	None
Chromium (VI)	EPA 7196A	2	None	None	None
Temperature		2	None	None	None
Other					

NOTES:
[1]EPA Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (SW-8216)

TO – Toxic Organics
TIC – Tentatively Identified Compounds
NIOSH – National Institute for Occupational Health and Safety

TABLE B3-1

ANALYTICAL METHODS, CONTAINER, PRESERVATION, AND HOLDING TIME REQUIREMENTS

FORMER METRO-NORTH SITE

Parameter	Method Number / Reference[1]	Volume Requirements	Preservation	Holding Time[1]
<u>I. Groundwater</u>				
Target Compound List (TCL)				
VOC + TICs	EPA 8260	27 x 40 ml VOA	HCl to pH<2, Cool $4^{0}C$	14- days preserved
TCL SVOC + TICs	EPA 8270	18 x 1L Amber Bottle	Unpreserved	
TCL Pesticides/Herbicides/PCBs	EPA 8081/8151/8082	18 x 1 L Amber	Unpreserved	
Target Analyte List (TAL) Metals (total)	EPA 6010, 7471	18 x 500ml Plastic	HNO_3 to pH<2, Cool $4^{0}C$	
Cyanide	EPA 9012	18 x 250 mL	NaOH Preserved	
<u>II. Subsurface Soils[2]</u>				
TCL VOC + TICs	SW 8260	22 x 4 oz Jars	Cool $4^{0}C$	7-day preserved
TCL SVOC + TICs	SW 8270	22 x 8 oz Jars	Cool $4^{0}C$	
TCL Pesticides/Herbicides/PCBs	SW 8081/8151/8082	*	Cool $4^{0}C$	
TAL Metals (total) plus Cyanide	EPA 6010, 7471, EPA 9012	*	Cool $4^{0}C$	
<u>III. Test Pits[2]</u>				
TCL VOC + TICs	SW 8260	6 x 4 oz Jars	Cool $4^{0}C$	7-day preserved
TCL SVOC + TICs	SW 8270	6 x 8 oz Jars	Cool $4^{0}C$	
TCL Pesticides/Herbicides/PCBs	SW 8081/8151/8082	*	Cool $4^{0}C$	
TAL Metals (total) plus Cyanide	EPA 6010, 7471, EPA 9012	*	Cool $4^{0}C$	
<u>IV. Soil Gas</u>				
VOC	TO-15	66 x 6L Summa Can	None	7-day holding
Methane	TO-3 Modified	66 x 6L Summa Can		

<u>V. NYCDEP Sewer Effluent</u>				
<u>Analysis</u>				
pH (range)	EPA 150.1	2 x 1 L Plastic Bottle	Cool 4^{0}C	15 min upon receipt
Total Suspended Solids	EPA 160.2	a	Cool 4^{0}C	7-day
Cadimum	SW 6010	2 x 250 mL Plastic Bottle	HNO_3 to pH<2, Cool 4^{0}C	
Copper	SW 6010	(all metals included)		Metals – 30 days
Lead	SW 6010			holding time
Mercury	SW 7471			
Nickel	SW 6010			
Zinc	SW 6010			
Total Nitrogen	EPA 351		Cool 4^{0}C	
PCB=s (total)**	SW 8082	2 x 1 L Amber	Cool 4^{0}C	28 days
Benzene	SW 8260	4 x 40 mL VOA (EPA	HCl to pH<2, Cool 4^{0}C	30 days
Ethylbenzene	SW 8260	8260)		VOC (s) – 14 days
MTBE (Methyl-Tert-Butyl-Ether)	SW 8260			preserved
Naphthalene	SW 8260			
Perc (Tetrachloroethylene)	SW 8260			
Toluene	SW 8260			
Xylenes (Total)	SW 8260			
Flash Point	EPA 1020A		HCl to pH<2, Cool 4^{0}C	
Non-polar material	EPA 1664A	2 x 500 mL Plastic Bottle	Unpreserved	
CBOD (Carbonaceous Biochemical	EPA 5210B	2 x 1 L Amber Bottle	Unpreserved	48 hours
Oxygen Demand)		2 x 500 mL Plastic		
Chromium (VI)	EPA 7196A		Cool 4^{0}C	24 hours
Temperature		b		
Other				

NOTES:

[1]All holding times begin with the Validated Time of Sample Receipt (VTSR) at the laboratory.

[2]EPA Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods (SW-8216).

