

March 23, 2006

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Division of Environmental Remediation  
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**Subject:           Remediation Work Plan  
                      BCP ID No. 231043  
                      West 61<sup>st</sup> Street Site  
                      New York, New York**

Dear Mr. Chawla:

AKRF, Inc. (AKRF) is pleased to submit the enclosed Remediation Work Plan (RWP), Remediation Health and Safety Plan (RHASP), and a proposed Fact Sheet (# 3) for the West 61<sup>st</sup> Street Site, New York, New York. This plan addresses: collection and analytical procedures for waste characterization, petroleum-contaminated soil delineation, and post-excavation endpoint verification samples; management practices for the handling of on-site excavated soils, management of the vehicles entering, receiving the soil, and leaving the site; and the disposition of the soil removed from the Site.

All on-site activities will be undertaken in conformance with Remediation Health and Safety Plan (RHASP), included in Appendix A of this RWP. The RHASP also contains an Expanded Community Air Monitoring Plan, which is included as Appendix F. This same Expanded Community Air Monitoring Plan was previously included in the NYSDEC/NYSDOH-approved June 2005 HASP. The RHASP expands the previously approved June 2005 Revised HASP to include health and safety issues relating to the excavation, storage, and removal of soil of known chemical composition, and any additional unknown tanks encountered during excavation.

If you have any questions, please contact Project Manager Richard Gardineer, P.E. at 914-922-2369, or me at 646-388-9520.

Sincerely,  
AKRF, Inc.

Michelle Lapin, P.E.  
Senior Vice President

cc:     Ms. Julia Guastella, NYSDOH  
          Mr. Bennet Schonfeld, Algin Management Company, LLC  
          David Freeman, Paul, Hastings, Janofsky & Walker LLP

March 23, 2006

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**BCP ID No. 231043**  
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All on-site activities will be undertaken in conformance with Remediation Health and Safety Plan (RHASP), included in Appendix A of this RWP. The RHASP also contains an Expanded Community Air Monitoring Plan, which is included as Appendix F. This same Expanded Community Air Monitoring Plan was previously included in the NYSDEC/NYSDOH-approved June 2005 HASP. The RHASP expands the previously approved June 2005 Revised HASP to include health and safety issues relating to the excavation, storage, and removal of soil of known chemical composition, and any additional unknown tanks encountered during excavation.

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        Mr. Bennet Schonfeld, Algin Management Company, LLC  
        David Freeman, Paul, Hastings, Janofsky & Walker LLP



AKRF, Inc.  
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Submitted to:

**Algin Management Co., LLC**  
**64-35 Yellowstone Boulevard**  
**Forest Hills, NY 11375**

## REMEDIAL WORK PLAN

**West 61<sup>st</sup> Street Site**  
New York, New York

Project Number: 10321  
BCP ID 231043

**MARCH 2006**

# **West 61<sup>st</sup> Site**

**NEW YORK, NEW YORK**

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## **Remedial Work Plan**

**NYSDEC BCP Number: C231043**

**AKRF Project Number: 10321**

### **Prepared for:**

Algin Management Company, LLC  
64-35 Yellowstone Boulevard  
Forest Hills, New York 11375

### **Prepared by:**



**AKRF Engineering, P.C.**  
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### **Reviewed and Approved by:**

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**MARCH 2006**



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**TABLE OF CONTENTS**

1.0	INTRODUCTION .....	3
2.0	SITE DESCRIPTION .....	5
2.1	SITE LOCATION .....	5
2.2	SITE AND VICINITY CHARACTERISTICS .....	5
2.3	NEARBY PUBLIC AREAS OF CONCERN .....	5
2.4	SITE HISTORY .....	5
2.5	OFF-SITE HISTORY .....	7
2.6	DESCRIPTION OF CONTEMPLATED SITE USE .....	8
2.7	SITE GEOLOGY, HYDROGEOLOGY, AND SUBSURFACE CHARACTERISTICS .....	8
2.8	NATURE AND EXTENT OF CONTAMINATION .....	8
2.8.1	Soil, Groundwater, and Soil Vapor Assessments .....	8
2.8.2	Soil Contamination .....	10
2.8.3	Groundwater Contamination .....	11
2.8.4	Soil Gas .....	12
3.0	ALTERNATIVES ANALYSIS .....	12
3.1	EXPOSURE ASSESSMENT .....	12
3.2	REMEDIAL GOALS .....	14
3.3	STANDARDS, CRITERIA, AND GUIDANCE .....	14
3.4	REMEDIAL OBJECTIVES .....	15
3.5	DEVELOPMENT OF REMEDIAL ALTERNATIVES .....	15
3.6	ANALYSIS OF REMEDIAL ALTERNATIVES .....	17
3.6.1	Remedial Alternative #1: Track 1 Cleanup For Unrestricted Use .....	17
3.6.2	Remedial Alternative #2: Track 4 Cleanup For Planned Use .....	18
3.6.3	Preferred Alternative .....	19
4.0	REMEDIAL WORK PLAN .....	20
4.1	SITE PREPARATION .....	21
4.1.1	Sediment and Erosion Control Measures .....	21
4.1.2	Permanent Sheeting .....	21
4.1.3	Grading/On-Site Fill Material .....	21
4.1.4	Permits .....	22
4.2	SOIL REMOVAL .....	22
4.2.1	Extent of Soil Removal .....	22
4.2.2	Excavation .....	22
4.2.3	Dewatering .....	23
4.2.4	Off-Site Disposal Facilities .....	24
4.2.5	Trucking .....	24
4.2.6	Air/Odor Monitoring .....	25
4.2.7	Endpoint Sampling .....	25
4.3	RESTORATION .....	26
4.3.1	Backfill Material .....	26
4.3.2	Backfilling .....	26
4.4	ENGINEERING CONTROLS .....	27
4.4.1	Soil Cap – Track 4 Cleanup .....	27
4.4.2	Vapor Barrier .....	27
4.5	NUISANCE CONTROL .....	27

4.5.1	Rodent Control .....	27
4.5.2	Noise Control .....	27
4.6	CITIZEN PARTICIPATION .....	27
4.7	RECORD KEEPING .....	28
4.8	REPORTING .....	28
4.8.1	Daily Reports .....	28
4.8.2	Final Remedial Report .....	28
4.9	INSTITUTIONAL CONTROLS .....	29
4.9.1	Site Management Plan .....	29
4.9.2	Environmental Easement .....	29
4.9.3	Annual Certification .....	30
4.10	SCHEDULE AND COSTS .....	30
5.0	REFERENCES .....	31

## TABLES

Table 1	On-Site Tanks Identified in Phase 1 ESA
Table 2	Site Specific Soil Action Levels
Table 3	Site Specific Soil Action Level Exceedances

## FIGURES

Figure 1	Project Site Location
Figure 2	Project Site Abutters
Figure 3	Summary Of Previous Site Uses
Figure 4	Environmental Sampling Locations and Anomalies
Figure 5	Limits of Excavation For Foundation and Recreation Area
Figure 6	Site Topographic Map
Figure 7	Inferred Native Soil Contours
Figure 8	Land Use Map
Figure 9	Inferred Bedrock Contours
Figure 10	Overburden Aquifer - Equipotential Map
Figure 11	Bedrock Aquifer - Equipotential map
Figure 12	Geologic Section Locations
Figure 12A	Geologic Cross Section A-A'
Figure 12B	Geologic Cross Section B-B'
Figure 12C	Geologic Cross Section C-C'
Figure 12D	Geologic Cross Section D-D'
Figure 13	Site Survey
Figure 14	Soil Removal Thickness Contours
Figure 15	Locations of Areas of Concern and Site Specific Action Level Exceedances

## **APPENDICES**

Appendix A	Remediation Health and Safety Plan and Expanded Community Air Monitoring Plan
Appendix B	Glossary of Terms (Acronyms) Used in Report
Appendix C	Quality Assurance Project Plan
Appendix D	Soil Sampling Plan
Appendix E	Soil Management Plan
Appendix F	Waterproofing/Vapor Barrier Technical Specifications and Information Sheets
Appendix G	Remedial Investigation Soil, Groundwater, and Soil Vapor Analytical Results
Appendix H	Citizen Participation Activities During Remedial Construction
Appendix I	Estimated Remediation Costs and Schedule
Appendix J	NYSDEC Generic List of Agreements
Appendix K	Electronic Copy of Remedial Work Plan and Appendices
Appendix L	Sanborn Maps and Summary Presentation
Appendix M	Aerial Photograph
Appendix N	Conceptual Site Model
Appendix O	Foundation Construction Plans

## EXECUTIVE SUMMARY

The West 61<sup>st</sup> Street Site (the “Site”) consists of approximately 62,500 square feet (approximately 1.44 acres) located on West 60<sup>th</sup> and 61<sup>st</sup> Streets between West End Avenue and Amsterdam Avenue in Manhattan, New York. The southwestern boundary of the Site is 100 feet east of West End Avenue and approximately 500 feet east of the Hudson River. Specifically, the Site consists of Block 1152, Lots 5, 8, 10, 11, 12, 13, 43, 52, 53, and 55. These parcels are currently occupied by vacant land, except for the northeastern corner of the Site, which is presently used as a commercial parking lot. Residential, industrial, institutional (three schools and a NYC Parks Department pool and community center), and commercial properties (an auto repair shop) are present in the surrounding neighborhood. The Site is located in an area currently going through a transformation from four and five-story residential, industrial, and commercial establishments, to schools and low-rise and high-rise residential buildings containing first-floor retail uses (stores).

The proposed development on the Site is a multi-tenant residential complex with low-rise and high-rise structures, located on the main area of the Site, between West 60<sup>th</sup> and 61<sup>st</sup> Streets. A two-level underground parking garage will be situated beneath two of the buildings. A recreation area, consisting of a tennis court and track, will be constructed on the northeastern portion of the Site, along West 60<sup>th</sup> Street. The intended use of this site is consistent with the current transition of this neighborhood and surrounding area.

A Phase I Environmental Site Assessment (ESA) was performed by AKRF on the Project Site in June 2003 to provide a preliminary Site evaluation to determine whether any existing environmental conditions or past Site uses could affect the intended Site use. The Phase I ESA Report included the findings of a Site inspection, the evaluation of available historical information, and the interpretation of relevant federal and State environmental databases. The Phase I ESA noted the presence of several above ground storage tanks and the likelihood of several below ground storage tanks. Former Site uses included a gasoline station, an automobile repair shop, an iron works, and automobile parking areas. The report also noted the presence of a commercial-industrial facility (Emsig) located east of Lot 13, which produced buttons and fabric. Records indicated that the facility generated metals and solvents in concentrations to be classified as hazardous wastes, and utilized two petroleum storage tanks during its operation from 1926 to 2003. The Phase I ESA identified several recognized environmental conditions (e.g., on-site tanks and previous uses of the Site and the off-site Emsig facility), and recommended that additional information be gathered to further assess the Site.

In October of 2004, Algin Management Company, LLC (Algin) submitted an application to the New York State Department of Environmental Conservation (NYSDEC) to participate in the Brownfield Cleanup Program as a volunteer and was approved to participate in early 2005. Under this agreement, Algin performed a NYSDEC- approved and New York State Department of Health (NYSDOH)-approved remedial site investigation in late summer and early fall of 2005, and submitted a Remedial site Investigation Report (RIR) in January 2006. An Interim Remedial Measure Work Plan was submitted to NYSDEC and NYSDOH in February 2006 to remove one or more suspected underground tanks at three locations, and to remove two distinct locations of contaminated soil containing lead and acetone. The Remediation Work Plan has been prepared to address the environmental conditions identified in the January 2006 RIR.

The remedial investigation activities that occurred at the Site included; a geophysical survey to identify underground tanks; the advancement of soil borings at 18 locations with the collection of two or more samples at each location and analysis for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and metals; the installation of 10

groundwater monitoring wells, with the collection of samples and analysis for VOCs, SVOCs, pesticides, PCBs and metals; and the installation of soil vapor probes with the collection and analysis of soil vapor samples for VOCs. The results of the remedial investigation indicated that underground tanks are suspected at three locations (two in Lot 43 and one in Lot 53), and possibly a fourth location in Lot 8. Elevated levels of lead were detected in the northeastern corner of Lot 43 and a slightly elevated concentration of acetone was detected at one location (MW-4) in Lot 5. Petroleum contamination was identified in the southern portion of the Site along West 60<sup>th</sup> Street. The groundwater flowing from the Site contained one volatile organic compound (benzene) and two pesticides (heptachlor epoxide and 4,4' DDD) slightly above groundwater quality standards. Several metals were identified in concentrations exceeding groundwater standards. The RIR stated that the Site does not pose a significant threat to public health or the environment and indicated that the proposed remedy (construction of the proposed project and removal of contaminated soil) would remove on-site contamination to NYSDEC/NYSDOH standards such that the future occupants would not be exposed to any contaminants remaining at the Site, and any remaining contaminants would not pose a future off-site environmental or health threat.

This Remediation Work Plan includes measures to remove sources of contamination including: underground tanks; contaminated soil directly around the tanks; petroleum-contaminated soil; historic (urban) fill; and construction and demolition debris within the proposed cellar and sub-cellar. In addition, excavation of fill material is necessary in the recreation area and the courtyard to achieve desired elevations for development. Soil beneath the limits of excavation will be tested to ensure that they meet NYSDEC-approved limits in Technical and Administrative Guidance Memorandum (TAGM) # 4046 Recommended Soil Cleanup Objectives (RSCOs) or the allowable site specific soil limits proposed in this document. Another important feature in the Remediation Work Plan is the immediate post-excavation construction of the building foundation and cellar/sub-cellar walls to prevent and/or minimize the recontamination of the remediated areas of the Site. The bottom elevation of the cellar of Building A and the sub-cellar of Buildings B and C are below the groundwater level. Immediate construction of the foundation and surrounding walls will prevent and/or minimize off-site contaminants from entering the Site and avert possible recontamination of the Site. The installation of the foundation and walls is necessary around the entire site, except the eastern section of Lot 43, which is elevated and is not subject to groundwater inflow. The groundwater is in the bedrock and will flow beneath this portion of the Site. To achieve this purpose, the proposed foundation and walls should be constructed: along West 60th Street; along the western property line of Lot 5; along the northern property line of Lot 5; along Building A facing Lot 8; along Building A facing Lots 55, 56, and 57; along Building B facing Lot 8; along Building C facing Lot 55, along the western property line of Lot 55; along West 61<sup>st</sup> Street; along Building C facing the eastern section of Lot 43 (existing parking lot); and along the eastern property line of Lot 13.

The Remediation Work Plan indicates that most of the excavated waste will be transported off-site to out-of-state facilities located in New Jersey and Pennsylvania. Only native soil to be used as backfill will be tested and approved by NYSDEC before its use. The RWP contains several appendices: a Remediation Health and Safety Plan (Appendix A), which addresses Community Air Monitoring to ensure that the surrounding community is protected from any vapors, dust or odors emitted during the excavation and loading of the on-site soil; a Quality Assurance Project Plan (Appendix C) to ensure that appropriate collection and analytical procedures are observed for any environmental or waste characterization sampling activities; a Sampling Plan (Appendix D) to ensure specific collection and analytical procedures are observed to meet the requirements of the facilities receiving the on-site soil and NYSDEC endpoint sample requirements; and a Soil Management Plan (Appendix E) to provide direction for excavation and any stockpiling of the excavated material, and truck waiting, loading and exiting procedures, including haul routes, and measures to minimize dust, odors and noise from the trucks.

## 1.0 INTRODUCTION

The West 61<sup>st</sup> Street Site (the “Site”) consists of approximately 62,500 square feet located on West 60<sup>th</sup> and 61<sup>st</sup> Streets between West End Avenue and Amsterdam Avenue in Manhattan, New York (Figure 1). Specifically, the study Site consists of Block 1152, Lots 5, 8, 10, 11, 12, 13, 43, 52, 53, and 55 (Figure 2). These parcels are currently occupied by vacant land, except for the northeastern corner of the Site, which is presently used as a commercial parking lot. Residential, industrial, institutional (school), and commercial properties are present in the surrounding neighborhood.

A Phase I Environmental Site Assessment (ESA) performed by AKRF, Inc. (AKRF), in June 2003 identified Recognized Environmental Conditions (RECs) for the Site, including former and current land use and potential underground storage tanks. In October 2004, West 60<sup>th</sup> Street Associates, LLC, and West End Enterprises, LLC (the Volunteer), submitted an application to participate in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). The Brownfield Cleanup Agreement for the Site was signed by the Volunteer in March 2005 and has been subsequently executed by NYSDEC. Under this agreement, the Volunteer prepared and submitted a Remedial Investigation Work Plan (RIWP), dated April 2005, which included the Phase I ESA, and a subsequent RIWP Addendum, dated June 2005, which were approved by the NYSDEC. These documents were prepared in compliance with NYSDEC Division of Environmental Remediation guidance document DER-10 and included digital submittals.

The Remedial Investigation (RI) commenced in late summer 2005, and was completed in early November 2005. The RI was performed in conformance with the BCP Guidance Document, DER-10, and a NYSDEC-prepared Cross-Reference Check List (Appendix J). The January 2006 Remedial Investigation Report (RIR) included the tabulated results of all Site investigation data and information. Specific tasks undertaken in this study included a Site-wide geophysical survey, excavation of three test trenches in Lot 8, and the collection and analysis of subsurface soil, groundwater, and soil vapor. A Conceptual Site Model, included as Appendix M of the RIR, explained the occurrence of contaminant sources and their fate and transport at the Site in context of the local Site stratigraphy and hydrogeology. The model utilized both plan views (Figures 6, 7, 9, 10, 11, and 17 of the RIR) and cross-sectional views (Figures 12, 12A 12B, 12C, and 12D of the RIR) of the Site. The potential off-site migration of on-site contaminants, and the potential effect on off-site receptors, are also evaluated in the Qualitative Human Health Exposure Assessment, included as Appendix L of the RIR.

The RIR indicated that the Site did not contain consequential amounts of hazardous waste and, therefore, did not pose a significant threat to public health and the environment. The groundwater leaving the southwestern corner of the Site contained benzene and two pesticides (4,4'-DDD and heptachlor epoxide) in concentrations slightly above their respective groundwater standards. Several metals, whose unfiltered (total metal) sample concentrations were above groundwater quality standards, were detected. Volatile organic compounds (VOCs) were present in the soil vapor collected at five locations around the Site, but were not considered to have an adverse health effect on the area surrounding the Site. Seven on-site Areas of Concern (AOCs) were identified in the RIR. Three identified AOCs are suspected locations of underground storage tanks, identified during the geophysical survey. A fourth tank, located in the basement of a former building, was not verified during the RI field work, but is still considered to be an AOC. The analysis of soil samples collected at two locations indicated the presence of lead and acetone in concentrations warranting removal. The lead was further tested through the Toxicity Characteristic Leaching Procedure (TCLP), and was determined to be a characteristic hazardous waste. The acetone is considered to be a non-hazardous industrial waste. The final on-site AOC identified was an area of apparent petroleum-contaminated soil and groundwater along West 60<sup>th</sup> Street.

An Interim Remedial Measure Work Plan (IRM), dated February 2006, has been submitted to clean up five of the AOCs. The three tank locations (AOC-2, AOC-3, and AOC-4) will be excavated. All liquids, semi-solids, and solids will be removed from the tanks. The tanks will be cleaned and removed and any contaminated soil will be removed. Each material will be transported to an approved disposal, processing, or recovery facility. Post-excavation samples will be collected to verify that all petroleum contamination has been removed from the surrounding fill. The lead-contaminated and acetone-contaminated soil will be excavated and transported off-site to approved disposal facilities. Post-excavation samples will be collected to verify that targeted contaminated soil has been removed. This work will be undertaken with an approved Construction Health and Safety Plan (CHASP), including a Community Air Monitoring Plan (CAMP).

The objectives of this Remedial Work Plan (RWP) are to: develop and conduct a sampling program to classify the existing material to be removed from the Site; evaluate the soil remaining at the Site to determine whether the soil meets Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs), or whether the soil will result in future off-site contamination; assess potential exposure pathways of on-site residual contamination; develop remedial goals for the Site; develop and evaluate appropriate remedial alternatives; and present a preliminary design of the preferred alternative. A complete description of the preferred alternative is presented in Section 3.6.3.

As required under the BCP, the Volunteer has prepared and provided the NYSDEC with a Fact Sheet describing the RWP to be distributed to the Site contact list. A 45-day public comment period will be observed to allow for public review of the document and for submission of comments. In addition, the approved RWP and the Fact Sheet will be made available in the document repository at the following locations:

Riverside Branch  
New York Public Library  
127 Amsterdam Avenue  
New York, NY 10023-6447  
(212) 870-1810

NYSDEC  
One Hunters Point Plaza  
47-40 21<sup>st</sup> Street  
Long Island City, NY 11101  
(718) 482-4897

## **2.0 SITE DESCRIPTION**

### **2.1 SITE LOCATION**

The 1.44-acre Site is located in western Manhattan, approximately 500 feet east of the Hudson River. It is contiguous between West 60<sup>th</sup> and 61<sup>st</sup> Streets, and is situated on the block between West End Avenue and Amsterdam Avenue. The Site consists of Block 1152, Lots 5, 8, 10, 11, 12, 13, 43, 52, 53, and 55. The eastern boundary of Lot 5 is approximately 100 feet east of West End Avenue, as shown on Figure 2.

### **2.2 SITE AND VICINITY CHARACTERISTICS**

The Site is located in an area currently going through a transformation from residential, industrial, and commercial establishments, to schools and residential buildings containing first-floor retail uses (stores). Past and present commercial establishments in the area have included gasoline stations, automobile repair shops, a fabric/button manufacturer that generated hazardous wastes, and a railyard. The immediate area around the Site currently contains residential buildings, three schools, a community center, and an auto repair shop.

### **2.3 NEARBY PUBLIC AREAS OF CONCERN**

There are a number of residences and schools in close proximity to the Site. Residences and a public school are located across West 61<sup>st</sup> Street from the Site. A public school is located adjacent to Lot 43, along West 61<sup>st</sup> Street, at the intersection of West 61<sup>st</sup> Street and Amsterdam Avenue. Residential buildings are being constructed adjacent to Lot 13, along West 60<sup>th</sup> Street and at the southeastern corner of West 60<sup>th</sup> Street and West End Avenue. A New York City Parks Department pool is located across West 60<sup>th</sup> Street. A charter school is located on West 60<sup>th</sup> Street adjacent to Lot 5. The immediate area is shown on Figure 2; the surrounding area is shown on Figure 8.

### **2.4 SITE HISTORY**

The regulatory databases, Fire Department records, electronic Building Department records, historical land-use maps, and visual inspections indicated that the subject block was developed prior to 1907 as residential, transitioned from primarily residential to commercial and industrial uses by the 1950s, and has remained commercial and industrial through the present.

A Phase I Environmental Site Assessment (ESA) was performed by AKRF on the Project Site in June 2003. The ESA report included the findings of a Site inspection, the evaluation of available historical information, and the interpretation of relevant federal and State environmental databases. The aboveground and underground storage tanks identified in the Phase I ESA are listed in Table 1. The pertinent findings of the June 2003 report are summarized below.

#### Lot Uses:

The building on Lot 5 was constructed prior to 1926, and had a partial basement used to house a fuel storage tank and a furnace. The most recent use of this structure was as a garage for the repair and maintenance of taxis. The most recent inspection prior to the Remedial Investigation (RI) identified three 275-gallon tanks on the first floor used to store engine oil, transmission fluid, and used engine oil. A 1,080-gallon vaulted aboveground storage tank was observed in the basement. The building was demolished during the RI field activities.



Lot 8 was occupied by two four-story brick residential buildings with basements. In 1926, the building was identified as containing one 550-gallon underground storage tank. In 1940, New York City (NYC) Building Department records indicated the installation of a gasoline tank, but Site interviews did not confirm the presence of the underground storage tank. In 1961, a City permit for a fuel oil burner was issued and the presence of a 1,050-gallon tank was verified by a previous Site inspection. The building also contained one 55-gallon drum and 8 empty 55-gallon drums. This building was demolished prior to the RI.

Lot 10 was occupied by a vacant one-story building constructed between 1926 and 1951. Historically, this parcel was initially occupied by a four-story residential building, followed by an auto repair shop, followed by a one-story packing case manufacturer, and then by unknown occupants. During the Site visit, one 275-gallon waste oil aboveground storage tank was observed. The building contained piles of debris consisting of auto parts, garbage, and construction debris. Building Department records indicated that a permit application was filed in 1950 to install a gasoline tank. It is unknown whether this gasoline tank was installed and whether it was present at the time of the inspection. This building was demolished before the RI.

Lot 11 contained a two-story brick building constructed between 1926 and 1951, and was occupied by N&P Auto Repair on the first floor with an employee break room on the second floor. Historically, this parcel was occupied by a four-story residential building, then residences and manufacturing, then a two-story auto repair shop, and finally by unknown occupants. During the Site visit, the first-floor garage contained small containers of spray paint, cases of motor oil, two hydraulic lifts with external hydraulic oil canisters, a small solvent degreasing station, and a radiator fluid wash bath. The floor was observed to be stained with automobile fluids and the shop was observed to generally practice poor housekeeping. The building reportedly had a crawl space, but it was inaccessible at the time of the inspection. The building was demolished during the RI field activities.

Lot 12 was occupied by a two-story brick building at the time of the inspection that contained an electrical contractor's office constructed between 1926 and 1951. Historically, this parcel was occupied by a four-story factory building with residences on the fourth floor, followed by a one-story iron works factory, and finally by unknown occupants. There was no evidence of current or historical on-site storage tanks. The building was demolished during the RI field activities.

Lot 13 was occupied by a gravel parking lot used for taxicab parking and a small elevated office in the rear of the lot. Historically, this parcel was occupied by a total of four separate four-story, residential buildings with ground-floor retail uses. The lot was then used for two separate periods as a two-story auto repair shop, and became a vacant lot in 2001. The 1926 historical (Sanborn) map indicated that a 1,000-gallon gasoline underground storage tank was located on the Site. This parcel was listed for three 550-gallon diesel underground storage tanks installed in 1969 on the regulatory database. Their registration expired in 1993. Records maintained by the Fire Department revealed that a permit for three 550-gallon tanks filed in 1984 expired in 1989. These are likely the same tanks listed in the regulatory database. It is unknown whether or not these tanks had been removed or remained on the parcel at the time of the Site inspection. During the Site visit, no evidence of on-site tanks, such as fill caps or vent pipes, was observed. The Phase I ESA noted the presence of a manufacturer directly uphill from and adjacent to this lot. Discharges from this adjacent off-site property, the former Emsig Manufacturing, may have affected on-site conditions. The building was demolished during the RI field activities.

Lot 43 is presently occupied by a gravel paved lot used for commercial parking. Historically, this parcel was occupied by nine five-story residential buildings until 1926. The lot was then used for

parking and as a gasoline station with a small one-story office. It was then a vacant lot from 1976 to 1986, at which time it became a commercial parking lot. NYC Building Department records indicated that an unspecified number of gasoline tank installation permits were applied for in 1947. These permits are most likely associated with the former on-site gasoline station noted on the 1951 Sanborn map. The Phase I ESA stated that these tanks apparently remained in place. The one-story office has not been demolished.

Lot 52 contained a one-story concrete block and brick building used by 3G Studio Corporation for soundstage and set building activities. This building was constructed sometime between 1907 and 1926. There was no evidence to indicate the current presence of petroleum or chemical storage tanks on-site. Historically, this parcel was occupied by a one- to two-story building with a storefront, then a one-story auto repair shop, followed by a metal works factory (c. 1951), and then a one-story building with unknown occupants just prior to its most recent use by 3G Studios. Storage tanks may have been in use on-site in the past, but there were no records to indicate any such tanks. The building was demolished during the RI field activities.

Lot 53 contained a one-story brick building with a basement. It was attached to the building on Lot 52, and was also most recently used by 3G Studio Corporation for soundstage and set building activities. This building was constructed between 1926 and 1951, and was occupied by two five-story residential buildings, followed by a one- to two-story garage, and finally the one- to two-story soundstage. NYC Building Department records indicated that a gasoline tank installation permit was applied for in 1950. Site interviews indicated that there were no active gasoline tanks on-site. The Phase I ESA was unable to ascertain whether this tank was installed, and if so, whether it was subsequently removed. The building was demolished during RI field activities.

Lot 55 was most recently occupied by a gravel and paved lot containing parked trucks and cars. This parking area was used by the east-adjacent 3G Studio Corporation. There was no evidence to suggest the presence of chemical or petroleum storage tanks. Historically, this parcel was occupied by a five-story residential building, and was then used as a parking lot. The former residential building may have utilized a fuel oil storage tank; however, no records indicated such usage.

During the June 2003 Phase I ESA Site inspection, buildings were present on seven of the ten Site lots. Since that time, the Site buildings have been demolished; all that remains is a one-story guard shack located in the eastern portion of the Site on Lot 43, along West 61<sup>st</sup> Street. Concrete slabs have been left in place on Lots 5 and 53. After demolition of the buildings, the Site was graded with on-site construction and demolition (C&D) debris to match the surrounding ground surface elevation. Three aboveground storage tanks from Lots 5 and 12 were closed and disposed of off-site prior to the demolition.

## **2.5 OFF-SITE HISTORY**

The area around the Site contained tenement houses and some commercial establishments, such as an auto repair shop, a parking garage with gasoline tanks, a gasoline station, a brewing company, a junkyard, a bakery, and a public bathhouse. In subsequent years, two public schools were constructed on West 61<sup>st</sup> Street, and a charter school was constructed on West 60<sup>th</sup> Street. From 1926 to approximately June 2003, Emsig Manufacturing, a factory that produced buttons and fabrics, operated adjacent to the Lot 13. Emsig Manufacturing, listed as a hazardous waste generator, used acetone and styrene in their manufacturing process, generating wastes such as ignitable, corrosive, solvents, plating wastes, and metals including barium and chromium. The

property contained two 3,000-gallon fuel oil storage tanks. The original structure was demolished and the property is presently being developed as an apartment building.

## **2.6 DESCRIPTION OF CONTEMPLATED SITE USE**

The proposed development on the Site is a multi-tenant residential complex with low-rise and high-rise structures, located on the Main Area of the Site, between West 60<sup>th</sup> and 61<sup>st</sup> Streets. A two-level underground parking garage would be situated beneath two of the buildings (Buildings B and C). A recreation area, consisting of a tennis court and track, would be constructed on the Eastern Area of the Site, along West 60<sup>th</sup> Street. The layout of these contemplated uses is shown on Figure 4.

## **2.7 SITE GEOLOGY, HYDROGEOLOGY, AND SUBSURFACE CHARACTERISTICS**

The surface topography at the Site and the surrounding area slopes downward from east to west towards the Hudson River. Based on a Site survey by True North Surveyors, Inc., the property lies at an elevation of approximately 61 feet at its highest point, sloping westerly to an elevation of approximately 32 feet at its lowest point, based on the Borough of Manhattan Datum (Figure 6). Geotechnical engineering borings performed by RA Consultants (Appendix P of the Remedial Investigation Report [RIR]) indicate that the bedrock surface is variable and ranges from elevation 40.8 feet in the northeastern corner of the Site to elevation 0 at a point along West 61<sup>st</sup> Street near the northwestern corner (Figure 9). Depth to bedrock varies from 9.5 to 45 feet below ground surface. The geotechnical investigation indicated that the bedrock appears to undulate as well as slope. The bedrock consists of highly-weathered schist that is part of the Manhattan Formation.

The information gathered from the overburden and bedrock groundwater monitoring wells identified groundwater at depths of approximately ten to 16 feet below grade. In the bedrock aquifer, the groundwater elevations ranged from elevation 51 in the northeastern corner of the Site to elevation 31 in the southeastern corner. Based on this information, the estimated flow direction in the bedrock aquifer appears to be slightly towards the southwest. In the overburden aquifer, groundwater was not encountered in the Eastern Area of the Site. In the central portion to the western perimeter of the Site, the groundwater ranged from elevation 30 to elevation 15. Groundwater in the overburden aquifer appears to flow from the northeast to the southwest, ultimately discharging into the Hudson River. The groundwater flow at the Site is probably affected by one or more factors, which may include current and past pumping of groundwater; past filling activities; underground utilities and other subsurface openings or obstructions such as basements or underground parking garages; bedrock geology; and other factors. Groundwater in New York County is not used as a source of potable water.

## **2.8 NATURE AND EXTENT OF CONTAMINATION**

### **2.8.1 Soil, Groundwater, and Soil Vapor Assessments**

A geotechnical investigation was undertaken at the Site in February 2005 by RA Consultants. Sixteen borings were advanced to bedrock at various locations throughout the Site using rotary drill rigs. Four borings were drilled on the southern portion of the Site along West 60<sup>th</sup> Street: one boring (B-10) was placed in the southeastern corner of Lot 13; one boring (B-12) was placed in the southwestern corner of Lot 13; one boring (B-14) was located in the southern portion of Lot 8; and one boring (B-16) was placed in the sidewalk near the southwestern corner of Lot 3. The report and boring location map are included in Appendix P of the Remedial Investigation Report (RIR). Petroleum odors

were noted in three of the boring logs (B-12, B-14, and B-16) and the report narrative. The petroleum odors were noted at depths ranging from 15 to 22 feet below the surface.

In the fall of 2005, a Remedial Investigation (RI) was undertaken at the Site. Between September 8 and 26, 2005, General Borings, Inc., of Prospect, Connecticut, advanced soil borings B-1 through B-18 at locations shown on Figure 4. A hollow-stem auger (HSA) rotary rig with a split-spoon sampler was used to advance the soil borings into the subsurface. All soil samples were characterized according to the Modified Burmeister soil classification system and screened for volatile organic compounds (VOCs) using a Thermo 580B Organic Vapor Meter (OVM) equipped with a photoionization detector (PID). Two or more soil samples from each boring were selected for laboratory analysis based on PID response and visual indications of contamination (e.g., staining, sheens, and odors). If no evidence of contamination was encountered during field screening, one soil sample was collected from the top two feet of the boring (referred to as a surficial sample), and the second soil sample was collected from the two-foot interval directly above the water table. At five locations (B-11, B-14, B-16, B-17, and B-18), a third soil sample was taken at approximately 20 to 25 feet below the surface. These deep samples were used to ascertain the soil quality near the bottom of the proposed excavations for the building construction. The collected soil samples were submitted to Severn Trent Laboratories, Inc. (STL), of Shelton, Connecticut, a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. Soil samples were analyzed for VOCs by Environmental Protection Agency (EPA) Method 8260, semi-volatile organic compounds (SVOCs) by EPA Method 8270, polychlorinated biphenyls (PCBs) by EPA Method 8081, pesticides by EPA Method 8082, and Target Analyte List (TAL) metals by EPA Methods 6000/7000 series.

Ten groundwater monitoring wells were installed between September 8 and 23, 2005, around the perimeter of the Site. Nine borings were converted into groundwater monitoring wells. Seven of these wells were installed in the overburden. At three locations where groundwater was not encountered in the overburden, the groundwater monitoring wells (MW-3, MW-5, and MW-9) were installed in the bedrock. Each groundwater monitoring well, consisting of two-inch diameter PVC, was installed with at least seven feet of the ten-foot slotted screen length below the groundwater level. Each well had a one-foot bottom-capped riser beneath the screen to act as a sump. In the southwestern corner of Lot 5, a second groundwater monitoring well (MW-7D) was installed such that the bottom of the screen was at the bedrock interface. This well was installed to check for dense non-aqueous phased liquids (DNAPLs), and to determine the vertical component of the groundwater flow. Immediately following installation, the monitoring wells were developed using dedicated polyethylene tubing connected to a submersible whale pump. During development, the water was periodically monitored for turbidity and water quality indicators (pH, temperature, dissolved oxygen, oxidation-reduction potential [ORP], and specific conductivity), with measurements collected approximately every five minutes. Development of the well was continued until turbidity was less than 50 nephelometric turbidity units (NTUs) for 3 successive readings, or until water quality indicators stabilized to within 10 percent for pH, temperature, and specific conductivity for 3 successive readings, or until at least 3 well volumes were purged from the well. All well development water was containerized in labeled 55-gallon drums to await off-site disposal.

Groundwater samples were collected at least one week following well development. Low flow sampling techniques were used based on the guidance in the USEPA Region II's Ground Water Sampling Procedure for Low Stress (Low Flow) Purging and Sampling, dated March 16, 1998. More than three well volumes of water were removed from each well, and the turbidity in each well was less than 50 NTUs. Groundwater samples were collected in laboratory-supplied containers according to EPA analytical protocols. Each sample was labeled, sealed, placed in a chilled cooler, and submitted to STL for analysis. Groundwater samples were analyzed for VOCs by EPA Method 8260, SVOCs by EPA Method 8270, PCBs by EPA method 8081, pesticides by EPA Method 8082, and TAL metals by EPA Methods 6000/7000 series (both filtered and unfiltered samples). The groundwater sampling logs are provided in Appendix G.

Seven soil gas vapor probes were installed at NYSDOH-approved locations on the Site between September 20 and 26, 2005. Shallow and deep gas vapor probes were installed at two locations. Due to the presence of bricks and rock in the upper soil or fill material, the soil vapor probes were installed using a 4.5-inch HSA. The shallow and deep holes were drilled to five feet and 12 feet, respectively. An approximately three-inch outside diameter split-spoon sampler was then lowered into the auger and driven six to seven inches below grade. The sampler was withdrawn and an assembly consisting of an anchor point, a six-inch stainless steel screen, and Teflon tubing was lowered into the hole. The three-inch hole was then backfilled with six to eight inches of coarse sand. Next, the hole was filled with hydrated bentonite chips to a depth of three feet below grade. The auger was then lifted several feet, and the hole was backfilled with hydrated bentonite chips, continuing until 12 inches below grade, which was then filled with a concrete mixture and completed with a seven-inch diameter flush-mount "road box."

The vapor probes were sampled for VOCs using EPA Method TO-15. A trip blank, selected at random from the prepared Summa canisters, was sent back to the laboratory, filled by certified clean air, and then analyzed along with the other canisters. Each day of sampling, a new Summa canister was set up in the center of the Site for the purpose of collecting a background sample. One duplicate sample was taken simultaneously with the standard sample at vapor probe 2-D using a "T-connection" device provided by the laboratory. The background samples were set up with eight-hour regulators, which was representative of background conditions during the entire sample collection period.

Prior to the collection of air samples into the Summa canisters, three volumes of air were evacuated at each vapor probe using a peristaltic pump and a Tedlar bag. Prior to the evacuation, the sampling point was covered with a three-foot by three-foot shroud or plastic sheet. A hole was cut in the center of the shroud and the Teflon tube was pulled through the shroud. A tube from a helium tank was placed under the shroud, the edges of the shroud were sealed, and the helium tank was opened. After the Tedlar bag was filled, methane, helium, and PID meters were used to monitor its contents. Helium gas was used as a trace gas for the detection of any leaks in the bentonite seal of the well. Since helium was not detected in any of the Tedlar bags, no additional measures were needed to ensure a proper seal.

### **2.8.2 Soil Contamination**

The overburden soil at the Site, excluding the northeastern area located along West 61<sup>st</sup> Street, consists of two distinct layers. The upper layer, ranging from approximately 3 to 16 feet thickness, is urban fill material, consisting of rock, brick, silt, wood, and glass,

with ash and slag. The lower layer is native soil comprises sand and silt with some gravel. The urban fill material was placed directly on the bedrock in the Eastern Area of the Site (presently used as a parking lot). The native soil varies in thickness from 6 to 26 feet in the Main Area of the Site, located between West 60<sup>th</sup> and 61<sup>st</sup> Streets. The two layers differ in chemical composition. Semi-volatile organic compounds (SVOCs), including carcinogenic polycyclic aromatic hydrocarbons (cPAHs), were detected in the 28 samples collected at the surface and below grade. The concentrations of one or more cPAHs at 20 sample locations were above the New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs). Surficial samples of the fill material contained one VOC (acetone); no other VOCs were detected in the fill material. The fill material did not contain pesticides or polychlorinated biphenyls (PCBs). Each fill sample contained at least one metal above the applicable Eastern US Background. Zinc was identified in every sample at concentrations above the Eastern US background range. Other metals detected in concentrations above the Eastern US background range included aluminum, barium, cadmium, calcium, chromium, copper, lead, magnesium, mercury, and nickel. The native soil did not contain VOCs, SVOCs, pesticides, or PCBs. One or two metals were present in concentrations above Eastern US background concentrations. Two of the 14 native soil samples collected contained one VOC each: acetone and xylenes (total). Three samples contained one or more cPAHs (SVOCs). Eleven of the 14 native soil samples contained one or more metals in concentrations above the Eastern US background ranges; zinc was the most prevalent. Other metals present in the native soil in concentrations above the Eastern US background ranges were aluminum, barium, cadmium, calcium, chromium, lead, magnesium, mercury, and nickel.

The analytical data from B-17 and observations of staff during the drilling of the geotechnical and environmental borings in the southern portion of the Site along West 60<sup>th</sup> Street indicate the presence of petroleum in the soil. Elevated cPAHs were present in the two samples of native soil collected from boring B-17 at depths just above and below the apparent groundwater level. The source of this contamination has not been identified. Acetone was detected in soil samples collected at two locations, MW-4 (12'-14') and MW-6 (0-2'). The Remedial Work Plan (RWP) includes additional soil sampling to provide in-situ sampling of the fill material and native soil at and above elevation 14.5 for classification and disposal options, and to determine the horizontal and vertical extent of the petroleum contamination along West 60<sup>th</sup> Street.

### **2.8.3 Groundwater Contamination**

The groundwater flows through the Site generally from the east and northeast towards the southwest. The groundwater in the eastern (parking lot) and southeastern portions of the Site is present in the bedrock only. No volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyls (PCBs) were detected at concentrations above New York Code of Rules and Regulations (NYCRR) Section 703.5, Groundwater Quality Standards and/or Technical and Operational Guidance Series (TOGS) 1.1.1. Four metals (aluminum, iron, manganese, and sodium) were present in the groundwater samples collected from these upgradient bedrock monitoring wells in concentrations above groundwater standards. Due to the sharp decrease in elevation of the bedrock, the bedrock groundwater discharges into the Site overburden (fill and native soil). Metals were detected in filtered and unfiltered samples

taken from “intermediate” groundwater monitoring wells MW-1, MW-4, and MW-8. In two of these wells (MW-1 and MW-4), no VOCs, SVOCs, pesticides, or PCBs were detected above groundwater standards. The sample collected from MW-8 contained four VOCs (benzene, toluene, ethylbenzene, and xylenes [total]) in concentrations above groundwater standards. One SVOC (naphthalene) was detected at a concentration above its groundwater standard. MW-8 is approximately 80 feet downgradient of boring B-17, the location of the petroleum-contaminated material. This petroleum appears to be flowing on the groundwater table towards the southwestern corner of the Site. The samples collected from downgradient groundwater monitoring wells MW-6, MW-7, and MW-7D contained ten metals (aluminum, cadmium, chromium, iron, lead, magnesium, manganese, nickel, selenium, and sodium), analyzed from unfiltered samples, in concentrations above groundwater standards. Two pesticides (4,4'-DDD in MW-7 and heptachlor epoxide in MW-7D) were present in concentrations above groundwater standards. Benzene was present in a sample collected from MW-7 at a concentration above its groundwater standard at a concentration of 2.0 micrograms per liter [ $\mu\text{g/L}$ ] or 1.0  $\mu\text{g/L}$ . The presence of benzene in the groundwater at location MW-7 indicates that the petroleum contamination has migrated to the southwestern corner of the Site.

#### **2.8.4 Soil Gas**

Volatile organic compounds (VOCs) were detected in the soil vapor probes installed and sampled around the perimeter of the Site. The sample collected from soil vapor probe SG-3D, located near MW-8, contained one tentatively identified compound (TIC) (unknown VOC) at a concentration of 14,000 parts per billion per (1 Liter) volume (ppbv). This vapor probe was installed at a depth of approximately 12 feet below the surface, and was located in the area of the apparent petroleum contamination plume. This area will be excavated to bedrock as part of the construction of the parking garage. Samples collected from the other soil vapor probes contained numerous VOCs in concentrations ranging from one microgram per cubic meter [ $\mu\text{g/m}^3$ ] to 390  $\mu\text{g/m}^3$ , with a few TICs, ranging up to 690 ppbv. A number of the VOCs detected in the soil vapor were not found in the soil or groundwater. This indicates the existence of apparent off-site source(s) of VOCs, which have migrated beneath the Site. In all but two locations (the southeastern and northeastern corners [parking lot] of the Site) the construction of the cellar and sub-cellar will result in the removal of the fill material and, therefore, the structures will be below the groundwater level, thus eliminating any need for soil vapor management. The northeastern corner of the Site will be covered with asphaltic concrete, paving block, and/or two feet of soil for recreation and outdoor use. Therefore, soil vapor management will not be required. A cellar will be constructed to elevation 30 in the southeastern corner of the Site. The structure will be placed directly onto bedrock in half of this section; native soil will remain beneath the structure in the remainder of this section. This area will be further evaluated during the remedial design process to determine whether soil vapor management is needed.

### **3.0 ALTERNATIVES ANALYSIS**

#### **3.1 EXPOSURE ASSESSMENT**

Potentially exposed populations and potential exposure pathways for on-site contamination are evaluated in this section. An exposure assessment for off-site contamination will be included in a

separate off-site investigation. Exposure can only occur if there is a complete pathway from a specific chemical of concern contained in one of the on-site media to a receptor. The mere presence of a chemical at a site is not in itself evidence that a complete exposure pathway will exist. Based on results from the previous Site investigations, contaminated media at the Site include historic fill; contaminated soil (carcinogenic polycyclic aromatic hydrocarbons [cPAHs], pesticides, and metals); petroleum-contaminated soil; and petroleum-, pesticide-, and metal-contaminated groundwater. Potential receptors include: on-site environmental and construction workers for the proposed redevelopment, future residents of the proposed development, future on-site maintenance workers, off-site residents, off-site schoolchildren, off-site maintenance workers, and off-site surface water. Considering the use limitations already in place at the Site and in the surrounding area, the following potential exposure pathways are considered incomplete:

- *Groundwater ingestion:* New York City Code prohibits the use of groundwater for potable purposes; therefore, this exposure pathway is not complete for any current or future on-site or off-site receptors.
- *Soil dermal contact by future on-site residents:* Following Site redevelopment, direct contact with soil would be prevented by the total removal of all on-site soil containing contaminants with concentrations above Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs) if a Track 1 Cleanup is selected, or by the removal of on-site grossly contaminated soil and the presence of structures or impervious surfaces over the majority of the Site's ground surface and two feet of clean fill material covering the small landscaped area in the north-central portion of the Site if a Track 4 Cleanup is selected.
- *Inhalation of vapor by future on-site residents:* The building will consist of a cellar and sub-cellar. Retail stores will be located on the first floor, with residences on the second floor and above. The bottom slab of the sub-cellar is located at an elevation below the groundwater level; vapors will not accumulate or penetrate through the slab. The cellar will be above the water level, but will be sealed to prevent vapor intrusion. An exhaust system will be constructed to vent the parking garage located in the cellar and sub-cellar; this will remove any potential vapor intrusion through the sidewalls above groundwater level. Direct exposure to soil vapors will not occur; the pathway is incomplete.

The following on-site pathways are considered potentially complete:

- *Soil dermal contact by on-site environmental and construction workers and future maintenance workers:* Proposed remediation and construction activities would involve excavation in areas of known soil contamination, which could result in direct contact with the soil. If a Track 4 Cleanup is selected, direct contact with contaminated soil could also occur during future maintenance activities requiring soil excavation (e.g., repair of utility lines or subsurface repair activities in the recreation area). If a Track 1 Cleanup is selected, the contaminated material will be removed and the pathway will be incomplete.
- *Groundwater dermal contact by on-site environmental and construction workers and future maintenance workers:* Proposed remediation and construction activities would involve excavation to below the water table, and dewatering, which could result in direct contact with contaminated groundwater. Future maintenance activities could also involve excavating below the water table, resulting in direct contact with groundwater. If a Track 1 Cleanup is selected, the on-site source of contaminants entering the groundwater will be



eliminated and the groundwater contamination will diminish such that the pathway for exposure in the future may become incomplete.

- *Incidental groundwater ingestion by on-site environmental and construction workers and future maintenance workers:* Remediation and construction workers could ingest small amounts of contaminated groundwater that would be exposed during remediation/redevelopment activities. Incidental groundwater ingestion could also occur during non-potable groundwater use (e.g., for irrigation) by future maintenance workers.
- *Inhalation of particulates and vapors by on-site environmental and construction workers:* Proposed remediation activities involve disturbing contaminated soil, which could result in the release of contaminant-laden dust and contaminant vapors. Dust and contaminant vapors could be released during future maintenance activities requiring excavation.
- *Inhalation of particulates and vapors by off-site residents:* Dust and vapors released on-site during proposed remediation activities and future maintenance activities could migrate off-site, resulting in exposure to off-site residents.
- *Storm water runoff into the Hudson River:* Contaminated soil exposed during the early stages of the proposed remediation activities could become entrained in stormwater runoff, and subsequently enter the Hudson River through the City's stormwater sewer system.

### 3.2 REMEDIAL GOALS

The remedial goals for the West 61<sup>st</sup> Street Site are: to be protective of public health and the environment, given the intended use of the Site; to remove or eliminate on-site identifiable sources of contamination to the extent feasible, regardless of presumed risk or intended use of the Site; and to prevent future re-contamination from off-site sources, through the immediate construction and sealing of footings, sub-cellar walls, and cellar walls to prevent the flow of contaminated groundwater into the Site. These remedial goals are consistent with guidance for Brownfield (Voluntary) Cleanup Program sites in New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation guidance document DER-10.

### 3.3 STANDARDS, CRITERIA, AND GUIDANCE

For unrestricted use of the Site (Track 1 Cleanup), contaminant levels in soil would need to be below Recommended Soil Cleanup Objectives (RSCOs) listed in Technical and Administrative Guidance Memorandum (TAGM) #4046. If a Track 4 Cleanup is selected, considering the contemplated Site use and anticipated institutional controls, Site Specific Soil Action Levels (SSSALs) have been developed that are considered consistent with the remedial goal of protection of human health and the environment. The SSSALs for benzene, toluene, ethylbenzene, and xylene (BTEX); naphthalene; total volatile organic compounds (VOCs); and total semi-volatile organic compounds (SVOCs) are the RSCOs listed in TAGM #4046. The SSSALs for metals are based on Site and nearby background levels in the West 61<sup>st</sup> Street area. The SSSALs are summarized in Table 2.

A table summarizing the analytical results for all soil samples analyzed during the Supplemental Remedial Investigation (RI), additional delineation soil borings, and the soil pile characterization is provided in Appendix G. Soil and groundwater concentrations of metals and compounds exceeding TAGM #4046 RSCOs and 6 New York Code of Rules and Regulations (NYCRR) Section 703.5 Groundwater Quality Standards are shown in **bold**. Locations where soil contaminants exceeding the SSSALs are listed in Table 3 and are shown on Figure 15.

### 3.4 REMEDIAL OBJECTIVES

Based on the potentially complete exposure pathways identified in the exposure assessment and the remedial goals for the Site, remedial objectives have been established as follows:

- Remove Areas of Concern (AOCs) AOC-1, AOC-2, AOC-3, AOC-4, and AOC-7 by excavating known or suspected underground storage tanks, petroleum-contaminated soil around the tanks, lead-contaminated soil, and acetone-affected soil.
- Remove six feet of fill material (containing carcinogenic polycyclic aromatic hydrocarbons [cPAHs] and metals) from the northeastern portion of the Site, and all of the non-petroleum-contaminated fill material in the Main Area of the Site.
- Remove the petroleum-contaminated fill material and native soil along West 60<sup>th</sup> Street, whose benzene, toluene, ethylbenzene, xylene (BTEX); naphthalene; total volatile organic compound (VOC); and semi-volatile organic compound (SVOC) concentrations exceed Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs).
- Remove any on-site native soil or fill material with VOC, SVOC, pesticide, or polychlorinated biphenyl (PCB) concentrations exceeding TAGM #4046 RSCOs (for Track 1 Cleanup) or Site Specific Soil Action Levels (SSSALs) (for Track 4 Cleanup).
- Prevent future on-site re-contamination by preventing and/or minimizing the inflow of contaminated groundwater into the Site through the construction and waterproofing (with a vapor barrier) of footings, sub-cellar walls, and cellar walls. Specifically, these structures are needed to prevent contamination: along West 61<sup>st</sup> Street (Lots 43-55); along West 60<sup>th</sup> Street (Lots 5-13); along the eastern property line of Lot 13; along the western property line of Lot 55; along the northern property line Lots 5 and 8, and along the western property line of Lot 5. The barrier will not be required along the eastern property line of Lot 43, along the southern property line of Lot 43, or along the upper portion of Lot 43, which currently serves as a parking area. This portion of Lot 43 is elevated and does not have groundwater inflow within the overburden.
- Prevent on-site reuse of historic fill or native soil with VOC, SVOC, pesticide, or PCB concentrations exceeding TAGM #4046 RSCOs.
- Prevent inhalation of contaminant vapors and dust.
- Prevent direct contact with contaminants in soil and groundwater.
- Prevent storm water runoff during soil disturbing activities.

### 3.5 DEVELOPMENT OF REMEDIAL ALTERNATIVES

Two remedial alternatives were developed to achieve the remedial action objectives established for the Site, as described in this section. These alternatives are consistent with the Brownfield Cleanup Program (BCP) guidelines for a site determined not to pose a significant threat to public health or the environment.

#### Remedial Alternative #1: Track 1 Cleanup For Unrestricted Use

Alternative #1 involves conducting remedial activities to address subsurface soil and groundwater contamination through source removal. It will consist of excavating and disposing of all tanks, petroleum-contaminated soil, fill material, and native soil that contain contaminant concentrations

above the applicable Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs). This would include removing the urban historic fill from the entire Site; and removing all known and discovered underground storage tanks, petroleum-contaminated soil, acetone-contaminated soil, lead-contaminated soil, and native soil exceeding TAGM #4046 RSCOs. Site controls, including a Health and Safety Plan (HASP), a Community Air Monitoring Plan, and an Erosion and Sediment Control Plan, would be implemented during remedial activities to prevent unacceptable exposure to Site workers, the surrounding community, and nearby surface water. The foundation, footings, and cellar/sub-cellar would be constructed after the removal of the contaminated soil and uncontaminated soil to the desired excavation elevations; the cellar/sub-cellar walls will limit and/or prevent the flow of contaminants in the groundwater from entering and re-contaminating the Site. Construction of this “containment wall” would begin immediately after the soil was removed to the desired construction elevation, and endpoint sampling indicated that no contaminants were present in concentrations above TAGM #4046 RSCOs. Consideration of this alternative fulfills New York State Department of Environmental Conservation (NYSDEC) guidance requiring analysis of a cleanup action that would result in unrestricted use of the Site.

#### Remedial Alternative #2: Track 4 Cleanup For Planned Use

Alternative #2 involves conducting remedial activities to address subsurface soil and groundwater contamination based on the intended or planned use for the Site. The extent of the removal of subsurface contaminants at the Site in this alternative would be to ensure that the occupants of the Site would not be exposed to contaminants left in place and that these contaminants will not create future off-site contamination or adversely affect public health or the environment. The Main Area of the Site will be redeveloped with residential buildings and a parking garage; the Eastern Area will be redeveloped for recreation use. The top six feet of fill material would be removed from the Eastern Area of the Site and covered with asphalt, pavers (walkway), or two feet of clean soil. Some fill material in the Main Area of the Site would remain in the courtyard area, provided that it does not contain contaminants in concentrations above the Site Specific Soil Action Levels (SSSALs). All suspected and discovered underground storage tanks, grossly petroleum-contaminated soil, and soil containing lead in a concentration exceeding the SSSAL would be removed. Petroleum-contaminated and acetone-contaminated soil found to exceed SSSALs would be removed. Site controls, including a HASP, Community Air Monitoring Plan (CAMP), and Storm Water Pollution Prevention Plan (SWPPP), would be implemented during remedial activities to prevent unacceptable exposure to Site workers, the surrounding community, and nearby surface water. The foundation, footings, and cellar/sub-cellar would be constructed after the removal of the contaminated soil and uncontaminated soil to desired excavation elevations; the cellar/sub-cellar walls will limit and/or prevent the flow of contaminants in the groundwater from entering and re-contaminating the Site. Construction of this “containment wall” would begin immediately after the soil was removed to the desired construction elevation, and endpoint sampling indicated that no contaminants were present in concentrations above the SSSALs. Institutional controls would be required to ensure minimal exposure through subsurface excavation in the recreation and courtyard areas, and those areas that are adjacent to the buildings. Consideration of this alternative fulfills NYSDEC guidance requiring analysis of the “Track 4 Cleanup” alternative.

### 3.6 ANALYSIS OF REMEDIAL ALTERNATIVES

#### 3.6.1 Remedial Alternative #1: Track 1 Cleanup For Unrestricted Use

##### Overall Protection of Public Health and the Environment

Alternative #1 would provide overall protection of public health and the environment because all contaminants exceeding Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RCSOs) would be removed from the Site. In addition, future residents would not be exposed to contaminant vapors from off-site sources that may migrate from soil gas into the proposed residential building. There could be some exposure to on-site workers and residents during the remediation process. This will be mitigated through the sequencing of remedial activities and implementation of a Health and Safety Plan (HASP), including a Community Air Monitoring Plan. Prior to the removal of the fill material, the underground storage tanks, lead-contaminated soil, and acetone-contaminated soil will be removed by specialized workers who have undergone the 40-hour HAZWOPER Training. After removal of the fill material, the specialized workers will return to the Site to remove the petroleum-contaminated native soil. The construction workers would follow procedures of an approved Construction Health and Safety Plan (CHASP) to address measures to be observed if an underground storage tank or other unknown condition is discovered. The specialized workers would then return if such conditions are encountered.

##### Compliance with Standards, Criteria, and Guidance (SCGs)

Alternative #1 would comply with the Standards, Criteria, and Guidance (SCGs), because contaminants left in place would be at concentrations below TAGM #4046 RSCOs, which would be protective of public health, and would not result in groundwater or surface water violations.

##### Long-Term Effectiveness and Permanence

Alternative #1 would provide long-term effectiveness and permanence. All material above TAGM #4046 RSCOs would be removed.

##### Reduction of Toxicity, Mobility, or Volume with Treatment

Contaminant toxicity, mobility, and volume would be reduced if Alternative #1 is implemented, as all of the contaminated material that could create a potential adverse effect on public health or the environment would be removed.

##### Short-Term Effectiveness

Alternative #1 would provide short-term effectiveness because there would be controls in place, such as a CHASP and a Community Air Monitoring Plan (CAMP), to minimize direct exposure to contaminants by construction workers for the proposed development. In addition, controlled storm water runoff would prevent contaminants from entering nearby surface water.

##### Implementability

Alternative #1 requires approvals and permits prior to its implementation. This remedial work would be completed within eight months of the commencement of activities.

Cost

It is estimated that implementation of this Alternative would cost approximately \$3,900,000.

**3.6.2 Remedial Alternative #2: Track 4 Cleanup For Planned Use**Overall Protection of Public Health and the Environment

Alternative #2 would provide protection of public health and the environment, provided that all contaminants above Site Specific Soil Action Levels (SSSAL) are removed and institutional controls are implemented and maintained. Future residents would not be exposed to contaminant vapors from on-site or off-site sources that may migrate from soil gas into the proposed residential building, due to the location of the residences (second floor and higher) and the operation of the cellar/sub-cellar ventilation system. There could be some exposure to on-site workers and residents during the remediation process. This will be mitigated through the sequencing of remedial activities and the implementation of a Health and Safety Plan (HASP), including a Community Air Monitoring Plan (CAMP). Prior to the removal of the fill material, the underground storage tanks, soil containing lead in a concentration above SSSAL, and acetone-contaminated soil will be removed by specialized workers who have undergone the 40-hour HAZWOPER Training. After removal of the fill material, the specialized workers will return to the Site to remove the petroleum-contaminated native soil. The construction workers would follow procedures of an approved Construction Health and Safety Plan (CHASP) to address measures to be observed if an underground storage tank or some other unknown condition is discovered. The specialized workers would then return to the work area, if such conditions are encountered.

Compliance with Standards, Criteria, and Guidance (SCGs)

Alternative #2 would comply with the Standards, Criteria, and Guidance (SCGs), because contaminants at the Site would remain beneath the buildings and below the surface in the eastern (recreation) area, and would be at concentrations below SSSALs that would not result in future air or off-site groundwater quality standard violations.

Long-Term Effectiveness and Permanence

Alternative #2 would provide long-term effectiveness and permanence, provided that institutional controls are implemented, observed, and maintained.

Reduction of Toxicity, Mobility, or Volume with Treatment

Contaminant toxicity, mobility, and volume would be reduced if Alternative #2 is implemented, provided that institutional controls are implemented, observed, and maintained.

Short-Term Effectiveness

Alternative #2 would provide short-term effectiveness because there would be controls in place, such as a CHASP and a CAMP, to minimize direct exposure to contaminants by construction workers for the proposed development. In addition, controlled storm water runoff would prevent contaminants from entering nearby surface water.

Implementability

Alternative #2 requires approvals and permits prior to its implementation. This remedial work would be completed within eight months of the commencement of activities.

Cost

It is estimated that implementation of this Alternative would cost approximately \$3,250,000.

**3.6.3 Preferred Alternative**

The comparison of both alternatives is based on the implementation, observance, and maintenance of the institutional controls to ensure that there is no worker exposure during any post-remediation excavation activities, and that cap or cover on the recreation area and the courtyard are maintained, and the basement exhaust ventilation system is operated and maintained. Both alternatives are equally protective of public health and the environment. Alternative #1 will meet all Standards, Criteria, and Guidance (SCG) on-site and off-site; Alternative #2 will not meet on-site SCG (subsurface soil) or on-site groundwater quality standards, but will not cause future off-site groundwater contravention or adversely affect the downgradient surface water (Hudson River). Both alternatives will provide long-term effectiveness and permanence. Alternative #1 will more effectively reduce toxicity and mobility through the removal of all contaminated material above TAGM RSCOs. The short-term effectiveness and implementability are the same for both alternatives. The cost for Alternative #1 is approximately \$500,000 higher than Alternative #2.

Due to cost, Alternative #1 may not be the desired alternative for the entire Site. Three sections of the Site will be discussed regarding the preferred alternatives.

Eastern Area (Parking Lot)

Removal of all of the fill material in the Eastern Area (parking lot) of the Site is not necessary to protect public health and the environment. The area is outdoors and will remain so, and any potential volatile organic compounds (VOCs) in the soil vapor will not have an adverse health impact. The proposed Project includes the removal of six feet of fill material in this area, to be covered by an asphalt tennis court and surrounding asphalt track. The portion of this area along West 61<sup>st</sup> Street will be covered with pavers for the walkway and two feet of clean soil for ornamental gardens and grass (see Figure 4). Therefore, there is no direct exposure (dermal or ingestion) in this recreation area. The amount of vapors emanating from the soil does not appear to pose an inhalation problem. The cost to remove all additional fill material in this area to bedrock, and to transport and place clean soil, is approximately \$475,000. Alternative #2 may be preferred for the Eastern Area of the Site.

Main Area (Buildings and Garage)

Alternative #1 is preferred for the Main Area of the Site, where the buildings are to be constructed. A Track 1 Cleanup is attainable. The cost between the two alternatives, excluding the removal of the soil in the courtyard, is not appreciable; the cost is approximately 2,850,000.

Courtyard Area (Along Western Border)

Both alternatives are protective for this area. The placement and maintenance of two feet of clean soil will prevent direct exposure (dermal and ingestion). The potential vapors emanating from the fill material does not appear to pose an inhalation problem. The cost of removing and replacing all of the fill material in this area compared to removing and replacing two feet is approximately \$400,000. Alternative #2 may be preferred for this area.

## 4.0 REMEDIAL WORK PLAN

Both remedial alternatives involve excavating and disposing of urban fill, petroleum-contaminated soil, lead-contaminated soil above Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs), construction and demolition (C&D) debris in Lot 8, and all hydrocarbon-contaminated soil and historic fill that contain contaminant concentrations exceeding the Site Specific Soil Action Levels (SSSALs). The anticipated sequence of activities is as follows:

- Collect subsurface samples of the urban fill material, soil mixed with C&D debris in Lot 8, and native soil above the desired excavation elevation throughout the Site. Collect additional subsurface soil samples in the southern portion of the Site along West 60<sup>th</sup> Street (AOC-5 on Figure 4) to delineate the suspected petroleum-contaminated soil and groundwater. This information will be submitted to the selected disposal facility for waste acceptability review.
- Collect endpoint samples in the native soil below the anticipated vertical extent of excavation. In each of the borings drilled for waste classification, a third sample will be collected at a depth one to two feet below the anticipated elevation of excavation (e.g., elevation 14.0 for the sub-cellar and elevation 30.0 for the cellar).
- Conduct an Interim Remedial Measure (IRM) to excavate and remove the suspected underground storage tanks and any petroleum-contaminated soil around the tanks in Lots 43 and 53 (AOC-2, AOC-3, and AOC-4 on Figure 4). Remove the lead-contaminated soil at location B/MW-1 (0-2') (AOC-1 on Figure 4), and remove the acetone-affected soil at B/MW-4 (12'-14') (AOC-7 as shown on Figure 4). Depending upon the waste analysis by the disposal facility, the acetone-affected soil at location B/MW-7 (0-2') may be removed.
- Remove six feet of fill material on the eastern or upper portion of Lot 43 to accommodate the recreation area. Excavate an additional 14 feet of fill material along the western edge of the Eastern Area of the Site to accommodate the basement exhaust system. If a Track 1 Cleanup is selected, additional soil will be excavated to bedrock.
- Remove fill material in the areas of the footprint of the building sub-cellar, and move fill to elevation 30.0 in the areas of the footprint of the building cellar. Remove material to elevation 37.0 in the courtyard area. If a Track 1 Cleanup is selected, all fill material exceeding TAGM #4046 RSCOs will be removed.
- Remove any underground storage tanks and petroleum-contaminated soil discovered during the removal of the fill material in accordance with the Construction Health and Safety Plan (CHASP).
- Remove the suspected petroleum-contaminated material (fill and native soil) along West 60<sup>th</sup> Street.
- Remove the native soil to the desired elevation.
- Conduct post-excavation verification sampling to determine compliance with the SSSALs (Track 4 Cleanup) or TAGM #4046 RSCOs (Track 1 Cleanup).

- Construct the foundations, footings, and cellar and sub-cellar walls with membrane sheet waterproofing/vapor barrier in each portion of the Site immediately after the surrounding soil is found to meet the selected cleanup track standards.

During the removal of the suspected petroleum-contaminated material, plastic sheeting and/or foam may be used during excavation of this area to contain odors and dust. A CHASP, a Community Air Monitoring Plan, and an Erosion and Sediment Control Plan will be implemented to ensure protection of Site workers, the surrounding community, and nearby surface water during the soil excavation activities. The cellar floor slab and walls may be constructed with a vapor protection material, and institutional controls will be implemented to prevent exposure to residual contamination that is left in place following soil removal if a Track 4 Cleanup is selected. All remediation work will be conducted in accordance with this Remedial Work Plan (RWP). Any development activities, such as the placement of footings or other foundation, conducted concurrently with the remediation activities will not interfere with the work described in this RWP. The various elements of the proposed remedial alternative are described in more detail in the following sections. Technical specifications for contractor implementation of the RWP are included as Appendix F.

#### **4.1 SITE PREPARATION**

##### **4.1.1 Sediment and Erosion Control Measures**

Sediment and erosion control measures will be installed at the Site prior to conducting any ground-intrusive work. These measures will be installed according to the requirements of the Erosion and Sediment Control Plan, and all applicable or relevant and appropriate federal, State, and local laws. The measures will provide for abatement and control of environmental pollution arising from proposed remediation and construction activities. The control measures will include silt fencing around the perimeter of the Site, drainage inlet protection, and stabilized construction (gravel) pads at each construction entrance.

##### **4.1.2 Permanent Sheeting**

Permanent interlocking steel sheeting may be installed around the southern, western, and northern perimeters of the Main Area of the Site to isolate the Site from potential off-site future contaminant migration. The sheeting will be driven into the native soil. The seams in the sheeting will be sealed with hydrocarbon-resistant Adeka gaskets (or equivalent) to prevent the infiltration of contaminants back onto the Site.

During soil remediation activities, the sheeting will serve to limit lateral and vertical migration of groundwater into the excavation area, thereby limiting the volume of dewatering fluids that will need to be treated and discharged. The sheeting will also serve to prevent collapse of the excavation sidewalls to ensure that the excavation areas will fit within the containment structures and allow excavation up to the property lines. During the remediation activities, fill material meeting the Site Specific Soil Action Levels (SSSALs) will be backfilled within the confines of the permanent sheeting (if a Track 4 clean up is selected), which will serve to further isolate potential contaminants from the surrounding environment.

##### **4.1.3 Grading/On-Site Fill Material**

After removal of the suspected petroleum-contaminated material, filling may be necessary to raise the excavated area to the desired elevation for the foundation. On-site fill material may be used to fill these depressed areas if it meets environmental and



geotechnical criteria. In areas using a Track 4 Cleanup, only fill material demonstrated not to exceed Site Specific Soil Action Levels (SSSALs) will be utilized. In areas using a Track 1 Cleanup, only fill material demonstrated not to exceed Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs) will be utilized. This data will be from the pre-excavation in-situ testing, or from composite testing of segregated piles, if required. All soil stockpiling and grading activities will be performed in conformance with the Erosion and Sediment Control Plan.

#### **4.1.4 Permits**

All necessary permits will be obtained prior to commencing the remediation work. The required permits include:

- New York City Department of Sanitation (DOS) landfill permit (16 RCNY Chapter 3) for placement of clean fill;
- A New York City Department of Environmental Protection (NYCDEP) sewer connection permit (15 RCNY Chapter 19) for discharge of groundwater from dewatering operations to the City sanitary sewer;
- Filing of a Notice of Intent (NOI) with the New York State Department of Environmental Conservation (NYSDEC) to obtain coverage under New York State Pollutant Discharge Elimination System (SPDES) General Stormwater Permit for Construction Activity (Permit Number GP-02-01); and
- Submitting a permit application to the New York City Department of Buildings for excavation and foundation work to construct the footings, sub-cellar, and cellar walls.

## **4.2 SOIL REMOVAL**

### **4.2.1 Extent of Soil Removal**

The soil removal area will extend laterally and vertically to the limits of excavation, as shown on Figure 5. In the proposed recreation area located in the northeastern section of the Site, a minimum thickness of six feet of fill material (Track 4 Cleanup) will be excavated through the entire area (approximately 150 feet by 100 feet.) In the western portion of this area, an additional excavation of approximately 14 feet will be undertaken to place the ventilation system to elevation 39.6, as shown on Figure 14. In the Main Area of the Site, excavation to construct the cellar and sub-cellar will occur within the outline shown on Figure 5. Approximately three feet of fill material will be excavated in the courtyard area (see Figure 5) to elevation 37.0. If a Track 1 Cleanup is selected, the excavation for the cellar and the courtyard area will continue to the native soil. For a Track 4 Cleanup, the estimated amounts of material to be excavated and disposed of off-site are 31,000 cubic yards (cy) of fill material, 13,000 cy of native soil, 3,000 cy of bedrock, 5,000 cy of petroleum-contaminated material, 1,500 cy of construction and demolition (C&D) debris, 15 cy of acetone-affected soil, and 8 cy of lead-contaminated soil. A Track 1 Cleanup would require the additional excavation of approximately 6,500 cubic yards of fill material and native soil.

### **4.2.2 Excavation**

All excavation and loading of soil will be performed on-site. The sequence involves the removal of five Areas of Concern (AOCs) (AOC-1, AOC-2, AOC-3, AOC-4, and AOC-

7), followed by the removal of the fill material throughout the Site. The petroleum-contaminated material (fill material and native soil) will then be removed, followed by the uncontaminated native soil. All material destined for off-site disposal will be loaded directly onto the haul vehicles, if possible. The only material that may be stockpiled would be the native soil. Any off-site fill material will be tested prior to transportation to the Site in accordance with the requirements of the intended receiving facility.

Endpoint sampling at the bottom of the excavation will occur prior to excavation. Additional endpoint samples will be taken, if required. Sidewall endpoint samples will be taken at the completion of excavation.

#### **4.2.3 Dewatering**

Dewatering will be performed as necessary to complete the proposed work. Submersible pumps will be used to pump groundwater from gravel-lined sumps dug at the bottom of the excavations. The chemicals present in the groundwater samples collected from groundwater monitoring wells MW-6, MW-7, MW-7D, and MW-8 are in concentrations below the maximum allowable limits set by the New York City Department of Environmental Protection (NYCDEP) for discharge into the combined sewers. A sample of the on-site water will be collected and analyzed for NYCDEP discharge parameters to ensure that effluent limitations are met. Additional sampling and analysis of the dewatering discharge will be completed as required by the NYCDEP. Analysis of the groundwater collected from three downgradient groundwater monitoring wells located in the southeastern corner of the Site, and one intermediate groundwater monitoring well located along West 61<sup>st</sup> Street, indicates that the collected water will meet the majority of the discharge limitations with the exception of total solids and total suspended solids. To address this issue, the collected on-site water will be pumped into a settling tank before being discharged into the sewer system.

Should the chemical analysis of future collected samples of the groundwater and/or surface water indicate exceedances of the discharge limits, the groundwater and surface water will be pumped to a treatment unit consisting of two settling tanks to remove suspended solids, a separator to remove free-phase product, if any, filters to remove suspended particles from the water stream, and liquid phase granulated activated carbon (GAC) units to remove dissolved organic contaminants. Vents in the holding tanks will be connected to a vapor phase GAC unit to remove volatile organic compounds (VOCs) from the vented air stream. The treated water will be discharged to the sanitary sewer through a sewer connection to the existing 12-inch New York City sanitary sewer under West 60<sup>th</sup> Street, or transported to an approved facility by a hauler with a valid 6 New York Code of Rules and Regulations (NYCRR) Part 364 Waste Transporter Permit. The sewer connection and discharge will be conducted under a sewer connection permit from the NYCDEP.

A sample of the treated water will be collected prior to the sewer connection at the time of system activation, and will be analyzed for NYCDEP discharge parameters to ensure that effluent limitations are met. Additional sampling and analysis of the dewatering discharge will be completed as required by NYCDEP. All waste materials from the water treatment system (e.g., spent carbon and bag filters, sediment from the settling tanks) will be characterized and disposed of at an appropriate waste receiving facility. No dewatering fluids will be recharged back to the land surface or subsurface of the Site.

#### 4.2.4 Off-Site Disposal Facilities

The on-site fill material, native soil, construction and demolition (C&D) debris in Lot 8, and petroleum-contaminated material will be transported to facilities located in New Jersey and Pennsylvania. The fill material and native soil that meets the chemical and geotechnical criteria for beneficial reuse will be transported to either the EnCap-Meadowlands Redevelopment Site in Lyndhurst and Rutherford, New Jersey, or the Former Allied Signal Site in Elizabeth, New Jersey. Material that does not meet the criteria for acceptance for beneficial reuse will be transported to one or more of the following facilities: Soil Safe in Logan, New Jersey; Clean Earth of Philadelphia, Pennsylvania; and/or Clean Earth of Carteret, Inc., of Carteret, New Jersey.

If facilities located in New York State are selected, the various waste components will be classified consistent with applicable New York State regulations. Hazardous waste determination and classification will be based on 6 New York Code of Rules and Regulations (NYCRR) Part 360. Non-hazardous waste will be characterized consistent with 6 NYCRR Part 360. Based on these regulations the following tentative classifications are as follows: Municipal Waste – fill material, and native soil and bedrock containing contaminants in concentrations above Site background; C&D Debris – Lot 8; Petroleum-Contaminated Soil – any fill material, native soil, and C&D debris containing petroleum above TAGM; C&D Debris (“Exempt”) as defined in 6 NYCRR Subpart 360-7.1 – uncontaminated native soil and bedrock; and characteristic hazardous waste – any on-site material containing lead that exceeds the maximum allowable value for lead when analyzed by the Toxicity Characteristic Leaching Procedure (TCLP).

#### 4.2.5 Trucking

All trucks hauling hazardous waste, non-hazardous industrial waste, and petroleum-contaminated waste will have valid waste transporter permits from the New York State Department of Environmental Conservation (NYSDEC) as per 6 New York Code of Rules and Regulations (NYCRR) Part 364, and any applicable permits required by the City of New York. The trucks will be fully lined and covered with plastic sheeting followed by a tarp. All loads will be covered before the trucks leave the Site. Each cover will be tight-fitting; loose-fitting canvas truck covers will be prohibited. If deemed necessary, Biosolve will be sprayed on the truckloads before placement of the cover.

The decontamination pads for the Main Area will be located at the eastern exit gate on West 60<sup>th</sup> Street, and at the exit gate currently serving the parking lot in the Eastern Area of the Site. At each point of egress, a pad composed of gravel or crushed stone will be constructed. At each gravel pad, soil will be washed off the exterior, undercarriage, and wheels of the trucks before leaving the Site. Wash water will be collected for treatment and disposal. Prior to leaving the excavation area, all petroleum-contaminated material containers and transport vehicles will be inspected for evidence of exterior contamination (including inside of wheels and undercarriage). Any such contamination will be removed on the decontamination pad before the truck exits the Site.

All trucks will enter the Site from West 60<sup>th</sup> Street whenever possible. Trucks picking up excavated material from the Eastern Area (parking lot) of the Site will enter from West 61<sup>st</sup> Street. Queuing of trucks will be performed on-site only. Trucks will not stop or idle in the neighborhood surrounding the Site. After loading, all trucks will proceed directly to Amsterdam Avenue (10<sup>th</sup> Avenue), travel north to West 66<sup>th</sup> Street, and then travel west on West 66<sup>th</sup> Street to West End Avenue (11<sup>th</sup> Avenue). From that location, the

trucks will head either north to the Cross Bronx Expressway, or south to the Lincoln Tunnel. No stopping or staging in the neighborhood between the Site and the Lincoln Tunnel or the Cross Bronx Expressway will occur. The specified truck routes to and from the Site and the Lincoln Tunnel, and from the Site to the Cross Bronx Expressway, are shown on Figures 1 and 2 in Appendix E. The specific truck route(s) between the Site and the designated disposal facilities will be determined once the appropriate disposal facilities are identified.

#### **4.2.6 Air/Odor Monitoring**

Work zone air monitoring at and around the Site will be performed in accordance with the Remediation Health and Safety Plan (RHASP) provided in Appendix A. Air monitoring at the Site perimeter and in the surrounding community will be performed in accordance with a Community Air Monitoring Plan (CAMP) provided in Section 4.7 of the RHASP, and an Expanded Community Air Monitoring Plan and Odor/Vapor Control Plan, included as Appendix F in the RHASP. The CAMP specifies monitoring at the Site perimeter for organic vapors, particulates (PM<sub>10</sub>), odors, and visible dust. Walk-around air monitoring, including downwind monitoring locations near the three neighborhood schools, will be conducted in accordance with the CAMP.

#### **4.2.7 Endpoint Sampling**

Endpoint samples will be collected from borings advanced during the waste characterization activities. The endpoint sample will be a grab sample, taken from a two-foot split-spoon sampler, driven two feet below the anticipated depth of excavation elevation. The samples will be collected at a rate of one sample for every approximately 1,800 square feet (an average grid size of 42 feet by 42 feet). The collected samples will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds, (SVOCs), TCL pesticides and polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) metals. The analysis will occur at an approved New York State Department of Health (NYSDOH)-approved laboratory using Category B Deliverables.

Endpoint samples in the area of the suspected petroleum contamination will be collected after the removal of the contamination consistent with the requirements of Division of Remediation guidance memorandum DER-10. For larger areas, a sample grid will be established and samples will be collected at a 30-foot interval (one sample per 900 square feet). The endpoint samples will be collected at 30-foot intervals (900 square feet). In the areas of petroleum contamination, sidewall samples will be taken at 30-foot intervals (900 square feet) after completion of the removal of the contaminated soil. If the sides of excavation are limited to the sheeting, sidewall endpoint soil samples outside the sheeting limits will be collected via soil borings advanced along each side of the sheeting at an interval of approximately 50 feet. The sidewall samples will be collected from a depth corresponding to the approximate center of the contamination. Endpoint samples will be analyzed in the following manner:

- Sidewall and bottom endpoint samples in areas where no further construction or waste removal is anticipated will be analyzed for TCL VOCs, SVOCs, pesticides and PCBs, and TAL metals using Category B Deliverables.
- Sidewall and bottom endpoint samples in petroleum-contaminated areas where further excavation or waste removal is anticipated will be analyzed for Spills

Technology and Remediation Series (STARS) VOCs (Environmental Protection Agency [EPA] Method 8201) or TCL VOCs (EPA Method 8260) using Category A Deliverables.

### **4.3 RESTORATION**

#### **4.3.1 Backfill Material**

Fill material from off-site sources brought to the Site will not consist of any material considered to be a hazardous waste, construction and demolition (C&D) debris, municipal waste, industrial commercial waste, or any other material that must be disposed of at a Part 360-permitted facility. Material from a quarry, a registration facility, and “exempt” C&D debris under 360-7.1 will be considered for acceptance. Approval from the New York Department of Environmental Conservation (NYSDEC) will be obtained prior to the acceptance of any of these materials. No organic material will be considered for use as a fill material.

On-site fill material and native soil may be considered for use as backfill for a Track 4 Cleanup. These materials can be used only if their contaminant concentrations are less than the Site Specific Soil Action Levels (SSSALs). Only native soil demonstrated to contain contaminants in concentrations less than the Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs) can be placed within the top two feet of the surface beneath the courtyard area and beneath the ornamental flower, grass, and pavers in the recreation area. If a Track 1 Cleanup is selected, only native soil can be used as a backfill material, provided that the contaminant concentrations are below TAGM #4046 RSCOs. Fill material and/or native soil to be used will be excavated and staged in approximately 1,000-cubic yard (cy) stockpiles and characterized for on-site reuse as backfill. Soil meeting the SSSALs will be used to backfill the soil excavations (Track 4 Cleanup only). All soil stockpiling, handling, and characterization will be conducted according to the requirements of the Erosion and Sediment Control Plan and Soil Management Plan, included in Appendix E. Historic fill that does not meet the SSSALs will be delivered to an appropriate disposal facility in accordance with the Soil Management Plan. If sufficient on-site fill material meeting the SSSALs (Track 4 Cleanup) or TAGM #4046 RSCOs (Track 1 Cleanup) is not available for reuse, additional fill material will be imported from off-site for backfilling the excavations. The material will be obtained only from a source that is approved by the New York State Department of Environmental Conservation (NYSDEC).

#### **4.3.2 Backfilling**

If excavation of waste material (e.g., petroleum-contaminated soil) necessitates backfilling, approved fill material will be used to achieve proper elevation. Depending on the selected cleanup track (Track 1 or Track 4), the material will meet the Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs) or Site Specific Soil Action Levels (SSSALs), respectively. No backfilling will occur without prior New York State Department of Environmental Conservation (NYSDEC) approval. Air monitoring will be performed during all backfilling activities in accordance with the Health and Safety Plan (HASP) and Air Monitoring Plan.