* - Required volume will be taken from TCL SVOC samples ....TO – Toxic Organics

a – Required volume will be taken from pH sample

b – Required volume will be taken from Flash Point Sample

NIOSH – National Institute for Occupational Health and Safety

PART C

FIELD SAMPLING PLAN

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PART C – FIELD SAMPLING PLAN

APPENDICES

C1.0 INTRODUCTION

This Field Sampling Plan (FSP) is designed to provide detailed step-by-step procedures for the field activities outlined in the Remedial Investigation for the Former Metro North Property. It will serve as the field procedures manual to be strictly followed by all Shaw personnel. Adherence to these procedures will ensure the quality and defensibility of the field data collected. In addition to the field procedures outlined in this document, all personnel performing field activities must do so in compliance with: (1) the appropriate Health and Safety guidelines found in the Health and Safety Plan (Part D); (2) the Quality Assurance/Quality Control measures outlined in Part B; (3) the scope of work outlined in the Remedial Investigation Work Plan (Part A); and (4) the time schedule outlined in the Remedial Investigation Work Plan.

The Remedial Investigation strategy for the Site consists of the following field tasks:

- **Mobilization** – to obtain public utility clearance, coordination with NYCSCA Legal Department for site access, procurement of the subcontractors required to perform the work (i.e. drillers, surveyors, etc.) and obtaining required permits (e.g., sidewalk opening permits, NYCDEP sewer discharge permit/water use permits);
- **Geophysical Survey** – to assure that underground utilities are not present at locations where subsurface investigation is planned;
- **Soil Gas Survey** – to further assess Recognized Environmental Conditions (RECs) identified during the Phase I and Phase II Site Assessment/Investigation and to assess the potential for the presence of methane gas in the northwest corner of the Site;.
- **Sampling Location Survey** – to document sample locations;
- **Test Pit Excavation and Soil Sampling** – to further characterize the soil mound areas;
- **Subsurface Soil Sampling** – to further assess and delineate RECs identified during the Phase II Investigation, to collect information in portions of the site not previously investigated, and to collect information that will be used during the construction phase of the project;
- **Monitoring Well Installation and Groundwater Sampling** – to assess groundwater quality at the Site.

C2.0 MOBILIZATION

A centralized decontamination area with a decontamination pad will be constructed near the site entrance to decontaminate vehicles/heavy equipment/drill rigs entering and leaving the site. The decontamination area will be large enough to allow storage of cleaned equipment and materials prior to use.

Proposed excavation locations will be staked, labeled, and flagged, as appropriate, prior to start of work. Following the markout of sample locations, all proposed subsurface sampling locations will be evaluated by a geophysical contractor. Utilities in areas designated for intrusive activities will be cleared through the Underground Facilities Protective Organization (UFPO). Vehicle access routes to excavation, drilling, and boring locations will be determined and cleared prior to any field activities.

C3.0 SOIL SAMPLING

C3.1 Soil Sampling Program Summary

Soil samples will be collected to further assess and delineate RECs identified during the Phase II Investigation, to collect information in portions of the site not previously investigated, and to collect information that will be used during the construction phase of the project.

As part of the Remedial Investigation activities the following soil sampling activities will be conducted:

- A total of 26 soil borings will be advanced with soil samples submitted for laboratory analysis; and
- A total of 9 test pits will be dug and soil samples submitted for laboratory analysis to provide information on characterization of the soil mound areas.

C3.2 Test Pit Procedures

Summary: Test pits will be dug to provide additional information needed to characterize the soil mound areas. The following is a standard method of digging test pits which enables the recovery of representative subsurface samples for identification and laboratory testing.

Procedure:

Before start of excavation activities, the Field Geologist/Engineer will review the scope of work and health and safety requirements with the excavation contractor or subcontractor. If a backhoe is used, care will be taken to ensure that clearances from overhead lines are maintained in accordance with applicable regulations.

The following general procedures will be used to excavate test pits/trenches:

Excavating

- All excavating activities will be conducted using the appropriate level of protection specified in the site-specific HASP.
- Test pits/trenches will be excavated in compliance with applicable OSHA safety regulations regarding sloping of sidewalls.
- According to OSHA requirements, field personnel should NOT enter any excavation 4 feet or more in depth unless the walls of the excavation are sloped or shored. Details on the precautions to be taken with regard to trenching and entering trenches are provided in the site-specific HASP.
- Excavating equipment will be decontaminated before and between each test pit/trench using a pressurized hot water "steam" wash.
- Field personnel will locate and stake and/or paint (as appropriate) each test pit/trench location, document each location on a site map, inspect the excavation activity, and direct the excavation contractor or subcontractor on the size and depth of the excavation.
- During excavation, soil will be placed on polyethylene sheeting adjacent to the test pit/trench and segregated, to the extent practicable, by depth of origin.
- An air monitoring instrument such as a photoionization detector (PID) or flame ionization detector (FID) will be used to monitor ambient air quality during intrusive activities to

characterize air quality for health and safety purposes, and to identify potential contaminant emissions.

- Walls of the test pits/trenches will be cut as near vertical as practicable to facilitate stratigraphic mapping.

- Test trenching activities (particularly exposed side walls and any subsurface structures encountered) will be photo documented. A scale or an item providing a size perspective should be included in each photograph

- All measurements will be recorded to the nearest 0.1 feet

- The Field Geologist/Engineer will be on-site during all excavation operations to classify materials encountered in accordance with the Unified Soil Classification System (USCS) and to maintain an accurate log for each test pit/trench.

- Material encountered during excavation will be monitored with a PID or FID for the presence of volatile organic compounds (VOCs) and will be inspected for visual evidence of contamination.

- Before measuring the depth to ground water (if encountered) in the test pits/ trenches, the field personnel will allow sufficient time for stabilization of the ground water table.

Sampling

- Before collecting each soil sample for field or laboratory analysis, a dedicated pair of clean rubber or latex gloves will be donned

- According to OSHA requirements, field personnel should NOT enter any excavation 4 feet or more in depth unless the walls of the excavation are sloped or shored. Details on the precautions to be taken with regard to trenching and entering trenches must be provided in the site-specific HASP for a particular site.

- If appropriate according to the site-specific HASP, field personnel may enter a test-pit/trench to obtain samples. Alternatively, sample(s) may be obtained by standing near the edge of the trench and using a decontaminated sampling device (e.g., bucket auger) with extension(s) if necessary to reach the trench sidewall or bottom. Samples may also be obtained from the bucket of the backhoe in an area where the sample material is not in contact with the bucket.

- Collect the soil to be sampled for analyses using a decontaminated trowel/spoon. Laboratory-decontaminated trowels/spoons are preferred. If laboratory-decontaminated trowels/spoons are not available so as to dedicate one trowel/spoon per sample location, the trowels/spoons will be field decontaminated between sampling points in accordance with procedures described in the site-specific QAPP.

- Homogenize the soil to be sampled for non-VOC analysis either in situ or in a decontaminated stainless steel bowl or tray.

- Place homogenized soil into laboratory-supplied sample container(s) and cap container(s).
- Label sample container(s) (e.g., project name/number, date, time and parameters).

- Complete chain of custody forms.

- Package and ship samples in accordance with preservation requirements (typically ice to achieve 4 degrees Celsius).

- Record all appropriate data in field log book

Logging

A legible, concise record of all significant information pertaining to excavation and sampling operations for each test pit/trench will be maintained by the Field Geologist/Engineer concurrent with the excavation of the test pit/trench. A preliminary log will be prepared in the field by the Field Geologist/Engineer. The data will be transferred at a later date to generate profiles at a scale to be determined by the Field Geologist/Engineer. Sample locations will be referenced onto a plan view/vertical section of each test pit/trench.

A sample test pit/trench log is provided in Appendix A. Required information on the test pit/trench log includes:

- Test pit/trench identification
- Excavation contractor or subcontractor and name of foreman
- Excavation equipment
- Excavation location
- Date started test pit/trench operations and date completed
- Ground elevation (feet)
- Completion depth (feet)
- Depth to water, if encountered
- Name of environmental consulting firm and name of inspector (person supervising excavating activities and preparing log)
- Project number
- Test pit/trench plan showing sketch of approximate shape, length and width dimensions (feet), cross-section line indicating profile orientation, and orientation to north
- Horizontal scale of profile
- View (compass direction as looking at profile)
- Profile showing vertical section of test pit/trench and including:

- depth of stratigraphic changes
- description of subsurface materials in accordance with the USCS
- PID or FID measurements and where measurements were obtained
- depth to water table and estimated water inflow rate, if water encountered
- description and location of contamination evidenced by staining, presence of free-phase product or noticeable odors, if encountered
- location of laboratory sample(s), if collected

Information regarding test trench operations, other than the types listed above, will be recorded in the field notebook.

C3.3 Hollow-Stem Auger Drilling Procedures

Summary: A total of 26 soil borings will be drilled to a depth of approximately 15 feet. The following describes a standard method of subsurface drilling which enables the recovery of representative subsurface samples for identification and laboratory testing.

Procedure:

1) Advance the boring by rotating and advancing to the desired depth. The borings will be advanced incrementally to permit continuous or intermittent sampling as required.
2) Remove center plug from augers and sample subsurface per method stipulated by the project geologist or hydrogeologist. Sampling methods are presented in Section C3.4, below.
3) To the extent possible, drilling will begin at locations with anticipated clean samples and proceed progressively to the locations that are anticipated to be more contaminated.