#### **4.4 ENGINEERING CONTROLS**

##### **4.4.1 Soil Cap – Track 4 Cleanup**

A cap will be placed over the entire Site. The cap for a Track 4 Cleanup, if selected, will prevent exposure to underlying soil that could contain contaminant concentrations exceeding New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objectives (RSCOs). The Site cap will consist of: on-site buildings in the Main Area; asphalt paving, paving blocks, and two feet of clean soil for the recreation area; and two feet of clean soil in the courtyard area, located west of the proposed buildings. A marker layer (e.g., orange construction fencing or other geotextile) will be installed under the entire cap in the recreation area and beneath the two-foot clean soil cap in the courtyard to demarcate the interface between reused fill material and clean fill/paving/structures. The top six inches of the soil cap will consist of soil suitable for sustaining vegetative growth.

##### **4.4.2 Vapor Barrier**

The proposed development on the Site will comprise high-rise and low-rise residential structures on the Main Area of the Site, located between West 60<sup>th</sup> and 61<sup>st</sup> Streets. The first floor of the buildings will be retail stores. Private residences will begin on the second floor and continue upward. The sublevels of the building will include a cellar and sub-cellar. A two-floor parking garage will be constructed in the entire sub-cellar and approximately half of the cellar. An exhaust system will be constructed to remove the air from the garage. The floor of the sub-cellar will be beneath the groundwater level and will be sealed with membrane waterproofing to prevent water intrusion. Portions of the cellar not situated above the sub-cellar will be on soil above the groundwater elevation. If required, an appropriate material will be placed beneath the slab as a vapor barrier.

#### **4.5 NUISANCE CONTROL**

##### **4.5.1 Rodent Control**

Although there is no current evidence of rodents, traps will be placed around the Site periphery to control rats and other rodents. The traps will be replaced as required, but at a minimum frequency of once every month. All general refuse generated during remediation/construction activities will be containerized in covered dumpsters or roll-offs, which will be emptied on a weekly basis to avoid attracting rodents. In addition, no food will be stored on-site.

##### **4.5.2 Noise Control**

All construction vehicles and equipment will be equipped with appropriate noise control devices to maintain noise levels that conform to the latest Occupational Safety and Health Act (OSHA) standards and all State and local regulations. All mufflers and noise control devices will be properly maintained and replaced, as necessary. All pumps and other equipment that are required to operate during normal non-working hours will be, to the extent possible, electrically driven.

#### **4.6 CITIZEN PARTICIPATION**

Citizen participation (CP) activities will include preparation of a Project Fact Sheet. The Project Fact Sheet will be submitted in WordPerfect format for New York State Department of Environmental Conservation (NYSDEC) approval, and will include: a Site description; a

summary of the remedial action objectives and the selected remedial alternative; a Project schedule; and a list of sources of additional information. The approved Fact Sheet will be sent via certified mail to persons on the Project mailing list (included as Appendix H) prior to the start of remedial activities, with certification of the mailing provided to the NYSDEC Project Manager.

#### **4.7 RECORD KEEPING**

A Project logbook will be maintained during all remediation activities, and will be available for New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) inspection. The following information will be recorded in the Project logbook:

- Date, weather, and Site conditions;
- Names and companies of all on-site personnel;
- Makes, models, and calibration records for all monitoring equipment;
- Makes and models of remediation equipment;
- Sample numbers and descriptions;
- A truck log listing license plate numbers and arrival/departure times; and,
- Site sketches showing excavation areas, sampling locations, and stockpiles (if any).

Copies of all waste manifests and bills of lading will be maintained with the Project logbook.

#### **4.8 REPORTING**

##### **4.8.1 Daily Reports**

Daily reports will be provided to the New York State Department Environmental Conservation (NYSDEC)/New York State Department of Health (NYSDOH) Project Managers via e-mail during excavation activities. The reports will include a summary of daily activities and air sampling results (including any exceedances), and will describe any odor or dust problems and corrective actions taken. A Site map will be submitted, as required, to identify work areas described in the reports. Any time-sensitive information (e.g., the occurrence of a spill or an emergency situation) will be communicated directly to the NYSDEC Project Manager.

##### **4.8.2 Final Remedial Report**

Upon completion of Site remediation, a Final Remedial Report will be prepared and submitted to the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH). The Final Remedial Report will include:

- Photographs of remedial activities (submitted on compact disk);
- As-built drawings for all constructed elements (e.g., sub-floor slab vapor barrier);
- Monitoring and endpoint sampling results collected during implementation of the remedy;
- A Site Management Plan for the remedy;
- An accounting of the destination of all material removed from the Site and associated manifests/bills of lading and certificates of disposal from the respective receiving facilities;

- Documentation of source approval and sampling for backfill materials imported from off-site;
- A Site survey showing locations of all primary contaminant sources (including, but not limited to, tanks and hotspots) identified during investigation and remediation activities; and,
- An itemized description of costs incurred during Site remediation.

The Final Remediation Report will include a certification by a Professional Engineer that all remediation and development excavation activities (i.e., grading cuts, utility trenches, footings, etc.) were completed in accordance with the contaminant field screening methodology defined in the Remedial Work Plan (RWP), inclusive of the Soil Management Plan (Appendix E).

## **4.9 INSTITUTIONAL CONTROLS**

### **4.9.1 Site Management Plan**

In the event that a Track 1 cleanup is not selected for the entire site, a final site management plan will be prepared upon completion of the remedial activities to specify future soil handling requirements, operation and maintenance (O&M) procedures, and Site use restrictions. The Site Management Plan will include the Project's Soil Management Plan; Health and Safety Plan (HASP); Erosion and Sediment Control Plan; and an Operation, Maintenance, and Monitoring (OM&M) Plan. The Soil Management Plan, HASP, will be included as Appendices to this document; the OM&M Plan will be prepared at the completion of the remedy and will include the following:

- As-built drawings and descriptions of all engineering controls implemented as part of the long-term remedy (i.e., vapor mitigation system, Site cap, containment wall), including manufacturer cut sheets of any remediation equipment;
- O&M procedures, including an inspection protocol, to ensure proper functioning of the remedy;
- Vapor and groundwater monitoring plans to evaluate the performance of the remedy; and,
- A contingency plan describing procedures to be conducted in the event of an emergency.

The OM&M Plan will be updated periodically during use to reflect changes in Site conditions, or the manner in which the remedy is operated and/or maintained.

### **4.9.2 Environmental Easement**

An environmental easement will be recorded for the Site to enforce the following use restrictions:

- Installation of groundwater wells for potable and non-potable purposes (e.g., car washing, non-contact cooling water) will be prohibited;
- Any future excavation activities must be conducted in accordance with the Site Management Plan; and,



- The vapor mitigation system, soil cap, and permanent containment wall must be operated and maintained according to the Site OM&M Plan.

The environmental easement will be recorded in the New York County Clerk's office and will include: a description of the use restriction; a map showing the area of the restriction; a written agreement by the property owner to establish and maintain the institutional and engineering controls; and a copy of the Site Management Plan. Prior to recording the environmental easement, notification of the intent to establish the institutional controls will be sent to all adjacent property owners, New York State Department of Health (NYSDOH), New York City Department of Health and Mental Hygiene, and the New York County Clerk's office.

#### **4.9.3 Annual Certification**

In the event Track 4 is selected for any portion of the Site, an Annual Certification will be submitted to the New York State Department of Environmental Conservation (NYSDEC) to document the efficacy of the remedy. The Annual Certification will be signed by a Professional Engineer (P.E.), and will certify that: the institutional and/or engineering controls are unchanged from the previous certification; nothing has occurred that would impair the ability of the controls to protect public health and the environment; and no violations of the Site Management Plan have occurred. The certification will include the monitoring data collected during the reporting period as specified in the Site Management Plan.

#### **4.10 SCHEDULE AND COSTS**

Fieldwork for the remedial actions will be scheduled from 7:00 AM to 5:00 PM on weekdays. Prior New York State Department of Environmental Conservation (NYSDEC) approval will be obtained for work conducted outside of these hours. The excavation and removal of the on-site soil, based on an estimated excavation and transportation rate of 1,000 to 1,500 cubic yards per day, is anticipated to require two months to complete. The excavation is scheduled to commence mid-to-late May 2006 and will be completed by the end of July. The construction of the foundation and walls will require four to five months to complete. This work should be completed by the end of 2006. The estimated cost for the excavation, loading the hauling vehicles, and the construction of the foundation and walls is \$10,000,000. This cost may increase if a Track 1 Cleanup requires additional excavation and backfilling. The cost for the transportation and disposal of the on-site soil is dependent upon the cleanup track selected. Appendix I includes Track 1 and Track 4 cost estimates for the Eastern Area and the Main Area. The recommended scenario is a Track 1 Cleanup for the Main Area (the three proposed buildings and the courtyard) and a Track 4 Cleanup for the Eastern Area (the recreation area). The transportation and removal cost this scenario is \$3,700,000.

## 5.0 REFERENCES

1. AKRF Inc.; *Phase I Environmental Assessment, Algin Properties, West 61<sup>st</sup> Street Project*, New York, New York; June 2003.
2. AKRF, Inc.; *Remedial Investigation Work Plan, West 61<sup>st</sup> Site*, New York, New York; April 2005.
3. EDR, Sanborn, Inc.; *Historical Fire Insurance Maps*; 1907, 1926, 1951, 1976, 1986, and 2001.
4. AKRF, Inc.; *Revised Health and Safety Plan, West 61<sup>st</sup> Street Site*, New York, New York; June 2005.
5. AKRF, Inc.; *Remedial Investigation Work Plan Addendum, West 61<sup>st</sup> Street Site*, New York, New York; June 2005.
6. AKRF, Inc.; *Revised Citizen Participation Plan, West 61<sup>st</sup> Street Site*, New York, New York; June 2005.
7. AKRF, Inc.; *Remedial Investigation Report, West 61<sup>st</sup> Street Site*, New York, New York; January 2006.
8. AKRF, Inc.; *Interim Remedial Measure Work Plan, West 61<sup>st</sup> Street Site*, New York, New York; February 2006.
9. NYSDEC, *Draft DER-10 Technical Guidance for Site Investigation and Remediation*, Division of Environmental Remediation; December 2002.
10. NYSDEC, *Draft Voluntary Cleanup Program Guide*, Division of Environmental Remediation; May 2002.
11. NYSDEC, *Technical and Administrative Guidance Memorandum #4046*, Division of Environmental Remediation; December 2000.
12. NYSDEC, *6 NYCRR Part 371, Identification and Listing of Hazardous Wastes*; September 2005.
13. NYSDEC, *6 NYCRR Part 360, Solid Waste Management Facilities*; November 1999.

## TABLES

**Table 1**  
**On-Site Tanks Identified in Phase 1 ESA**  
**West 61<sup>st</sup> Street, New York, NY**

Lot	Source	Date	Capacity (gallons)	Contents	UST/AST
5	Sanborn Maps	1926	550	GT	UST
	Site Visit, Fire/Bldg Dept	1940	1,080	FO	AST
	Site Visit	* * *	275 275 275	Motor Oil Waste Oil Transmission Oil	AST AST AST
8	Sanborn Maps	1926	550	GT	UST
	Bldg Dept	1940	*	GT Permit	*
	Site Visit, Bldg Dept	1961	1,050	Fuel Oil	AST (Vaulted)
10	Site Visit	*	275	Waste Oil	AST
	Bldg Dept	1950	*	GT Permit	*
11	No Evidence of Tanks				
12	No Evidence of Tanks				
13	Sanborn Maps	1926	1,000	GT	UST
	Fire Dept, Regulatory Database	1969	Three 550	Diesel	UST
Part of 43	Sanborn Maps	1951	*	Gasoline Station	*
	Bldg Dept	1947	*	GT Permit	*
52	No Evidence of Tanks				
53	Bldg Dept	1950	*	GT Permit	*
55	No Evidence of Tanks				
Notes: AST = Aboveground Storage Tank, UST = Underground Storage Tank, * = Unknown, FO = Fuel Oil, GT = Gasoline Tank,					

**Table 2**  
**Site Specific Soil Action Levels**  
**West 60<sup>th</sup> Street, New York, NY**

<b>Compound</b>	<b>Action Level (mg/kg)</b>	<b>Source</b>
Benzene	0.06	TAGM #4046
Toluene	1.5	TAGM #4046
Ethylbenzene	5.5	TAGM #4046
O-xylene	1.2	TAGM #4046
M/P-xylene	0.6	TAGM #4046
Naphthalene	13.0	TAGM #4046
Total VOCs	10.0	TAGM #4046
Total SVOCs	500	TAGM #4046
B(a)P equivalents	3.00	NYSDEC Guidance
Lead	1,000	Background range in historic fill
Mercury	2	Background range in historic fill
Arsenic	25	Background range in historic fill
Other Criteria	Grossly petroleum-contaminated soil	DER-10

**Notes:**

mg/kg = milligrams per kilogram

TAGM #4046 = New York State Department of Environmental Conservation Technical and Administrative Guidance Memorandum #4046 – Determination of Soil Cleanup Objectives and Cleanup Levels.

VOCs = volatile organic compounds

SVOCs = semi-volatile organic compounds

B(a)P Equivalents = the sum of the concentrations of seven carcinogenic polynuclear hydrocarbons, each in units equivalent to one mg/kg of benzo(a)pyrene.

DER – Division of Environmental Remediation

**Table 3**  
**Site Specific Soil Action Level Exceedances**  
**West 60<sup>th</sup> Street, New York, NY**

<b>Location</b>	<b>Compound</b>	<b>Concentration (mg/kg)</b>	<b>SSSAL (mg/kg)</b>
B/MW-3 (0-2')	Lead	2,980	1,000
B-12 (0-2')	Lead	1,5000	1,000
B-12 (2'-4')	Lead	1,160	1,000
B-17 (14'-16')	Lead	2,580	1,000
B/MW-2 (0-2')	Naphthalene	15.0	13.00
		<b>B(a)P Units</b>	
B/MW-2 (0-2')	B(a)P Equivalents	5.5	3.00
B/MW-7 (0-2')	B(a)P Equivalents	4.17	3.00
B-13 (0-2')	B(a)P Equivalents	4.74	3.00
B-17 (14'-16')	B(a)P Equivalents	8.27	3.00

Notes:

mg/kg = milligrams per kilogram

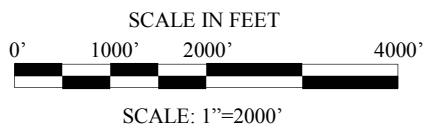
B(a)P Equivalents = the sum of the concentrations of seven carcinogenic polynuclear hydrocarbons, each in units equivalent to one mg/kg of benzo(a)pyrene.

## FIGURES

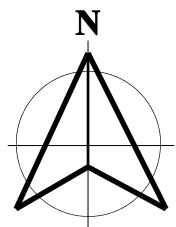




QUADRANGLE



SOURCE:  
USGS TOPOGRAPHIC MAP - CENTRAL PARK, N.Y.  
QUADRANGLE - DATED 1966, PHOTOREVISED 1979.



West 61st Street Site  
New York, New York

## PROJECT SITE LOCATION



## Environmental Consultants

440 Park Avenue South, New York, N.Y. 10016

DATE  
12.08.05

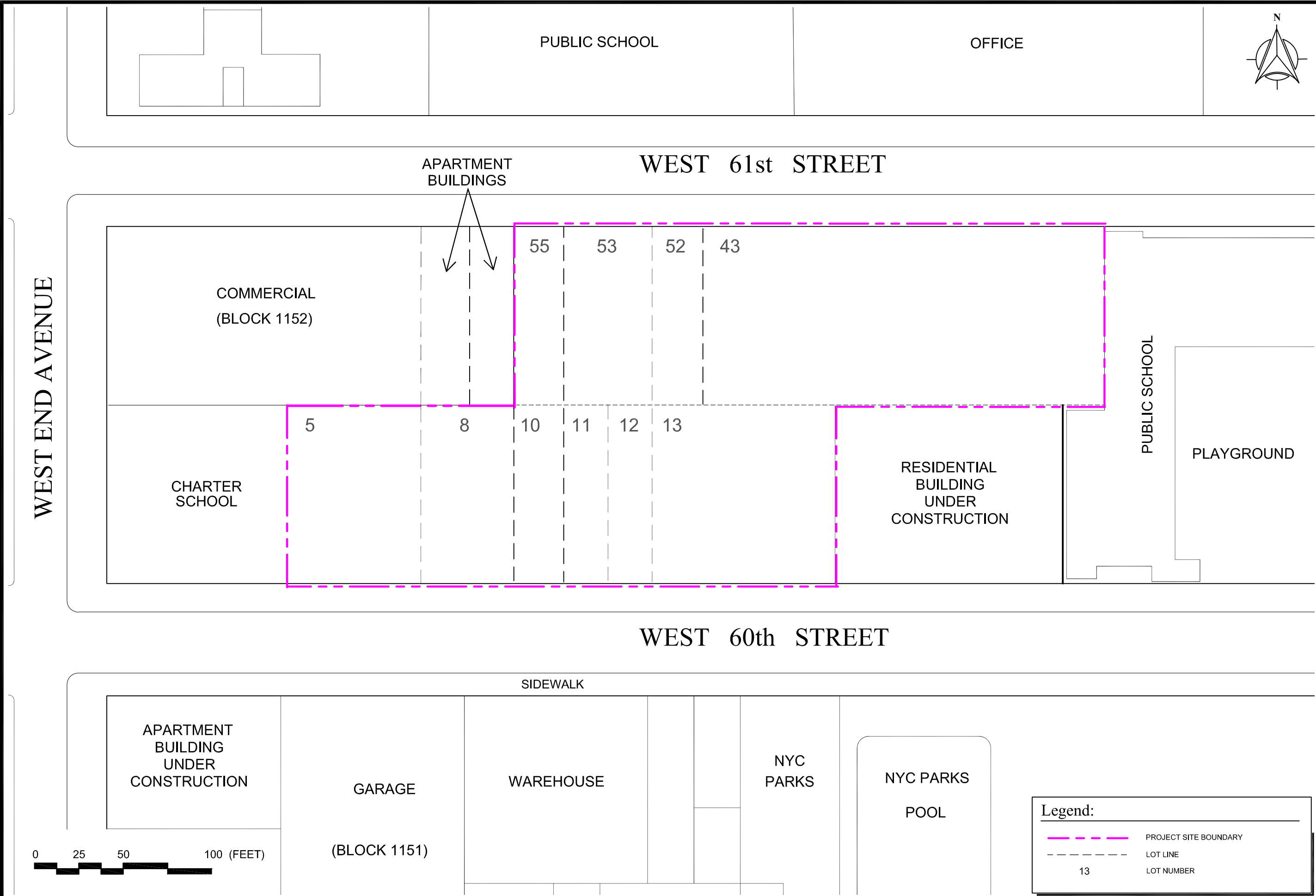
PROJECT No.  
10321

FIGURE No.

1



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West 61st Street Site  
New York, New York

PROJECT SITE ABUTTERS

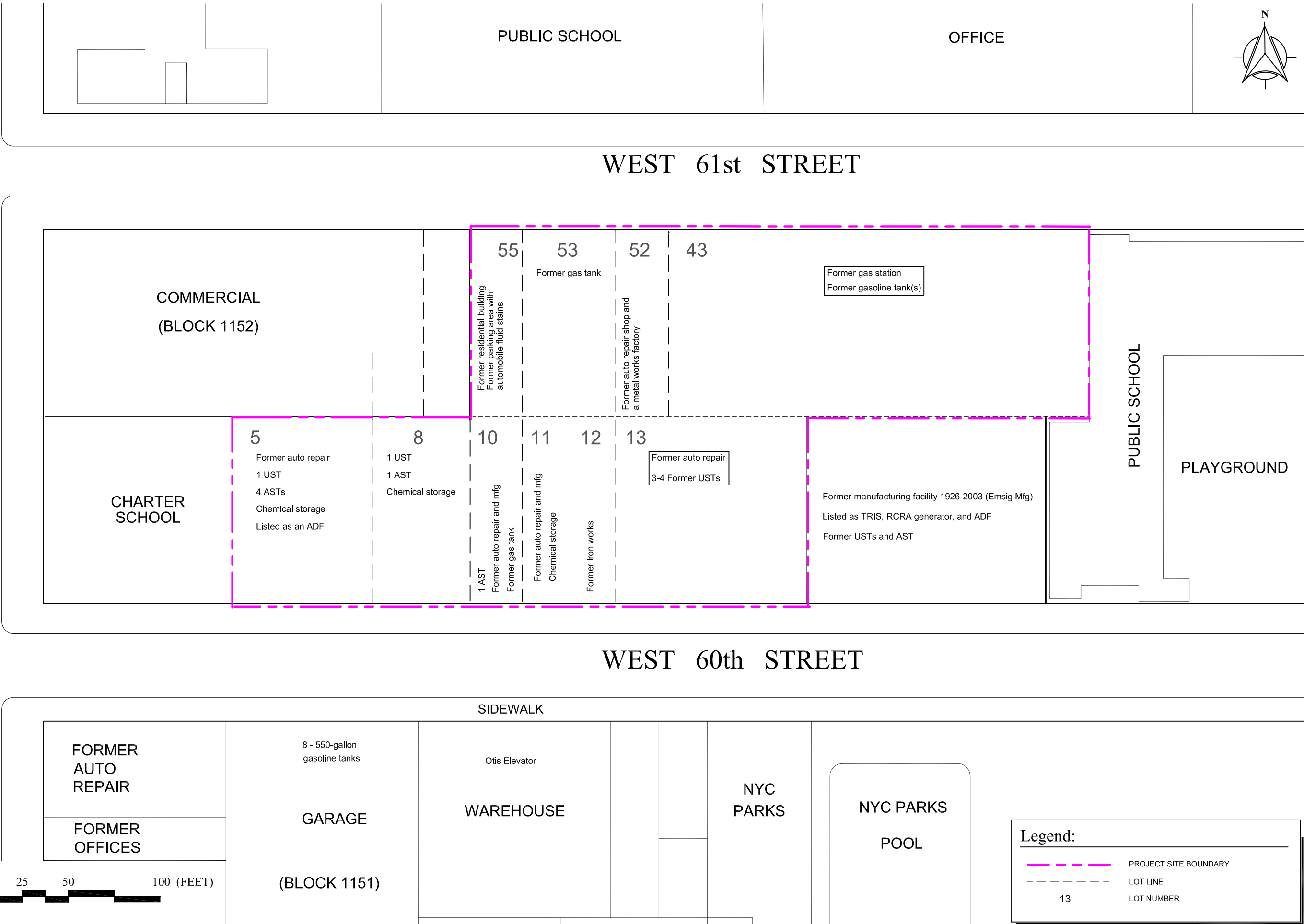
DATE  
**03.15.06**


APPROX SCALE  
**As Shown**

PROJECT No.  
**10321**

FIGURE No.  
**2**

WEST END AVENUE





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**West 61st Street Site**  
New York, New York

**SUMMARY OF PREVIOUS SITE USES**

DATE  
**03.15.06**

APPROX SCALE  
**As Shown**

PROJECT No.  
**10321**

FIGURE No.  
**3**

WEST END AVENUE

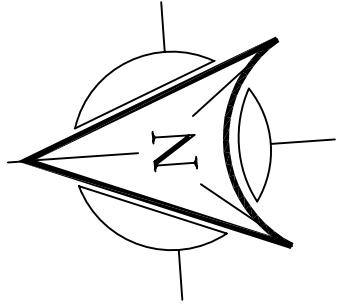
Legend:

- PROPERTY BOUNDARY
- LOT BOUNDARY
- BACKGROUND AIR SAMPLE LOCATION
- SUSPECTED UNDERGROUND STORAGE TANK(S)
- METALLIC OBJECTS IDENTIFIED IN GEOPHYSICAL SURVEY
- GEOTECHNICAL BEDROCK BORINGS
- SOIL GAS WELL
- MONITORING WELL / SOIL BORING
- SOIL BORING
- AREA OF CONCERN

- ⊗
- ⊕
- ×
- 
- 
- AOC-1

Note:

ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU OF BOROUGH OF MANHATTAN, WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 (UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.



0 10 20 40 (FEET)

Elevations and locations surveyed by:  
True North Surveyors, Inc.  
John J. Vada – N.Y.P.L.S. Lic. 050298  
PROFESSIONAL LAND SURVEYORS

DATE  
03.15.06

SCALE  
As Shown

PROJECT No.  
10321

FIGURE No.

4

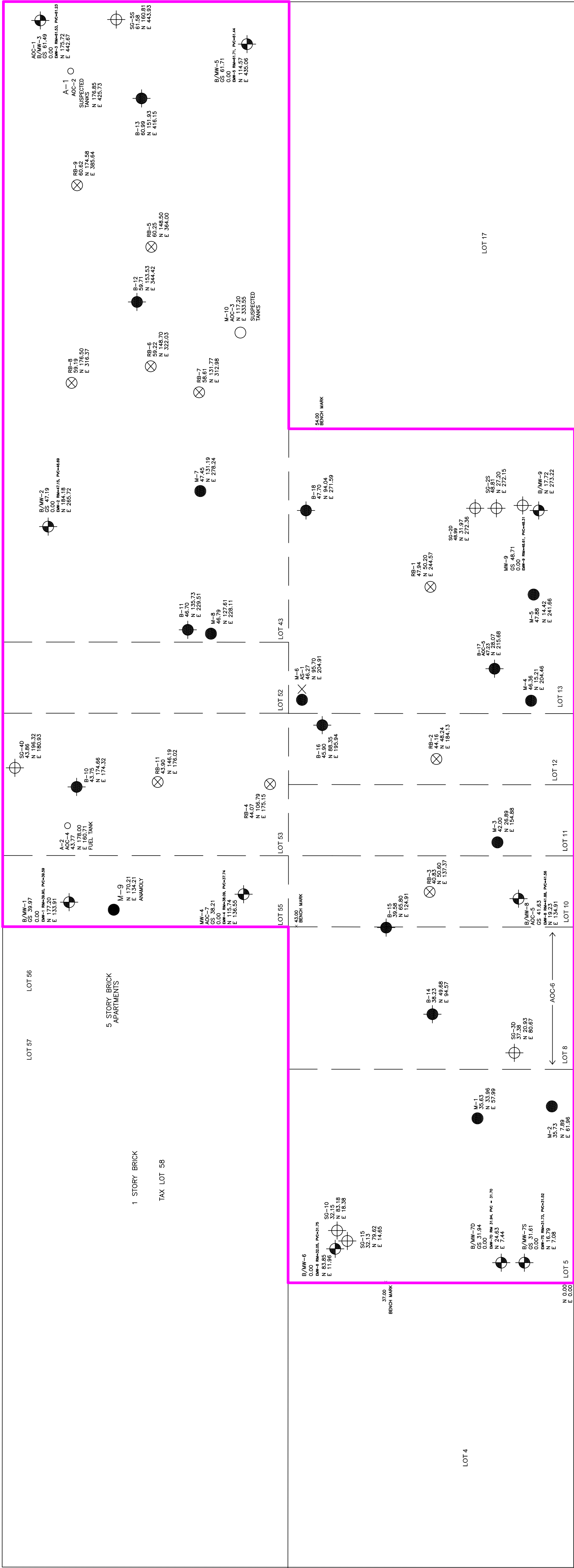
ENVIRONMENTAL SAMPLING LOCATIONS AND ANAMOLIES

West 61st Street Site  
New York, New York

Environmental Consultants  
440 Park Avenue South, New York, N.Y. 10016

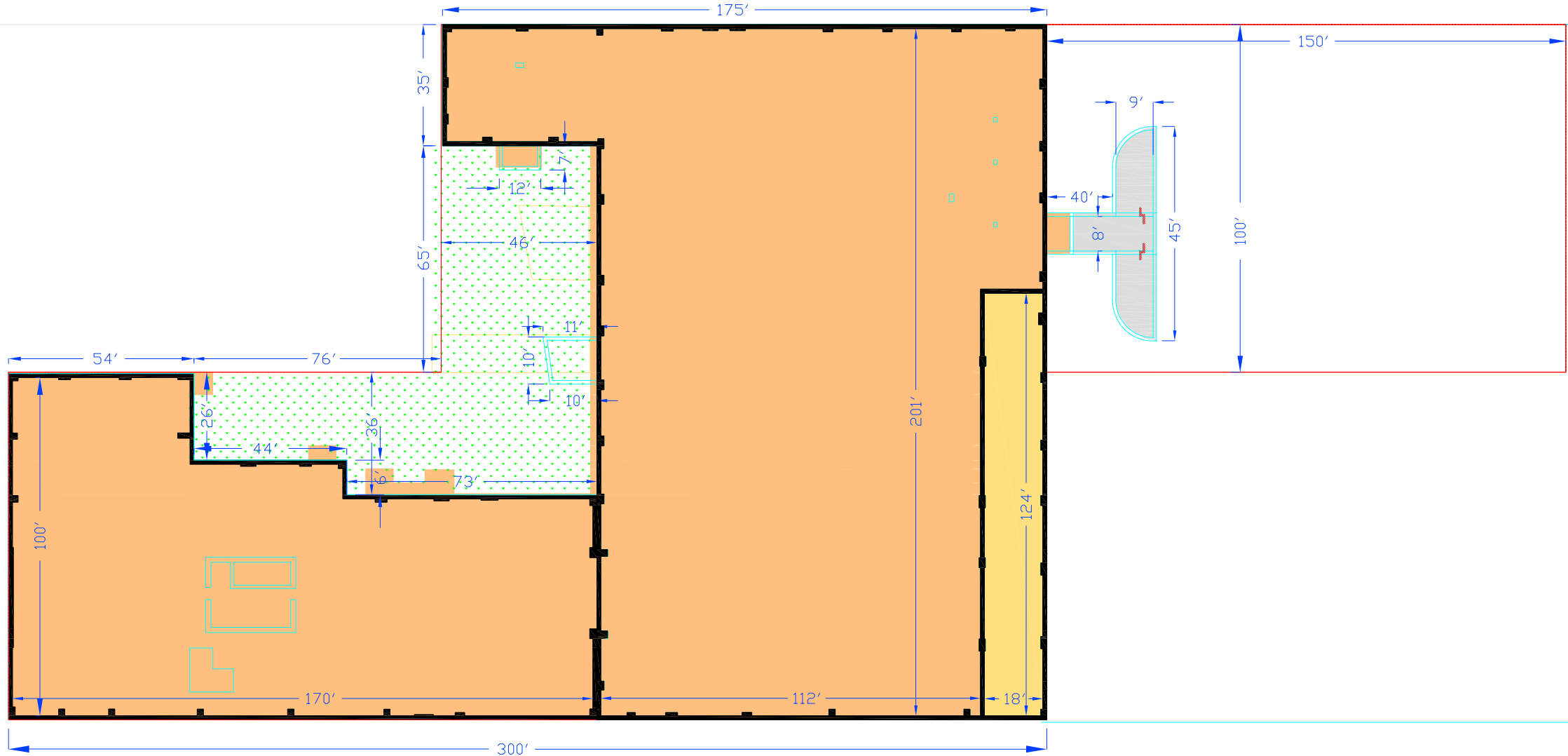
WEST 61st STREET

WEST 60th STREET



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WEST 61ST STREET



WEST 60TH STREET

Legend:

- PROPOSED BUILDING
- COURTYARD
- EXCAVATE TO ELEVATION 30.0
- EXCAVATE TO ELEVATION 54.0
- EXCAVATE TO ELEVATION 40.0
- EXCAVATE TO ELEVATION 14.0



NOTE: ELEVATIONS IN MANHATTAN BOROUGH DATUM

WEST 61st STREET SITE  
New York, New York

APPROXIMATE LIMITS OF EXCAVATION



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DATE  
03.14.06

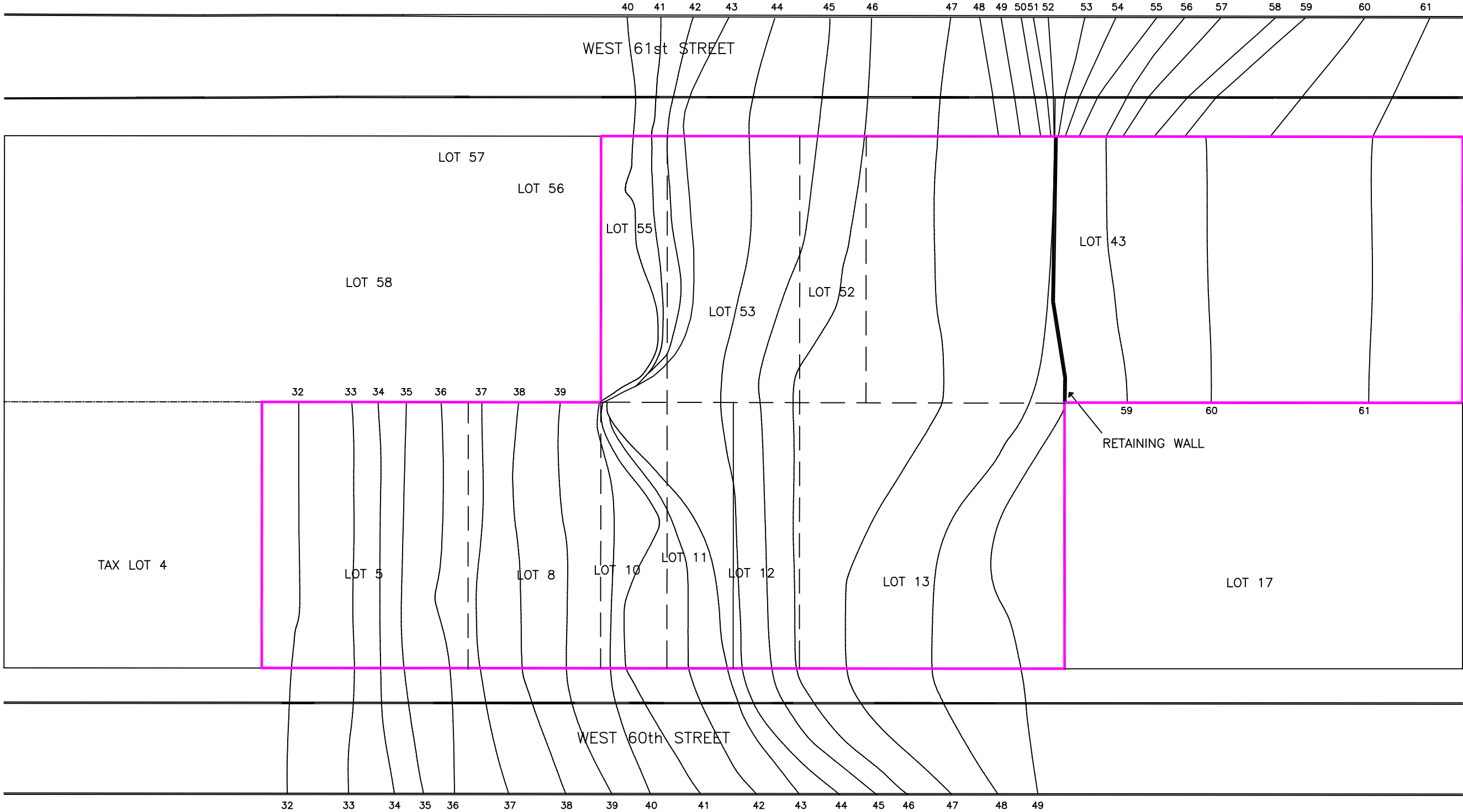
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PROJECT No.  
10321

FIGURE No.  
5

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WEST END AVENUE



Legend:

- PROPERTY BOUNDARY
- 20' CONTOUR LINE
- RETAINING WALL

Note:

ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF MANHATTAN, WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 (UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.

0 20 40 80 (FEET)



This map reflects the site topography after the removal of the three buildings on Lot 5, Lots 11 and 12, and Lots 52 and 53, and subsequent site grading.

Based on a survey by:  
True North Surveyors, Inc.  
John J. Vida - N.Y.P.L.S. Lic. 050298  
PROFESSIONAL LAND SURVEYORS

WEST 61st STREET SITE

New York, New York

SITE TOPOGRAPHIC MAP



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440 Park Avenue South, New York, N.Y. 10016

DATE

11.21.05

SCALE

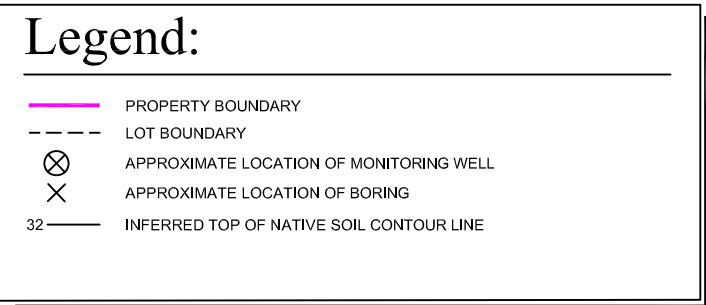
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PROJECT No.

10321

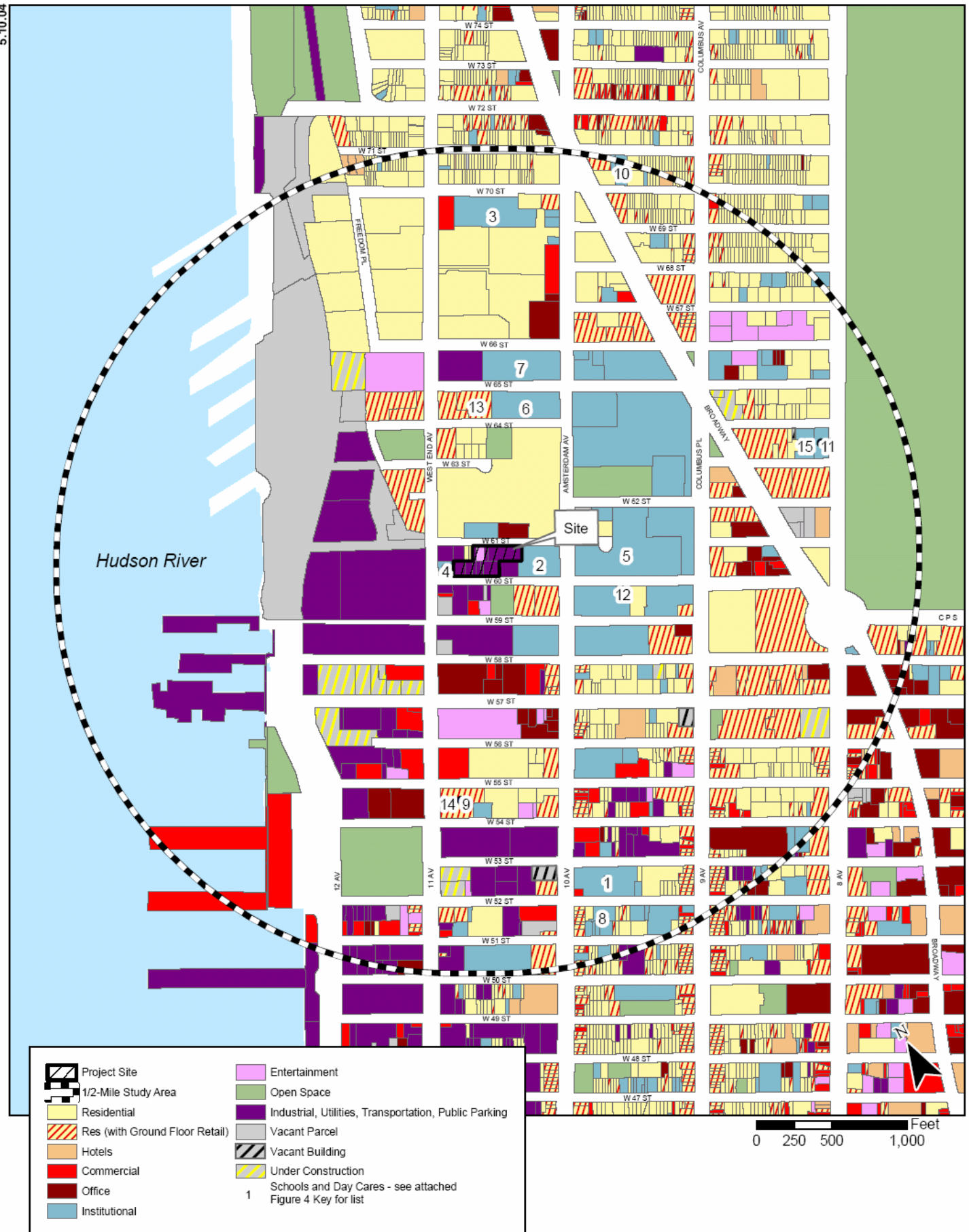
FIGURE No.

6



7





**West 61st Street Site  
New York, New York**

**Land Use Map  
Figure 8**

**FIGURE 8 KEY - SCHOOLS AND DAYCARES WITHIN 1/2 MILE**  
**West 61st Street Site, New York, NY**

ID	BLOCK	LOT	FACILITY NAME	FACILITY ADDRESS	ZIP
1	1062	3	PS 111 ADOLPH S. OCHS SCHOOL	440 West 53rd St	10019
2	1152	29	PS 191 AMSTERDAM SCHOOL	210 W 61st St	10023
3	1158	40	PS 199 JESSE I. STRAUS SCHOOL	270 W 70th St	10023
4	1152	1	PS 252 (CSD of jurisdiction 6)	20-26 W End Ave	10023
5	1132	20	BEACON SCHOOL	113 W 60th St	10023
6	1156	30	FIORELLO H. LA GUARDIA HS	108 Amsterdam Ave	10023
7	1157	25	MARTIN LUTHER KING HS	122 Amsterdam Ave	10023
8	1061	54	SACRED HEART OF JESUS SCHOOL	456 West 52nd St	10019
9 (same as 14)	1083	1	POLLY DODGE DAY CARE CTR	538 West 55th St	10019
10	1142	61	BLESSED SACRAMENT SCHOOL	147 W 70th St	10023
11	1116	29	MIDTOWN ETHICAL CULTURE SCHOOL	33 Central Park West	10023
12	1131	50	PROFESSIONAL CHILDRENS SCHOOL	132 West 60th St	10023
13	1156	20	MABEL BARRETT FITZGERALD	243 West 64th Street	10023
14	1083	1	POLLY DODGE CTR	538 West 55th Street	10019
15	1116	24	WESTSIDE YMCA AFTERSCHOOL CC	5 West 63 Street	10023

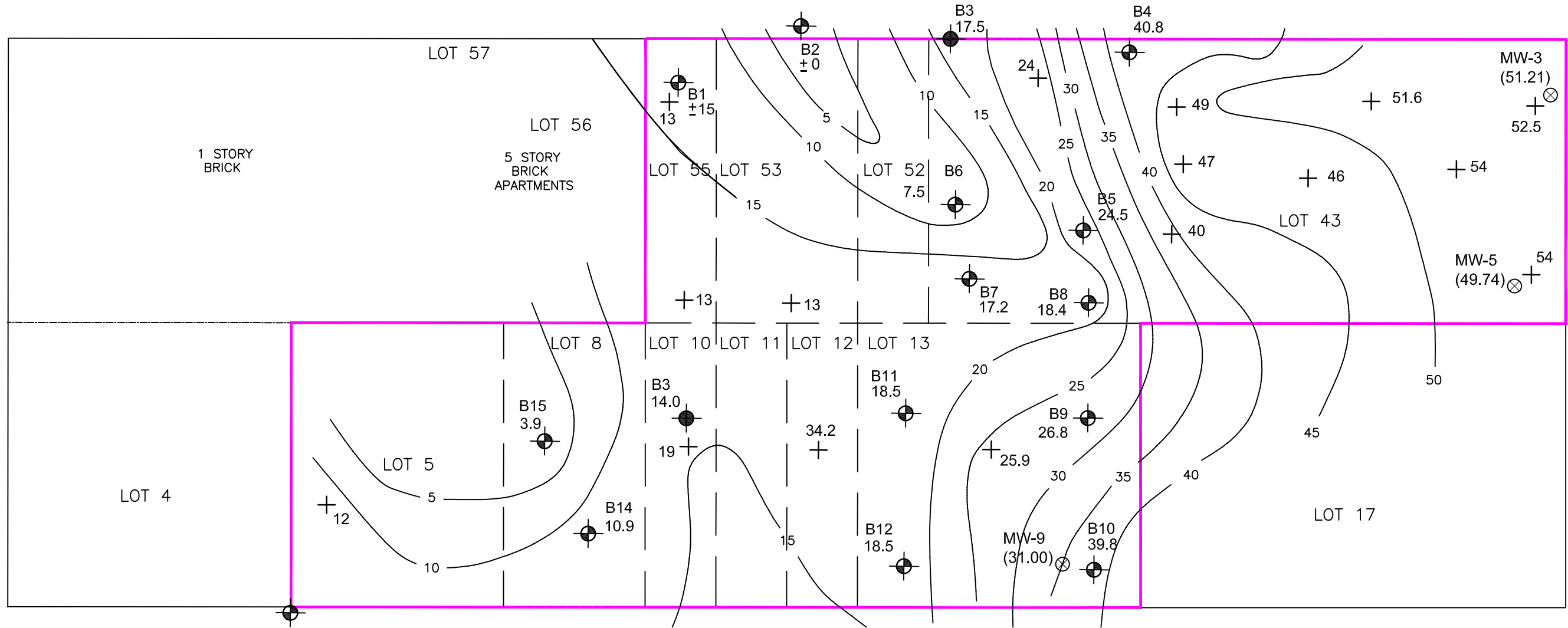


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WEST END AVENUE

WEST 61st STREET

WEST 60th STREET



**Legend:**

- PROPERTY BOUNDARY
- LOT BOUNDARY
- APPROXIMATE LOCATION OF BORING WITH OBSERVATION WELL
- APPROXIMATE LOCATION OF BORING TOP OF ROCK ELEVATION (MBD)
- INFERRED BEDROCK CONTOUR LINE
- APPROXIMATE LOCATION OF BEDROCK MONITORING WELLS INSTALLED BY AKRF, INC.

**Note:**

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0 20 40 80 (FEET)



BASED ON CONTOURS PROVIDED BY:  
RA CONSULTANTS  
WAYNE, NJ

**WEST 61st STREET SITE**  
New York, New York

**INFERRED BEDROCK CONTOURS**

DATE  
**11.21.05**

SCALE  
**As Shown**

PROJECT No.  
**10321**

FIGURE No.  
**9**

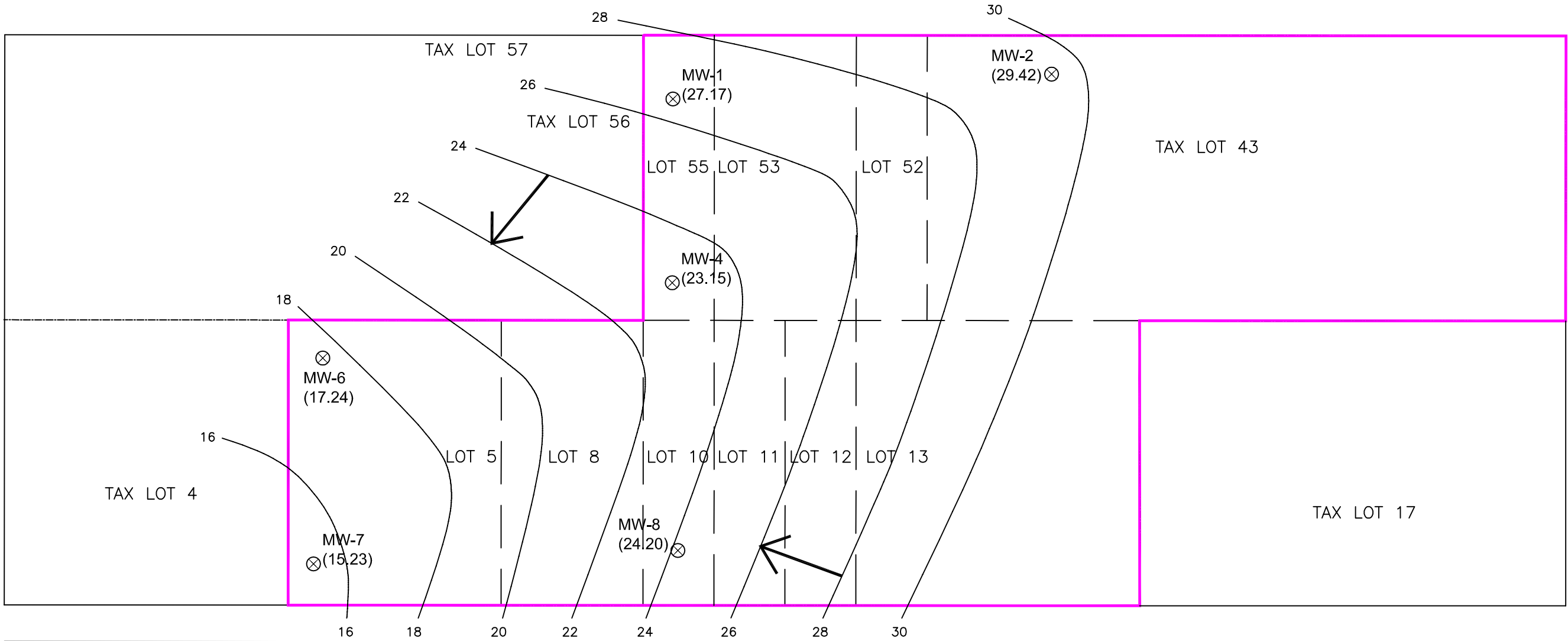


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WEST END AVENUE

WEST 61st STREET



WEST 60th STREET

## Legend:

- PROPERTY BOUNDARY
- LOT BOUNDARY
- OVERBURDEN MONITORING WELL
- (31.00) GROUNDWATER ELEVATION
- GROUNDWATER EQUIPOTENTIAL LINE
- INFERRED GROUNDWATER DIRECTION

## Notes:

- ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF MANHATTAN (MBD), WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 (UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.
- WATER LEVELS MEASURED ON OCTOBER 7, 2005.

0 20 40 80 (FEET)



Elevations based on a survey by:  
True North Surveyors, Inc.  
John J. Vida - N.Y.P.L.S. Lic. 050298  
PROFESSIONAL LAND SURVEYORS

WEST 61st STREET SITE

New York, New York

OVERBURDEN AQUIFER-EQUIPOTENTIAL MAP



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440 Park Avenue South, New York, N.Y. 10016

DATE

11.21.05

SCALE

As Shown

PROJECT No.

10321

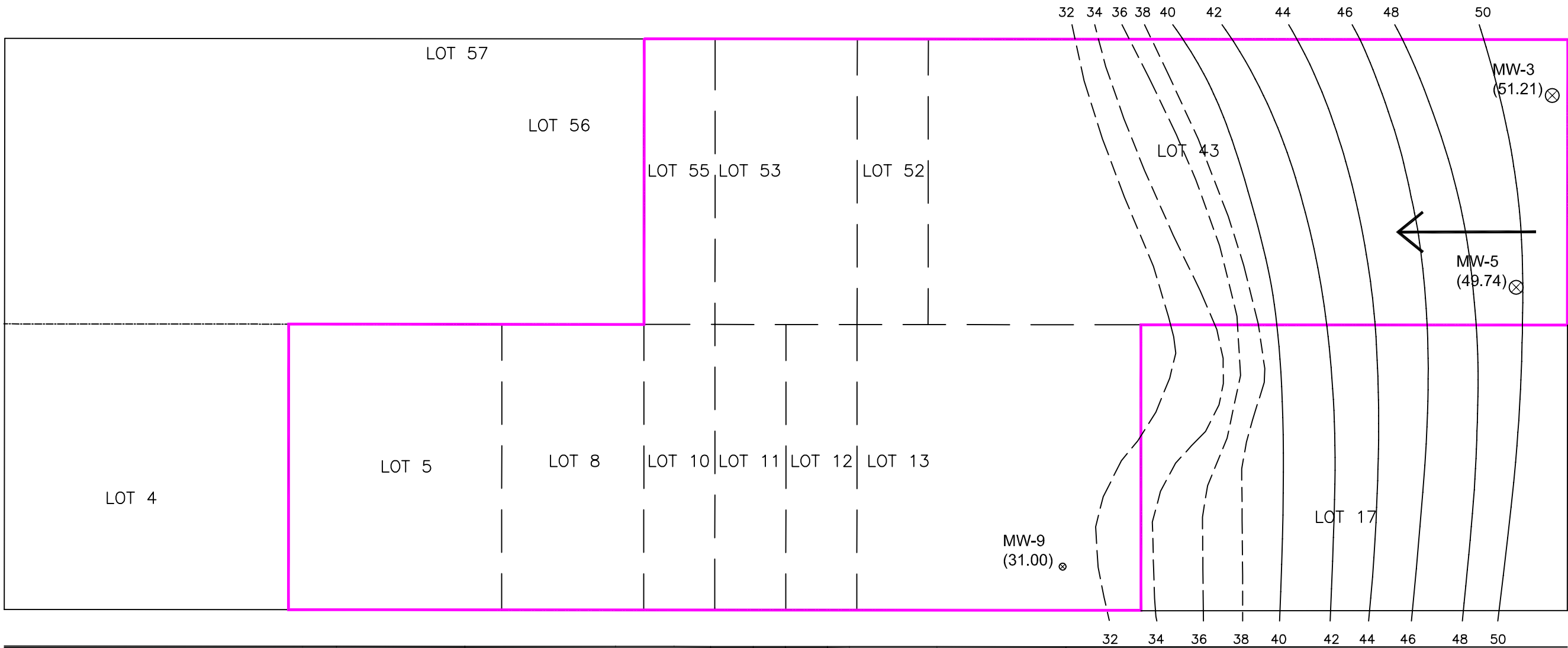
FIGURE No.

10

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WEST END AVENUE

WEST 61st STREET



WEST 60th STREET

## Legend:

- PROPERTY BOUNDARY
- LOT BOUNDARY
- BEDROCK MONITORING WELL
- (31.00) GROUNDWATER ELEVATION
- GROUNDWATER EQUIPOTENTIAL LINE BASED ON WELL ELEVATIONS
- GROUNDWATER EQUIPOTENTIAL LINE BASED ON BEDROCK ELEVATIONS
- INFERRED GROUNDWATER DIRECTION

## Notes:

- ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF MANHATTAN (MBD), WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 (UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.
- WATER LEVELS MEASURED ON OCTOBER 7, 2005.

0 20 40 80 (FEET)



Elevations based on a survey by:  
True North Surveyors, Inc.  
John J. Vida - N.Y.P.L.S. Lic. 050298  
PROFESSIONAL LAND SURVEYORS

WEST 61st STREET SITE

New York, New York

BEDROCK AQUIFER-EQUIPOTENTIAL MAP



Environmental Consultants  
440 Park Avenue South, New York, N.Y. 10016

DATE

11.21.05

SCALE

As Shown

PROJECT No.

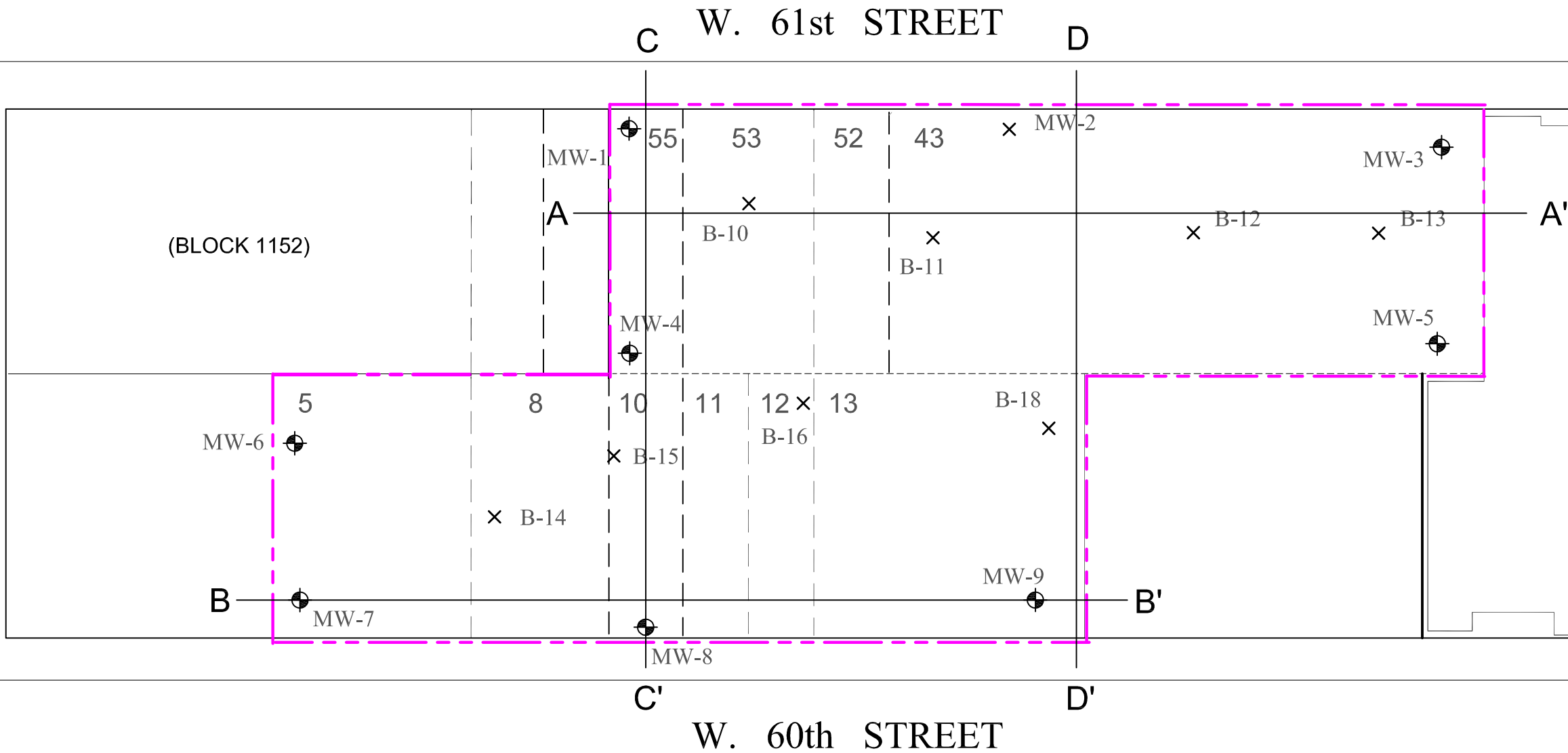
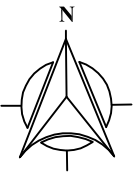
10321

FIGURE No.

11

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WEST END AVENUE



Legend:

- PROJECT SITE BOUNDARY
- - - LOT LINE
- 13 LOT NUMBER
- X BORING LOCATION
- ⊕ MONITORING WELL LOCATION



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440 Park Avenue South, New York, NY 10016

West 61st Street Site  
New York, New York

GEOLOGIC SECTION LOCATIONS

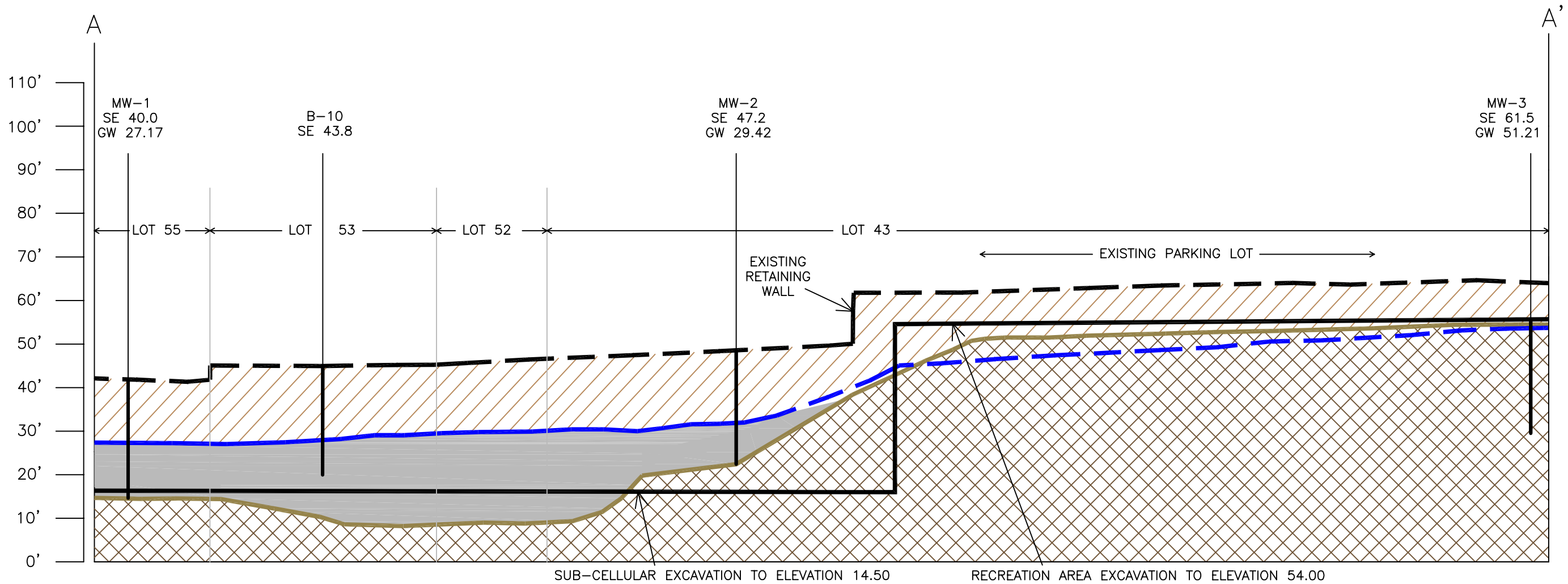
DATE  
**12.23.05**

APPROX SCALE  
**As Shown**

PROJECT No.  
**10321**

FIGURE No.  
**12**

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SECTION A-A'

Legend:

	GROUNDWATER LEVEL
	INFERRED GROUNDWATER LEVEL
	BEDROCK INTERFACE
	SURFACE ELEVATION
	EXTENT OF EXCAVATION
	MANHATTAN SCHIST
	FILL - SAND, SILT, BRICK, CONCRETE, BRICK, ASH, SLAG WOOD, GLASS, ASPHALT
	NATIVE SOIL - SAND & SILT, TRACE GRAVEL
GW	GROUNDWATER ELEVATION
SE	SURFACE ELEVATION

Notes:

- ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF MANHATTAN (MBD), WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 (UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.
- WATER LEVELS MEASURED ON OCTOBER 7, 2005.

0 10 20 40 (FEET)



Environmental Consultants  
440 Park Avenue South, New York, N.Y. 10016

WEST 61st STREET SITE  
New York, New York

GEOLOGIC CROSS SECTION A-A'

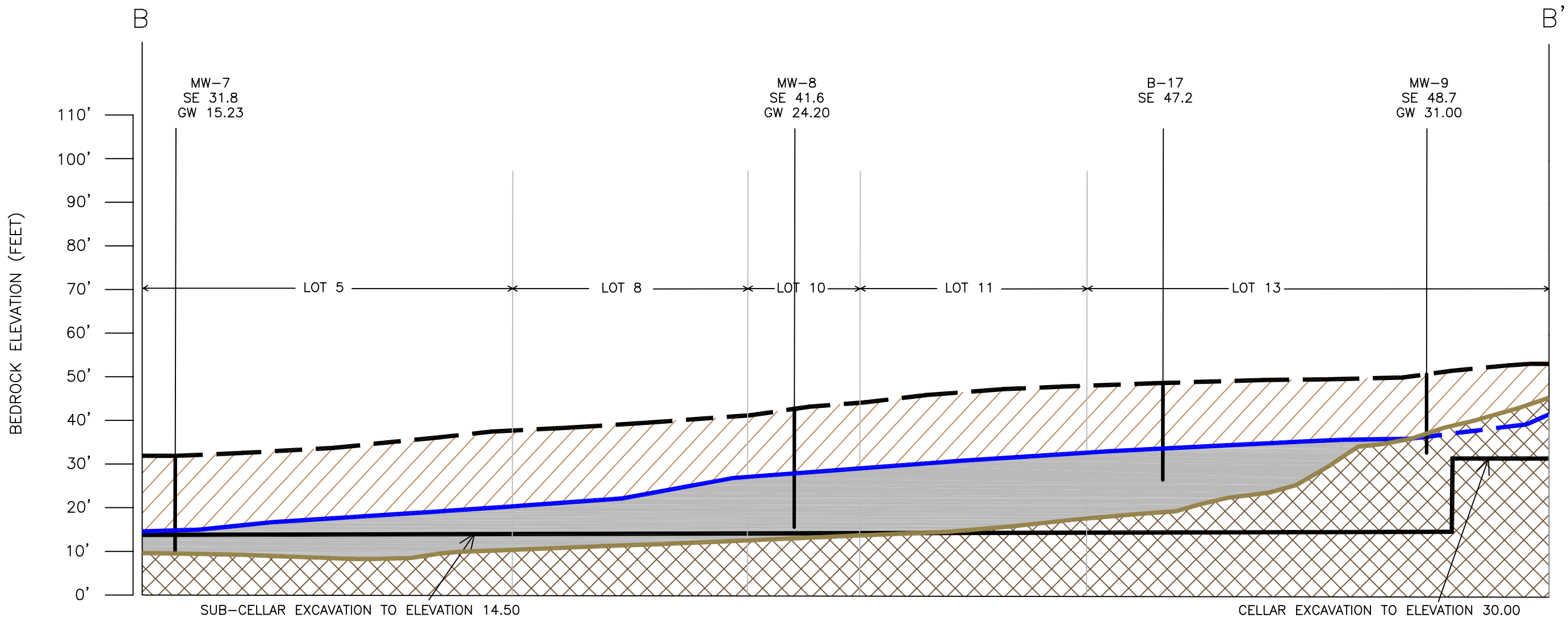
DATE  
12.19.05

SCALE  
As Shown

PROJECT No.  
10321

FIGURE No.  
12A

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SECTION B-B'

Legend:

- GROUNDWATER LEVEL
- INFERRED GROUNDWATER LEVEL
- BEDROCK INTERFACE
- SURFACE ELEVATION
- EXTENT OF EXCAVATION
- MANHATTAN SCHIST
- FILL - SAND, SILT, BRICK, CONCRETE, BRICK, ASH, SLAG, WOOD, GLASS, ASPHALT
- NATIVE SOIL - SAND & SILT, TRACE GRAVEL
- GW
- SE
- GROUNDWATER ELEVATION
- SURFACE ELEVATION

Notes:

- ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF MANHATTAN (MBD), WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 (UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.
- WATER LEVELS MEASURED ON OCTOBER 7, 2005.

0 10 20 40 (FEET)

WEST 61st STREET SITE  
New York, New York

GEOLOGIC CROSS SECTION B-B'

DATE  
12.19.05

SCALE  
As Shown

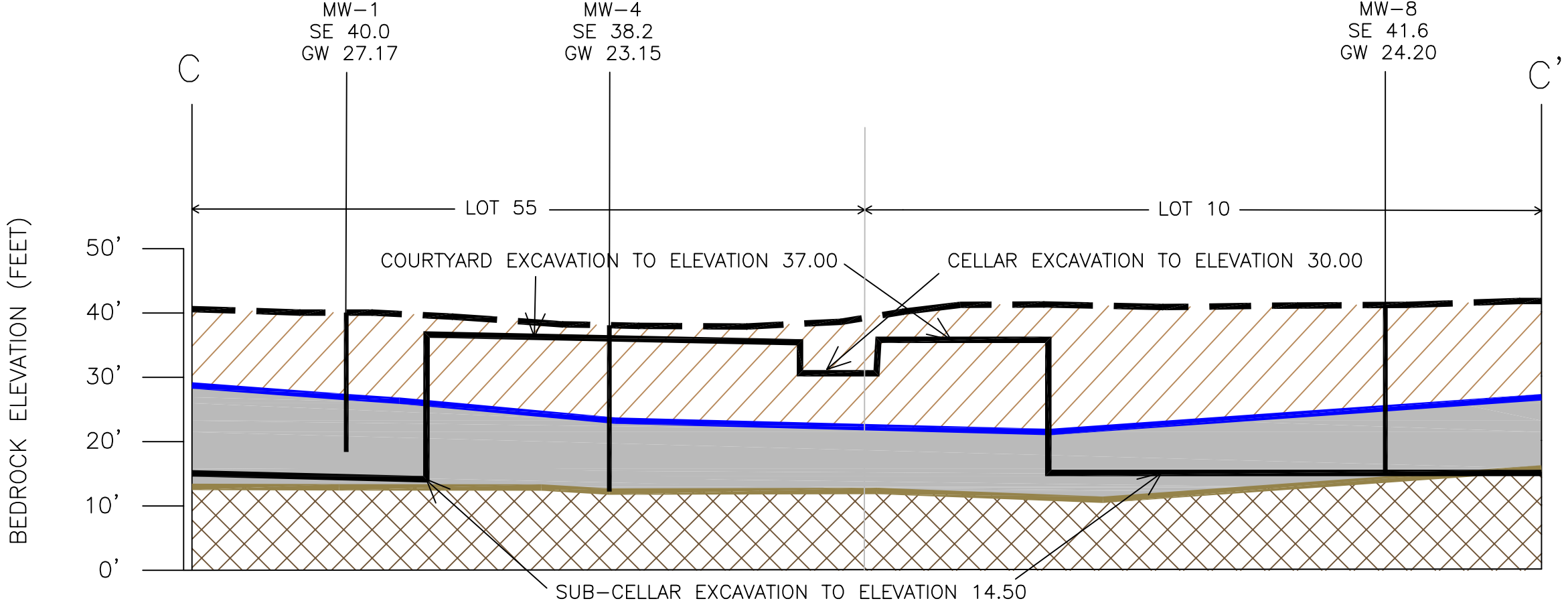
PROJECT No.  
10321

FIGURE No.  
12B



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McAKRF Project Files\10321 - Algin Properties W. 60th St\Figures\Figure 12.dwg



SECTION C-C'

Legend:

	GROUNDWATER LEVEL
	INFERRED GROUNDWATER LEVEL
	BEDROCK INTERFACE
	SURFACE ELEVATION
	EXTENT OF EXCAVATION
	MANHATTAN SCHIST
	FILL - SAND, SILT, BRICK, CONCRETE, BRICK, ASH, SLAG WOOD, GLASS, ASPHALT
	NATIVE SOIL - SAND & SILT, TRACE GRAVEL
GW	GROUNDWATER ELEVATION
SE	SURFACE ELEVATION

Notes:

- ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF MANHATTAN (MBD), WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 (UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.
- WATER LEVELS MEASURED ON OCTOBER 7, 2005.



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WEST 61st STREET SITE  
New York, New York

GEOLOGIC CROSS SECTION C-C'

DATE  
12.19.05

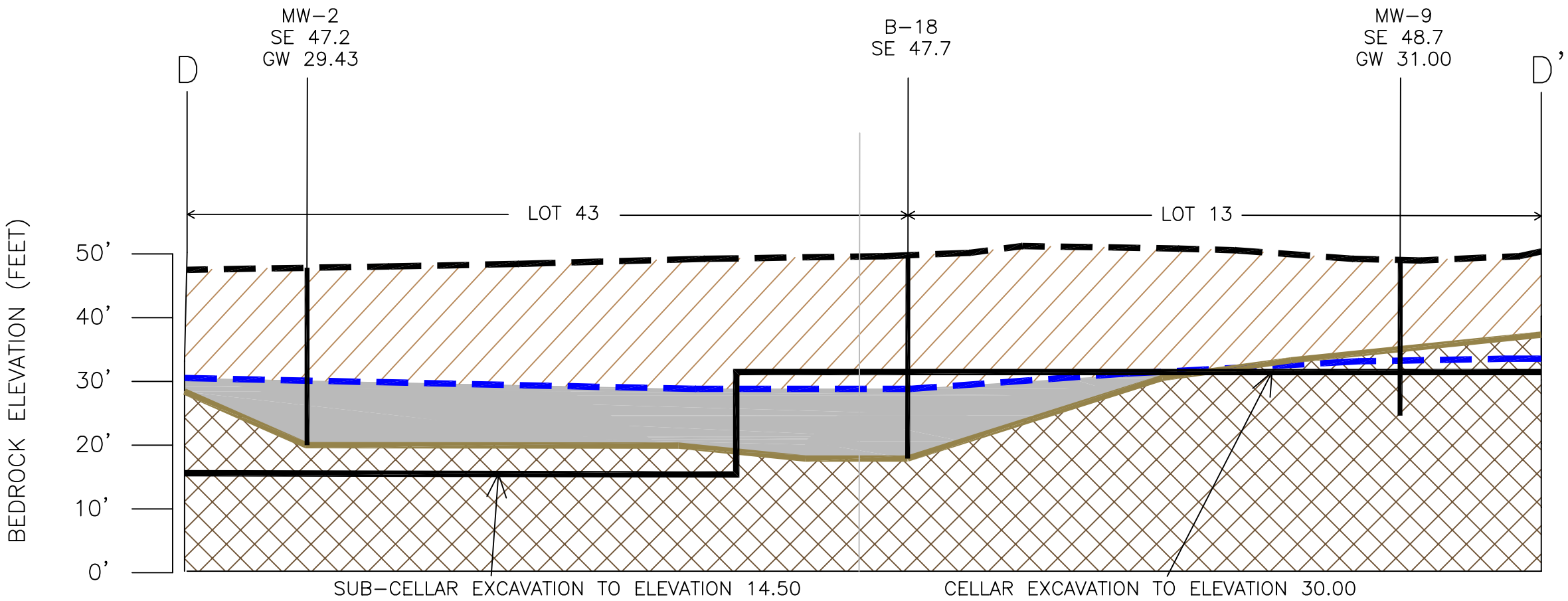
SCALE  
As Shown

PROJECT No.  
10321

FIGURE No.  
12C



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SECTION D-D'

Legend:

- GROUNDWATER LEVEL
- INFERRED GROUNDWATER LEVEL
- BEDROCK INTERFACE
- SURFACE ELEVATION
- EXTENT OF EXCAVATION
- MANHATTAN SCHIST
- FILL - SAND, SILT, BRICK, CONCRETE, BRICK, ASH, SLAG, WOOD, GLASS, ASPHALT
- NATIVE SOIL - SAND & SILT, TRACE GRAVEL
- GROUNDWATER ELEVATION
- SURFACE ELEVATION

Notes:

- ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF MANHATTAN (MBD), WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 (UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.
- WATER LEVELS MEASURED ON OCTOBER 7, 2005.



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WEST 61st STREET SITE  
New York, New York

GEOLOGIC CROSS SECTION D-D'

DATE	12.19.05
SCALE	As Shown
PROJECT No.	10321
FIGURE No.	12D

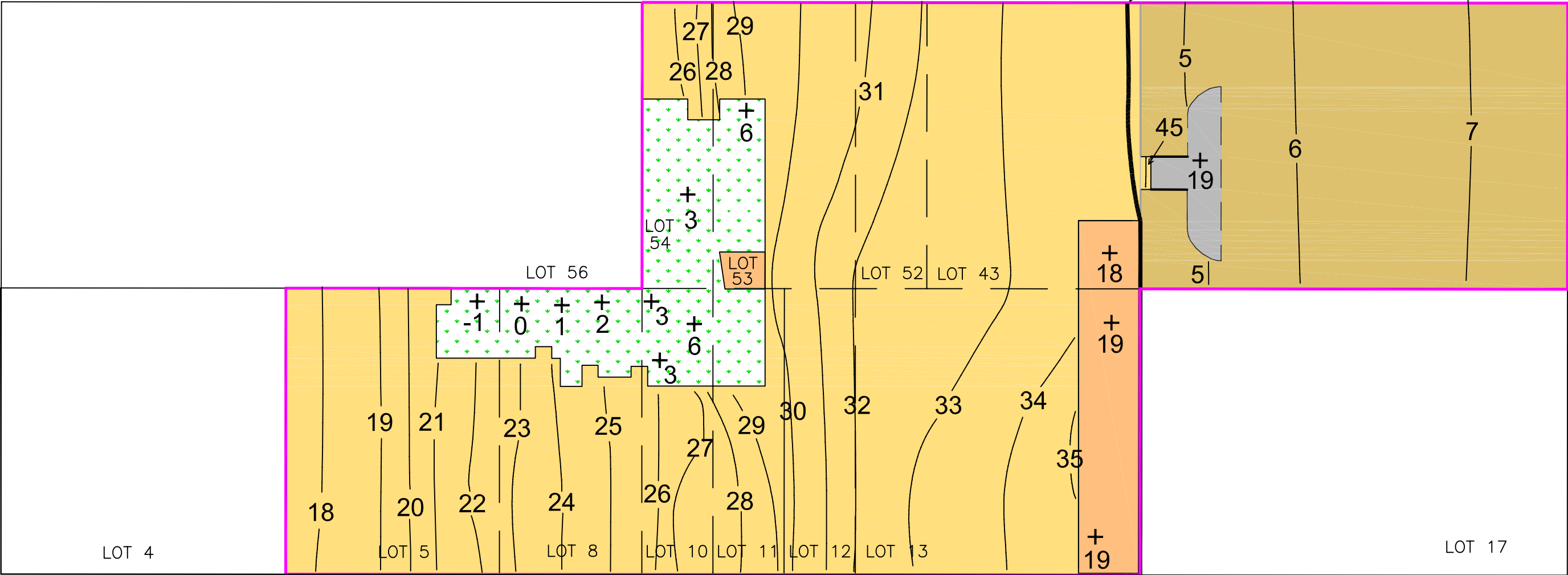


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WEST END AVENUE

WEST 61st STREET

EXISTING RETAINING WALL



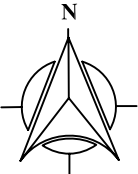
WEST 60th STREET

Legend:

- PROPERTY BOUNDARY
- DEPTH IN FEET TO LOWER LIMIT OF CONSTRUCTION
- CONTOUR HAVING THE SAME DEPTH IN FEET TO LOWER LIMIT OF CONSTRUCTION
- LOT BOUNDARIES
- SUB-CELLAR EXCAVATION TO ELEVATION 14.00
- COURTYARD EXCAVATION TO ELEVATION 37.00
- CELLAR EXCAVATION TO ELEVATION 30.00
- RECREATION ARA EXCAVATION TO ELEVATION 54.00
- EXHAUST SYSTEM EXCAVATION TO ELEVATION RANGE 39.64 TO 42.00

Notes:

- ELEVATIONS ARE ACTUAL AND REFER TO DATUM USED BY THE TOPOGRAPHICAL BUREAU, BOROUGH OF MANHATTAN, WHICH IS 2.75 FEET ABOVE THE NATIONAL GEODETIC SURVEY VERTICAL DATUM OF 1929 ( UNITED STATES COAST AND GEODETIC SURVEY), MEAN SEA LEVEL, SANDY HOOK, NEW JERSEY.
- THE SOIL REMOVAL DEPTHS WERE COMPUTED BY SUBTRACTING THE ELEVATION OF THE LOWER LIMIT OF CONSTRUCTION EXCAVATION FOR EACH BUILDING (SEE LEGEND) FROM THE EXISTING SURFACE ELEVATION CONTOURS SHOWN ON FIGURE 6.



NOTE: ELEVATIONS IN MANHATTAN BOROUGH DATUM



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WEST 61st STREET SITE  
New York, New York

SOIL REMOVAL DEPTHS

DATE  
03.15.06

SCALE  
As Shown

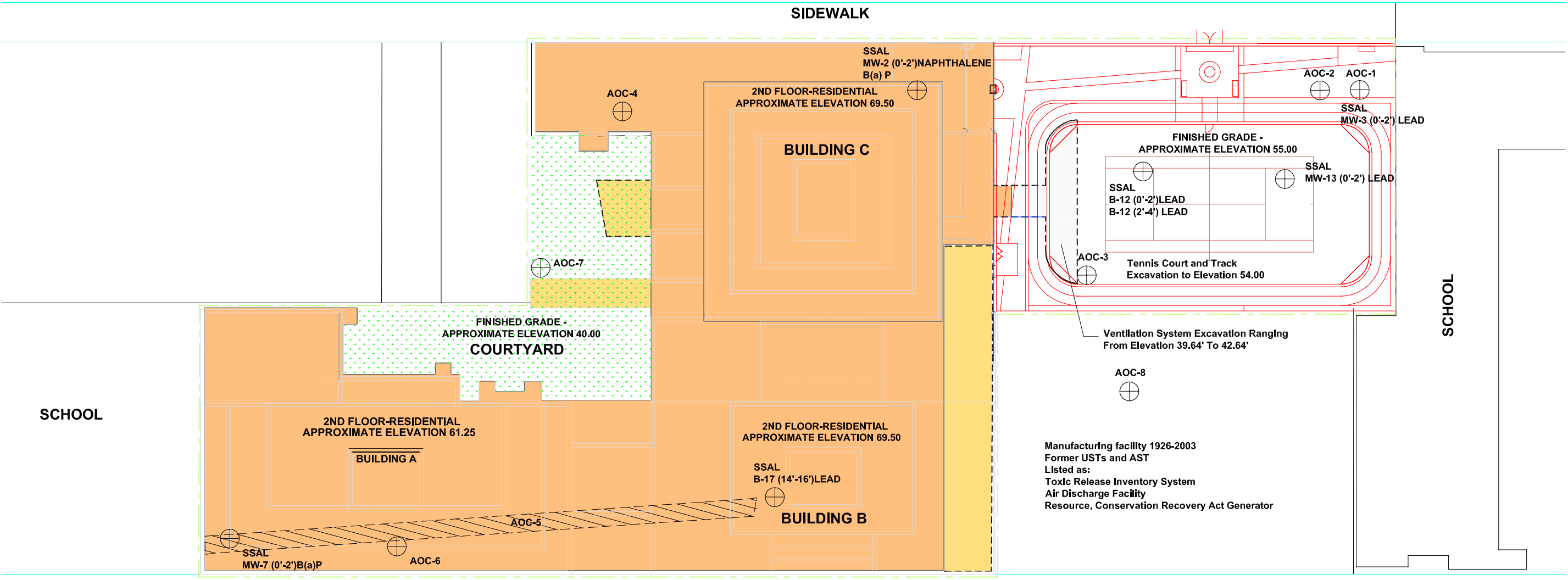
PROJECT No.  
10321

FIGURE No.  
14

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WEST 61ST STREET

SIDEWALK



SCHOOL

SCHOOL

SIDEWALK

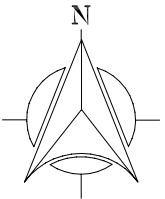
WEST 60TH STREET

Legend:

- PROPERTY LINE
- AREA OF CONCERN
- PROPOSED BUILDING
- UST UNDERGROUND STORAGE TANK
- AST ABOVEGROUND STORAGE TANK
- COURTYARD EXCAVATION TO ELEVATION 37.00
- SUB-CELLAR EXCAVATION TO ELEVATION 14.50 (MBD)
- CELLAR EXCAVATION TO ELEVATION 30.00 (MBD)
- SSAL SITE SPECIFIC ACTION LEVEL EXCEEDANCE
- B(a)p BENZO (A) PYRENE EQUIVALENT

Notes:

- AOC-1 ELEVATED LEAD IN SAMPLE B/MW-3 (0-2")
- AOC-2 ONE OR MORE USTs NEAR GATEHOUSE
- AOC-3 ONE OR MORE USTs IN SOUTHWEST CORNER OF PARKING LOT
- AOC-4 ONE OR MORE POTENTIAL USTs ON LOT 53
- AOC-5 ESTIMATED EXTENT OF PETROLEUM-CONTAMINATED SOIL AND/OR GROUNDWATER
- AOC-6 POSSIBLE VAULTED 1,050-GALLON TANK IN BASEMENT OF LOT 8
- AOC-7 ELEVATED ACETONE IN SAMPLE B/MW-4 (12-14)
- AOC-8 POSSIBLE OFF-SITE SOURCE OF CONTAMINATION



0 20 40 80 (FEET)

NOTE: ELEVATIONS IN MANHATTAN BOROUGH DATUM



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WEST 61st STREET SITE

New York, New York

LOCATIONS OF AREAS OF CONCERN  
AND SITE SPECIFIC ACTION LEVEL EXCEEDANCES

DATE

03.15.06

SCALE

As Shown

PROJECT No.