C3.4 Split-Spoon Sampling Procedures

Summary: Split-spoon sampling is a standard method of soil sampling to obtain representative samples for identification and laboratory testing as well as to serve as a measure of resistance of soil to sampler penetration. Soil samples from borings to be conducted as part of this Remedial Investigation will be collected from split spoon samplers advanced in conjunction with hollow-stem augers (see above).

Procedure:

1) Measure the sampling equipment lengths to ensure that they conform to specifications. Confirm the weight of the hammer (140 pounds.).
2) Clean out the auger flight to the bottom depth prior to sampling. Select additional components as required (i.e., leaf spring core retainer for clays or a sand trap for non-cohesive sands).
3) Lower the sampler to the bottom of the auger column and check the depth against length of the rods and the sampler.
4) Attach the drive head and hammer to the drill rods without the weight resting on the rods.
5) Lower the weight and allow the sampler to settle up to 6 inches. If it settles more, consider use of another sampler.
6) Mark four 6-inch intervals on the drill rods relative to a drive reference point on the rig. With the sampler resting on the bottom of the hole, drive the sampler with the 140 pound hammer falling freely over its 30-inch fall until 24 inches have been penetrated or 100 blows applied.
7) Record the number of blows per 6 inches. Determine the "N" value by adding the blows for the 6-to 12-inch and 12-to 18-inch interval of each sample attempt.
8) After penetration is complete, remove the sampler.
9) Open sampler and describe the soil.
10) Document all properties and sample locations in the field notebook and later on the Boring Log form (Appendix A).
11) Place sample in suitable container, label (Section C10.0), and store on site until onsite work has been completed, at which time the samples will be properly disposed of.

Trowels, bowls, hand augers, coring devices, and other downhole sampling or drilling equipment will be decontaminated by scrubbing with a non-phosphate detergent (i.e., Alconox) and rinsing with fresh water prior to use at each sample location. Drilling equipment will be steam cleaned or manually scrubbed with Alconox between soil borings to minimize the possibility of cross-contamination between drilling locations.

Upon completion of probing/drilling, each boring will be filled to near grade surface with either the drill cuttings (if no PID/FID measurements have been recorded) or a cement/bentonite grout mixture (if PID/FID response is noted). The boring will be patched with the appropriate materials (asphalt or concrete patch) if the area is paved.

All samples will be collected, preserved as necessary, properly cooled and packaged to prevent breakage, and delivered or forwarded via overnight courier to a NYS ELAP-certified analytical laboratory. Standard chain of custody procedures will be followed.

C3.4.1 Unified Soil Classification System

Soils are classified for engineering purposes according to the Unified Soil Classification System (USCS) adopted by the U.S. Army Corps of Engineers and U.S. Department of the Interior Bureau of Reclamation. Soil properties which form the basis for the USCS are:

- Percentage of gravel, sand, and fines;
- Shape of the grain-size distribution curve; and
- Plasticity and compressibility characteristics.

According to this system, all soils are divided into three major groups: coarse-grained, fine-grained, and highly-organic (peaty). The boundary between coarse-grained and fine-grained soils is taken to be the 200-mesh sieve (0.074 mm). In the field the distinction is based on whether the individual particles can be seen with the unaided eye. If more than 50% of the soil by weight is judged to consist of grains that can be distinguished separately, the soil is considered to be coarse-grained.

The coarse-grained soils are divided into gravelly (G) or sandy (S) soils, depending on whether more or less than 50% of the visible grains are larger than the No. 4 sieve (3/16 inch). They are each divided further into four groups:

W: Well graded; fairly clean (<5% finer than 0.074 mm)

P: Poorly graded (gap-graded); fairly clean (<5% finer than 0.074mm)

C: Clayey (>12% finer than 0.074mm); plastic (clayey) fines. Fine fraction above the A- line with plasticity index above 7.

M: Silty (>12% finer than 0.074 mm); nonplastic or silty fines. Fine fraction below the A- line and plasticity index below 4.

The soils are represented by symbols such as GW or SP. Borderline materials are represented by a double symbol, as GW-GC.

The fine-grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower than 50% (L), or higher than 50% (H).

The distinction between the inorganic clays (C), the inorganic silts (M), and organic soils (O) is made on the basis of a modified plasticity chart. Soils CH and CL are represented by points above the A-line, whereas soils OH, OL, and MH correspond to positions below the A-line. Soils ML, except for a few clayey fine sands, are also represented by points below the A-line. The organic soils O are distinguished from the inorganic soils M and C by their characteristic odor and dark color.

C3.4.2 <u>Visual Identification</u>

Soil properties required to define the USCS classification of a soil are the primary features to be considered in field identification. These properties and other observed characteristics normally identified in describing a soil are defined below:

a. Color
b. Moisture conditions
c. Grain size

(1) Estimated maximum grain size

(2) Estimated percent by weight of fines (material passing No. 200 sieve)

d. Gradation

e. Grain shape

f. Plasticity

g. Predominant soil type

h. Secondary components of soil

i. Classification symbol

j. Other features such as:

- organic, chemical, or metallic content;
- compactness;
- consistency;
- cohesiveness near plastic limit;
- dry strength; and source - residual, or transported (aeolian, water borne, glacial deposit, etc.)

C3.5 Disposal of Drill Cuttings and Other Investigation-Derived Waste

Summary: Disposal of drill cuttings will be performed in accordance with New York State Department of Environmental Conservation Technical and Administrative Guidance Memorandum (TAGM) HWR-89-4032, November 21, 1989. All other investigation-derived waste will be dealt with as discussed in Section 2.2.8 of the Work Plan.

Procedure:

1) Cuttings will be stored/disposed on site in bulk and monitored for volatile emissions and fugitive dust with on site instruments. If any action level specified in the HASP is exceeded, corrective action such as an interim cover or placement in containers will be implemented.

2) If wastes are present in the cuttings, cuttings will be placed in a segregated storage or disposal area.

3) If materials are found to be hazardous, cuttings will be disposed of off site at a properly permitted treatment, storage or disposal facility.

C3.6 Documentation

Each subsurface boring will be logged in a bound field notebook during drilling by the supervising geologist. Field notes will include descriptions of subsurface materials encountered during drilling, sample numbers, and types of samples recovered from the borehole. Additionally, the geologist will note time and material expenditures for later verification of contractor invoices.

Upon completion of daily drilling activities, the geologist will complete the daily drilling record form and initiate chain-of-custody on any samples recovered for chemical laboratory testing. Following completion of the drilling program, the geologist will transfer field notes onto standard forms for the RI report.

A legible, concise record of all significant information pertaining to sampling operations for each soil boring will be maintained concurrent with the advancement of the borehole. A typical boring log is provided in Appendix A.

The boring log will include the following information (as appropriate):

- Description of materials encountered
- Depth or elevation of strata changes
- Number of blows per 6 inches of penetration of the split-spoon sampler during the Standard Penetration Test
- Location and number of split-spoon samples obtained
- Length of recovered sample

In addition, the remarks section of the boring log may include such pertinent information as:

- Offset (magnitude and direction) of as-drilled location from staked location

- Depth to water (if encountered) including any perched water zones or water seams in saprolitic bedrock
- Odors or staining (if noted) and specific depth(s) at which noted
- Field measurements (where appropriate)
- Occurrence and depth of obstructions
- Stoppage and resumption of drilling operations
- PID/FID readings

Separating lines will be drawn when changes in major soil components occur. Separating lines between different soil strata will be drawn as follows:

- Solid line if a lithologic change is observed in the split-spoon sampler
- Dashed line at an intermediate location between samples or change in drilling effort if lithologic change is not observed in the split-spoon sampler.

On a weekly basis the project geologist will submit a summary report to the project manager containing at a minimum the following: (1) a summary of the daily drilling records; (2) progress report on field activities; and (3) a record of site visitors.

The proper completion of the following forms/logs will be considered correct procedure for documentation during the drilling program:

1) Field Log Book including the daily field activities and drilling records - weather-proof hand-bound field book;
2) Test Pit and Boring Logs (Appendix A); and
4) Monitoring Well Construction Details (Appendix A).

C4.0 SOIL GAS SAMPLING

Summary: A soil gas survey will be conducted as described in Section 2.2.2 of the Work Plan. The following is a general description of the procedure to be used. The soil gas survey will be implemented and documented by Shaw.

For this Investigation, it is anticipated that soil gas will be screened at 16 locations and 16 soil gas samples will be collected for laboratory analysis. Depths of soil gas samples will be as described in Section 2.2.2 of the revised Workplan. Samples submitted to a laboratory will be analyzed using methods as shown in Table B3-1. A minimum of one (1) field duplicate sample will be collected for every twenty (20) field samples (total of 1), and one (1) trip blank will be analyzed per sample shipment to the laboratory (approximately 3 samples), for a total of approximately 20 samples.