10321

FIGURE No.

15

**APPENDIX A**  
**REMEDIATION HEALTH AND SAFETY PLAN**  
**(INCLUDING EXPANDED COMMUNITY AIR MONITORING PLAN)**

# **REMEDIATION HEALTH AND SAFETY PLAN**

---

## **WEST 61<sup>st</sup> STREET SITE**

New York, New York

AKRF Project Number: 10321

BCP Site ID 231043

### **Prepared by:**



440 Park Avenue South, 7<sup>th</sup> Floor  
New York, NY 10016  
(212) 696-0670

### **Prepared for:**

Algin Management Co., LLC  
64-35 Yellowstone Blvd.  
Forest Hills, NY 11375

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**MARCH 2006**

## TABLE OF CONTENTS

1.0	PURPOSE .....	1
2.0	APPLICABILITY .....	1
3.0	INTRODUCTION .....	1
4.0	HEALTH AND SAFETY GUIDELINES AND PROCEDURES.....	2
4.1	Hazard Evaluation .....	2
4.1.1	Hazards of Concern.....	4
4.1.2	Physical Characteristics.....	4
4.1.3	Hazardous Materials.....	4
4.1.4	Chemicals of Concern .....	5
4.2	Designated Personnel .....	6
4.3	Training .....	6
4.4	Medical Surveillance Program .....	7
4.5	Site Work Zones .....	7
4.6	Work Zone Air Monitoring .....	7
4.6.1	Volatile Organic Compounds.....	8
4.6.2	Dust Particulates.....	8
4.6.3	Oxygen and Combustible Gases .....	8
4.6.4	Work Zone Action Levels and Response Actions.....	9
4.7	Community Air Monitoring.....	9
4.7.1	Volatile Organic Compounds.....	9
4.7.2	Dust Particulates.....	10
4.7.3	Community Action Levels and Response Actions.....	11
4.8	Contingency Community Air Monitoring and Odor/Vapor Control Plan.....	11
4.9	Personal Protection Equipment .....	11
4.10	General Work Practices .....	12
4.11	Contingency Plan.....	12
5.0	EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN .....	13
5.1	Hospital Directions.....	13
5.2	Emergency Contacts .....	13
6.0	APPROVAL & ACKNOWLEDGEMENTS OF RHASP .....	14

## FIGURES

Figure 1      Project Site Location and Nearest Hospital

## APPENDICES

Appendix A	Potential Health Effects from On-Site Contaminants
Appendix B	West Nile Virus/St. Louis Encephalitis Prevention
Appendix C	Site Safety Officer Resume
Appendix D	Report Forms
Appendix E	Emergency Hand Signals
Appendix F	Expanded Community Air Monitoring and Odor/Vapor Control Plan

## **1.0 PURPOSE**

The purpose of this Remediation Health and Safety Plan (RHASP) is to assign responsibilities, establish personnel protection standards and mandatory safety practices and procedures, and provide for contingencies that may arise during remedial excavation activities at the Project Site. The RHASP is intended to minimize health and safety risks resulting from the known and potential presence of hazardous materials on the Site.

This plan is not designed to address potential geotechnical, mechanical, or structural safety concerns, nor to supersede or replace any OSHA regulation and/or local and State construction codes or regulations.

## **2.0 APPLICABILITY**

This Remediation Health and Safety Plan (RHASP) has been developed for implementation of construction activities conducted by all personnel on-site, both AKRF employees and others. This RHASP does not discuss other routine health and safety issues common to general construction/excavation, including but not limited to slips, trips, falls, shoring, and other physical hazards.

All AKRF employees are directed that all work must be performed in accordance with the Company's Generic HASP and all applicable OSHA regulations for the work activities required for the Project. All Project personnel are furthermore directed that they are not permitted to enter Permit Required Confined Spaces (as defined by OSHA). For issues unrelated to contaminated materials, all non-AKRF employees are to be bound by all applicable OSHA regulations and any more stringent requirements specified by their employer in their corporate HASP or otherwise. AKRF is not responsible for providing oversight for issues unrelated to contaminated materials for non-employees. This oversight will be the responsibility of the employer of that worker or other official designated by that employer.

## **3.0 INTRODUCTION**

The West 61<sup>st</sup> Street Site (the "Project Site" or "Site") consists of the ten parcels located at the intersection of West 61<sup>st</sup> Street and West End Avenue in Manhattan, New York (Figure 1). Specifically, the Site consists of Block 1152, Lots 5, 8, 10, 11, 12, 13, part of 43, 52, 53, and 55. These parcels are currently occupied by vacant land and an outdoor parking lot. Residential, industrial, and commercial properties are present in the surrounding neighborhood.

The proposed development Project includes the construction of three new buildings that would include parking and mechanical spaces at the cellar and subcellar levels; retail, residential, and community use on the first floor; and residential use (rental and condominium) from the second floor up. Building "A" will comprise 9 floors, Building "B" will comprise 14 floors, and Building "C" will comprise 29 floors. The proposed Project currently consists of the excavation of developed portions of the Site to the bedrock or within five to ten feet of the bedrock surface, which varies from a depth of approximately 9 to 40 feet below existing grade.

A Phase I Environmental Site Assessment (ESA) performed by AKRF, Inc. (AKRF), in June 2003 identified recognized environmental concerns (RECs) for the Site, including potential underground storage tanks. Geotechnical borings undertaken by RA Consultants in February 2005 detected petroleum odors at four locations along West 60<sup>th</sup> Street. A Remedial Investigation (RI), completed by AKRF in November of 2005, identified seven Areas of Concern (AOCs). Three AOCs were identified in the eastern parking lot portion of Lot 43 along West 61<sup>st</sup> Street, including two suspected underground storage tank locations and one discrete location of subsurface lead-contaminated fill material. Two AOCs were

identified in the northwestern portion of the Site on Lots 53 and 55; a suspected underground storage tank and a discrete location of acetone-affected soil. Two AOCs were identified along West 60<sup>th</sup> Street; a suspected fuel oil vaulted storage tank observed in the basement of a building on Lot 8 (the tank's removal was not verified prior to the demolition of the building, and the basement has been filled with debris from the building); and the possible presence of petroleum-contaminated subsurface soil and groundwater identified from the RA Consultant's observations during the drilling of the rock borings and the analytical results of the samples collected during the RI.

An Interim Remedial Measure (IRM) Work Plan, dated February 2006, was submitted to the New York State department of Environmental Conservation and New York State Department of Health. The purpose of the IRM is to investigate the three alleged tank locations (ACOs 2, 3, and 4) and remove and identified tanks and petroleum-contaminated soil; to remove the lead-contaminated soil at location MW-3 (AOC-1); and to investigate the acetone-affected soil at location MW-4 (12'-14').

The IRM activities will be undertaken prior to the commencement of the construction-related removal of the fill material, construction and demolition debris in Lot 8, and the native soil. During the IRM activities, all personnel who enter locations on the Site that have been designated as Areas of Concern (AOCs) while intrusive sampling and/or excavation activities are being performed, will have completed a 40-hour training course that meets the OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards, and have up-to-date eight-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety. After the removal of the tanks, any identified petroleum-contaminated soil around the tanks, as well as soil containing elevated concentrations of lead and/or acetone-affected soil will be removed. The remaining identified AOCs consist of the alleged petroleum-contaminated material (fill and/or native soil), located slightly above and below the groundwater level, and a suspected vaulted tank in the former basement of Lot 8 (AOC 5 and AOC-6). After the removal of the five AOCs identified in the IRM, personnel involved in the excavation and removal of fill material located in the Eastern Area (former parking lot along West 61<sup>st</sup> Street), fill and native soil in the northern portion of the Site along West 61<sup>st</sup> Street, and uncontaminated (by petroleum) fill and native soil in the southern portion of the Site along West 60<sup>th</sup> Street, will not be required to meet the OSHA requirements of 29 CFR Part 1910. The excavation and removal of the petroleum-affected soil in the southern portion of the Site along West 60<sup>th</sup> Street, the removal of the vaulted tank in Lot 8, if present, or elsewhere in the site, and any other areas subsequently identified as AOCs, will be undertaken by personnel who have completed the 40-hour training that meets the OSHA requirements of 29 CFR Part 1910. The AKRF Health and Safety Officer or designee will be present during any on-site intrusive activity to provide guidance in the event an unknown material is encountered.

## **4.0 HEALTH AND SAFETY GUIDELINES AND PROCEDURES**

### **4.1 Hazard Evaluation**

A Remedial Investigation (RI) was performed in the Fall of 2005. The results were reported in the Remedial Investigation Report (RIR), dated January 2006. Urban fill is present throughout the Site, consisting of sand, gravel, concrete and brick fragments, wood, slag, and construction debris. Based on laboratory analytical results, the fill material was not petroleum-contaminated, but contained semi-volatile organic compounds (SVOCs), including the SVOCs (benzo(a)pyrene, dibenzo(a,h)anthracene, chrysene, benzo(a)anthracene, benzo(b)fluoranthene, dibenzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene). At some locations, the concentrations of one or more of the carcinogenic polycyclic aromatic hydrocarbons (cPAHs) were above the New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative

Guidance Memorandum (TAGM) #4046 recommended soil cleanup objective values. Analytical results of the samples collected from the fill material revealed elevated concentrations of ten metals (aluminum, arsenic, barium, cadmium, calcium, magnesium, lead, mercury, nickel, and zinc) in concentrations above Eastern US background range concentrations at one or more locations. No significant impact from volatile organic compounds (VOCs) or pesticides was detected in the soil. One area along West 60<sup>th</sup> Street contained the presence of suspect petroleum-related compounds in the lower level of the fill material and the native soil beneath the urban fill material. VOCs (xylene and acetone) and SVOCs (all seven cPAHs) were present in the fill material and native soil along West 60<sup>th</sup> Street (Lots 5, 8, 10, 11, and 13).

The groundwater in the northeastern corner of the Site did not contain VOCs, SVOCs, pesticides, or PCBs. Four metals (aluminum, iron, selenium, and sodium) were detected in the unfiltered groundwater samples collected from the bedrock groundwater monitoring wells at concentrations above groundwater quality standards. Groundwater was found only in the bedrock in the northeastern corner of the Site; no groundwater was detected in the fill material on top of the bedrock during the remedial investigation in this portion of the Site. Groundwater was detected in the overburden (fill material and native soil) along West 61<sup>st</sup> Street. Six metals (aluminum, iron, manganese, mercury, sodium, and selenium) were detected in unfiltered samples collected from one or more groundwater monitoring wells in this portion of the Site above groundwater quality standards. The samples collected from these wells did not contain VOCs, SVOCs, pesticides, or PCBs in concentrations above groundwater quality standards. Analysis of groundwater samples collected from groundwater monitoring wells along West 60<sup>th</sup> Street revealed the presence of suspect petroleum-related compounds. Five VOCs (acetone, benzene, toluene, ethylbenzene, and total xylenes) and one SVOC (naphthalene) were detected in concentrations above groundwater quality standards in one or more groundwater monitoring wells. Two pesticides (heptachlor epoxide and 4,4'-DDD) collected from the groundwater monitoring wells in this portion of the Site were detected in concentrations above groundwater quality standards. Ten metals (aluminum, cadmium, chromium, iron, lead, magnesium, manganese, nickel, selenium, and sodium) were detected in one or more unfiltered samples at concentrations above groundwater quality standards.

Soil vapor probes were installed at five locations around the perimeter of the Site. VOCs were detected in all of the samples. The concentrations detected for the identified VOCs ranged up to 390 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ). The highest reading along West 60<sup>th</sup> Street was 14,000 parts per billion by volume (ppbv) for an unknown compound. This is in the area of the suspected petroleum contamination.

The most likely routes of exposure are breathing of SVOCs or metals in the particulate-laden air released during soil disturbing activities, dermal contact, and accidental ingestion. Appendix A includes specific health effects from the known on-site chemicals. The remaining sections of this RHASP address procedures (including training, air monitoring, work practices, and emergency response) to reduce the potential for unnecessary and unacceptable exposure to these contaminants.

The potential adverse health effects from these detected contaminants are diverse. Many of these compounds are known or suspected to result in chronic illness from long-term exposures. However, due to the limited nature of the proposed construction, only acute effects are a potential concern.



**4.1.1 Hazards of Concern**

Check all that apply		
<input checked="" type="checkbox"/> Organic Chemicals	<input checked="" type="checkbox"/> Inorganic Chemicals	<input type="checkbox"/> Radiological
<input type="checkbox"/> Biological	<input type="checkbox"/> Explosive/Flammable	<input type="checkbox"/> Oxygen Deficient Atmosphere
<input checked="" type="checkbox"/> Heat Stress	<input checked="" type="checkbox"/> Cold Stress	<input type="checkbox"/> Other
Comments: No personnel are permitted to enter Permit Required Confined Spaces.		

**4.1.2 Physical Characteristics**

Check all that apply		
<input checked="" type="checkbox"/> Liquid	<input checked="" type="checkbox"/> Solid (soil)	<input checked="" type="checkbox"/> Sludge from tanks
<input checked="" type="checkbox"/> Vapors	<input type="checkbox"/> Unknown	<input type="checkbox"/> Other
Comments:		

**4.1.3 Hazardous Materials**

Check all that apply					
Chemicals	Solids	Sludges	Solvents	Oils	Other
<input type="checkbox"/> Acids	<input checked="" type="checkbox"/> Ash	<input type="checkbox"/> Paints	<input type="checkbox"/> Halogens	<input checked="" type="checkbox"/> Transformer	<input type="checkbox"/> Lab
<input type="checkbox"/> Caustics	<input type="checkbox"/> Asbestos	<input type="checkbox"/> Metals	<input checked="" type="checkbox"/> Petroleum	<input type="checkbox"/> Other DF	<input type="checkbox"/> Pharm
<input checked="" type="checkbox"/> Pesticides	<input type="checkbox"/> Tailings	<input type="checkbox"/> POTW	<input type="checkbox"/> Other	<input checked="" type="checkbox"/> Motor or Hydraulic Oil	<input type="checkbox"/> Hospital
<input checked="" type="checkbox"/> Petroleum	<input checked="" type="checkbox"/> Other	<input type="checkbox"/> Other		<input type="checkbox"/> Other	<input type="checkbox"/> Rad
<input type="checkbox"/> Inks		<input checked="" type="checkbox"/> Petroleum sludge in tanks			<input type="checkbox"/> MGP
<input type="checkbox"/> PCBs					<input type="checkbox"/> Mold
<input checked="" type="checkbox"/> Metals					<input type="checkbox"/> Other
<input checked="" type="checkbox"/> Other: VOCs & SVOCs					

**4.1.4 Chemicals of Concern**

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
Acetone	REL = 250 ppm PEL = 1000 ppm	Irritated eyes, nose, respiratory system; dizziness; headache, nausea, unconsciousness, confusion, possible coma, could affect menstrual cycle, kidney, liver, and nerve damage.
Benzene	REL = 0.1 ppm PEL = 1 ppm STEL = 5 ppm	Irritated eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude, dermatitis; bone marrow depression, potential occupational carcinogen.
Toluene	REL = 100 ppm PEL = 200 ppm STEL = 300 ppm	Irritated eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.
Ethylbenzene	REL = 100 ppm PEL = 100 ppm	Irritated eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.
Xylenes	REL = 100 ppm PEL = 100 ppm	Irritated eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.
Naphthalene	REL = 10 ppm PEL = 10 ppm	Irritated eyes; headache, confusion, excitement, malaise; nausea, vomiting, abdominal pain; irritated bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage.
Lead	REL=0.1 mg/m <sup>3</sup> PEL=0.05 mg/m <sup>3</sup>	Weak, lassitude, insomnia; facial pallor, pale eye, anorexia, low weight, malnutrition, constipation, abdominal pain, colic; anemia; gingival lead line; tremors, paralysis wrists and ankles; encephalopathy; kidney disease; irritation eyes; hypotension.
Particulate	PEL = 15 mg/m <sup>3</sup> (total) PEL = 5 mg/m <sup>3</sup> (respirable)	Irritated eyes, skin, throat, upper respiratory system.
Comments: REL = NIOSH Recommended Exposure Limit PEL = OSHA Permissible Exposure Limit STEL = OSHA Short Term Exposure Limit		

The potential health effects from on-site contamination are detailed in the fact sheets attached as Appendix A. Other environmental risks are outlined in the West Nile Virus and St. Louis Encephalitis Prevention information outlined in Appendix B.

#### **4.2 Designated Personnel**

AKRF has appointed Jessica Leber as the on-site Site Safety Officer (SSO). Ms. Leber will be responsible for the implementation of the Health and Safety Plan (HASP). The SSO has a four-year college degree in a scientific field, and experience in implementation of air monitoring and hazardous materials sampling programs. Ms. Leber's resume is provided in Appendix C. Health and safety training required for the SSO and all field personnel is outlined in Section 4.3 of this HASP.

#### **4.3 Training**

Prior to the commencement of construction excavation, six of the seven Areas of Concern (AOCs) will have been either removed or further evaluated through the collection of additional soil samples. The tanks and potential petroleum-contaminated soil at AOC-2, AOC-3, and AOC-4 will have been removed through Interim Remedial Measure (IRM) activities. The lead-contaminated soil (AOC-1) will be excavated, removed, and endpoint samples collected around the areas of contamination during the RIM. The suspected petroleum contamination along West 60<sup>th</sup> Street, areas of elevated semivolatile organic compounds, and the acetone-affected soil at MW -7 will be further evaluated during the waste classification sampling.

All personnel who enter locations on the Site designated as either Areas of Concern (AOC) or suspected of being AOCs, while intrusive sampling and/or excavation activities are being performed, will have completed a 40-hour training course that meets the OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. All personnel will also have up-to-date eight-hour refresher training. The training will allow personnel to recognize and understand the potential hazards to health and safety.

Workers who are involved in excavation of fill material, construction and demolition debris, or uncontaminated native soil, will not be required to meet the OSHA requirements of 29 CFR Part 1910, Occupational Safety and Health Standards. However, all field personnel must attend a training program, whose purpose is to:

- Make them aware of the potential hazards they may encounter;
- Provide the knowledge and skills necessary for them to perform the work with minimal risk to health and safety;
- Make them aware of known and suspected Areas of Concern and actions that should be taken in the event they discover tanks, drums, petroleum-contaminated waste, and chemical odors not identified in the Remedial Investigation Report;
- Make them aware that any questions, observations or concerns should be immediately brought to the attention of the Site Safety Officer;
- Make them aware of the purpose and limitations of safety equipment; and
- Ensure that they can safely avoid or escape from emergencies.

Each member of the field crew will be instructed in these objectives before he/she goes onto the Site. A Site safety meeting will be conducted at the start of the Project. Additional meetings will be conducted, as necessary, for new personnel working at the Site. The Site Safety Officer, or a designated person assigned this task by the Site Safety Officer will be present during all excavation activities, regardless of the material being excavated.

#### 4.4 Medical Surveillance Program

All AKRF and subcontractor personnel performing field work involving subsurface disturbance at the Site in designated or suspected Areas of Concern are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120 (f). A physician's medical release for work will be confirmed by the Site Safety Officer (SSO) before an employee can begin Site activities. The medical release will consider the type of work to be performed and the required personal protection equipment (PPE). The medical examination will, at a minimum, be provided annually and upon termination of hazardous waste Site work.

#### 4.5 Site Work Zones

During any activities involving subsurface disturbance, the work area will be divided into various zones to prevent the spread of contamination, ensure that proper protective equipment is donned, and provide an area for decontamination.

The Exclusion Zone is defined as the area where exposure to affected media could be encountered. The Contamination Reduction Zone (CRZ) is the area where decontamination procedures take place, and is located next to the Exclusion Zone. The Support Zone is the area where support facilities such as vehicles, a fire extinguisher, and first aid supplies are located. The emergency staging area (part of the Support Zone) is the area where all workers on-site would assemble in the event of an emergency. These zones may be changed by the Site Safety Officer (SSO), depending on that day's activities. All field personnel will be informed of the location of these zones before work begins.

##### Site Work Zones

Task	Exclusion Zone	CRZ	Support Zone
Excavation of lead-contaminated soil, acetone-affected soil, tank removal, and petroleum-contaminated material	10 ft from excavation	25 ft from excavation	As needed
Sampling	10 ft from drill rig	25 ft from drill rig	As needed
Comments: Control measures such as "caution tape" and/or traffic cones will be placed around the perimeter of the work area when work is being in active on-site construction area.			

#### 4.6 Work Zone Air Monitoring

Real time air monitoring will be performed with the photoionization detector (PID) and particulate monitor during contaminated soil disturbance activities. Real time air monitoring will be performed with the combustible gas indicator and/or the multi-gas meter during tank removal activities. Measurements will be taken prior to the commencement of work and continuously during the work. Measurements will be made as close to the workers as practicable, and at the breathing height of the workers. The Site Safety Officer (SSO) will set up the equipment and confirm that it is working properly. His/her designee may oversee the air measurements during the day. The initial measurement for the day will be performed before the start of work and will establish the background level for that day. The final measurement for the day will be performed

after the end of work. The action levels and required responses are listed in the table in Section 4.6.4.

#### **4.6.1 Volatile Organic Compounds**

A photoionization detector (PID) will be used to perform air monitoring during soil and groundwater sampling and soil disturbance activities conducted at the Site to determine airborne levels of total volatile organic compounds (VOCs). The PID will be calibrated daily with a 100-ppm isobutylene standard. The PID will be capable of calculating 15-minute running average concentrations and will be equipped with an audible alarm to indicate the exceedance of an action level. The VOC work zone action levels and required responses are listed in the table in Section 4.6.4.

#### **4.6.2 Dust Particulates**

A particulate monitor will be used to measure airborne levels of respirable particulates (less than ten microns) during soil disturbing activities. The particulate monitor will be used in accordance with the manufacturer's specifications. The dust particulate work zone action levels and required responses are listed in the table in Section 4.6.4.

#### **4.6.3 Oxygen and Combustible Gases**

A combined combustible gas indicator and oxygen meter (CGI/O<sub>2</sub>) or a multi-gas meter that measures the lower explosion limit of combustible gases (LEL), oxygen (O<sub>2</sub>), carbon monoxide (CO), and hydrogen sulfide (H<sub>2</sub>S) will be used to measure oxygen and combustible gases during tank removal. The combustible gas indicator and/or the multi-gas meter will be calibrated daily in accordance with manufacturers' specifications. The CGI and O<sub>2</sub> work zone action levels and required responses are listed in the table in Section 4.6.4.

**4.6.4 Work Zone Action Levels and Response Actions**

Instrument	Task to be monitored	Action Level (Note 1)	Response Action
PID	All soil disturbance tasks	Less than 10 ppm in breathing zone.	Level D or D-Modified
		Between 10 and 100 ppm Half-face mask to 50 ppm (max.) Full-face mask to 100 ppm	Level C
		More than 100 ppm	Stop work. Resume work when readings are less than 100 ppm.
Particulate monitor	All soil disturbance tasks	Less than 5 mg/m <sup>3</sup>	Level D
		Between 5 mg/m <sup>3</sup> and 125 mg/m <sup>3</sup>	Level C. Apply dust suppression measures. If <2.5 mg/m <sup>3</sup> , resume work using Level D. Otherwise, use Level C.
		Above 125 mg/m <sup>3</sup>	Stop work. Apply additional dust suppression measures. Resume work when less than 125 mg/m <sup>3</sup> .
Combustible Gas Indicator (CGI) or Equivalent (Note 2)	Tank Removal	Less than 20 percent LEL	Continue work.
		Between 20 and 80 percent LEL	Stop work. Resume work when less than 20 percent LEL.
		Above 80 percent LEL	Evacuate Exclusion Zone.
Oxygen Monitor	Tank Removal	Above 19.5 percent	Continue work.
		Below 19.5 percent	Stop work. Resume work when greater than 19.5 percent.
<b>Notes:</b> 1 – 15-minute time-weighted average, except for CGI, which is instantaneous reading. 2 – CGI or equivalent must measure oxygen (O <sub>2</sub> ), carbon monoxide (CO), hydrogen sulfide (H <sub>2</sub> S), and combustible gas (LEL). ppm – parts per million mg/m <sup>3</sup> – milligrams per cubic meter LEL – lower explosive limit			

**4.7 Community Air Monitoring**

Perimeter community air monitoring for volatile organic compounds (VOCs) and dust particulates will be conducted during soil disturbance activities, including removal of liquids from tanks (if found), excavation and removal of underground storage tanks, excavation and removal of contaminated soil around the underground storage tanks, and drilling operations. At the start of work, air monitoring stations will be established upwind and downwind of the work activities. Exceedances of community air monitoring action levels will be reported in the daily report to the New York State Department of Environmental Conservation (NYSDEC) Project Manager.

**4.7.1 Volatile Organic Compounds**

Monitoring for volatile organic compounds (VOCs) will be conducted using a photoionization detector (PID). Monitoring for VOCs at both the upwind and downwind stations will be conducted at the start of each workday and every time the wind direction changes, to establish background conditions. Monitoring for VOCs at the downwind station will be continuous during soil excavation. If readings approach the Work Zone Action Levels shown in the table in Section 4.6.4, the location of the community monitoring downwind station will be moved to the downwind perimeter of the Site. Background readings and any readings that trigger response actions will be recorded in the Project log book, which will be available on-site for NYSDEC and NYSDOH review.

The VOC community action levels and required responses are listed in the table in Section 4.7.3.

Downwind odor monitoring will be performed during the excavation and loading of contaminated soil. If nuisance odors are noted, corrective actions will be implemented in accordance with Section 4.8 and the Expanded Community Air Monitoring and Odor/Vapor Control Plan provided in Appendix F.

#### **4.7.2 Dust Particulates**

Community air monitoring for dust particulates will be conducted using a real time particulate monitor that measures the concentration of airborne respirable particulates less than ten micrometers in size (PM<sub>10</sub>). The monitor will be capable of calculating 15-minute running average concentrations and will be equipped with an audible alarm to indicate exceedance of action levels. Monitoring for particulates at the upwind location will be conducted at the start of each workday and every time the wind direction changes, to establish background conditions. Monitoring at the downwind station will be continuous during soil excavation. If readings approach the Work Zone Action Levels shown in the table in Section 4.6.4, the location of the community monitoring downwind station will be moved to the downwind perimeter of the Site. Background readings and any readings that trigger response actions will be recorded in the Project log book, which will be available on-site for NYSDEC and NYSDOH review. The dust particulate community action levels and required responses are listed in the table in Section 4.7.3.

**4.7.3 Community Action Levels and Response Actions**

Instrument	Task to be Monitored	Action Level	Response Action
PID	All soil disturbance tasks	Less than 5 ppm above background at downwind perimeter.	Continue work.
		Between 10 and 25 ppm above background at downwind perimeter.	Stop work and continue monitoring. If organic vapor levels (instantaneous reading) steadily decrease to less than 5 ppm, resume work. If organic vapor levels persists at >5 ppm, identify source and take steps to abate emissions. Work can resume if organic vapor level (15-minute average) is below 5 ppm at 200 feet downwind of work zone or half the distance to the nearest potential receptor, whichever is closer.
		More than 25 ppm above background at downwind perimeter.	Stop work.
Particulate monitor	All soil disturbance tasks	Less than 100 µg/m <sup>3</sup> above background (upwind perimeter) at downwind perimeter.	Continue work.
		Between 100 µg/m <sup>3</sup> and 150 µg/m <sup>3</sup> above background (upwind perimeter) at downwind perimeter.	Apply dust suppression measures. Work can continue provided downwind PM <sub>10</sub> particulate levels do not exceed 150 µg/m <sup>3</sup> above background levels and no visible dust is migrating from the work area.
		Greater than 150µg/m <sup>3</sup> above background (upwind perimeter) at downwind perimeter after dust suppression.	Stop work. Apply additional dust suppression measures. Resume work when less than 150 µg/m <sup>3</sup> above background levels and no visible dust is migrating from the work area.
<b>Notes:</b> ppm – parts per million µg/m <sup>3</sup> – micrograms per cubic meter			

**4.8 Contingency Community Air Monitoring and Odor/Vapor Control Plan**

Community air monitoring during subsurface disturbance activities will be performed in accordance with Section 4.7. Disturbance activities as part of the Remediation Work Plan (RWP) include soil borings and potential tank removal activities. If the community air monitoring and action level response measures described in Section 4.7 are not adequate to prevent repeated exceedences of perimeter monitoring action levels, or to prevent off-site nuisance odor impacts as detected by the community air monitoring program, the following measures will be implemented:

- The invasive activities that resulted in the repeated exceedences will be suspended.
- The NYSDEC and NYSDOH will be notified.
- The suspended activities will not be resumed until the Expanded Community Air Monitoring and Odor/Vapor Control Plan can be implemented. The Expanded Community Air Monitoring and Odor/Vapor Control Plan is attached as Appendix F.

**4.9 Personal Protection Equipment**

The personal protection equipment (PPE) required for various kinds of Site investigation tasks are based on 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response Appendix B, “General Description and Discussion of the Levels of Protection and Protective Gear.” AKRF



field personnel and other Site personnel will wear, at a minimum, Level D PPE. The protection will be based on the air monitoring described in Section 4.6 of this HASP.

LEVEL OF PROTECTION and PPE		Soil Excavation
<b>Level D</b> (x) Steel Toe Shoes (x) Hard Hat (within 25 ft of drill rig/excavator) (x) Work Gloves	(x) Safety Glasses ( ) Face Shield (x) Ear Plugs (within 25 ft of drill rig/excavator) (x) Nitrile Gloves	Yes
<b>Level C (in addition to Level D)</b> ( ) Half Face Respirator (x) Full Face Respirator ( ) Full Face PAPR	( ) Particulate Cartridge ( ) Organic Cartridge (x) Dual Organic/Particulate Cartridge	If PID >10 ppm (breathing zone)
Comments: Cartridges to be changed out at least once per shift unless warranted beforehand (e.g., more difficult to breath, any odors detected, etc.).		

#### 4.10 General Work Practices

To protect the health and safety of the field personnel, field personnel will adhere to the following guidelines during activities involving subsurface disturbance:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited, except in designated areas on the Site. These areas will be designated by the Site Safety Officer (SSO).
- Workers must wash their hands and face thoroughly on leaving the work area and before eating, drinking, or any other such activity.
- The workers should shower as soon as possible after leaving the Site. Contact with contaminated or suspected surfaces should be avoided.
- The buddy system should always be used; each buddy should watch for signs of fatigue, exposure, and heat/cold stress.

#### 4.11 Contingency Plan

In the event that an underground storage tank, drum, odor, stained-soil, spill, or evidence of a previous spill or release is identified at a location, which has not been designated as an Area of Concern (AOC) in the Construction (IRM) Work Plan, that location will be considered to be the center of a new work zone. All applicable work zone requirements of Section 4.0 will apply, including but not limited to: hazardous characterization and evaluation, work zone delineation, work zone air monitoring, adherence to action levels, community air monitoring, personnel protection training requirements, and general work practices.

If the identified material is unknown or the apparent chemical has not been identified in this Remediation Health and Safety Plan (RHASP), the workers will withdraw to the edge of the exclusion zone and conduct monitoring consistent with Sections 4.7 and 4.8. The contractor will then contact the NYSDEC Spill Hotline and the other emergency contacts listed in Section 5.2.

## 5.0 EMERGENCY PROCEDURES AND EMERGENCY RESPONSE PLAN

The field crew will be equipped with emergency equipment, such as a first aid kit and disposable eye washes. In the case of a medical emergency, the Site Safety Officer (SSO) will determine the nature of the emergency and he/she will have someone call for an ambulance, if needed. If the nature of the injury is not serious, i.e., the person can be moved without expert emergency medical personnel, he/she should be driven to a hospital by on-site personnel. Directions to the hospital are provided below, and a hospital route map is attached.

### 5.1 Hospital Directions

<b>Hospital Name:</b>	St. Luke's Roosevelt Hospital
<b>Phone Number:</b>	(212) 523-4000
<b>Address/Location:</b>	1000 10 <sup>th</sup> Avenue, New York, NY The entrance to the Emergency Room is on West 59 <sup>th</sup> Street between 10 <sup>th</sup> Avenue (Amsterdam Avenue) and 11 <sup>th</sup> Avenue (West End Avenue).
<b>Directions:</b>	Go EAST on West 60 <sup>th</sup> Street Turn RIGHT onto Columbus Avenue (9 <sup>th</sup> Avenue) Turn RIGHT onto West 59 <sup>th</sup> Street

A map to the hospital from the Site is attached as Figure 1.

### 5.2 Emergency Contacts

Company	Individual Name	Title	Contact Number
AKRF	Michelle Lapin	Project Director	646-388-9520 (office)
	Richard Gardineer	Project Manager	914-949-7336 (office)
	Jessica Leber	Site Safety Officer	646-388-9533 (office) 917-612-6175 (cell)
Algin Management Co., LLC	Larry Ginsberg	Client	718-896-9600
Subcontractors (driller, tank removal, etc.)	TBD – will be provided prior to the start of work	TBD	TBD
Ambulance, Fire Department, & Police Department	-	-	911
NYSDEC Spill Hotline	-	-	800-457-7362
NYSDEC	Shaminder Chawla	Project Manager	718-482-4897
NYSDOH	Julia Guastella	Project Manager	800-485-1158 x27780

**6.0 APPROVAL & ACKNOWLEDGEMENTS OF RHASP****APPROVAL**

Signed:	Date:
AKRF Project Manager	
Signed:	Date:
AKRF Health and Safety Officer	

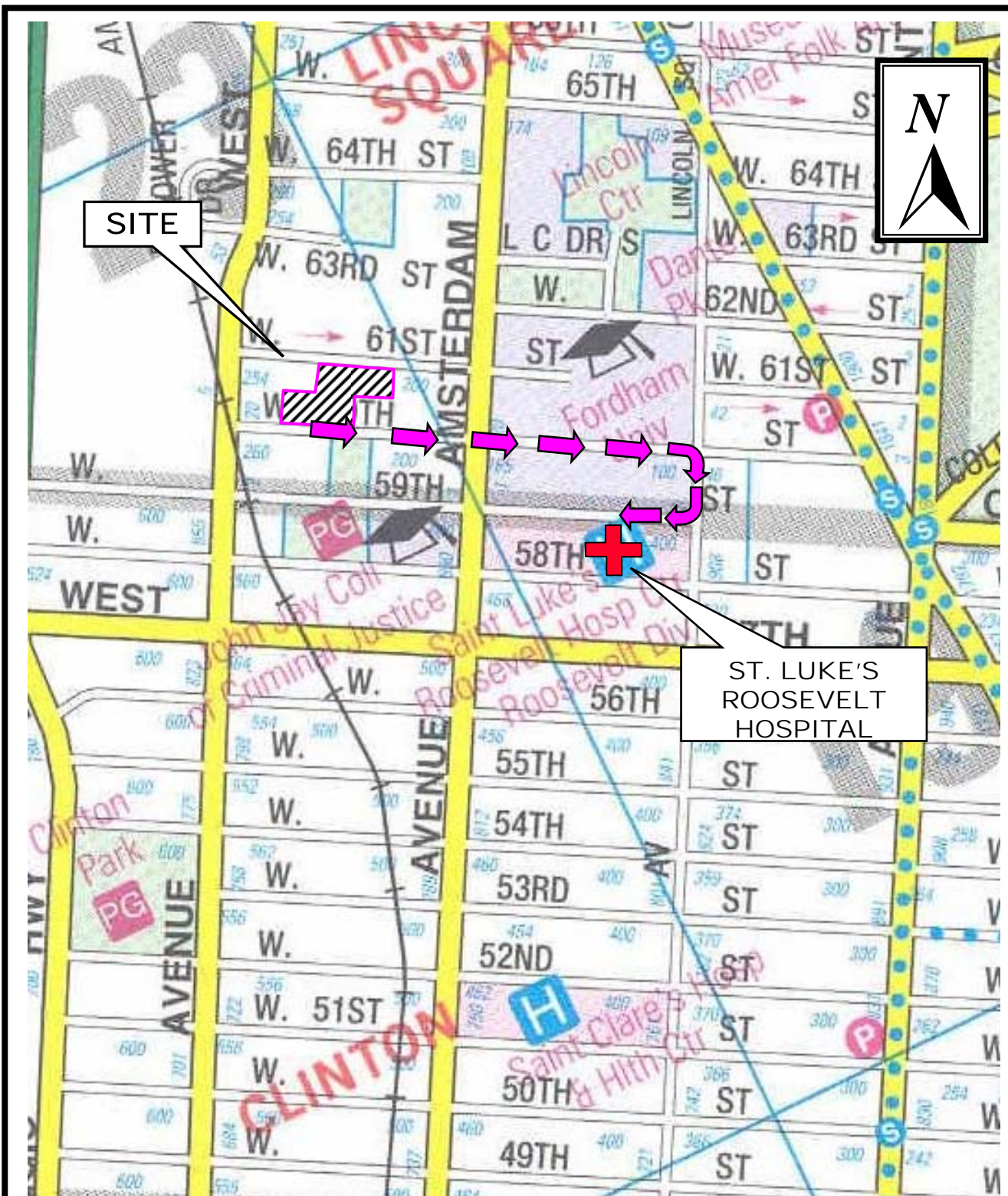
Below is an affidavit that must be signed by all workers who enter the Site. A copy of the RHASP must be on-site at all times and will be kept by the Site Safety Officer (SSO).

**AFFIDAVIT**

I, \_\_\_\_\_ (name), of \_\_\_\_\_ (company name), have read the Remediation Health and Safety Plan (RHASP) for the West 61<sup>st</sup> Street Site. I agree to conduct all on-site work in accordance with the requirements set forth in this RHASP and understand that failure to comply with this HASP could lead to my removal from the Site.

Signed:	Company:	Date:
Signed:	Company:	Date:
Signed:	Company:	Date:
Signed:	Company:	Date:
Signed:	Company:	Date:
Signed:	Company:	Date:
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**FIGURE**



West 61<sup>st</sup> Street Site  
New York, New York

PROJECT SITE MAP  
AND NEAREST HOSPITAL

**AKRF, Inc.**

Environmental Consultants

440 Park Avenue S., New York, New York 10016

DATE  
April 2005

DRAWING No.

PROJECT No.  
10321

FIGURE No.  
1

**APPENDIX A**  
**POTENTIAL HEALTH EFFECTS FROM ON-SITE CONTAMINANTS**

This fact sheet answers the most frequently asked health questions (FAQs) about acetone. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**SUMMARY:** Exposure to acetone results mostly from breathing air, drinking water, or coming in contact with products or soil that contain acetone. Exposure to moderate-to-high amounts of acetone can irritate your eyes and respiratory system, and make you dizzy. Very high exposure may cause you to lose consciousness. This chemical has been found in at least 572 of 1,416 National Priorities List sites identified by the Environmental Protection Agency.

### What is acetone?

(Pronounced äs'ŷ-tön')

Acetone is a manufactured chemical that is also found naturally in the environment. It is a colorless liquid with a distinct smell and taste. It evaporates easily, is flammable, and dissolves in water. It is also called dimethyl ketone, 2-propanone, and beta-ketopropane.

Acetone is used to make plastic, fibers, drugs, and other chemicals. It is also used to dissolve other substances.

It occurs naturally in plants, trees, volcanic gases, forest fires, and as a product of the breakdown of body fat. It is present in vehicle exhaust, tobacco smoke, and landfill sites. Industrial processes contribute more acetone to the environment than natural processes.

### What happens to acetone when it enters the environment?

- ☐ A large percentage (97%) of the acetone released during its manufacture or use goes into the air.
- ☐ In air, about one-half of the total amount breaks down from sunlight or other chemicals every 22 days.
- ☐ It moves from the atmosphere into the water and soil by rain and snow. It also moves quickly from soil and water back to air.

- ☐ Acetone doesn't bind to soil or build up in animals.
- ☐ It's broken down by microorganisms in soil and water.
- ☐ It can move into groundwater from spills or landfills.
- ☐ Acetone is broken down in water and soil, but the time required for this to happen varies.

### How might I be exposed to acetone?

- ☐ Breathing low background levels in the environment.
- ☐ Breathing higher levels of contaminated air in the workplace or from using products that contain acetone (for example, household chemicals, nail polish, and paint).
- ☐ Drinking water or eating food containing acetone.
- ☐ Touching products containing acetone.
- ☐ For children, eating soil at landfills or hazardous waste sites that contain acetone.
- ☐ Smoking or breathing secondhand smoke.

### How can acetone affect my health?

If you are exposed to acetone, it goes into your blood which then carries it to all the organs in your body. If it is a small amount, the liver breaks it down to chemicals that are not harmful and uses these chemicals to make energy for normal body functions. Breathing moderate-to-high levels

**ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>**

of acetone for short periods of time, however, can cause nose, throat, lung, and eye irritation; headaches; light-headedness; confusion; increased pulse rate; effects on blood; nausea; vomiting; unconsciousness and possibly coma; and shortening of the menstrual cycle in women.

Swallowing very high levels of acetone can result in unconsciousness and damage to the skin in your mouth. Skin contact can result in irritation and damage to your skin.

The smell and respiratory irritation or burning eyes that occur from moderate levels are excellent warning signs that can help you avoid breathing damaging levels of acetone.

Health effects from long-term exposures are known mostly from animal studies. Kidney, liver, and nerve damage, increased birth defects, and lowered ability to reproduce (males only) occurred in animals exposed long-term. It is not known if people would have these same effects.

### **How likely is acetone to cause cancer?**

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified acetone for carcinogenicity.

Acetone does not cause skin cancer in animals when applied to the skin. We don't know if breathing or swallowing acetone for long periods will cause cancer. Studies of workers exposed to it found no significant risk of death from cancer.

### **Is there a medical test to show whether I've been exposed to acetone?**

Methods are available to measure the amount of acetone in your breath, blood, and urine. The test can tell you how much acetone you were exposed to, although the amount that

people have naturally in their bodies varies with each person. The tests can't tell you if you will experience any health effects from the exposure.

The test must be performed within 2-3 days after exposure because acetone leaves your body within a few days. These tests are not routinely performed at your doctor's office, but your doctor can take blood or urine samples and send them to a testing laboratory.

### **Has the federal government made recommendations to protect human health?**

The EPA requires that spills of 5,000 pounds or more of acetone be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum concentration limit in workplace air of 1,000 parts of acetone per million parts of air (1,000 ppm) for an 8-hour workday over a 40-hour week to protect workers. The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 250 ppm in workplace air for up to a 10-hour workday over a 40-hour workweek.

### **Glossary**

**Carcinogenicity:** Ability to cause cancer.  
**Evaporate:** To change into a vapor or a gas.  
**Ingesting:** Taking food or drink into your body.  
**Long-term:** Lasting one year or longer.

### **References**

Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for acetone. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





This fact sheet answers the most frequently asked health questions (FAQs) about benzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Benzene is a widely used chemical formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness; long-term benzene exposure causes effects on the bone marrow and can cause anemia and leukemia. Benzene has been found in at least 813 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is benzene?

(Pronounced bĕn/zĕn')

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities.

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.

### What happens to benzene when it enters the environment?

- ☐ Industrial processes are the main source of benzene in the environment.
- ☐ Benzene can pass into the air from water and soil.
- ☐ It reacts with other chemicals in the air and breaks down within a few days.
- ☐ Benzene in the air can attach to rain or snow and be carried back down to the ground.

- ☐ It breaks down more slowly in water and soil, and can pass through the soil into underground water.
- ☐ Benzene does not build up in plants or animals.

### How might I be exposed to benzene?

- ☐ Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions.
- ☐ Indoor air generally contains higher levels of benzene from products that contain it such as glues, paints, furniture wax, and detergents.
- ☐ Air around hazardous waste sites or gas stations will contain higher levels of benzene.
- ☐ Leakage from underground storage tanks or from hazardous waste sites containing benzene can result in benzene contamination of well water.
- ☐ People working in industries that make or use benzene may be exposed to the highest levels of it.
- ☐ A major source of benzene exposures is tobacco smoke.

### How can benzene affect my health?

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death.

ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection.

Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men.

Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

### **How likely is benzene to cause cancer?**

The Department of Health and Human Services (DHHS) has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

### **Is there a medical test to show whether I've been exposed to benzene?**

Several tests can show if you have been exposed to benzene. There is test for measuring benzene in the breath; this test must be done shortly after exposure. Benzene can also be measured in the blood, however, since benzene disappears rapidly from the blood, measurements are accurate only for recent exposures.

In the body, benzene is converted to products called metabolites. Certain metabolites can be measured in the urine. However, this test must be done shortly after exposure and is not a reliable indicator of how much benzene you have been exposed to, since the metabolites may be present in urine from other sources.

### **Has the federal government made recommendations to protect human health?**

The EPA has set the maximum permissible level of benzene in drinking water at 0.005 milligrams per liter (0.005 mg/L). The EPA requires that spills or accidental releases into the environment of 10 pounds or more of benzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set a permissible exposure limit of 1 part of benzene per million parts of air (1 ppm) in the workplace during an 8-hour workday, 40-hour workweek.

### **Glossary**

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogen: A substance with the ability to cause cancer.

CAS: Chemical Abstracts Service.

Chromosomes: Parts of the cells responsible for the development of hereditary characteristics.

Metabolites: Breakdown products of chemicals.

Milligram (mg): One thousandth of a gram.

Pesticide: A substance that kills pests.

### **References**

This ToxFAQs information is taken from the 1997 Toxicological Profile for Benzene (update) produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about ethylbenzene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Ethylbenzene is a colorless liquid found in a number of products including gasoline and paints. Breathing very high levels can cause dizziness and throat and eye irritation. Ethylbenzene has been found in at least 731 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is ethylbenzene?

(Pronounced ĕth' əl bĕn' zĕn')

Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum and is also found in manufactured products such as inks, insecticides, and paints.

Ethylbenzene is used primarily to make another chemical, styrene. Other uses include as a solvent, in fuels, and to make other chemicals.

### What happens to ethylbenzene when it enters the environment?

- ☐ Ethylbenzene moves easily into the air from water and soil.
- ☐ It takes about 3 days for ethylbenzene to be broken down in air into other chemicals.
- ☐ Ethylbenzene may be released to water from industrial discharges or leaking underground storage tanks.
- ☐ In surface water, ethylbenzene breaks down by reacting with other chemicals found naturally in water.
- ☐ In soil, it is broken down by soil bacteria.

### How might I be exposed to ethylbenzene?

- ☐ Breathing air containing ethylbenzene, particularly in areas near factories or highways.
- ☐ Drinking contaminated tap water.
- ☐ Working in an industry where ethylbenzene is used or made.
- ☐ Using products containing it, such as gasoline, carpet glues, varnishes, and paints.

### How can ethylbenzene affect my health?

Limited information is available on the effects of ethylbenzene on people's health. The available information shows dizziness, throat and eye irritation, tightening of the chest, and a burning sensation in the eyes of people exposed to high levels of ethylbenzene in air.

Animals studies have shown effects on the nervous system, liver, kidneys, and eyes from breathing ethylbenzene in air.

### How likely is ethylbenzene to cause cancer?

The EPA has determined that ethylbenzene is not classifiable as to human carcinogenicity.

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No studies in people have shown that ethylbenzene exposure can result in cancer. Two available animal studies suggest that ethylbenzene may cause tumors.

### **How can ethylbenzene affect children?**

Children may be exposed to ethylbenzene through inhalation of consumer products, including gasoline, paints, inks, pesticides, and carpet glue. We do not know whether children are more sensitive to the effects of ethylbenzene than adults.

It is not known whether ethylbenzene can affect the development of the human fetus. Animal studies have shown that when pregnant animals were exposed to ethylbenzene in air, their babies had an increased number of birth defects.

### **How can families reduce the risk of exposure to ethylbenzene?**

Exposure to ethylbenzene vapors from household products and newly installed carpeting can be minimized by using adequate ventilation.

Household chemicals should be stored out of reach of children to prevent accidental poisoning. Always store household chemicals in their original containers; never store them in containers children would find attractive to eat or drink from, such as old soda bottles. Gasoline should be stored in a gasoline can with a locked cap.

Sometimes older children sniff household chemicals, including ethylbenzene, in an attempt to get high. Talk with your children about the dangers of sniffing chemicals.

### **Is there a medical test to show whether I've been exposed to ethylbenzene?**

Ethylbenzene is found in the blood, urine, breath, and

some body tissues of exposed people. The most common way to test for ethylbenzene is in the urine. This test measures substances formed by the breakdown of ethylbenzene. This test needs to be done within a few hours after exposure occurs, because the substances leave the body very quickly.

These tests can show you were exposed to ethylbenzene, but cannot predict the kind of health effects that might occur.

### **Has the federal government made recommendations to protect human health?**

The EPA has set a maximum contaminant level of 0.7 milligrams of ethylbenzene per liter of drinking water (0.7 mg/L).

The EPA requires that spills or accidental releases into the environment of 1,000 pounds or more of ethylbenzene be reported to the EPA.

The Occupational Safety and Health Administration (OSHA) has set an occupational exposure limit of 100 parts of ethylbenzene per million parts of air (100 ppm) for an 8-hour workday, 40-hour workweek.

### **References**

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for ethylbenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about fuel oils. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**SUMMARY:** Fuel oils are liquid mixtures produced from petroleum, and their use mostly involves burning them as fuels. Drinking or breathing fuel oils may cause nausea or nervous system effects. However, exposure under normal use conditions is not likely to be harmful. Fuel oils have been found in at least 26 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What are fuel oils?

(Pronounced fyoo'el oilz)

Fuel oils are a variety of yellowish to light brown liquid mixtures that come from crude petroleum. Some chemicals found in fuel oils may evaporate easily, while others may more easily dissolve in water.

Fuel oils are produced by different petroleum refining processes, depending on their intended uses. Fuel oils may be used as fuel for engines, lamps, heaters, furnaces, and stoves, or as solvents.

Some commonly found fuel oils include kerosene, diesel fuel, jet fuel, range oil, and home heating oil. These fuel oils differ from one another by their hydrocarbon compositions, boiling point ranges, chemical additives, and uses.

### What happens to fuel oils when they enter the environment?

- ☐ Some chemicals found in fuel oils may evaporate into the air from open containers or contaminated soil or water.
- ☐ Some chemicals found in fuel oils may dissolve in water after spills to surface waters or leaks from underground storage tanks.

- ☐ Some chemicals found in fuel oils may stick to particles in water, which will eventually cause them to settle to the bottom sediment.
- ☐ Some of the chemicals found in fuel oils may be broken down slowly in air, water, and soil by sunlight or small organisms.
- ☐ Some of the chemicals found in fuel oils may build up significantly in plants and animals.

### How might I be exposed to fuel oils?

- ☐ Using a home kerosene heater or stove, or using fuel oils at work.
- ☐ Breathing air in home or building basements that has been contaminated with fuel oil vapors entering from the soil.
- ☐ Drinking or swimming in water that has been contaminated with fuel oils from a spill or a leaking underground storage tank.
- ☐ Touching soil contaminated with fuel oils.
- ☐ Using fuel oils to wash paint or grease from skin or equipment.

### How can fuel oils affect my health?

Little information is available about the health effects that may be caused by fuel oils. People who use kerosene

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stoves for cooking do not seem to have any health problems related to their exposure.

Breathing some fuel oils for short periods may cause nausea, eye irritation, increased blood pressure, headache, lightheadedness, loss of appetite, poor coordination, and difficulty concentrating. Breathing diesel fuel vapors for long periods may cause kidney damage and lower your blood's ability to clot.

Drinking small amounts of kerosene may cause vomiting, diarrhea, coughing, stomach swelling and cramps, drowsiness, restlessness, painful breathing, irritability, and unconsciousness. Drinking large amounts of kerosene may cause convulsions, coma, or death. Skin contact with kerosene for short periods may cause itchy, red, sore, or peeling skin.

### How likely are fuel oils to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that some fuel oils (heavy) may possibly cause cancer in humans, but for other fuel oils (light) there is not enough information to make a determination. IARC has also determined that occupational exposures to fuel oils during petroleum refining are probably carcinogenic in humans.

Some studies with mice have suggested that repeated contact with fuel oils may cause liver or skin cancer. However, other mouse studies have found this not to be the case. No studies are available in other animals or in people on the carcinogenic effects of fuel oils.

### Is there a medical test to show whether I've been exposed to fuel oils?

There is no medical test that shows if you have been exposed to fuel oils. Tests are available to determine if some of

the chemicals commonly found in fuel oils are in your blood. However, the presence of these chemicals in blood may not necessarily mean that you have been exposed to fuel oils.

### Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) and the Air Force Office of Safety and Health (AFOSH) have set a permissible exposure level (PEL) of 400 parts of petroleum distillates per million parts of air (400 ppm) for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) recommends that average workplace air levels not exceed 350 milligrams of petroleum distillates per cubic meter of air (350 mg/m<sup>3</sup>) for a 40-hour workweek.

The Department of Transportation (DOT) lists fuel oils as hazardous materials and, therefore, regulates their transportation.

### Glossary

Carcinogenic: Able to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or a gas.

Hydrocarbon: Any compound made up of hydrogen and carbon.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for fuel oils. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about automobile gasoline. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**SUMMARY:** Exposure to automotive gasoline most likely occurs from breathing its vapor at a service station while filling a car's fuel tank. At high levels, automotive gasoline is irritating to the lungs when breathed in and irritating to the lining of the stomach when swallowed. Exposure to high levels may also cause harmful effects to the nervous system. Automotive gasoline has been found in at least 23 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is automotive gasoline?

(Pronounced ô'tə-mō'tīv gās'ə-lēn')

The gasoline discussed in this fact sheet is automotive used as a fuel for engines in cars. Gasoline is a colorless, pale brown, or pink liquid, and is very flammable.

Gasoline is a manufactured mixture that does not exist naturally in the environment. Gasoline is produced from petroleum in the refining process.

Typically, gasoline contains more than 150 chemicals, including small amounts of benzene, toluene, xylene, and sometimes lead. How the gasoline is made determines which chemicals are present in the gasoline mixture and how much of each is present. The actual composition varies with the source of the crude petroleum, the manufacturer, and the time of year.

### What happens to automotive gasoline when it enters the environment?

- ☐ Small amounts of the chemicals present in gasoline evaporate into the air when you fill the gas tank in your car or when gasoline is accidentally spilled onto surfaces and soils or into surface waters.

- ☐ Other chemicals in gasoline dissolve in water after spills to surface waters or underground storage tank leaks into the groundwater.
- ☐ In surface releases, most chemicals in gasoline will probably evaporate; others may dissolve and be carried away by water; a few will probably stick to soil.
- ☐ The chemicals that evaporate are broken down by sunlight and other chemicals in the air.
- ☐ The chemicals that dissolve in water also break down quickly by natural processes.

### How might I be exposed to automotive gasoline?

- ☐ Breathing vapors at a service station when filling the car's fuel tank is the most likely way to be exposed.
- ☐ Working at a service station.
- ☐ Using equipment that runs on gasoline, such as a lawn mower.
- ☐ Drinking contaminated water.
- ☐ Being close to a spot where gasoline has spilled or leaked into the soil.

### How can automotive gasoline affect my health?

Many of the harmful effects seen after exposure to gasoline are due to the individual chemicals in the gasoline mix-



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ture, such as benzene and lead. Inhaling or swallowing large amounts of gasoline can cause death.

Inhaling high concentrations of gasoline is irritating to the lungs when breathed in and irritating to the lining of the stomach when swallowed. Gasoline is also a skin irritant. Breathing in high levels of gasoline for short periods or swallowing large amounts of gasoline may also cause harmful effects on the nervous system.

Serious nervous system effects include coma and the inability to breathe, while less serious effects include dizziness and headaches.

There is not enough information available to determine if gasoline causes birth defects or affects reproduction.

### **How likely is automotive gasoline to cause cancer?**

The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified automotive gasoline for carcinogenicity. Automotive gasoline is currently undergoing review by the EPA for cancer classification.

Some laboratory animals that breathed high concentrations of unleaded gasoline vapors continuously for 2 years developed liver and kidney tumors. However, there is no evidence that exposure to gasoline causes cancer in humans.

### **Is there a medical test to show whether I've been exposed to automotive gasoline?**

Laboratory tests are available that can measure elevated blood or urine levels of lead (as an indication of exposure to leaded gasoline only), benzene, or other substances that may result from exposure to gasoline or other sources. These meth-

ods are sensitive enough to measure background levels and levels where health effects may occur. These tests aren't available in most doctors' offices, but can be done at special laboratories that have the right equipment.

### **Has the federal government made recommendations to protect human health?**

The EPA has established many regulations to control air pollution. These are designed to protect the public from the possible harmful health effects of gasoline.

The American Conference of Governmental Industrial Hygienists (ACGIH) set a maximum level of 890 milligrams of gasoline per cubic meter of air (890 mg/m<sup>3</sup>) for an 8-hour workday, 40-hour workweek.

### **Glossary**

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Crude petroleum: Petroleum that has not been processed.

Dissolve: To disappear gradually.

Evaporate: To change into a vapor or a gas.

Irritant: A substance that causes an abnormal reaction.

Mixture: A combination of two or more components.

Refining process: The process by which petroleum is purified to form gasoline.

Tumor: An abnormal mass of tissue.

### **References**

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for automotive gasoline. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





This fact sheet answers the most frequently asked health questions (FAQs) about hydraulic fluids. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Exposure to hydraulic fluids occurs mainly in the workplace. Drinking certain types of hydraulic fluids can cause death in humans, and swallowing or inhaling certain types of hydraulic fluids has caused nerve damage in animals. Contact with some types of hydraulic fluids can irritate your skin or eyes. These substances have been found in at least 10 of the 1,428 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What are hydraulic fluids?

(Pronounced hī-drô/lik flōô/ydz)

Hydraulic fluids are a large group of liquids made of many kinds of chemicals. They are used in automobile automatic transmissions, brakes, and power steering; fork lift trucks; tractors; bulldozers; industrial machinery; and airplanes. The three most common types of hydraulic fluids are mineral oil, organophosphate ester, and polyalphaolefin. Some of the trade names for hydraulic fluids include Durad®, Fyrquel®, Skydrol®, Houghton-Safe®, Pydraul®, Reofos®, Reolube®, and Quintolubric®. (Use of trade names is for identification only and does not imply endorsement by the Agency for Toxic Substances and Disease Registry, the Public Health Service, or the U.S. Department of Health and Human Services.)

Some hydraulic fluids have a bland, oily smell and others have no smell; some will burn and some will not burn. Certain hydraulic fluids are produced from crude oil and others are manufactured.

### What happens to hydraulic fluids when they enter the environment?

- ☐ Hydraulic fluids can enter the environment from spills, leaks in machines that use them, or from storage areas and waste sites.

- ☐ If spilled on soil, some of the ingredients in hydraulic fluids will stay on top and others will sink into the groundwater.
- ☐ In water, some hydraulic fluids' ingredients will transfer to the bottom and can stay there for more than a year.
- ☐ Certain chemicals in hydraulic fluids may break down in air, soil, or water, but how much breaks down isn't known.
- ☐ Fish may contain some hydraulic fluids if they live in contaminated water.

### How might I be exposed to hydraulic fluids?

- ☐ Touching or swallowing hydraulic fluids.
- ☐ Breathing hydraulic fluids in the air near machines where hydraulic fluids are used.
- ☐ Touching contaminated water or soil near hazardous waste sites or industrial manufacturing facilities that use or make hydraulic fluids.

### How can hydraulic fluids affect my health?

Little is known about how hydraulic fluids can affect your health. Since hydraulic fluids are actually mixtures of chemicals, some of the effects seen may be caused by additives in the hydraulic fluids.

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In people, the effects of breathing air with high levels of hydraulic fluids are not known. Drinking large amounts of some types of hydraulic fluids can cause pneumonia, intestinal bleeding, or death in humans. Weakness of the hands was seen in a worker who touched a lot of hydraulic fluids.

Rabbits that inhaled very high levels of one type of hydraulic fluid had trouble breathing, congested lungs, and became drowsy. The nervous systems of animals that swallowed or inhaled other hydraulic fluids were affected immediately with tremors, diarrhea, sweating, breathing difficulty, and sometimes several weeks later with weakness of the limbs, or paralysis. The immediate effects are caused because hydraulic fluids stop the action of certain enzymes, called cholinesterases, in the body. There are no reports of people swallowing or breathing the types of hydraulic fluids that cause these effects. When certain types of hydraulic fluids were put into the eyes of animals or allowed to touch the skin of people or animals for short periods of time, redness and swelling occurred. It is not known whether hydraulic fluids can cause birth defects or reproductive effects.

### How likely are hydraulic fluids to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified hydraulic fluids as to their carcinogenicity.

### Is there a medical test to show whether I've been exposed to hydraulic fluids?

Hydraulic fluids can't be measured in blood, urine, or feces, but certain chemicals in the hydraulic fluids can be measured. Some of the hydraulic fluids stop the activity of certain enzymes, called cholinesterases, in blood and this activity can be measured. However, many other chemicals also cause this effect. This test isn't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

### Has the federal government made recommendations to protect human health?

There are no federal government recommendations to protect humans from the health effects of the major hydraulic fluids. However, mineral oil, the major chemical ingredient of one type of hydraulic fluid, is part of the petroleum distillate class of chemicals and there are regulations for these chemicals.

The Occupational Safety and Health Administration (OSHA) has set an exposure limit of 2,000 milligram per cubic meter ( $\text{mg}/\text{m}^3$ ) petroleum distillates for an 8-hour workday, 40-hour workweek. The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 350  $\text{mg}/\text{m}^3$  petroleum distillates for a 10-hour workday, 40-hour workweek.

### Glossary

Additive: Substance added to another in small amounts to improve its properties.

CAS: Chemical Abstracts Service.

Carcinogenicity: Ability to cause cancer.

Petroleum Distillate: A chemical fraction of petroleum.

### References

This ToxFAQs information is taken from the 1997 Toxicological Profile for Hydraulic Fluids produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about naphthalene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**SUMMARY:** Exposure to naphthalene happens mostly from breathing air contaminated from the burning of wood or fossil fuels, industrial discharges, tobacco smoke, or moth repellents. Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. Naphthalene has been found in at least 536 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is naphthalene?

(Pronounced năf'the-lên')

Naphthalene is a white solid that is found naturally in fossil fuels. Burning tobacco or wood produces naphthalene. It has a strong, but not unpleasant smell.

The major products made from naphthalene are moth repellents. It is also used for making dyes, resins, leather, tanning agents, and the insecticide, carbaryl.

### What happens to naphthalene when it enters the environment?

- ☐ Naphthalene enters the environment from industrial uses, and from its use as a moth repellent.
- ☐ It also enters from the burning of wood or tobacco, and from accidental spills.
- ☐ Naphthalene evaporates easily.
- ☐ In air, moisture and sunlight break it down, often within 1 day.
- ☐ Naphthalene in water is destroyed by bacteria or evaporates into the air.
- ☐ Naphthalene binds weakly to soils and sediment.
- ☐ It does not accumulate in animals or fish.

- ☐ If dairy cows are exposed to naphthalene, some of it will be in their milk.
- ☐ If laying hens are exposed, some of it will be in their eggs.

### How might I be exposed to naphthalene?

- ☐ Breathing low levels in outdoor air.
- ☐ Breathing air contaminated from industrial discharges or from burning wood or fossil fuels.
- ☐ Breathing air in homes or businesses where cigarettes are smoked, wood is burned, or moth repellents are used.
- ☐ Drinking water from contaminated wells.
- ☐ Touching clothing, blankets, or coverlets that are treated with naphthalene.

### How can naphthalene affect my health?

Exposure to large amounts of naphthalene may damage or destroy some of your red blood cells. This could cause you to have too few red blood cells until your body replaces the destroyed cells. People, particularly children, have developed this problem after eating naphthalene-containing mothballs or deodorant blocks. Some of the symptoms of this

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problem are fatigue, lack of appetite, restlessness, and pale skin. Exposure to large amounts of naphthalene may also cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color to the skin.

Animals sometimes develop cloudiness in their eyes after swallowing naphthalene. It is not clear if this also develops in people.

When mice were repeatedly exposed to naphthalene vapors for 2 years, their noses and lungs became inflamed and irritated.

### How likely is naphthalene to cause cancer?

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC) and the EPA have not classified naphthalene as to its human carcinogenicity.

No studies are available in people. Naphthalene has caused cancer in studies in female mice, but not in male mice or in rats of either sex.

### Is there a medical test to show whether I've been exposed to naphthalene?

Tests are available that measure levels of naphthalene and its breakdown products in urine, stool, blood, or maternal milk. A small sample of your body fat can also be removed and analyzed for naphthalene. These tests are not routinely available in a doctor's office. However, a sample taken in a doctor's office can be sent to a special laboratory, if needed.

These tests cannot determine exactly how much naphthalene you were exposed to or predict whether harmful effects will occur.

### Has the federal government made recommendations to protect human health?

The EPA recommends that children not drink water containing over 0.5 parts of naphthalene per million parts of water (0.5 ppm) for more than 10 days, or 0.4 ppm for longer than 7 years. Adults should not drink water with more than 1 ppm for more than 7 years. For water consumed over a lifetime, the EPA suggests it contain no more than 0.02 ppm naphthalene. The EPA requires that discharges or spills into the environment of 100 pounds or more be reported.

The Occupational Safety and Health Administration (OSHA) has set a limit of 10 parts per million (10 ppm) for the level of naphthalene in workplace air over an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) considers more than 250 ppm of naphthalene in air to be immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

### Glossary

Carcinogenicity: Ability of a substance to cause cancer.

CAS: Chemical Abstracts Service.

Insecticide: A substance that kills insects.

Sediment: Mud and debris that have settled to the bottom of a body of water.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about lead. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating lead-based paint chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system. Lead has been found in at least 1,026 of 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is lead?

(Pronounced lēd)

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays.

Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

### What happens to lead when it enters the environment?

- ☐ Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- ☐ When lead is released to the air, it may travel long distances before settling to the ground.
- ☐ Once lead falls onto soil, it usually sticks to soil particles.
- ☐ Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil.
- ☐ Much of the lead in inner-city soils comes from old houses painted with lead-based paint.

### How might I be exposed to lead?

- ☐ Eating food or drinking water that contains lead.
- ☐ Spending time in areas where lead-based paints have been used and are deteriorating.
- ☐ Working in a job where lead is used.
- ☐ Using health-care products or folk remedies that contain lead.
- ☐ Engaging in certain hobbies in which lead is used (for example, stained glass).

### How can lead affect my health?

Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

At high levels, lead may decrease reaction time, cause weakness in fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can also damage the male reproductive system. The connection between these effects and exposure to low levels of lead is uncertain.

### How likely is lead to cause cancer?

The Department of Health and Human Services has determined that lead acetate and lead phosphate may reasonably

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be anticipated to be carcinogens based on studies in animals. There is inadequate evidence to clearly determine lead's carcinogenicity in people.

### How can lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead.

Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. A large amount of lead might get into a child's body if the child ate small pieces of old paint that contained large amounts of lead. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead.

### How can families reduce the risk of exposure to lead?

Avoid exposure to sources of lead. Do not allow children to chew or mouth painted surfaces that may have been painted with lead-based paint (homes built before 1978). Run your water for 15 to 30 seconds before drinking or cooking with it. This will get rid of lead that may have leached out of pipes. Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children. Wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

### Is there a medical test to show whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth and bones can be measured with X-rays, but this test is not as readily available. Medical treatment may be necessary in children if the lead concentration in blood is higher than 45 micrograms per deciliter (45 µg/dL).

### Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that children ages 1 and 2 be screened for lead poisoning. Children who are 3 to 6 years old should be tested for lead if they have never been tested for lead before and if they receive services from public assistance programs; if they live in or regularly visit a building built before 1950; if they live in or visit a home built before 1978 that is being remodeled; or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers children to have an elevated level of lead if the amount in the blood is 10 µg/dL.

The EPA requires lead in air not to exceed 1.5 micrograms per cubic meter (1.5 µg/m<sup>3</sup>) averaged over 3 months. EPA limits lead in drinking water to 15 µg per liter.

The Occupational Health and Safety Administration (OSHA) develops regulations for workers exposed to lead. The Clean Air Act Amendments of 1990 banned the sale of leaded gasoline. The Federal Hazardous Substance Act bans children's products that contain hazardous amounts of lead.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about methyl *tert*-butyl ether (MTBE). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Methyl *tert*-butyl ether (MTBE) is a flammable liquid which is used as an additive in unleaded gasoline. Drinking or breathing MTBE may cause nausea, nose and throat irritation, and nervous system effects. MTBE has been found in at least 11 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is methyl *tert*-butyl ether?

(Pronounced mëth'əl tûr/shē-ër'ē byôôt'l ē'thër)

Methyl *tert*-butyl ether (MTBE) is a flammable liquid with a distinctive, disagreeable odor. It is made from blending chemicals such as isobutylene and methanol, and has been used since the 1980s as an additive for unleaded gasolines to achieve more efficient burning.

MTBE is also used to dissolve gallstones. Patients treated in this way have MTBE delivered directly to their gall bladders through special tubes that are surgically inserted.

### What happens to MTBE when it enters the environment?

- ☐ MTBE quickly evaporates from open containers and surface water, so it is commonly found as a vapor in the air.
- ☐ Small amounts of MTBE may dissolve in water and get into underground water.
- ☐ It remains in underground water for a long time.

- ☐ MTBE may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- ☐ MTBE may be broken down quickly in the air by sunlight.
- ☐ MTBE does not build up significantly in plants and animals.

### How might I be exposed to MTBE?

- ☐ Touching the skin or breathing contaminated air while pumping gasoline.
- ☐ Breathing exhaust fumes while driving a car.
- ☐ Breathing air near highways or in cities.
- ☐ Drinking, swimming, or showering in water that has been contaminated with MTBE.
- ☐ Receiving MTBE treatment for gallstones.

### How can MTBE affect my health?

Breathing small amounts of MTBE for short periods may cause nose and throat irritation. Some people exposed to MTBE while pumping gasoline, driving their cars, or working



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in gas stations have reported having headaches, nausea, dizziness, and mental confusion. However, the actual levels of exposure in these cases are unknown. In addition, these symptoms may have been caused by exposure to other chemicals.

There are no data on the effects in people of drinking MTBE. Studies with rats and mice suggest that drinking MTBE may cause gastrointestinal irritation, liver and kidney damage, and nervous system effects.

### **How likely is MTBE to cause cancer?**

There is no evidence that MTBE causes cancer in humans. One study with rats found that breathing high levels of MTBE for long periods may cause kidney cancer. Another study with mice found that breathing high levels of MTBE for long periods may cause liver cancer.

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified MTBE as to its carcinogenicity.

### **Is there a medical test to show whether I've been exposed to MTBE?**

MTBE and its breakdown product, butyl alcohol, can be detected in your breath, blood, or urine for up to 1 or 2 days after exposure. These tests aren't available at most doctors' offices, but can be done at special laboratories that have the right equipment. There is no other test specific to determining MTBE exposure.

### **Has the federal government made recommendations to protect human health?**

The EPA has issued guidelines recommending that, to protect children, drinking water levels of MTBE not exceed 4 milligrams per liter of water (4 mg/L) for an exposure of 1-10 days, and 3 mg/L for longer-term exposures.

The American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an exposure limit of 40 parts of MTBE per million parts of air (40 ppm) for an 8-hour workday, 40-hour workweek.

### **Glossary**

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To change into a vapor or gas.

Milligram (mg): One thousandth of a gram.

ppm: Parts per million.

Sediment: Mud and debris that have settled to the bottom of a body of water.

### **References**

This ToxFAQs information is taken from the 1996 Toxicological Profile for Methyl *tert*-Butyl Ether produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





This fact sheet answers the most frequently asked health questions (FAQs) about polychlorinated biphenyls. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Polychlorinated biphenyls (PCBs) are a mixture of individual chemicals which are no longer produced in the United States, but are still found in the environment. Health effects that have been associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children. PCBs are known to cause cancer in animals. PCBs have been found in at least 500 of the 1,598 National Priorities List sites identified by the Environmental Protection Agency (EPA).

## What are polychlorinated biphenyls?

Polychlorinated biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow. Some PCBs can exist as a vapor in air. PCBs have no known smell or taste. Many commercial PCB mixtures are known in the U.S. by the trade name Aroclor.

PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment because they don't burn easily and are good insulators. The manufacture of PCBs was stopped in the U.S. in 1977 because of evidence they build up in the environment and can cause harmful health effects. Products made before 1977 that may contain PCBs include old fluorescent lighting fixtures and electrical devices containing PCB capacitors, and old microscope and hydraulic oils.

## What happens to PCBs when they enter the environment?

- ☐ PCBs entered the air, water, and soil during their manufacture, use, and disposal; from accidental spills and leaks during their transport; and from leaks or fires in products containing PCBs.
- ☐ PCBs can still be released to the environment from hazardous waste sites; illegal or improper disposal of industrial wastes and consumer products; leaks from old electrical transformers containing PCBs; and burning of some wastes in incinerators.
- ☐ PCBs do not readily break down in the environment and thus may remain there for very long periods of time. PCBs can travel long distances in the air and be deposited in areas far away from where they were released. In water, a small amount of PCBs may remain dissolved, but most stick to organic particles and bottom sediments. PCBs also bind strongly to soil.
- ☐ PCBs are taken up by small organisms and fish in water. They are also taken up by other animals that eat these

aquatic animals as food. PCBs accumulate in fish and marine mammals, reaching levels that may be many thousands of times higher than in water.

## How might I be exposed to PCBs?

- ☐ Using old fluorescent lighting fixtures and electrical devices and appliances, such as television sets and refrigerators, that were made 30 or more years ago. These items may leak small amounts of PCBs into the air when they get hot during operation, and could be a source of skin exposure.
- ☐ Eating contaminated food. The main dietary sources of PCBs are fish (especially sportfish caught in contaminated lakes or rivers), meat, and dairy products.
- ☐ Breathing air near hazardous waste sites and drinking contaminated well water.
- ☐ In the workplace during repair and maintenance of PCB transformers; accidents, fires or spills involving transformers, fluorescent lights, and other old electrical devices; and disposal of PCB materials.

## How can PCBs affect my health?

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. Studies in exposed workers have shown changes in blood and urine that may indicate liver damage. PCB exposures in the general population are not likely to result in skin and liver effects. Most of the studies of health effects of PCBs in the general population examined children of mothers who were exposed to PCBs.

Animals that ate food containing large amounts of PCBs for short periods of time had mild liver damage and some died. Animals that ate smaller amounts of PCBs in food over several weeks or months developed various kinds of health effects, including anemia; acne-like skin conditions; and liver, stomach, and thyroid gland injuries. Other effects

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of PCBs in animals include changes in the immune system, behavioral alterations, and impaired reproduction. PCBs are not known to cause birth defects.

#### How likely are PCBs to cause cancer?

Few studies of workers indicate that PCBs were associated with certain kinds of cancer in humans, such as cancer of the liver and biliary tract. Rats that ate food containing high levels of PCBs for two years developed liver cancer. The Department of Health and Human Services (DHHS) has concluded that PCBs may reasonably be anticipated to be carcinogens. The EPA and the International Agency for Research on Cancer (IARC) have determined that PCBs are probably carcinogenic to humans.

#### How can PCBs affect children?

Women who were exposed to relatively high levels of PCBs in the workplace or ate large amounts of fish contaminated with PCBs had babies that weighed slightly less than babies from women who did not have these exposures. Babies born to women who ate PCB-contaminated fish also showed abnormal responses in tests of infant behavior. Some of these behaviors, such as problems with motor skills and a decrease in short-term memory, lasted for several years. Other studies suggest that the immune system was affected in children born to and nursed by mothers exposed to increased levels of PCBs. There are no reports of structural birth defects caused by exposure to PCBs or of health effects of PCBs in older children. The most likely way infants will be exposed to PCBs is from breast milk. Transplacental transfers of PCBs were also reported. In most cases, the benefits of breastfeeding outweigh any risks from exposure to PCBs in mother's milk.

#### How can families reduce the risk of exposure to PCBs?

- ☐ You and your children may be exposed to PCBs by eating fish or wildlife caught from contaminated locations. Certain states, Native American tribes, and U.S. territories have issued advisories to warn people about PCB-contaminated fish and fish-eating wildlife. You can reduce your family's exposure to PCBs by obeying these advisories.
- ☐ Children should be told not play with old appliances,

electrical equipment, or transformers, since they may contain PCBs.

- ☐ Children should be discouraged from playing in the dirt near hazardous waste sites and in areas where there was a transformer fire. Children should also be discouraged from eating dirt and putting dirty hands, toys or other objects in their mouths, and should wash hands frequently.
- ☐ If you are exposed to PCBs in the workplace it is possible to carry them home on your clothes, body, or tools. If this is the case, you should shower and change clothing before leaving work, and your work clothes should be kept separate from other clothes and laundered separately.

#### Is there a medical test to show whether I've been exposed to PCBs?

Tests exist to measure levels of PCBs in your blood, body fat, and breast milk, but these are not routinely conducted. Most people normally have low levels of PCBs in their body because nearly everyone has been environmentally exposed to PCBs. The tests can show if your PCB levels are elevated, which would indicate past exposure to above-normal levels of PCBs, but cannot determine when or how long you were exposed or whether you will develop health effects.

#### Has the federal government made recommendations to protect human health?

The EPA has set a limit of 0.0005 milligrams of PCBs per liter of drinking water (0.0005 mg/L). Discharges, spills or accidental releases of 1 pound or more of PCBs into the environment must be reported to the EPA. The Food and Drug Administration (FDA) requires that infant foods, eggs, milk and other dairy products, fish and shellfish, poultry and red meat contain no more than 0.2-3 parts of PCBs per million parts (0.2-3 ppm) of food. Many states have established fish and wildlife consumption advisories for PCBs.

#### References

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for polychlorinated biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about polycyclic aromatic hydrocarbons (PAHs). For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**SUMMARY:** Exposure to polycyclic aromatic hydrocarbons usually occurs by breathing air contaminated by wild fires or coal tar or by eating foods that have been grilled. PAHs have been found in at least 600 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What are polycyclic aromatic hydrocarbons?

(Pronounced pŏl'ī-sī'klīk ār'ə-măt'īk hī'drə-kar'bənz)

Polycyclic aromatic hydrocarbons (PAHs) are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds, such as soot.

Some PAHs are manufactured. These pure PAHs usually exist as colorless, white, or pale yellow-green solids. PAHs are found in coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides.

### What happens to PAHs when they enter the environment?

- ☐ PAHs enter the air mostly as releases from volcanoes, forest fires, burning coal, and automobile exhaust.
- ☐ PAHs can occur in air attached to dust particles.
- ☐ Some PAH particles can readily evaporate into the air from soil or surface waters.
- ☐ PAHs can break down by reacting with sunlight and other chemicals in the air, over a period of days to weeks.

- ☐ PAHs enter water through discharges from industrial and wastewater treatment plants.
- ☐ Most PAHs do not dissolve easily in water. They stick to solid particles and settle to the bottoms of lakes or rivers.
- ☐ Microorganisms can break down PAHs in soil or water after a period of weeks to months.
- ☐ In soils, PAHs are most likely to stick tightly to particles; certain PAHs move through soil to contaminate underground water.
- ☐ PAH contents of plants and animals may be much higher than PAH contents of soil or water in which they live.

### How might I be exposed to PAHs?

- ☐ Breathing air containing PAHs in the workplace of coking, coal-tar, and asphalt production plants; smoke-houses; and municipal trash incineration facilities.
- ☐ Breathing air containing PAHs from cigarette smoke, wood smoke, vehicle exhausts, asphalt roads, or agricultural burn smoke.
- ☐ Coming in contact with air, water, or soil near hazardous waste sites.
- ☐ Eating grilled or charred meats; contaminated cereals, flour, bread, vegetables, fruits, meats; and processed or pickled foods.
- ☐ Drinking contaminated water or cow's milk.

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- ☐ Nursing infants of mothers living near hazardous waste sites may be exposed to PAHs through their mother's milk.

### How can PAHs affect my health?

Mice that were fed high levels of one PAH during pregnancy had difficulty reproducing and so did their offspring. These offspring also had higher rates of birth defects and lower body weights. It is not known whether these effects occur in people.

Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.

### How likely are PAHs to cause cancer?

The Department of Health and Human Services (DHHS) has determined that some PAHs may reasonably be expected to be carcinogens.

Some people who have breathed or touched mixtures of PAHs and other chemicals for long periods of time have developed cancer. Some PAHs have caused cancer in laboratory animals when they breathed air containing them (lung cancer), ingested them in food (stomach cancer), or had them applied to their skin (skin cancer).

### Is there a medical test to show whether I've been exposed to PAHs?

In the body, PAHs are changed into chemicals that can attach to substances within the body. There are special tests that can detect PAHs attached to these substances in body tissues or blood. However, these tests cannot tell whether any

health effects will occur or find out the extent or source of your exposure to the PAHs. The tests aren't usually available in your doctor's office because special equipment is needed to conduct them.

### Has the federal government made recommendations to protect human health?

The Occupational Safety and Health Administration (OSHA) has set a limit of 0.2 milligrams of PAHs per cubic meter of air (0.2 mg/m<sup>3</sup>). The OSHA Permissible Exposure Limit (PEL) for mineral oil mist that contains PAHs is 5 mg/m<sup>3</sup> averaged over an 8-hour exposure period.

The National Institute for Occupational Safety and Health (NIOSH) recommends that the average workplace air levels for coal tar products not exceed 0.1 mg/m<sup>3</sup> for a 10-hour workday, within a 40-hour workweek. There are other limits for workplace exposure for things that contain PAHs, such as coal, coal tar, and mineral oil.

### Glossary

**Carcinogen:** A substance that can cause cancer.

**Ingest:** Take food or drink into your body.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for polycyclic aromatic hydrocarbons. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about toluene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Exposure to toluene occurs from breathing contaminated workplace air, in automobile exhaust, some consumer products paints, paint thinners, fingernail polish, lacquers, and adhesives. Toluene affects the nervous system. Toluene has been found at 959 of the 1,591 National Priority List sites identified by the Environmental Protection Agency.

### What is toluene?

Toluene is a clear, colorless liquid with a distinctive smell. Toluene occurs naturally in crude oil and in the tolu tree. It is also produced in the process of making gasoline and other fuels from crude oil and making coke from coal.

Toluene is used in making paints, paint thinners, fingernail polish, lacquers, adhesives, and rubber and in some printing and leather tanning processes.

### What happens to toluene when it enters the environment?

☐ Toluene enters the environment when you use materials that contain it. It can also enter surface water and groundwater from spills of solvents and petroleum products as well as from leaking underground storage tanks at gasoline stations and other facilities.

☐ When toluene-containing products are placed in landfills or waste disposal sites, the toluene can enter the soil or water near the waste site.

☐ Toluene does not usually stay in the environment long.

☐ Toluene does not concentrate or buildup to high levels in animals.

### How might I be exposed to toluene?

☐ Breathing contaminated workplace air or automobile exhaust.

☐ Working with gasoline, kerosene, heating oil, paints, and lacquers.

☐ Drinking contaminated well-water.

☐ Living near uncontrolled hazardous waste sites containing toluene products.

### How can toluene affect my health?

Toluene may affect the nervous system. Low to moderate levels can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and

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hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

**Inhaling** High levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

### **How likely is toluene to cause cancer?**

Studies in humans and animals generally indicate that toluene does not cause cancer.

The EPA has determined that the carcinogenicity of toluene can not be classified.

### **How can toluene affect children?**

It is likely that health effects seen in children exposed to toluene will be similar to the effects seen in adults. Some studies in animals suggest that babies may be more sensitive than adults.

Breathing very high levels of toluene during pregnancy can result in children with birth defects and retard mental abilities, and growth. We do not know if toluene harms the unborn child if the mother is exposed to low levels of toluene during pregnancy.

### **How can families reduce the risk of exposure to toluene?**

☐ Use toluene-containing products in well-ventilated areas.

☐ When not in use, toluene-containing products should be tightly covered to prevent evaporation into the air.

### **Is there a medical test to show whether I've been exposed to toluene?**

There are tests to measure the level of toluene or its breakdown products in exhaled air, urine, and blood. To determine if you have been exposed to toluene, your urine or blood must be checked within 12 hours of exposure. Several other chemicals are also changed into the same breakdown products as toluene, so some of these tests are not specific for toluene.

### **Has the federal government made recommendations to protect human health?**

EPA has set a limit of 1 milligram per liter of drinking water (1 mg/L).

Discharges, releases, or spills of more than 1,000 pounds of toluene must be reported to the National Response Center.

The Occupational Safety and Health Administration has set a limit of 200 parts toluene per million of workplace air (200 ppm).

### **Source of Information**

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological Profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



This fact sheet answers the most frequently asked health questions (FAQs) about used mineral-based crankcase oil. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Used mineral-based crankcase oil is also called used engine oil. Exposure to this oil can occur when you change the oil of your car or another type of engine. Exposure to very high levels of used oil can cause skin rashes, headaches and tremors. Used oil has been found in at least 85 of the 1,416 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is used mineral-based crankcase oil?

Used mineral-based crankcase oil is the brown-to-black, oily liquid removed from the engine of a motor vehicle when the oil is changed. It is similar to unused oil except it contains additional chemicals from its use as an engine lubricant.

The chemicals in oil include hydrocarbons, which are distilled from crude oil, and various additives that improve the oil's performance. Used oil also contains chemicals formed when the oil is exposed to high temperatures and pressures inside an engine. It also contains some metals from engine parts and small amounts of gasoline, antifreeze, and chemicals that come from gasoline when it burns inside the engine.

The chemicals found in used mineral-based crankcase oil vary depending on the brand and type of oil, whether gasoline or diesel fuel was used, the mechanical condition of the engine that the oil came from, and the amount of use between oil changes. Used oil is not naturally found in the environment.

### What happens to used mineral-based crankcase oil when it enters the environment?

- ☐ Used mineral-based crankcase oil enters the air through the exhaust system during engine use.
- ☐ It may enter water or soil when disposed of improperly.

- ☐ The hydrocarbon components of the oil generally stick to the soil surface.
- ☐ Some hydrocarbons evaporate into the air very quickly, and others evaporate more slowly.
- ☐ Hydrocarbon components of the oil that enter surface water bind to small particles in the water and eventually settle to the bottom.
- ☐ Hydrocarbons from used mineral-based crankcase oil may build up in shellfish or other organisms.
- ☐ Some metals in used mineral-based crankcase oil dissolve in water and move through the soil easily and may be found in surface water and groundwater.

### How might I be exposed to used mineral-based crankcase oil?

- ☐ When you change the engine oil in your car.
- ☐ Breathing a small amount of the chemicals from the oil in exhaust fumes or from burning the oil as heating fuel.
- ☐ Touching contaminated soil or drinking contaminated water.

### How can used mineral-based crankcase oil affect my health?

The health effects of used mineral-based crankcase oil vary depending on the brand and type of oil used and the



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characteristics of the engine it came from.

Mechanics and other auto workers who are exposed to used mineral-based crankcase oil from a large number of cars have experienced skin rashes, blood effects (anemia), and headaches and tremors. However, these workers are also exposed to other chemicals, which may have caused these health effects.

Volunteers who breathed mists of used mineral-based crankcase oil for a few minutes had slightly irritated noses, throats, and eyes. Animals that ate large amounts of this oil developed diarrhea. Thus, people who swallow used mineral-based crankcase oil may also have diarrhea.

Some cows that ate used oil containing metals such as molybdenum and lead in contaminated pastures experienced anemia and tremors. Some of the cows died.

We do not know if exposure to used mineral-based crankcase oil affects the reproductive ability of men or women or whether it causes birth defects.

### **How likely is used mineral-based crankcase oil to cause cancer?**

Long-term exposure (365 days or longer) of the skin to used mineral-based crankcase oil causes skin cancer in mice. Oils contain PAHs. Some PAHs have been identified as the cancer-causing agents. Animal tests have shown that the higher the PAH content in oil, the more likely for the oil to be carcinogenic.

The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified used mineral-based crankcase oil with regard to its carcinogenicity in people.

### **Is there a medical test to show whether I've been exposed to used mineral-based crankcase oil?**

Used mineral-based crankcase oil is a mixture of a large number of chemicals. Its composition depends on the brand of oil and the characteristics of the engine in which it was used. However, there are methods for determining if you have been exposed to some of the chemicals in used oil. These tests aren't available at most doctors' offices, but can be done at special laboratories that have the right equipment.

### **Has the federal government made recommendations to protect human health?**

The EPA and most states have developed regulations regarding disposal of used oil, its recycling, spraying used oil onto road surfaces for dust control, or burning it as a fuel.

### **Glossary**

Anemia: A decreased ability of the blood to transport oxygen.

Carcinogenicity: Ability to cause cancer.

CAS: Chemical Abstracts Service.

Evaporate: To enter the air as a vapor.

PAHs: Polycyclic aromatic hydrocarbons; a group of chemicals found in oil and other minerals.

### **References**

This ToxFAQs information is taken from the 1997 Toxicological Profile for Used Mineral-based Crankcase Oil produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.





This fact sheet answers the most frequently asked health questions (FAQs) about xylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**SUMMARY:** Exposure to xylene occurs in the workplace and when you use paint, gasoline, paint thinners and other products that contain it. People who breathe high levels may have dizziness, confusion, and a change in their sense of balance. This substance has been found in at least 658 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What is xylene?

(Pronounced zī'lēn)

Xylene is a colorless, sweet-smelling liquid that catches on fire easily. It occurs naturally in petroleum and coal tar and is formed during forest fires. You can smell xylene in air at 0.08–3.7 parts of xylene per million parts of air (ppm) and begin to taste it in water at 0.53–1.8 ppm.

Chemical industries produce xylene from petroleum. It's one of the top 30 chemicals produced in the United States in terms of volume.

Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

### What happens to xylene when it enters the environment?

- ☐ Xylene has been found in waste sites and landfills when discarded as used solvent, or in varnish, paint, or paint thinners.
- ☐ It evaporates quickly from the soil and surface water into the air.

- ☐ In the air, it is broken down by sunlight into other less harmful chemicals.
- ☐ It is broken down by microorganisms in soil and water.
- ☐ Only a small amount of it builds up in fish, shellfish, plants, and animals living in xylene-contaminated water.

### How might I be exposed to xylene?

- ☐ Breathing xylene in workplace air or in automobile exhaust.
- ☐ Breathing contaminated air.
- ☐ Touching gasoline, paint, paint removers, varnish, shellac, and rust preventatives that contain it.
- ☐ Breathing cigarette smoke that has small amounts of xylene in it.
- ☐ Drinking contaminated water or breathing air near waste sites and landfills that contain xylene.
- ☐ The amount of xylene in food is likely to be low.

### How can xylene affect my health?

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of

ToxFAQs Internet home page via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

### How likely is xylene to cause cancer?

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans.

Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.

### Is there a medical test to show whether I've been exposed to xylene?

Laboratory tests can detect xylene or its breakdown products in exhaled air, blood, or urine. There is a high degree of agreement between the levels of exposure to xylene and the levels of xylene breakdown products in the urine. However, a urine sample must be provided very soon after exposure ends because xylene quickly leaves the body. These tests are not routinely available at your doctor's office.

### Has the federal government made recommendations to protect human health?

The EPA has set a limit of 10 ppm of xylene in drinking water.

The EPA requires that spills or accidental releases of xylenes into the environment of 1,000 pounds or more must be reported.

The Occupational Safety and Health Administration (OSHA) has set a maximum level of 100 ppm xylene in workplace air for an 8-hour workday, 40-hour workweek.

The National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists (ACGIH) also recommend exposure limits of 100 ppm in workplace air.

NIOSH has recommended that 900 ppm of xylene be considered immediately dangerous to life or health. This is the exposure level of a chemical that is likely to cause permanent health problems or death.

### Glossary

Evaporate: To change from a liquid into a vapor or a gas.

Carcinogenic: Having the ability to cause cancer.

CAS: Chemical Abstracts Service.

ppm: Parts per million.

Solvent: A liquid that can dissolve other substances.

### References

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for xylenes (update). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 404-498-0093. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.



**APPENDIX B**  
**WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION**

## **WEST NILE VIRUS/ST. LOUIS ENCEPHALITIS PREVENTION**

The following section is based upon information provided by the CDC Division of Vector-Borne Infectious Diseases. Symptoms of West Nile Virus include fever, headache, and body aches, occasionally with skin rash and swollen lymph glands, with most infections being mild. More severe infection may be marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, paralysis, and, rarely, death. Most infections of St. Louis encephalitis are mild without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially infants), and spastic (but rarely flaccid) paralysis. The only way to avoid infection of West Nile Virus and St. Louis encephalitis is to avoid mosquito bites. To reduce the chance of mosquito contact:

- Stay indoors at dawn, dusk, and in the early evening.
- Wear long-sleeved shirts and long pants whenever you are outdoors.
- Spray clothing with repellents containing permethrin or DEET (N, N-diethyl-meta-toluamide), since mosquitoes may bite through thin clothing.
- Apply insect repellent sparingly to exposed skin. An effective repellent will contain 35 percent DEET. DEET in high concentrations (greater than 35 percent) provides no additional protection.
- Repellents may irritate the eyes and mouth.
- Whenever you use an insecticide or insect repellent, be sure to read and follow the manufacturer's directions for use, as printed on the product.

**APPENDIX C**  
**SITE SAFETY OFFICER RESUME**

## **JESSICA E. LEBER**

### **ENVIRONMENTAL SCIENTIST**

Ms. Leber is an environmental scientist with about one year of professional environmental consulting experience. Her range of experience includes completing environmental site assessments, subsurface investigations, hazardous materials impact studies, and preparing sampling protocols and health and safety plans. Ms. Leber's fieldwork experience includes soil boring installation and sampling, groundwater monitoring well installation and sampling, test pit oversight, and air monitoring.

Prior to joining AKRF, Ms. Leber graduated cum laude from Columbia University with a degree in Environmental Chemistry. She has past experience working in organic and environmental chemistry research laboratories at Columbia University and Stony Brook University. Prior to her graduation, she completed an internship at a small environmental consulting firm in Nassau County.

### **BACKGROUND**

#### Education

B.A., Environmental Chemistry, Columbia University

#### Certifications

40 Hour Hazardous Waste Operations Site Worker

New York State-Licensed Asbestos Inspector

### **RELEVANT EXPERIENCE**

#### **Atlantic Yards Arena, Brooklyn, NY**

As part of the New York City CEQR process, Ms. Leber served on a team of Hazmat staff conducting Phase I Environmental Site Assessments in accordance with ASTM E-1527-00 related to the potential development of eight city blocks for the Atlantic Yards Arena. Ms. Leber coordinated with clients, property owners, and tenants to conduct the site inspections, historical research, regulatory records review, and preparation of the Phase I report.

#### **Flushing, Queens, NY**

Ms. Leber is serving on a team conducting an investigation and remediation of a large PCB-contaminated former utility property in Flushing, Queens. She has completed field work for several hundred soil boring installations in the contaminant delineation phase of the project and has aided in preparing documents for the site's transfer from the State Voluntary Cleanup Program to the State Brownfield Cleanup Program.

#### **Queens West, Long Island City, NY**

Ms. Leber conducted field work for a supplemental remedial investigation at this former Blau Gas manufacturing facility on a portion of the Queens West Development site in Long Island City. The work is being conducted as part of a Voluntary Cleanup Agreement with the NYSDEC. Field work activities have included soil boring installation, test pit oversight, and monitoring well installation and sampling. Ms. Leber will analyze the laboratory analytical data and aid in preparing a report of the findings of the investigation.



## **JESSICA E. LEBER**

**ENVIRONMENTAL SCIENTIST**

| p. 2

**West - Chambers Street, New York, NY**

Ms. Leber completed a subsurface investigation for this property currently in the CEQR process to allow residential and commercial development at the site. Ms. Leber's work included the installation and sampling of soil borings and groundwater monitoring wells, analysis of analytical laboratory data, and preparation of an investigation report. Based on the findings of this study, Ms. Leber prepared a Remedial Action Plan and Construction Phase Health and Safety Plan currently pending approval by the New York City Department of Environmental Protection.

**APPENDIX D**  
**REPORT FORMS**



## WEEKLY SAFETY REPORT FORM

Week Ending: \_\_\_\_\_ Project Name/Number: \_\_\_\_\_

Report Date: \_\_\_\_\_ Project Manager Name: \_\_\_\_\_

Summary of any violations of procedures occurring that week: \_\_\_\_\_

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Summary of any job related injuries, illnesses, or near misses that week: \_\_\_\_\_

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Summary of air monitoring data that week (include and sample analyses, action levels exceeded, and actions taken):

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Comments:

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Name: \_\_\_\_\_ Company: \_\_\_\_\_

Signature: \_\_\_\_\_ Title: \_\_\_\_\_

## INCIDENT REPORT FORM

Date of Report: \_\_\_\_\_

Injured: \_\_\_\_\_

Employer: \_\_\_\_\_

Site: \_\_\_\_\_ Site Location: \_\_\_\_\_

Report Prepared By: \_\_\_\_\_

Signature

Title

### ACCIDENT/INCIDENT CATEGORY (check all that applies)

<input type="checkbox"/> Injury	<input type="checkbox"/> Illness	<input type="checkbox"/> Near Miss
<input type="checkbox"/> Property Damage	<input type="checkbox"/> Fire	<input type="checkbox"/> Chemical Exposure
<input type="checkbox"/> On-site Equipment	<input type="checkbox"/> Motor Vehicle	<input type="checkbox"/> Electrical
<input type="checkbox"/> Mechanical	<input type="checkbox"/> Spill	<input type="checkbox"/> Other

**DATE AND TIME OF ACCIDENT/INCIDENT:** Narrative report of Accident/Incident: Identify: 1) actions leading to or contributing to the accident/incident; 2) the accident/incident occurrence; and 3) actions following the accident/incident.

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### WITNESS TO ACCIDENT/INCIDENT:

Name \_\_\_\_\_ Company: \_\_\_\_\_

Address: \_\_\_\_\_

Phone No.: \_\_\_\_\_

Name \_\_\_\_\_ Company: \_\_\_\_\_

Address: \_\_\_\_\_

Phone No.: \_\_\_\_\_

**INJURED - ILL:**

Name: \_\_\_\_\_ SSN: \_\_\_\_\_

Address: \_\_\_\_\_ Age: \_\_\_\_\_

Length of Service: \_\_\_\_\_ Time on Present Job: \_\_\_\_\_

Time/Classification: \_\_\_\_\_

**SEVERITY OF INJURY OR ILLNESS:**☐ Disabling ☐ Non-disabling ☐ Fatality☐ Medical Treatment ☐ First Aid Only**ESTIMATED NUMBER OF DAYS AWAY FROM JOB:** \_\_\_\_\_**NATURE OF INJURY OR ILLNESS:** \_\_\_\_\_\_\_\_\_\_  
\_\_\_\_\_**CLASSIFICATION OF INJURY:**

<input type="checkbox"/> Abrasions	<input type="checkbox"/> Dislocations	<input type="checkbox"/> Punctures
<input type="checkbox"/> Bites	<input type="checkbox"/> Faint/Dizziness	<input type="checkbox"/> Radiation Burns
<input type="checkbox"/> Blisters	<input type="checkbox"/> Fractures	<input type="checkbox"/> Respiratory Allergy
<input type="checkbox"/> Bruises	<input type="checkbox"/> Frostbite	<input type="checkbox"/> Sprains
<input type="checkbox"/> Chemical Burns	<input type="checkbox"/> Heat Burns	<input type="checkbox"/> Toxic Resp. Exposure
<input type="checkbox"/> Cold Exposure	<input type="checkbox"/> Heat Exhaustion	<input type="checkbox"/> Toxic Ingestion
<input type="checkbox"/> Concussion	<input type="checkbox"/> Heat Stroke	<input type="checkbox"/> Dermal Allergy
<input type="checkbox"/> Lacerations		

Part of Body Affected: \_\_\_\_\_

Degree of Disability: \_\_\_\_\_

Date Medical Care was Received: \_\_\_\_\_

Where Medical Care was Received: \_\_\_\_\_

Address (if off-site): \_\_\_\_\_

(If two or more injuries, record on separate sheets)

**PROPERTY DAMAGE:**

Description of Damage: \_\_\_\_\_

Cost of Damage: \$ \_\_\_\_\_

**ACCIDENT/INCIDENT LOCATION:** \_\_\_\_\_

**ACCIDENT/INCIDENT ANALYSIS:** Causative agent most directly related to accident/incident  
(Object, substance, material, machinery, equipment, conditions)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Was weather a factor?: \_\_\_\_\_

Unsafe mechanical/physical/environmental condition at time of accident/incident (Be specific):

\_\_\_\_\_  
\_\_\_\_\_

Personal factors (Attitude, knowledge or skill, reaction time, fatigue):

\_\_\_\_\_

**ON-SITE ACCIDENTS/INCIDENTS:**

Level of personal protection equipment required in Site Safety Plan:

\_\_\_\_\_

Modifications:

Was injured using required equipment?:

\_\_\_\_\_

If not, how did actual equipment use differ from plan?:

\_\_\_\_\_  
\_\_\_\_\_

ACTION TAKEN TO PREVENT RECURRENCE: (Be specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?)

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**ACCIDENT/INCIDENT REPORT REVIEWED BY:**

\_\_\_\_\_  
SSO Name Printed

\_\_\_\_\_  
SSO Signature

**OTHERS PARTICIPATING IN INVESTIGATION:**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

**ACCIDENT/INCIDENT FOLLOW-UP:**      Date: \_\_\_\_\_

Outcome of accident/incident: \_\_\_\_\_

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Physician's recommendations: \_\_\_\_\_

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Date injured returned to work: \_\_\_\_\_

Follow-up performed by: \_\_\_\_\_

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

**ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM**

**APPENDIX E**  
**EMERGENCY HAND SIGNALS**

## **EMERGENCY SIGNALS**

In most cases, field personnel will carry portable radios for communication. If this is the case, a transmission that indicates an emergency will take priority over all other transmissions. All other site radios will yield the frequency to the emergency transmissions.

Where radio communications is not available, the following air-horn and/or hand signals will be used:

### **EMERGENCY HAND SIGNALS**

**OUT OF AIR, CAN'T BREATHE!**



**Hand gripping throat**

**LEAVE AREA IMMEDIATELY,  
NO DEBATE!**

**(No Picture) Grip partner's wrist or place both hands around waist**

**NEED ASSISTANCE!**



**Hands on top of head**

**OKAY! – I'M ALL RIGHT!  
- I UNDERSTAND!**



**Thumbs up**

**NO! - NEGATIVE!**



**Thumbs down**

**APPENDIX F**  
**EXPANDED COMMUNITY AIR MONITORING AND ODOR/VAPOR CONTROL PLAN**



# **EXPANDED COMMUNITY AIR MONITORING AND ODOR/VAPOR CONTROL PLAN**

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## **WEST 61<sup>st</sup> STREET SITE**

New York, New York

AKRF Project Number: 10321

BCP Site ID 231043

**Prepared by:**



440 Park Avenue South, 7<sup>th</sup> Floor  
New York, NY 10016  
(212) 696-0670

**Prepared for:**

Algin Management Co., LLC  
64-35 Yellowstone Blvd.  
Forest Hills, NY 11375

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**March 2006**

## TABLE OF CONTENTS

1.0	Introduction.....	1
2.0	Dust, Odor, and Vapor Suppression .....	1
2.1	Dust Suppression Measures.....	1
2.2	Odor and Vapor Control Measures.....	1
3.0	Expanded Perimeter Monitoring.....	2
3.1	Perimeter Monitoring – Volatile Organic Compounds .....	2
3.1.1	Monitoring Procedure .....	2
3.1.2	Response Actions .....	2
3.2	Perimeter Monitoring – Particulates.....	3
3.2.1	Monitoring Procedure .....	3
3.2.2	Response Actions .....	3
4.0	Neighborhood Odor and Vapor Monitoring .....	3
5.0	Odor and Vapor Control Plan Revisions.....	4

## **1.0 INTRODUCTION**

This Expanded Community Air Monitoring and Odor/Vapor Control Plan specifies the following:

- Expanded procedures to be implemented to control emissions of vapors, particulate matter, or odors resulting from operations on the Site;
- Expanded procedures for monitoring to detect any emissions from operations on the Site which may impact the surrounding community; and
- The appropriate response measures to be implemented if such emissions are detected.

This Plan will be implemented during the Remedial Investigation (RI) activities only when the air monitoring and response action measures described in Section 4.7 of the Interim Remedial Measure Health and Safety Plan (IRMHASp) are insufficient in preventing repeated exceedances of perimeter monitoring action levels or in preventing off-site nuisance odor impacts. The NYSDEC and NYSDOH will be notified should the implementation of this contingency Expanded Community Air Monitoring and Odor/Vapor Control Plan be required. Procedures intended to detect and respond to conditions which may affect on-site personnel are specified in the IRMHASp for this Site.

## **2.0 DUST, ODOR, AND VAPOR SUPPRESSION**

### **2.1 Dust Suppression Measures**

Dust suppression measures will be implemented during excavation activities associated with potential underground storage tank removals in accordance with the guidelines in NYSDEC Technical and Administrative Guidance Memorandum #4031, Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites. The following dust suppression measures will be implemented:

- Applying water on haul roads.
- Wetting equipment and excavation faces.
- Spraying water on buckets during excavation and dumping.
- Hauling materials in properly tarped or covered containers.
- Restricting vehicle speeds on the Site to ten mph.
- Covering excavated areas and material after excavation activity ceases.
- Reducing the excavation size and/or number of excavations.

### **2.2 Odor and Vapor Control Measures**

Emissions of odors and vapors will be controlled by minimizing, to the extent possible, the exposure of contaminated soil to the atmosphere. Specific measures that will be implemented are:

- Minimizing the size of excavations. Contaminated soil will be excavated by sections to minimize the size of the excavation that is open at any time.
- Promptly backfilling excavations. Adequate volumes of on-site or off-site fill material will be available if it is not possible to backfill with excavated material.
- Promptly removing contaminated soil. Pre-approval will be obtained from disposal facilities to minimize delay in moving soil off-site. Stockpiling of contaminated soil will be avoided to the extent practicable.
- Covering exposed excavated soil surfaces with encapsulant foam if odor is detected. A biodegradable, non-hazardous, non-flammable foam, such as Rusmar A-600, Allied AFT-

400, or equivalent with an appropriate applicator unit will be present on-site during the excavation work. The foam will be used to cover stockpiles and exposed soil surfaces if necessary. In addition, odor neutralizing agents (such as Ecosorb 606 by Lenntech Water) will be applied directly to the soil, or in the air, if odors persist. No long-term invasive activities are planned as part of the Remedial Investigation (RI); therefore, long-term encapsulants and tarps would not be needed.

- Hauling soil only in covered trucks. When a disposal facility has been arranged, a trucking route will be selected that will minimize truck travel through residential areas.

### **3.0 EXPANDED PERIMETER MONITORING**

Expanded perimeter air monitoring will be performed for volatile organic compounds (VOCs) and particulate matter. Since excavations as part of the Remedial Investigation (RI) will be localized, monitoring locations will be at the upwind and downwind boundaries of the exclusion zone.

#### **3.1 Perimeter Monitoring – Volatile Organic Compounds**

##### **3.1.1 Monitoring Procedure**

Perimeter monitoring for volatile organic compounds (VOCs) will be conducted using an organic vapor meter (OVM) equipped with a photoionization detector (PID). The OVM will be capable of calculating 15-minute running average concentrations and is equipped with an audible alarm to indicate the exceedance of an action level. Monitoring for VOCs at the upwind station will be conducted at the start of each workday and every time the wind direction changes, to establish background conditions. Monitoring for VOCs at the downwind station will be conducted on a continuous basis during excavation and loading operations. Background readings and any readings that trigger response actions will be recorded in the Project log book, which will be available on-site for NYSDEC/NYSDOH review, and the results of air monitoring activities and odor/vapor control measures will be provided in daily reports submitted to the NYSDEC and NYSDOH. The perimeter monitoring locations chosen will be recorded on a Site map submitted with the daily reports.

##### **3.1.2 Response Actions**

If the ambient (breathing zone) air concentration of volatile organic compounds (VOCs) at the Site perimeter exceeds five parts per million (ppm) over a 15-minute time weighted running average, but does not exceed 25 ppm, then invasive work activities will be temporarily halted. If VOC levels readily return to below five ppm, then work may resume with continued monitoring. If VOC levels do not readily return to below five ppm, then work will be halted and NYSDEC and NYSDOH will be notified immediately. The source of the VOC emissions will be identified and corrective actions taken to reduce emissions. Work will not resume until VOC levels are below five ppm.

If the ambient (breathing zone) air concentration of VOCs at the Site perimeter exceeds 25 parts per million (ppm) over a 15-minute time weighted running average, or ambient air concentrations do not readily fall below 5 ppm after two consecutive 15-minute time-weighted running averages, then work will be halted and NYSDEC and NYSDOH will be notified immediately. Confirmatory air samples will be collected at the upwind and downwind Site perimeters for laboratory analysis. Samples will be collected over a half-hour period in six-liter SUMMA canisters using flow controllers set at a rate of 0.2 liters per minute. The air samples will be analyzed for VOCs including tentatively identified compounds (TICs) by EPA Method TO-15. The source of the VOC emissions will be

identified and corrective actions taken to reduce emissions. Work will not resume until VOC levels are below five ppm and the start-up is approved by NYSDEC and NYSDOH.

### **3.2 Perimeter Monitoring – Particulates**

#### **3.2.1 Monitoring Procedure**

Community air monitoring for dust particulates will be conducted using a real time particulate monitor that measures the concentration of airborne respirable particulates less than ten micrometers in size (PM<sub>10</sub>). The monitor will be capable of calculating 15-minute running average concentrations and is equipped with an audible alarm to indicate exceedance of action levels. Monitoring for particulates at the upwind location will be conducted at the start of each workday and every time the wind direction changes, to establish background conditions. Monitoring at the downwind station will be continuous during soil excavation and loading activities. Background readings and any readings that trigger response actions will be recorded in the Project log book, which will be available on-site for NYSDEC/NYSDOH review.

#### **3.2.2 Response Actions**

If downwind PM<sub>10</sub> concentrations exceed 100 micrograms per cubic meter (µg/m<sup>3</sup>) above background for a 15-minute time-weighted average, then invasive work activities will be temporarily halted and resume only after the source of the dust has been identified, dust-suppression measures have been implemented, and the downwind PM<sub>10</sub> level is less than 100 µg/m<sup>3</sup> above background for a 15-minute time-weighted average.

If downwind PM<sub>10</sub> concentrations exceed 150 µg/m<sup>3</sup> above background concentrations over a 15-minute time-weighted running average, the NYSDEC and NYSDOH will be notified and the source of the particulates will be identified. Appropriate dust suppression measures will be implemented as described in Section 2.1, and work will not begin until PM<sub>10</sub> concentration is less than 100 µg/m<sup>3</sup> above background and the NYSDEC and NYSDOH approve start-up. Confirmatory particulate samples will be collected of ambient air at the upwind and downwind perimeters. These samples will be analyzed in a laboratory for lead, arsenic, and polycyclic aromatic hydrocarbons (PAHs).

## **4.0 NEIGHBORHOOD ODOR AND VAPOR MONITORING**

Neighborhood odor and vapor monitoring will be performed during soil excavation and loading. The frequency of these surveys will be continuous starting at the commencement of work until the success of these odor control measures has been established. The subsequent surveys will be less frequent, based on field observations and measurements, but will occur no less than four times per day. The monitoring will utilize an organic vapor meter (OVM) equipped with a photoionization detector (PID) to measure volatile organic compound (VOC) concentrations in addition to olfactory observations. The OVM will be capable of calculating 15-minute running average concentrations and is equipped with an audible alarm to indicate the exceedance of an action level. To avoid any olfactory fatigue, the monitoring will be performed by a person who has not been working in the work area. The survey will focus on downwind locations and the adjacent sensitive receptors such as schools (adjacent to the north, east, and west of the Site) or residential buildings (adjacent to the west). The results of the surveys will be logged, and the records maintained on-site for inspection by NYSDEC or NYSDOH.

If odors or vapors from the Site are detected off-site, then work will be halted and NYSDEC and NYSDOH will be notified immediately. Confirmatory air samples will be collected at the upwind and downwind Site perimeters for laboratory analysis. Samples will be collected over a half-hour period in six-liter SUMMA canisters using flow controllers set at a rate of 0.2 liters per minute. The air samples will be analyzed for VOCs including tentatively identified compounds (TICs) by EPA Method TO-15.

The source of the emissions will be identified and corrective actions taken to reduce emissions. Work will not resume until the start-up is approved by NYSDEC and NYSDOH.

## **5.0 ODOR AND VAPOR CONTROL PLAN REVISIONS**

If the odor and vapor control measures described in this contingency plan are still not adequate to prevent repeated exceedances of perimeter monitoring action levels, or to prevent off-site impacts as detected by the neighborhood odor and vapor monitoring program, then the invasive activities that resulted in the exceedances will be suspended, and NYSDEC and NYSDOH will be notified. A revised plan for dust, vapor, or odor control with alternative work practices and control measures will be submitted to NYSDEC and NYSDOH. The suspended activities will not be resumed until the revised dust, vapor, or odor control plan is approved by NYSDEC and NYSDOH, and the alternative work practices and control measures are implemented.

**APPENDIX B**  
**GLOSSARY OF TERMS (ACRONYMS) USED IN REPORT**

## Glossary of Terms (Acronyms) Used In Report

AOC	Area of Concern
API	American Petroleum Institute
ARAR	Applicable or Relevant and Appropriate Requirement
ASCE	American Society of Civil Engineers
ASP	Analytical Services Protocol
ASTM	American Society for Testing and Materials
ASTs	Aboveground Storage Tanks
ATSDR	Agency for Toxic Substances and Disease Registry - a federal branch of the Center for Disease Control
B(a)P	Benzo(a)pyrene equivalents
BCP	Brownfields Cleanup Program
BED	Brownfield Eligibility Determination
BHC	Benzene Hexachlorides - a group of pesticides that includes lindane
BNA	Base/Neutral/Acid extractable organics analyzed by GC/MS
BQE	Bronx-Queens Expressway
BSPR	Bureau of Spill Prevention and Response
BTEX	Benzene, Toluene, Ethyl-benzene and Xylene - major components of gasoline
BTX	Benzene, Toluene, and Xylene, common components of many petroleum based products
BUD	Beneficial Use Determination - exempts a material from regulation, allowing it to be beneficially used.
C&D	Construction and Demolition debris
CAMP	Community Air Monitoring Plan
CBS	Chemical Bulk Storage
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act (1980) - the Federal Superfund law
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
CLP	Contract Laboratory Protocol
CO	Consent Order
CO <sub>2</sub>	Carbon dioxide
COC	Chemical of Concern
CP	Citizen Participation
cPAHs	Carcinogenic Polynuclear (or Polycyclic) Aromatic Hydrocarbons - a class of chemicals commonly found in tar, asphalt and combustion residues – that may cause cancer.
CPP	Citizen Participation Plan
CVOC	Chlorinated Volatile Organic Compound
DEC	Department of Environmental Conservation (New York State) - used interchangeably with NYSDEC or ENCON
DEE	Division of Environmental Enforcement - legal division within DEC responsible for regulatory enforcement



DER	Division of Environmental Remediation (formerly DHWR and DSM) - division within DEC responsible for the Inactive Hazardous Waste Disposal Site Remedial Program, the Voluntary Cleanup Program, the Environmental Restoration (Brownfields) Program, the Spill Prevention and Response Program (including spill remediation, petroleum and chemical bulk storage and major oil storage facility programs), and the Construction Grants program
DFW	Division of Fish and Wildlife - previous name for DFWMR
DFWMR	Division of Fish, Wildlife and Marine Resources (formerly DFW) - division within DEC responsible for assessment and management of our natural resources, regulation of hunting and fishing, and fisheries management.
DHWR	Division of Hazardous Waste Remediation - previous name for DER
DNAPL	Dense (heavier than water) Non-Aqueous Phase Liquid
DOD	United States Department of Defense
DOH	Department of Health (New York State) - interchangeable with NYSDOH
DOW	Division of Water - division within DEC responsible for water pollution control and monitoring of watersheds and waterways
DSHM	Division of Solid and Hazardous Materials - division within DEC responsible for regulation of solid and hazardous wastes
DSM	Division of Spills Management (former Division within DEC responsible for Spills Management, now the Bureau of Spill Prevention and Response within DER)
DUSR	Data Usability Summary Report
ECL	Environmental Conservation Law
EIS	Environmental Impact Statement
ELAP	Environmental Laboratory Approval Program
ENB	Environmental Notice Bulletin (DEC weekly publication)
EP Toxicity	Also known as EP Tox - An Extraction Procedure test to determine the leachability of selected hazardous chemicals. No longer widely used, it has been replaced by TCLP
EPA	Environmental Protection Agency (U.S.) - interchangeable with USEPA
ERP	New York's Environmental Restoration Program - also known as the "Brownfields" program
FID	Flame Ionization Detector
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FOIA	Freedom of Information Act - Federal
FOIL	Freedom of Information Law - NY State
FS	Feasibility Study
FEMA	Federal Emergency Management Agency (U.S.)
FSF	Federal SuperFund
GAC	Granular Activated Carbon
GC	Gas Chromatograph
GPM	Gallons per Minute
GRO	Gasoline Range Organics
GW	Groundwater
HASP	Health and Safety Plan
Haz Mat	Hazardous Materials

HDPE	High-Density Polyethylene (a widely used chemical resistant plastic)
HNu	a type of hand held field instrument used to measure Volatile Organic
Compounds	
IDL	Instrument Detection Limit
	IDLH - Immediately Dangerous to Life or Health - a critical concentration of
	air contamination
IP	Ionization Potential
IRM	Interim Remedial Measures
kg	kilogram - a unit of mass
LC	Lethal Concentration
LD	Lethal Dose
LEL	Lower Explosive Limit (see UEL)
LNAPL	Light (lighter than water) Non-Aqueous Phase Liquid
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
MEK	Methyl Ethyl Ketone
mg/kg	milligram/kilogram - a unit of concentration in solids (equivalent to ppm)
mg/L	milligram/Liter - a unit of concentration in liquids (equivalent to ppm)
MGP	Manufactured Gas Plant
MIBK	Methyl Isobutyl Ketone
MOSF	Major Oil Storage Facility
MS	Mass Spectrometer
MSDS	Material Safety Data Sheet
MTBE	Methyl Tertiary Butyl Ether (gasoline constituent)
MW	Monitoring Well
N <sub>2</sub>	Nitrogen - typically shipped and used in liquid form
NAPL	Non-Aqueous Phase Liquid
NCP	National Contingency Plan
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
NL	Navigation Law
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NRC	National Response Center
NYCDEP	New York City Department of Environmental Protection
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O <sub>2</sub>	Oxygen
OSHA	Occupational Safety and Health Act (U.S.) or Occupational Safety and
	Health Administration (U.S.)
O&M	Operation and Maintenance
OM&M	Operation, Maintenance, and Monitoring
OU	Operable Unit
OVA	Organic Vapor Analyzer

PA	USEPA Preliminary Assessment
PAHs	Polynuclear Aromatic Hydrocarbons - a class of chemicals commonly found in tar, asphalt and combustion residues - the same as PNA.
Pb	Lead
PBS	Petroleum Bulk Storage
PCBs	Polychlorinated Biphenyls - a class of chemicals known for persistence in the environment
PCE	Perchloroethylene or Tetrachloroethene - one of the most common chemical contaminants, often coming from dry cleaning operations
PCS	Petroleum Contaminated Soil
PEL	Permissible Exposure Limit - an air contaminant level applicable to the work place
Perc	Perchloroethylene - same as PCE
Phase I	A preliminary investigation of site location and history by DEC
Phase I ESA	Phase I Environmental Site Assessment meeting the standards of ASTM.
Phase II	A preliminary investigation of site conditions, possibly including groundwater, surface water and soils sampling
Phase II ESI	Phase II Environmental Site investigation which meets the standards of ASTM
PID	Photo Ionization Detector
PNA	Polynuclear Aromatic hydrocarbons - the same as PAH
ppb	parts per billion
PPE	Personal Protective Equipment
ppm	parts per million
ppt	parts per trillion
PQL	Practical Quantitation Level
PRAP	Proposed Remedial Action Plan
PRP	Potentially Responsible Party (Also RP)
PSA	Preliminary Site Assessment
PVC	Poly Vinyl Chloride
QA	Quality Assurance
QAPP	Quality Assurance Program Plan
QAPjP	Quality Assurance Project Plan
QC	Quality Control
QRCL	Qualified Remediation Consultants List
QWDC	Queens West Development Corporations
RA	Remedial Action
RAWP	Remedial Action Work Plan
RAR	Remedial Alternatives Report - in NY's Brownfields Program
RBCA	Risk-Based Corrective Action
RCRA	Resource Conservation and Recovery Act - federal law that regulates the transfer, storage and disposal of solid and hazardous waste
RD	Remedial Design
RD/RA	Remedial Design / Remedial Action
RECs	Recognized Environmental Conditions – Identified in Phase I ESA
REL	Recommended Exposure Limit

RHWRE	Regional Hazardous Waste Remediation Engineer - head of the hazardous waste remediation unit in each of the DEC's Regional offices
RIR	Remedial Investigation Report
RI/FS	Remedial Investigation / Feasibility Study
RIWP	Remedial Investigation Work Plan
ROD	Record of Decision
RP	Responsible Party
RQ	Reportable Quantity
RSCOs	Recommended Soil Cleanup Objectives
RSE	Regional Spills Engineer - head of petroleum spill response and prevention unit in each of the DEC's Regional offices
RTK	Community Right To Know - Executive Order No. 33 (NYS)
RWP	Remedial Work Plan
SARA	Superfund Amendments Reauthorization Act of 1986 (Federal)
SCBA	Self-Contained Breathing Apparatus
SCGs	Standards, Criteria, and Guidance - the State version of ARARs
SEMO	State Emergency Management Office
SEQRA	State Environmental Quality Review Act
SGC	Short-term Guideline Concentration (Air Toxics)
SI	Site Investigation - in NY's Brownfield Program (Also USEPA Site Investigation)
SI/RAR	Site Investigation/Remedial Alternatives Report
SISD	Spill Information System Database
SMP	Soil Management Plan
SOP	Standard Operating Procedure
SPDES	State Pollution Discharge and Elimination System - the State regulatory system for controlling pollution discharges to waterways and groundwater
SPOTS	Spill Prevention Operations Technology Series (DEC guidance documents)
SPR	Spill Prevention Report
SRF	Spill Response Form
SSF	State SuperFund
SSSALs	Site Specific Soil Action Levels
STARS	Spills Technology And Remediation Series - guidance from DEC for petroleum and chemical spill remediation
STP	Sewage Treatment Plant
SVE	Soil Vapor Extraction or Soil Vacuum Extraction
SVOC	Semi-Volatile Organic Compound
SW	Surface Water
SWMU	Solid Waste Management Unit
SWPPP	Storm Water Pollution Prevention Plan
TAGM	Technical and Administrative Guidance Memorandum - guidance issued by DER for implementation of the hazardous waste site remedial program
TAL	Target Analyte List – usually metals
TCA	Trichloroethane
TCDD	Tetrachlorodibenzo para-dioxin - one of many chlorinated dioxin compounds
TCDF	Tetrachlorodibenzofuran - one of many chlorinated furan compounds

TCE	Trichloroethylene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure - a leaching test used to identify hazardous waste and evaluate petroleum contaminated soils.
THO	Total Halogenated Organic compounds
Title 3	Article 52, Title 3 of the ECL authorizes EQBA grants to municipalities for hazardous waste site cleanup
TLV	Threshold Limit Value - an air contaminant level
TOCs	Total Organic Compounds
TOGS	Technical Operating Guidance Series - from DEC's Division of Water
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act (U.S.)
TSDF	Treatment, Storage or Disposal Facility
UEL	Upper Explosive Limit (see LEL)
µg/kg	microgram/kilogram - a unit of concentration in solids (equivalent to ppb)
µg/L	microgram/Liter - a unit of concentration in liquids (equivalent to ppb)
UL	Underwriters Laboratories
USGS	United States Geological Survey
UST	Underground Storage Tank
VCP	New York State's Voluntary Cleanup Program
VOA	Volatile Organic Analysis or Volatile Organic Analyte
VOC	Volatile Organic Compound
WWTP	Waste Water Treatment Plant

**APPENDIX C**  
**QUALITY ASSURANCE PROJECT PLAN**

# **West 61<sup>st</sup> Street Site Remedial Work Plan**

**BCP ID 231043**

**NEW YORK, NEW YORK**

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## **Quality Assurance Project Plan**

**AKRF Project Number: 10321**

### **Prepared for:**

Algin Management Company, LLC  
64-35 Yellowstone Boulevard  
Forest Hills, New York 11375

### **Prepared by:**



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**MARCH 2006**

**TABLE OF CONTENTS**

1.0	INTRODUCTION .....	1
2.0	PROJECT TEAM .....	1
2.1	PROJECT DIRECTOR .....	1
2.2	PROJECT MANAGER .....	1
2.3	FIELD TEAM LEADER .....	1
2.4	PROJECT QUALITY ASSURANCE/QUALITY CONTROL OFFICER .....	1
2.5	LABORATORY QUALITY ASSURANCE/QUALITY CONTROL OFFICER .....	2
3.0	STANDARD OPERATING PROCEDURES .....	2
3.1	SOIL BORINGS .....	2
3.1.1	Pre-Remediation Endpoint Sampling .....	2
3.1.2	Waste Characterization Samples .....	3
3.1.3	Delineation of Petroleum-Contamination .....	4
3.2	SOIL SAMPLE COLLECTION .....	4
3.3	GROUNDWATER MONITORING WELL INSTALLATION AND DEVELOPMENT .....	5
3.4	MONITORING WELL SAMPLING .....	6
3.5	AIR SAMPLING .....	8
3.6	DECONTAMINATION OF SAMPLING EQUIPMENT .....	9
3.7	FIELD INSTRUMENTATION .....	9
3.8	MANAGEMENT OF INVESTIGATION-DERIVED WASTE .....	10
3.9	SURVEYING AND WATER TABLE READINGS .....	10
4.0	QUALITY CONTROL AND LABORATORY PROCEDURES .....	10
4.1	LABORATORY METHODS .....	10
4.2	QUALITY CONTROL SAMPLING .....	11
4.3	SAMPLE HANDLING .....	11
4.3.1	Sample Identification .....	11
4.3.2	Sample Labeling and Shipping .....	12
4.3.3	Sample Custody .....	12
5.0	DATA REVIEW .....	13

**TABLES**

Table 1 -	Stabilization Criteria
Table 2	Laboratory Analytical Methods for Field Samples
Table 3 -	Examples of Sample Names

**APPENDICES**

APPENDIX A -	Resume of Project QA/QC Officer, Project Director, and Project Manager
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## **1.0 INTRODUCTION**

This Quality Assurance Project Plan (QAPP) describes the protocols and procedures that will be followed during implementation of the Remedial Work Plan (RWP) for the West 61<sup>st</sup> Street Site in New York, New York. The objective of the QAPP is to provide for Quality Assurance (QA) and maintain Quality Control (QC) of environmental sampling and remedial activities conducted under the RWP. Adherence to the QAPP will ensure that defensible data will be obtained during the remediation.

## **2.0 PROJECT TEAM**

The Project Team will be drawn from AKRF professional and technical personnel, and the Volunteer's subcontractors. All field personnel and subcontractors involved in the excavation and removal of lead-contaminated soil, acetone-contaminated soil, underground storage tanks, and petroleum-contaminated materials will have completed a 40-hour training course and an updated 8-hour refresher course that meet the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR Part 1910. The following sections describe the key Project personnel and their responsibilities.

### **2.1 PROJECT DIRECTOR**

The Project Director will be responsible for the general oversight of all aspects of the Project, including scheduling, budgeting, data management, and decision-making regarding the remediation program. The Project Director will communicate regularly with all members of the AKRF Project Team, the New York State Department of Environmental Conservation (NYSDEC), and Algin Management Company, LLC, to ensure a smooth flow of information between involved parties. Michelle Lapin, P.E., Senior Vice President, will serve as the Project Director for the Remedial Work Plan (RWP). Ms. Lapin's resume is included in Appendix A.

### **2.2 PROJECT MANAGER**

The Project Manager will be responsible for directing and coordinating all elements of the Remedial Work Plan (RWP). He will prepare reports and participate in meetings with Algin Management Company, LLC, and/or the New York State Department of Environmental Conservation (NYSDEC). Richard Gardineer, P.E., will serve as the Project Manager for the RWP. Mr. Gardineer's resume is included in Appendix A.

### **2.3 FIELD TEAM LEADER**

The field team leader will be responsible for supervising the daily oversight and health and safety activities in the field, and will ensure adherence to the work plan and Health and Safety Plan (HASP). She will report to the Project Manager on a regular basis regarding daily progress and any deviations from the work plan. The field team leader will be a qualified, responsible person, able to act professionally and promptly during soil disturbing activities. Freda Ponce will be the field team leader for the Remedial Work Plan (RWP). Ms. Ponce's resume is included in Appendix A.

### **2.4 PROJECT QUALITY ASSURANCE/QUALITY CONTROL OFFICER**

The Project Quality Assurance/Quality Control (QA/QC) Officer will be responsible for adherence to the Quality Assurance Project Plan (QAPP). He will review the procedures with all personnel prior to commencing any fieldwork and will conduct periodic Site visits to assess implementation of the procedures. The QA/QC Officer will also be responsible for preparing a Data Usability Summary Report (DUSR) for soil and groundwater analytical results, as described in Section 5.0 of this QAPP. Andrew Rudko, Ph.D., will serve as the QA/QC Officer for the Remedial Work Plan (RWP). Mr. Rudko's resume is included in Appendix A.

## **2.5 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL OFFICER**

The Laboratory Quality Assurance/Quality Control (QA/QC) Officer will be responsible for making sure Quality Control (QC) procedures and checks are followed in the laboratory, and ensuring adherence to laboratory protocols. The Laboratory QA/QC Officer will track the movement of samples from the time they are checked in at the laboratory to the time that analytical results are issued, and will conduct a final check on the analytical calculations and sign off on the laboratory reports. Andrew Rudko, Ph.D., will serve as the Laboratory QA/QC Officer for the Remedial Work Plan (RWP). Mr. Rudko's resume is included in Appendix A.

## **3.0 STANDARD OPERATING PROCEDURES**

The following sections describe the standard operating procedures (SOPs) for the remedial and investigative activities included in the Remedial Work Plan (RWP). During these operations, safety monitoring will be performed as described in the Remediation Health and Safety Plan (RHASP), and field personnel will wear appropriate personal protective equipment (PPE).

### **3.1 SOIL BORINGS**

Borings will be utilized to collect samples for: waste characterization of fill, construction and demolition debris in Lot 8, and native soil; endpoint sampling at the anticipated horizontal and vertical limits of construction excavation; and delineation of the petroleum-contaminated material (fill and native soil) along West 60<sup>th</sup> Street. Individual grab and composite samples will be collected at each boring location of the fill material, construction and demolition debris, and native soil. Each boring will then be extended downward to the anticipated lower limit of construction excavation, where a grab sample will be collected as an endpoint sample. Borings advanced for the delineation of the petroleum contamination will be extended downward to the bottom of the apparent petroleum-contaminated soil. Three or more grab samples will be collected to provide vertical delineation of the contamination at each location. Endpoint grab samples, located in the areas of the petroleum-contaminated soil, will not be collected until after completion of the removal of the contamination. Endpoint samples in areas that have not been contaminated with petroleum will be collected for laboratory analysis to determine if contaminant concentrations are below the Site Specific Soil Action Levels (SSSALs) and/or the Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs) for a Track 4 and Track 1 Cleanup, respectively.

Soil samples, collected during the pre-remediation sampling, will be collected using a hollow-stem auger (HSA) rotary rig with a split-spoon sampler. The soil samples will be collected by driving a two-foot length of a 1½-inch inside diameter split-spoon sampler through the auger and bringing it back to the surface. A second split-spoon sampler will be inserted in the auger and driven an additional two feet. The auger will then be advanced four feet. The location of each sample is listed on Figure 1 of the Sampling Plan (Remedial Work Plan [RWP] Appendix D). All soil samples will be characterized according to the Modified Burmeister soil classification system, and screened for volatile organic compounds (VOCs) using a Thermo 580B Organic Vapor Meter (OVM) equipped with a photoionization detector (PID).

#### **3.1.1 Pre-Remediation Endpoint Sampling**

Pre-remediation endpoint samples will be collected by driving a two-foot sampler into the exposed soil at the pre-determined depth, as shown on Table 2 of the Sampling Plan (Appendix D of the Remedial Work Plan [RWP]). The top six inches to one foot of the

samples will be collected for analysis. All soil samples will be characterized according to the Modified Burmeister soil classification system, and screened for volatile organic compounds (VOCs) using a Thermo 580B Organic Vapor Meter (OVM) equipped with a photoionization detector (PID).

Additional endpoint samples will be collected during or after remediation at locations: where the analysis of the pre-construction samples indicated the presence of contaminants in concentrations above Site Special Soil Action Levels (SSSALs) or Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs) in the locations of petroleum contamination in the southern portion of the Site along West 60<sup>th</sup> Street; on sidewalls along the Site boundary, consistent with applicable DER-10 guidance; and where New York State Department of Environmental Conservation (NYSDEC) requires that additional samples are warranted to achieve adequate coverage. These soil samples will be characterized according to the Modified Burmeister soil classification system, and screened for VOCs using a Thermo 580B OVM equipped with a PID.

The endpoint soil samples will be collected using dedicated sampling equipment. One matrix spike/matrix spike duplicate (MS/MSD) sample will be collected and analyzed for every twenty endpoint samples. Field blanks will be collected by pouring laboratory-provided distilled water over the cleaned split-spoon into the sample containers. Trip blanks will accompany the coolers to the field. The soil samples, field blanks, and trip blanks will be placed into laboratory-supplied containers in a chilled cooler, and submitted to Severn Trent Laboratories, Inc. (STL), of Shelton, Connecticut, a New Jersey Department of Environmental Protection (NJDEP)-approved and New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory. The samples will be analyzed using Contract Laboratory Protocol (CLP) Category B Deliverables for Target Compound List (TCL) VOCs, semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) metals. A Data Usability Summary Report (DUSR) will be prepared for the endpoint samples.

### **3.1.2 Waste Characterization Samples**

Separate grab and composite samples will be collected from the fill material, native soil, construction and demolition debris, and petroleum-contaminated soil. Split-spoon sampling will be continuous through each layer of each type of material up to a maximum depth based on the requirements of the receiving facility. The depths for 100, 500, and 1,000 cubic yards (cy) per sample analysis for each grid are shown in Table 1 of the Sampling Plan in Appendix D of the Remedial Work Plan (RWP). Each two-foot length will be placed in a bag. At the pre-determined depth (maximum thickness shown in Table 1), a composite sample will be collected from the individual two-foot samples (see Sampling Plan in Appendix D of the RWP). Any required grab sample for volatile organic compounds (VOCs) will be collected from the sample location situated at the approximate midpoint of the depth of the layer being sampled, and immediately placed in a sample container and placed in the cooler. The split-spoon samplers will then be cleaned between layers. This process will be observed for the remaining fill material until a different type of soil is encountered (e.g., fill to native soil, construction and demolition debris to fill, fill to petroleum-contaminated material). The split-spoon samplers are cleaned again and the process is repeated. At the elevation of the vertical limit of excavation, the split-spoon sampler will be cleaned and one grab sample will be collected

of the soil beneath the vertical limit of excavation (see Section 3.2). All sampling equipment and the drill rig augers will be decontaminated between sampling locations. The decontamination procedures are described in Section 3.6.

The soil samples will be analyzed for specific analytical parameters dependent upon the receiving facility. The tests for the beneficial use facilities are different from the treatment/disposal facilities. The facilities and their respective analytical requirements are contained in Appendices B and C of the Sampling Plan. The containers, preservatives, and holding times for the different analytical parameters are listed in Table 4 of the Sampling Plan in Appendix D of the RWP. These samples will be analyzed at Severn Trent Laboratories, Inc. (STL). STL is certified by the New Jersey Department of Environmental Protection (NJDEP) to perform these analytical procedures. In addition, if the soil from the Site is transported to the ENCAP Meadowlands Project, a NJDEP-certified subsurface specialist will be supervising the sample collection activities for waste characterization. The analytical procedures will meet Contract Laboratory Protocol for Category A Deliverables. A data Usability Summary Report (DUSR) will not be prepared for the waste characterization analyses.

### **3.1.3 Delineation of Petroleum-Contamination**

Petroleum delineation samples will be installed along West 60<sup>th</sup> Street, as shown on Figure 1 of the Sampling Plan, contained in Appendix D of the RWP. Each line, perpendicular to West 60<sup>th</sup> Street, will contain three to five borings heading south to north. The grid lines are spaced approximately 60 feet apart. The hollow-stem auger (HSA) rig will advance a split-spoon sampler through the fill material to the groundwater level, and then continue to the end of the petroleum contamination or to bedrock. Grab samples will be collected approximately three feet above the groundwater table, at or just below the groundwater level, and in clean soil beneath the petroleum contamination or at bedrock, if clean soil is not encountered. The soil will be screened for volatile organic compounds (VOCs) using a photoionization detector (PID). The samplings will be collected using an En Core® Sampler and a 60-milliliter plastic bottle. The samples will be analyzed for VOCs using EPA Method 8260, and for percent solids.

The soil samples slated for analysis will be collected in laboratory-supplied containers, sealed and labeled, and placed in a chilled cooler. The En Core® samples will be analyzed for VOCs via EPA Method 8270 at Severn Trent Laboratories, Inc. (STL) for analysis following New Jersey Department of Environmental Protection (NJDEP) protocols. These samples will be analyzed for Category A Deliverables. A Data Usability Summary Report (DUSR) will not be prepared for the analysis of these samples.

## **3.2 SOIL SAMPLE COLLECTION**

Soil sampling will be conducted according to the following procedures:

- Characterize the sample according to the Modified Burmeister soil classification system.
- If advancing soil borings for endpoint sampling from the bottom of the excavation and/or from the sidewalls, collect an aliquot of soil from each sampling location and place the sample directly in laboratory-supplied jars and place in a cooler.
- If performing endpoint sampling from excavation walls, soil can be placed directly in laboratory-supplied sample jars.

- If collecting a waste characterization sample from a soil stockpile, collect an aliquot of soil from at least five evenly distributed locations, or as required by the receiving facility, and place in a labeled sealable plastic bag to create a single composite sample. If a volatile organic compound (VOC) sample is being collected, the sampling will be a grab sample based on the direction of the receiving facility.
- After selecting which samples will be analyzed in the laboratory, fill the required laboratory-supplied sample jars with the soil from the selected sampling location or labeled sealable plastic bags. Seal and label the sample jars as described in Section 4.3 of this QAPP, and place in an ice-filled cooler.
- Decontaminate any soil sampling equipment between sample locations, as described in Section 3.6 of this QAPP.
- Record boring number, sample depth, and sample observations (evidence of contamination, photoionization detector [PID] readings, soil classification) in a field book and boring log data sheet, if applicable.

### **3.3 GROUNDWATER MONITORING WELL INSTALLATION AND DEVELOPMENT**

If required by the New York State Department of Environmental Conservation (NYSDEC), monitoring wells will be installed at select locations to monitor groundwater conditions within and outside of the soil remediation area. The locations of the proposed wells will be determined at the conclusion of the remediation activities. Both shallow and deep wells would be installed to monitor petroleum- and fill-related contamination, respectively.

Borings for the wells would be installed using 6.25-inch outside diameter hollow-stem augers (HSAs) and a truck-mounted drill rig. All wells would be constructed with two-inch diameter PVC, with ten feet of 0.10-slotted screens. Well screens for the shallow wells would be set with four feet of screen above and six feet of screen below the water table. Well screens for the deep wells would be set just above the surface of the till layer/bedrock interface (whichever is shallower), with a one-foot sump set into the till layer/bedrock to provide a reservoir for silt accumulation. The annular space around the well screen would be backfilled with a sand filter pack extending from the bottom of the well to one to two feet above the screen. The annular space around the well riser would be sealed with bentonite extending one to two feet above the sand filter pack and completed with a non-shrinking cement mixture to approximately one foot below grade. Monitoring wells would be completed using locking, flush-with-grade gate boxes. A cement apron would be set around the gate box or steel casing to prevent drainage of surface runoff toward the well.

Following installation, each monitoring well would be developed via over-pumping or surging and pumping. The purge water would be monitored for turbidity and water quality indicators (i.e., pH, dissolved oxygen, oxidation-reduction potential [ORP], temperature, and specific conductivity), with measurements collected approximately every five minutes. Development would continue until turbidity is less than 50 nephelometric turbidity units (NTUs) for 3 successive readings, or until water quality indicators have stabilized, whichever occurs first. The criteria for stabilization will be three successive readings within ten percent for pH, temperature, and specific conductivity. All monitor well drill cuttings, well development water, decontamination water, and purge water would be containerized in 55-gallon steel drums and handled as described in Section 3.8.

Wells would be installed according to the following procedure:

- Place a PVC riser with a ten-foot length of PVC 0.10-slotted screen at the bottom of the borehole (with a 1-foot sump provided for the deep monitoring wells).
- Install a No. 1 sand filter pack around the well screen to a depth of one to two feet above the top of the screen.
- Install a bentonite seal to a depth of one to two feet above the filter pack.
- Backfill the remainder of the annular space using a bentonite-cement grout.
- Complete the well with a locking cap flush-with-grade curb box set in concrete. Provide a concrete apron around the curb box to direct runoff away from the well.
- Decontaminate the augers prior to and following installation of each well as described in Section 3.6 of this QAPP.
- Document well installation data (location, depth, construction details, water level measurements) in the field book or on field data sheets.

Following well installation, the new wells will be developed according to the following procedure:

- Measure the depth to water using an oil/water interface probe, and the total depth of the well using a weighted tape. Use these measurements to calculate the length of the water column. Calculate the volume of water in the well using 0.163 gallons per foot of water column as the conversion factors for a 2-inch diameter well.
- For the first five minutes of well development, develop the well using a submersible pump and re-circulate the water back into the well to create maximum agitation. This method is intended to remove fines from the sand pack, the adjacent formation, and the well.
- After the first five minutes of well development, develop the well using a submersible pump and discharge the water into five-gallon buckets. Transfer water from the buckets to 55-gallon drums designated for well development water.
- During development, collect periodic samples and analyze for turbidity and water quality indicators (pH, temperature, dissolved oxygen, oxidation-reduction potential [ORP], and specific conductivity), with measurements collected approximately every five minutes.
- Continue developing the well until turbidity is less than 50 NTUs for 3 successive readings, and water quality indicators have stabilized to within 10 percent for pH, temperature, and specific conductivity for 3 successive readings, or until 3 well volumes have been purged from the well.
- Document the volume of water removed and any other observations made during well development in the field book or on field data sheets.
- Decontaminate the equipment prior to and following development at each well location as described in Section 3.6 of this QAPP.

All well development, decontamination, and purge water will be containerized in 55-gallon drums.

### **3.4 MONITORING WELL SAMPLING**

Groundwater samples will be collected at least one week following well development. Low flow sampling techniques will be used, as described in the EPA's Groundwater Sampling Guidelines

for Superfund and Resource Conservation and Recovery Act (RCRA) (EPA 542-S-02-001, May 2002). Sampling will be conducted according to the following procedure:

- Prepare the sampling area by placing plastic sheeting over the well. Cut a hole in the sheeting to provide access to the well cover.
- Remove the locking cap and measure the vapor concentrations in the well with a photoionization detector (PID).
- Measure the depth to water and total well depth, and check for the presence of light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) using an oil/water interface probe. Measure the thickness of non-aqueous phase liquid (NAPL), if any, and record in field book and well log. If NAPL is present, collect a sample of NAPL using a disposable plastic weighted bailer or similar collection device. Groundwater samples will not be collected from wells containing measurable NAPL.
- Use the water level and total well depth measurements to calculate the length of the mid-point of the water column within the screened interval. For example, for a shallow well where the total depth is 15 feet, screened interval is 5 to 15 feet, and depth to water is 7 feet, the mid-point of the water column within the screened interval would be 11 feet. Similarly, for a deep well where the total depth is 40 feet, screened interval is 30 to 40 feet, and depth to water is 15 feet, the mid-point of the water column within the screened interval would be 35 feet.
- Connect dedicated tubing to either a submersible or bladder pump and lower the pump such that the intake of the pump is set at the mid-point of the water column within the screened interval of the well. Connect the discharge end of the tubing to the flow-through cell of a Hydrolab Quanta multi-parameter (or equivalent) meter. Connect tubing to the output of the cell and place the discharge end of the tubing in a five-gallon bucket.
- Activate the pump at the lowest flow rate setting of the pump.
- Measure the depth to water within the well. The pump flow rate may be increased such that the water level measurements do not change by more than 0.3 feet as compared to the initial static reading. The well-purging rate should be adjusted so as to produce a smooth, constant (laminar) flow rate, and so as not to produce excessive turbulence in the well. The expected targeted purge rate will be around 500 milliliters per minute, and will be no greater than 3.8 liters per minute.
- Transfer discharged water from the 5-gallon buckets to 55-gallon drums designated for well purge water.
- During purging, collect periodic samples and analyze for water quality indicators (e.g., turbidity, pH, temperature, dissolved oxygen, oxidation-reduction potential [ORP], and specific conductivity), with measurements collected approximately every five minutes.
- Continue purging the well until turbidity is less than 50 nephthalometric turbidity units (NTUs) and water quality indicators have stabilized to the extent practicable. The criteria for stabilization will be three successive readings for the parameters and criteria noted in Table 1:

Table 1  
Stabilization Criteria

Parameter	Stabilization Criteria
pH	+/- 0.1 pH units
Specific Conductance	+/- 3% mS/cm
ORP/Eh	+/- 10mV
Turbidity	<50 NTU
Dissolved Oxygen	+/- 0.3 mg/l

Notes: mS/cm = millisievert per centimeter  
mV = millivolts  
ORP/Eh = oxidation-reduction potential  
NTU = nephthalometric turbidity units  
mg/l = milligrams per liter

- If the water quality parameters do not stabilize and/or turbidity is greater than 50 NTUs within 2 hours, purging may be discontinued. Efforts to stabilize the water quality for the well must be recorded in the field book, and samples may then be collected as described herein.
- After purging, disconnect the tubing to the inlet of the flow-through cell. Collect groundwater samples directly from the discharge end of the tubing and place into the required sample containers as described in Section 4.3 of this QAPP. Label the containers, as described in Section 4.3 of this QAPP, and place in a chilled cooler. Samples should be collected first for volatile organic compounds (VOCs), then semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and the remaining inorganic analyses.
- Unless the sample is to be filtered at the laboratory, for the dissolved metals sample, collect the water into the plastic filter chamber and seal. Attach a hand pump outfitted with a disposable filter to the chamber, and pump the water through the filter into the appropriate sample container.
- Collect one final field sample and analyze for turbidity and water quality parameters (pH, temperature, dissolved oxygen, oxidation-reduction potential [ORP], and specific conductivity).
- Once sampling is complete, remove the pump and tubing from the well. Disconnect the tubing and place it back in the well for reuse during the next sampling event. Dispose of the sample filter in a 55-gallon drum designated for disposable sampling materials.
- Decontaminate the pump, oil/water interface probe, flow-through cell, and plastic filter chamber, as described in Section 3.6 of this QAPP.
- Record all measurements (depth to water, depth to NAPL, water quality parameters, turbidity), calculations (well volume), and observations in the field book and field data sheet, if applicable.

### 3.5 AIR SAMPLING

If it is required by the New York State Department of Environmental Conservation (NYSDEC) and/or the New York State Department of Health (NYSDOH), confirmatory air samples will be collected during remediation activities to measure concentrations of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) in ambient air at the Site perimeter.



Samples will be analyzed for VOCs using Environmental Protection Agency (EPA) Method TO-15, and for SVOCs using EPA Method TO-13. The air samples to be analyzed for VOCs will be collected using the following procedures:

- Select a downwind perimeter location based on actual wind conditions for the particular day.
- Place a three-liter Summa canister at the selected downwind location and label as described in Section 4.3 of this QAPP. Attach a flow controller, which has been calibrated to collect a three-liter sample over an eight-hour period, to the canister.
- Attach a length of Teflon tubing to the intake for the flow controller, and place the intake for the tubing at breathing height (approximately four feet above grade).
- Record the vacuum reading from the vacuum gauge on the canister at the beginning of the sampling period. Open the valve of the canister and record the time in the field book.
- At the end of the sampling period, record the final vacuum reading and close the valve. Record the time in the field book.
- Wrap the Summa canister in plastic bubble wrap and place in a box for shipment to the laboratory via overnight delivery.

### **3.6 DECONTAMINATION OF SAMPLING EQUIPMENT**

All sampling equipment will be either dedicated or decontaminated between sampling locations. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush.
2. Rinse with tap water.
3. Scrub again with tap water/Simple Green® and bristle brush.
4. Rinse with tap water.
5. Rinse with distilled water.
6. Air-dry the equipment, if possible.

Hollow-stem augers (HSAs) will be decontaminated between monitor well locations by steam cleaning using a tap water/Simple Green® solution. Decontamination will be conducted on plastic sheeting (or equivalent) that will be bermed to prevent discharge to the ground.

### **3.7 FIELD INSTRUMENTATION**

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the Site for referencing proper operation, maintenance, and calibration procedures. The equipment will be calibrated according to manufacturer specifications at the start of each day of fieldwork, if applicable. If an instrument fails calibration, the Project Manager or Quality Assurance/Quality Control (QA/QC) Officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate, and corrective actions taken. The photoionization detector (PID) will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas.

### **3.8 MANAGEMENT OF INVESTIGATION-DERIVED WASTE**

All investigation-derived waste (IDW) will be containerized in Department of Transportation (DOT)-approved 55-gallon drums. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, development water, or purge water), and the name of an AKRF point-of-contact. Soil samples collected from soil borings will be used for waste characterization of soils. Additional waste characterization soil samples will be collected, if warranted. Grab samples will be collected from drums containing well development and purge water for waste characterization of liquids. The samples will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), ignitability, corrosivity, reactivity, and lead using Toxicity Characteristic Leaching Procedure (TCLP). All drums will be labeled “pending analysis” until laboratory data is available. Additional analyses may be required by the receiving facility. All IDW will be disposed of or treated according to applicable local, State, and federal regulations.

### **3.9 SURVEYING AND WATER TABLE READINGS**

The groundwater monitoring wells and boring locations will be surveyed by a New York State-licensed surveyor. Three elevation measurements will be taken at each well location; the elevation of the ground beside the well, the elevation on the rim of the gate box or protective casing, and the elevation of the top of the PVC casing. One elevation measurement will be taken at each boring on the north side of the boring location prior to the advancement of borings for the collection of waste characterization samples.

Water table readings will be taken in the groundwater monitoring wells using a Solinst® Water Level Meter - Model 101 or equivalent. The gate boxes will be unlocked and opened at each well location. The Solinst® Water Level Meter will be turned on and sound tested. The probe of the meter will be inserted into the PVC casing. The probe will be lowered down the casing until the meter alarm indicates the probe is at the water table. A reading of the depth from the top of the PVC casing to the groundwater table will be recorded in the field book.

## **4.0 QUALITY CONTROL AND LABORATORY PROCEDURES**

### **4.1 LABORATORY METHODS**

Table 2 summarizes the laboratory methods that will be used to analyze field samples (excluding waste characterization and petroleum delineation samples), and the sample container type, preservation, and applicable holding times. An Environmental Laboratory Approval Program (ELAP)-certified laboratory will be used for all chemical analyses in accordance with DER-10 2.1(b) and 2.1(f). Category B deliverables and Contract Laboratory Protocol (CLP) ELAP certification will be required for confirmatory (post-remediation) samples and final delineation samples, and Category A deliverables (or Spills Category) laboratory data deliverables will be required for all other analyses (e.g., waste characterization sampling).

Table 2  
Laboratory Analytical Methods for Analysis Groups

ANALYSIS GROUP	MATRIX	PARAMETER	EPA METHOD	SAMPLE CONTAINERS	PRESERVATION	HOLDING TIMES
SOIL ANALYSIS PARAMETERS	solid	TCL VOCs	8260	2-oz. clear glass Septum	4°C	14 days
		TCL SVOCs	8270 BN	8-oz. clear glass	4°C	14 days
		TAL Metals	1311/6010B/7470A	8-oz. clear glass	4°C	14 days
GROUNDWATER ANALYSIS PARAMETERS	liquid/sludge	TCL VOCs	8260	Two 40-ml clear glass vials	HCl, 4°C	14 days
		TCL SVOCs	8270 BN	3-L amber glass	4°C	7 days
		TAL Metals	6000/7000 series	500-ml plastic	HNO <sub>3</sub> , 4°C	6 months (28 days for Hg)
AIR ANALYSIS PARAMETERS	vapor	VOCs	TO-15	Summa canisters	none	14 days
		SVOCs	TO-13	PUF samplers	none	7 days

Notes: TCL = Target Compound List  
VOCs = volatile organic compounds  
SVOCs = semi-volatile organic compounds  
TAL = Target Analyte List  
BN = Base Neutral  
PUF = Polyurethane Foam

## 4.2 QUALITY CONTROL SAMPLING

In addition to the laboratory analysis of the investigative and remedial soil and groundwater samples, additional analysis will be included for quality control (QC) measures, as required by the Category B sampling techniques (e.g., one set of quality control samples per 20 field samples). These samples will include equipment rinsate blanks, trip blanks, matrix spike/matrix spike duplicates (MS/MSD), and duplicate/blind duplicate samples. Equipment blank, MS/MSD, and duplicate samples will be analyzed for the same parameter set for which the samples will be analyzed. If the requested parameters include volatile organic compounds (VOCs), a trip blank will be analyzed for VOCs only. QC sampling will be performed in accordance with the disposal facility requirements when collecting samples for disposal characterization.

## 4.3 SAMPLE HANDLING

### 4.3.1 Sample Identification

All samples will be consistently identified in all field documentation, chain-of-custody (COC) documents, and laboratory reports using an alpha-numeric code. All samples will be identified with a prefix of "W61" to designate the West 61<sup>st</sup> Street Development Site. Groundwater samples will be identified by the monitoring well number, and soil boring samples will be identified by the soil boring number followed by the sample depth interval (in parentheses). Waste characterization samples collected from the 55-gallon drums will be identified by the drum number (e.g., D-1 or D-2) followed by a sample type designation (e.g., "LQ" for liquid and "SD" for solid). Waste characterization samples collected from soil stockpiles will be identified by the pile number (e.g., SP-1 or SP-2). Air samples will be labeled with "AS," followed by the date in parentheses.

The designation "MS" will be added at the end of the designation for matrix spike/matrix spike duplicate samples. The field duplicate samples will be labeled with a dummy sample location to ensure that they are submitted as blind samples to the laboratory. The

dummy identification will consist of the sample type followed by a letter. For duplicate soil boring samples, the sample depth will be the actual sample depth interval. Trip blanks and field blanks will be identified with “TB” and “FB,” respectively.

Table 3 provides examples of the sampling identification scheme.

Table 3  
Examples of Sample Names

Sample Description	Sample Designation
Soil sample collected from five to seven feet at SB-21	W61-SB-21 (5'-7')
Groundwater sample collected from monitoring well MW-10	W61-MW-10
MS/MSD sample from MW-10	W61-MW-10-MS
Duplicate sample from 12 to 14 feet at S-10	W61-SB-B (12'-14')
Air sample collected on 9/12/05	W61-AS (9/12/05)

#### 4.3.2 Sample Labeling and Shipping

All sample containers will be provided with labels containing the following information:

- Project identification
- Sample identification
- Date and time of collection
- Analysis(es) to be performed
- Sampler's initials

Additionally, the air samples will be labeled with the serial number for the flow controller used during sampling. Once the samples are collected and labeled, they will be placed in chilled coolers and stored in a cool area away from direct sunlight to await shipment to the laboratory. Air samples will be placed in coolers that do not contain ice or in cardboard shipping boxes. Soil and groundwater samples will be shipped to the laboratory once to twice per week. At the start and end of each workday, field personnel will add ice to the coolers as needed.

The samples will be prepared for shipment by placing each sample in a sealable plastic bag, then wrapping each container in bubble wrap to prevent breakage, and finally adding freezer packs and/or fresh ice in sealable plastic bags along with the chain-of-custody (COC) form. Samples will be shipped overnight (e.g., via Federal Express) or transported by a laboratory courier. All coolers shipped to the laboratory will be sealed with mailing tape and a COC seal to ensure that the coolers remain sealed during delivery.

#### 4.3.3 Sample Custody

Field personnel will be responsible for maintaining the sample coolers in a secured location until they are picked up and/or sent to the laboratory. The record of possession of samples from the time they are obtained in the field to the time they are delivered to

the laboratory or shipped off-site will be documented on chain-of-custody (COC) forms. The COC forms will contain the following information: Project name; names of sampling personnel; sample number; date and time of collection and matrix; and signatures of individuals involved in sample transfer, and the dates and times of transfers. Laboratory personnel will note the condition of the custody seal and sample containers at sample check-in.

## **5.0 DATA REVIEW**

The Quality Assurance/Quality Control (QA/QC) Officer will conduct a review of all analytical data and prepare a Data Usability Summary Report (DUSR) for all samples except waste characterization and petroleum delineation samples, to assess the quality of the data and determine its usability. To assess the data, the QA/QC Officer will:

- Ensure that the data package for all samples, except waste characterization and plume delineation samples, is complete as defined under the requirements for the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) Category B deliverables, and that all data were generated using established and agreed upon protocols.
- Check that all holding times were met.
- Check that all QC data (blanks, instrument tunings, calibration standards, calibration verifications, surrogate recoveries, spike recoveries, replicate analyses, laboratory controls, and sample data) fall within the protocol's required limits and specifications.
- Compare raw data with results provided in the data summary sheets and QC verification forms.
- Check that the correct data qualifiers were used.
- Evaluate the raw data and confirm the results provided in the data summary sheets and QC verification forms.

Any QC exceedances will be specified in the DUSR, and the corresponding data package QC summary sheet identifying the exceedances will be attached. The DUSR will identify any data deficiencies, analytical protocol deviations, and QC problems, and will discuss their effect on the data. Recommendations for re-sampling and/or reanalysis will be made.

**APPENDIX A**  
**RESUME OF PROJECT QA/QC OFFICER, PROJECT DIRECTOR,**  
**PROJECT MANAGER, AND FIELD TEAM LEADER**

## **MICHELLE LAPIN, P.E.**

### **SENIOR VICE PRESIDENT**

Michelle Lapin is a senior vice president with 20 years of experience in the assessment and remediation of hazardous waste issues. She leads the firm's Hazardous Materials group and offers more than a decade of experience providing strategic planning and management for clients. Ms. Lapin has been responsible for the administration of technical solutions to contaminated soil, groundwater, and geotechnical problems. Her other duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

Ms. Lapin's hydrogeologic experience includes performing groundwater investigations, and formulation and administration of groundwater monitoring programs in New York, New Jersey, Connecticut, New Hampshire, Massachusetts, Rhode Island, Virginia, and Maryland. Her experience with groundwater contamination includes Level B hazardous waste site investigations; execution of leaking underground storage tank studies, including hazardous soil removal and disposal; soil and water sampling; soil gas surveys; and wetlands issues. Ms. Lapin is experienced in coordinating and monitoring field programs concerning hazardous waste cell closures. She has directed numerous Phase I, Phase II, and Phase III investigations, many of them in conjunction with developers, law firms, lending institutions, and national retail chains. She is also experienced in the cleanup of contaminated properties under Brownfield Cleanup Program (BCP) regulations.

### **BACKGROUND**

#### **Education**

B.S., Civil Engineering, Clarkson University, 1983

M.S., Civil Engineering, Syracuse University, 1985

#### **Professional Registrations**

New York State P.E.

State of Connecticut P.E.

#### **Professional Memberships**

Member, American Society of Professional Engineers (ASPE), National and CT Chapters

Member, American Society of Civil Engineers (ASCE), National and CT Chapters

Member, Connecticut Business & Industry Association (CBIA), CBIA Environmental Policies Council

#### **Years of Experience**

Year started in company: 1994

Year started in industry: 1984

### **RELEVANT EXPERIENCE**

#### **Hudson River Park, New York, NY**

Ms. Lapin is directing AKRF's hazardous materials work during construction of Hudson River Park, a 5-mile linear park along Manhattan's West Side. As the Hudson River Park Trust's (HRPT's) environmental consultant, AKRF is overseeing preparation and implementation of additional soil and groundwater investigations (working with both



## **MICHELLE LAPIN, P.E.**

**SENIOR VICE PRESIDENT**

| p. 2

NYSDEC and NYCDEP), all health and safety activities, removal of both known underground storage tanks and those encountered during construction. Previously, the firm performed hazardous materials assessments as part of the Environmental Impact Statement (EIS) process, including extensive database and historical research, as well as soil and groundwater investigations. Ms. Lapin has been the senior consultant for the soil and groundwater investigations and remediation, and the asbestos investigations and abatement oversight.

### **Fiterman Hall Deconstruction and Decontamination Project, New York, NY**

The 15-story Fiterman Hall building, located at 30 West Broadway between Barclay and Murray Streets, originally constructed as an office building in the 1950s, had served as an extension of the City University of New York (CUNY) Borough of Manhattan Community College (BMCC) since 1993. The building was severely damaged during the September 11, 2001, attack on the World Trade Center (WTC) when 7 WTC collapsed and struck the south façade of the building, resulting in the partial collapse of the southwest corner of the structure. The building was subsequently stabilized, with breaches closed and major debris removed, however extensive mold and WTC dust contaminants remain within the building, which must be taken down. The project requires the preparation of two EASs for the redevelopment of Fiterman Hall—one for the deconstruction and decontamination of the building and one for the construction of a replacement building on the site. AKRF is currently preparing the EAS for the Deconstruction and Decontamination project, which includes the decontamination of the interior and exterior of the building, the removal and disposal of all building contents, and the deconstruction of the existing, approximately 377,000-gross-square-foot partially collapsed structure. Ms. Lapin was the reviewer for the deconstruction and decontamination plans for the EAS. The cleanup plan is due to be submitted shortly to the U.S. Environmental Protection Agency; once approved, remediation work will begin, followed by the deconstruction and rebuilding of Fiterman.

### **Brooklyn Bridge Park, Brooklyn, NY**

AKRF is preparing an EIS and providing technical and planning support services for Brooklyn Bridge Park, which will revitalize the 1.3-mile stretch of the East River waterfront between Jay Street on the north and Atlantic Avenue on the south. The new park, to be completed by 2010, would allow public access to the water's edge, allowing people to enjoy the spectacular views of the Manhattan skyline and New York Harbor. It would also provide an array of passive and active recreational opportunities, including lawns, pavilions, and a marina. As with many waterfront sites around New York City, the lands along the Brooklyn waterfront have a long history of industrial activities. Some of these industries used dangerous chemicals and generated toxic by-products that could have entered the soil and groundwater. In addition, landfilling activities along the shoreline also made use of ash and other waste materials from industrial processes. Based on site inspections and historical maps, government records, and other sources, AKRF is in the process of investigating the potential for the presence for hazardous materials in the park. This information will be compiled into a Phase 1 Environmental Site Assessment report. AKRF will also provide support to the design team related to designing the project to minimize costs related to remediating hazardous materials where possible. Ms. Lapin is serving as senior manager for the hazardous materials investigations, including procuring a Beneficial Use Determination (BUD) from the New York State Department of Environmental Conservation (NYSDEC) for the acceptance of fill materials to the site.

### **Columbia University Manhattanville Academic Mixed-Use Development, New York, NY**

Ms. Lapin is serving as hazardous materials task leader on this EIS for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work has included Phase I Environmental Site Assessments for the properties within the site boundaries and estimates for upcoming investigation and remediation.

### **Albert Einstein College of Medicine Center for Genetic and Translational Medicine, Bronx, NY**

Ms. Lapin directed the firm's hazardous materials work in connection with the construction a new Center for Genetics and Translational Medicine (CGTM) building on the Bronx campus of the Albert Einstein College of Medicine of Yeshiva University. The building is expected to be opened by 2006. AKRF prepared an





## **MICHELLE LAPIN, P.E.**

**SENIOR VICE PRESIDENT**

| p. 3

Environmental Assessment Statement (EAS) that examined such issues as land use, zoning, air quality, urban design and visual resources, hazardous materials, traffic, noise, and air quality. Ms. Lapin's work included analysis of the existing conditions and potential impacts that the construction could cause to the environment and human health.