Procedure:

All soil gas points will be sampled using a truck-mounted Geoprobe® unit. To collect the soil gas sample, a 1-foot screen with a fitted drive point will be advanced to the requisite depth. The Geoprobe® rods will then be retracted 3-4 inches to create a void. Polyethylene tubing (1/4 inch) will be attached to a stainless steel adaptor and the adaptor will be attached to the drive point to make a seal. The tubing will be sealed to the surface with a non-VOC containing material consisting of permagum grout or beeswax or equivalent. Prior to attaching the sample container, the drive point will be purged of 1-3 probe volumes to eliminate air within the tubing. The flow rate during purging will not exceed 0.2 liters/minute. Following purging, the tubing will be attached to a summa canister (for TO-15 and TO-3 analysis) fitted with a one hour flow regulator. Immediately after opening the summa canister, the initial vacuum (inches of mercury) will be noted. After one hour, the summa canister will be closed and the final vacuum noted. (The flow rate during sampling will not exceed 0.2 liters minute). The laboratory methods used to analyze for VOCs will achieve a detection limit of 1 microgram/cubic meter.

C5.0 MONITORING WELL INSTALLATION AND TESTING

C5.1 Monitoring Well Program Summary

A total of 15 shallow overburden monitoring wells will be installed and sampled. Monitoring wells will be installed and developed in accordance with procedures found in Sections C5.2 and C5.3. To collect representative groundwater samples, groundwater wells must be adequately purged prior to sampling. Purging will require the removal of three to five volumes of standing water in rapidly recharging wells and at least one volume from wells with slow recharge rates. Shallow wells in which the screen intersects the water table should require a minimum amount of purging since the groundwater would flow through the screen and not be entrapped in the casing. A thorough purging would require the removal of several volumes of this trapped water to ensure that representative groundwater is brought into the casing for sampling. Sampling should commence immediately after purging as soon as adequate recharge has occurred.

C5.2 Well Construction Procedures

Summary: A method for construction of groundwater monitoring wells within unconsolidated material which enables monitoring of groundwater elevation and acquisition of groundwater samples for laboratory testing. Fifteen (15) monitoring wells will be installed during this Remedial Investigation using the procedures described below.

Procedure:

Prior to the start of drilling, equipment (i.e., augers, split spoons) and well materials will be decontaminated either through the use of a steam cleaner or manual scrubbing with a non-phosphate detergent (i.e., Alconox). If the well casings arrive in a sealed condition with a certification of decontamination from the manufacturer, additional decontamination will not be performed. All equipment and materials will be visually inspected prior to the start of work. Monitoring well construction diagrams and soil boring logs will be generated for each well installed.

1) Advance subsurface boring to the desired depth by means of hollow-stem auger drilling.
2) Remove center plug from augers and verify borehole depth using weighted measuring tape.
3) Add washed and graded medium sand as needed to base of borehole.
4) Insert the well screen and riser pipe into borehole through the hollow stem augers. Cap the riser to prevent well construction materials from entering the well.
5) Add sand to screen section of well while slowly removing augers. Sand pack should extend at least two feet above the top of the screen section. Measure with a tape.
6) Slowly add bentonite pellet seal to borehole as augers are slowly removed. The bentonite seal should extend at least two feet above the top of the sand pack section. Measure with tape.

Note: The rate of removal of the auger from the borehole should closely follow the rate that the sand pack and bentonite pellets fill the borehole.

7) If bentonite seal is placed above the groundwater level within the borehole, add potable water to the borehole to hydrate the bentonite pellets. Allow pellets to hydrate for at least 30 minutes.
8) Mix cement/bentonite grout per Manufacturer's specifications.
9) Add grout to borehole through tremie pipe or hose from the top of the bentonite seal to the ground surface.
10) Remove remaining augers from the borehole.
11) Top off grout in borehole. Grout should extend to approximately two feet below ground surface.
12) Cut well riser pipe to about three feet above the ground surface for stickup type wells. Flush-mount well risers should be cut off just below surface grade.
13) Backfill the remaining two feet of the borehole with concrete.

14) Install a protective casing over the well riser pipe and set it into the concrete backfill.

15) Lock the protective casing cover.

16) Document well construction in the field notebook and later on a Monitoring Well Construction Detail diagram (Appendix A).

C5.3 Well Development Procedures

Summary: Following completion of drilling and well installation, each monitoring well will be developed by pumping until the discharged water is relatively sediment free and the indicator parameters (pH, temperature, and specific conductivity) have reached steady state. Developing the well not only removes any sediment but also may improve the hydraulic properties of the formation. The effectiveness of the development measures will be closely monitored in order to keep the volume of discharged water to the minimum necessary to obtain sediment-free samples. A portable turbidimeter will be used to monitor effectiveness of development. A turbidity reading of < 50 Nepheliomatic Turbidity Units (NTU) and steady state pH, temperature, and specific conductivity readings will be used as a guide for discontinuing well development.

Procedure:

1) An appropriate well development method should be selected, depending on water level depth, well productivity, and sediment content of water. Well development options include: (a) manual pumping; and (b) powered suction-lift or hydrolift pumping.

2) Equipment should be assembled, decontaminated (if necessary), and installed in the well. Care should be taken not to introduce contaminants to the equipment during installation.