### **Yonkers Waterfront Redevelopment Project, Yonkers, NY**

For this redevelopment along Yonkers Hudson River waterfront, Ms. Lapin headed the remedial investigation and remediation work that included Phase I assessments of 12 parcels, investigations of underground storage tank removals and associated soil remediation, remedial alternatives reports, and remedial work plans for multiple parcels. Several of the city-owned parcels were remediated under a Voluntary Cleanup Agreement; others were administered with state Brownfields grants. Hazardous waste remediation was completed on both brownfield and voluntary clean-up parcels, and construction is underway for mixed-use retail, residential development, and parking.

### **Davids Island Site Investigations, New Rochelle, NY**

Ms. Lapin managed the hazardous materials investigation of Davids Island, the largest undeveloped island on the Long Island Sound in Westchester County. The 80-acre island features pre- and post-Civil War military buildings and parade grounds, and is viewed as a major heritage, tourism, and recreational amenity. The island, formerly known as Fort Slocum, was used by the U.S. military, beginning in the 19th century, as an Army base, hospital, and training center. The island is planned for county park purposes. The investigation included a Phase I site assessment, with historical research going back to the 17th century, a Phase II subsurface investigation, underground storage tank investigations, and asbestos surveys of all remaining structures. Cost estimates were submitted to Westchester County for soil remediation, asbestos abatement, and building demolition.

### **Site Selection and Installation of 11 Turbine Generators, New York and Long Island, NY**

AKRF was retained by the New York Power Authority (NYPA) to assist in the State Environmental Quality Review Act (SEQRA) review of the proposed siting, construction, and operation of 11 single-cycle gas turbine generators in the New York metropolitan area. Ms. Lapin managed the hazardous materials investigation of the sites. The work has included Phase I site assessments, subsurface investigations, and construction health and safety plans.

### **Cross Westchester (I-287) Expressway Phases V and VI, Westchester County, NY**

For the New York State Department of Transportation (NYSDOT), Ms. Lapin served as project manager and was responsible for directing the contaminated materials aspect of the final design effort for the reconstruction of Westchester County's major east-west artery. As part of her duties, Ms. Lapin was responsible for managing the asbestos investigations at eight bridges and wetland delineation along the entire corridor, as well as writing the scope of work and general management of the project.

### **Shaw's Supermarket, New Fairfield, CT**

AKRF is providing consulting services to the developer and owner of a 9-acre site included conducting a remedial investigation and remediation of a site contaminated from former dry cleaning operations and off-site gasoline spills. The investigation included the installation of monitoring wells in three distinct aquifers, geophysical logging, pump tests, and associated data analysis. Ms. Lapin presented the environmental issues and planned remediation to local and state officials during the early stages of the planning process to incorporate their comments into the final remedial design. A remedial action work plan (RAWP) was completed and approved by the Connecticut Department of Environmental Protection within a year to enable redevelopment work for a new supermarket and shopping center. The RAWP included the remediation of soils within the source area and a multi-well pump and treat system for the recovery of non-aqueous and dissolved phase contamination in groundwater. The design of the recovery well system included extensive groundwater modeling to ensure capture of the contaminant plume.



## **MICHELLE LAPIN, P.E.**

**SENIOR VICE PRESIDENT**

| p. 4

and the appropriate quantity and spacing of the wells. Ms. Lapin directed the soil removal remedial activities and monitoring for additional potential contamination during construction. In addition, AKRF performed comprehensive pre-demolition asbestos and lead-based paint surveys of the former site structures, and are continuing to provide environmental consulting support for the development of the site. Site development has been completed and a groundwater remediation system was installed during site development. The remediation system is successfully operating. The next phase of work includes an off-site study to determine whether the contamination plume has migrated from the site since area residents use groundwater as a source of drinking water. Ms. Lapin will continue to manage the project through the study and remediation phases.

### **East 75th/East 76th Street Site, New York, NY**

Ms. Lapin served as senior manager for this project that encompassed coordination and direct remediation efforts of this former dry cleaning facility and parking garage prior to the sale of the property and its ultimate redevelopment for use as a private school. A preliminary site investigation identified 20 current and former petroleum and solvent tanks on the property. A soil and groundwater testing program was designed and implemented to identify the presence and extent of contamination resulting from potential tank spills. This investigation confirmed the presence of subsurface petroleum contamination in the soil and solvent contamination from former dry cleaning activities in the bedrock. AKRF completed oversight of the remediation under the State's Voluntary Cleanup Program. Remediation, consisting of tank removals and excavation of contaminated soil and the removal of solvent-contaminated bedrock down to 30 feet below grade, has been completed. AKRF completed oversight of the pre-treatment of groundwater prior to discharge to the municipal sewer system and is currently completing an off-site study to determine impacts to groundwater in downgradient locations.

### **Former Macy's Site, White Plains, NY**

Ms. Lapin managed the pre-demolition work for Tishman Speyer. Work included a Phase I site assessment; subsurface investigation (Phase II), including the analysis of soil and groundwater samples for contamination; a comprehensive asbestos, lead paint, and PCB investigation; radon analysis; and coordination and oversight of the removal of hazardous materials left within the building from previous tenants. Work also included asbestos abatement specifications and specifications for the removal of two 10,000-gallon vaulted fuel-oil underground storage tanks.

### **Storage Deluxe, Various Locations, NY**

Ms. Lapin manages the firm's ongoing work with Storage Deluxe, which includes Phase I and Phase II subsurface investigations, underground storage tank removals and associated remediation, asbestos surveys and abatement oversight, and contaminated soil removal and remediation for multiple sites in the Bronx, Brooklyn, Manhattan, Westchester County, and Long Island.

### **Home Depot, Various Locations, NY**

Ms. Lapin, serving as either project manager or senior manager, has managed the investigations and remediation at multiple Home Depot sites in the five boroughs, Long Island, and Connecticut. The investigations have included Phase I and II site assessments, asbestos and lead paint surveys, abatement specifications and oversight, and soil and groundwater remediation.

### **Avalon on the Sound, New Rochelle, NY**

For Avalon Bay Communities, Ms. Lapin is managing the investigations and remediation of two phases of this residential development, including two luxury residential towers and an associated parking garage. Remediation of the first phase of development (the first residential tower and the parking garage) included gasoline contamination from a former taxi facility, fuel oil contamination from multiple residential underground storage tanks, and chemical contamination from former on-site manufacturing facilities. The remediation and closure of the tank spills was coordinated with the New York State Department of Environmental Conservation (NYSDEC). The



## **MICHELLE LAPIN, P.E.**

**SENIOR VICE PRESIDENT**

| p. 5

initial investigation of the Phase II development—an additional high-rise luxury residential building—detected petroleum contamination. A second investigation was conducted to delineate the extent of the contamination and estimate the costs for remediation. The remediation will be conducted in conjunction with the development plan.

### **Mill Basin, Gerritsen Inlet, and Paerdegat Basin Bridges, Final Design, Shore Parkway, Brooklyn, NY**

Following the preparation of the GEIS for the Belt Parkway Bridges Project, the firm was retained for supplemental work during the final design phase of the project. This included NEPA and SEQRA documentation for three of the bridges—Mill Basin, Gerritsen Inlet, and Paerdegat Basin—which will be federally funded. Ms. Lapin managed the contaminated materials investigation that included a detailed subsurface contaminated materials assessment, both subaqueous and along the upland approaches.

### **NYSDOT Transportation Management Center (TMC), Hawthorne, NY**

AKRF conducted environmental studies for the NYSDOT at the current troopers' headquarters in Hawthorne, NY. The property is the proposed site of a new Transportation Management Center. AKRF completed a comprehensive asbestos survey of the on-site building and prepared asbestos abatement specifications; performed a Phase I site assessment; conducted an electromagnetic (EM) survey that located two fuel oil underground storage tanks, and developed removal specifications for the two underground storage tanks and an aboveground storage tank.

### **Metro-North Railroad Poughkeepsie Intermodal Station/Parking Improvement Project, Poughkeepsie, NY**

Ms. Lapin served as project manager of the hazardous materials investigation in connection with AKRF's provision of planning and environmental services for parking improvement projects at this station along the Hudson Line. The project included an approximately 600-space garage, additional surface parking, and an intermodal station to facilitate bus, taxi, and kiss-and-ride movements. Ms. Lapin conducted Phase I and II contaminated materials assessments and worked with the archaeologists to locate an historical roundhouse/turntable.

### **Metro-North Railroad Golden's Bridge Station Parking Project, Westchester County, New York**

For Metro-North Railroad, Ms. Lapin managed a Phase I Environmental Site Assessment of a property that has since become the new parking area, used by the existing Golden's Bridge train station. Ms. Lapin also conducted a subsurface (Phase II) investigation of the original parking area, track area, and existing platform for the potential impact of moving tracks in the siding area to extend the existing parking area and adding an access from a proposed overhead walkway (connecting the train station to the new parking area). The study also included an assessment for lead-based paint and asbestos on the platform structures.

## **RICHARD A. GARDINEER, P.E.**

### **TECHNICAL DIRECTOR**

Richard A. Gardineer, P.E., is a technical director who specializes in the assessment and remediation of hazardous and non-hazardous waste facilities. Phase I and Phase II Environmental Assessments, Brownfield site investigations/remediations, landfill closures, and waste classification/handling are Mr. Gardineer's primary areas of responsibility at AKRF. He conducts environmental assessments and investigations that include analyses of waste material, soil, groundwater, surface water, sub-surface soil gas, and indoor air. These investigations typically involve communication with federal, state, and city agencies, including the New York State Department of Conservation (NYSDEC), New York State Department of Health (NYSDOH), the U.S. Environmental Protection Agency (USEPA), the New York City Department of Environmental Protection (NYCDEP), and the New York City Department of Health (NYCDOH).

Prior to joining AKRF, Mr. Gardineer worked as a regulator in the three solid and hazardous waste management programs of NYSDEC for more than 25 years. Mr. Gardineer worked in Region 3 (Lower Hudson Valley) for 16 years as a program supervisor regulating landfills, construction and demolition debris disposal sites, and RCRA C hazardous waste facilities; he also investigated inactive hazardous waste disposal sites under the State Superfund. Mr. Gardineer then served as the Regional Remediation Engineer in the Region 2 New York City Office for 9 years. Mr. Gardineer managed the Environmental Remediation Program, which regulated the investigation and cleanup of hazardous waste, hazardous substances, and petroleum contaminated sites. During Mr. Gardineer's tenure in Region 2, five of the New York City's largest landfills were investigated and/or closed through the State Superfund Grant Program, the Brownfields Program (Voluntary Cleanup) was initiated in New York City, and numerous petroleum contaminated sites were investigated and cleaned up. Throughout his career, Mr. Gardineer has testified as a witness for New York State in a number of legal actions to close illegal landfills, to remediate hazardous waste sites, and to recover funds under the State Superfund.

### **BACKGROUND**

#### **Education**

Bachelor of Engineering in Civil Engineering, New York University, 1970

Master of Science in Civil Engineering, New York University, 1973

#### **Professional Certifications**

Professional Engineer, licensed in New York State

#### **Years of Experience**

Year started in company: 2005

Year started in industry: 1977

### **RELEVANT EXPERIENCE**

#### **Closure of New York City Landfills Under EQBA, Various Locations, NY**

Mr. Gardineer and his staff regulated the closure of the Brookfield Avenue, Edgemere, and Pelham Bay Landfills under the Environmental Quality Bond Act of 1986. Activities for each of these inactive hazardous waste landfills included the negotiation/monitoring of the State Assistance Contract, the review/ approval of the Remedial



## **RICHARD A. GARDINEER, P.E.**

**SENIOR ENGINEER**

| p. 2

Investigation Work Plan and Report, the review/approval of the proposed remedy, the preparation of the Proposed Remedial Action Work Plan and the Record of Decision, the preparation of Fact Sheets, the review/approval of the Remedial contract., the review/approval of the Operation and Maintenance Plan, and the participation at public meetings involving the landfill.

### **New York City School Construction Authority (SCA), Long Island City, NY**

Mr. Gardineer's primary duty as a consultant to the SCA was to determine the suitability of potential sites for use as public schools. His activities included reviewing/revising Phase I Environmental Site Assessments, proposed Phase II Scopes of Work, Phase II Environmental Site Assessments, Brownfields Remedial Investigative Work Plans, Indoor Air Quality Studies, remedial contract specifications, and waste disposal plans. Consultation was provided to the SCA regarding specific measures necessary to make each site suitable for use as a school.

### **Brownfields Program (Voluntary Cleanup), Various Locations, NY**

Mr. Gardineer and his staff reviewed plans to clean up and reuse numerous sites in New York City under the Voluntary Cleanup Program. Notable sites included St. George Ballpark in Staten Island (NY Yankee Class A team), the Pfizer Pharmaceutical site in Brooklyn, Queens West Development, Home Depot in Rego Park, Queens, Outlet City in Queens, Sports Authority in Queens, Nassau Metals on Staten Island, and Visy Paper in Staten Island. Mr. Gardineer made a presentation on the Visy Paper site at the Brownfields 2000 Conference in Atlantic City. Activities included the negotiation of the BCP agreement, the review/approval of the Remedial Investigation Work Plan and report, the review/approval of the Remedial Action plan, the review and issuance of Fact Sheets, the recommendation of institutional controls, the review/approval of the Operation and Maintenance Plan, and participation in public meetings.

### **Inactive Hazardous Waste Disposal Sites (State Superfund Program), Various Locations, NY**

Mr. Gardineer supervised the investigation and cleanup of inactive hazardous waste (Superfund) sites in New York City. Activities included supervising and/or participating in environmental sampling efforts at suspected sites, negotiation of Consent Orders, scoping and review of Phase I and Phase II Site Investigations, negotiation and review of Remedial Investigations and Feasibility Studies, preparation of Proposed Remedial Action Plans (PRAPs) and Records of Decision, preparation of Fact Sheets, communications with public officials and participation at public meetings. Notable sites handled in this program included Amtrak Sunnyside yard in Queens, Phelps Dodge in Queens, Arden Woods in Staten Island, Princes Bay in Staten Island, Standard Motor Products in Queens, and the Arthur Kill Generating Station in Staten Island.

### **Landfill Closure Region 3, Various Locations, NY**

Mr. Gardineer managed staff activities leading to the orderly closure of non-complying landfills, construction and demolition debris disposal sites, and other solid waste management facilities in the Lower Hudson Valley (NYSDEC Region 3). Activities included landfill inspections, taking environmental samples (leachate, groundwater, and soil gas), negotiating Consent Orders, and review of closure plans. Mr. Gardineer participated in negotiations with Towns in Dutchess and Ulster Counties to allow for the orderly closure of non-complying landfills in concert with the implementation of the each County's Solid Waste Management Plans. Notable landfills closed during Mr. Gardineer's tenure in Region 3 included landfills operated by the Towns of Clarkstown, Ramapo, and Haverstraw in Rockland County, the Orange County Landfill, and portions of the Al Turi Landfill in Orange County.

### **Construction and Demolition Debris Disposal Sites, Various Locations, NY**

Mr. Gardineer supervised staff in the investigation and closure of numerous non-complying construction and demolition debris disposal sites in the Lower Hudson Valley. Activities included site inspections, the taking of environmental samples (waste material, leachate, groundwater, soil gas), participation in enforcement action, review of closure plans, and supervision of landfill capping.



## **RICHARD A. GARDINEER, P.E.**

**SENIOR ENGINEER**

| p. 3

### **Solid Waste Management Plans**

Mr. Gardineer supervised staff and participated in activities involving the review/approval of Solid Waste Management Plans submitted by six of the seven counties in Region 3. Activities included pre-submission meetings with the counties, scoping the plans, review/approval of the plans, and participation at public meetings.

### **Part 360 Solid Waste Management Applications**

Mr. Gardineer supervised staff and participated in activities involving sanitary landfills, ashfills, construction and demolition debris landfills, resource recovery facilities, transfer stations and composting facility applications for sites in the Lower Hudson River Valley. Mr. Gardineer supervised his staff in the technical review of the applications, participation at permit hearings, preparation of permit conditions, and review of construction certification. Mr. Gardineer has expertise in NYCRR Part 360 (Solid Waste Management Facilities), Part 617 (State Environmental Quality Review Act), and Part 621 (Uniform procedures Act). Notable projects included the Al Turi Landfill, the Orange County Landfill, the Ramapo Landfill, the Westchester County (Sprout Brook) Ashfill (expansion), the Westchester County material Recovery Facility, and the Dutchess County Resource Recovery Facility.

### **Expert Witness**

Mr. Gardineer testified as an expert and fact witness at NYSDEC permit and enforcement hearings, civil litigation in State and Federal Court, Superfund cost recovery cases, and criminal trials. Notable civil litigation cases included the *State of New York v. Town of Ramapo*, *State of New York v. Dow Chemical*, *State of New York v. Frank Sacco* (Tuxedo C+D site), *State of New York v. Thomas Prisco*, and the *State of New York v. Town of Haverstraw*.

## **FREDA PONCE**

### **GEOLOGIST**

Freda Ponce is a geologist with 2 years experience working in environmental consulting. Her current work at AKRF Inc. involves Phase I and Phase II environmental site assessments (ESA). Her Phase II technical expertise involves; soil and groundwater contamination delineation via soil borings and groundwater monitoring, installation and development of groundwater monitoring wells, hazardous soil removal and disposal, soil gas surveys and sampling, and low-flow groundwater sampling. Her hydrogeologic experience includes 72 hour permeability pump tests, and modeling of groundwater contamination plumes using the GMS 4.0 groundwater modeling program. She is also proficient in the use of ArcView GIS to map and model various environmental field data.

Prior to joining AKRF, Ms. Ponce worked for a Hydrogeological consulting firm in Millburn, New Jersey as junior geologist.

### **BACKGROUND**

#### **Education**

B.S., Geology, City College of New York 2001

#### **Certifications**

40 Hour Hazardous Waste Operations Site Worker 2001

New York State-Licensed Asbestos Inspector 2004

NYC Department of Buildings Inspector License 2004

#### **Years of Experience**

Year started in company: 2004

Year started in industry: 2001

### **RELEVANT EXPERIENCE**

#### **Yankees Stadium Site, Phase II, Bronx, NY**

Ms. Ponce completed a Phase II subsurface investigation for this property currently in the CEQR process to allow for redevelopment of the site. Ms. Ponce's work included; a geophysical survey, advancement of soil borings installation of groundwater monitoring wells, analysis of analytical laboratory data, and preparation of a subsurface investigation report.

#### **Avalon Phase II, New Rochelle, NY**

Ms. Ponce completed a Phase II subsurface investigation for this property to allow for redevelopment of the site. Ms. Ponce's work included; advancement of soil borings, installation of groundwater monitoring wells, analysis of analytical laboratory data, and preparation of a subsurface investigation report. Ms. Ponce was also involved with the oversight of sub-contractors during excavation of contaminated soil at the subject site.

#### **West 61<sup>st</sup> Phase II, New York, NY**

Ms. Ponce completed a Phase II subsurface investigation for this property currently in the Brownfields cleanup program to allow for redevelopment of the site. Ms. Ponce's work included; a geophysical survey, installation and sampling of soil borings and groundwater monitoring wells, installation and sampling of soil gas wells, analysis of





## **FREDA PONCE,**

**GEOLOGIST**

| p. 2

analytical laboratory data, and preparation of a subsurface investigation report for submission to applicable regulatory agencies.

### **325-329 West Broadway, New York, NY**

Ms. Ponce conducted a Phase I Environmental Site Assessment in accordance with ASTM E-1527-00 related to the redevelopment of this site. Ms. Ponce coordinated with clients, property owners, and tenants to conduct the site inspection, historical research, regulatory records review, and prepare the Phase I report. Ms. Ponce also completed a Phase II subsurface investigation for this property which included; advancement of soil borings, sampling of groundwater, analysis of analytical laboratory data, and preparation of a subsurface investigation report.

### **CE Flushing Site, Flushing, NY**

Ms. Ponce is serving on a team conducting a Phase II investigation of a large PCB-contaminated former utility property in Flushing, Queens. She has completed field work for several soil boring installations in the contaminant delineation phase of the project.

### **Queens West, Long Island City, NY**

Ms. Ponce conducted field work for a supplemental remedial investigation at this former Blau Gas manufacturing facility on a portion of the Queens West Development site in Long Island City. The work is being conducted as part of a Voluntary Cleanup Agreement with the NYSDEC. Field work activities have included soil borings, and monitoring well sampling. Ms. Ponce also prepared a Supplemental Remedial Investigation Workplan, Health and Safety Plan, and Quality Assurance Protection Plan for further field activities related to be conducted at the project site.

### **201-205 Saw Mill River Road, Millwood, NY**

Ms. Ponce completed a Phase II subsurface investigation for this property to allow for commercial redevelopment of the site. Ms. Ponce's work included the advancement of soil borings, sampling of monitoring wells, analysis of analytical laboratory data, and preparation of a subsurface investigation report.

### **Zerega Avenue EAS, Bronx, NY**

Ms. Ponce completed a subsurface investigation for this property under NYCDEP guidance, to allow for commercial redevelopment of the site. Ms. Ponce's work included the installation and sampling of soil borings, excavation of test pits, installation and sampling of temporary groundwater monitoring wells, soil gas sampling, analysis of field data and laboratory analytical data, and preparation of a subsurface investigation report.

### **Columbia University Manhattanville Development, New York, NY**

As part of the New York City CEQR process, Ms. Ponce conducted a Phase I Environmental Site Assessment in accordance with ASTM E-1527-00 related to the development of approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside location. Ms. Ponce coordinated with clients, property owners, and tenants to conduct the site inspection, historical research, regulatory records review, and prepare the Phase I report.

### **27-06 43<sup>Rd</sup> Avenue, Long Island City, NY**

As part of the New York City CEQR process, Ms. Ponce conducted a Phase I Environmental Site Assessment in accordance with ASTM E-1527-00 related to the development of an e-designated site located in Long Island City,





## **FREDA PONCE,**

**GEOLOGIST**

| p. 3

New York. Ms. Ponce coordinated with clients, property owners, and tenants to conduct the site inspection, historical research, regulatory records review, and prepare the Phase I report.

### **312 Warburton Avenue, Yonkers, NY**

Ms. Ponce conducted a Phase I Environmental Site Assessment in accordance with ASTM E-1527-00 related to the redevelopment of a site located in along the Yonkers, New York. Ms. Ponce coordinated with clients, property owners, and tenants to conduct the site inspection, historical research, regulatory records review, and prepare the Phase I report.

### **K. Hovnanian's Four Seasons at Hamptonburgh, Town of Hamptonburgh, NY**

Ms. Ponce assisted in writing a groundwater resources chapter as well as a soils, geology, and topography chapter as part of a Draft Environmental Impact Statement (DEIS) for a residential development in the Town of Hamptonburgh, New York. The EIS was conducted in accordance with the State Environmental Quality Review Act and was currently submitted for review by the Town of Hamptonburgh.

## ANDREW D. RUDKO, Ph.D.

### SENIOR VICE PRESIDENT

Andrew D. Rudko, Ph.D., is a senior vice president of AKRF, with more than 25 years of experience in environmental analysis and management, with particular emphasis on hazardous materials, environmental site assessments and audits, and soil and groundwater remediation. Dr. Rudko's current and recent experience includes management of several projects involving Voluntary Cleanup Agreements and Brownfields Cleanup Agreements for assessment and remediation of soil and groundwater contamination problems on major development sites. These include the Queens West Development site, a New York State-sponsored development which extends for three quarters of a mile along the East River waterfront in Queens, New York. The site, which formerly contained an oil refinery, gas plant, paint and varnish factories, and railroad yards, is being redeveloped for residential and commercial uses. Dr. Rudko is also managing the assessment of soil and groundwater on the site of Brooklyn Bridge Park, which is being developed on a stretch of Brooklyn waterfront with a long history of industrial uses.

Dr. Rudko has managed cleanups of many **petroleum and solvent spills**. He is managing ongoing remediation work for chlorinated solvent releases to the groundwater for sites in Harlem, Rego Park, and Springfield Gardens. Some recent spill cleanup sites include a former gasoline station in Downtown Brooklyn, a portion of the Fordham University campus in the Bronx, the Tribeca Hotel site developed by Hartz Mountain Industries in Lower Manhattan, retail sites in Maspeth and Long Island City developed by Forest City Ratner Companies, a site in the Bronx developed by Triangle Equities for the Department of Motor Vehicles, the Rivergate Apartments on East 34th Street in Manhattan, the Tate apartment building on West 23<sup>rd</sup> Street in Manhattan, and a residential development on Sixth Avenue and 26<sup>th</sup> Street in Manhattan.

He has been responsible for assessing **impacts on public health** for a number of projects involving the use of hazardous chemicals, biohazards, and radioactive materials. These projects include an engineering and physics research center on the campus of Columbia University, a new laboratory building for biomedical research at Rockefeller University, a new research center for Memorial Sloan Kettering Medical Center and the Audubon Research Park in upper Manhattan.

Dr. Rudko has managed a number of site assessments for New York City Department of Environmental Protection sewer improvement projects. These include the installation of new sewers in the Meadowmere and Warnerville sections of southeastern Queens, the Avenue V Pump Station and associated force mains in Brooklyn, new facilities at the 26<sup>th</sup> Ward wastewater treatment plant in Brooklyn, and combined sewer outfall abatement projects in Queens and Staten Island.

Dr. Rudko was project director for the site assessment work the firm performed for the New York City School Construction Authority, directing assessments on school sites in the Bronx, Brooklyn, and Queens. Sites included a former gas station, a truck salvage yard, and a former plastics factory. Testing programs were recommended, developed, and implemented for these sites, and remedial actions were recommended where necessary. At the former plastics factory site, the testing program included soil and groundwater sampling, testing of building floors for PCB contamination, and location and removal of old underground gasoline and oil tanks, with screening of surrounding soil for possible petroleum contamination.

### BACKGROUND

#### Education

B.S., Biochemistry, Cornell University, 1965

Ph.D., Biochemistry, Columbia University, 1972



# **ANREW RUDKO, PhD.**

**SENIOR VICE PRESIDENT**

| p. 2

## **Years experience**

With this firm: 21

With other firms: 6

## **RELEVANT EXPERIENCE**

### **Gowanus Canal Clean-Up, Brooklyn, NY**

Dr. Rudko managed the investigation and remedial design of a former manufactured gas plant site on the Gowanus Canal in Brooklyn. The subsurface remains of three large gasholders filled with coal tar-contaminated soil and debris were cleaned up prior to development of the property.

### **Queens West Development Project, Queens, NY**

Dr. Rudko directed the site assessment work on the 90-acre site of the proposed Queens West development project being sponsored by the Empire State Development Corporation, the New York City Public Development Corporation, and the Port Authority of New York and New Jersey. This site comprises more than 10 blocks of industrial property along the East River in Queens. Former uses on the site include oil refineries, paint manufacturers, and railyards. AKRF developed and implemented extensive soil and groundwater testing programs, and developed remediation plans which have been incorporated into four separate Voluntary Cleanup Agreements.

### **Brooklyn Bridge Park, Brooklyn, NY**

Dr. Rudko is responsible for the site assessment work being performed on this waterfront site which is being developed as a park by New York State and New York City. The site, which stretches from Brooklyn Heights under the Brooklyn Bridge to the Manhattan Bridge, has a long history of industrial uses.

### **Shea Stadium Redevelopment, Flushing, NY**

Dr. Rudko is directing the site assessment work being performed on the proposed site of a new stadium adjacent to the existing Shea Stadium in Flushing, Queens. The area was formerly used as a landfill for the disposal of ash and other wastes. Dr. Rudko previously directed the soil and groundwater testing on the site of the adjacent National Tennis Center.

### **Home Depot, New Rochelle, NY**

Dr. Rudko directed the assessment and remediation work on a 14-acre parcel in New Rochelle, New York that was being developed by Home Depot USA. After extensive review and discussions with the New York State Department of Environmental Conservation (DEC), a remediation agreement was developed and approved that became the model for New York State's Voluntary Cleanup Program. AKRF supervised the implementation of the remediation measures, which included removal of underground storage tanks and associated contaminated soil, and construction of an impermeable cap with a gas venting system for areas with lead contamination.

### **Home Depot, Rego Park, NY**

On another retail site, serious solvent contamination was unexpectedly encountered on a property being developed in Queens, New York. Dr. Rudko managed the design and execution of a testing program, planned a remediation program that would permit development of the site, and assisted in the negotiation of a Voluntary Cleanup Agreement with DEC. Development of the property is now continuing while a groundwater remediation system designed by AKRF's Engineering division is installed as part of the building construction.



## **ANREW RUDKO, PHD.**

**SENIOR VICE PRESIDENT**

| p. 3

### **18-30 Whitestone Expressway Clean-Up, College Point, NY**

Dr. Rudko directed a Voluntary Clean-Up involving the delineation and removal of PCB-contaminated soil from a site in College Point. DEC issued a release letter following the successful completion of this project.

### **Laundry/Dry Cleaning Plant, New York, NY**

Dr. Rudko has been managing the assessment and cleanup of the only listed hazardous waste site in Manhattan, a former laundry/dry cleaning plant on Fifth Avenue in Harlem. Remediation has included the removal of contaminated building materials and operation of an innovative sub-slab vapor extraction system. Installation of this system required the development of special techniques for horizontal drilling under the floor of the building.

### **Jamaica Water Company, Queens, NY**

For the New York City Department of Environmental Protection, Dr. Rudko directed fast-track site assessments of 17 properties acquired from the Jamaica Water Company. The assessments, all of which were completed within 2 months, included soil and groundwater testing, asbestos and lead paint surveys, and testing of buildings for mercury contamination.

### **Columbia University Properties, New York, NY**

Dr. Rudko has directed site assessments on many properties being acquired by Columbia University. He managed Phase I, Phase II and remediation work on an old garage at a location on Broadway where Columbia developed a new dormitory. He has managed Phase I site assessments on over twenty properties in the area of Manhattanville where the University is developing a new campus.

### **Home Depot, Various Locations, NY**

Dr. Rudko has been providing environmental consulting services to Home Depot, Inc. in connection with their development of major retail facilities at locations throughout the New York metropolitan area. Many of these locations are former industrial properties that have required remedial actions prior to redevelopment.

### **New York Times, New York, NY**

He directed Phase I and Phase II assessments for the New York Times in preparation for the development of its major new printing facility in New York City. Assessments were prepared for three alternative sites: a former railyard in the Bronx later used as an illegal landfill for demolition debris; a site in Queens comprising six industrial properties, several with multiple tenants; and a large city-owned site in Queens.

## **Medical Facilities**

### **Medical Care Facilities Finance Agency (MCFFA), New York, NY**

Dr. Rudko directed Phase I environmental assessments of several major medical facilities in connection with new financing through bonds issued by MCFFA. Facilities include Presbyterian Hospital, Mt. Sinai Medical Center, St. Lukes/Roosevelt Hospital Center, Brooklyn Hospital, and Syosset Hospital. The firm performed preliminary investigations, including Phase I site assessments, and Phase II assessments if necessary. The firm identified potential environmental liabilities and suggested remediation. For example, for the New York Presbyterian Hospital, AKRF identified several underground tanks remaining on the site, then designed and implemented a remediation plan. For the Syosset Hospital on Long Island, AKRF identified floor drains in basement areas that discharged into old dry wells as a potential environmental liability.

### **Audubon Research Park, New York, NY**

Dr. Rudko directed the hazardous materials assessment for the EIS for a 5.5-acre development that includes the Mary Woodard Lasker Biomedical Research Building, which houses the Audubon Business and Technology Center, and the Russ Berrie Medical Science Pavilion. The Berrie Pavilion houses a community health facility, a



## **ANREW RUDKO, PHD.**

**SENIOR VICE PRESIDENT**

| p. 4

comprehensive diabetes center, genetics research and a research program in pediatrics. The Irving Center will house research on cancer, genetics, and cell biology. Dr. Rudko led the analysis of medical waste disposal procedures and potential health concerns associated with chemicals used in the proposed research laboratories.

### **Memorial Sloan-Kettering Cancer Center (MSKCC), New York, NY**

AKRF prepared a comprehensive EIS for the expansion of MSKCC, a state-of-the-art cancer treatment and research center located on the Upper East Side in Manhattan. Dr. Rudko directed the hazardous materials study, which included analyses of radioactive and toxic materials used in the cancer research and treatment facility

### **Mount Sinai School of Medicine, New York, NY**

Dr. Rudko directed a hazardous materials assessment in connection with the EIS for a multi-use building for the Mount Sinai School of Medicine. The site, formerly used for parking, is on the east side of Madison Avenue between 98th and 99th Streets opposite the main portion of the Mount Sinai Medical Center. The 740,000-gross-square-foot structure will contain research labs, clinical labs, psychiatric care beds, administrative offices, an auditorium, a seminar room, a cafeteria, faculty offices, a vivarium, and approximately 300 accessory parking spaces.

### **Columbia University Center for Engineering and Physical Science Research, New York, NY**

Dr. Rudko directed the preparation of an EIS for Columbia University's Center for Engineering and Physical Science Research, located on the south side of 120th Street in Manhattan. The project serves as a center for university, government, and industry partnership in high-technology research. The approximately 200,000-square-foot building contains an auditorium, seminar rooms, laboratories, and offices for research activities in four general areas: telecommunications, microelectronics and electronic materials, intelligent systems and robotics, and parallel and distributed computer systems. In addition, a new central boiler facility and power plant for the campus are located in the lower level of the new building.

### **Rockefeller University, New York, NY**

Dr. Rudko led the analysis of hazardous materials for an Environmental Assessment Statement (EAS) and supplemental studies in connection with a new laboratory building. The proposed building would include approximately chemistry and biomedical research laboratories, an auditorium, office and meeting space, underground parking for approximately 180 cars, a glass wash facility, and truck loading and receiving space. Significant issues for environmental review included hazardous materials and air quality, including the potential effects of a spill within a laboratory on pollutant levels at adjacent buildings and receptor locations.

**APPENDIX D**  
**SOIL SAMPLING PLAN**

# **West 61<sup>st</sup> Street Site Remedial Work Plan**

**BCP ID 231043**

**NEW YORK, NEW YORK**

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## **Sampling Plan**

**AKRF Project Number: 10321**

### **Prepared for:**

Algin Management Company, LLC  
64-35 Yellowstone Boulevard  
Forest Hills, New York 11375

### **Prepared by:**



**AKRF, Inc.**  
440 Park Avenue South, 7<sup>th</sup> Floor  
New York, NY 10016  
212-696-0670

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**MARCH 2006**

**TABLE OF CONTENTS**

1.0	INTRODUCTION .....	1
2.0	SOIL REUSE AND DISPOSAL .....	1
3.0	SOIL SAMPLING .....	2
3.1	Locations and Methodology .....	3
3.1.1	Waste Classification Sampling.....	3
3.1.2	Endpoint Sampling.....	3
3.1.3	Petroleum Delineation Sampling .....	4
3.2	Analytical .....	5
3.2.1	Waste Classification Sampling.....	5
3.2.2	Endpoint Sampling.....	6
3.2.3	Petroleum Delineation Sampling .....	6
4.0	STANDARD OPERATING PROCEDURES .....	6
4.1	Soil Sample Collection .....	6
4.2	Groundwater Monitoring Well Installation and Development.....	7
4.3	Monitoring Well Sampling.....	7
4.4	Air Sampling .....	7
4.5	Decontamination of Sampling Equipment.....	7
4.6	Field Instrumentation.....	8
4.7	Management of Investigation Derived Waste .....	8
4.8	Surveying and Water Table Measurement Readings.....	8
5.0	QUALITY CONTROL AND LABORATORY PROCEDURES .....	8

**TABLES**

Table 1A	Sample Grid Dimensions and Volumes
Table 1B	Sampling Grids and Sub-Grids
Table 2	Endpoint Sampling Grid Coordinates, Elevations, and Depths
Table 3A	Sampling and Analytical Program
Table 3B	Sampling and Analytical Program – Petroleum Delineation
Table 4A	NJDEP Laboratory Analytical Methods and Requirements
Table 4B	NYSDEC Laboratory Analytical Methods and Requirements for Endpoint Samples

**FIGURE**

Figure 1	Sampling Grid
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**APPENDICES**

Appendix A	STL New Jersey Department of Environmental Protection Laboratory Certification
Appendix B	Beneficial Use Facilities Testing Protocol
Appendix C	Treatment and Disposal Facilities Testing Protocol



## **1.0 INTRODUCTION**

This Sampling Plan (SP) describes the procedures that will be followed to collect environmental samples at the Site during the pre-remediation and post-remediation activities. The media to be sampled is primarily soil, but may be expanded to groundwater, soil vapor, and the outdoor air. The waste characterization samples will consist of fill material, native soil, and construction and demolition debris (in Lot 8). Horizontal and vertical endpoint samples will be collected at the anticipated limit of the projected construction excavation. Delineation samples will be collected to determine the horizontal and vertical extent of the petroleum contamination along West 60<sup>th</sup> Street. Soil vapor samples may be requested by the New York State Department of Health (NYSDOH) to gain additional soil vapor information in areas where the building foundation is not submerged. Downwind outdoor air samples during excavation will be required by the NYSDOH to verify that vapors and particulates are not affecting downwind off-site locations during excavation activities. All sampling activities and procedures will comply with the requirements in the Remedial Work Plan (RWP), Remedial Health and Safety Plan (RHASP) and the Quality Assurance Project Plan (QAPP) (Appendix C).

The SP has been prepared under the premise that all excavated waste will be loaded directly onto the hauling vehicles and removed immediately from the Site without being stockpiled, and that any significant amount of unacceptable material beneath or at the vertical limits of construction is identified before excavation commences. The classification of the material to be excavated will be accomplished through the collection of separate composite samples of the fill material and native soil at each sample location. In addition, petroleum-contaminated soil is present at and beneath the groundwater level along the southern portion of the Site, and construction and demolition debris is present in Lot 8. The pre-remediation endpoint samples will be collected within six inches to one foot below the anticipated elevation of the vertical limit of construction excavation. The SP also includes borings in the southern portion of the Site (Lots 5, 8, 11, and 13 along West 60<sup>th</sup> Street), for the purpose of delineating the extent of suspected petroleum contamination. This suspected contamination is based on the information ascertained from the analysis of samples collected from boring B-17, and groundwater monitoring wells MW-6, MW-7, MW-7D, and MW-8. This SP will also include provisions for any additional post-excavation samples needed to demonstrate the removal of the on-site contaminants after excavation has been completed.

## **2.0 SOIL REUSE AND DISPOSAL**

The on-site fill material, native soil, construction and demolition debris in Lot 8, and petroleum-contaminated material will be transported to facilities located in New Jersey and Pennsylvania. The fill material and native soil that meets the chemical and geotechnical criteria for beneficial reuse will be transported to either the ENCAP-Meadowlands Redevelopment Site in Lyndhurst and Rutherford New Jersey or the Former Allied Signal Site in Elizabeth, New Jersey. Material that does not meet the criteria for acceptance for beneficial reuse will be transported to one or more of the following facilities: Soil Safe in Logan, New Jersey; Clean Earth of Philadelphia, Pennsylvania; and/or Clean Earth of Carteret, Inc., of Carteret, New Jersey. The Sampling Plan (SP) will provide specific chemical and geotechnical analyses that will determine which portions of the various types of on-site materials – fill material, native soil, construction and demolition debris, and petroleum-contaminated material – can be accepted at the beneficial use facilities, and which materials and locations must be transported to the treatment and/or disposal facilities. Based on the results of the Remedial Investigation (RI) soil sampling activities, some areas have been determined to be unacceptable for reuse due to elevated lead, polycyclic aromatic hydrocarbon (PAH) concentrations, or petroleum-contamination. The testing in these areas will follow the disposal criteria. The Sampling Program will use a grid (Figure 1) to calculate soil volumes and areas.

### 3.0 SOIL SAMPLING

To meet the testing requirements of the New Jersey and Pennsylvania facilities for in-situ Site testing and the New York State Department of Environmental Conservation (NYSDEC) pre-excavation endpoint sampling coverage, the Site has been divided into a sampling grid containing 32 boxes, shown on Figure 1. The average area of each grid, excluding grid numbers 21 and 22 located in the northeastern portion of the Site, is 1,750 square feet (average dimensions 42 feet by 42 feet). The dimensions of each grid are slightly different and are shown on Table 1. Grid numbers 21 and 22 each have a larger area (2,500 square feet each) and will be handled differently. The depth of the excavation in grid number 21 will remove almost all of the fill material above the bedrock and grid number 22 endpoint samples will be taken after removal of the fill material. The average volume for each grid is approximately 1,000 cubic yards (cy) per 15-foot depth, or 500 cy per 7.5-foot depth. This volume-to-depth relationship will be utilized in meeting the sampling requirement of the facility receiving the waste material. The volume versus depth relationship for each grid is shown on Table 1.

The testing requirements for the beneficial reuse facilities are different from those for the treatment and disposal facilities. Generally, the beneficial reuse facilities require analysis of Priority Pollutants + 40 (additional parameters). The ENCAP facility also requires a Toxicity Characteristic Leaching Procedure (TCLP) test with analysis for the complete list of parameters listed in 40 CFR Part 261.24. The frequency of testing (cy per test) is based on the known Site information and the presence of Areas of Concern (AOCs). Geotechnical analysis, consisting of sieve, modified proctor, and total organic content, may be required. Testing for treatment and disposal includes volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), total organic halogens (TOX), total sulfur, ignitibility, corrosivity, reactivity for sulfide and cyanide, and TCLP – metals and VOCs.

A major consideration for disposal is the presence of petroleum in the soil. The information ascertained from the soil sample collected at boring B-17 and the groundwater samples collected from monitoring wells MW-6, MW-7, and MW-7D indicate the potential presence of petroleum from the southeastern corner of the Site. This sampling program includes advancing borings in the southern portion of Lots 5, 8, 11, 12, and 13, along West 60<sup>th</sup> Street. These borings and the collected samples will verify the presence and, if found, locate the horizontal and vertical extent of the petroleum contamination in this area. Soil samples collected will be analyzed for VOCs by Environmental Protection Agency (EPA) Method 8260, using the New Jersey Department of Environmental Protection (NJDEP) procedures and analysis at a laboratory certified by both the New York State Department of Health (NYSDOH) and the NJDEP.

Initial endpoint samples will be taken in each of the grids at a projected elevation of the lower limit of excavation. The sample will be collected at approximately elevation 14.0 in the areas of Buildings A, B, and C. The endpoint sample will be collected at elevation 30.0 in locations where the cellar juts outside of the sub-cellar foundation. The sample will be collected at two feet below the finished grade elevation (approximately elevation 40.0) in the courtyard areas. The samples will be collected six inches to one foot beneath elevation 54.0 in grid numbers 22 and 25 in the Eastern Area. Samples 23 and 24 will be collected six inches to one foot below the anticipated excavation for the exhaust system (elevation 39.6). Additional endpoint samples will be collected at the completion of construction excavation: at locations where pre-construction samples contain contaminants above cleanup standards and additional excavation has occurred; along sidewalls exposed from soil excavation around the perimeter of the Site; at locations where petroleum-contaminated soil has been removed; and at other locations selected by the New York State Department of Environmental Conservation (NYSDEC) to achieve desired aerial coverage.

A hollow-stem auger (HSA) will be used to collect the samples due to the nature of the fill material and the presence of construction and demolition debris. A split-spoon sampler will be advanced continually throughout the depth of the boring. Samples of the fill material and native soil will be collected separately. The endpoint sample will be collected at the depth of the anticipated completion of excavation. Each depth is based on the surface elevation and the anticipated excavation elevation. All

borings will be surveyed. Coordinates and elevations will be calculated as shown in Table 2. Each type of sample to be collected at each location is shown on Tables 3A and 3B. Table 4 includes the types of analyses, bottles, preservatives and holding times for each parameter.

### **3.1 Locations and Methodology**

#### **3.1.1 Waste Classification Sampling**

The overburden material consists of a layer with average thickness of approximately 16 feet of fill material on top of 10 to 20 feet of native soil. The uppermost layer is construction and demolition debris on top of fill material on top of native soil in Lot 8. The fill material consists of brick, gravel, concrete, wood, glass, ash, and slag. The native soil is sand and silt with some gravel. The fill material and native soil will be sampled separately, based on the sampling frequency and method of the selected New Jersey or Pennsylvania facility. Composite samples will be collected of each material (e.g., fill, native soil, soil within the construction and demolition debris, petroleum-contaminated soil) based on the minimum tests per volume. Continuous split-spoon samples will be collected, placed in separate bags, and labeled throughout the fill. Based on the minimum tests per volume, the bags comprising each sample volume will be composited when the maximum depth of the sample is reached. Volatile organic compound (VOC) samples will be collected at the mid-level depth of the grid sample thickness. For example, if the maximum allowable sample volume is 1,000 cubic yards (cy), the sample depth is 15.5 feet. Eight split-spoon samples will be collected and used for the composite sample. The VOC sample will be collected from the split-spoon sample taken at a depth of 7.25 feet below the surface.

Composite samples of the bags will be created by pouring each bag onto a plastic sheet, one at a time. Each successive sample will be poured directly on top of the preceding sample, forming a cone. One-quarter of the pile (as if slicing a pie) will be separated from the pile. The sample will be collected from the separated material. This procedure will be followed through all of the layers encountered to the anticipated limit of construction excavation. If the material collected indicates a change in soil type (e.g., fill to native soil, construction and demolition debris to fill or native soil, clean material to contaminated material), the change will be noted in the boring log. Samples of mixed material will be used only if the material is going to the same disposal facility and can be comingled. All soil samples will be characterized according to the Modified Burmeister soil classification system, and screened for VOCs using a Thermo 580B Organic Vapor Meter (OVM) equipped with a photoionization detector (PID) or equivalent instrument. Sampling protocol will be consistent with the Quality Assurance Project Plan. (QAPP), contained in RWP Appendix C.

#### **3.1.2 Endpoint Sampling**

Pre-excavation endpoint sampling will occur twice during the Site remediation process. Endpoint samples will be collected before remediation commences and after completion of the excavation and removal of the on-site materials. The pre-remediation samples will be collected during the collection of the waste classification samples, using the same bore holes. To accomplish this, True North Surveyors, Inc., will establish vertical and horizontal controls for each grid sampling point before the sampling. Waste classification composite and grab samples will be collected at each location, consistent with Section 3.1.1, to the elevation of the lower limit of construction excavation. At each sampling location, the depth to the composite sample will be calculated by subtracting the elevation of the lower limit of construction from the surface elevation. The lower limit of construction excavation is generally as follows: elevation 14.0 under the sub-cellar of

Buildings B and C, and the cellar of Building A; elevation 30.0 under the portion of the cellar in the areas of Buildings A and B, where the cellar juts outside of the sub-cellar foundation (see Figure 1); elevation 37.0 in the courtyard area; elevation 54.0 in the recreation area; and elevation 39.0 in the area of the ventilation system. Table 2 shows the collection depth calculations. At the desired elevation, the split-spoon sampler will be driven downward two feet and the sample will be collected from the upper half of the material in the split-spoon. Endpoint samples will not be collected via the advancement of borings in the areas of petroleum-contaminated soil.

Bedrock will be removed, primarily in the southeastern corner and center of the Site. In these areas, the endpoint sample will be collected from the native soil at the bedrock interface. If the sample meets cleanup standards, bedrock samples may be collected for disposal purposes, but endpoint samples will not be considered necessary. If the soil sample collected at the bedrock interface contains contaminants above cleanup guidelines, the bedrock will be characterized for waste disposal and endpoint samples will be collected from the exposed bedrock at the limit of construction excavation (e.g., elevation 14.0 for the sub-cellar and elevation 30.0 for the cellar).

Additional post-excavation (endpoint) samples will be collected from sidewalls and the bottom after completion of excavation. One sidewall sample will be collected per 2,500 square feet (50-foot centers), or as directed by the New York State Department of Environmental Conservation (NYSDEC). The bottom sampling points will supplement the pre-excavation samples and address any additional excavation required to remove any undesirable material at locations below the anticipated lower limit of excavation. Bottom samples and sidewall samples in areas of petroleum contamination will be collected consistent with the requirements of DER-10 (samples taken on 30-foot centers and one sample per 900 square feet). All soil samples will be characterized according to the Modified Burmeister soil classification system, and screened for volatile organic compounds (VOCs) using a Thermo 580B Organic Vapor Meter (OVM) equipped with a photoionization detector (PID) or equivalent instrument. Sampling protocol for all endpoint samples collected prior to and after excavation will be consistent with the Quality Assurance Project Plan (QAPP) contained in RWP Appendix C.

### **3.1.3 Petroleum Delineation Sampling**

An estimated additional 30 to 35 borings will be advanced in the southern portion of the Site on Lots 5, 8, 11, 12, and 13, along West 60<sup>th</sup> Street, to delineate the petroleum-contaminated soil. An estimated three samples will be collected from each boring to determine the vertical and horizontal extent of the contamination. The tentative boring locations are shown on Figure 1. Additional borings, if needed, will be advanced to further delineate the contamination and determine whether an on-site source is present.

The borings will be arranged in rows from south to north (perpendicular to West 60<sup>th</sup> Street). An estimated three to five borings will be advanced in each row. The first row is located approximately 15 feet west of the western property line of Lot 5. Each row of borings is 60 feet apart. After completing each row, the drill rig will move to the next row to the east. Boring 52A will be located as close to the southern property line as possible, inside the Site along the existing fence. The drilling sequence for each row will start at the fence (boring delineation "A") for each row, and then proceed to boring delineation "E," located 50 feet north of the fence. The remaining three borings ("B," "C," and "D") will then be advanced at locations determined by the results of the preceding boring.

At each row, the drill rig will start outside the plume at point A, situated next to the southern Site fence. The rig will then move to point E, located approximately 50 feet north of the fence. If point E is determined to be uncontaminated, the drill rig will move 15 feet south, towards point A, to a new location (point D). If petroleum contamination is not noted at this location (point D), the rig will move another 15 feet south to point C and drill one final time in the row. If petroleum contamination is detected in point D, the drill rig will move seven to eight feet north, towards point E, and drill one final boring for the row. If point E is identified to contain petroleum, the drill rig will move 20 to 25 feet north, and will drill again (point D). If petroleum is not identified in that boring (point D), the rig will move another ten to 15 feet south and advance one final boring (point C). If petroleum is identified in point D, the rig will move another 20 to 25 feet north and advance another boring (point C). If point C is clean, the rig will move approximately 12 feet south and advance one final boring (point B) for the row. If point C is determined to contain petroleum, the rig will move north and drill one final boring for the row.

Samples will be collected above the groundwater level, at the groundwater level, and below the contamination, if possible. The first sample will be collected in the fill material, approximately two to three feet above the water level. The second sample will be collected at or below the groundwater level. If the second sample does not appear to contain petroleum contamination, the boring will stop and no further samples will be collected. If the second sample appears to contain petroleum-contaminated soil, the boring will be advanced to non-petroleum-contaminated soil or bedrock and a third sample will be collected. The soil in the bottom of the split-spoon sampler will be used. All samples will be collected using an En Core® Sampler for volatile organic compounds (VOCs) and a 60-milliliter plastic bottle for percent solids. The locations and instructions are shown in Table 3A.

All soil samples will be characterized according to the Modified Burmeister soil classification system, and screened for VOCs using a Thermo 580B Organic Vapor Meter (OVM) or equivalent instrument equipped with a photoionization detector (PID). A boring log will be maintained for each boring, including the location (depth) of each sample and the apparent distance from the surface to the upper limit of the petroleum contamination. Endpoint samples will be collected after the removal of the petroleum-contaminated soil, consistent with Section 3.1.2.

## **3.2 Analytical**

### **3.2.1 Waste Classification Sampling**

The waste classification will be conducted in accordance with New Jersey Department of Environmental Protection (NJDEP) sampling protocols. Certification that the samples were collected in accordance with these protocols will be provided to NJDEP through the facilities receiving the various materials from the Site. Copies of all analytical reports and certification will be submitted to the New York State Department of Environmental Conservation (NYSDEC). Analysis of the collected samples will be performed by Severn Trent Laboratories (STL). A copy of the company's certificate is included in this report as Appendix A. The laboratory will analyze the samples consistent with New York State Department of Health (NYSDOH) Contract Laboratory Protocol (CLP) – Category A Deliverables. A Data Usability Summary Report (DUSR) will not be prepared for these samples.

The analysis for the beneficial use at the former Allied Signal Site in Elizabeth, New Jersey, includes Priority Pollutants + 40 and a five-gallon soil sample to be analyzed for compaction. The testing rate for the Elizabeth, New Jersey, facility is one sample per

1,000 cy. The analytical and sampling frequency requirements for both beneficial use facilities are included as Appendix B.

The treatment and disposal facilities considered require somewhat similar analyses involving the determination of hazardous waste. Testing involves volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), TCLP full list, ignitability, corrosivity, reactivity (sulfur and cyanide), total organic halogens (TOX), and total sulfur. The frequency of testing varies by parameter from one test per 60 cy, to one test per 800 cy. This process includes composite sampling for non-VOCs, and grab samples for VOCs. The analytical and sampling frequency requirements for Clean Earth Carteret, Clean Earth of Philadelphia, and Soil Safe are included as Appendix C.

### **3.2.2 Endpoint Sampling**

Endpoint samples collected during the pre-remediation sampling and after completion of the excavation will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) metals by Severn Trent Laboratory (STL). STL, a New York State Department of Health (NYSDOH)-approved laboratory, will analyze these samples consistent with NYSDOH Environmental Laboratory Approval Program (ELAP) – Category B Deliverables. Sample preservation and holding times are listed in the Quality Assurance Project Plan (QAPP), found in RWP Appendix C. A Data Usability Summary Report (DUSR) will be prepared for this data.

### **3.2.3 Petroleum Delineation Sampling**

The samples will be collected using an En Core® sampler for volatile organic compounds (VOCs) and a plastic 60-milliliter bottle for percent solids. The collected soil samples will be analyzed for VOCs using Environmental Protection Agency (EPA) Method 8260 and analyzed following New Jersey Department of Environmental Protection (NJDEP) protocol. The samples will be analyzed at Severn Trent Laboratory (STL) using equivalent New York State Department of Health (NYSDOH) Contract Laboratory Protocol (CLP) – Category A Deliverables. A Data Usability Summary Report (DUSR) will not be prepared for this sample analysis.

## **4.0 STANDARD OPERATING PROCEDURES**

The standard operating procedures will be the same as those in the Remedial Investigation (RI), which are included in Quality Assurance Project Plan (QAPP), found in Appendix C of the Remediation Work Plan (RWP). During these operations, safety monitoring will be performed as described in the Remediation Health and Safety Plan (RHASP), and all field personnel will wear appropriate personal protective equipment (PPE).

### **4.1 Soil Sample Collection**

Soil sampling will be conducted according to the following procedures:

- Characterize the sample according to the Modified Burmeister soil classification system.
- If advancing soil borings for endpoint sampling from the bottom of the excavation and/or from the sidewalls, collect an aliquot of soil from each sampling location, place the sample directly in laboratory-supplied jars, and place in a cooler.

- Soil selection will also be based on odors, staining, and photoionization detector (PID) readings.
- If performing endpoint sampling from excavation walls, soil can be placed directly in laboratory-supplied sample jars.
- If collecting a waste characterization sample from a soil stockpile, collect an aliquot of soil from at least five evenly distributed locations on the stockpile and place in a labeled sealable plastic bag to create a single composite sample.
- After selecting which samples will be analyzed in the laboratory, fill the required laboratory-supplied sample jars with the soil from the selected sampling location or labeled sealable plastic bags. Seal and label the sample jars as described in Section 4.3 of the Quality Assurance Project Plan (QAPP), found in Remedial Work Plan (RWP) Appendix C, and place in an ice-filled cooler.
- Decontaminate any soil sampling equipment between sample locations as described in Section 3.6 of the QAPP.
- Record boring number, sample depth, and sample observations (evidence of contamination, photoionization detector [PID] readings, soil classification) in a field logbook and boring log data sheet, if applicable.

#### **4.2 Groundwater Monitoring Well Installation and Development**

If required by the New York State Department of Environmental Conservation (NYSDEC), monitoring wells will be installed at select locations to monitor groundwater conditions within and outside of the soil remediation area. The procedures to be followed are included in the Quality Assurance Project Plan (QAPP) found in RWP Appendix C.

#### **4.3 Monitoring Well Sampling**

Samples will be collected for analysis at least one week following well development. Parameters will include Target Compound List (TCL) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) metals. The sampling methodology is included in the Quality Assurance Project Plan (QAPP) found in RWP Appendix C.

#### **4.4 Air Sampling**

If required by the New York State Department of Environmental Conservation (NYSDEC) or the New York State Department of Health (NYSDOH), confirmatory air samples will be collected during remediation activities to measure concentrations of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) in ambient air at the Site perimeter. Samples will be analyzed for VOCs using Environmental Protection Agency (EPA) Method TO-15 and SVOCs using EPA Method TO-13. The air samples to be analyzed for VOCs will be collected using the procedures listed in the Quality Assurance Project Plan (QAPP), included in RWP Appendix C.

#### **4.5 Decontamination of Sampling Equipment**

All sampling equipment will be either dedicated or decontaminated between sampling locations. The decontamination procedure will be as follows:

1. Scrub using tap water/Simple Green® mixture and bristle brush.
2. Rinse with tap water.
3. Scrub again with tap water/Simple Green® and bristle brush.

4. Rinse with tap water.
5. Rinse with distilled water.
6. Air-dry the equipment, if possible.

Hollow-stem augers (HSAs) will be decontaminated between monitor well locations by steam cleaning using a tap water/Simple Green® solution. Decontamination will be conducted on plastic sheeting (or equivalent) that is bermed to prevent discharge to the ground.

#### **4.6 Field Instrumentation**

Field personnel will be trained in the proper operation of all field instruments at the start of the field program. Instruction manuals for the equipment will be on file at the Site for referencing proper operation, maintenance, and calibration procedures. The equipment will be calibrated according to manufacturer's specifications at the start of each day of fieldwork, if applicable. If an instrument fails calibration, the Project Manager (PM) or Quality Assurance/Quality Control (QA/QC) Officer will be contacted immediately to obtain a replacement instrument. A calibration log will be maintained to record the date of each calibration, any failure to calibrate and corrective actions taken. The photoionization detector (PID) will be calibrated each day using 100 parts per million (ppm) isobutylene standard gas.

#### **4.7 Management of Investigation Derived Waste**

All investigation-derived waste (IDW) will be containerized in Department of Transportation (DOT)-approved 55-gallon drums. The drums will be sealed at the end of each work day and labeled with the date, the well or boring number(s), the type of waste (i.e., drill cuttings, development water, or purge water), and the name of an AKRF point-of-contact. Soil samples collected from soil borings will be used for waste characterization of soil. Additional waste characterization soil samples will be collected, if warranted. Grab samples will be collected from drums containing well development and purge water for waste characterization of liquids. The samples will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), lead using Toxicity Characteristic Leaching Procedure (TCLP), polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPH), ignitability, corrosivity, and reactivity. All drums will be labeled "pending analysis" until laboratory data is available. All IDW will be disposed of or treated according to applicable local, State, and federal regulations.

#### **4.8 Surveying and Water Table Measurement Readings**

The boring locations, monitoring well locations (if required), and soil vapor probe locations (if required), will be surveyed by a New York State-licensed surveyor. Three elevation measurements will be taken at each well location: the elevation of the ground beside the well; the elevation on the rim of the gate box or protective casing; and the elevation of the top of PVC casing. One elevation measurement will be taken at each boring, on the north side of the boring location, prior to the advancement of borings for the collection of waste characterization samples.

### **5.0 QUALITY CONTROL AND LABORATORY PROCEDURES**

The laboratory methods are summarized in Section 5.0 of the Quality Assurance Project Plan (QAPP), included in Remedial Work Plan (RWP) Appendix C. Quality Control (QC) sampling for the endpoint samples, sample handling, sample labeling and shipping, and sample custody will be consistent with the procedures outlined in Section 5.0 of the QAPP. The Data Usability Summary Report (DUSR) will be prepared for the endpoint samples, and will follow the procedures listed in Section 5.0 of the QAPP.



## TABLES

**TABLE 1A**  
**SAMPLING GRID DIMENSIONS AND VOLUMES**  
**WEST 61<sup>ST</sup> STREET SITE, NEW YORK, NEW YORK**

<b>Grid No.</b>	<b>N/S Distance (in feet)</b>	<b>E/W Distance (in feet)</b>	<b>Area (in square feet)</b>	<b>Depth for 100 cubic yards (cy) (in feet)</b>	<b>Depth for 500 cy (in feet)</b>	<b>Depth for 1,000 cy (in feet)</b>
20	33.33	75	2500	1.1	2.2	10.0
21	33.33	75	2500	1.1	2.2	10.0
22	33.33	75	2500	1.1	2.2	10.0
23	33.33	75	2500	1.1	2.2	10.0
24	33.33	75	2500	1.1	2.2	10.0
25	33.33	75	2400	1.1	2.2	10.0
26	40	43.75	1750	1.5	7.7	15.4
27	40	43.75	1750	1.5	7.7	15.4
28	40	43.75	1750	1.5	7.7	15.4
29	40	43.75	1750	1.5	7.7	15.4
30	40	43.75	1750	1.5	7.7	15.4
31	40	43.75	1750	1.5	7.7	15.4
32	40	43.75	1750	1.5	7.7	15.4
33	40	43.75	1750	1.5	7.7	15.4
34	40	43.75	1750	1.5	7.7	15.4
35	40	43.75	1750	1.5	7.7	15.4
36	40	43.75	1750	1.5	7.7	15.4
37	40	43.75	1750	1.5	7.7	15.4
38	40	43.75	1750	1.5	7.7	15.4
39	40	43.75	1750	1.5	7.7	15.4
40	40	43.75	1750	1.5	7.7	15.4
41	40	43.75	1750	1.5	7.7	15.4
42	40	43.75	1750	1.5	7.7	15.4
43	58	31.25	1813	1.5	7.4	14.9
44	58	31.25	1813	1.5	7.4	14.9

**TABLE 1A (Continued)**  
**SAMPLING GRID DIMENSIONS AND VOLUMES**  
**WEST 61ST STREET SITE, NEW YORK, NEW YORK**

<b>Grid No.</b>	<b>N/S Distance (in feet)<sup>1</sup></b>	<b>E/W Distance (in feet)<sup>2</sup></b>	<b>Area (in square feet)</b>	<b>Depth for 100 cubic yards (cy) (in feet)</b>	<b>Depth for 500 cy (in feet)</b>	<b>Depth for 1,000 cy (in feet)</b>
45	58	31.25	1813	1.5	7.4	14.9
46	58	31.25	1813	1.5	7.4	14.9
47	42	42.7	1793	1.5	7.5	15.1
48	42	42.7	1793	1.5	7.5	15.1
49	42	42.7	1793	1.5	7.5	15.1
50	42	42.7	1793	1.5	7.5	15.1
51	42	42.7	1793	1.5	7.5	15.1
52	42	42.7	1793	1.5	7.5	15.1

Comment: Each grid is rectangular in shape.

Notes: <sup>1</sup> The “N/S Distance” represents the distance from the northern boundary of the grid to the southern boundary. The N/S distance is perpendicular to West 60<sup>th</sup> and West 61<sup>st</sup> Streets.

<sup>2</sup> The “E/W Distance” represents the distance from the eastern boundary of the grid to the western boundary. The E/W distance is parallel to West 60<sup>th</sup> and West 61<sup>st</sup> Streets.

**TABLE 1B**  
**SAMPLING GRIDS AND SUB-GRIDS**  
**WEST 61<sup>ST</sup> STREET SITE. NEW YORK, NEW YORK**

Grid No.	Depth	Sub-Grid Depth	Soil Type	Type of Sample	Grid Volume (Cubic Yards)
20	6' – 1 Sampling Grid – Endpoint sampling after removal				
20A	6'	0-6'	Fill	Waste classification	741
21	6' – 1 Sampling Grid – Endpoint sampling after removal				
21A		0-6'	Fill	Waste Classification	741
22	6'				
22A		0-6'	Fill	Waste classification	741
		6.5'	Fill	Endpoint sampling	
23	6'				
23A		0-6'	Fill	Waste classification	370
		6.5'	Fill	Endpoint sampling	
24	19' – 2 Sampling grids				
24A		0-6'	Fill	Waste Classification	370
24B		6'-19'	Fill/NS	Beneficial Use	981
		19.5	Fill/NS	Endpoint	
25	19' – 2 Sampling Grids				
25A		0-6'	Fill	Waste Classification	370
25B		6-19	Fill/NS	Beneficial Use	695
		19.5'	Fill/NS	Endpoint	
26	33.5' – 3 Sampling sub-grids				
26A		0-6'	Contam. Fill	Waste Classification	389
26B		6'-20'	Fill	Beneficial Use	908
26C		20'-33.5'	NS	Beneficial Use	875
		34'	NS	Endpoint	
27	32.5' – 2 Sampling sub-grids				
27A		0-16.3'	Fill	Beneficial Use	1,057
27B		16.3'-32.5'	Fill/NS	Beneficial Use	1,050
		33'	NS	Endpoint	
28	30.5 – 2 Sampling sub-grids				
28A		0-15.2'	Fill	Beneficial Use	986
28B		15.2'-30.5'	Fill/NS	Beneficial Use	992
		31'	NS	Endpoint	
29	28' – 3 Sampling sub-grids				
29A		0-6'	Contam. Fill	Waste Classification	389
29B		6'-17'	Fill	Beneficial Use	713
29C		17'-28'	Fill/NS	Beneficial Use	713
		29'	NS	Endpoint	
30	33.5' – 2 Sampling sub-grids				
30A		0-16.8'	Fill	Beneficial Use	1,089
30B		16.8-33.5	Fill/NS	Beneficial Use	1,083

**TABLE 1B**  
**SAMPLING GRIDS AND SUB-GRIDS**  
**WEST 61<sup>ST</sup> STREET SITE. NEW YORK, NEW YORK**

Grid No.	Depth	Sub-Grid Depth	Soil Type	Type of Sample	Grid Volume (cubic yards)
		34'	NS	Endpoint	
31	32.5' – 2 Sampling sub-grids				
31A		0-16.3'	Fill	Beneficial Use	1,057
31B		16.3'-33.5'	Fill/NS	Beneficial Use	1,053
		34'	NS	Endpoint	
32	31' – 2 Sampling sub-grids				
32A		0-15.5'	Fill	Beneficial Use	1,005
32B		15.5'-31.0'	Fill/NS	Beneficial Use	1,005
		31.5'	NS	Endpoint	
33	26' – 2 Sampling sub-grids				
		4'	Fill	Endpoint	
33A		0-13'	Fill	Beneficial Use	843
		10'	Fill	Endpoint	
33B		13'-26'	Fill/NS	Fill/NS	843
		26.5'	NS	Endpoint	
34	33.5' – 2 Sampling sub-grids				
34A		0-15'	Fill	Beneficial Use	973
34B		15'-25'	NS	Beneficial Use	649
		26'	NS/BR	Endpoint	
35	32.5' – 2 Sampling sub-grids				
35A		0-16.3'	Fill	Beneficial Use	1,057
35B		16.3'-32.5'	Fill/NS	Beneficial Use	1,053
		33'	Fill	Endpoint	
36	31.5' - 2 Sampling sub-grids				
36A		0-15.8'	Fill	Beneficial Use	1,024
36B		15.8'-35.5'	Fil/NS	Beneficial Use	1,018
		36.0'	NS	Endpoint	
37	28' – 2 Sampling sub-grids				
		5'	Fill	Endpoint	
37A		0-14'	Fill	Beneficial Use	908
		12'	Fill	Endpoint	
37B		14'-28'	NS	Beneficial Use	908
		28.5	NS	Endpoint	
38	24' – 2 Sampling sub-grids				
38A		0-12'	Fill	Beneficial Use	778
38B		12'-24'	NS	Beneficial Use	778
		24.5'	NS/BR	Endpoint	
39	22' – 2 Sampling sub-grids				
39A		0-11'	Fill	Beneficial Use	713

**TABLE 1B**  
**SAMPLING GRIDS AND SUB-GRIDS**  
**WEST 61<sup>ST</sup> STREET SITE. NEW YORK, NEW YORK**

Grid No.	Depth	Sub-Grid Depth	Soil Type	Type of Sample	Grid-Volume (Cubic Yards)
39B		11'-22'	Fill/NS	Beneficial Use	713
			NS/BR	Endpoint	
40	24' – 2 Sampling sub-grids				
40A		0-12'	Fill	Beneficial Use	778
40B		12'-24'	Fill/NS	Beneficial Use	778
		24.5'	NS/BR	Endpoint	
41	30' – 2 Sampling sub-grids				
41A		0-15'	Fill	Beneficial Use	973
41B		15'-30'	Fill/NS	Beneficial Use	973
		30.5'	NS/BR	Endpoint	
42	29' – 2 Sampling sub-grids				
42A		0-15.5'	Fill	Beneficial Use	1,005
		16'-16.5'	NS	Endpoint	
42B		15.5-31	NS	Beneficial Use	1,005
		31.5	NS	Endpoint	
43	25' – 2 Sampling sub-grids				
43A		0-14'	C+D	Waste Classification	941
		14.5'	NS	Endpoint	
43B		14'-25'	NS	Beneficial Use	739
		25.5'	NS	Endpoint	
44	23' – 2 Sampling sub-grids				
44A		0-14'	C+D	Waste Classification	941
		14.5'	NS	Endpoint	
44B		14'-23'	NS	Beneficial Use	605
		23.5	NS	Endpoint	
45	21' – 2 Sampling sub-grids				
45A		0-6'	Fill/Petroleum	Waste Class. Pet.	403
45B		6'-21'	Fill/NS	Beneficial Use	1,008
		21.5'	NS	Endpoint	
46	28' – 2 Sampling sub-grids – Endpoint sampling after removal				
46A		0-6'	Fill	Waste Classification	403
46B		6'-19'	Fill/NS	Beneficial Use	873
		19.5'	NS	Endpoint	
46C		19'-28'	NS/BR	Waste Class.Pet.	605
47	27' – 3 Sampling sub-grids – Endpoint sampling after removal				
47A		0-10'	Fill	Beneficial Use	665
47B		10'-19'	Fill/NS	Waste Class.	598
47C		19'-27'	NS/BR	Waste Class. Pet.	532
48	28' – 2 Sampling sub-grids – Endpoint sampling after removal				

**TABLE 1B**  
**SAMPLING GRIDS AND SUB-GRIDS**  
**WEST 61<sup>ST</sup> STREET SITE. NEW YORK, NEW YORK**

Grid No.	Depth	Sub-Grid Depth	Soil Type	Type of Sample	Grid Volume (cubic yards)
48A		0-14'	Fill	Beneficial Use	930
48B		14'-26'	Fill/NS	Waste Class. Pet.	806
49	27' – 3 Sampling sub-grids – Endpoint sampling after removal				
49A		0-9'	Fill	Beneficial Use	598
49B		9'-17'	Fill/NS	Waste Class. Pet.	531
49C		17'-25'	NS/BR	Waste Class. Pet.	531
50	24' – 2 Sampling sub-grids – Endpoint sampling after removal				
50A		0-12'	C+D	Waste Class. Pet.	797
50B		12'-24'	C+D/Fill/NS	Waste Class. Pet.	797
51	24' – 2 Sampling sub-grids – Endpoint sampling after removal				
51A		0-12'	Fill/NS	Waste Class. Pet.	797
51B		12'-24'	Fill	Waste Class. Pet.	797
52	28' – 3 Sampling Grids – Endpoint sampling after removal				
52A		0-6'	Fill	Waste Classification	399
52B		6'-17'	Fill/NS	Waste Class. Pet.	731
52C		17'-28'	NS	Waste Class. Pet.	731

Notes:

Beneficial Use - Sampling for acceptance at former Allied Signal Site in Elizabeth, NJ.

Waste Classification – Sampling for acceptance at Clean Earth of Philadelphia, Penn.

Waste Class. Pet. – Sampling For acceptance at Clean Earth of Carteret, NJ.

Endpoint – Sampling for NYSDEC cleanup criteria.

C+D – Construction and demolition debris as defined in 6 NYCRR Section 360-1.

Fill – Fill material previously brought to the Site.

NS – Native Soil – sand and silt with some gravel.

BR – Bedrock

Depth – Depth of excavation to final grade or to remove known petroleum contamination.

Sub-grid – Division of grid by elevation (depth range) to achieve 1,000 cubic yard volumes.

**TABLE 2**  
**ENDPOINT SAMPLING GRID COORDINATES, ELEVATIONS, AND DEPTHS**  
**WEST 61<sup>ST</sup> STREET SITE, NEW YORK, NEW YORK**

<b>Grid No.</b>	<b>Boring Number</b>	<b>North Coordinate</b>	<b>East Coordinate</b>	<b>*Surface Elevation</b>	<b>Lower Limit of Construction Elevation</b>	<b>**Depth to Endpoint Sample (in feet)</b>
20	20	183.0	413.0		54.0	
21	21	150.0	413.0		54.0	
22	22	117.0	413.0		54.0	
23	23	183.0	338.0		39.6	
24	24	150.0	325.0		39.6	
25	25	117.0	325.0		54.0	
26	26	181.8	278.0		14.0	
27	27	181.0	234.0		14.0	
28	28	181.0	191.0		14.0	
29	29	181.0	147.0		14.0	
30	30	141.0	278.0		14.0	
31	31	141.0	234.0		14.0	
32	32	141.0	191.0		14.0	
33	33	141.0	147.0		37.0	
34	34	101.0	270.0		30.0	
35	35	101.0	234.0		14.0	
36	36	101.0	191.0		14.0	
37	37	101.0	147.0		30.0	
38	38	61.0	270.0		30.0	
39	39	21.0	270.0		14.0	
40	40	61.0	234.0		14.0	
41	41	61.0	191.0		14.0	
42	42	72.0	147.0		14.0 37.0	
43	43	75.0	109.0		14.0 37.0	
44	44	82.0	78.0		14.0 37.0	



**TABLE 2 (Continued)**  
**ENDPOINT SAMPLING GRID COORDINATES, ELEVATIONS, AND DEPTHS**  
**WEST 61<sup>ST</sup> STREET SITE, NEW YORK, NEW YORK**

<b>Grid No.</b>	<b>Boring Number</b>	<b>North Coordinate</b>	<b>East Coordinate</b>	<b>*Surface Elevation</b>	<b>Lower Limit of Construction Elevation</b>	<b>**Depth to Endpoint Sample (in feet)</b>
45	45	70.0	47.0		14.0	
46	46	70.0	16.0		14.0	
47	47	21.0	235.0		14.0	
48	48	21.0	192.0		14.0	
49	49	21.0	149.0		14.0	
50	50	21.0	197.0		14.0	
51	51	21.0	64.0		14.0	
52	52	21.0	21.0		14.0	

Comment: Each grid is rectangular in shape.

Notes: 1) The southwestern corner of Lot 5 has been designated as coordinate (0,0) [North, East]. All Site coordinates are related to these coordinates.

2) The elevations are based on the Manhattan Borough Datum.

3) \* The surface elevation will be measured by a licensed surveyor for each coordinate listed.

4) \*\* The depth to endpoint sample will be computed by subtracting the lower limit of construction elevation from the surface elevation.

**TABLE 3A**  
**SAMPLING AND ANALYTICAL PROGRAM**  
**WEST 61<sup>st</sup> STREET SITE, NEW YORK, NEW YORK**

Location	Depth of Sample	Soil Type	Sample Type	Purpose of Sample / Parameters
B-20 B-21 B-22 B-23 B-24 B-25	0-6' 0-6' 0-21' 0-21' 0-6'	Fill	Grab and composite	Waste characterization parameters for soil unacceptable for beneficial reuse. Waste characterization for beneficial use parameters.
			Grab	Post-excavation endpoint sample collected at anticipated bottom of excavation – New York Stated Department of Environmental Conservation (NYSDEC) parameters (Target Compound List [TCL] – volatile organic compounds [VOCs], semi-volatile organic compounds [SVOCs], pesticides, polychlorinated biphenyls [PCBs], and Target Analyte List [TAL] Metals – Category B Deliverables.
B-26 B-29	0-6'	Fill	Grab and composite	Waste characterization parameters for soil unacceptable for beneficial use
	6' to limit of excavation	Fill and native soil	Grab and/or composite	Waste characterization for beneficial use parameters
	Limit of excavation	Native soil	Grab	Post-excavation sample – NYSDEC endpoint parameters
B-27, 28, B-30 through B-38, B-40 through B-46	Surface to limit of excavation	Fill and native soil	Grab and/or composite	Waste characterization for beneficial reuse parameters
	Limit of excavation	Fill or native soil	Grab	Post-excavation sample – NYSDEC parameters
B-39 B-47 B-48 B-49 B-52	0-10'	Fill and native soil	Grab and/or composite	Waste characterization for beneficial reuse parameters
	10' to bedrock	Fill and native soil	Grab and composite	Waste characterization parameters for petroleum-contaminated soil
B-50, B-51	0-10'	C&D and fill	Grab and/or composite	Waste characterization parameters for soil unacceptable for beneficial reuse
	10' to bedrock	Fill, C&D, and native soil	Grab and Composite	Waste characterization parameters for petroleum-contaminated soil
Grids 39, 47-52	Sidewalls and bottom of excavation	Fill and native soil	Grab	Post-excavation samples – NYSDEC endpoint parameters along exposed sidewalls and bottom after removal of petroleum-contaminated soil in accordance with DER-10
Notes: 1) Waste characterization parameters for beneficial use, and for material both unacceptable for beneficial reuse and petroleum-contaminated material, are located in Attachments B and C, respectively. 2) C&D - Construction and demolition debris as defined in 6 New York Code of Rules and Regulations (NYCRR) Subpart 360-1. 3) Depth to limit of excavation is shown in Table 2. 4) Composite samples vary in number and representative volume based on the facility.				

**TABLE 3B**  
**SAMPLING AND ANALYTICAL PROGRAM – PETROLEUM DELINEATION**  
**WEST 61<sup>st</sup> STREET SITE, NEW YORK, NEW YORK**

Location	Depth of Sample	Soil Type	Sample Type	Purpose of Sample / Parameters
B-39A through B-39E	10' to bedrock	Fill and native soil	Grab	Investigate to determine the horizontal and aerial extent of petroleum contamination. Collect one sample at a depth two to three feet above the groundwater. Collect a second soil sample at or below the groundwater interface. If the interface appears to be uncontaminated, the boring is considered to be completed and the two samples will be analyzed for confirmation. If contamination is evident at or below the groundwater interface, continue drilling until uncontaminated soil is identified or bedrock is encountered. Collect a sample from the uncontaminated soil or soil at the bedrock interface. These samples will be analyzed for volatile organic compounds (VOCs) using Environmental Protection Agency (EPA) Method 8260, following New Jersey Department of Environmental Protection (NJDEP) Protocol.
B-47A through B-47E	10' to bedrock	Fill and native soil	Grab	
B-48A through B-48E	10' to bedrock	Fill and native soil	Grab	
B-49A through B-49E	10' to bedrock	Fill and native soil	Grab	
B-50A through B-50E	10' to bedrock	Fill, C&D, and native soil	Grab	
B-51A through B-51E	10' to bedrock	Fill, C&D, and native soil	Grab	
B-52A through B-52E	10' to bedrock	Fill and native soil	Grab	
Notes: 1) C&D – Construction and demolition debris as defined in 6 New York Code of Rules and Regulations (NYCRR) Subpart 360-1. 2) NJDEP – New Jersey Department of Environmental Protection				

**TABLE 4A**  
**NJDEP LABORATORY ANALYTICAL METHODS AND REQUIREMENTS**  
**West 61<sup>st</sup> Street Site; New York, NY**

MATRIX	PARAMETER	EPA METHOD	SAMPLE CONTAINERS	MINIMUM SAMPLE VOLUME REQUIRED	PRESERVATION/ STORAGE TEMPERATURE	HOLDING TIMES				
SOIL SAMPLES	Full TCLP									
	TCLP VOCs	SW-846 8260	One 2-oz. widemouth glass, cap lined with Teflon	25g	none/cool to 4°C	14 days				
	TCLP SVOCs	SW-846 8270	One 8-oz. widemouth glass, cap lined with Teflon	100g		14 days				
	TCLP Metals	SW-846 6010				Mercury: 28 days; All other metals: 180 days				
	TCLP Pesticides	SW-846 8081				14 days				
	TCLP Herbicides	SW-846 8151				14 days				
	Misc. Parameters									
	Total Metals	SW-846 6010	One 8-oz. widemouth glass, cap lined with Teflon	30g	none/cool to 4°C	Mercury: 28 days; All other metals: 180 days				
	Percent Moisture	ASTM D-2216	One 4-oz. widemouth glass, cap lined with Teflon	10g		As soon as possible				
	Paint Filter	SW-846 9095	One 4-oz. widemouth glass, cap lined with Teflon	100g		None specified				
	PAH	SW-846 8270	One 8-oz. widemouth glass, cap lined with Teflon	30g		14 days to extraction, 40 days to analyze				
	PCBs	SW-846 8082	One 2-oz. widemouth glass, lined with septum	5g		14 days				
	VOC (NY)	SW-846 8260					One 5-g EnCore Sampler + One 60-mL plastic	5g + 10g	48 hours to transfer EnCore, 14 days to analyze	
	VOC (NJ)		SW-846 8015	One 2-oz. widemouth glass, cap lined with Teflon		5g				14 days
	TPH-GRO	One 8-oz. widemouth glass, cap lined with Teflon					50g	14 days to extraction, 40 days to analyze		
	TPH-DRO	SW-846 1030	One 4-oz. widemouth glass, cap lined with Teflon	30g		As soon as possible				
	Ignitability	SW-846 9045		20g		Immediately				
	Corrosivity	SW-846 7332		50g		14 days				
	Reactive Cyanide	SW-846 7342		3g		7 days				
	Reactive Sulfide	ASTM D-129	One 2-oz. widemouth glass, cap lined with Teflon							
	Priority Pollutants + 40, plus 5									
	Total Cyanide	SW-846 9012	One 4-oz. widemouth glass, cap lined with Teflon	20g		none/cool to 4°C	14 days			
	Phenols	SW-846 9066	One 8-oz. widemouth glass, cap lined with Teflon	30g	28 days					
	Pesticides, including methoxychlor	SW-846 8081			One 5-g EnCore Sampler + One 60-mL plastic		5g + 10g	14 days to extraction, 40 days to analyze		
	PCBs	SW-846 8082						SW-846 7196/6010B	One 4-oz. widemouth glass, cap lined with Teflon	Mercury: 28 days; All other metals: 180 days
	Metals, including Barium	SW-846 6010								14 days to extraction, 40 days to analyze
	SVOCs	SW-846 8270								48 hours to transfer EnCore, 14 days to analyze
	VOCs, including Total Xylenes	SW-846 8260	One 4-oz. widemouth glass, cap lined with Teflon	50g	28 days					
	Hexavalent/Trivalent Chromium	SW-846 9012		20g	14 days					
	Total Cyanide									

**TABLE 4A**  
**NJDEP LABORATORY ANALYTICAL METHODS AND REQUIREMENTS**  
**West 61<sup>st</sup> Street Site; New York, NY**

MATRIX	PARAMETER	EPA METHOD	SAMPLE CONTAINERS	MINIMUM SAMPLE VOLUME REQUIRED	PRESERVATION/STORAGE TEMPERATURE	HOLDING TIMES	
WATER SAMPLES (Field Blanks)	Misc. Parameters						
	Total Metals	SW-846 6010/7470	One 500-mL plastic bottle	250mL	HNO <sub>3</sub> /N/A	Mercury: 28 days; All other metals: 180 days	
	Paint Filter	SW-846 9095	One 500-mL glass bottle	100mL	none/cool to 4°C	None specified	
	PAH	SW-846 8270	Two 1-L amber glass bottle with Teflon-lined lid	1L		7 days to extraction, 40 days to analyze	
	PCBs	SW-846 8082	Two 40-mL glass VOA vial, cap lined with Teflon	40mL	HCl/cool to 4°C	14 days	
	VOCs	SW-846 8260					
	TPH-GRO	SW-846 8015	Two 1-L amber glass bottle with Teflon-lined lid	1L	none/cool to 4°C	7 days to extraction, 40 days to analyze	
	TPH-DRO					None specified	
	Ignitability	SW-846 1020	One 250-mL plastic bottle	25mL		As soon as possible	
	Corrosivity	SW-846 9040	One 100-mL plastic bottle			14 days	
	Reactive Cyanide	SW-846 7332	One 500-mL plastic bottle	3mL		Zn Acetate + NaOH/cool to 4°C	7 days
	Reactive Sulfide	SW-846 7342					
	Total Sulfur	ASTM D-129 modified					
	Total Organic Halogens (TOX)	SW-846 9020	One 500-mL glass bottle with Teflon-lined lid	250mL	H <sub>2</sub> SO <sub>4</sub> /cool to 4°C	28 days	
	Priority Pollutants + 40, plus 5						
	Total Cyanide	SW-846 9012	One 500-mL plastic bottle	100mL	NaOH/cool to 4°C	14 days	
	Phenols	SW-846 420.2	One 500-mL glass bottle with Teflon-lined lid		H <sub>2</sub> SO <sub>4</sub> /cool to 4°C		
	Pesticides, including methoxychlor	SW-846 8081	Two 1-L amber glass bottle with Teflon-lined lid	1L	none/cool to 4°C	7 days to extraction, 40 days to analyze	
	PCBs	SW-846 8082					
	Total Metals, including Barium	SW-846 6010/7470	One 500-mL plastic bottle	250mL	HNO <sub>3</sub> /N/A	Mercury: 28 days; All other metals: 180 days	
	Filtered Metals						
	SVOCs	SW-846 8270	Two 1-L amber glass bottle with Teflon-lined lid	1L	none/cool to 4°C	7 days to extraction, 40 days to analyze	
	VOCs, including Total Xylenes	SW-846 8260	Two 40-mL glass VOA vial, cap lined with Teflon	40mL	HCl/cool to 4°C	14 days	
	TOC (average quads)	SW-846 9060	Two 40-mL glass VOA vial, cap lined with Teflon	40mL	H <sub>2</sub> SO <sub>4</sub> /cool to 4°C	28 days	
	Hexavalent/Trivalent Chromium	SW-846 7196/6010B	One 500-mL plastic bottle (Cr <sub>6</sub> ) + below	100mL	none/cool to 4°C	24 hours	
			One 500-mL plastic bottle (Cr <sub>3</sub> ) + above				

NOTES:

\* Filtering of samples for dissolved metals analysis will be performed in the laboratory.

**TABLE 4B**  
**NYSDEC LABORATORY ANALYTICAL METHODS AND REQUIREMENTS FOR ENDPOINT SAMPLING**  
**West 61st Street Site; New York, NY**

MATRIX	PARAMETER	EPA METHOD	SAMPLE CONTAINERS	PRESERVATION	HOLDING TIMES
<b>SOIL SAMPLES</b>	TCL VOCs	8260	2 oz. clear glass Septum	4°C	14 days
	TCL SVOCs	8270	8 oz. clear glass	4°C	14 days
	TAL Metals	1311 / 6010B / 7470A		4°C	6 months (28 days for Hg)
	PCBs	8081		4°C	14 days
	Pesticides	8082		4°C	14 days
<b>GROUNDWATER SAMPLES</b>	TCL VOCs	8260	(2) 40 ml clear glass vial	HCl, 4°C	14 days
	TCL SVOCs	8270	(2) 1L amber glass	4°C	7 days
	PCBs	8081	(2) 1L amber glass	4°C	7 days
	Pesticides	8082			
	TAL Metals (total)	6000/7000 series	500 mL plastic	HNO <sub>3</sub> , 4°C	6 months (28 days for Hg)
	TAL Metals (dissolved)*	6000/7000 series	500 mL plastic	4°C	ASAP
<b>TANK EXCAVATION ENDPOINT SAMPLES</b>	STARS VOCs + MTBE	8021	2 oz. clear glass Septum	4°C	14 days
	STARS SVOCs	8270	4 oz. clear glass	4°C	14 days

NOTES:

\* Filtering of samples for dissolved metals analysis will be performed in the laboratory.

ASAP - As soon as possible

## FIGURES

2006 AKRF, Inc. Environmental Consultants M:\AKRF Project Files\10321 - Algin Properties W. 60th St\Figures\RAWP Figures\RWP\_SP\_Figure\_1\_grid.dwg

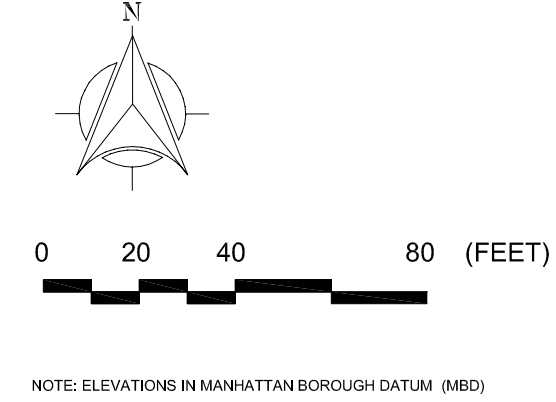


Legend:

	GRID BOUNDARY		EXISTING GROUNDWATER MONITORING WELL INSTALLED DURING REMEDIAL INVESTIGATION. SOIL AND GROUNDWATER SAMPLES COLLECTED.
	AREA OF CONCERN		BORING DRILLED DURING REMEDIAL INVESTIGATION. SOIL SAMPLES COLLECTED.
	PROPOSED BUILDING		BORING LOCATION FOR WASTE CHARACTERIZATION AND ENDPOINT SAMPLING
	UNDERGROUND STORAGE TANK		BORING LOCATIONS FOR PETROLEUM INVESTIGATION
	ABOVEGROUND STORAGE TANK		
	COURTYARD EXCAVATION TO ELEVATION 37.0		
	SUB-CELLAR EXCAVATION TO ELEVATION 14.5 (MBD)		
	CELLAR EXCAVATION TO ELEVATION 30.0 (MBD)		

EACH GRID IS APPROXIMATELY 1,000 CUBIC YARDS PER 16 FT DEPTH

Notes:	
AOC-1	ELEVATED LEAD IN SAMPLE B/MW-3 (0-2")
AOC-2	ONE OR MORE USTS NEAR GATEHOUSE
AOC-3	ONE OR MORE USTS IN SOUTHWEST CORNER OF PARKING LOT
AOC-4	ONE OR MORE POTENTIAL USTS ON LOT 53
AOC-5	ESTIMATED EXTENT OF PETROLEUM-CONTAMINATED SOIL AND/OR GROUNDWATER
AOC-6	POSSIBLE VAULTED 1,050-GALLON TANK IN BASEMENT OF LOT 8
AOC-7	ELEVATED ACETONE IN SAMPLE B/MW-4 (12-14)



Environmental Consultants  
440 Park Avenue South, New York, N.Y. 10016

West 61st Street Site  
New York, New York

PROPOSED SAMPLE LOCATIONS FOR WASTE CHARACTERIZATION,  
PETROLEUM INVESTIGATION, AND ENDPOINT SAMPLING

DATE  
**03.15.06**

SCALE  
**As Shown**

PROJECT No.  
**10321**

FIGURE No.  
**1**



**APPENDIX A**  
**SEVERN TRENT LABORATORY NJDEP LABORATORY CERTIFICATION**



State of New Jersey  
Department of Environmental Protection

Certifies That

ST

Laboratory

Regulatory  
Laboratories And

National Environmental

State

to perform the analysis

which must



NJDEP is a NELAP Recognized Accrediting Authority

Expiration Date June 30, 2006

*Joseph F. Aiello*

Joseph F. Aiello, Chief  
Office of Quality Assurance

THIS CERTIFICATE IS TO BE CONSPICUOUSLY DISPLAYED AT THE LABORATORY WITH THE ANNUAL CERTIFIED PARAMETER LIST IN A LOCATION ON THE PREMISES VISIBLE TO THE PUBLIC

**APPENDIX B**  
**BENEFICIAL USE FACILITIES TESTING PROTOCOL**

**Table - 1**  
**General Fill Acceptance Criteria - Former Allied Signal Site**  
**Elizabeth, New Jersey**

Contaminant	CASRN	(RDCSCC)	(NRDCSCC)	(IGWSCC)	Maximum Onsite Concentration	Revised Final Acceptance Criteria	Rationale
Acetone	67-64-1	1000(d)	1000(d)	100		1000	IGWSCC
Acetone (2-propanone)	67-64-1	1000(d)	1000(d)	100		100	IGWSCC
Aldrin	809-00-2	0.04	0.17	50		0.17	NRDCSCC
Antimony	7440-88-0	14	240	(h)	1550	1550	M.O.C.
Barium	7440-39-3	700	47000(u)	(h)		47000	NRDCSCC
Benzo(b)fluoranthene (3,4-)	205-99-2	0.6	4	50	14	14	M.O.C.
Benzo(a)pyrene (BaP)	50-32-6	0.68(f)	0.68(f)	100	8.3	8.3	M.O.C.
Benzyl Alcohol	100-51-6	10000(o)	10000(o)	50		50	IGWSCC
Bis(2-chloroethyl) ether	111-44-4	0.68(f)	3	10		3	NRDCSCC
Bis(2-ethylhexyl) phthalate	117-81-7	49	210	100		210	NRDCSCC
Bromoform	75-26-2	86	570	1		1	IGWSCC
2-Butanone (Methyl ethyl ketone) (MEK)	78-93-3	1000 (d)	1000 (d)	50		50	IGWSCC
Cadmium	7440-49-9	1000 (d)	100	(h)		100	NRDCSCC
4-Chloroaniline	106-47-8	230	4200	(f)		4200	NRDCSCC
Chloroform	67-68-3	19 (k)	28 (k)	1	1500	1	IGWSCC
Chloromethane (Methyl chloride)	74-87-3	620	1000 (d)	10		10	IGWSCC
Chromium - hexavalent (VI)	18540-28-9	6100: 20 (h)(i)	6100: 20 (h)(i)	(h)		50 (v)	NRDCSCC
Chrysene	218-01-9	9	40	500		40	NRDCSCC
Cyanide	57-12-5	1100	21000 (c)	(h)		21000	NRDCSCC
4,4'-DDE (p,p'-DDX)	72-55-6	2	0	50		0	NRDCSCC
Dibenz(a,h)anthracene	56-70-8	0.04 (f)	0.46 (f)	100	0.93	0.93	M.O.C.
Di-n-butyl phthalate	84-74-2	4700	10000 (c)	100		10000	NRDCSCC
1,2-Dichlorobenzene (o)	95-50-1	5100	10000 (c)	50		10000	NRDCSCC
1,2-Dichlorobenzene (m)	95-50-1	5100	10000 (c)	100		10000	NRDCSCC

**Table - 1**  
**General Fill Acceptance Criteria - Former Allied Signal Site**  
**Elizabeth, New Jersey**

Contaminant	CASRN	(RDCSCC)	(NRDCSCC)	(IGWSCC)	Maximum Orelin Concentration	Revised Final Acceptance Criteria	Rationale
1,4-Dichlorobenzene (p-Dichlorobenzene)	106-46-7	570	10000 (4)	100		10000	NRDCSCC
1,1-Dichloroethane	78-34-3	570	1000 (d)	10	1400	10	IGWSCC
1,1-Dichloroethane	78-35-1	8	100	10		10	IGWSCC
1,2-Dichloroethane (cis)	156-59-2	70	1000 (d)	1		1	IGWSCC
1,2-Dichloroethane (trans)	156-60-5	1000 (d)	1000 (d)	50		50	IGWSCC
1,2-Dichloropropane	78-27-5	10	43	(f)		50	IGWSCC
1,1-Dichloropropane (anti)	78-27-5	4	43	1		1	IGWSCC
Dieldrin	60-57-1	0.042	0.15	50		0.15	NRDCSCC
Dieldrin	60-57-1	10000 (c)	10000 (c)	50		10000	NRDCSCC
2,4-Dimethyl phenol	106-67-3	1100	10000 (c)	10		10000	NRDCSCC
Dimethyl phthalate	131-11-3	10000 (c)	10000 (c)	50		10000	NRDCSCC
2,4-Dinitrophenol	61-28-5	110	2100	10		2100	NRDCSCC
Dinitrophenol (2,4,6-trinitrophenol)	65-05-1	100	100	100 (d)		1	NRDCSCC
Endosulfan	115-29-7	340	6200	50		6200	NRDCSCC
Endosulfan	115-29-7	10	310	50		310	NRDCSCC
Ethylbenzene	100-41-4	1000 (d)	1000 (d)	100		100	IGWSCC
Fluoranthene	236-40-0	2300	10000 (c)	100		10000	NRDCSCC
Fluorene	86-73-7	2300	10000 (c)	100		10000	NRDCSCC
Heptachlor	76-44-5	0.1	0.65	50		0.65	NRDCSCC
Hexachlorobenzene	118-74-1	0.66 (f)	2	100		100	NRDCSCC
Hexachlorocyclopentadiene	77-47-4	400	7300	100		7300	NRDCSCC
Hexachlorocyclopentadiene	77-47-4	10	100	100		100	NRDCSCC
Indeno(1,2,3-cd)pyrene	169-49-5	0.8	4	500		4	NRDCSCC
Isobutyl chloride	74-85-1	1100	10000 (c)	50		10000	NRDCSCC
Lead	7489-82-1	400 (b)	600 (c)	(h)	613	613	N.O.C.
Linoleic acid (gamma, delta) (gamma, delta)	60-33-0	0.5	2.2	10		2.2	NRDCSCC
2-Methylphenol (o-cresol)	95-46-7	2800	10000 (c)	(f)		10000	NRDCSCC
3-Methylphenol (m-cresol)	100-14-9	2800	10000 (c)	(f)		10000	NRDCSCC
Methoxychlor	72-42-5	280	5200	50		5200	NRDCSCC
Methyl	74-85-1	10	100	(h)		270	NRDCSCC
4-Methyl-2-pentanone (MIBK)	106-10-1	1000 (d)	1000 (d)	50		50	IGWSCC
Methyl	74-85-1	10	100	1		1	IGWSCC
Naphthalene	91-20-3	230	4200	100		4200	NRDCSCC
Nitrobenzene	71-43-2	250	2400 (f)	(h)		2400	NRDCSCC
Nitrobenzene	98-95-3	28	520	10		520	NRDCSCC
N-Nitrosodipropylamine	61-30-3	140	500	100		500	NRDCSCC
N-Nitrosodipropylamine	621-64-7	0.66 (f)	0.66 (f)	10		0.66	NRDCSCC
PCB (polychlorinated biphenyl)	133-03-2	0.49		50	100		NRDCSCC and N.O.C.
Pentachlorophenol	87-86-5	6	24	100		24	NRDCSCC
Phenol	108-95-2	10000 (p)	10000 (p)	50		10000	NRDCSCC
Pyrene	129-00-0	1700	10000 (c)	100		10000	NRDCSCC
Selenic acid	7782-49-3	40	3100 (d)	(b)		3100	NRDCSCC
Silver	7440-22-4	110	4100 (h)	(h)		4100	NRDCSCC
Styrene	70-117-1	2	9	100		100	IGWSCC
1,1,1,2-Tetrachloroethane	680-20-6	170	510	1		1	IGWSCC
1,1,2,2-Tetrachloroethane	79-12-6	3	70 (h)	1	10000	1	IGWSCC

**Table - 1**  
**General Fill Acceptance Criteria - Former Allied Signal Site**  
**Elizabeth, New Jersey**

Contaminant	CASRN	(RDCSCC)	(NRDCSCC)	(IGWSCC)	Maximum Onsite Concentration	Revised Final Acceptance Criteria	Rationale
Tetrachloroethene (Tetrachloroethylene) (PCE)	127-18-4	4 (k)	6 (k)	1	20	1	IGWSCC
Thallium	7440-29-1	20	20	(h)		20	NRDCSCC
Toluene	108-88-3	1000 (d)	1000 (d)	500		500	IGWSCC
Total Organic Contaminant Compounds	NA	10,000	10,000	—		10,000 (d)	
Total VOCs	NA	1,000	1,000	—		1000	
Trichloroethene	7067-33-7	NRDCSCC	NRDCSCC	50		50	NRDCSCC
1,2,4-Trichlorobenzene	120-82-1	60	1200	100		100	IGWSCC
1,2,3-Trichlorobenzene	7440-35-2	200	1000 (d)	50		50	IGWSCC
1,1,2-Trichloroethane	78-00-5	22	420	1		1	IGWSCC
Trichloroethylene (Trichloroethylene) (TCE)	7067-33-7	20	20 (h)	1	2000	1	IGWSCC
2,4,5-Trichlorophenol	88-06-4	8600	10000 (e)	50		10000	NRDCSCC
2,4,6-Trichlorophenol	88-06-2	60	200	10		200	NRDCSCC
Vanadium	7440-62-2	370	7100 (h)	(h)		7100	NRDCSCC
Vinyl Chloride	7535-9-1	2	2	10		10	IGWSCC
Xylenes (Total)	1330-20-7	410	1000 (d)	100 (d) (a)		87	IGWSCC
Zinc	7440-66-3	1000 (d)	1500 (h)	10		1500	NRDCSCC

**NJDEP Clean Up Criteria Notes**

- Criteria are health based using an incidental ingestion exposure pathway except where noted below.
- Criteria are subject to change based on site specific factors (e.g., aquifer classification, soil type, natural background, environmental impacts, etc.).
- Health based criterion exceeds the 10,000 mg/kg maximum for total organic contaminants.
- Health based criterion exceeds the 1000 mg/kg maximum for total volatile organic contaminants.
- Cleanup standard proposal was based on natural background.
- Health based criterion is lower than analytical limits cleanup criterion based on practical quantitation level.
- Criterion based on the inhalation exposure pathway.
- The impact to ground water values for inorganic constituents will be developed based upon site specific chemical and physical parameters.
- Site specific determination required for SOC for the allergic contact dermatitis exposure pathway.
- Contaminant not regulated for this exposure pathway.
- Criteria based on inhalation exposure pathway, which yielded a more stringent criterion than the incidental ingestion exposure pathway.
- No criterion derived for this contaminant.
- Criterion based on ecological (phytotoxicity) effects.
- Level of the human health based criterion is such that evaluation for potential environmental impacts on a site by site basis is recommended.
- Level of the criterion is such that evaluation for potential acute exposure hazard is recommended.
- Criterion based on the USEPA Integrated Exposure Uptake Biokinetics (IEUBK) model utilizing the default parameters. The concentration is considered to be protective.
- Criteria were derived from a model developed by the Society for Environmental Geochemistry and Health (SEGEH) and were designed to be protective for.
- Insufficient information available to calculate impact to ground water criteria.
- Criterion based on new drinking water standard.

**Site Specific Material Acceptance Criteria Notes**

- NA

# ENCAP - MEADOWLANDS REDEVELOPMENT SITE

## MATERIALS TESTING REQUIREMENTS - BELOW BARRIER LAYER

ENVIRONMENTAL ANALYSIS			GEOTECHNICAL ANALYSIS*			
MATERIAL TYPE	Full TCLP	Full PP-40 & EnCap Parameters (Note 1)	SAMPLE FREQUENCY	GRAIN SIZE	MODIFIED PROCTOR	% WOOD TOTAL ORGANIC CONTENT VOID VOLUME
Recycled Masonry (Brick, Block, & Glass)	-	-	NA	X	-	- X
Recycled Asphalt	-	-	NA	X	-	-
Water Treatment Plant Residuals (Note 2)	X	X	1 TCLP & 1 PP sample per 5000 cu. yds (composite of 1 sample per 1000 cu. yds). (Note 2).	X	X	-
Construction & Demolition Screenings (CDS)	X	X	1 TCLP & 1 PP sample per 2000 cu. yds (composite of 1 sample per 500 cu. yds), with <i>volatile organic analysis</i> (PPVO and TCLPVO) at 1 discrete sample per 500 cu.yds. (Note 3)	X	X	X
Construction Site Fill	X	X	1 TCLP & 1 PP sample per 5000 cu. yds (composite of 1 sample per 1000 cu. yds), with <i>volatile organic analysis</i> (PPVO and TCLPVO) at 1 discrete sample per 5000 cu.yds. (Note 4)	X	X	X
Materials from Area of Concern as defined by N.J.A.C. 7:26E-3.9 (f)	X	X	1 TCLP & 1 PP sample per 5000 cu. yds (composite of 1 sample per 1000 cu. yds), with <i>volatile organic analysis</i> (PPVO and TCLPVO) at 1 discrete sample per 5000 cu.yds. (Note 4).	X	X	X
Materials from Area of Concerns as defined by N.J.A.C. 7:26E-3.9 (a-e)	X	X	A minimum of 1 TCLP & 1 PP sample per 500 cu.yds (composite of 1 sample per 100 cu. yds), with <i>volatile organic analysis</i> (PPVO and TCLPVO) at 1 discrete sample per 500 cu.yds. (Note 4).	X	X	X
Chipped Tires	Not Required if from clean source (Note 5). If tire chips are soiled or have been stored outside for more than 1 year, see sample frequency.		1 TCLP & 1 PP sample per 5000 cu. yds (composite of 1 sample per 1000 cu. yds), with <i>volatile organic analysis</i> (PPVO and TCLPVO) at 1 discrete sample per 5000 cu.yds.	X	-	-
KEY:		TCLP = Toxicity Characteristic Leaching Procedure PP = Priority Pollutants	TCLPVO = Toxicity Characteristic Leaching Procedure Volatile Organics PPVO = Priority Pollutant Volatile Organics	X = Analysis Required - = No Analysis Required		
*Geotechnical Methods:		Geotechnical analysis will be performed at a frequency of 1 composite sample per 10,000 cy. Grain Size Analysis = ASTM D421 Modified Proctor Test = ASTM D698 & D1557	Void Volume must be determined by volumetric displacement methods. Percent Wood by dry weight. Total Organic Content (TOC) = ASTM D2974			
Environmental Notes:		A PP-40 test does not include all parameters on the NJDEP's Soil Cleanup Criteria (SCC) list. All samples requiring a PP-40 shall additionally be analyzed for the remaining parameters on the SCC list, and for TPHC. For a full list of parameters (besides TPHC) and their acceptance limits, refer to the table herein entitled "Approved Soil Acceptance Criteria".				
NOTE 1		After 10,000 cy of CDS materials from a single CDS source has been sampled, analyzed, and shown not to exceed the site's acceptance criteria, a reduced sampling frequency may be applied to that specific CDS source. The reduced testing frequency shall consist of one composite sample per 10,000 cy generated from 1 discrete sample every 1,000 cy, with <i>volatile analysis</i> (PPVO and TCLPVO) at 1 discrete sample per 1,000 cy.				
NOTE 2		Volatile organic analysis is not required for Water Treatment Plant Residuals.				
NOTE 3		After 10,000 cy of CDS materials from a single CDS source has been sampled, analyzed, and shown not to exceed the site's acceptance criteria, a reduced sampling frequency may be applied to that specific CDS source. The reduced testing frequency shall consist of one composite sample per 10,000 cy generated from 1 discrete sample every 1,000 cy, with <i>volatile analysis</i> (PPVO and TCLPVO) at 1 discrete sample per 1,000 cy.				
NOTE 4		Site specific requirements will apply. Submit to the Review Engineer all characterization performed prior to excavation at its original site by sampling procedures and analytical requirements in accordance with the Technical Requirements for Site Remediation (NJAC 7:26E).				
NOTE 5		If the tire chips have been stored outside for over one year in an environment unprotected from the elements, or intermixed with soils or other materials, the tires will need to be analyzed for Full TCLP and Full PP-40. See Sample Frequency above.				

**APPROVED SOIL ACCEPTANCE CRITERIA**  
**EnCap Meadowlands Redevelopment Site**

Parameter	NJDEP Non-Residential Soil Cleanup Criteria (ppm)	Alternate Acceptance Criteria (ppm) (Note 1)	Parameter Category*	Parameters Not Included in a PP+40
Acenaphthene	10000	—	S	
Acetone	1000	—	V	X
Acrylonitrile	5	—	V	
Aldrin	0.17	—	P	
Anthracene	10000	—	S	
Antimony	340	680	M	
Arsenic	20	100	M	
Barium	47000	—	M	X
Benzene	13	—	V	
Benzo(b)fluoranthene	4	Note 2	S	
Benzo(a)anthracene	4	Note 2	S	
Benzo(e)pyrene	0.66	Note 2	S	
Benzo(k)fluoranthene	4	Note 2	S	
Benzyl Alcohol	10000	—	S	X
Beryllium	2	10	M	
Bis(2-chloroethyl)ether	3	30	S	
Bis(2-chloroisopropyl)ether	10000	—	S	
Bis(2-ethylhexyl)phthalate	210	—	S	
Bromodichloromethane	46	—	V	
Bromoform	370	—	V	
Bromomethane	1000	—	V	
2-Butanone (MEK)	1000	—	V	X
Butylbenzyl phthalate	10000	—	S	
Cadmium	100	200	M	
Carbon tetrachloride	4	—	V	
4-Chloroaniline	4200	—	S	X
Chlorobenzene	680	—	V	
Chloroform	28	—	V	
4-Chloro-3-methyl phenol	10000	—	S	
Chloromethane	1000	—	V	
2-Chlorophenol	5200	—	S	
Chromium - hexavalent (VI)	20	—	M	X
Chromium - trivalent (III)	—	—	M	X
Chrysene	40	Note 2	S	
Copper	600	4000	M	
Cyanide	21000	—	M	
4,4'-DDD	12	—	P	
4,4'-DDE	9	—	P	
4,4'-DDT	9	—	P	
Dibenz(a,h)anthracene	0.66	Note 2	S	
Dibromochloromethane	1000	—	V	
Di-n-butyl phthalate	10000	—	S	
Di-n-octyl phthalate	10000	—	S	
1,2-Dichlorobenzene	10000	—	S	
1,3-Dichlorobenzene	10000	—	S	



**APPROVED SOIL ACCEPTANCE CRITERIA**  
**EnCap Meadowlands Redevelopment Site**

Parameter	NJDEP Non-Residential Soil Cleanup Criteria (ppm)	Alternate Acceptance Criteria (ppm) (Note 1)	Parameter Category*	Parameters Not Included in a PP+40
1,4-Dichlorobenzene	10000	3000	S	
3,3'-Dichlorobenzidine	6	30	S	
1,1-Dichloroethane	1000	1000	V	
1,2-Dichloroethane	24	1000	V	
1,1-Dichloroethene	180	1000	V	
1,2-Dichloroethene (trans)	1000	1000	V	
1,2-Dichloroethene (cis)	1000	1000	V	X
2,4-Dichlorophenol	3100	1000	S	
1,2-Dichloropropane	43	1000	V	
1,3-Dichloropropene (cis and trans)	5	1000	V	
Dieldrin	0.18	1000	P	
Diethyl phthalate	10000	1000	S	
2,4-Dimethyl phenol	10000	1000	S	
Dimethyl phthalate	10000	1000	S	
2,4-Dinitrophenol	2100	1000	S	
Dinitrotoluene(2,4-/2,6-mixture)	4	20	S	
Endosulfan	6200	1000	P	
Endrin	310	1000	P	
Ethylbenzene	1000	1000	V	
Fluoranthene	10000	1000	S	
Fluorene	10000	1000	S	
Heptachlor	0.66	6.5	P	
Hexachlorobenzene	2	20	S	
Hexachlorobutadiene	21	105	S	
Hexachlorocyclopentadiene	7300	1000	S	
Hexachloroethane	100	1000	S	
Indeno(1,2,3-cd)pyrene	4	40	S	
Isophorone	10000	1000	S	
Lead	600	1200	M	
Lindane (gamma BHC)	2.2	1000	P	
2-Methylphenol	10000	1000	S	X
4-Methylphenol	10000	1000	S	X
Methoxychlor	6200	1000	P	X
Mercury	270	1000	M	
4-Methyl-2-pentanone	1000	1000	V	X
Methylene chloride	210	1000	V	
Naphthalene	4200	1000	S	
Nickel	2400	1000	M	
Nitrobenzene	520	1000	S	
N-Nitrosodiphenylamine	600	1000	S	
N-Nitrosodi-n-propylamine	0.66	6.6	S	
PCBs (Polychlorinated biphenyls)	2	1000	P	
Pentachlorophenol	24	110	S	
Phenol	10000	1000	S	
Pyrene	10000	1000	S	

**APPROVED SOIL ACCEPTANCE CRITERIA**  
**EnCap Meadowlands Redevelopment Site**

Parameter	NJDEP Non-Residential Soil Cleanup Criteria (ppm)	Alternate Acceptance Criteria (ppm) (Note 1)	Parameter Category*	Parameters Not Included in a PP+40
Selenium	3100	—	M	
Silver	4100	—	M	
Styrene	97	—	V	X
1,1,1,2-Tetrachloroethane	310	—	V	
1,1,2,2-Tetrachloroethane	70	—	V	
Tetrachloroethene	6	—	V	
Thallium	2	<b>10</b>	M	
Toluene	1000	—	V	
Toxaphene	0.2	—	P	
1,2,4-Trichlorobenzene	1200	—	S	
1,1,1-Trichloroethane	1000	—	V	
1,1,2-Trichloroethane	420	—	V	
Trichloroethene	54	—	V	
2,4,5-Trichlorophenol	10000	—	S	X
2,4,6-Trichlorophenol	270	—	S	
Vanadium	7100	—	M	X
Vinyl chloride	7	—	V	
Xylenes (Total)	1000	—	V	X
Zinc	1500	<b>3000</b>	M	

\*Parameter Category: M = Metal or Inorganic, S = Semi-volatile, P = Pesticide

**NOTE 1:** Soil acceptance criteria for the EnCap site includes NJDEP Non-Residential Direct Contact Soil Cleanup Criteria, and AAC values where applicable. AAC values are in bold.

**NOTE 2:** The sum of these PAHs may not exceed 200 ppm and the concentration of any individual PAH may not be 15 times greater than its NRDCSCC. Additionally, these concentrations shall not exceed the Impact to Ground Water Soil Cleanup Criteria (IGWSCC).

**APPENDIX C**  
**TREATMENT AND DISPOSAL FACILITIES TESTING PROTOCOL**



## Analytical Requirements For Clean Earth of Carteret, Inc.

### I. Contaminated Soil from Residential Source:

- TPH every 100 cubic yards (150 tons) - *NJ Method GC/FID OQA-QAM-025 or SW-846 Method 8015*
- VO Scan every 800 cubic yards (1200 tons) - *SW-846 Method 8260*

### II. Contaminated Soil from Commercial Source:

- TPH every 100 cubic yards (150 tons) - *NJ Method GC/FID OQA-QAM-025 or SW-846 Method 8015*
- VO Scan every 800 cubic yards (1200 tons) - *SW-846 Method 8260*
- PCB's every 800 cubic yards (1200 tons)
- TCLP RCRA Metals every 800 cubic yards (1200 tons)
- RCRA Characteristics (Ignitability, Corrosivity, Reactivity) every 800 cubic yards (1200 tons)
- PAH's every 800 cubic yards (1200 tons) - *SW-846 Method 8270*

### Notes:

1. Total TPH not to exceed 10,000 PPM/vol.
2. All Incoming Soil must be RCRA Non-Hazardous.
3. All Analysis must be performed by a New Jersey Certified Laboratory.
4. TPH Sampling Frequency: (5) 20 yard grabs composited for each 100 yards of material.
5. Other Sampling Frequency: (8) 100 yard grabs composited for each 800 yards of material.
6. Percent Moisture not to exceed 15 percent. (No Free Liquids - Must Pass Paint Filter Test).
7. PAH constituents exceeding NJNRDSCC are evaluated on a case-by-case basis.

**Clean Earth of Philadelphia**  
Analytical Acceptance Requirements

**Non-Petroleum Sources**

Frequency	Sample Type	Analysis	Method	Limit
First 90 Tons	Grab	Volatile Organics	8260B	<30,000
		TCLP Volatile Organics	1311/8260B	TCLP Limits
Second 90 Tons	Grab	Volatile Organics	8260B	<30,000
		TCLP Volatile Organics	1311/8260B	TCLP Limits
Every 180 tons thereafter	Grab	Volatile Organics	8260B	<30,000
		TCLP Volatile Organics	1311/8260B	TCLP Limits
Every 900 Tons	Composite	Semivolatile Organics	8270C	<400,000
		TCLP Metals**	1311/6010	TCLP Limits
		Ignitibility	1010	negative
		Corrosivity	9040	>2 - <12.5
		Reactivity-Sulfide/Cyanide	SW-846 7.3	RORA Limits
		PCBs	8082	<50
		TOX	9023	<1000
		Total Sulfur	ASTM D129	None
		TCLP Organics***	1311/8000	TCLP Limits

\*\*Includes As, Ba, Cd, Cr, Cu, Hg, Ni, Pb, Se, Ag, Zn

**Coal Tar Sources**

Frequency	Sample Type	Analysis	Method	Limit
First 90 Tons	Grab	Volatile Organics	8260B	<30,000
		TPH- DRO to C-44	8015M*	<400,000
		Semivolatile Organics	8270C	<400,000
Second 90 Tons	Grab	Volatile Organics	8260B	<30,000
		TPH- DRO to C-44	8015M*	<400,000
		Semivolatile Organics	8270C	<400,000
Every 180 tons thereafter	Grab	Volatile Organics	8260B	<30,000
		TPH- DRO to C-44	8015M*	<400,000
		Semivolatile Organics	8270C	<400,000
Every 900 Tons	Composite	TCLP Metals**	1311/6010	TCLP Limits
		Ignitibility	1010	negative
		Corrosivity	9040	>2 - <12.5
		Reactivity-Sulfide/Cyanide	SW-846 7.3	RORA Limits
		PCBs	8082	<50
		Total Sulfur	ASTM D129	None
		TCLP Organics***	1311/8000	TCLP Limits

\*\*Includes As, Ba, Cd, Cr, Cu, Hg, Ni, Pb, Se, Ag, Zn

Method 418.1M cannot be used for coal tar sources

\*\*\* Includes VOA, Semivoa, pesticides, herbicides

## Soil Safe, Inc. - Logan, NJ Facility Non-Hazardous Material Approval Procedures

### Bridgeport Facility Acceptance Criteria – Minimum Analytical Requirements

EPA 8260 (VOC)	(at least 1 analysis per every 800 yd <sup>3</sup> )
EPA 1311 (TCLP Metals)	(at least 1 representative composite sample per site) (Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver) As Ba Cd Cr Pb Hg Se Ag
EPA 8082 (PCB)	(at least 1 representative composite sample per site)
Total Metals	(at least 1 representative composite sample per every 800 yd <sup>3</sup> ) (Arsenic, Beryllium, Cadmium, Chromium, Lead, Nickel, Mercury & Zinc) As Be Cd Cr Pb Ni Hg Zn
Moisture	(at least 1 representative composite sample per every 800 yd <sup>3</sup> )
EPA 9095 Paint Filter	(at least 1 representative composite sample per every 800 yd <sup>3</sup> )
EPA 8270 (PAH)	(for industrial sites only**, 1 per every 800 yd <sup>3</sup> )
EPA 8015 (TPH)	<b>EITHER</b> GRO for gasoline contaminated soils (1 per every 100 yd <sup>3</sup> ) Acceptance level – less than 30,000 ppm  <b>OR</b> DRO for other petroleum contaminated soils (1 per every 100 yd <sup>3</sup> ) Acceptance level – less than 30,000 ppm

**Note:** Other tests may be required depending on source of contamination.

An authorized representative of Soil Safe Incorporated will review the analytical results. If approved for recycling at the facility, an **Approval Number** will be provided and must be on the incoming manifest or the shipment will be rejected at the facility.

**Only after Soil Safe verifies that the soil meets all acceptance criteria**, following confirmatory analysis performed after arrival at the facility, will Soil Safe Inc. assume ownership and/or responsibility for the soil.

**APPENDIX E**  
**SOIL MANAGEMENT PLAN**

# **West 61<sup>st</sup> Street Site**

**BCP ID 231043**

**NEW YORK, NEW YORK**

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## **Soil Management Plan**

**AKRF Project Number: 10321**

### **Prepared for:**

Algin Management Company, LLC  
64-35 Yellowstone Boulevard  
Forest Hills, New York 11375

### **Prepared by:**



**AKRF Engineering, P.C.**

440 Park Avenue South  
New York, NY 10016  
212-696-0670

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**MARCH 2006**



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**TABLE OF CONTENTS**

1.0	INTRODUCTION .....	1
2.0	SITE DESCRIPTION .....	2
2.1	Site Location .....	2
2.2	Site and Vicinity Characteristics .....	2
2.3	Nearby Public Areas of Concern .....	2
2.4	Description of Contemplated Site Use .....	2
2.5	Site Geology, Hydrogeology, and Subsurface Characteristics .....	2
2.6	Nature and Extent of Contamination .....	3
2.6.1	Soil Contamination.....	3
2.6.2	Groundwater Contamination .....	4
2.6.3	Soil Gas .....	4
3.0	SUMMARY OF REMEDY .....	5
4.0	SOIL MANAGEMENT .....	5
4.1	Site Preparation .....	6
4.2	Soil Excavation and Stockpiling.....	6
4.2.1	Excavation Requirements.....	6
4.2.2	Fill .....	6
4.2.3	Petroleum-Contaminated Soil .....	7
4.2.4	Construction and Demolition Debris/Municipal Waste – Lot 8.....	7
4.2.5	Native Soil.....	7
4.2.6	Bedrock .....	8
4.2.7	Soil Segregation .....	8
4.2.8	Stockpile Management.....	8
4.3	Soil Characterization .....	9
4.3.1	Petroleum-Contaminated Material .....	9
4.3.2	Fill .....	9
4.3.3	Native Soil.....	10
4.3.4	Construction and Demolition Debris/Municipal Waste – Lot 8.....	10
4.3.5	Discovered Waste Material .....	10
4.3.6	Bedrock .....	10
4.3.7	Imported Backfill .....	10
4.4	Cover System.....	11
4.5	Erosion Control/Stormwater Management.....	11
4.6	Air Quality Monitoring.....	12
4.7	Construction Water Management.....	12
4.8	Access Control.....	12
5.0	OFF-SITE DISPOSAL/HAUL ROUTES.....	12
5.1	Receiving Facilities .....	12
5.2	Transportation Routes .....	13
6.0	HEALTH AND SAFETY .....	13
7.0	QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC).....	13
7.1	Analytical Data.....	13
8.0	NOTIFICATION AND REPORTING .....	14

## **FIGURES**

- Figure 1      Transportation Route from Project Site to Lincoln Tunnel  
Figure 2      Transportation Route from Project Site to George Washington Bridge

## **APPENDIX**

Appendix A — Resumes of Environmental Monitoring Personnel

## 1.0 INTRODUCTION

The West 61<sup>st</sup> Street Site (the “Site”) consists of approximately 1.4 acres, located between West 60<sup>th</sup> and 61<sup>st</sup> Streets. The Site is on a block situated between West End Avenue and Amsterdam Avenue in Manhattan, New York (Remedial Work Plan [RWP] Figure 1). These parcels are currently occupied by vacant land, except for the northeastern corner of the Site, which is presently used as a commercial parking lot. Residential, industrial, institutional (school), and commercial properties are present in the surrounding neighborhood.

A Phase I Environmental Site Assessment (ESA) performed by AKRF, Inc. (AKRF) in June 2003 identified Recognized Environmental Conditions (RECs) for the Site, including former and current land use and potential underground storage tanks. In October 2004, West 60<sup>th</sup> Street Associates, LLC and West End Enterprises, LLC (the Volunteer), submitted an application to participate in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP). The Brownfield Cleanup Agreement for the Site was signed by the Volunteer in March 2005, and has been subsequently executed by NYSDEC. Under this agreement, the Volunteer prepared and submitted a Remedial Investigation Work Plan (RIWP), dated April 2005, which included the Phase I ESA, and a subsequent RIWP Addendum, dated June 2005, which were approved by the NYSDEC. These documents were prepared in compliance with NYSDEC Division of Environmental Remediation guidance document DER-10 and included digital submittals.

The Remedial Investigation (RI) commenced in late summer of 2005 and was completed in early November. The Remedial Investigation Report (RIR) indicated that the Site did not contain hazardous waste (other than one sample that contained an elevated lead concentration), nor did the Site pose a significant threat to the public health and the environment. The groundwater leaving the southwestern corner of the Site contained benzene and two pesticides (4,4'-DDD and heptachlor epoxide) in concentrations slightly above their respective groundwater standards. Several metals were also detected whose unfiltered (total metal) sample concentrations were above groundwater quality standards. Volatile organic compounds (VOCs) were present in the soil vapor collected at five locations around the Site, but were not considered to have an adverse health effect on the area surrounding the Site. Seven on-site Areas of Concern (AOCs) were identified in the RIR. Three identified AOCs are suspected locations of underground storage tanks, identified during the geophysical survey. A fourth tank, located in the basement of a former building, was not verified during the RI field work, but is still considered to be an AOC. The analysis of soil samples collected at two locations indicated the presence of lead and acetone in concentrations warranting removal. The lead was further tested through the Toxicity Characteristic Leaching Procedure (TCLP), and was determined to be a characteristic hazardous waste. The acetone is considered to be a non-hazardous industrial waste. The final on-site AOC identified was an area of apparent petroleum-contaminated soil and groundwater along West 60<sup>th</sup> Street.

Prior to commencing the Remedial Work Plan (RWP), an Interim Remedial Measure (IRM) Work Plan, will begin to clean up five of the AOCs. The IRM will excavate and remove tanks at the three locations (AOC-2, AOC-3, and AOC-4). All liquids, semi-solids, and solids will be removed from the tanks. The tanks will be cleaned and removed and any contaminated soil will be removed. Each material will be transported to an approved disposal, processing, or recovery facility. Post-excavation samples will be collected to verify that all contamination has been removed from the surrounding area. The lead-contaminated and acetone-affected soil will be excavated and transported off-site to approved disposal facilities. Post-excavation samples will be collected to verify that all contaminated or affected soil has been removed to applicable NYSDEC standards. This work will be undertaken with an approved Remediation Health and Safety Plan (RHASP), including a Community Air Monitoring Plan (CAMP). The RWP will begin after the completion of the IRM activities.

This Soil Management Plan (SMP) has been included as an appendix to the RWP to describe the procedures and protocols for disturbance of soil and groundwater at the Site during planned Site remediation, Site redevelopment, and long-term use (if a Track 4 Cleanup is selected). It will be applied in conjunction with a Site-specific RHASP and Air Monitoring Work Plan, which are being submitted as part of the RWP.

## **2.0 SITE DESCRIPTION**

### **2.1 Site Location**

The West 61<sup>st</sup> Street Site (the “Site”) consists of approximately 62,500 square feet located on West 60<sup>th</sup> and 61<sup>st</sup> Streets between West End Avenue and Amsterdam Avenue in Manhattan, New York (Remedial Work Plan [RWP] Figure 1). Specifically, the study Site consists of Block 1152, Lots 5, 8, 10, 11, 12, 13, 43, 52, 53, and 55 (RWP Figure 2).

### **2.2 Site and Vicinity Characteristics**

The Site is located in an area currently going through a transformation from residential, industrial, and commercial establishments, to schools and residential buildings containing first floor retail uses (stores). Past and present commercial establishments in the area have included gasoline stations, automobile repair shops, a fabric/button manufacturer that generated hazardous wastes, and a railyard. The immediate area around the Site currently contains residential buildings, three schools, a community center, and an auto repair shop.

### **2.3 Nearby Public Areas of Concern**

There are a number of residences and schools in close proximity to the Site. Residences and a public school are located across West 61<sup>st</sup> Street from the Site. Another public school is located adjacent to Lot 43, along West 61<sup>st</sup> Street, at the intersection of West 61<sup>st</sup> Street and Amsterdam Avenue. A residential building is being constructed adjacent to Lot 13, along West 60<sup>th</sup> Street. A New York City Parks Department pool is located across West 60<sup>th</sup> Street. A charter school is located on West 60<sup>th</sup> Street adjacent to Lot 5. There is presently new building construction at the southeastern corner of West 60<sup>th</sup> Street and West End Avenue, and on the west side of West End Avenue between West 60<sup>th</sup> and 61<sup>st</sup> Streets. The immediate area is shown on Figure 2 of the Remediation Work Plan (RWP); the surrounding area is shown on the Land Use Plan (RWP Figure 8).

### **2.4 Description of Contemplated Site Use**

The proposed development on the Site is a multi-tenant residential complex with low-rise and high-rise structures located on the “Main Area” of the Site, between West 60<sup>th</sup> and 61<sup>st</sup> Streets. A two-level underground parking garage would be situated beneath two of the buildings (Buildings B and C). A recreation area, consisting of a tennis court and track, would be constructed on the “Eastern Area” of the Site, along West 60<sup>th</sup> Street. The layout of these contemplated uses is shown on Remedial Work Plan (RWP) Figure 15.

### **2.5 Site Geology, Hydrogeology, and Subsurface Characteristics**

The surface topography at the Site and the surrounding area slopes downward from east to west towards the Hudson River. Based on a Site survey by True North Surveyors, Inc., the property lies at an elevation of approximately 61 feet at its highest point, sloping westerly to an elevation

of approximately 32 feet at its lowest point, based on the Borough of Manhattan Datum (RWP Figure 6). Geotechnical engineering borings performed by RA Consultants (RWP Appendix P) indicate that the bedrock surface is variable and ranges from elevation 40.8 feet in the northeastern corner to elevation 0 along West 61<sup>st</sup> Street near the northwestern corner of the Site (RWP Figure 9). Depth to bedrock varies from 9.5 to 45 feet below existing ground surface. The geotechnical investigation indicated that the bedrock appears to undulate as well as slope. The bedrock consists of highly-weathered schist that is part of the Manhattan Formation.

The information gathered from the overburden and bedrock groundwater monitoring wells identified groundwater at depths of approximately 10 to 16 feet below grade. In the bedrock aquifer, the groundwater elevations ranged from elevation 51 in the northeastern corner of the Site to elevation 31 in the southeastern corner. Based on this information, the estimated flow direction in the bedrock aquifer appears to be slightly towards the southwest. Groundwater was not encountered in the overburden aquifer in the Eastern Area of the Site. The groundwater ranged from elevation 30 to elevation 15 in the central portion to the western perimeter of the Site. Groundwater in the overburden aquifer appears to flow from the northeast to the southwest, ultimately discharging into the Hudson River. The groundwater flow at the Site is likely affected by one or more factors, which may include current and past pumping of groundwater; past filling activities; underground utilities and other subsurface openings or obstructions such as basements or underground parking garages; bedrock geology; and other factors. Groundwater in New York County is not used as a source of potable water.

## 2.6 Nature and Extent of Contamination

### 2.6.1 Soil Contamination

The overburden soil at the Site, excluding the northeastern area located along West 61<sup>st</sup> Street, consists of two distinct layers. The upper layer, ranging from approximately 3 to 16 feet, is urban fill material, consisting of rock, brick, gravel, silt, wood, and glass, with ash and slag. The lower layer is native soil, composed of sand and silt with some gravel. The urban fill material was placed directly on the bedrock in the Eastern Area of the Site (presently used as a parking lot). The native soil varies in thickness from 6 to 26 feet in the Main Area of the Site, located between West 60<sup>th</sup> and 61<sup>st</sup> Streets. The two layers differ in chemical composition. Semi-volatile organic compounds (SVOCs), including carcinogenic polycyclic aromatic hydrocarbons (cPAHs), were detected in the 28 samples collected at the surface and below grade. The concentrations of one or more cPAHs at 20 sample locations were above the New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs). Surficial samples of the fill material contained one volatile organic compound (VOC) (acetone); no other VOCs were detected in the fill material. The fill material did not contain pesticides or polychlorinated biphenyls (PCBs). Each fill sample contained at least one metal above the Eastern US background range. Zinc was identified in every sample at concentrations above the Eastern US background range. Other metals detected in concentrations above the Eastern US background range included aluminum, barium, cadmium, calcium, chromium, copper, lead, magnesium, mercury, and nickel. The native soil did not contain VOCs, SVOCs, pesticides, or PCBs. One or two metals were present in concentrations above Eastern US background concentrations. Two of the 14 native soil samples contained one VOC each; acetone and xylenes (total). Three samples contained one or more cPAHs (SVOCs). Eleven of the 14 native soil samples collected contained

one or more metals in concentrations above the Eastern US background ranges. Zinc was the most prevalent. Other metals present in the native soil in concentrations above the Eastern US background ranges were aluminum, barium, cadmium, calcium, chromium, lead, magnesium, mercury, and nickel.

The analytical data from boring B-17 and observations of staff during the drilling of the geotechnical and environmental borings in the southern portion of the Site along West 60<sup>th</sup> Street indicate the presence of a petroleum substance in the soil. Elevated cPAHs were present in the two samples of native soil collected from boring B-17 at depths just above and below the apparent groundwater level. The source of this contamination has not been identified. Acetone was detected in soil samples collected at two locations, MW-4 (12'-14') and MW-6 (0-2'). The Remedial Work Plan (RWP) includes: additional proposed soil sampling to provide in-situ sampling of the fill material and native soil at and above elevation 14.5 for classification and disposal options; and determining the horizontal and vertical extent of the petroleum contamination along West 60<sup>th</sup> Street.

### **2.6.2 Groundwater Contamination**

The groundwater flows through the Site generally from the east and northeast towards the southwest. The groundwater in the eastern (parking lot) and southeastern portions of the Site is present in the bedrock only. No volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyls (PCBs) were detected at concentrations above New York Code of Rules and Regulations (NYCRR) Section 703.5, Groundwater Quality Standards and/or Technical and Operational Guidance Series (TOGS) 1.1.1. Four metals (aluminum, iron, manganese, and sodium) were present in the groundwater samples collected from these upgradient bedrock monitoring wells in concentrations above groundwater standards. Due to the sharp decrease in elevation of the bedrock, the bedrock groundwater discharges into the Site overburden (fill and native soil). Metals were detected in filtered and unfiltered samples taken from "intermediate" groundwater monitoring wells MW-1, MW-4, and MW-8. In two of these wells (MW-1 and MW-4), no VOCs, SVOCs, pesticides, or PCBs were detected above groundwater standards. The sample collected from MW-8 contained four VOCs (benzene, toluene, ethylbenzene, and xylenes [total]) in concentrations above groundwater standards. One SVOC (naphthalene) was detected at a concentration above its groundwater standard. MW-8 is approximately 80 feet downgradient of boring B-17, the location of the petroleum-contaminated material. This petroleum appears to be flowing on the groundwater table towards the southwestern corner of the Site. The samples collected from downgradient groundwater monitoring wells MW-6, MW-7, and MW-7D contained ten metals (aluminum, cadmium, chromium, iron, lead, magnesium, manganese, nickel, selenium, and sodium), analyzed from unfiltered samples, in concentrations above groundwater standards. Two pesticides (4,4'-DDD in MW-7 and heptachlor epoxide in MW-7D) were present in concentrations above groundwater standards. Benzene was present in a sample collected from MW-7 at a concentration of 2.0 micrograms per liter [ $\mu\text{g/L}$ ], above the groundwater standard of 1.0  $\mu\text{g/L}$ . The presence of benzene in the groundwater at location MW-7 indicates that the petroleum contamination has migrated to the southwestern corner of the Site.

### **2.6.3 Soil Gas**

Volatile organic compounds (VOCs) were detected in the soil vapor probes installed and sampled around the perimeter of the Site. The sample collected from soil vapor probe

SG-3D, located near MW-8, contained one tentatively identified compound (TIC) (unknown VOC) at a concentration of 14,000 parts per billion per (1 Liter) volume (ppbv). This vapor probe was installed at a depth of approximately 12 feet below the surface, and was located in the area of the apparent petroleum contamination plume. This area will be excavated to bedrock as part of the construction of the parking garage. Samples collected from the other soil vapor probes contained numerous VOCs in concentrations ranging from one microgram per cubic meter [ $\mu\text{g}/\text{m}^3$ ] to  $390 \mu\text{g}/\text{m}^3$ , with a few TICs, ranging up to 690 ppbv. A number of the VOCs detected in the soil vapor were not found in the soil or groundwater. This indicates the existence of apparent off-site source(s) of VOCs, which have migrated beneath the Site. In all but two locations, the southeastern and northeastern corners (parking lot) of the Site, the construction of the cellar and sub-cellar will result in the removal of the fill material and, therefore, the structures will be below the groundwater level, thus eliminating any need for soil vapor management. In the northeastern corner of the Site, the area will be covered with asphaltic concrete, paving block, and/or two feet of soil for recreation and outdoor use. Therefore, soil vapor management will not be required. A cellar will be constructed to elevation 30 in the southeastern corner of the Site. The structure will be placed directly onto bedrock in half of this section. Native soil will remain beneath the structure in the remainder of the section. This area will be further evaluated during the remedial design process to determine whether soil vapor management is needed.

### **3.0 SUMMARY OF REMEDY**

The selected remedy for the Site involves excavating and disposing of fill material, construction and demolition (C&D) debris in Lot 8, and native soil that contains contaminant concentrations exceeding the Site Specific Soil Action Levels (SSSALs), as defined in the Remedial Work Plan (RWP), or the Recommended Soil Cleanup Objectives (RSCOs) in Division of Environmental Remediation Technical and Administrative Guidance Memorandum (TAGM) #4046, dependent upon the cleanup track (Track 4 or Track 1, respectively) selected. The anticipated limits of the soil removal are shown on RWP Figure 5. Based on the potential presence of petroleum (normally containing volatile organic compounds [VOCs]) in the on-site soil and groundwater, nuisance odors may be encountered during the excavation activities. A Remedial Health and Safety Plan (RHASP), including a Community Air Monitoring Plan (CAMP), will be implemented to ensure protection of Site workers and the surrounding community. The floor slabs of the cellar in Building A and the sub-cellars in Buildings B and C will be below the groundwater table. A membrane will be placed beneath the slabs to prevent groundwater infiltration into the buildings. The two sections of the cellar in Buildings B and C jut outside of the sub-cellar foundation. Although these small areas are approximately ten feet above the groundwater table, the soil vapor concentrations in these areas are not significant, and the residents using these buildings will reside on the second floor and above, a membrane vapor barrier will be installed beneath these floor slabs. If a Track 4 Cleanup is selected, institutional controls, such as an environmental easement, will be implemented to prevent exposure to residual contamination that is left in place following soil removal.

### **4.0 SOIL MANAGEMENT**

The intended soil handling at the Site is to load the excavated material destined for off-site disposal directly onto the hauling vehicles. To accomplish this, a pre-excavation in-situ sampling program will be undertaken to collect composite samples of the fill material, construction and demolition (C&D) debris in

Lot 8, native soil, and petroleum-contaminated material. The sampling protocol (e.g., sampling frequency, sampling parameters, sample location) will be consistent with the requirements of the receiving facilities and appropriate State regulatory agencies governing the receiving facilities. Stockpiling of excavated material will occur only if the material is considered for reuse at the Site, or if the trucks are not present for immediate loading. Excavated material destined for off-site use or disposal will not reside on the Site for more than 72 hours, if possible.

Site remediation may involve disturbing large volumes of petroleum-contaminated soil, with excavations extending below the water table into intervals where light non-aqueous phase liquids (LNAPLs) may be present. However, no LNAPL or dense non-aqueous phase liquid (DNAPL) was detected during the Remedial Investigation (RI). More stringent soil management requirements will be specified during the removal of the petroleum-contaminated material. Site redevelopment and future maintenance activities will occur after all of the petroleum-contaminated material has been removed from the Site, and only fill and native soil will remain. Then, less stringent soil management procedures will be required. The following sections describe the measures that will be taken to minimize impacts to human health and the environment during both small- and large-scale soil disturbance activities.

All soil management activities will be monitored by AKRF personnel. Michelle Lapin, P.E., will serve as the Project Director. Richard Gardineer, P.E., will serve as the Project Manager. Freda Ponce and/or Jessica Leber will be at the Site, monitoring the soil excavation, stockpiling, and loading activities; collecting soil samples for waste classification and endpoint verification; and collecting air samples and conducting air monitoring. Copies of their resumes are found in Appendix A.

#### **4.1 Site Preparation**

Prior to conducting any intrusive activities, excluding the activities addressed in the Interim Remedial Measure (IRM) Work Plan for Site remediation and redevelopment activities, a Site plan will be prepared that defines the work zone(s), designated entry points, soil stockpile staging areas, decontamination zones, and truck routes, as applicable. The Site plan will be updated as necessary to reflect any changes in operations during the course of the intrusive work. The existing fence will be maintained during remediation activities to ensure access control to the Site. Necessary sediment and erosion control measures will be installed prior to any intrusive activities.

#### **4.2 Soil Excavation and Stockpiling**

The New York State Department of Environmental Conservation (NYSDEC) will be notified a minimum of one week prior to the initiation of any soil disturbance activities.

##### **4.2.1 Excavation Requirements**

Excavations for remediation, Site development, and future maintenance will be considered open excavations and will be managed according to applicable local, State, and federal regulations. All entrance gates will be closed and locked overnight. Fencing will be maintained to prevent unauthorized access.

##### **4.2.2 Fill**

The upper on-site layer, ranging in thickness up to approximately 16 feet, containing rock, brick, concrete, wood, glass, ash, and slag, is considered to be a fill material. Fill material is not petroleum-contaminated, but may contain concentrations of polycyclic aromatic hydrocarbons (PAHs) and metals. During Site remediation, excavated fill may be stockpiled for on-site use only if a Track 4 Cleanup is selected and the compounds



present in the fill are less than the Site Specific Soil Action Levels (SSSALs). All soil stockpiling and handling will be conducted as described in Section 4.2.8. Characterization for on-site reuse and off-site disposal will be conducted as described in Section 4.3. Preliminary estimates indicate that approximately 30,000 cubic yards (cy) of fill material will be excavated and removed from the Site.

#### **4.2.3 Petroleum-Contaminated Soil**

Petroleum-contaminated soil consists of soil containing low levels of benzene, toluene, ethyl-benzene, and xylene (BTEX), with relatively lower naphthalene and polycyclic aromatic hydrocarbon (PAH) concentrations. The lateral and vertical extents of petroleum-contaminated soil that exceed the Site Specific Soil Action Levels (SSSALs) and Technical and Administrative Guidance Memorandum (TAGM) #4046 will be determined during the petroleum delineation and waste characterization sampling as described in the Sampling Plan (Remedial Work Plan [RWP] Appendix D). During remediation activities, the petroleum-contaminated material will be excavated, loaded directly onto trucks to the extent feasible, and disposed of off-site as non-hazardous petroleum-contaminated waste, based on pre-characterization sampling, conducted as described in Section 2.0 of the Sampling Plan. Preliminary estimates indicate that approximately 5,000 cubic yards (cy) of petroleum-contaminated soil will be excavated and removed from the Site.

#### **4.2.4 Construction and Demolition Debris/Municipal Waste – Lot 8**

Test trenches excavated into the building's basement on Lot 8 during the Remedial Investigation (RI) indicated the presence of construction and demolition (C&D) debris, as defined in 6 New York Code of Rules and Regulations (NYCRR) Part 360. During remediation activities, this material will be excavated, loaded directly onto trucks to the extent feasible, and disposed of off-site as C&D debris, or possibly, dependent upon the presence of non-structural material, as a non-hazardous municipal solid waste. Preliminary estimates indicate that 1,500 cubic yards (cy) of C&D debris will be excavated and removed from the Site.

#### **4.2.5 Native Soil**

The soil samples collected from the Remedial Investigation (RI) borings indicated the presence of a layer of sand and silt with some gravel beneath the fill material overlying bedrock. Based on testing data gathered thus far, this native soil in the northern area of the Site, located along West 61<sup>st</sup> Street, is not considered contaminated and meets the Division of Environmental Remediation Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs). The native soil in the southern portion of the Site, located along West 60<sup>th</sup> Street, may be affected by the petroleum contamination. Pre-excavation sampling throughout the Site will determine the presence and extent of petroleum-contaminated native soil in the southern portion of the Site. Uncontaminated native soil meeting the TAGM #4046 RSCOs may be stockpiled for reuse throughout the Site. Native soil containing contaminants in concentrations above TAGM #4046 RSCOs, but below the Site Specific Soil Action Levels (SSSALs), may be stockpiled for reuse, if a Track 4 Cleanup is selected. Preliminary estimates indicate that approximately 13,000 cubic yards (cy) of uncontaminated native soil will be excavated to achieve the desired final elevations.

Some of this material may be used for on-site backfilling. The remainder will be transported to a beneficial use facility in New Jersey.

#### **4.2.6 Bedrock**

Bedrock is present at elevations above the final grade (elevation 14 for the sub-cellar and elevation 30 for the cellar) in areas along the southeastern Site boundary and in the central portion of the Site. In some areas, ten feet of bedrock will be removed. Split-spoon samples will be collected at the bedrock interface as part of the pre-construction sampling. In the areas where the overburden soil at the bedrock interface is not contaminated, the bedrock will be either loaded directly onto the hauling vehicles, or stockpiled and tested, dependent upon the testing requirements of the receiving facility. If the soil above the bedrock exceeds the Site Specific Soil Action Levels (SSSALs) or Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs), the bedrock will be stockpiled and sampled for waste characterization. Preliminary estimates indicate that 3,000 cubic yards (cy) of bedrock will be removed and transported off-site.

#### **4.2.7 Soil Segregation**

Spot elevations will be taken during remediation activities to determine the limits of the specified excavation areas and to segregate the fill, petroleum-contaminated soil, construction and demolition (C&D) debris, and native soil, if these materials are stockpiled for off-site disposal. A qualified environmental professional, representing the property owner/developer, will be on-site to monitor all remediation activities and to direct the contractor in segregating soil in the transition zones at the top and bottom of the fill, native soil, petroleum-contaminated material, and C&D debris layers. Monitoring will include inspecting soil for staining, sheen, odors, or other evidence of contamination, and field screening for the presence of volatile organic compounds (VOCs) with a photoionization detector (PID). Excavated material containing both petroleum and fill, sand/silt with gravel, and C&D debris will be disposed of as a petroleum waste. Soil in intervals containing fill and native soil will be classified as fill.

#### **4.2.8 Stockpile Management**

All petroleum-contaminated material excavated during remediation activities will be loaded directly onto trucks for off-site disposal to the extent feasible; however, temporary stockpiling may be required in addition to in-situ dewatering to drain the soils before they will be accepted by the receiving facility. If this occurs, a plastic sheet will be placed in the area where this material will be stockpiled, and above the petroleum-contaminated material after the pile has been formed. After removal of the pile, any soil beneath the pile that appears to have come into contact with liquid from the pile will be excavated and removed as a petroleum-contaminated material. If stockpiling of petroleum-contaminated material occurs in areas that have reached the vertical limit of construction elevation, endpoint samples will be collected and analyzed consistent with the spacing requirements for petroleum spills in Division of Environmental Remediation guidance memorandum DER-10.

Pre-tested and New York State Department of Environmental Conservation (NYSDEC)-approved clean imported fill material to be used as backfill may also be temporarily stockpiled on-site during remediation, redevelopment, and future maintenance activities. This material will be tested off-site prior to receipt at the Site. Uncontaminated native

soil meeting Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs) may be stockpiled for on-site filling. If a Track 4 Cleanup is selected, on-site fill material meeting Site Specific Soil Action Levels (SSSALs) may be stockpiled for use as fill. Each material stockpiled for use as a backfill will be approved by the NYSDEC prior to its transportation and placement in an on-site stockpile.

All soil stockpiles will have side slopes not to exceed a slope of two-to-one, and will be placed on a base consisting of a double layer of minimum eight-mil plastic sheeting that will be bermed with hay bales and/or silt fence at the edges. Stockpiles will be kept covered whenever loading operations are not occurring with appropriately anchored tarps that will be routinely inspected for damage and replaced as needed. Screening and processing operations for soil or construction and demolition (C&D) debris will not be performed on-site without prior approval from NYSDEC. If stockpiling becomes a necessity, a Stockpile Management Plan will be prepared and submitted to NYSDEC.

### **4.3 Soil Characterization**

Soil will be pre-characterized prior to commencement of soil excavation, excluding the Interim Remedial Measure (IRM) activities. The sampling protocol will be approved by the State regulatory agency governing the reuse, recycling, or disposal facilities accepting the on-site materials. The protocol is included in the Sampling Plan (Remedial Work Plan [RWP] Appendix D). Soil borings and sample collection will be monitored by AKRF, Inc., and possibly Environmental Remedies, Inc., of Middlesex, New Jersey, or another professional certified in the State of New Jersey to perform subsurface evaluation, if the EnCap Meadowlands facility is selected as a receiving facility. The soil samples will be analyzed at Severn Trent Laboratories, Inc. (STL), a New Jersey- and New York-certified laboratory.

#### **4.3.1 Petroleum-Contaminated Material**

Petroleum-contaminated material will be pre-characterized prior to the start of remediation activities to allow for direct loading and disposal. This will occur in two activities. The vertical and horizontal extent of the suspected petroleum contamination in the southern area of the Site, located along West 60<sup>th</sup> Street, will be delineated through the soil borings and collection of two or three soil samples per boring. If a New Jersey facility is chosen as the receiving facility, these samples will be analyzed for volatile organic compounds (VOCs) (Environmental Protection Agency [EPA] Method 8260), using New Jersey Department of Environmental Protection (NJDEP) protocol. Additional samples will be collected for disposal criteria for the facility receiving this waste material. Pre-characterization sampling will be conducted at grid locations shown on Figure 1 of Remedial Work Plan (RWP) Appendix D. The frequency of the sampling and the analytical parameters will be determined based on the requirements of the selected disposal facilities. It is anticipated that all petroleum-contaminated material will be disposed of as non-hazardous waste.

#### **4.3.2 Fill**

Fill materials will be pre-characterized prior to the start of the remediation activities to allow for direct loading and disposal. Sampling and analysis of the in-situ fill will be consistent with the sampling protocol provided by the disposal facility. Each sample collected from soil borings will be a representative or composite of the entire depth of the material. The volume of each grid shown on Figure 1 of the Sampling Plan (Remedial

Work Plan [RWP] Appendix D) is approximately 500 cubic yards (cy) per 7.5-foot depth, and 1,000 cy per 15-foot depth.

#### **4.3.3 Native Soil**

The native soil will be pre-characterized prior to the start of remediation excavation activities to allow for direct loading and disposal or reuse. Sampling and analysis of the in-situ fill will be consistent with the sampling protocol provided by the disposal facility. Each sample collected from soil borings will be a representative or composite sample of the entire depth of the material. The native soil sample will be collected at a lower elevation from the same borehole as the fill material. The volume of the sampling grid is the same as that of the fill material. The volume-to-depth relationship is approximately 500 cubic yards (cy) for a 7.5-foot depth, and 1,000 cy for a 15-foot depth.

#### **4.3.4 Construction and Demolition Debris/Municipal Waste – Lot 8**

The buried building debris will be pre-characterized prior to the start of remediation excavation activities to allow for direct loading and disposal. Sampling and analysis of the in-situ fill will be consistent with the sampling protocol provided by the disposal facility. Each sample will be collected from soil borings. The sample collected will be a representative or composite sample of the entire depth of the material sampled. The volume of the sampling grid is the same as that of the fill material. The volume-to-depth relationship is approximately 500 cubic yards (cy) for a 7.5-foot depth, and 1,000 cy for a 15-foot depth.

#### **4.3.5 Discovered Waste Material**

Additional waste material discovered from the analysis of the pre-construction samples, or uncovered during construction excavation activities, will be sampled for Target Compound List (TCL) volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals, Toxicity Characteristic Leaching Procedure (TCLP) – full list, reactivity (cyanide and sulfur), pH, ignitability, and any other tests required by the disposal facility. One sample will be collected for every 500 cubic yards (cy) of material. Post-excavation samples will be collected as one sample for approximately every 900 square feet along the sidewalls and bottom. The parameters selected will be based on the results of the waste classification sampling.

#### **4.3.6 Bedrock**

Initial bedrock classification will be based on the level of contamination in overburden native soil located at the bedrock-soil interface. If no contaminants are present in soil at concentrations above Technical and Administrative Guidance Memorandum (TAGM) #4046 Recommended Soil Cleanup Objectives (RSCOs), the bedrock will be considered uncontaminated. Additional sampling and analysis will be conducted to meet receiving facility requirements as required.

#### **4.3.7 Imported Backfill**

Any off-site material used as backfill must be either from a New York State Department of Transportation (NYSDOT)-approved source, or must qualify as “exempt fill” under New York Code of Rules and Regulations (NYCRR) Section 360-7.1. The material will be clean and free of debris, cinders, combustibles, wood, roots, organic material, and any

staining or odors. The “exempt fill” will not be placed in grass or ornamental garden areas within two feet of the surface unless it has been analyzed and found to contain no contaminants in concentrations above the Recommended Soil Cleanup Objectives (RSCOs) of New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Document (TAGM) #4046.

Off-site soils will be documented as having originated from locations having no evidence of disposal or release of hazardous, toxic or radioactive substances, wastes, or petroleum products. If the contractor designates a source as “virgin” soil, it shall be further documented in writing to be native soil material from areas not having supported any known prior industrial or commercial development or agricultural use. Documented virgin soils will not be sampled prior to use as backfill on the Site.

Non-virgin off-site soils will be tested via collection of one composite sample per 500 cubic yards (cy) of material from each source area. Samples will be analyzed for volatile organic compounds (VOCs) using Environmental Protection Agency (EPA) Method 8260; semi-volatile organic compounds (SVOCs) using EPA Method 8270, Target Analyte List (TAL) metals using EPA Method 6000/7000 series; polychlorinated biphenyls (PCBs) using EPA Method 8082; pesticides using EPA Method 8081; and herbicides using EPA Method 8151. Soils will be considered appropriate for use as on-site backfill if contaminant concentrations are less than applicable RSCOs in NYSDEC TAGM #4046.

If more than 1,000 cubic yards (cy) of soil are imported from a given off-site, non-virgin soil source area, and both samples of the first 1,000 cy meet the limits described above, the sample collection frequency will be reduced to one composite sample for every 2,500 cy of additional soil from the same source, up to 5,000 cy. For sources greater than 5,000 cy, sampling frequency may be reduced to one sample per 5,000 cy, provided that all earlier samples meet the prescribed limits.

#### **4.4 Cover System**

At the conclusion of Site remediation activities, all excavated areas above the sidewalk elevations along West 60<sup>th</sup> and 61<sup>st</sup> Streets will be temporarily stabilized to prevent wind and water erosion. At the conclusion of Site redevelopment activities, all disturbed areas will be covered with: on-site buildings; asphalt or concrete sidewalks, a paved recreation area (tennis court and track), or pavers (walkway); or landscaped with a minimum of two feet of clean fill and vegetation, thereby capping all on-site soils.

#### **4.5 Erosion Control/Stormwater Management**

Proven soil conservation practices will be incorporated into construction and development plans to mitigate soil erosion, off-site sediment migration, and water pollution from erosion. Typical measures that may be applicable at various stages of the Project include the use of hay bales, silt fences, sewer inlet protection, a stabilized construction entrance, dust control measures, and sediment basins.

Smaller-scale soil disturbances for future utility maintenance and landscaping conducted after the completion of Site redevelopment are not anticipated to require coverage under the general State Pollution Discharge and Elimination System (SPDES) Permit or preparation of a Storm Water Pollution Prevention Plan (SWPPP). However, best management practices, such as the placement

of straw bales and silt fencing around soil stockpiles and/or the use of polyethylene liners and covers, will be implemented during small-scale soil disturbance.

#### **4.6 Air Quality Monitoring**

All soil excavation during remediation activities will be conducted within a containment structure to control fugitive dust and vapors. Air monitoring will be performed within the structure, as required under the Site-specific Remediation Health and Safety Plan (RHASP), to ensure worker protection. Perimeter air quality monitoring will be performed at upwind and downwind locations around the perimeter of the Site, as specified in the Air Monitoring Plan, before and during remedial activities, to ensure that dust and vapors are being controlled by the containment structure and air handling system. Dust suppression and vapor mitigation measures will be implemented as indicated by particulate monitoring, and may include spraying foam and/or Biosolve on open excavations; applying water on haul roads; spraying water on equipment during excavation; restricting vehicle speeds to ten miles per hour; covering excavated areas and stockpiles with plastic sheeting; and minimizing the excavation size and number of open excavations.

Subsequent to remediation, only small-scale soil disturbance will be required for Site development, including excavation for elevator pits and utility vaults. In addition, future maintenance and landscaping work is anticipated to require only small-scale disturbance of the historic fill material or capped soils. Therefore, only work zone monitoring will be conducted during these redevelopment and future maintenance activities, as specified in the RHASP.

#### **4.7 Construction Water Management**

Remediation and construction dewatering will be performed in accordance with federal, State, and local regulations. Produced water will be treated, if necessary, and discharged to the sanitary sewer under a New York City Department of Environmental Protection (NYCDEP) sewer connection permit. Prior to discharge of on-site collected water into the combined sewer system, all on-site collected water, including water pumped from excavations, will be sent to a sedimentation tank to reduce the particulates (suspended and total solids).

#### **4.8 Access Control**

As described in Section 4.1, existing fencing and gates will be upgraded (where necessary) and maintained around any areas of the Site where soils are disturbed and obvious access points will be established. Unauthorized persons will not be allowed access to the work zones while excavation or handling of potentially contaminated soil is taking place.

### **5.0 OFF-SITE DISPOSAL/HAUL ROUTES**

#### **5.1 Receiving Facilities**

The on-site fill material and native soil determined to meet the beneficial use chemical and physical criteria will be transported to either the EnCap Meadowlands Facility, located in the Boroughs of Lyndhurst and Rutherford, New Jersey, or the former Allied Signal Site in Elizabeth, New Jersey. The on-site fill material and native soil not meeting the criteria will be transported to one or more of the following facilities: Soil Safe, located in Logan, New Jersey; Clean Earth of

Carteret, located in Carteret, New Jersey; or Clean Earth of Philadelphia, located in Philadelphia, Pennsylvania.

## **5.2 Transportation Routes**

There are two available routes from the Site to the receiving facilities in New Jersey and Pennsylvania – the Lincoln Tunnel, and the George Washington Bridge via the Cross Bronx Expressway. The Cross Bronx Expressway would also provide access to receiving facilities on Long Island or Connecticut (New England). The route from the Site to the Lincoln Tunnel (Figure 1) is as follows:

East on West 60<sup>th</sup> or 61<sup>st</sup> Streets to Amsterdam (10<sup>th</sup>) Avenue;  
North on Amsterdam Avenue to West 66<sup>th</sup> Street;  
West on West 66<sup>th</sup> Street to West End (11<sup>th</sup>) Avenue;  
South on West End Avenue to West 40<sup>th</sup> Street;  
East on West 40<sup>th</sup> Street - exit right to Lincoln Tunnel entrance ramp.

The route from the Site to the Cross Bronx Expressway/George Washington Bridge (Figure 2) is as follows:

East on West 60<sup>th</sup> or 61<sup>st</sup> Streets to Amsterdam (10<sup>th</sup>) Avenue;  
North on Amsterdam Avenue to West 66<sup>th</sup> Street;  
West on West 66<sup>th</sup> Street to West End (11<sup>th</sup>) Avenue;  
North on West End Avenue to West 79<sup>th</sup> Street;  
West on West 79<sup>th</sup> Street to Riverside Drive;  
North on Riverside Drive to West 165<sup>th</sup> Street;  
Exit on right ramp, located approximately 800 feet north of West 165<sup>th</sup> Street;  
Follow signs to either the George Washington Bridge or the Cross Bronx Expressway.

Truck management practices will include measures to prevent contaminants from leaving the Site into the neighborhood during loading and exiting the Site, minimize truck noises and odors, and minimize traffic congestion. These measures are presented in Remedial Work Plan (RWP) Section 4.2.5.

## **6.0 HEALTH AND SAFETY**

All work that involves soil disturbance will be performed in accordance with all applicable local, State, and federal regulations to protect worker health and safety. The Site-specific Remediation Health and Safety Plan (RHASP), included as Appendix A in the Remediation Work Plan (RWP), submitted simultaneously with this Soil Management Plan, provides details of personnel protection, air monitoring and particulate response levels, vapor emission response programs for the Site, and other health and safety protocols, procedures, and requirements. The RHASP will be implemented during all remediation, redevelopment, and future maintenance work.

## **7.0 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)**

### **7.1 Analytical Data**

All pre-construction and post-construction endpoint samples collected during Site remediation and redevelopment activities will be analyzed using the most recent New York State Department

of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) at Severn Trent Laboratories, Inc. (STL), certified through the New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP). Analytical data for the endpoint samples will be submitted in ASP Category B data packages, including documentation of laboratory Quality Assurance/Quality Control (QA/QC) procedures that will provide legally defensible data in a court of law. The laboratory will maintain this certification for the duration of this Project. A Data Usability Summary Report (DUSR) will be prepared.

Waste characterization and petroleum delineation samples will be sent to STL. STL, a New Jersey Department of Environmental Protection (NJDEP)-certified laboratory, will meet the specific laboratory analytical protocols of New Jersey, where the receiving facilities are located. AKRF, Inc. will submit the appropriate materials to the NJDEP to certify that the samples were collected in an acceptable manner.

Sampling and decontamination will be conducted according to established Standard Operating Procedures (SOPs) provided in the Remedial Work Plan (RWP). Procedures for chain-of-custody (COC), laboratory instrumentation calibrations, laboratory analyses, reporting of data, internal quality control (QC), and corrective actions shall be followed as per NYSDEC ASP, and as per the laboratory's Quality Assurance (QA) Plan. Where appropriate, trip blanks, field blanks, field duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples shall be collected at a rate of five percent (one sample per up to 20 samples) for endpoint samples, and will be used to assess the quality of the data.

## **8.0 NOTIFICATION AND REPORTING**

The following minimum notification and reporting requirements shall be followed by the developer prior to and following Site development, as appropriate:

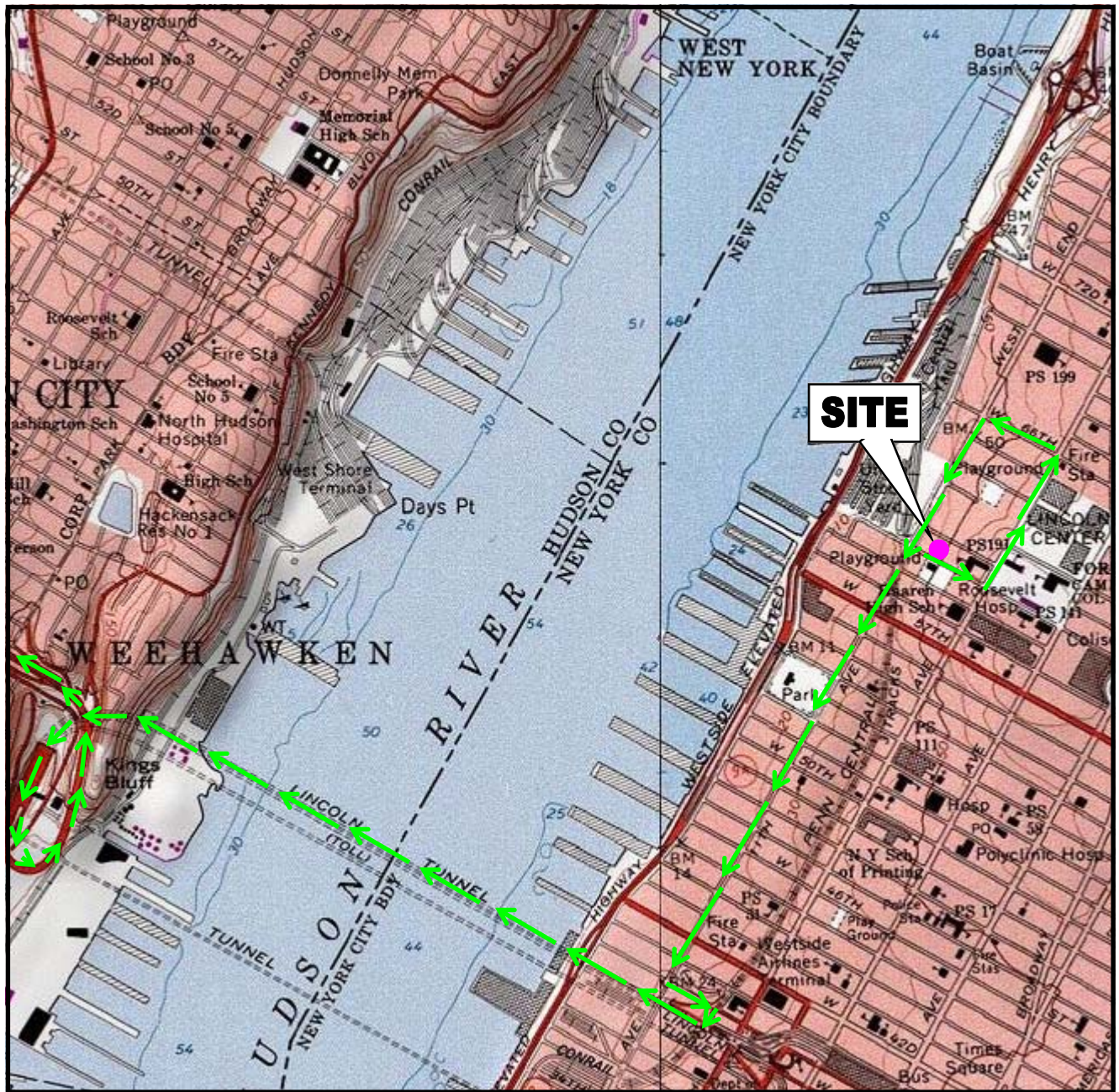
- Prior to initiation of the remedial action, the developer will submit a Notice of Intent for Stormwater Discharge Associated with Construction Activity (General Permit #GP-02-01).
- The New York State Department of Environmental Conservation (NYSDEC) will be notified that sub-grade activities are being initiated a minimum of one week in advance of construction.
- A Final Remediation Report, stamped by a New York State-licensed Professional Engineer, will be prepared and submitted to the NYSDEC and New York State Department of Health (NYSDOH) no later than 90 days following completion of the soil remediation activities. A second report will be submitted no later than 90 days following completion of redevelopment activities to document soil management and installation of soil vapor barrier/collection systems.
- Prior to any discharge of construction water to the on-site sanitary sewer, an application for a discharge permit must be submitted to the appropriate parties.