3) Well development should proceed by repeated removal of water from the well until the discharged water is relatively sediment-free. Effectiveness of development should be monitored at regular intervals using a portable turbidimeter. Volume of water removed and turbidity, pH, temperature, and

conductivity measurements will be recorded on a Well Development/Purging Log form (Appendix A).

4) Well development will be discontinued when the turbidity of the discharged water is below 50 NTU and the other indicator parameters have stabilized.

C5.4 Well Purging and Sampling Procedures

Summary: To collect representative groundwater samples, groundwater wells must be adequately purged prior to sampling. Purging will require the removal of three to five volumes of standing water in rapidly recharging wells and at least one volume from wells with slow recharge rates. Sampling should commence immediately after purging as soon as adequate recharge has occurred.

Groundwater sampling will be performed as indicated in Section A2.2.5 of the revised RIWP. The wells will be purged following procedures found in Section C5.4 and sampled following procedures found in Section C5.5. The samples will be labeled and shipped following procedures outlined in Sections C7.0 and C8.0 and analyzed according to the program outlined in Section 2.2.5 the RIWP.

Procedure:

Groundwater Purging

1) The well cover will be unlocked and carefully removed to avoid having any foreign material enter the well. The interior of the riser pipe will be monitored for organic vapors using a photoionization detector (PID). If a reading of greater than 5 ppm is recorded, the well will be vented until levels are below 5 ppm before purging begins.
2) Using an electronic water level detector, the water level below top of casing will be measured. Knowing the total depth of the well, it will be possible to determine the volume of water in the well. The end of the probe will be soap-and-water-washed and deionized-water-rinsed between wells.

3) On wells with water levels that remain 25 feet or less below the top of casing, a suction-lift pump will be used to remove three to five times the well volume, measured into a calibrated pail. (A well volume will be defined as the volume of water standing inside the casing measured prior to evacuation.) Dedicated new polyethylene discharge and intake tubing (½" I.D. high-density polyethylene [HDPE]) will be used for each well.

During this evacuation of the well, the intake opening of the pump tubing will be positioned just below the surface of the well water. If the water level drops, then the tubing will be lowered as needed to maintain flow. Pumping from the top of the water column will ensure proper flushing of the well. Pumping will continue until the required volumes are removed.

If the well purges to dryness and recharges rapidly (within 15 minutes), water will continue to be removed as it recharges until the required volumes are removed. If the well purges to dryness and is slow to recharge (greater than 15 minutes), evacuation will be terminated.

4) Purging will continue until three to five well volumes of water have been removed. The discharge volume will be established on a well-by-well basis. Measurements for pH, temperature, turbidity, and specific conductivity will be recorded during purging. The stability of these measurements with time will also be used to guide the decision to discontinue purging.

5) Well purging data are to be recorded in the field notebook and on the Well Development/Purging Log (Appendix A).

Groundwater Sampling

1) Well sampling may be performed on the same date as purging at any time after the well has recovered sufficiently to sample, or within 24 hours after evacuation, if the well recharges slowly. If a well does not contain or yield sufficient volume for all required laboratory analytical testing (including quality control), then a decision will be made to prioritize analyses. If a well takes longer than 24 hours

to recharge, then a decision will be made whether or not the sample will be considered valid.

2) After well purging is completed and the well has recharged sufficiently per the previous item, a sample will be collected into appropriate containers using a dedicated teflon bailer. The bailer will have a 5-foot teflon-coated stainless steel "leader" which will be attached to a clean, dedicated ¼-inch nylon line. The bailer will be lowered below the surface of the water so as to allow the water to touch only the "leader" and not the nylon rope.

3) All sample bottles will be labeled in the field using a waterproof permanent marker. Procedures outlined in Sections C7.0 will be followed. Labels will include:

- Site name
- Sample identification code
- Project number
- Date/time
- Sampler's initials
- Preservation added (if any)
- Analysis to be performed

4) Samples will be collected into verifiably clean sample bottles (containing required preservatives) and placed on ice in coolers for processing (preservation and packing) prior to shipment to the analytical laboratory. Chain-of-custody will be initiated. The analytical laboratory will certify that the sample bottles are analyte-free.

5) A separate sample of approximately 200 mls will be collected into a 16-ounce plastic bottle to measure pH, conductivity, turbidity, and temperature of the groundwater sample in the field.

6) Well sampling data are to be recorded in the field notebook and on the Well Development/Purging Log (Appendix A).

C5.5 Water Level Monitoring Procedures

Summary: Determination of groundwater surface elevations throughout a monitoring well network makes possible the construction of a potentiometric surface contour map and determination of groundwater flow patterns.