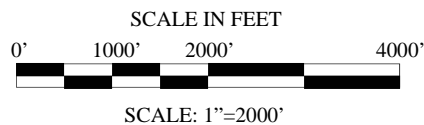
Notification contacts are as follows:

<b>Name</b>	<b>Agency</b>	<b>Address</b>	<b>Telephone</b>
Mr. Dan Walsh	NYSDEC	Solid & Haz Waste – Reg. 2 1 Hunter's Point Plaza 47-40 21 <sup>st</sup> Street Long Island City, NY 11101	718-482-4996
Mr. Shaminder Chawla	NYSDEC	Solid & Haz Waste – Reg. 2 1 Hunter's Point Plaza 47-40 21 <sup>st</sup> Street Long Island City, NY 11101	718-482-4897
Mr. Joe Maloughney	NYSDEC	Div. of Env. Remediation 625 Broadway Albany, NY 12233	518-402-9564
Ms. Julia Guastella	NYSDOH	Div. of Env. Health River Street Troy, NY 12180	518-402-7880

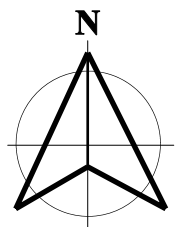
## FIGURES



QUADRANGLE



**SOURCE:**  
 USGS TOPOGRAPHIC MAP - CENTRAL PARK, N.Y.  
 QUADRANGLE - DATED 1966, PHOTOREVISED 1979



**West 61st Street Site  
 New York, New York**

**HAUL ROUTE TO LINCOLN TUNNEL**

**AKRF, Inc.**

**Environmental Consultants**  
 440 Park Avenue South, New York, N.Y. 10016

DATE  
**03.06.06**

PROJECT No.  
**10321**

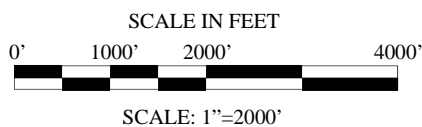
FIGURE No.

**1**

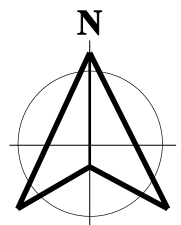




QUADRANGLE



**SOURCE:**  
USGS TOPOGRAPHIC MAP - CENTRAL PARK, N.Y.  
QUADRANGLE - DATED 1966, PHOTOREVISED 1979



**West 61st Street Site  
New York, New York**

**HAUL ROUTE TO CROSS BRONX EXPRESSWAY  
AND GEORGE WASHINGTON BRIDGE**

**AKRF, Inc.**

**Environmental Consultants**  
440 Park Avenue South, New York, N.Y. 10016

DATE  
**03.07.06**

PROJECT No.  
**10321**

FIGURE No.

**2**

**APPENDIX A**  
**RESUMES OF ENVIRONMENTAL MONITORING PERSONNEL**

## **MICHELLE LAPIN, P.E.**

### **SENIOR VICE PRESIDENT**

Michelle Lapin is a senior vice president with 20 years of experience in the assessment and remediation of hazardous waste issues. She leads the firm's Hazardous Materials group and offers more than a decade of experience providing strategic planning and management for clients. Ms. Lapin has been responsible for the administration of technical solutions to contaminated soil, groundwater, and geotechnical problems. Her other duties have included technical and report review, proposal writing, scheduling, budgeting, and acting as liaison between clients and regulatory agencies, and project coordination with federal, state, and local authorities.

Ms. Lapin's hydrogeologic experience includes performing groundwater investigations, and formulation and administration of groundwater monitoring programs in New York, New Jersey, Connecticut, New Hampshire, Massachusetts, Rhode Island, Virginia, and Maryland. Her experience with groundwater contamination includes Level B hazardous waste site investigations; execution of leaking underground storage tank studies, including hazardous soil removal and disposal; soil and water sampling; soil gas surveys; and wetlands issues. Ms. Lapin is experienced in coordinating and monitoring field programs concerning hazardous waste cell closures. She has directed numerous Phase I, Phase II, and Phase III investigations, many of them in conjunction with developers, law firms, lending institutions, and national retail chains. She is also experienced in the cleanup of contaminated properties under Brownfield Cleanup Program (BCP) regulations.

### **BACKGROUND**

#### **Education**

B.S., Civil Engineering, Clarkson University, 1983

M.S., Civil Engineering, Syracuse University, 1985

#### **Professional Registrations**

New York State P.E.

State of Connecticut P.E.

#### **Professional Memberships**

Member, American Society of Professional Engineers (ASPE), National and CT Chapters

Member, American Society of Civil Engineers (ASCE), National and CT Chapters

Member, Connecticut Business & Industry Association (CBIA), CBIA Environmental Policies Council

#### **Years of Experience**

Year started in company: 1994

Year started in industry: 1984

### **RELEVANT EXPERIENCE**

#### **Hudson River Park, New York, NY**

Ms. Lapin is directing AKRF's hazardous materials work during construction of Hudson River Park, a 5-mile linear park along Manhattan's West Side. As the Hudson River Park Trust's (HRPT's) environmental consultant, AKRF is overseeing preparation and implementation of additional soil and groundwater investigations (working with both





## **MICHELLE LAPIN, P.E.**

**SENIOR VICE PRESIDENT**

| p. 2

NYSDEC and NYCDEP), all health and safety activities, removal of both known underground storage tanks and those encountered during construction. Previously, the firm performed hazardous materials assessments as part of the Environmental Impact Statement (EIS) process, including extensive database and historical research, as well as soil and groundwater investigations. Ms. Lapin has been the senior consultant for the soil and groundwater investigations and remediation, and the asbestos investigations and abatement oversight.

### **Fiterman Hall Deconstruction and Decontamination Project, New York, NY**

The 15-story Fiterman Hall building, located at 30 West Broadway between Barclay and Murray Streets, originally constructed as an office building in the 1950s, had served as an extension of the City University of New York (CUNY) Borough of Manhattan Community College (BMCC) since 1993. The building was severely damaged during the September 11, 2001, attack on the World Trade Center (WTC) when 7 WTC collapsed and struck the south façade of the building, resulting in the partial collapse of the southwest corner of the structure. The building was subsequently stabilized, with breaches closed and major debris removed, however extensive mold and WTC dust contaminants remain within the building, which must be taken down. The project requires the preparation of two EASs for the redevelopment of Fiterman Hall—one for the deconstruction and decontamination of the building and one for the construction of a replacement building on the site. AKRF is currently preparing the EAS for the Deconstruction and Decontamination project, which includes the decontamination of the interior and exterior of the building, the removal and disposal of all building contents, and the deconstruction of the existing, approximately 377,000-gross-square-foot partially collapsed structure. Ms. Lapin was the reviewer for the deconstruction and decontamination plans for the EAS. The cleanup plan is due to be submitted shortly to the U.S. Environmental Protection Agency; once approved, remediation work will begin, followed by the deconstruction and rebuilding of Fiterman.

### **Brooklyn Bridge Park, Brooklyn, NY**

AKRF is preparing an EIS and providing technical and planning support services for Brooklyn Bridge Park, which will revitalize the 1.3-mile stretch of the East River waterfront between Jay Street on the north and Atlantic Avenue on the south. The new park, to be completed by 2010, would allow public access to the water's edge, allowing people to enjoy the spectacular views of the Manhattan skyline and New York Harbor. It would also provide an array of passive and active recreational opportunities, including lawns, pavilions, and a marina. As with many waterfront sites around New York City, the lands along the Brooklyn waterfront have a long history of industrial activities. Some of these industries used dangerous chemicals and generated toxic by-products that could have entered the soil and groundwater. In addition, landfilling activities along the shoreline also made use of ash and other waste materials from industrial processes. Based on site inspections and historical maps, government records, and other sources, AKRF is in the process of investigating the potential for the presence for hazardous materials in the park. This information will be compiled into a Phase 1 Environmental Site Assessment report. AKRF will also provide support to the design team related to designing the project to minimize costs related to remediating hazardous materials where possible. Ms. Lapin is serving as senior manager for the hazardous materials investigations, including procuring a Beneficial Use Determination (BUD) from the New York State Department of Environmental Conservation (NYSDEC) for the acceptance of fill materials to the site.

### **Columbia University Manhattanville Academic Mixed-Use Development, New York, NY**

Ms. Lapin is serving as hazardous materials task leader on this EIS for approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside campus. The work has included Phase I Environmental Site Assessments for the properties within the site boundaries and estimates for upcoming investigation and remediation.

### **Albert Einstein College of Medicine Center for Genetic and Translational Medicine, Bronx, NY**

Ms. Lapin directed the firm's hazardous materials work in connection with the construction a new Center for Genetics and Translational Medicine (CGTM) building on the Bronx campus of the Albert Einstein College of Medicine of Yeshiva University. The building is expected to be opened by 2006. AKRF prepared an



## **MICHELLE LAPIN, P.E.**

**SENIOR VICE PRESIDENT**

| p. 3

Environmental Assessment Statement (EAS) that examined such issues as land use, zoning, air quality, urban design and visual resources, hazardous materials, traffic, noise, and air quality. Ms. Lapin's work included analysis of the existing conditions and potential impacts that the construction could cause to the environment and human health.

### **Yonkers Waterfront Redevelopment Project, Yonkers, NY**

For this redevelopment along Yonkers Hudson River waterfront, Ms. Lapin headed the remedial investigation and remediation work that included Phase I assessments of 12 parcels, investigations of underground storage tank removals and associated soil remediation, remedial alternatives reports, and remedial work plans for multiple parcels. Several of the city-owned parcels were remediated under a Voluntary Cleanup Agreement; others were administered with state Brownfields grants. Hazardous waste remediation was completed on both brownfield and voluntary clean-up parcels, and construction is underway for mixed-use retail, residential development, and parking.

### **Davids Island Site Investigations, New Rochelle, NY**

Ms. Lapin managed the hazardous materials investigation of Davids Island, the largest undeveloped island on the Long Island Sound in Westchester County. The 80-acre island features pre- and post-Civil War military buildings and parade grounds, and is viewed as a major heritage, tourism, and recreational amenity. The island, formerly known as Fort Slocum, was used by the U.S. military, beginning in the 19th century, as an Army base, hospital, and training center. The island is planned for county park purposes. The investigation included a Phase I site assessment, with historical research going back to the 17th century, a Phase II subsurface investigation, underground storage tank investigations, and asbestos surveys of all remaining structures. Cost estimates were submitted to Westchester County for soil remediation, asbestos abatement, and building demolition.

### **Site Selection and Installation of 11 Turbine Generators, New York and Long Island, NY**

AKRF was retained by the New York Power Authority (NYPA) to assist in the State Environmental Quality Review Act (SEQRA) review of the proposed siting, construction, and operation of 11 single-cycle gas turbine generators in the New York metropolitan area. Ms. Lapin managed the hazardous materials investigation of the sites. The work has included Phase I site assessments, subsurface investigations, and construction health and safety plans.

### **Cross Westchester (I-287) Expressway Phases V and VI, Westchester County, NY**

For the New York State Department of Transportation (NYSDOT), Ms. Lapin served as project manager and was responsible for directing the contaminated materials aspect of the final design effort for the reconstruction of Westchester County's major east-west artery. As part of her duties, Ms. Lapin was responsible for managing the asbestos investigations at eight bridges and wetland delineation along the entire corridor, as well as writing the scope of work and general management of the project.

### **Shaw's Supermarket, New Fairfield, CT**

AKRF is providing consulting services to the developer and owner of a 9-acre site included conducting a remedial investigation and remediation of a site contaminated from former dry cleaning operations and off-site gasoline spills. The investigation included the installation of monitoring wells in three distinct aquifers, geophysical logging, pump tests, and associated data analysis. Ms. Lapin presented the environmental issues and planned remediation to local and state officials during the early stages of the planning process to incorporate their comments into the final remedial design. A remedial action work plan (RAWP) was completed and approved by the Connecticut Department of Environmental Protection within a year to enable redevelopment work for a new supermarket and shopping center. The RAWP included the remediation of soils within the source area and a multi-well pump and treat system for the recovery of non-aqueous and dissolved phase contamination in groundwater. The design of the recovery well system included extensive groundwater modeling to ensure capture of the contaminant plume.





## **MICHELLE LAPIN, P.E.**

**SENIOR VICE PRESIDENT**

| p. 4

and the appropriate quantity and spacing of the wells. Ms. Lapin directed the soil removal remedial activities and monitoring for additional potential contamination during construction. In addition, AKRF performed comprehensive pre-demolition asbestos and lead-based paint surveys of the former site structures, and are continuing to provide environmental consulting support for the development of the site. Site development has been completed and a groundwater remediation system was installed during site development. The remediation system is successfully operating. The next phase of work includes an off-site study to determine whether the contamination plume has migrated from the site since area residents use groundwater as a source of drinking water. Ms. Lapin will continue to manage the project through the study and remediation phases.

### **East 75th/East 76th Street Site, New York, NY**

Ms. Lapin served as senior manager for this project that encompassed coordination and direct remediation efforts of this former dry cleaning facility and parking garage prior to the sale of the property and its ultimate redevelopment for use as a private school. A preliminary site investigation identified 20 current and former petroleum and solvent tanks on the property. A soil and groundwater testing program was designed and implemented to identify the presence and extent of contamination resulting from potential tank spills. This investigation confirmed the presence of subsurface petroleum contamination in the soil and solvent contamination from former dry cleaning activities in the bedrock. AKRF completed oversight of the remediation under the State's Voluntary Cleanup Program. Remediation, consisting of tank removals and excavation of contaminated soil and the removal of solvent-contaminated bedrock down to 30 feet below grade, has been completed. AKRF completed oversight of the pre-treatment of groundwater prior to discharge to the municipal sewer system and is currently completing an off-site study to determine impacts to groundwater in downgradient locations.

### **Former Macy's Site, White Plains, NY**

Ms. Lapin managed the pre-demolition work for Tishman Speyer. Work included a Phase I site assessment; subsurface investigation (Phase II), including the analysis of soil and groundwater samples for contamination; a comprehensive asbestos, lead paint, and PCB investigation; radon analysis; and coordination and oversight of the removal of hazardous materials left within the building from previous tenants. Work also included asbestos abatement specifications and specifications for the removal of two 10,000-gallon vaulted fuel-oil underground storage tanks.

### **Storage Deluxe, Various Locations, NY**

Ms. Lapin manages the firm's ongoing work with Storage Deluxe, which includes Phase I and Phase II subsurface investigations, underground storage tank removals and associated remediation, asbestos surveys and abatement oversight, and contaminated soil removal and remediation for multiple sites in the Bronx, Brooklyn, Manhattan, Westchester County, and Long Island.

### **Home Depot, Various Locations, NY**

Ms. Lapin, serving as either project manager or senior manager, has managed the investigations and remediation at multiple Home Depot sites in the five boroughs, Long Island, and Connecticut. The investigations have included Phase I and II site assessments, asbestos and lead paint surveys, abatement specifications and oversight, and soil and groundwater remediation.

### **Avalon on the Sound, New Rochelle, NY**

For Avalon Bay Communities, Ms. Lapin is managing the investigations and remediation of two phases of this residential development, including two luxury residential towers and an associated parking garage. Remediation of the first phase of development (the first residential tower and the parking garage) included gasoline contamination from a former taxi facility, fuel oil contamination from multiple residential underground storage tanks, and chemical contamination from former on-site manufacturing facilities. The remediation and closure of the tank spills was coordinated with the New York State Department of Environmental Conservation (NYSDEC). The



## **MICHELLE LAPIN, P.E.**

**SENIOR VICE PRESIDENT**

| p. 5

initial investigation of the Phase II development—an additional high-rise luxury residential building—detected petroleum contamination. A second investigation was conducted to delineate the extent of the contamination and estimate the costs for remediation. The remediation will be conducted in conjunction with the development plan.

### **Mill Basin, Gerritsen Inlet, and Paerdegat Basin Bridges, Final Design, Shore Parkway, Brooklyn, NY**

Following the preparation of the GEIS for the Belt Parkway Bridges Project, the firm was retained for supplemental work during the final design phase of the project. This included NEPA and SEQRA documentation for three of the bridges—Mill Basin, Gerritsen Inlet, and Paerdegat Basin—which will be federally funded. Ms. Lapin managed the contaminated materials investigation that included a detailed subsurface contaminated materials assessment, both subaqueous and along the upland approaches.

### **NYSDOT Transportation Management Center (TMC), Hawthorne, NY**

AKRF conducted environmental studies for the NYSDOT at the current troopers' headquarters in Hawthorne, NY. The property is the proposed site of a new Transportation Management Center. AKRF completed a comprehensive asbestos survey of the on-site building and prepared asbestos abatement specifications; performed a Phase I site assessment; conducted an electromagnetic (EM) survey that located two fuel oil underground storage tanks, and developed removal specifications for the two underground storage tanks and an aboveground storage tank.

### **Metro-North Railroad Poughkeepsie Intermodal Station/Parking Improvement Project, Poughkeepsie, NY**

Ms. Lapin served as project manager of the hazardous materials investigation in connection with AKRF's provision of planning and environmental services for parking improvement projects at this station along the Hudson Line. The project included an approximately 600-space garage, additional surface parking, and an intermodal station to facilitate bus, taxi, and kiss-and-ride movements. Ms. Lapin conducted Phase I and II contaminated materials assessments and worked with the archaeologists to locate an historical roundhouse/turntable.

### **Metro-North Railroad Golden's Bridge Station Parking Project, Westchester County, New York**

For Metro-North Railroad, Ms. Lapin managed a Phase I Environmental Site Assessment of a property that has since become the new parking area, used by the existing Golden's Bridge train station. Ms. Lapin also conducted a subsurface (Phase II) investigation of the original parking area, track area, and existing platform for the potential impact of moving tracks in the siding area to extend the existing parking area and adding an access from a proposed overhead walkway (connecting the train station to the new parking area). The study also included an assessment for lead-based paint and asbestos on the platform structures.

## **RICHARD A. GARDINEER, P.E.**

### **TECHNICAL DIRECTOR**

Richard A. Gardineer, P.E., is a technical director who specializes in the assessment and remediation of hazardous and non-hazardous waste facilities. Phase I and Phase II Environmental Assessments, Brownfield site investigations/remediations, landfill closures, and waste classification/handling are Mr. Gardineer's primary areas of responsibility at AKRF. He conducts environmental assessments and investigations that include analyses of waste material, soil, groundwater, surface water, sub-surface soil gas, and indoor air. These investigations typically involve communication with federal, state, and city agencies, including the New York State Department of Conservation (NYSDEC), New York State Department of Health (NYSDOH), the U.S. Environmental Protection Agency (USEPA), the New York City Department of Environmental Protection (NYCDEP), and the New York City Department of Health (NYCDOH).

Prior to joining AKRF, Mr. Gardineer worked as a regulator in the three solid and hazardous waste management programs of NYSDEC for more than 25 years. Mr. Gardineer worked in Region 3 (Lower Hudson Valley) for 16 years as a program supervisor regulating landfills, construction and demolition debris disposal sites, and RCRA C hazardous waste facilities; he also investigated inactive hazardous waste disposal sites under the State Superfund. Mr. Gardineer then served as the Regional Remediation Engineer in the Region 2 New York City Office for 9 years. Mr. Gardineer managed the Environmental Remediation Program, which regulated the investigation and cleanup of hazardous waste, hazardous substances, and petroleum contaminated sites. During Mr. Gardineer's tenure in Region 2, five of the New York City's largest landfills were investigated and/or closed through the State Superfund Grant Program, the Brownfields Program (Voluntary Cleanup) was initiated in New York City, and numerous petroleum contaminated sites were investigated and cleaned up. Throughout his career, Mr. Gardineer has testified as a witness for New York State in a number of legal actions to close illegal landfills, to remediate hazardous waste sites, and to recover funds under the State Superfund.

### **BACKGROUND**

#### **Education**

Bachelor of Engineering in Civil Engineering, New York University, 1970

Master of Science in Civil Engineering, New York University, 1973

#### **Professional Certifications**

Professional Engineer, licensed in New York State

#### **Years of Experience**

Year started in company: 2005

Year started in industry: 1977

### **RELEVANT EXPERIENCE**

#### **Closure of New York City Landfills Under EQBA, Various Locations, NY**

Mr. Gardineer and his staff regulated the closure of the Brookfield Avenue, Edgemere, and Pelham Bay Landfills under the Environmental Quality Bond Act of 1986. Activities for each of these inactive hazardous waste landfills included the negotiation/monitoring of the State Assistance Contract, the review/ approval of the Remedial



## **RICHARD A. GARDINEER, P.E.**

**SENIOR ENGINEER**

| p. 2

Investigation Work Plan and Report, the review/approval of the proposed remedy, the preparation of the Proposed Remedial Action Work Plan and the Record of Decision, the preparation of Fact Sheets, the review/approval of the Remedial contract., the review/approval of the Operation and Maintenance Plan, and the participation at public meetings involving the landfill.

### **New York City School Construction Authority (SCA), Long Island City, NY**

Mr. Gardineer's primary duty as a consultant to the SCA was to determine the suitability of potential sites for use as public schools. His activities included reviewing/revising Phase I Environmental Site Assessments, proposed Phase II Scopes of Work, Phase II Environmental Site Assessments, Brownfields Remedial Investigative Work Plans, Indoor Air Quality Studies, remedial contract specifications, and waste disposal plans. Consultation was provided to the SCA regarding specific measures necessary to make each site suitable for use as a school.

### **Brownfields Program (Voluntary Cleanup), Various Locations, NY**

Mr. Gardineer and his staff reviewed plans to clean up and reuse numerous sites in New York City under the Voluntary Cleanup Program. Notable sites included St. George Ballpark in Staten Island (NY Yankee Class A team), the Pfizer Pharmaceutical site in Brooklyn, Queens West Development, Home Depot in Rego Park, Queens, Outlet City in Queens, Sports Authority in Queens, Nassau Metals on Staten Island, and Visy Paper in Staten Island. Mr. Gardineer made a presentation on the Visy Paper site at the Brownfields 2000 Conference in Atlantic City. Activities included the negotiation of the BCP agreement, the review/approval of the Remedial Investigation Work Plan and report, the review/approval of the Remedial Action plan, the review and issuance of Fact Sheets, the recommendation of institutional controls, the review/approval of the Operation and Maintenance Plan, and participation in public meetings.

### **Inactive Hazardous Waste Disposal Sites (State Superfund Program), Various Locations, NY**

Mr. Gardineer supervised the investigation and cleanup of inactive hazardous waste (Superfund) sites in New York City. Activities included supervising and/or participating in environmental sampling efforts at suspected sites, negotiation of Consent Orders, scoping and review of Phase I and Phase II Site Investigations, negotiation and review of Remedial Investigations and Feasibility Studies, preparation of Proposed Remedial Action Plans (PRAPs) and Records of Decision, preparation of Fact Sheets, communications with public officials and participation at public meetings. Notable sites handled in this program included Amtrak Sunnyside yard in Queens, Phelps Dodge in Queens, Arden Woods in Staten Island, Princes Bay in Staten Island, Standard Motor Products in Queens, and the Arthur Kill Generating Station in Staten Island.

### **Landfill Closure Region 3, Various Locations, NY**

Mr. Gardineer managed staff activities leading to the orderly closure of non-complying landfills, construction and demolition debris disposal sites, and other solid waste management facilities in the Lower Hudson Valley (NYSDEC Region 3). Activities included landfill inspections, taking environmental samples (leachate, groundwater, and soil gas), negotiating Consent Orders, and review of closure plans. Mr. Gardineer participated in negotiations with Towns in Dutchess and Ulster Counties to allow for the orderly closure of non-complying landfills in concert with the implementation of the each County's Solid Waste Management Plans. Notable landfills closed during Mr. Gardineer's tenure in Region 3 included landfills operated by the Towns of Clarkstown, Ramapo, and Haverstraw in Rockland County, the Orange County Landfill, and portions of the Al Turi Landfill in Orange County.

### **Construction and Demolition Debris Disposal Sites, Various Locations, NY**

Mr. Gardineer supervised staff in the investigation and closure of numerous non-complying construction and demolition debris disposal sites in the Lower Hudson Valley. Activities included site inspections, the taking of environmental samples (waste material, leachate, groundwater, soil gas), participation in enforcement action, review of closure plans, and supervision of landfill capping.



## **RICHARD A. GARDINEER, P.E.**

**SENIOR ENGINEER**

| p. 3

### **Solid Waste Management Plans**

Mr. Gardineer supervised staff and participated in activities involving the review/approval of Solid Waste Management Plans submitted by six of the seven counties in Region 3. Activities included pre-submission meetings with the counties, scoping the plans, review/approval of the plans, and participation at public meetings.

### **Part 360 Solid Waste Management Applications**

Mr. Gardineer supervised staff and participated in activities involving sanitary landfills, ashfills, construction and demolition debris landfills, resource recovery facilities, transfer stations and composting facility applications for sites in the Lower Hudson River Valley. Mr. Gardineer supervised his staff in the technical review of the applications, participation at permit hearings, preparation of permit conditions, and review of construction certification. Mr. Gardineer has expertise in NYCRR Part 360 (Solid Waste Management Facilities), Part 617 (State Environmental Quality Review Act), and Part 621 (Uniform procedures Act). Notable projects included the Al Turi Landfill, the Orange County Landfill, the Ramapo Landfill, the Westchester County (Sprout Brook) Ashfill (expansion), the Westchester County material Recovery Facility, and the Dutchess County Resource Recovery Facility.

### **Expert Witness**

Mr. Gardineer testified as an expert and fact witness at NYSDEC permit and enforcement hearings, civil litigation in State and Federal Court, Superfund cost recovery cases, and criminal trials. Notable civil litigation cases included the *State of New York v. Town of Ramapo*, *State of New York v. Dow Chemical*, *State of New York v. Frank Sacco* (Tuxedo C+D site), *State of New York v. Thomas Prisco*, and the *State of New York v. Town of Haverstraw*.

## **FREDA PONCE**

### **GEOLOGIST**

Freda Ponce is a geologist with 2 years experience working in environmental consulting. Her current work at AKRF Inc. involves Phase I and Phase II environmental site assessments (ESA). Her Phase II technical expertise involves; soil and groundwater contamination delineation via soil borings and groundwater monitoring, installation and development of groundwater monitoring wells, hazardous soil removal and disposal, soil gas surveys and sampling, and low-flow groundwater sampling. Her hydrogeologic experience includes 72 hour permeability pump tests, and modeling of groundwater contamination plumes using the GMS 4.0 groundwater modeling program. She is also proficient in the use of ArcView GIS to map and model various environmental field data.

Prior to joining AKRF, Ms. Ponce worked for a Hydrogeological consulting firm in Millburn, New Jersey as junior geologist.

### **BACKGROUND**

#### **Education**

B.S., Geology, City College of New York 2001

#### **Certifications**

40 Hour Hazardous Waste Operations Site Worker 2001

New York State-Licensed Asbestos Inspector 2004

NYC Department of Buildings Inspector License 2004

#### **Years of Experience**

Year started in company: 2004

Year started in industry: 2001

### **RELEVANT EXPERIENCE**

#### **Yankees Stadium Site, Phase II, Bronx, NY**

Ms. Ponce completed a Phase II subsurface investigation for this property currently in the CEQR process to allow for redevelopment of the site. Ms. Ponce's work included; a geophysical survey, advancement of soil borings installation of groundwater monitoring wells, analysis of analytical laboratory data, and preparation of a subsurface investigation report.

#### **Avalon Phase II, New Rochelle, NY**

Ms. Ponce completed a Phase II subsurface investigation for this property to allow for redevelopment of the site. Ms. Ponce's work included; advancement of soil borings, installation of groundwater monitoring wells, analysis of analytical laboratory data, and preparation of a subsurface investigation report. Ms. Ponce was also involved with the oversight of sub-contractors during excavation of contaminated soil at the subject site.

#### **West 61<sup>st</sup> Phase II, New York, NY**

Ms. Ponce completed a Phase II subsurface investigation for this property currently in the Brownfields cleanup program to allow for redevelopment of the site. Ms. Ponce's work included; a geophysical survey, installation and sampling of soil borings and groundwater monitoring wells, installation and sampling of soil gas wells, analysis of



## **FREDA PONCE,**

**GEOLOGIST**

| p. 2

analytical laboratory data, and preparation of a subsurface investigation report for submission to applicable regulatory agencies.

### **325-329 West Broadway, New York, NY**

Ms. Ponce conducted a Phase I Environmental Site Assessment in accordance with ASTM E-1527-00 related to the redevelopment of this site. Ms. Ponce coordinated with clients, property owners, and tenants to conduct the site inspection, historical research, regulatory records review, and prepare the Phase I report. Ms. Ponce also completed a Phase II subsurface investigation for this property which included; advancement of soil borings, sampling of groundwater, analysis of analytical laboratory data, and preparation of a subsurface investigation report.

### **CE Flushing Site, Flushing, NY**

Ms. Ponce is serving on a team conducting a Phase II investigation of a large PCB-contaminated former utility property in Flushing, Queens. She has completed field work for several soil boring installations in the contaminant delineation phase of the project.

### **Queens West, Long Island City, NY**

Ms. Ponce conducted field work for a supplemental remedial investigation at this former Blau Gas manufacturing facility on a portion of the Queens West Development site in Long Island City. The work is being conducted as part of a Voluntary Cleanup Agreement with the NYSDEC. Field work activities have included soil borings, and monitoring well sampling. Ms. Ponce also prepared a Supplemental Remedial Investigation Workplan, Health and Safety Plan, and Quality Assurance Protection Plan for further field activities related to be conducted at the project site.

### **201-205 Saw Mill River Road, Millwood, NY**

Ms. Ponce completed a Phase II subsurface investigation for this property to allow for commercial redevelopment of the site. Ms. Ponce's work included the advancement of soil borings, sampling of monitoring wells, analysis of analytical laboratory data, and preparation of a subsurface investigation report.

### **Zerega Avenue EAS, Bronx, NY**

Ms. Ponce completed a subsurface investigation for this property under NYCDEP guidance, to allow for commercial redevelopment of the site. Ms. Ponce's work included the installation and sampling of soil borings, excavation of test pits, installation and sampling of temporary groundwater monitoring wells, soil gas sampling, analysis of field data and laboratory analytical data, and preparation of a subsurface investigation report.

### **Columbia University Manhattanville Development, New York, NY**

As part of the New York City CEQR process, Ms. Ponce conducted a Phase I Environmental Site Assessment in accordance with ASTM E-1527-00 related to the development of approximately 4 million square feet of new academic, research and neighborhood uses to be constructed north of Columbia University's existing Morningside location. Ms. Ponce coordinated with clients, property owners, and tenants to conduct the site inspection, historical research, regulatory records review, and prepare the Phase I report.

### **27-06 43<sup>Rd</sup> Avenue, Long Island City, NY**

As part of the New York City CEQR process, Ms. Ponce conducted a Phase I Environmental Site Assessment in accordance with ASTM E-1527-00 related to the development of an e-designated site located in Long Island City,





## **FREDA PONCE,**

**GEOLOGIST**

| p. 3

New York. Ms. Ponce coordinated with clients, property owners, and tenants to conduct the site inspection, historical research, regulatory records review, and prepare the Phase I report.

### **312 Warburton Avenue, Yonkers, NY**

Ms. Ponce conducted a Phase I Environmental Site Assessment in accordance with ASTM E-1527-00 related to the redevelopment of a site located in along the Yonkers, New York. Ms. Ponce coordinated with clients, property owners, and tenants to conduct the site inspection, historical research, regulatory records review, and prepare the Phase I report.

### **K. Hovnanian's Four Seasons at Hamptonburgh, Town of Hamptonburgh, NY**

Ms. Ponce assisted in writing a groundwater resources chapter as well as a soils, geology, and topography chapter as part of a Draft Environmental Impact Statement (DEIS) for a residential development in the Town of Hamptonburgh, New York. The EIS was conducted in accordance with the State Environmental Quality Review Act and was currently submitted for review by the Town of Hamptonburgh.



## **JESSICA LEBER**

### **ENVIRONMENTAL SCIENTIST**

Since joining AKRF, Ms. Leber has performed Phase I and Phase II environmental site assessments, remediation oversight, and other hazardous material investigations. She has previous experience in laboratory work and data review, and recently graduated with a degree in environmental chemistry from Columbia University.

### **BACKGROUND**

#### **Education**

B.A., Environmental Chemistry, Columbia University, 2004

#### **Professional Registrations**

40 Hour Hazardous Waste Operations Site Worker, 2004 - Current

New York State-Licensed Asbestos Inspector, 2004 - Current

#### **Professional Memberships**

Member, American Chemical Society, 2004-2005

#### **Years experience**

With this firm: 1

With other firms: 0

### **RELEVANT EXPERIENCE**

#### **Queens West Development, Long Island City, NY**

Ms. Leber conducted investigation activities at a Brownfields Cleanup Program site on a portion of the Queens West Development site in Long Island City. She has supervised ongoing remediation activities including the excavation of contaminated soil within a containment structure, removal of storage tanks, and health and safety and community air monitoring.

#### **Brooklyn Arena/Atlantic Yards Development, Brooklyn, NY**

As part of the New York City CEQR process, Ms. Leber served on a team of Hazmat staff conducting Phase I Environmental Site Assessments related to the potential development of eight city blocks for the Atlantic Yards Arena. Ms. Leber is preparing the hazardous materials analysis for the Environmental Impact Statement and will eventually compose the Construction Phase Health and Safety Plan for this project.

#### **CE Flushing Site, Flushing, NY**

Ms. Leber is serving on a team conducting an investigation and remediation of a large PCB-contaminated former utility property in Flushing, Queens. She has completed several hundred soil boring installations in the



## **JESSICA LEBER**

**ENVIRONMENTAL SCIENTIST** | p. 2

contaminant delineation phase of the project and has aided in preparing documents for the site's transfer from the State Voluntary Cleanup Program to the State Brownfield Cleanup Program.

### **329 Gold Street, Brooklyn, NY**

Ms. Leber prepared the Department of Environmental Protection approved sampling protocol for a Phase II subsurface investigation on a site with auto-related uses undergoing conversion to a high rise structure. Ms. Leber is coordinating and conducting the implementation of this sampling protocol.



**APPENDIX F**  
**WATERPROOFING/VAPOR BARRIER TECHNICAL SPECIFICATION AND INFORMATION SHEETS**

P R O D U C T I N F O R M A T I O N

# Bituthene® System 4000

Self-adhesive HDPE waterproofing membrane with super tacky compound for use with patented, water-based System 4000 Surface Conditioner

## Advantages

- **Excellent adhesion** – special adhesive compound engineered to work with high tack System 4000 Surface Conditioner
- **Cold applied** – simple application to substrates, especially at low temperatures
- **Reduced inventory and handling costs** – System 4000 Surface Conditioner is included with each roll of membrane
- **Wide application temperature range** – excellent bond to self and substrate from -4°C (25°F) and above
- **Overlap security** – minimizes margin for error under site conditions
- **Cross laminated, high density polyethylene carrier film** – provides high tear strength, puncture and impact resistance
- **Flexible** – accommodates minor structural movements and will bridge shrinkage cracks
- **RIPCORDER®** – this Split Release on Demand feature allows the splitting of the membrane into two (2) pieces for ease of installation in detailed areas

## Description

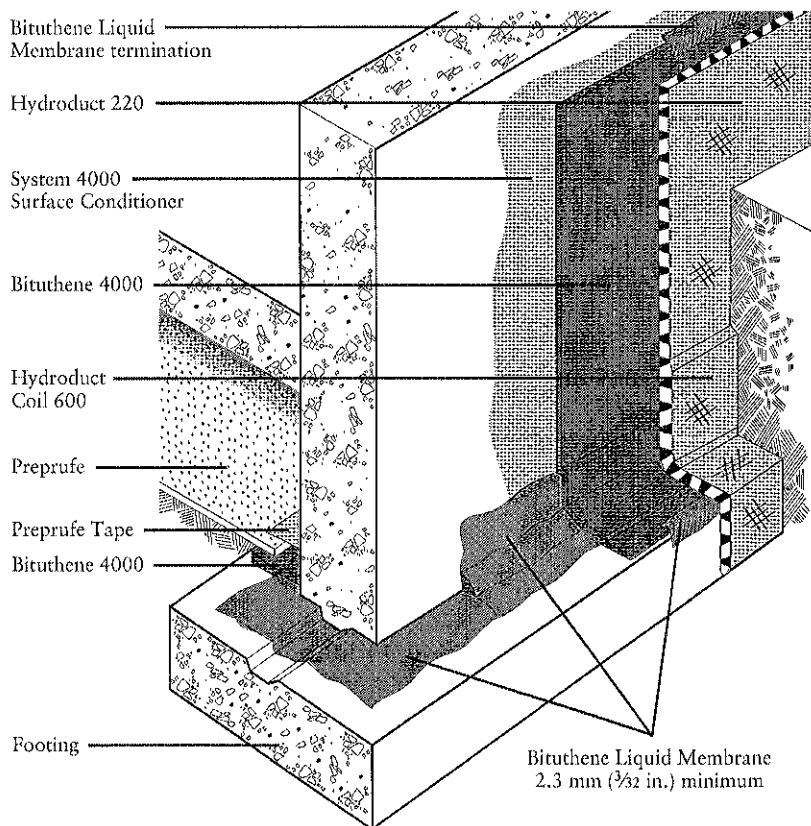
Bituthene® System 4000 is a 1.5 mm (1/16 in.) flexible, pre-formed waterproof membrane which combines a high

performance, cross laminated, HDPE carrier film with a unique, super tacky, self-adhesive rubberized asphalt compound.

System 4000 Surface Conditioner is a unique, water-based, latex surface treatment which imparts an aggressive, high tack finish to the treated substrate. It is specifically formulated to bind site dust and concrete

efflorescence, thereby providing a suitable surface for the Bituthene System 4000 Waterproofing Membrane.

Conveniently packaged in each roll of membrane, System 4000 Surface Conditioner promotes good initial adhesion and, more importantly, excellent permanent adhesion of the Bituthene System 4000 Waterproofing Membrane.



The VOC (Volatile Organic Compound) content of this product is 125 g/L.

Architectural and Industrial Maintenance Regulations limit the VOC content in products classified as Architectural Coatings. Refer to Technical Letters at [www.graceconstruction.com](http://www.graceconstruction.com) for most current list of allowable limits.

### Use

Bituthene is ideal for waterproofing concrete, masonry and wood surfaces where in-service temperatures will not exceed 57°C (135°F). It can be applied to foundation walls, tunnels, earth sheltered structures and split slab construction, both above and below grade. (For above grade applications, see "Above Grade Waterproofing Bituthene System 4000.")

Bituthene is 1.5 mm (1/16 in.) thick, 0.9 m (3 ft) wide and 20 m (66.7 ft) long and is supplied in rolls. It is unrolled sticky side down onto concrete slabs or applied onto vertical concrete faces primed with System 4000 Surface Conditioner. Continuity is achieved by overlapping a minimum 50 mm (2 in.) and firmly rolling the joint.

Bituthene is extremely flexible. It is capable of bridging shrinkage cracks in the concrete and will accommodate minor differential movement throughout the service life of the structure.

## Application Procedures

### Safety, Storage and Handling Information

Bituthene products must be handled properly. Vapors from solvent-based primers and mastic are harmful and flammable.

For these products, the best available information on safe handling, storage, personal protection, health and environmental considerations has been gathered. Material Safety Data Sheets (MSDS) are available at [www.graceconstruction.com](http://www.graceconstruction.com) and users should acquaint themselves with this information. Carefully read detailed precaution statements on product labels and the MSDS before use.

### Surface Preparation

Surfaces should be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Concrete must be properly dried (minimum 7 days for normal structural concrete and 14 days for lightweight structural concrete).

If time is critical, Bituthene Primer B2 may be used to allow priming and installation of membrane on damp surfaces or green concrete. Priming may begin in this case as soon as the concrete will maintain structural integrity. Use form release agents which will not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane. Cure concrete with clear, resin-based curing compounds which do not contain oil, wax or pigment. Except with Primer B2, allow concrete to thoroughly dry following rain. Do not apply any products to frozen concrete.

Repair defects such as spalled or poorly consolidated areas. Remove sharp protrusions and form match lines. On masonry surfaces, apply

a parge coat to rough concrete block and brick walls or trowel cut mortar joints flush to the face of the concrete blocks.

### Temperature

- Apply Bituthene System 4000 Membrane and Conditioner only in dry weather and when air and surface temperatures are -4°C (25°F) or above.
- Apply Bituthene Primer B2 in dry weather above -4°C (25°F). (See separate product information sheet.)

### Conditioning

Bituthene System 4000 Surface Conditioner is ready to use and can be applied by spray or roller. For best results, use a pump-type air sprayer with fan tip nozzle, like the Bituthene System 4000 Surface Conditioner Sprayer, to apply the surface conditioner.

Apply Bituthene System 4000 Surface Conditioner to clean, dry, frost-free surfaces at a coverage rate of 7.4 m<sup>2</sup>/L (300 ft<sup>2</sup>/gal). Coverage should be uniform. Surface conditioner should not be applied so heavily that it puddles or runs. **Do not apply conditioner to Bituthene membrane.**

Allow Bituthene System 4000 Surface Conditioner to dry one hour or until substrate returns to its original color. At low temperatures or in high humidity conditions, dry time may be longer.

Bituthene System 4000 Surface Conditioner is clear when dry and may be slightly tacky. In general, conditioning should be limited to what can be covered within 24 hours. In situations where long dry times may prevail, substrates may be conditioned in advance. Substrates should be reconditioned if significant dirt or dust accumulates.

Before surface conditioner dries, tools should be cleaned with water. After surface conditioner dries, tools should be cleaned with mineral spirits. Mineral spirits is a combustible liquid which should be used only in accordance with manufacturer's recommendations. **Do not use solvents to clean hands or skin.**

### Corner Details

The treatment of corners varies depending on the location of the corner. For detailed information on Bituthene Liquid Membrane, see separate product information sheet.

- At wall to footing inside corners –  
**Option 1:** Apply membrane to within 25 mm (1 in.) of base of wall. Treat the inside corner by installing a 20 mm (3/4 in.) fillet of Bituthene Liquid Membrane. Extend Bituthene Liquid Membrane at least 65 mm (2 1/2 in.) onto footing, and 65 mm (2 1/2 in.) onto wall membrane.  
**Option 2:** Treat the inside corner by installing a 20 mm (3/4 in.) fillet of Bituthene Liquid Membrane. Apply 300 mm (12 in.) wide strip of sheet membrane centered over fillet. Apply wall membrane over inside corner and extend 150 mm (6 in.) onto footing. Apply 25 mm (1 in.) wide troweling of Bituthene Liquid Membrane over all terminations and seams within 300 mm (12 in.) of corner.
- At footings where the elevation of the floor slab is 150 mm (6 in.) or more above the footing, treat the inside corner either by the above two methods or terminate the membrane at the base of the wall. Seal the termination with Bituthene Liquid Membrane.

### Joints

Properly seal all joints with waterstop, joint filler and sealant as required. Bituthene membranes are not intended to function as the primary joint seal. Allow sealants to fully cure. Pre-strip all slab and wall cracks over 1.5 mm (1/16 in.) wide and all construction and control joints with 230 mm (9 in.) wide sheet membrane strip.

### Application on Horizontal Surfaces

(Note: Preprufe® pre-applied membranes are strongly recommended for below slab or for any application where the membrane is applied before concreting. See Preprufe product information sheets.)

Apply membrane from the low point to the high point so that laps shed water. Overlap all seams at least 50 mm (2 in.). Stagger all end laps. Roll the entire membrane firmly and completely as soon as possible. Use a linoleum roller or standard water-filled garden roller less than 760 mm (30 in.) wide, weighing a minimum of 34 kg (75 lbs) when filled. Cover the face of the roller with a resilient material such as a 13 mm (1/2 in.) plastic foam or two wraps of indoor-outdoor carpet to allow the membrane to fully contact the primed substrate. Seal all T-joints and membrane terminations with Bituthene Liquid Membrane at the end of the day.

### Protrusions and Drains

Apply membrane to within 25 mm (1 in.) of the base of the protrusion. Apply Bituthene Liquid Membrane 2.5 mm (0.1 in.) thick around protrusion.

Bituthene Liquid Membrane should extend over the membrane a minimum of 65 mm (2 1/2 in.) and up the penetration to just below the finished height of the wearing course.

### Vertical Surfaces

Apply membrane in lengths up to 2.5 m (8 ft). Overlap all seams at least 50 mm (2 in.). On higher walls apply membrane in two or more sections with the upper overlapping the lower by at least 50 mm (2 in.). Roll all membrane with a hand roller.

Terminate the membrane at grade level. Press the membrane firmly to the wall with the butt end of a hardwood tool such as a hammer handle or secure into a reglet. Failure to use heavy pressure at terminations can result in a poor seal. A termination bar may be used to ensure a tight seal. Terminate the membrane at the base of the wall if the bottom of the interior floor slab is at least 150 mm (6 in.) above the footing. Otherwise, use appropriate inside corner detail where the wall and footing meet.

### Membrane Repairs

Patch tears and inadequately lapped seams with membrane. Clean membrane with a damp cloth and dry. Slit fishmouths and repair with a patch extending 150 mm (6 in.) in all directions from the slit and seal edges of the patch with Bituthene Liquid Membrane. Inspect the membrane thoroughly before covering and make any repairs.

### Drainage

Hydroduct® drainage composites are recommended for both active drainage and protection of the membrane. See Hydroduct product information sheets.

### Protection of Membrane

Protect Bituthene membranes to avoid damage from other trades, construction materials or backfill. Place protection immediately in temperatures above 25°C (77°F) to avoid potential for blisters.

- On vertical applications, use Hydroduct 220 Drainage Composite. Adhere Hydroduct 220 Drainage Composite to membrane with Hydroduct Tape. Alternative methods of protection are to use 25 mm (1 in.) expanded polystyrene or 6 mm (1/4 in.) extruded polystyrene that has a minimum compressive strength of 55 kN/m<sup>2</sup> (8 lbs/in.<sup>2</sup>). Such alternatives do not provide positive drainage to the system.

If 6 mm (1/4 in.) extruded polystyrene protection board is used, backfill should not contain sharp rock or aggregate over 50 mm (2 in.) in diameter. Adhere polystyrene protection board with Hydroduct Tape.

- In mud slab waterproofing, or other applications where positive drainage is not desired and where reinforced concrete slabs are placed over the membrane, the use of 6 mm (1/4 in.) hardboard or 2 layers of 3 mm (1/8 in.) hardboard is recommended.

### Insulation

Always apply Bituthene membrane directly to primed or conditioned structural substrates. Insulation, if used,

must be applied over the membrane. Do not apply Bituthene membranes over lightweight insulating concrete.

### Backfill

Place backfill as soon as possible. Use care during backfill operation to avoid damage to the waterproofing system. Follow generally accepted practices for backfilling and compaction. Backfill should be added and compacted in 150 mm (6 in.) to 300 mm (12 in.) lifts.

For areas which cannot be fully compacted, a termination bar is recommended across the top termination of the membrane.

## System 4000 Surface Conditioner Sprayer

The Bituthene System 4000 Surface Conditioner Sprayer is a professional grade, polyethylene, pump-type, compressed air sprayer with a brass fan tip nozzle. It has a 7.6 L (2 gal) capacity. The nozzle orifice and spray pattern have been specifically engineered for the optimum application of Bituthene System 4000 Surface Conditioner.

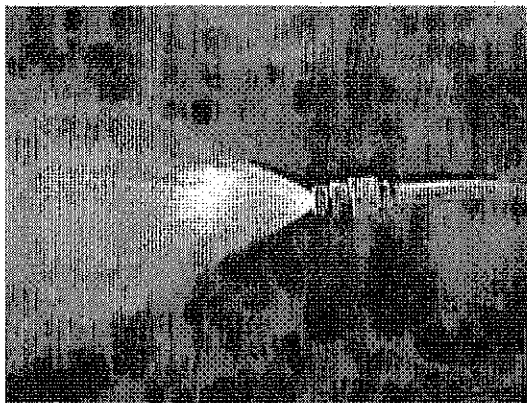
Hold nozzle 450 mm (18 in.) from substrate and squeeze handle to spray. Spray in a sweeping motion until substrate is uniformly covered.

Sprayer should be repressurized by pumping as needed. For best results, sprayer should be maintained at high pressure during spraying.

To release pressure, invert the sprayer and spray until all compressed air is released.

### Maintenance

The Bituthene System 4000 Surface Conditioner Sprayer should perform without trouble for an extended period if maintained properly.



Sprayer should not be used to store Bituthene System 4000 Surface Conditioner. The sprayer should be flushed with clean water immediately after spraying. For breaks in the spray operation of one hour or less, invert the sprayer and squeeze the spray handle until only air comes from the nozzle. This will avoid clogging.

Should the sprayer need repairs or parts, call the maintenance telephone number on the sprayer tank (800-323-0620).

## Supply

Bituthene System 4000	0.9 m x 20 m roll (18.6 m <sup>2</sup> ) 3 ft x 66.7 ft (200 ft <sup>2</sup> )
Roll weight	38 kg (83 lbs) gross
Palletization	25 rolls per pallet
Storage	Store upright in dry conditions below +35°C (95°F)
System 4000 Surface Conditioner	1 x 2.3 L (0.625 gal) bottle in each roll of System 4000 Membrane
<b>Ancillary Products</b>	
Surface Conditioner Sprayer	7.6 L (2 gal) capacity professional grade sprayer with specially engineered nozzle
Bituthene Liquid Membrane	5.7 L (1.5 gal) pail/125 pails per pallet or 15.1 L (4 gal) pail/48 pails per pallet
Hydroduct Tape	2.5 cm x 61.0 m (1 in. x 200 ft) roll/6 rolls per carton
Bituthene Mastic	12 - 0.9 L (30 oz) tubes/carton or 18.9 L (5 gal) pail/36 pails per pallet
<b>Complementary Material</b>	
Hydroduct	See separate data sheets

Equipment by others:

Soft broom, utility knife, brush or roller for priming

### Placing Steel

When placing steel over properly protected membrane, use concrete bar supports (dobies) or chairs with plastic tips or rolled feet to prevent damage from sharp edges. Use special care when using wire mesh, especially if the mesh is curled.

### Approvals

- City of Los Angeles  
Research Report RR 24386
- U.S. Department of Housing and Urban Development (HUD) HUD Materials Release 628E

### Warranty

Five year material warranties covering Bituthene and Hydroduct products are available upon request. Contact your Grace sales representative for details.

### Technical Services

Support is provided by full time, technically trained Grace representatives and technical service personnel, backed by a central research and development staff.



### Physical Properties for Bituthene 4000 Membrane

Property	Typical Value	Test Method
Color	Dark gray-black	
Thickness	1.5 mm (1/16 in.) nominal	ASTM D3767 – method A
Flexibility, 180° bend over 25 mm (1 in.) mandrel at -32°C (-25°F)	Unaffected	ASTM D1970
Tensile strength, membrane, die C	2240 kPa (325 lbs/in. <sup>2</sup> ) minimum	ASTM D412 modified <sup>1</sup>
Tensile strength, film	34.5 MPa (5,000 lbs/in. <sup>2</sup> ) minimum	ASTM D882 modified <sup>1</sup>
Elongation, ultimate failure of rubberized asphalt	300% minimum	ASTM D412 modified <sup>1</sup>
Crack cycling at -32°C (-25°F), 100 cycles	Unaffected	ASTM C836
Lap adhesion at minimum application temperature	880 N/m (5 lbs/in.)	ASTM D1876 modified <sup>2</sup>
Peel strength	1576 N/m (9 lbs/in.)	ASTM D903 modified <sup>3</sup>
Puncture resistance, membrane	222 N (50 lbs) minimum	ASTM E154
Resistance to hydrostatic head	70 m (210 ft) of water	ASTM D5385
Permeance	2.9 ng/m <sup>2</sup> sPa (0.05 perms) maximum	ASTM E96, section 12 – water method
Water absorption	0.1% maximum	ASTM D570

**Footnotes:**

1. The test is run at a rate of 50 mm (2 in.) per minute.
2. The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in.) per minute at 5°C (40°F).
3. The 180° peel strength is run at a rate of 300 mm (12 in.) per minute.

### Physical Properties for System 4000 Surface Conditioner

Property	Typical Value
Solvent type	Water
Flash point	>60°C (>140°F)
VOC* content	125 g/L
Application temperature	-4°C (25°F) and above
Freeze thaw stability	5 cycles (minimum)
Freezing point (as packaged)	-10°C (14°F)
Dry time (hours)	1 hour**

\* Volatile Organic Compound

\*\* Dry time will vary with weather conditions

**For Technical Assistance call toll free at 866-333-35BM (3726).**

**web** Visit our web sites at [www.graceconstruction.com](http://www.graceconstruction.com)

W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140

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BIT-220E

Printed in USA

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**GRACE**  
Construction Products

## Section 07135

### Pre-applied Integrally Bonded Sheet Membrane Waterproofing

#### PART 1 — GENERAL

##### 1.01 SUMMARY

- A. The Work of this Section includes, but is not limited to, pre-applied sheet membrane waterproofing that forms an integral bond to poured concrete for the following applications:
  - 1. Vertical Applications: Membrane applied against soil retention system prior to placement of concrete foundation walls;
  - 2. Horizontal Applications: Membrane applied on prepared subbase prior to placement of concrete slabs.
- B. Related sections include, but are not limited to, the following:
  - 1. Section 02200 – Earthwork
  - 2. Section 02350 – Piles and Caissons
  - 3. Section 03100 – Concrete Formwork
  - 4. Section 03300R – Cast-In-Place Concrete

**NOTE TO SPECIFIER: For vertical applications, coordinate with concrete formwork section to require one-sided wall forming system to minimize punctures to the sheet membrane waterproofing during formwork installation.**

##### 1.02 SUBMITTALS

- A. Submit manufacturer's product data, installation instructions and membrane samples for approval.

##### 1.03 REFERENCE STANDARDS

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM):
  - C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
  - D 412 Standard Test Methods for Rubber Properties in Tension
  - D 570 Standard Test Method for Water Absorption of Plastics
  - D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
  - D 1434 Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting
  - D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
  - D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

- D 3767 Standard Practice for Rubber - Measurements of Dimensions
- D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
- E 96 Standard Test Methods for Water Vapor Transmission of Materials
- E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer: Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.
- B. Installer: A firm which has at least 3 years experience in work of the type required by this section.
- C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
- D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.
- E. Schedule Coordination: Schedule work such that membrane will not be left exposed to weather for longer than that recommended by the manufacturer.

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's instructions. Protect from damage from weather, excessive temperature and construction operations. Remove and dispose of damaged material in accordance with applicable regulations.

#### **1.06 PROJECT CONDITIONS**

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

#### **1.07 WARRANTY**

- A. Sheet Membrane Waterproofing: Provide written five year material warranty issued by the membrane manufacturer upon completion of work.

## PART 2 — PRODUCTS

### 2.01 MATERIALS

- A. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Preprufe® 300R Membrane by Grace Construction Products, a 1.2mm (0.046 in) nominal thickness composite sheet membrane comprising 0.8 mm (0.030 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

#### PHYSICAL PROPERTIES FOR PREPRUFE 300R MEMBRANE:

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767 Method A	1.2 mm (0.046 in.) nominal
Low Temperature Flexibility	ASTM D 1970	Unaffected at -23°C (-10°F)
Elongation	ASTM D 412 Modified <sup>1</sup>	>300%
Crack Cycling at -23°C (-10°F), 100 Cycles	ASTM C 836	Unaffected
Tensile Strength, Film	ASTM D 412	27.6 MPa (4,000 lbs/in. <sup>2</sup> ) minimum
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>2</sup>	880 N/m (5.0 lbs/in.)
Lap Adhesion	ASTM D 1876 Modified <sup>3</sup>	440 N/m (2.5 lbs/in.)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>4</sup>	>70 m (231 ft)
Puncture Resistance	ASTM E 154	990 N (180 lbs) minimum
Permeance	ASTM E 96 Method B	<0.6 ng/m <sup>2</sup> sPa (0.01 perms)
Water Absorption	ASTM D 570	<0.5%

#### Footnotes:

1. Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.
2. Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
3. The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).
4. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 70 m (231 ft) of water which is the limit of the apparatus.

- B. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Preprufe® 160R Membrane by Grace Construction Products, a 1.0mm (0.032 in) nominal thickness composite sheet membrane comprising 0.4 mm (0.016 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

**PHYSICAL PROPERTIES FOR PREPRUFE 160R MEMBRANE:**

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767 Method A	1.0 mm (0.032 in.) nominal
Low Temperature Flexibility	ASTM D 1970	Unaffected at -23°C (-10°F)
Elongation	ASTM D 412 Modified <sup>1</sup>	>300%
Crack Cycling at -23°C (-10°F), 100 Cycles	ASTM C 836	Unaffected
Tensile Strength, Film	ASTM D 412	27.6 MPa (4,000 lbs/in. <sup>2</sup> )
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>2</sup>	880 N/m (5.0 lbs/in.)
Lap Adhesion	ASTM D 1876 Modified <sup>3</sup>	440 N/m (2.5 lbs/in.)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>4</sup>	>70 m (231 ft)
Puncture Resistance	ASTM E 154	445 N (100 lbs)
Permeance	ASTM E 96 Method B	<0.6 ng/m <sup>2</sup> sPa (0.01 perms)
Water Absorption	ASTM D 570	<0.5%

*Footnotes:*

- Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.*
- Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.*
- The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).*
- Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 70 m (231 ft) of water which is the limit of the apparatus.*

**PART 3 — EXECUTION**

**3.01 EXECUTION**

- The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

**3.02 INSTALLATION, VERTICAL APPLICATIONS**

- Substrates shall be smooth and sound. Suitable substrates include Hydroduct® Drainage Composites by Grace Construction Products or plywood.
- Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
  - Apply membrane with the HDPE film facing the prepared soil retention system (wood lagging, sheet piling, gunite, shotcrete, etc.). Remove the release liner and fasten membrane along uncoated edge to Hydroduct drainage composite with large head nails or to plywood with large head nails or staples.
  - Apply succeeding sheets by overlapping the previous sheet 75 mm (3 in.) along the uncoated edge of the membrane. Side laps must be firmly rolled to ensure a tight seal.
  - Overlap the ends of the membrane 75 mm (3 in.). Apply Preprufe® Tape centered over the end lap and roll firmly to ensure a tight seal. Remove release liner.

### **3.03 INSTALLATION, HORIZONTAL APPLICATIONS**

- A. Earth and stone substrates shall be well compacted to produce an even, solid substrate. Remove loose aggregate or sharp protrusions. Concrete substrates shall be smooth or broom finished and monolithic. Fill gaps or voids greater than 13 mm (0.5 in.). Remove standing water prior to membrane applications.
- B. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
  - 1. Apply membrane with the HDPE film facing the prepared substrate. Remove the release liner during application.
  - 2. Apply succeeding sheets by overlapping the previous sheet 75 mm (3 in.) along the uncoated edge of the membrane. Lap area must be firmly rolled to ensure a tight seal.
  - 3. Overlap the ends of the membrane a minimum of 75 mm (3 in.) and apply Preprufe® Tape centered over the lap and roll firmly to ensure a tight seal.

### **3.04 PROTECTION**

- A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

### **END OF SECTION**

**W.R. Grace & Co.-Conn.      62 Whittemore Avenue      Cambridge, MA 02140**

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**Section 07135**  
**Sheet Membrane Waterproofing**

**PART 1 - GENERAL**

1.01 RELATED DOCUMENTS

- A. All of the Contract Documents, including General and Supplementary Conditions and Division 1 General Requirements, apply to the work of this section.

1.02 SUMMARY

- A. The work of this section includes, but is not limited to, the following:
  - 1. Rubberized asphalt sheet membrane waterproofing system
  - 2. Prefabricated drainage composite
  - 3. Protection board
- B. Related Sections: Other specification sections which directly relate to the work of this section include, but are not limited to, the following:
  - 1. Section 02710 - Drainage Composites
  - 2. Section 02712 - Subsurface Drainage Pipe
  - 3. Section 03300 - Cast-In-Place Concrete
  - 4. Section 04200 - Unit Masonry
  - 5. Section 05810 - Expansion Joint Cover Assemblies
  - 6. Section 07150 - Dampproofing
  - 7. Section 07600 - Flashing and Sheet Metal
  - 8. Section 07900 - Joint Sealers
  - 9. Section 15400 - Drains

1.03 REFERENCE STANDARDS

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM)
  - C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
  - D 412 Standard Test Methods for Rubber Properties in Tension
  - D 570 Standard Test Method for Water Absorption of Plastics

- D 882 Standard Test Methods for Tensile Properties of Thin Plastic Sheetings
- D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
- D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
- D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
- D 3767 Standard Practice for Rubber - Measurements of Dimensions
- D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
- E 96 Standard Test Methods for Water Vapor Transmission of Materials
- E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

#### 1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations. Include certification of data indicating VOC (Volatile Organic Compound) content of all components of waterproofing system.
- B. Samples: Submit representative samples of the following for approval:
  - 1. Sheet membrane
  - 2. Protection board
  - 3. Prefabricated drainage composite

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer: Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of self-adhesive sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.
- B. Installer: A firm which has at least 3 years experience in work of the type required by this section.
- C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.



- D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in labeled packages. Store and handle in strict compliance with manufacturer's instructions, recommendations and material safety data sheets. Protect from damage from sunlight, weather, excessive temperatures and construction operations. Remove damaged material from the site and dispose of in accordance with applicable regulations.
  - 1. Do not double-stack pallets of membrane on the job site. Provide cover on top and all sides, allowing for adequate ventilation.
  - 2. Protect mastic and adhesive from moisture and potential sources of ignition.
  - 3. Store drainage composite or protection board flat and off the ground. Provide cover on top and all sides.
  - 4. Protect surface conditioner from freezing.
- B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.07 PROJECT CONDITIONS

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.
- B. Proceed with installation only when substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

1.08 WARRANTY

- A. Sheet Membrane Waterproofing: Provide written 5 year material warranty issued by the membrane manufacturer upon completion of the work.

**PART 2 - PRODUCTS**

2.01 MATERIALS

- A. Sheet Membrane Waterproofing System: Bituthene® System 4000 Membrane by Grace Construction Products; a self-adhesive, cold-applied composite sheet consisting of a thickness of 1.4 mm (0.056 in.) of rubberized asphalt and 0.1 mm (0.004 in.) of cross-laminated, high density polyethylene film specially

SHEET MEMBRANE WATERPROOFING  
GRACE CONSTRUCTION PRODUCTS

BITUTHENE SYSTEM 4000

formulated for use with water-based surface conditioner.  
Provide rubberized asphalt membrane covered with a release  
sheet which is removed during installation. No special  
adhesive or heat shall be required to form laps.

B. Sheet Membrane Waterproofing

PHYSICAL PROPERTIES FOR BITUTHENE SYSTEM 4000 MEMBRANE:

Property  
Test Method  
Typical Value

Color

Dark gray-black

Thickness

ASTM D 3767 Method A

1.5 mm (0.060 in.) nominal

Flexibility, 180° bend over

25 mm (1 in.) mandrel at

-43°C (-45°F)

ASTM D 1970

Unaffected

Tensile Strength, Membrane

Die C

ASTM D 412 Modified1

2240 kPa (325 lbs/in.2) minimum

Tensile Strength, Film

ASTM D 882 Modified1

34.5 MPa (5,000 lbs/in.2) minimum

Elongation, Ultimate Failure of Rubberized Asphalt

ASTM D 412 Modified1

300% minimum

Crack Cycling at -32°C (-25°F), 100 Cycles

ASTM C 836

Unaffected

Lap Adhesion at Minimum Application Temperature

ASTM D 1876 Modified2

880 N/m (5 lbs/in.)

Peel Strength

ASTM D 903 Modified3

1576 N/m (9 lbs/in.)

Puncture Resistance, Membrane

ASTM E 154

222 N (50 lbs) minimum

Resistance to Hydrostatic Head

ASTM D 5385

70 m (231 ft) of water

Permeance

**SHEET MEMBRANE WATERPROOFING  
GRACE CONSTRUCTION PRODUCTS**

**BITUTHENE SYSTEM 4000**

ASTM E 96,  
Section 12 - Water Method  
2.9 ng/m<sup>2</sup>sPa  
(0.05 perms) maximum

Water Absorption  
ASTM D 570  
0.1% maximum

**Footnotes:**

1. The test is run at a rate of 50 mm (2 in.) per minute.
2. The test is conducted 15 minutes after the lap is formed and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).
3. The 180° peel strength is run at a rate of 300 mm (12 in.) per minute.

- C. Prefabricated Drainage Composite: (Hydroduct® 220) (Hydroduct® 660) Drainage Composite by Grace Construction Products. Drainage Composite shall be designed to promote positive drainage while serving as a protection course.

NOTE TO SPECIFIER: The following are product selection guidelines for Hydroduct Drainage Composites. Consult the "Product Summary" and "System Components" section of the Waterproofing Systems Manual North American Edition for complete information. Hydroduct 220: All vertical applications. Hydroduct 660: All horizontal applications. THE APPROPRIATE HYDRODUCT DRAINAGE COMPOSITE MAY ALSO SERVE AS PROTECTION FOR ALL BITUTHENE MEMBRANES.

**D. Protection Board:**

1. Expanded Polystyrene Protection Board: 25 mm (1 in.) thick for vertical applications with the following characteristics. Adhere to waterproofing membrane with Bituthene Protection Board Adhesive.

Normal Density: 16 kg/m<sup>3</sup> (1.0 lb/ft<sup>3</sup>)

Thermal Conductivity, K factor: 0.24 at 5°C (40°F), 0.26 at 24°C (75°F)

Thermal Resistance, R-Value: 4 per 25 mm (1 in.) of thickness.

2. Asphalt Hardboard: A premolded semi-rigid protection board consisting of bitumen, mineral core and reinforcement. Provide 3 mm (0.125 in.) thick hardboard on horizontal surfaces not receiving steel reinforced slab. Where steel reinforcing bars are to be used, apply two layers of 3 mm (0.125 in.) thick hardboard or one layer of 6 mm (0.25 in.) thick hardboard.

- E. Miscellaneous Materials: Surface conditioner, mastic, liquid membrane, tape and accessories specified or acceptable to manufacturer of sheet membrane waterproofing.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

- A. The installer shall examine conditions of substrates and other

conditions under which this work is to be performed and notify the contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

### 3.02 PREPARATION OF SUBSTRATES

A. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminants such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing.

B. Cast-In-Place Concrete Substrates:

1. Do not proceed with installation until concrete has properly cured and dried  
(minimum 7 days for normal structural concrete and minimum 14 days for lightweight structural concrete).

NOTE TO SPECIFIER: If time is critical Bituthene® Primer B2 may be used to allow priming and installation of membrane sooner than 7 days. Priming may begin in this case as soon as the concrete will maintain structural integrity.

2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
3. Repair bugholes over 13 mm (0.5 in.) in length and 6 mm (0.25 in.) deep and finish flush with surrounding surface.
4. Remove scaling to sound, unaffected concrete and repair exposed area.
5. Grind irregular construction joints to suitable flush surface.

C. Masonry Substrates: Apply waterproofing over concrete block and brick with smooth trowel-cut mortar joints or parge coat.

D. Wood Substrates: Apply waterproofing membrane over securely fastened sound surface. All joints and fasteners shall be flush to create a smooth surface.

E. Related Materials: Treat joints and install flashing as recommended by waterproofing manufacturer.

### 3.03 INSTALLATION

A. Refer to manufacturer's literature for recommendations on installation, including but not limited to, the following:

1. Apply surface conditioner at rate recommended by manufacturer. Recoat areas not waterproofed if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of surface conditioner.

2. Delay application of membrane until surface conditioner is completely dry. Dry time will vary with weather conditions.
3. Seal daily terminations with troweled bead of mastic.
4. Apply protection board and related materials in accordance with manufacturer's recommendations.

3.04 CLEANING AND PROTECTION

- A. Remove any masking materials after installation. Clean any stains on materials which would be exposed in the completed work.
- B. Protect completed membrane waterproofing from subsequent construction activities as recommended by manufacturer.

## PRODUCT INFORMATION

# Preprufe® 300R & 160R

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites.

### Advantages

- Forms a unique continuous adhesive bond to concrete poured against it – prevents water migration and makes it unaffected by ground settlement beneath slabs
- Fully-adhered watertight laps and detailing
- Provides a barrier to water, moisture and gas – physically isolates the structure from the surrounding ground
- BBA Certified for basement Grades 2, 3, & 4 to BS 8102:1990
- Zero permeance to moisture
- Solar reflective – reduced temperature gain
- Simple and quick to install – requiring no priming or fillets
- Can be applied to permanent formwork – allows maximum use of confined sites
- Self protecting – can be trafficked immediately after application and ready for immediate placing of reinforcement
- Unaffected by wet conditions – cannot activate prematurely
- Inherently waterproof, non-reactive system:
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- Chemical resistant – effective in most types of soils and waters, protects structure from salt or sulphate attack

### Description

Preprufe® 300R & 160R membranes are unique composite sheets comprising a thick HDPE film, an aggressive pressure sensitive adhesive and a weather resistant protective coating.

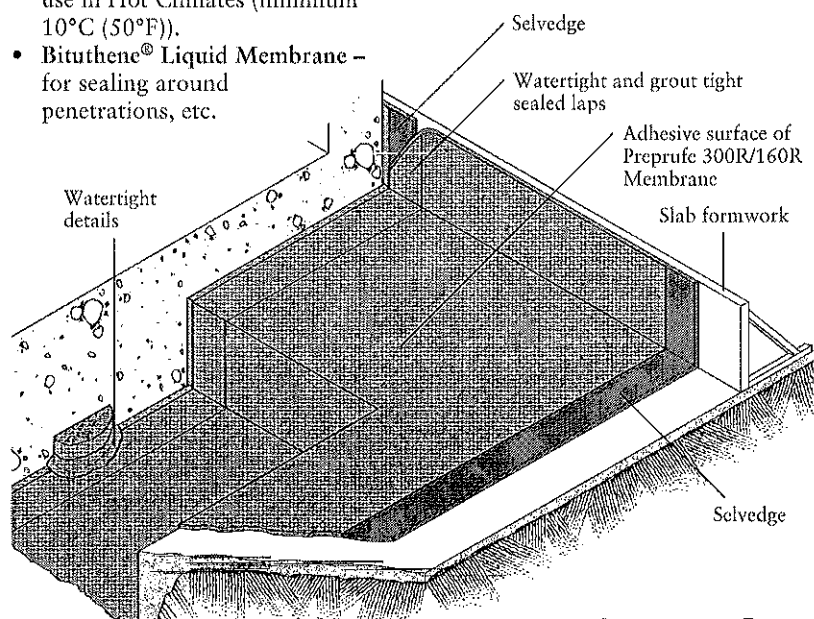
Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R System includes:

- **Preprufe 300R** – heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R** – thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT** – for covering cut edges, roll ends, penetrations and detailing (temperatures between -4°C (25°F) and +30°C (86°F)).
- **Preprufe Tape HC** – as above for use in Hot Climates (minimum 10°C (50°F)).
- **Bituthene® Liquid Membrane** – for sealing around penetrations, etc.

Preprufe 300R & 160R membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted sand or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be returned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.



## Installation

The most current application instructions, detail drawings and technical letters can be viewed at [www.graceconstruction.com](http://www.graceconstruction.com). Technical letters are provided for the following subjects to assist in the installation of Preprufe:

- Chemical Resistance
- Minimizing Concrete Shrinkage and Curling
- Rebar Chairs on Preprufe 300R Membrane
- Removal of Formwork Placed Against Preprufe Membranes
- Winter Lap Sealing and the use of Preprufe Tape LT

For other technical information contact your local Grace representative.

Preprufe 300R & 160R membranes are supplied in rolls 1.2 m (4 ft) wide, with a selvedge on one side to provide self-adhered laps for continuity between rolls. The rolls of Preprufe Membrane and Preprufe Tape are interwound with a disposable plastic release liner which must be removed before placing reinforcement and concrete.

### Substrate Preparation

**All surfaces** – It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 12 mm (0.5 in.). Grout around all penetrations such as utility conduits, etc. for stability.

**Horizontal** – The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. The surface does not need to be dry, but standing water must be removed.

**Vertical** – Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 12 mm (0.5 in.) out of alignment.

### Membrane Installation

Preprufe can be applied at temperatures of -4°C (25°F) or above. When installing Preprufe in cold or marginal weather conditions <13°C (55°F) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application.

### Horizontal substrates –

Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave plastic release liner in position until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 75 mm (3 in.) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

Refer to Grace Tech Letters for information on suitable rebar chairs for Preprufe.

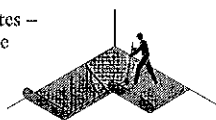
### Vertical substrates –

Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour.

The membrane may be installed in any convenient length. Secure the top of the membrane using a batten such as a termination bar or similar 50 mm (2 in.) below the top edge. Fastening can be made through the selvedge so that the membrane lays flat and allows firmly rolled overlaps. Immediately remove the plastic release liner. Any additional fasteners must be covered with a patch of Preprufe Tape.

Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Roll firmly to ensure a watertight seal.

**Roll ends and cut edges** – Overlap all roll ends and cut edges by a minimum 75 mm (3 in.) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap and roll firmly. Immediately remove printed plastic release liner from the tape.



## Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit [www.graceconstruction.com](http://www.graceconstruction.com). This Manual gives comprehensive guidance and standard details for:

- internal and external corners
- penetrations
- tiebacks
- columns
- grade beam pilecaps
- tie-ins
- terminations

### Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by jet washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (12 mm (0.5 in.) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 150 mm (6 in.) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove printed plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

### Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe R Membrane and Tape.

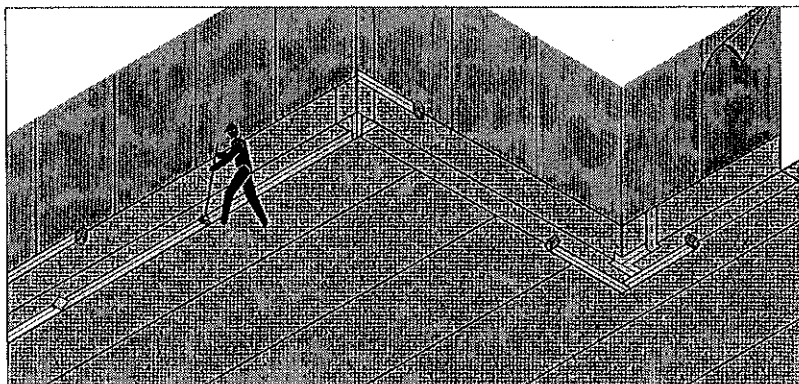
It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Concrete must be placed and compacted carefully to avoid damage to the membrane. Never use a sharp object to consolidate the concrete.

### Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 10 N/mm<sup>2</sup> (1500 psi) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

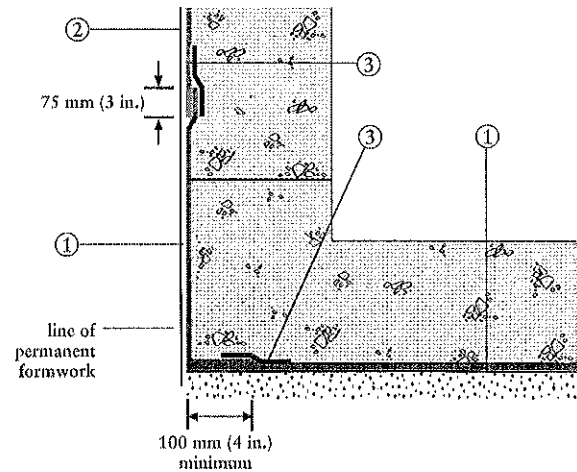
As a guide, to reach the minimum compressive strength stated above, a structural concrete mix with an ultimate strength of 40 N/mm<sup>2</sup> (6000 psi) will typically require a cure time of approximately 6 days at an average ambient temperature of -4°C (25°F), or 2 days at 21°C (70°F).



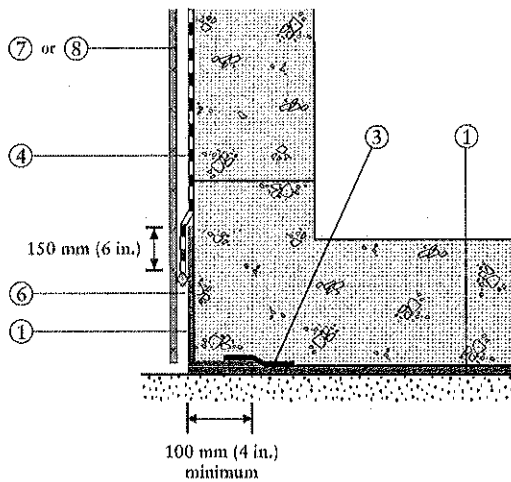
## Detail Drawings

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [www.graceconstruction.com](http://www.graceconstruction.com). For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

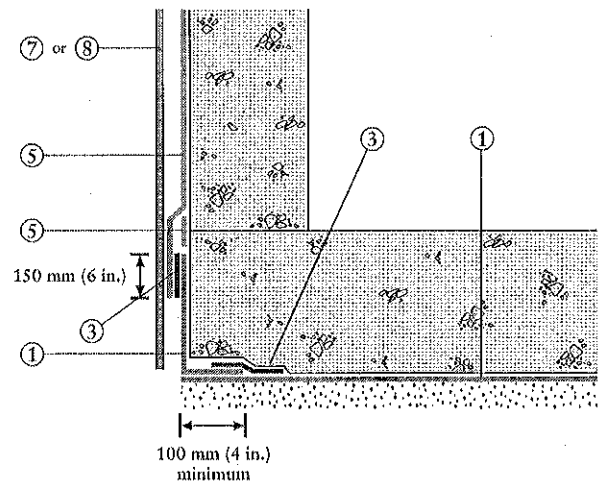
### Wall base detail against permanent shutter



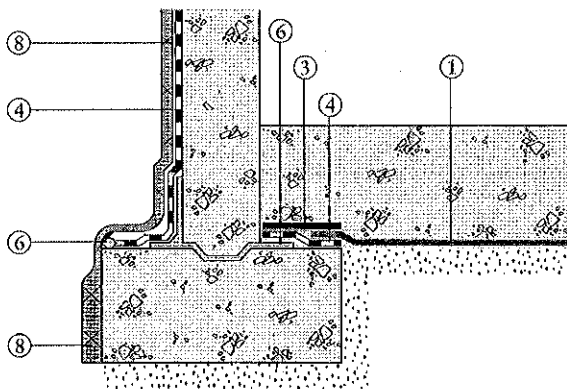
### Bituthene wall base detail (Option 1)



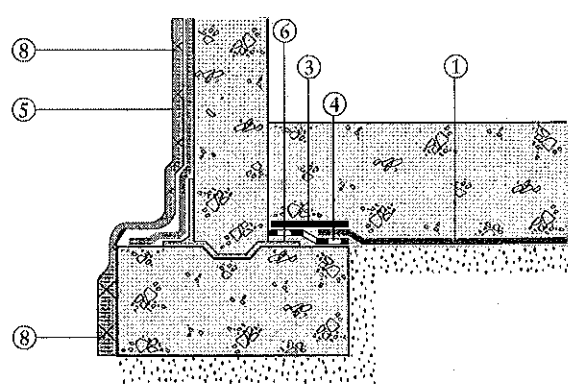
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



1 Preprufe 300R  
2 Preprufe 160R

3 Preprufe Tape  
4 Bituthene

5 Procor  
6 Bituthene Liquid Membrane

7 Protection  
8 Hydroduct®



## Supply

Dimensions (Nominal)	Preprufe 300R Membrane	Preprufe 160R Membrane	Preprufe Tape (LT or HC <sup>2</sup> )
Thickness	1.2 mm (0.046 in.)	0.8 mm (0.032 in.)	
Roll size	1.2 m x 30 m (4 ft x 98 ft)	1.2 m x 35 m (4 ft x 115 ft)	100 mm x 15 m (4 in. x 49 ft)
Roll area	36 m <sup>2</sup> (392 ft <sup>2</sup> )	42 m <sup>2</sup> (460 ft <sup>2</sup> )	
Roll weight	50 kg (108 lbs)	42 kg (92 lbs)	2 kg (4.3 lbs)
Minimum side/end laps	75 mm (3 in.)	75 mm (3 in.)	75 mm (3 in.)
*LT denotes Low Temperature (between -4°C (25°F) and +30°C (86°F))			
HC denotes Hot Climate (>+10°C (50°F))			
<b>Ancillary Products</b>			
Bituthene Liquid Membrane – 5.7 liter (1.5 US gal) or 15.1 liter (4 US gal)			

## Physical Properties

Property	Typical Value 300R	Typical Value 160R	Test Method
Color	white	white	
Thickness	1.2 mm (0.046 in.) nominal	0.8 mm (0.032 in.) nominal	ASTM D3767
Low temperature flexibility	Unaffected at -23°C (-10°F)	Unaffected at -23°C (-10°F)	ASTM D1970
Resistance to hydrostatic head, minimum	70 m (231 ft)	70 m (231 ft)	ASTM D5385, modified <sup>1</sup>
Elongation, minimum	300%	300%	ASTM D412, modified <sup>2</sup>
Tensile strength, film, minimum	27.6 MPa (4000 psi)	27.6 MPa (4000 psi)	ASTM D412
Crack cycling at -23°C (-10°F), 100 cycles	Unaffected	Unaffected	ASTM C836
Puncture resistance, minimum	990 N (221 lbs)	445 N (100 lbs)	ASTM E154
Peel adhesion to concrete, minimum	880 N/m (5.0 lbs/in.) width	880 N/m (5.0 lbs/in.) width	ASTM D903, modified <sup>3</sup>
Lap peel adhesion	440 N/m (2.5 lbs/in.) width	440 N/m (2.5 lbs/in.) width	ASTM D1876, modified <sup>4</sup>
Permeance to water vapor Transmission, maximum	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	0.01 perms (0.6 ng/(Pa × s × m <sup>2</sup> ))	ASTM E96, method B
Water absorption, maximum	0.5%	0.5%	ASTM D570
Methane permeability	9.1 mls/m <sup>2</sup> /day	N/A	University of London, QMW College <sup>5</sup>
Permeability <sup>5</sup> (hydraulic conductivity)	K=<1.4 × 10 <sup>-11</sup> cm.s <sup>-1</sup>	K=<1.4 × 10 <sup>-11</sup> cm.s <sup>-1</sup>	ASTM D5084-90

### Footnotes:

- Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
- Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.
- Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
- The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).
- Result is lower limit of apparatus. Membrane therefore considered impermeable.

## Specification Clauses

Preprufe 300R or 160R shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to

Preprufe 300R/160R. All Preprufe 300R/160R system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

**NOTE:** Use Preprufe Tape to tie-in Procor with Preprufe.

## Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be handled by a minimum of two persons.