Water levels in all monitoring wells will be measured using an electronic water level indicator or weighted tape. Initially, measurements will be taken following well development until the well has recovered to anticipated static conditions. Water levels will also be measured prior to groundwater sampling. Water level measurement procedures are presented below.

Procedure:

1) Clean the water level probe and the lower portion of cable following standard decontamination procedures (Section C6.0) and test water level meter to ensure that the batteries are charged.
2) Lower the probe slowly into the monitoring well until the audible alarm indicates water.
3) Read the depth to the nearest hundredth of a foot from the graduated cable using the V-notch on the riser pipe as a reference.
4) Repeat the measurement for confirmation and record the water level.
5) Remove the probe from the well slowly, drying the cable and probe with a clean "Chem Wipe" or paper towel.
6) Replace monitoring well cap and lock protective cap in place.
7) Decontaminate the water level meter (Section C6.0) if additional measurements are to be taken.

C6.0 SAMPLING EQUIPMENT CLEANING PROCEDURES

Summary: To assure that no outside contamination will be introduced into the samples/data, thereby invalidating the samples/data, the following cleaning protocols will apply for all equipment used to collect samples/ data during the field investigations. Drilling equipment and heavy machinery will be steam cleaned on the decontamination pad.

Procedures:

1) Thoroughly clean equipment with laboratory-grade soap and water, until all visible contamination is gone.
2) Rinse with tap water, until all visible evidence of soap is removed.
3) Rinse several times with deionized water.
4) Air dry before using. If equipment will not be used immediately, wrap in aluminum foil.

C7.0 SAMPLE LABELING

Summary: In order to prevent misidentification and to aid in the handling of environmental samples collected during the field investigation, the following procedures will be used:

Procedure:

1) Affixed to each sample container will be a non-removable (when wet) label. Apply label and wrap with 2-inch cellophane tape to cover label. The following information will be written on each label with permanent marker:

   - Site name
   - Sample identification

- Project number
- Date/time
- Sampler's initials
- Sample preservation
- Analysis required

2) Each sample of each matrix will be assigned a unique identification alphanumeric code. An example of this code and a description of its components is presented below:

<u>Examples</u>

1. MW1-GW
   MW1 = Monitoring Well 1
   GW = Groundwater

2. SB1 - 2'-4'
   SB1 = Soil Boring 1
   2' - 4' = Two-foot to four-foot soil sample

<u>List of Abbreviations</u>

<u>Monitor Type</u>

MW = Monitoring Well

<u>Sample Type</u>

GW	=	Groundwater
SB	=	Soil Boring
MSB	=	Matrix Spike Blank
EB	=	Equipment Rinse Blank
TB	=	Trip Blank
RB	=	Rinse Blank
MS	=	Matrix Spike
MSD	=	Matrix Spike Duplicate

C8.0 SAMPLE SHIPPING

Summary: Proper documentation of sample collection and the methods used to control these documents are referred to as chain-of-custody procedures. Chain-of-custody procedures are essential for presentation of sample analytical chemistry results as evidence in litigation or at administrative hearings held by regulatory agencies. Chain-of-custody procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples.

The procedures used follow the chain-of-custody guidelines outlined in NEIC Policies and Procedures, prepared by the National Enforcement Investigations Center (NEIC) of the U.S. Environmental Protection Agency Office of Enforcement.

Procedure:

1) The chain-of-custody (COC) record should be completely filled out, with all relevant information.
2) The original COC goes with the samples. It should be placed in a ziplock bag and taped inside the sample cooler. Sampler should retain a copy of the COC.
3) Place inert cushioning material such as vermiculite or bubble-wrap in bottom of cooler.
4) Place bottles in cooler in such a way that they do not touch (use cardboard dividers or bubble-wrap).
5) Wrap VOA vials securely in bubble-wrap and tape. Place them in the center of the cooler.
6) Pack cooler with ice in doubled ziplock plastic bags.
7) Pack cooler with cushioning material.
8) Tape the drain shut.
9) Wrap cooler completely with strapping tape at two locations securing the lid. Do not cover any labels.
10) Place lab address on top of cooler. For out-of-town laboratory, add the following: Put "This side up" labels on all four sides and "Fragile" labels on at

least two sides. Affix numbered custody seals on front right and left of cooler. Cover seals with wide, clear tape.

11) Ship samples via overnight carrier the same day that they are collected.

APPENDIX A

FIELD ACTIVITY FORMS

A COPY OF THE FIELD ACTIVITY FORMS

IS AVAILABLE UPON REQUEST

PART D

HEALTH AND SAFETY PLAN

A COPY OF THE HEALTH AND SAFETY PLAN

IS AVAILABLE UPON REQUEST