**For Technical Assistance call toll free at 866-333-35BM (3726).**

 Visit our web site at [www.graceconstruction.com](http://www.graceconstruction.com)

W. R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140

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PF-111D

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**GRACE**  
Construction Products

**APPENDIX G**  
**REMEDIAL INVESTIGATION SOIL, GROUNDWATER, AND SOIL VAPOR ANALYTICAL RESULTS**

**TABLE 5A**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>MW-1 (0-2')</b>	<b>MW-1 (15'-17')</b>	<b>MW-2 (0-2')</b>	<b>MW-2 (12'-14')</b>	<b>B/MW-3 (0-2')</b>	<b>B/MW-3 (7'-9')</b>	<b>MW-4(0-2)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210785-013	210785-014	210785-001	210785-002	210723-004	210723-005	210785-015
<b>Dilution</b>		1	1	1	1	1	1	1
<b>Date Sampled</b>		9/14/2005	9/14/2005	9/12/2005	9/12/2005	9/8/2005	9/8/2005	9/15/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>								
Carbon disulfide	2,700	1.9 U	2.1 U	2 <b>UJ</b>	2.3 U	36 <b>J</b>	2.8 <b>J</b>	1.8 U
Acetone	200	13 <b>UJ</b>	49 <b>UJ</b>	29 <b>UJ</b>	16 <b>UJ</b>	14 <b>UJ</b>	17 <b>UJ</b>	6.8 <b>UJ</b>
Methylene chloride	100	18 <b>UJ</b>	27 <b>UJ</b>	18 <b>UJ</b>	8.7 <b>UJ</b>	4.9 <b>UJ</b>	4.9 <b>UJ</b>	65 <b>UJ</b>
Methyl-tert-butyl-ether (MTBE)	120	0.34 U	0.38 UH	0.35 <b>UJ</b>	0.41 U	0.36 U	0.33 U	0.31 U
cis-1 2-Dichloroethene	NS	1.4 U	1.5 U	1.4 <b>UJ</b>	1.6 U	1.4 U	1.3 U	1.3 U
2-Butanone (MEK)	300	2.6 U	2.9 U	2.7 <b>UJ</b>	3.1 U	2.8 U	2.5 U	2.4 U
Benzene	60	1.6 U	1.8 U	2.1 J	1.9 U	2.4 J	1.5 U	2.7 J
Trichloroethene	700	5.1 J	6.3	2 J	2.3 U	2 U	1.9 U	33
4-Methyl-2-pentanone (MIBK)	1,000	1.1 U	1.3 U	2.9 J	1.4 UH	1.2 U	1.1 U	1 U
Toluene	1,500	2.2 J	2.3 J	11 <b>J</b>	2.3 U	20	2.5 J	2.6 J
Tetrachloroethene	1,400	2.2 <b>UJ</b>	2.4 <b>UJ</b>	2.2 U	2.6 U	2.3 <b>UJ</b>	2.1 <b>UJ</b>	2 <b>UJ</b>
Ethylbenzene	5,500	2 U	2.3 U	2.1 U	2.5 U	6.5	2.2 J	1.9 U
Styrene	NS	1.1 U	1.3 U	1.6 J	1.4 U	1.2 <b>UJ</b>	1.1 <b>UJ</b>	1 U
Xylenes (total)	1,200	5.1 <b>UJ</b>	5.6 <b>UJ</b>	6.8 <b>J</b>	6.2 U	96 <b>UJ</b>	26 <b>UJ</b>	4.7 <b>UJ</b>
<b>Total VOCs</b>	<b>10,000</b>	7.3	8.6	26.4	ND	64.9	7.5	38.3

**TABLE 5A**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	MW-4(12-14)	B/MW-5(0-2)	B/MW-5(5-7)	MW-6(2-4)	MW-6(15-17)	MW-7(0-2)	MW-7(6-8)
Lab Sample ID	RSCO <sup>1</sup>	210785-016	210723-008	210723-009	210941-007	210941-008	210941-005	210941-006
Dilution		1	1	1	1	1	5	1
Date Sampled		9/15/2005	9/9/2005	9/9/2005	9/22/2005	9/22/2005	9/21/2005	9/21/2005
Units	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
Compound								
Carbon disulfide	2,700	4.3 J	1.9 U	1.7 U	1.9 <b>UJ</b>	1.9 U	10 U	2.1 U
Acetone	200	<b>270 J</b>	13 <b>UJ</b>	6.6 <b>UJ</b>	<b>28 R</b>	<b>12 R</b>	<b>710 J</b>	12 <b>U</b>
Methylene chloride	100	31 <b>UJ</b>	8.1 <b>UJ</b>	4.4 <b>UJ</b>	34 <b>J</b>	13 <b>J</b>	61 <b>J</b>	29 <b>J</b>
Methyl-tert-butyl-ether (MTBE)	120	1.1 J	0.34 U	0.3 U	0.33 <b>UJ</b>	0.34 <b>UJ</b>	1.8 <b>UJ</b>	0.37 U
cis-1 2-Dichloroethene	NS	1.6 U	1.4 U	1.2 U	1.3 U	1.4 U	7.3 U	1.5 U
2-Butanone (MEK)	300	3 <b>UJ</b>	2.6 U	2.3 U	<b>2.5 R</b>	2.6 <b>R</b>	<b>14 R</b>	2.8 <b>UJ</b>
Benzene	60	1.8 U	1.6 U	1.4 U	1.5 <b>UJ</b>	1.6 U	8.5 U	1.7 U
Trichloroethene	700	16 <b>J</b>	8	1.7 U	7 <b>J</b>	1.9 U	10 U	5.5 J
4-Methyl-2-pentanone (MIBK)	1,000	1.5 J	1.1 U	1 U	1.1 U	1.1 <b>UJ</b>	6.1 <b>UJ</b>	1.2 U
Toluene	1,500	2.2 U	1.9 U	1.7 U	5 <b>J</b>	1.9 U	10 U	2.1 U
Tetrachloroethene	1,400	2.5 <b>UJ</b>	2.2 <b>UJ</b>	1.9 <b>UJ</b>	2.1 U	2.2 U	12 U	2.3 U
Ethylbenzene	5,500	2.3 U	2.1 U	1.8 U	2.6 <b>J</b>	2.1 U	11 U	2.2 U
Styrene	NS	1.3 U	1.1 <b>UJ</b>	1 <b>UJ</b>	<b>1.1 R</b>	<b>1.1 R</b>	<b>6.1 R</b>	1.2 U
Xylenes (total)	1,200	5.9 <b>UJ</b>	5.1 <b>UJ</b>	4.5 <b>UJ</b>	15 <b>J</b>	5.1 U	27 U	5.5 U
<b>Total VOCs</b>	<b>10,000</b>	292.9	8	ND	63.6	13	771	34.5

**TABLE 5A**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>MW-8(0-2)</b>	<b>MW-8(13-15)</b>	<b>MW-9(0-2)</b>	<b>MW-9(12-14)</b>	<b>B-10(0.5-2.5)</b>	<b>B-10(15-15.5)</b>	<b>B-11(0-2)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210941-001	210941-002	210785-006	210785-007	210785-017	210785-018	210810-004
<b>Dilution</b>		1	1	1	1	1	1	1
<b>Date Sampled</b>		9/19/2005	9/19/2005	9/13/2005	9/13/2005	9/15/2005	9/15/2005	9/16/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>								
Carbon disulfide	2,700	1.9 U	110 U	1.9 U	1.9 U	2 U	2.2 U	2 U
Acetone	200	7.7 U	450 R	27 UJ	7.8 UJ	21 UJ	32 U	12 U
Methylene chloride	100	24 UJ	280 U	22 UJ	18 UJ	8.3 UJ	29 U	11 UJ
Methyl-tert-butyl-ether (MTBE)	120	0.33 U	35 U	0.34 U	0.33 U	0.34 U	0.38 U	0.36 U
cis-1 2-Dichloroethene	NS	1.3 U	71 U	1.4 U	1.3 U	1.4 U	1.5 U	1.4 U
2-Butanone (MEK)	300	2.5 U	140 U	2.6 U	2.5 U	2.6 U	2.9 U	2.8 UJ
Benzene	60	1.6 U	47 U	1.6 U	1.5 U	1.6 U	1.8 U	1.7 U
Trichloroethene	700	2.5 J	82 U	8 J	3.9 J	2 U	12	2.4 J
4-Methyl-2-pentanone (MIBK)	1,000	1.1 U	82 UJ	1.5 J	1.1 U	1.2 J	1.3 U	1.2 U
Toluene	1,500	1.9 U	35 U	1.9 U	1.9 U	2 U	2.2 U	2 U
Tetrachloroethene	1,400	2.1 U	59 U	2.1 U	2.1 U	2.2 UJ	2.4 U	2.3 U
Ethylbenzene	5,500	2 U	120 U	2 U	2 U	2.1 U	2.3 U	2.2 U
Styrene	NS	1.1 U	59 U	1.1 U	1.1 U	1.1 U	1.3 U	1.2 U
Xylenes (total)	1,200	5 U	120 U	5.1 U	5 U	5.2 UJ	5.7 U	5.4 U
<b>Total VOCs</b>	<b>10,000</b>	2.5	ND	9.5	3.9	1.2	12	2.4

**TABLE 5A**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>B-11(12-14)</b>	<b>B-11(25-27)</b>	<b>B-12(0-2)</b>	<b>B-12(2-4)</b>	<b>B-12(11-13)</b>	<b>B-13(0-2)</b>	<b>B-13(6-8)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210810-005	210810-006	210723-001	210723-002	210723-003	210723-010	210723-011
<b>Dilution</b>		1	1	1	1	1	1	1
<b>Date Sampled</b>		9/16/2005	9/16/2005	9/8/2005	9/8/2005	9/8/2005	9/9/2005	9/9/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>								
Carbon disulfide	2,700	2 U	1.9 U	3 J	2 U	1.9 U	2 U	2.2 R
Acetone	200	5.7 U	12 U	16 UJ	13 UJ	9.5 UJ	11 UJ	220 J
Methylene chloride	100	14 UJ	8.9 UJ	10 UJ	4.8 UJ	4.9 UJ	8.1 UJ	5.4 R
Methyl-tert-butyl-ether (MTBE)	120	0.35 U	0.34 U	0.36 U	0.35 U	0.33 U	0.35 U	0.38 R
cis-1 2-Dichloroethene	NS	1.4 U	1.3 U	1.4 U	1.4 U	1.3 U	1.4 U	1.5 R
2-Butanone (MEK)	300	2.7 UJ	2.6 UJ	2.7 U	2.7 U	2.5 U	2.7 U	2.9 R
Benzene	60	1.7 U	1.6 U	1.7 U	1.6 U	1.5 U	1.6 U	1.8 R
Trichloroethene	700	3.9 J	2 J	4.8 J	2 U	1.9 U	2 J	2.2 R
4-Methyl-2-pentanone (MIBK)	1,000	1.2 U	1.1 U	1.2 U	1.2 U	1.1 U	1.2 U	1.3 R
Toluene	1,500	2 U	1.9 U	2 UJ	2 U	1.9 U	2 UJ	2.2 R
Tetrachloroethene	1,400	2.2 U	2.1 U	2.3 UJ	2.2 UJ	2.1 UJ	7.2 J	2.4 R
Ethylbenzene	5,500	2.1 U	2 U	2.1 UJ	2.1 U	2 U	2.1 UJ	2.3 R
Styrene	NS	1.2 U	1.1 U	1.2 UJ	1.2 UJ	1.1 UJ	1.2 UJ	1.3 R
Xylenes (total)	1,200	5.3 U	5.1 U	5.3 UJ	5.3 UJ	5 UJ	5.3 UJ	5.7 R
<b>Total VOCs</b>	<b>10,000</b>	3.9	2	7.8	ND	ND	9.2	220

**TABLE 5A**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	B-14(0-2)	B-14(15-17)	B-14(20-22)	B-15(0-2)	B-15(13-13.5)	B-16(0-2)	B-16(10-12)
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210941-011	210941-012	210941-013	210941-003	210941-004	210785-008	210785-011
<b>Dilution</b>		1	1	1	1	1	1	1
<b>Date Sampled</b>		9/23/2005	9/23/2005	9/23/2005	9/19/2005	9/19/2005	9/14/2005	9/14/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>								
Carbon disulfide	2,700	1.9 U	1.8 U	2.3 U	1.9 U	2.1 U	1.9 U	1.9 U
Acetone	200	80 J	27 R	28 R	7.7 U	24 U	16 UJ	15 UJ
Methylene chloride	100	6.1 J	8 J	8.9 J	15 UJ	5.5 UJ	13 UJ	19 UJ
Methyl-tert-butyl-ether (MTBE)	120	0.34 UJ	0.32 UJ	0.4 UJ	0.33 U	0.8 J	0.33 U	0.34 U
cis-1 2-Dichloroethene	NS	1.3 U	1.3 U	1.6 U	1.3 U	1.5 U	1.3 U	1.4 U
2-Butanone (MEK)	300	2.6 R	2.4 R	3.1 R	2.5 UJ	2.8 UJ	2.6 UJ	2.6 U
Benzene	60	1.6 U	1.5 U	1.9 U	1.5 U	1.7 U	1.6 U	1.6 U
Trichloroethene	700	1.9 U	1.8 U	2.3 U	4.6 J	2.1 U	11 J	4.4 J
4-Methyl-2-pentanone (MIBK)	1,000	1.1 UJ	1.1 UJ	1.3 UJ	1.1 U	1.2 U	1.2 J	1.1 U
Toluene	1,500	4.1 J	1.8 U	2.3 U	1.9 U	2.1 U	1.9 U	1.9 U
Tetrachloroethene	1,400	2.1 UJ	2 U	2.5 U	2.1 U	2.3 U	2.1 UJ	2.2 UJ
Ethylbenzene	5,500	2 UJ	1.9 U	2.4 U	2 U	2.2 U	2 U	2 U
Styrene	NS	1.1 R	1.1 R	1.3 R	1.1 U	1.2 U	1.1 U	1.1 U
Xylenes (total)	1,200	6.5	4.7 U	6 U	5 U	5.5 U	5 UJ	5.1 UJ
<b>Total VOCs</b>	<b>10,000</b>	90.2	8	8.9	4.6	0.8	12.2	4.4

**TABLE 5A**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>B-16(24-26)</b>	<b>B-17(0-2)</b>	<b>B-17(14-16)</b>	<b>B-17(18-20)</b>	<b>B-18(0-2)</b>	<b>B-18(14.5-16.5)</b>	<b>B-18(28-30)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210785-012	210810-001	210810-002	210810-003	210785-003	210785-004	210785-005
<b>Dilution</b>		1	1	1	2	1	1	1
<b>Date Sampled</b>		9/14/2005	9/16/2005	9/16/2005	9/16/2005	9/12/2005	9/12/2005	9/12/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>								
Carbon disulfide	2,700	2 U	1.8 U	2 U	200 U	1.8 U	2.2 U	1.9 U
Acetone	200	25 <b>UJ</b>	13 <b>U</b>	10 <b>U</b>	600 <b>UJ</b>	11 <b>UJ</b>	15 <b>UJ</b>	10 <b>UJ</b>
Methylene chloride	100	16 <b>UJ</b>	19 <b>UJ</b>	6.9 <b>UJ</b>	460 <b>U</b>	18 <b>UJ</b>	28 <b>UJ</b>	12 <b>UJ</b>
Methyl-tert-butyl-ether (MTBE)	120	0.36 U	0.32 U	0.36 U	67 U	0.33 U	0.39 U	0.33 U
cis-1 2-Dichloroethene	NS	1.4 U	1.3 U	1.4 U	130 U	1.3 U	1.5 U	1.3 U
2-Butanone (MEK)	300	2.8 U	2.5 <b>UJ</b>	2.8 <b>UJ</b>	270 U	2.5 U	3 U	2.6 U
Benzene	60	2.6 J	1.5 U	1.7 U	89 U	1.5 U	1.8 U	1.6 U
Trichloroethene	700	3.1 J	13	6.3	160 U	23	17	1.9 U
4-Methyl-2-pentanone (MIBK)	1,000	1.2 U	1.1 U	1.2 U	160 U	1.1 U	1.3 U	1.1 U
Toluene	1,500	3.2 J	1.8 U	2 U	67 U	1.8 U	2.2 U	1.9 U
Tetrachloroethene	1,400	2.3 <b>UJ</b>	2 U	2.3 U	110 U	2.1 <b>UJ</b>	2.4 <b>UJ</b>	2.1 U
Ethylbenzene	5,500	2.2 U	1.9 U	2.2 U	2,400	2 U	2.3 U	2 U
Styrene	NS	1.2 U	1.1 U	1.2 U	110 U	1.1 U	1.3 U	1.1 U
Xylenes (total)	1,200	5.4 <b>UJ</b>	4.8 U	5.4 U	<b>6,500</b>	4.9 U	5.8 U	5 U
<b>Total VOCs</b>	<b>10,000</b>	8.9	13	6.3	8900	23	17	ND



**TABLE 5A**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes**

1 - Recommended Soil Clean-up Objectives listed in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 (exceedances indicated in bold.)

µg/kg - micrograms per kilogram = parts per billion (ppb).

U - Compound not detected.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

H - concentration was calculated using manual alternate peak selection.

NS - No standard.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**U** - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

**R** - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)

**TABLE 5B**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>MW-1(0-2)</b>	<b>MW-1(15-17)</b>	<b>MW-2(0-2)</b>	<b>MW-2(12-14)</b>	<b>B/MW-3(0-2)</b>	<b>B/MW-3(7-9)</b>	<b>MW-4(0-2)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210785-013	210785-014	210785-001	210785-002	210723-004	210723-005	210785-015
<b>Dilution</b>		1	1	2	1	1	1	1
<b>Date Sampled</b>		9/14/2005	9/14/2005	9/12/2005	9/12/2005	9/8/2005	9/8/2005	9/15/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>								
Isophorone	4,400	130 U	73 U	260 U	79 U	70 U	64 U	240 U
Naphthalene	13,000	130 U	70 U	<b>15,000</b>	75 U	100 J	61 U	230 U
2-Methylnaphthalene	36,400	120 <b>UJ</b>	65 U	9,000 <b>J</b>	70 U	170 J	93 JH	210 <b>UJ</b>
Acenaphthylene	41,000	240 J	50 U	10,000	54 U	400	44 U	160 U
Acenaphthene	50,000	170 J	67 U	240 U	73 U	64 U	59 U	220 U
Dibenzofuran	6,200	120 U	65 U	910 J	70 U	61 U	57 U	210 U
Fluorene	50,000	160 J	52 U	190 U	57 U	85 J	46 U	170 U
n-Nitrosodiphenylamine	NS	110 U	61 U	220 U	66 U	58 U	53 U	200 U
Phenanthrene	50,000	2,300	48 U	3,300	52 U	1,500	42 U	160 U
Anthracene	50,000	540 J	67 U	1,700	73 U	510	59 U	220 U
Carbazole	NS	110 U	60 U	220 U	65 U	73 J	52 U	200 U
Di-n-butyl phthalate	8,100	97 U	54 U	1,000 J	58 U	51 U	47 U	180 U
Fluoranthene	50,000	4,400	51 U	2,800	56 U	2,600	45 U	390 J
Pyrene	50,000	6,000	56 U	7,100	61 U	2,500	49 U	180 U
Butyl benzyl phthalate	50,000	95 U	52 U	190 U	57 U	50 U	46 U	170 U
Benzo(a)anthracene	224 or MDL	<b>2,800</b>	55 U	<b>4,100</b>	60 U	<b>1,600</b>	48 U	180 U
Chrysene	400	<b>3,600</b>	51 U	<b>7,400</b>	56 U	<b>1,600</b>	45 U	410 J
Bis(2-ethylhexyl)phthalate	50,000	110 J	54 U	190 U	58 U	51 U	47 U	180 U
Benzo(b)fluoranthene	1,100	<b>1,800</b>	110 U	<b>5,100</b>	120 U	<b>1,500</b>	99 U	370 U
Benzo(k)fluoranthene	1,100	<b>2,000</b>	45 U	<b>8,200</b>	49 U	520	40 U	150 U
Benzo(a)pyrene	61 or MDL	<b>2,600</b>	50 U	<b>6,000</b>	54 U	<b>1,200</b>	44 U	160 U
Indeno(1 2 3-cd)pyrene	3,200	1,900	41 U	<b>9,800</b>	45 U	770 <b>J</b>	36 U	140 U
Dibenzo(a h)anthracene	14 or MDL	<b>590 J</b>	45 U	<b>3,400 J</b>	49 U	<b>260 J</b>	40 U	150 <b>UJ</b>
Benzo(ghi)perylene	50,000	1,900	45 U	9,900	49 U	750 <b>J</b>	40 U	790 J
<b>Total SVOCs</b>	<b>500,000</b>	<b>31,110</b>	<b>ND</b>	<b>104,710</b>	<b>ND</b>	<b>16,138</b>	<b>93</b>	<b>1,590</b>
<b>B(a)P Equivalents (EPA)-mg/kg</b>		1.3	ND	<b>5.4</b>	ND	0.7	ND	0.0004
<b>B(a)P Equivalents (NYSDEC) - mg/kg</b>		1.3	ND	<b>5.5</b>	ND	0.7	ND	0.0041
<b>cPAH</b>		15,260	0	44,000	ND	7,450	ND	410

**TABLE 5B**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>MW-4(12-14)</b>	<b>B/MW-5(0-2)</b>	<b>B/MW-5(5-7)</b>	<b>MW-6(2-4)</b>	<b>MW-6(15-17)</b>	<b>MW-7(0-2)</b>	<b>MW-7(6-8)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210785-016	210723-008	210723-009	210941-007	210941-008	210941-005	210941-006
<b>Dilution</b>		1	1	1	4	1	4	2
<b>Date Sampled</b>		9/15/2005	9/9/2005	9/9/2005	9/22/2005	9/22/2005	9/21/2005	9/21/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>								
Isophorone	4,400	77 U	68 U	60 U	3,100	65 U	280 U	140 U
Naphthalene	13,000	73 U	65 U	57 U	240 U	62 U	270 U	130 U
2-Methylnaphthalene	36,400	68 U	60 U	53 U	230 U	57 U	250 U	120 U
Acenaphthylene	41,000	53 U	47 U	53 J	180 U	44 U	190 U	990
Acenaphthene	50,000	71 U	63 U	55 U	240 U	59 U	260 U	130 U
Dibenzofuran	6,200	68 U	60 U	53 U	230 U	57 U	250 U	120 U
Fluorene	50,000	55 U	49 U	68 J	180 U	46 U	200 U	120 J
n-Nitrosodiphenylamine	NS	64 U	57 U	50 U	210 U	54 U	240 U	120 U
Phenanthrene	50,000	50 U	75 J	370	400 J	42 U	1,600	2,500
Anthracene	50,000	71 U	63 U	83 J	240 U	59 U	260 U	560 J
Carbazole	NS	63 U	56 U	49 U	210 U	53 U	230 U	190 J
Di-n-butyl phthalate	8,100	56 U	72 J	44 U	190 U	48 U	1,200 J	100 U
Fluoranthene	50,000	54 U	120 J	350	500 J	45 U	1,200 J	7,300
Pyrene	50,000	59 U	130 J	280 J	510 J	50 U	940 J	6,000
Butyl benzyl phthalate	50,000	55 U	49 U	43 U	180 U	46 U	2,400	100 U
Benzo(a)anthracene	224 or MDL	58 U	51 U	150 J	<b>230 J</b>	49 U	<b>460 J</b>	<b>3,900</b>
Chrysene	400	54 U	85 J	160 J	240 J	45 U	<b>490 J</b>	<b>4,300</b>
Bis(2-ethylhexyl)phthalate	50,000	56 U	2,000	44 U	190 U	48 U	12,000	420 J
Benzo(b)fluoranthene	1,100	120 U	110 U	180 J	400 U	100 U	440 U	4,800
Benzo(k)fluoranthene	1,100	47 U	42 U	58 J	160 U	40 U	180 U	1,900
Benzo(a)pyrene	61 or MDL	53 U	<b>77 J</b>	<b>140 J</b>	180 U	44 U	<b>360 J</b>	<b>4,100</b>
Indeno(1 2 3-cd)pyrene	3,200	44 U	68 J	89 J	150 U	37 U	230 J	3,000
Dibenzo(a h)anthracene	14 or MDL	47 U	42 U	<b>37 UJ</b>	160 U	40 UJ	180 UJ	<b>590 J</b>
Benzo(ghi)perylene	50,000	47 U	42 U	81 J	160 U	40 UJ	180 UJ	3,100 J
<b>Total SVOCs</b>	<b>500,000</b>	<b>ND</b>	<b>2,627</b>	<b>2,099</b>	<b>4,980</b>	<b>ND</b>	<b>21,240</b>	<b>43,770</b>
<b>B(a)P Equivalents (EPA)-mg/kg</b>		ND	0.08	0.22	0.02	ND	<b>4.17</b>	1.96
<b>B(a)P Equivalents (NYSDEC) - mg/kg</b>		ND	0.08	0.22	0.03	ND	<b>4.17</b>	2.00
<b>cPAH</b>		ND	162	814	470	ND	13,540	18,258

**TABLE 5B**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>MW-8(0-2)</b>	<b>MW-8(13-15)</b>	<b>MW-9(0-2)</b>	<b>MW-9(12-14)</b>	<b>B-10(0.5-2.5)</b>	<b>B-10(15-15.5)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210941-001	210941-002	210785-006	210785-007	210785-017	210785-018
<b>Dilution</b>		4	1	4	1	5	1
<b>Date Sampled</b>		9/19/2005	9/19/2005	9/13/2005	9/13/2005	9/15/2005	9/15/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>							
Isophorone	4,400	290 J	68 U	260 U	63 U	340 U	75 U
Naphthalene	13,000	380 J	64 U	250 U	60 U	910 J	72 U
2-Methylnaphthalene	36,400	230 U	60 U	230 U	56 U	660 J	67 U
Acenaphthylene	41,000	180 U	46 U	180 U	43 U	230 U	51 U
Acenaphthene	50,000	240 U	62 U	240 U	58 U	1,200 J	69 U
Dibenzofuran	6,200	230 U	60 U	230 U	56 U	560 J	67 U
Fluorene	50,000	190 U	49 U	190 U	45 U	1,300 J	54 U
n-Nitrosodiphenylamine	NS	220 U	57 U	220 U	52 U	290 U	63 U
Phenanthrene	50,000	180 J	64 J	170 <b>UJ</b>	41 U	17,000	49 U
Anthracene	50,000	240 U	62 U	240 U	58 U	2,500	69 U
Carbazole	NS	210 U	55 U	210 U	51 U	590 J	62 U
Di-n-butyl phthalate	8,100	190 U	50 U	190 U	46 U	250 U	55 U
Fluoranthene	50,000	270 J	69 J	180 U	44 U	10,000	53 U
Pyrene	50,000	260 J	61 J	200 U	48 U	14,000	58 U
Butyl benzyl phthalate	50,000	220 J	49 U	190 U	45 U	250 U	54 U
Benzo(a)anthracene	224 or MDL	200 U	51 U	190 U	47 U	<b>5,500</b>	57 U
Chrysene	400	190 J	47 U	180 U	44 U	<b>7,500</b>	53 U
Bis(2-ethylhexyl)phthalate	50,000	320 J	50 U	190 U	46 U	260 J	55 U
Benzo(b)fluoranthene	1,100	400 U	110 U	400 U	98 U	<b>4,300</b>	120 U
Benzo(k)fluoranthene	1,100	160 U	42 U	160 U	39 U	210 U	46 U
Benzo(a)pyrene	61 or MDL	180 U	46 U	180 U	43 U	<b>3,500</b>	51 U
Indeno(1 2 3-cd)pyrene	3,200	150 U	38 U	150 U	36 U	1,000 <b>J</b>	43 <b>UJ</b>
Dibenzo(a h)anthracene	14 or MDL	160 U	42 <b>UJ</b>	160 U	39 U	<b>500 J</b>	46 <b>UJ</b>
Benzo(ghi)perylene	50,000	160 U	42 <b>UJ</b>	160 U	39 U	2,100 <b>J</b>	46 <b>UJ</b>
<b>Total SVOCs</b>	<b>500,000</b>	<b>2,110</b>	<b>278</b>	<b>ND</b>	<b>ND</b>	<b>73,380</b>	<b>ND</b>
<b>B(a)P Equivalents (EPA)-mg/kg</b>		0.0002	ND	ND	ND	1.64	ND
<b>B(a)P Equivalents (NYSDEC) - mg/kg</b>		0.0019	ND	ND	ND	1.71	ND
<b>cPAH</b>		390	ND	ND	ND	22,510	ND

**TABLE 5B**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>B-11(0-2)</b>	<b>B-11(12-14)</b>	<b>B-11(25-27)</b>	<b>B-12(0-2)</b>	<b>B-12(2-4)</b>	<b>B-12(11-13)</b>	<b>B-13(0-2)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	210810-004	210810-005	210810-006	210723-001	210723-002	210723-003	210723-010
<b>Dilution</b>		1	1	1	1	1	1	5
<b>Date Sampled</b>		9/16/2005	9/16/2005	9/16/2005	9/8/2005	9/8/2005	9/8/2005	9/9/2005
<b>Units</b>	<b>µg/Kg</b>	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
<b>Compound</b>								
Isophorone	4,400	72 U	70 U	65 U	270 U	69 U	64 U	670 U
Naphthalene	13,000	200 J	66 U	62 U	290 J	390	60 U	640 U
2-Methylnaphthalene	36,400	290 J	61 U	57 U	240 U	61 U	56 U	590 U
Acenaphthylene	41,000	79 J	47 U	72 J	190 U	90 J	43 U	760 J
Acenaphthene	50,000	66 U	64 U	59 U	250 U	63 U	58 U	1,200 J
Dibenzofuran	6,200	63 U	61 U	57 U	240 U	61 U	56 U	710 J
Fluorene	50,000	51 U	50 U	46 U	200 U	50 U	46 U	1,200 J
n-Nitrosodiphenylamine	NS	64 J	58 U	54 U	230 U	58 U	53 U	560 U
Phenanthrene	50,000	400	98 J	280 J	2,300	840	41 U	17,000
Anthracene	50,000	79 J	64 U	77 J	480 J	190 J	58 U	2,900 J
Carbazole	NS	58 U	57 U	53 U	280 J	56 U	52 U	1,500 J
Di-n-butyl phthalate	8,100	750	51 U	48 U	380 J	51 U	47 U	490 U
Fluoranthene	50,000	550	98 J	670	3,900	1,300	45 U	21,000
Pyrene	50,000	270 J	120 J	770	3,700	1,500	49 U	23,000
Butyl benzyl phthalate	50,000	51 U	50 U	46 U	200 U	50 U	46 U	480 U
Benzo(a)anthracene	224 or MDL	220 J	72 J	540	2,200	820	48 U	12,000
Chrysene	400	450	77 J	490	2,300	990	45 U	12,000
Bis(2-ethylhexyl)phthalate	50,000	52 U	51 U	50 J	200 U	180 J	47 U	490 U
Benzo(b)fluoranthene	1,100	350 J	110 U	570	3,200	960	99 U	12,000
Benzo(k)fluoranthene	1,100	97 J	43 U	170 J	880 J	490	39 U	3,500 J
Benzo(a)pyrene	61 or MDL	150 J	74 J	480	2,500	930	43 U	11,000
Indeno(1 2 3-cd)pyrene	3,200	69 J	53 J	370 J	1,800 J	630 J	36 U	6,600
Dibenzo(a h)anthracene	14 or MDL	44 U	43 U	94 J	480 J	170 J	39 U	1,400 J
Benzo(ghi)perylene	50,000	90 J	66 J	460 J	1,900 J	680 J	39 U	7,400
<b>Total SVOCs</b>	<b>500,000</b>	<b>4,108</b>	<b>658</b>	<b>5,093</b>	<b>26,590</b>	<b>10,160</b>	<b>ND</b>	<b>135,170</b>
<b>B(a)P Equivalents (EPA)-mg/kg</b>		0.18	0.54	2.74	2.14	0.46	ND	<b>4.63</b>
<b>B(a)P Equivalents (NYSDEC) - mg/kg</b>		0.19	0.55	2.75	2.16	0.47	ND	<b>4.74</b>
<b>cPAH</b>		1,380	276	2,714	13,360	4,990	ND	58,500

**TABLE 5B**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	B-13(6-8)	B-14(0-2)	B-14(15-17)	B-14(20-22)	B-15(0-2)	B-15(13-13.5)	B-16(0-2)
Lab Sample ID	RSCO <sup>1</sup>	210723-011	210941-011	210941-012	210941-013	210941-003	210941-004	210785-008
Dilution	1	4	1	1	4	1	1	1
Date Sampled	9/9/2005	9/23/2005	9/23/2005	9/23/2005	9/19/2005	9/19/2005	9/14/2005	
Units	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
Compound								
Isophorone	4,400	76 U	260 U	63 U	79 U	270 J	73 U	130 U
Naphthalene	13,000	72 U	1,400 J	60 U	75 U	270 J	69 U	120 U
2-Methylnaphthalene	36,400	67 U	1,100 J	56 U	70 U	230 U	64 U	120 <b>UJ</b>
Acenaphthylene	41,000	52 U	340 J	43 U	54 U	180 U	50 U	170 J
Acenaphthene	50,000	69 U	360 J	58 U	73 U	240 U	66 U	120 U
Dibenzofuran	6,200	67 U	460 J	56 U	70 U	230 U	64 U	120 U
Fluorene	50,000	54 U	540 J	45 U	57 U	180 U	52 U	93 U
n-Nitrosodiphenylamine	NS	63 U	220 U	53 U	66 U	210 U	60 U	110 U
Phenanthrene	50,000	190 J	4,800	120 J	52 U	620 J	47 U	180 J
Anthracene	50,000	69 U	1,100 J	58 U	73 U	240 U	66 U	120 U
Carbazole	NS	62 U	730 J	52 U	65 U	210 U	59 U	110 U
Di-n-butyl phthalate	8,100	55 U	<b>11,000</b>	46 U	58 U	190 U	53 U	96 U
Fluoranthene	50,000	210 J	5,000	140 J	55 U	780 J	51 U	290 J
Pyrene	50,000	200 J	3,200	170 J	61 U	680 J	56 U	380 <b>J</b>
Butyl benzyl phthalate	50,000	54 U	4,300	45 U	57 U	180 U	52 U	400 J
Benzo(a)anthracene	224 or MDL	120 J	<b>1,800</b>	76 J	59 U	<b>350 J</b>	54 U	200 J
Chrysene	400	130 J	<b>1,900</b>	73 J	55 U	<b>430 J</b>	51 U	340 J
Bis(2-ethylhexyl)phthalate	50,000	55 U	6,600 <b>UJ</b>	53 J	58 U	280 <b>J</b>	53 U	150 J
Benzo(b)fluoranthene	1,100	140 J	<b>1,900</b>	98 U	120 U	400 U	110 U	200 U
Benzo(k)fluoranthene	1,100	62 J	660 J	39 U	49 U	160 U	45 U	80 U
Benzo(a)pyrene	61 or MDL	<b>120 J</b>	<b>1,300 J</b>	<b>66 J</b>	54 U	<b>240 J</b>	50 U	89 U
Indeno(1 2 3-cd)pyrene	3,200	100 <b>J</b>	900 J	36 <b>UJ</b>	45 <b>UJ</b>	150 U	41 U	440 J
Dibenzo(a h)anthracene	14 or MDL	<b>47 UJ</b>	<b>240 J</b>	39 <b>UJ</b>	49 <b>UJ</b>	160 U	45 <b>UJ</b>	80 <b>UJ</b>
Benzo(ghi)perylene	50,000	130 <b>J</b>	770 J	39 <b>UJ</b>	49 <b>UJ</b>	160 U	45 <b>UJ</b>	510 <b>J</b>
<b>Total SVOCs</b>	<b>500,000</b>	<b>1,402</b>	<b>43,800</b>	<b>698</b>	<b>ND</b>	<b>3,920</b>	<b>ND</b>	<b>3,060</b>
<b>B(a)P Equivalents (EPA)-mg/kg</b>		1.38	0.77	0.06	ND	0.09	ND	0.06
<b>B(a)P Equivalents (NYSDEC) - mg/kg</b>		1.38	0.79	0.06	ND	0.09	ND	0.07
<b>cPAH</b>		714	8,700	215	ND	1,020	ND	980

**TABLE 5B**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	B-16(10-12)	B-16(24-26)	B-17(0-2)	B-17(14-16)	B-17(18-20)	B-18(0-2)	B-18(14.5-16.5)	B-18(28-30)
Lab Sample ID	RSCO <sup>1</sup>	210785-011	210785-012	210810-001	210810-002	210810-003	210785-003	210785-004	210785-005
Dilution		1	1	1	5	1	2	1	1
Date Sampled		9/14/2005	9/14/2005	9/16/2005	9/16/2005	9/16/2005	9/12/2005	9/12/2005	9/12/2005
Units	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
Compound									
Isophorone	4,400	130 U	71 U	400 J	720 U	64 U	260 U	76 U	63 U
Naphthalene	13,000	1,000	68 U	120 U	1,700 J	61 U	240 U	72 U	60 U
2-Methylnaphthalene	36,400	440 J	63 U	110 U	1,000 J	57 U	480 J	67 U	56 U
Acenaphthylene	41,000	340 J	49 U	87 U	6,200	44 U	1,600	52 U	43 U
Acenaphthene	50,000	570 J	65 U	120 U	660 U	130 J	230 U	69 U	58 U
Dibenzofuran	6,200	580 J	63 U	110 U	1,000 J	57 U	770 J	67 U	56 U
Fluorene	50,000	600 J	51 U	91 U	560 J	190 J	870 J	54 U	45 U
n-Nitrosodiphenylamine	NS	110 U	59 U	110 U	600 U	54 U	210 U	63 U	53 U
Phenanthrene	50,000	8,200 J	78 J	180 J	29,000	340 J	6,900 J	49 U	41 U
Anthracene	50,000	1,500	65 U	120 U	4,100	59 U	1,900	69 U	58 U
Carbazole	NS	810	58 U	100 U	2,100 J	52 U	800 J	62 U	52 U
Di-n-butyl phthalate	8,100	98 U	52 U	93 U	530 U	47 U	190 U	56 U	46 U
Fluoranthene	50,000	9,800	110 J	430 J	49,000	45 U	6,800	53 U	44 U
Pyrene	50,000	8,300 J	55 U	320 J	31,000	140 J	4,500	58 U	49 U
Butyl benzyl phthalate	50,000	96 U	51 U	91 U	510 U	46 U	180 U	54 U	45 U
Benzo(a)anthracene	224 or MDL	<b>3,500</b>	54 U	<b>270 J</b>	<b>17,000</b>	48 U	<b>2,300</b>	57 U	47 U
Chrysene	400	<b>4,200</b>	50 U	290 J	<b>23,000</b>	45 U	<b>2,500</b>	53 U	44 U
Bis(2-ethylhexyl)phthalate	50,000	1,600 M	52 U	2000	530 U	47 U	190 U	56 U	46 U
Benzo(b)fluoranthene	1,100	<b>3,000 H</b>	110 U	360 J	<b>23,000</b>	100 U	<b>2,700 H</b>	120 U	98 U
Benzo(k)fluoranthene	1,100	<b>3,200</b>	44 U	140 J	<b>9,800</b>	40 U	<b>2,200</b>	47 U	39 U
Benzo(a)pyrene	61 or MDL	<b>3,800</b>	49 U	<b>320 J</b>	<b>19,000</b>	44 U	<b>2,700</b>	52 U	43 U
Indeno(1 2 3-cd)pyrene	3,200	2,500	40 U	170 J	<b>11,000 J</b>	36 UJ	2,100	43 U	36 U
Dibenzo(a h)anthracene	14 or MDL	<b>780</b>	44 U	78 U	<b>2,800 J</b>	40 U	160 U	47 U	39 U
Benzo(ghi)perylene	50,000	2,600	44 U	280 J	12,000 J	40 UJ	2,200	47 U	39 U
<b>Total SVOCs</b>	<b>500,000</b>	<b>57,320</b>	<b>188</b>	<b>5,160</b>	<b>243,260</b>	<b>800</b>	<b>41,320</b>	<b>ND</b>	<b>ND</b>
<b>B(a)P Equivalents (EPA)-mg/kg</b>		1.77	ND	<b>19.08</b>	<b>8.07</b>	ND	0.79	ND	ND
<b>B(a)P Equivalents (NYSDEC) - mg/kg</b>		1.80	ND	<b>19.08</b>	<b>8.27</b>	ND	0.81	ND	ND
<b>cPAH</b>		17,180	ND	6,668	105,600	ND	14,660	ND	ND

**TABLE 5B**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes:**

1 - Recommended Soil Clean-up Objectives listed in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 (exceedances indicated in bold).

ug/Kg - micrograms per kilogram = parts per billion (ppb).

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

H - concentration was calculated using manual alternate peak selection.

NS - No standard.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. (Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)



**TABLE 5C**  
**PESTICIDES AND PCBs IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	MW-1(0-2)	MW-1(15-17)	MW-2(0-2)	MW-2(12-14)	B/MW-3(0-2)	B/MW-3(7-9)
Lab Sample ID	RSCO <sup>1</sup>	210785-013	210785-014	210785-001	210785-002	210723-004	210723-005
Dilution		1	1	5	1	1	1
Date Sampled		9/14/2005	9/14/2005	9/12/2005	9/12/2005	9/8/2005	9/8/2005
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Compound							
<b>Pesticides</b>							
beta-BHC	200	0.3 U	0.34 U	1.5 U	0.37 U	1 U	0.29 U
delta-BHC	300	0.12 <b>UJ</b>	0.13 <b>UJ</b>	21 <b>J</b>	0.14 <b>UJ</b>	0.12 <b>UJ</b>	0.11 <b>UJ</b>
gamma-BHC (Lindane)	60	0.17 U	0.19 U	0.87 U	0.21 U	0.18 U	0.17 U
Heptachlor	100	0.17 U	0.19 U	0.86 U	0.2 U	0.18 U	0.16 U
Aldrin	41	0.4 U	0.45 U	8.6 <b>U</b>	0.49 U	0.42 U	0.39 U
Heptachlor epoxide	20	5.7 <b>J</b>	0.14 U	43	0.16 U	14 <b>J</b>	0.12 U
Endosulfan I	900	0.16 U	0.18 U	0.84 U	0.2 U	0.17 U	0.16 U
Dieldrin	44	0.36 U	0.4 U	1.8 U	0.44 U	0.38 U	0.35 U
4 4'-DDE	2,100	0.49 U	0.54 U	2.5 U	0.59 U	76 <b>J</b>	1.6 <b>J</b>
Endrin	100	1 U	1.1 U	87	1.2 U	1.1 U	0.97 U
Endosulfan II	900	0.19 U	0.21 U	0.97 U	0.23 U	33 <b>J</b>	0.19 U
4 4'-DDD	2,900	0.43 <b>UJ</b>	0.48 <b>UJ</b>	2.2 <b>UJ</b>	0.52 <b>UJ</b>	0.45 U	0.42 U
Endosulfan sulfate	1,000	20 <b>J</b>	0.22 U	23 <b>J</b>	0.24 U	44 <b>J</b>	0.35 <b>U</b>
4 4'-DDT	2,100	0.35 <b>UJ</b>	0.39 <b>UJ</b>	1.8 <b>UJ</b>	0.42 <b>UJ</b>	0.37 <b>UJ</b>	0.34 <b>UJ</b>
Methoxychlor	<10,000	86 <b>J</b>	2.6 <b>UJ</b>	12 <b>UJ</b>	2.9 <b>UJ</b>	150 <b>J</b>	2.3 U
alpha-Chlordane	NS	0.85 <b>U</b>	0.14 U	15 <b>J</b>	0.15 U	0.13 U	0.12 U
gamma-Chlordane	540	0.1 U	0.11 U	0.52 U	0.12 U	0.11 U	0.099 U
Endrin ketone	NS	0.16 U	0.18 U	0.82 U	0.2 U	0.17 U	0.16 U
<b>PCBs</b>							
Aroclor 1242	NS	3.3 U	3.7 U	3.4 U	4.1 U	3.6 U	3.3 U
Aroclor 1248	NS	3 U	3.4 U	3.1 U	3.7 U	3.2 U	2.9 U
Aroclor 1254	NS	1.4 U	1.5 U	1.4 U	1.7 U	1.4 U	1.3 U
Aroclor 1260	NS	36	5 U	4.6 U	5.4 U	4.7 U	4.4 U
<b>Total PCBs</b>	1,000/10,000*	36	ND	ND	ND	ND	ND

**TABLE 5C**  
**PESTICIDES AND PCBs IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	MW-4(0-2)	MW-4(12-14)	B/MW-5(0-2)	B/MW-5(5-7)	MW-6(2-4)	MW-6(15-17)
Lab Sample ID	RSCO <sup>1</sup>	210785-015	210785-016	210723-008	210723-009	210941-007	210941-008
Dilution		1	1	1	1	1	1
Date Sampled		9/15/2005	9/15/2005	9/9/2005	9/9/2005	9/22/2005	9/22/2005
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Compound							
<b>Pesticides</b>							
beta-BHC	200	0.28 <b>UJ</b>	0.35 U	0.31 U	0.27 U	0.37 <b>U</b>	0.31 U
delta-BHC	300	0.11 <b>UJ</b>	0.13 <b>UJ</b>	0.12 <b>UJ</b>	0.1 <b>UJ</b>	0.11 <b>UJ</b>	0.12 <b>UJ</b>
gamma-BHC (Lindane)	60	0.16 U	0.2 U	0.17 U	0.15 U	0.16 U	0.17 U
Heptachlor	100	0.16 <b>UJ</b>	0.19 U	0.17 U	0.15 U	0.16 U	0.17 U
Aldrin	41	0.37 <b>UJ</b>	0.46 U	0.41 U	0.36 U	0.38 U	0.4 U
Heptachlor epoxide	20	0.47 <b>UJ</b>	0.15 U	0.13 U	0.14 <b>U</b>	1.4 <b>U</b>	0.13 U
Endosulfan I	900	0.15 U	0.19 U	0.17 U	0.15 U	15	0.17 U
Dieldrin	44	0.33 U	0.42 U	0.37 U	0.32 U	0.34 U	0.36 U
4 4'-DDE	2,100	0.45 U	0.56 U	0.93 J	2.5 J	0.47 U	0.49 U
Endrin	100	0.93 U	1.2 U	1 U	0.9 U	0.95 U	1 U
Endosulfan II	900	2.4 J	0.22 U	0.58 <b>J</b>	0.39 J	3.2 J	0.19 U
4 4'-DDD	2,900	0.4 <b>UJ</b>	0.49 <b>UJ</b>	0.43 U	0.38 U	0.41 U	0.43 U
Endosulfan sulfate	1,000	1.7 <b>U</b>	0.22 U	0.2 U	0.5 <b>U</b>	2.4 <b>U</b>	0.2 U
4 4'-DDT	2,100	0.32 <b>UJ</b>	0.4 <b>UJ</b>	0.35 <b>UJ</b>	0.31 <b>UJ</b>	0.33 <b>UJ</b>	0.35 U
Methoxychlor	<10,000	2.2 <b>UJ</b>	2.7 <b>UJ</b>	2.4 U	3 <b>U</b>	9.6 <b>J</b>	2.4 U
alpha-Chlordane	NS	0.24 <b>U</b>	0.14 U	0.13 U	0.11 U	0.12 U	0.12 U
gamma-Chlordane	540	0.095 <b>UJ</b>	0.12 U	0.1 U	0.092 U	0.098 U	0.1 U
Endrin ketone	NS	0.15 <b>UJ</b>	0.19 U	0.16 U	0.15 U	0.15 U	0.16 U
<b>PCBs</b>							
Aroclor 1242	NS	3.1 <b>U</b>	3.9 U	3.4 U	3 U	3.2 U	3.4 U
Aroclor 1248	NS	2.8 U	3.5 U	3.1 U	2.7 U	2.9 U	3.1 U
Aroclor 1254	NS	14 <b>J</b>	1.6 U	1.4 U	1.2 U	7.9 <b>U</b>	1.4 U
Aroclor 1260	NS	7.1 <b>J</b>	5.2 U	4.5 U	4 U	4.3 U	4.5 U
<b>Total PCBs</b>	1,000/10,000*	21.1	ND	ND	ND	0	ND

**TABLE 5C**  
**PESTICIDES AND PCBs IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	NYSDEC RSCO <sup>1</sup>  ug/Kg	MW-7(0-2) 210941-005 5 9/21/2005 ug/Kg	MW-7(6-8) 210941-006 10 9/21/2005 ug/Kg	MW-8(0-2) 210941-001 1 9/19/2005 ug/Kg	MW-8(13-15) 210941-002 1 9/19/2005 ug/Kg	MW-9(0-2) 210785-006 1 9/13/2005 ug/Kg	MW-9(12-14) 210785-007 1 9/13/2005 ug/Kg	B-10(0.5-2.5) 210785-017 1 9/15/2005 ug/Kg
<b>Pesticides</b>								
beta-BHC	200	2.6 <b>U</b>	3.2 <b>U</b>	0.98 <b>U</b>	0.32 <b>U</b>	0.3 <b>U</b>	0.3 <b>U</b>	0.31 <b>U</b>
delta-BHC	300	0.61 <b>UJ</b>	1.2 <b>UJ</b>	0.11 <b>UJ</b>	0.12 <b>UJ</b>	0.12 <b>UJ</b>	0.11 <b>UJ</b>	0.12 <b>UJ</b>
gamma-BHC (Lindane)	60	0.91 <b>U</b>	1.8 <b>U</b>	0.16 <b>U</b>	0.18 <b>U</b>	0.17 <b>U</b>	0.17 <b>U</b>	0.17 <b>U</b>
Heptachlor	100	0.89 <b>U</b>	1.8 <b>U</b>	0.16 <b>U</b>	0.18 <b>U</b>	0.17 <b>U</b>	0.16 <b>U</b>	0.17 <b>U</b>
Aldrin	41	2.1 <b>U</b>	4.5 <b>U</b>	6.2 <b>J</b>	0.42 <b>U</b>	0.4 <b>U</b>	0.39 <b>U</b>	0.41 <b>U</b>
Heptachlor epoxide	20	2.3 <b>U</b>	3.6 <b>U</b>	0.99 <b>U</b>	0.13 <b>U</b>	0.18 <b>U</b>	0.13 <b>U</b>	0.66 <b>U</b>
Endosulfan I	900	63	110 <b>M</b>	16 <b>J</b>	0.52 <b>J</b>	0.17 <b>U</b>	0.16 <b>U</b>	0.17 <b>U</b>
Dieldrin	44	1.9 <b>U</b>	3.8 <b>U</b>	5.3 <b>J</b>	0.38 <b>U</b>	0.36 <b>U</b>	0.35 <b>U</b>	0.37 <b>U</b>
4 4'-DDE	2,100	30	5.2 <b>U</b>	12 <b>J</b>	0.51 <b>U</b>	0.49 <b>U</b>	0.48 <b>U</b>	0.49 <b>U</b>
Endrin	100	5.3 <b>U</b>	11 <b>U</b>	1.1 <b>U</b>	1 <b>U</b>	1 <b>U</b>	0.98 <b>U</b>	1 <b>U</b>
Endosulfan II	900	1 <b>U</b>	2 <b>U</b>	0.18 <b>U</b>	0.2 <b>U</b>	0.19 <b>U</b>	0.19 <b>U</b>	1.9 <b>U</b>
4 4'-DDD	2,900	13 <b>U</b>	4.5 <b>U</b>	12 <b>J</b>	0.45 <b>U</b>	0.43 <b>UJ</b>	0.42 <b>UJ</b>	0.43 <b>UJ</b>
Endosulfan sulfate	1,000	7.7 <b>U</b>	14 <b>U</b>	0.19 <b>U</b>	0.2 <b>U</b>	0.19 <b>U</b>	0.19 <b>U</b>	2.6 <b>U</b>
4 4'-DDT	2,100	43 <b>J</b>	3.7 <b>UJ</b>	22 <b>J</b>	0.36 <b>U</b>	0.35 <b>UJ</b>	0.34 <b>UJ</b>	0.35 <b>UJ</b>
Methoxychlor	<10,000	13 <b>UJ</b>	73 <b>J</b>	27 <b>J</b>	2.5 <b>U</b>	2.4 <b>UJ</b>	2.3 <b>UJ</b>	9.6 <b>UJ</b>
alpha-Chlordane	NS	4.9 <b>U</b>	1.3 <b>U</b>	3.5 <b>J</b>	0.13 <b>U</b>	0.12 <b>U</b>	0.12 <b>U</b>	0.13 <b>U</b>
gamma-Chlordane	540	0.54 <b>U</b>	1.1 <b>U</b>	2.5 <b>J</b>	0.11 <b>U</b>	0.1 <b>U</b>	0.1 <b>U</b>	0.1 <b>U</b>
Endrin ketone	NS	0.86 <b>U</b>	1.7 <b>U</b>	9.7 <b>J</b>	0.17 <b>U</b>	0.16 <b>U</b>	0.16 <b>U</b>	0.16 <b>U</b>
<b>PCBs</b>								
Aroclor 1242	NS	3.6 <b>U</b>	3.6 <b>U</b>	72	3.5 <b>U</b>	3.4 <b>U</b>	3.3 <b>U</b>	3.4 <b>U</b>
Aroclor 1248	NS	58 <b>J</b>	3.2 <b>U</b>	2.9 <b>U</b>	3.2 <b>U</b>	3 <b>U</b>	3 <b>U</b>	3.1 <b>U</b>
Aroclor 1254	NS	85 <b>J</b>	9 <b>U</b>	1.3 <b>U</b>	1.4 <b>U</b>	1.4 <b>U</b>	1.3 <b>U</b>	1.4 <b>U</b>
Aroclor 1260	NS	25	4.8 <b>U</b>	17 <b>U</b>	4.7 <b>U</b>	4.5 <b>U</b>	4.4 <b>U</b>	4.5 <b>U</b>
<b>Total PCBs</b>	1,000/10,000*	168	ND	ND	ND	ND	ND	ND

**TABLE 5C**  
**PESTICIDES AND PCBs IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	NYSDEC RSCO <sup>1</sup>  ug/Kg	B-10(15-15.5) 210785-018 1 9/15/2005 ug/Kg	B-11(0-2) 210810-004 1 9/16/2005 ug/Kg	B-11(12-14) 210810-005 1 9/16/2005 ug/Kg	B-11(25-27) 210810-006 1 9/16/2005 ug/Kg	B-12(0-2) 210723-001 5 9/8/2005 ug/Kg	B-12(2-4) 210723-002 2 9/8/2005 ug/Kg	B-12(11-13) 210723-003 1 9/8/2005 ug/Kg
<b>Pesticides</b>								
beta-BHC	200	0.34 U	0.32 <b>UJ</b>	2 <b>J</b>	0.59 <b>UJ</b>	1.6 U	0.61 U	0.29 U
delta-BHC	300	0.13 <b>UJ</b>	0.12 <b>UJ</b>	0.18 <b>UJ</b>	0.12 <b>UJ</b>	1.9 <b>U</b>	0.84 <b>U</b>	0.13 <b>U</b>
gamma-BHC (Lindane)	60	0.19 U	0.18 U	0.18 U	0.17 U	0.89 U	0.35 U	0.17 U
Heptachlor	100	0.19 U	0.18 <b>UJ</b>	0.21 <b>J</b>	0.17 <b>UJ</b>	0.88 U	0.34 U	0.16 U
Aldrin	41	0.45 U	0.42 U	0.42 U	0.4 U	2.1 U	0.81 U	0.39 U
Heptachlor epoxide	20	0.14 U	1.4 <b>UJ</b>	1.3 <b>UJ</b>	1.1 <b>UJ</b>	2.2 <b>U</b>	0.85 <b>U</b>	0.29 <b>U</b>
Endosulfan I	900	0.19 U	0.17 <b>UJ</b>	0.17 <b>UJ</b>	0.16 <b>UJ</b>	0.86 U	0.33 U	0.16 U
Dieldrin	44	0.4 U	0.38 U	0.38 U	0.36 U	1.9 U	0.73 U	0.35 U
4 4'-DDE	2,100	0.55 U	3.1 <b>J</b>	7.4 <b>J</b>	1.7 <b>U</b>	30 <b>J</b>	11 <b>J</b>	5.6
Endrin	100	1.1 U	1.1 <b>UJ</b>	1 <b>UJ</b>	1 <b>UJ</b>	5.2 U	3.9 <b>J</b>	0.97 U
Endosulfan II	900	0.21 U	0.2 U	1.3 <b>U</b>	0.19 U	1 U	4.1 <b>J</b>	1.1 <b>U</b>
4 4'-DDD	2,900	0.48 <b>UJ</b>	0.45 U	0.45 U	0.43 U	2.2 <b>UJ</b>	0.87 <b>UJ</b>	0.42 U
Endosulfan sulfate	1,000	0.22 U	2.7 <b>J</b>	3.7 <b>U</b>	1 <b>U</b>	7.9 <b>U</b>	4 <b>U</b>	1.3 <b>U</b>
4 4'-DDT	2,100	0.39 <b>UJ</b>	0.37 U	0.36 <b>UJ</b>	0.35 <b>UJ</b>	1.8 <b>R</b>	0.7 <b>R</b>	0.34 <b>UJ</b>
Methoxychlor	<10,000	2.7 <b>UJ</b>	2.5 <b>UJ</b>	5.5 <b>UJ</b>	5.1 <b>UJ</b>	32 <b>UJ</b>	12 <b>UJ</b>	4.8 <b>U</b>
alpha-Chlordane	NS	0.14 U	0.61 <b>UJ</b>	0.51 <b>UJ</b>	0.45 <b>UJ</b>	1 <b>U</b>	0.25 U	0.12 U
gamma-Chlordane	540	0.11 U	0.11 U	0.11 U	0.1 U	0.53 U	0.21 U	0.1 U
Endrin ketone	NS	0.18 U	0.17 U	0.17 U	0.16 U	0.84 U	0.33 U	0.16 U
<b>PCBs</b>								
Aroclor 1242	NS	3.8 U	3.5 U	3.5 U	3.3 U	3.5 U	3.4 U	3.3 U
Aroclor 1248	NS	3.4 U	3.2 U	3.2 U	3 U	3.1 U	3.1 U	2.9 U
Aroclor 1254	NS	1.5 U	24 <b>J</b>	1.4 U	1.4 U	1.4 <b>U</b>	1.4 U	1.3 U
Aroclor 1260	NS	5 U	61 <b>J</b>	4.7 U	4.5 U	26 <b>J</b>	4.5 U	4.4 U
<b>Total PCBs</b>	1,000/10,000*	ND	85	ND	ND	26	ND	ND

**TABLE 5C**  
**PESTICIDES AND PCBs IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	B-13(0-2)	B-13(6-8)	B-14(0-2)	B-14(15-17)	B-14(20-22)	B-15(0-2)	B-15(13-13.5)
Lab Sample ID	RSCO <sup>1</sup>	210723-010	210723-011	210941-011	210941-012	210941-013	210941-003	210941-004
Dilution		10	1	10	1	1	1	1
Date Sampled		9/9/2005	9/9/2005	9/23/2005	9/23/2005	9/23/2005	9/19/2005	9/19/2005
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Compound								
<b>Pesticides</b>								
beta-BHC	200	6.8 U	0.34 U	4.5 U	0.28 U	0.35 U	0.29 U	0.33 U
delta-BHC	300	1.2 UJ	0.17 U	1.2 UJ	0.11 UJ	0.13 UJ	0.11 UJ	0.13 UJ
gamma-BHC (Lindane)	60	1.8 U	0.19 U	1.7 U	0.16 U	0.2 U	0.17 U	0.19 U
Heptachlor	100	1.7 U	0.19 U	1.7 U	0.16 U	0.2 U	2 J	0.18 U
Aldrin	41	4.1 U	0.45 U	4 U	0.37 U	0.47 U	0.39 U	0.44 U
Heptachlor epoxide	20	16 U	0.29 U	5.7 U	0.12 U	0.15 U	0.36 U	0.14 U
Endosulfan I	900	1.7 U	0.19 U	160	1.6 J	0.19 U	8.9 J	0.18 U
Dieldrin	44	3.7 U	0.41 U	3.6 U	0.33 U	0.42 U	0.35 U	0.39 U
4 4'-DDE	2,100	260 J	2.6 J	83	0.92 J	0.57 U	14 J	0.53 U
Endrin	100	49 U	1.1 U	10 U	0.93 U	1.2 U	0.97 U	1.1 U
Endosulfan II	900	43 J	0.22 U	1.9 U	0.18 U	0.22 U	0.19 U	0.21 U
4 4'-DDD	2,900	4.4 UJ	0.48 U	4.3 U	0.4 U	0.5 U	0.42 U	0.47 U
Endosulfan sulfate	1,000	53 J	0.5 U	25 U	0.18 U	0.23 U	0.19 U	0.21 U
4 4'-DDT	2,100	3.6 R	0.39 UJ	3.5 UJ	0.32 U	0.4 U	31 J	0.38 U
Methoxychlor	<10,000	260 J	3.3 U	130 J	2.2 U	2.8 U	11 J	2.6 U
alpha-Chlordane	NS	1.3 U	0.14 U	1.2 U	0.55 U	0.14 U	36 J	0.14 U
gamma-Chlordane	540	1.1 U	0.12 U	1 U	0.24 J	0.12 U	20 J	0.11 U
Endrin ketone	NS	1.7 U	0.18 U	1.6 U	0.15 U	0.19 U	3.5 J	0.18 U
<b>PCBs</b>								
Aroclor 1242	NS	3.5 U	3.8 U	3.4 U	3.1 U	3.9 U	3.3 U	3.7 U
Aroclor 1248	NS	3.1 U	3.4 U	120	2.8 U	3.5 U	2.9 U	3.3 U
Aroclor 1254	NS	1.4 U	1.5 U	180 J	4.4 U	1.6 U	1.3 U	1.5 U
Aroclor 1260	NS	4.6 U	5 U	54 J	4.2 U	5.2 U	12 J	4.9 U
<b>Total PCBs</b>	1,000/10,000*	ND	ND	354	ND	ND	12	ND

**TABLE 5C**  
**PESTICIDES AND PCBs IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	NYSDEC RSCO <sup>1</sup>  ug/Kg	B-16(0-2) 210785-008 1 9/14/2005 ug/Kg	B-16(10-12) 210785-011 1 9/14/2005 ug/Kg	B-16(24-26) 210785-012 1 9/14/2005 ug/Kg	B-17(0-2) 210810-001 1 9/16/2005 ug/Kg	B-17(14-16) 210810-002 1 9/16/2005 ug/Kg	B-17(18-20) 210810-003 1 9/16/2005 ug/Kg	B-18(0-2) 210785-003 5 9/12/2005 ug/Kg
<b>Pesticides</b>								
beta-BHC	200	0.37 J	0.74 U	0.32 U	0.28 U	0.37 UJ	0.3 UJ	1.5 U
delta-BHC	300	0.11 UJ	0.12 U	0.12 UJ	0.11 UJ	0.12 UJ	0.11 UJ	1.9 J
gamma-BHC (Lindane)	60	0.17 U	0.17 U	0.18 U	0.16 U	0.18 U	0.31 U	17 J
Heptachlor	100	0.21 J	0.17 U	0.18 U	0.16 U	0.18 UJ	0.17 UJ	0.81 U
Aldrin	41	0.89 J	0.4 U	0.43 U	0.37 U	0.42 U	0.39 U	1.9 U
Heptachlor epoxide	20	3.1 J	0.85 U	0.14 U	0.47 U	2 J	0.39 UJ	1.5 U
Endosulfan I	900	0.16 U	0.16 U	0.18 U	0.15 U	0.17 UJ	0.16 UJ	0.79 U
Dieldrin	44	14 J	2.6 J	0.39 U	1.8 J	0.38 U	0.35 U	1.7 U
4 4'-DDE	2,100	0.48 U	11	0.52 U	0.45 U	24 J	0.48 U	2.3 U
Endrin	100	0.99 U	0.99 U	1.1 U	0.93 U	1.1 UJ	0.98 UJ	4.8 U
Endosulfan II	900	11 J	0.19 U	0.2 U	0.18 U	0.2 U	0.19 U	0.92 U
4 4'-DDD	2,900	0.43 UJ	0.42 UJ	0.46 UJ	0.51 UJ	0.45 U	0.45 U	2.1 UJ
Endosulfan sulfate	1,000	4 J	5.1 UJ	0.21 U	2 U	8.2 J	0.73 U	9.1 U
4 4'-DDT	2,100	13 J	0.34 UJ	0.37 UJ	0.32 UJ	0.37 U	0.34 UJ	1.7 UJ
Methoxychlor	<10,000	2.4 UJ	16 J	2.5 UJ	6.5 U	64 J	2.3 UJ	57 J
alpha-Chlordane	NS	8.7 J	1.4 U	0.13 U	0.11 U	1.8 UJ	0.12 UJ	0.59 U
gamma-Chlordane	540	11 J	0.1 U	0.11 U	1 J	1.9 U	0.1 U	0.54 U
Endrin ketone	NS	4.9 J	0.16 U	0.17 U	0.15 U	0.17 U	0.16 U	0.78 U
<b>PCBs</b>								
Aroclor 1242	NS	3.3 U	3.3 U	3.6 U	3.1 U	3.6 U	3.3 U	3.2 U
Aroclor 1248	NS	3 U	3 U	3.2 U	2.8 U	3.2 U	3 U	2.9 U
Aroclor 1254	NS	1.4 U	1.3 U	1.5 U	4.4 J	1.4 U	1.3 U	1.3 U
Aroclor 1260	NS	4.5 U	9.7 J	4.8 U	4.2 U	140	4.4 U	160 J
<b>Total PCBs</b>	1,000/10,000*	ND	9.7	ND	4.4	140	ND	160

**TABLE 5C**  
**PESTICIDES AND PCBs IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	B-18(14.5-16.5)	B-18(28-30)
Lab Sample ID	RSCO <sup>1</sup>	210785-004	210785-005
Dilution		1	1
Date Sampled		9/12/2005	9/12/2005
Units	ug/Kg	ug/Kg	ug/Kg
Compound			
<b>Pesticides</b>			
beta-BHC	200	0.34 U	0.29 U
delta-BHC	300	0.13 <b>UJ</b>	0.11 <b>UJ</b>
gamma-BHC (Lindane)	60	0.19 U	0.17 U
Heptachlor	100	0.19 U	0.16 U
Aldrin	41	0.45 U	0.39 U
Heptachlor epoxide	20	0.14 U	0.12 U
Endosulfan I	900	0.18 U	0.16 U
Dieldrin	44	0.4 U	0.35 U
4 4'-DDE	2,100	0.54 U	0.47 U
Endrin	100	1.1 U	0.97 U
Endosulfan II	900	0.39 <b>U</b>	0.18 U
4 4'-DDD	2,900	0.48 <b>UJ</b>	0.41 <b>UJ</b>
Endosulfan sulfate	1,000	0.86 <b>U</b>	0.19 U
4 4'-DDT	2,100	0.39 <b>UJ</b>	0.34 <b>UJ</b>
Methoxychlor	<10,000	2.6 <b>UJ</b>	2.3 <b>UJ</b>
alpha-Chlordane	NS	0.14 U	0.12 U
gamma-Chlordane	540	0.11 U	0.099 U
Endrin ketone	NS	0.18 U	0.16 U
<b>PCBs</b>			
Aroclor 1242	NS	3.7 U	3.2 U
Aroclor 1248	NS	3.4 U	2.9 U
Aroclor 1254	NS	1.5 U	1.3 U
Aroclor 1260	NS	5 U	4.3 U
<b>Total PCBs</b>	1,000/10,000*	ND	ND

**TABLE 5C**  
**PESTICIDES AND PCBs IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes:**

1 - Recommended Soil Clean-up Objectives listed in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 (exceedances indicated in bold).

ug/kg - micrograms per kilogram = parts per billion (ppb).

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

M - Concentration calculated using manual integration.

NS - No Standard

\* RSCO is 1,000 ug/kg for surface soil (<2 feet below grade) and 10,000 ug/kg for subsurface soil (>2 feet below grade).

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**U** - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

**R** - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)



**TABLE 5D**  
**METALS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC RSCO <sup>1</sup>	Eastern US Background <sup>2</sup>	MW-1(0-2)	MW-1(15-17)	MW-2(0-2)	MW-2(12-14)	B/MW-3(0-2)	B/MW-3(7-9)	MW-4(0-2)
Lab Sample ID			210785-013	210785-014	210785-001	210785-002	210723-004	210723-005	210785-015
Dilution			1	1	5	1	1	1	1
Date Sampled			9/14/2005	9/14/2005	9/12/2005	9/12/2005	9/8/2005	9/8/2005	9/15/2005
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Aluminum	SB	33,000	3,810 J	9,290 J	4,380 J	11,200 J	3,430 J	6,760 J	1,000 J
Antimony	SB	N/A	1.2 UJ	1.3 UJ	1.4 UJ	1.3 UJ	1.7 UJ	1.4 UJ	1.3 R
Arsenic	7.5 or SB	3-12	7.4 J	4.1 J	16.8	2.3 J	11.3 J	2.7 J	2.5 J
Barium	300 or SB	15-600	864 J	19.6 J	244 J	96.5 J	2,930	114	96.4 R
Beryllium	0.16 or SB	0-1.75	0.51 U	0.56 U	0.61 U	0.61 J	0.75 U	0.63 U	0.56 UJ
Cadmium	1 or SB	0.1-1	2 B	1.1 U	4.2	1.2 U	1.8 J	1.3 U	1.1 U
Calcium	SB	130-35,000	44,300	565	5,510	1,610	91,400	13,100	125,000 *
Chromium	10 or SB	1.5-40	15.8	13	17.2	16.3	18.4	15.3	3.8 J
Cobalt	30 or SB	2.5-60	2.6	7.5	2.4	7.4	2.9 J	10.1	1.9 J
Copper	25 or SB	1-50	30.2	15.2	166	15.6	16.8	29.4	11.5
Iron	2,000 or SB	2,000-550,000	10,800	20,500	23,000	19,300	7,310	17,600	4,940
Lead	SB <sup>3</sup>	200-500 <sup>3</sup>	803	7.7 J	475	18.3	2,980	427	89.2
Magnesium	SB	100-5,000	9,900	3,070	651	3,540	4,690	3,190	82,100
Manganese	SB	50-5,000	187	291	111	314	146	110	135
Mercury	0.1 or SB	0.001-0.2	0.87	0.039 B	0.3	0.058	2.5	0.16	0.013 U
Nickel	13 or SB	0.5-25	18.2	14.7	13.4	17.8	11.4	23.5	9.6 J
Potassium	SB	8,500-43,000	677	386	329	1,220	1,060 J	3,940 J	426 J
Selenium	2 or SB	0.1-3.9	1.6 U	1.8 U	1.9 U	1.9 U	2.4 U	2 U	1.8 U
Silver	SB	N/A	0.32 U	0.36 U	0.53 J	0.37 U	0.48 U	0.4 U	0.36 UJ
Sodium	SB	6,000-8,000	346 J	202 J	352 J	91.6 J	234 J	252 J	210 J
Thallium	150	1-300	1.3 UJ	1.5 UJ	1.6 UJ	1.5 UJ	2 U	1.7 U	1.5 R
Vanadium	SB	N/A	22	15.3	19.7	22.4	11	15.7	24.3 J
Zinc	20 or SB	9-50	565 J	35.3 J	435 J	51.4 J	2,060	469	70.4

**TABLE 5D**  
**METALS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	Eastern US	MW-4(12-14)	B/MW-5(0-2)	B/MW-5(5-7)	MW-6(2-4)	MW-6(15-17)	MW-7(0-2)	MW-7(6-8)
Lab Sample ID	RSCO <sup>1</sup>	Background <sup>2</sup>	210785-016	210723-008	210723-009	210941-007	210941-008	210941-005	210941-006
Dilution			1	1	1	1	1	5	10
Date Sampled			9/15/2005	9/9/2005	9/9/2005	9/22/2005	9/22/2005	9/21/2005	9/21/2005
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Aluminum	SB	33,000	8,440 J	5,960 J	6,760 J	15,800	10,800	3,840	5,180
Antimony	SB	N/A	1.5 R	1.3 UJ	1.3 UJ	1.5 UJ	1.3 UJ	1.6 UJ	1.3 UJ
Arsenic	7.5 or SB	3-12	3.4 J	3.3 J	1.3 U	5 J	1.8 J	3.7 B	6.3 J
Barium	300 or SB	15-600	96.6 R	93.3	143	214 J	91.9 J	193 J	922 J
Beryllium	0.16 or SB	0-1.75	0.66 UJ	0.57 U	0.55 U	0.64 U	0.58 U	0.69 U	0.57 U
Cadmium	1 or SB	0.1-1	1.3 U	1.1 U	1.1 U	1.3 U	1.2 U	1.4 U	1.1 U
Calcium	SB	130-35,000	2,850	47,200	2,240	68,400	1,280	100,000	67,500
Chromium	10 or SB	1.5-40	13.1 J	11.3	14	105 R	25.2 R	19 R	21 R
Cobalt	30 or SB	2.5-60	5.7	4.6	6.8	12.9 J	11 J	5 J	5 J
Copper	25 or SB	1-50	18.6	17.4	16	39.8 J	34.8 J	11.9 J	15 J
Iron	2,000 or SB	2,000-550,000	15,600	10,200	15,900	34,500	18,400	16,400	12,300
Lead	SB <sup>3</sup>	200-500 <sup>3</sup>	70.6	56.9	48.3	90.5 J	32.4 J	417 J	292 J
Magnesium	SB	100-5,000	2,670	6,920	3,710	13,900	4,220	5,180	5,030
Manganese	SB	50-5,000	260	306	77.8	511	193	167	158
Mercury	0.1 or SB	0.001-0.2	0.15	0.19	0.072	0.59 J	0.083 J	0.17 J	0.36 J
Nickel	13 or SB	0.5-25	14 J	10.3	17.9	48.6 J	25.2 J	7.4 J	14.6 J
Potassium	SB	8,500-43,000	694 J	2,570 J	4,350 J	7,290 J	2,850 J	984 J	1,800 J
Selenium	2 or SB	0.1-3.9	2.1 U	1.8 U	1.8 U	2.1 U	1.9 U	2.2 U	1.8 U
Silver	SB	N/A	0.42 UJ	0.36 U	0.35 U	0.41 UJ	0.37 UJ	0.44 UJ	0.36 UJ
Sodium	SB	6,000-8,000	105 J	335 J	139 J	676 J	104 J	2,380 J	356 J
Thallium	150	1-300	1.7 UJ	1.5 U	2.8 J	1.7 U	1.5 U	1.8 U	1.5 U
Vanadium	SB	N/A	16.2 J	16.4	14	39.9 J	30.5 J	11.4 J	18.3 J
Zinc	20 or SB	9-50	53.5	84.6	98.5	195 J	58.1 J	210 J	878 J

**TABLE 5D**  
**METALS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>Eastern US</b>	<b>MW-8(0-2)</b>	<b>MW-8(13-15)</b>	<b>MW-9(0-2)</b>	<b>MW-9(12-14)</b>	<b>B-10(0.5-2.5)</b>	<b>B-10(15-15.5)</b>	<b>B-11(0-2)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	<b>Background<sup>2</sup></b>	210941-001	210941-002	210785-006	210785-007	210785-017	210785-018	210810-004
<b>Dilution</b>			1	1	1	1	1	1	1
<b>Date Sampled</b>			9/19/2005	9/19/2005	9/13/2005	9/13/2005	9/15/2005	9/15/2005	9/16/2005
<b>Units</b>	<b>mg/Kg</b>	<b>mg/Kg</b>	<b>mg/Kg</b>	<b>mg/Kg</b>	<b>mg/Kg</b>	<b>mg/Kg</b>	<b>mg/Kg</b>	<b>mg/Kg</b>	<b>mg/Kg</b>
Aluminum	SB	33,000	8,500	15,100	5,990 J	6,770 J	5,400 J	8,810 J	2,680 J
Antimony	SB	N/A	1.3 UJ	1.1 UJ	1.6 UJ	1.4 UJ	1.4 R	1.5 R	1.5 UJ
Arsenic	7.5 or SB	3-12	4.4 J	2.5 J	3.2 J	2.7 J	3 J	1.6 U	14.6
Barium	300 or SB	15-600	184 *N	165 J	58.5 J	18.7 J	263 R	109 R	261 J
Beryllium	0.16 or SB	0-1.75	0.57 U	0.46 U	0.68 U	0.63 U	0.59 UJ	0.67 UJ	0.65 U
Cadmium	1 or SB	0.1-1	1.1 U	0.93 U	1.4 U	1.3 U	1.2 U	1.3 U	7.7
Calcium	SB	130-35,000	42,500	5,730	86,600	1,100	56,200	2,530	9,240
Chromium	10 or SB	1.5-40	27.6 R	107 R	17.1	9	10.4 J	13.1 J	11.2
Cobalt	30 or SB	2.5-60	3.9 J	12.5 J	3.8	6.5	2.6	5.9	26.3
Copper	25 or SB	1-50	13.9 J	33.8 J	17	27.4	11.1	17.1	116
Iron	2,000 or SB	2,000-550,000	12,800	34,900	15,900	14,300	6,590	15,400	8,770
Lead	SB <sup>3</sup>	200-500 <sup>3</sup>	510 J	133 J	6 J	6 J	277	85.1	364
Magnesium	SB	100-5,000	3,320	7,500	5,210	2,960	3,800	2,540	632
Manganese	SB	50-5,000	200	402	209	340	179	278	117
Mercury	0.1 or SB	0.001-0.2	1.5 J	0.099 J	0.015 U	0.018 J	0.14	0.46	0.12
Nickel	13 or SB	0.5-25	10.4 J	30.9 J	7.9	15.8	8.6 J	12.5 J	34.4
Potassium	SB	8,500-43,000	932 J	7,560 J	681	369	753 J	470 J	248 J
Selenium	2 or SB	0.1-3.9	1.8 U	1.7 J	2.2 U	2 U	1.9 U	2.1 U	2.1 U
Silver	SB	N/A	0.36 UJ	0.3 UJ	0.44 U	0.41 U	0.38 UJ	0.43 U	0.41 U
Sodium	SB	6,000-8,000	900 J	308 J	823 J	35.5 J	679 J	182 J	274 J
Thallium	150	1-300	1.5 U	2.2 J	1.8 UJ	1.7 UJ	1.6 UJ	1.8 UJ	1.7 UJ
Vanadium	SB	N/A	17.4 J	48 J	17.4	10.9	12.1 J	14.9 J	13.7
Zinc	20 or SB	9-50	155 J	1,440 J	48 J	30.6 J	276	47.3	812 J

**TABLE 5D**  
**METALS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>NYSDEC</b>	<b>Eastern US</b>	<b>B-11(12-14)</b>	<b>B-11(25-27)</b>	<b>B-12(0-2)</b>	<b>B-12(2-4)</b>	<b>B-12(11-13)</b>	<b>B-13(0-2)</b>	<b>B-13(6-8)</b>	<b>B-14(0-2)</b>
<b>Lab Sample ID</b>	<b>RSCO<sup>1</sup></b>	<b>Background<sup>2</sup></b>	210810-005	210810-006	210723-001	210723-002	210723-003	210723-010	210723-011	210941-011
<b>Dilution</b>			1	1	5	2	1	10	1	10
<b>Date Sampled</b>			9/16/2005	9/16/2005	9/8/2005	9/8/2005	9/8/2005	9/9/2005	9/9/2005	9/23/2005
<b>Units</b>	<b>mg/Kg</b>	<b>mg/Kg</b>	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/kg	mg/Kg	mg/Kg	mg/Kg
Aluminum	SB	33,000	10,900 <b>J</b>	9,160 <b>J</b>	6,030 <b>J</b>	<b>5,340 J</b>	8,620 <b>J</b>	4,080 <b>J</b>	6,210 <b>J</b>	7,940
Antimony	SB	N/A	1.2 <b>UJ</b>	1.5 <b>UJ</b>	5.2 <b>J</b>	1.3 <b>UJ</b>	3.3 <b>J</b>	1.6 <b>UJ</b>	1.5 <b>UJ</b>	1.5 <b>UJ</b>
Arsenic	7.5 or SB	3-12	4.6 <b>J</b>	4.7 <b>J</b>	<b>16.6</b>	10.1	4.2 <b>J</b>	<b>12.9</b>	5 <b>J</b>	5.5 <b>J</b>
Barium	300 or SB	15-600	130 <b>J</b>	285 <b>J</b>	<b>817</b>	387	<b>4,100</b>	<b>1,450</b>	<b>982</b>	314 <b>J</b>
Beryllium	0.16 or SB	0-1.75	0.54 U	0.66 U	0.71 U	0.55 U	0.56 U	0.71 U	0.64 U	0.64 U
Cadmium	1 or SB	0.1-1	1.1 U	1.3 U	<b>14.5</b>	1.1 U	<b>6.1</b>	1.4 U	1.3 U	1.3 U
Calcium	SB	130-35,000	24,000	8,490	<b>44,300</b>	20,000	27,800	<b>45,700</b>	<b>64,700</b>	<b>78,600</b>
Chromium	10 or SB	1.5-40	19.1	26.9	32.9	17.7	22.3	12.2	12.9	<b>53.6 R</b>
Cobalt	30 or SB	2.5-60	8.7	10.9	3.8	5.5	9	4.1	5.9	6.5 <b>J</b>
Copper	25 or SB	1-50	<b>54.3</b>	33.8	<b>297</b>	128	<b>69.6</b>	24.5	29.9	44.3 <b>J</b>
Iron	2,000 or SB	2,000-550,000	19,400	23,000	13,000	34,500	20100	15,800	13,200	14,200
Lead	SB <sup>3</sup>	200-500 <sup>3</sup>	<b>672</b>	153	<b>1,500</b>	<b>1,760</b>	<b>786</b>	<b>821</b>	498	423 <b>J</b>
Magnesium	SB	100-5,000	4,520	3,920	4690	<b>5,400</b>	<b>5,960</b>	3,130	<b>7,270</b>	<b>5,770</b>
Manganese	SB	50-5,000	418	281	167	393	275	302	319	197
Mercury	0.1 or SB	0.001-0.2	<b>0.43</b>	0.02 <b>J</b>	<b>0.27</b>	0.34	0.18	<b>0.54</b>	<b>0.33</b>	0.11 <b>J</b>
Nickel	13 or SB	0.5-25	19.5	21.7	18.2	15.4	22.3	24.2	14	12.5 <b>J</b>
Potassium	SB	8,500-43,000	2,250	1,910	604 <b>J</b>	1,210 <b>J</b>	6,820 <b>J</b>	1,000 <b>J</b>	2,310 <b>J</b>	1,680 <b>J</b>
Selenium	2 or SB	0.1-3.9	1.7 U	2.1 U	2.4 <b>J</b>	1.8 U	1.8 U	2.3 U	2 U	2.1 U
Silver	SB	N/A	0.34 U	0.42 U	1.1 <b>J</b>	0.61 <b>J</b>	0.36 U	0.46 U	0.41 U	0.41 <b>UJ</b>
Sodium	SB	6,000-8,000	212 <b>J</b>	152 <b>J</b>	465 <b>J</b>	294 <b>J</b>	310 <b>J</b>	353 <b>J</b>	364 <b>J</b>	1,230 <b>J</b>
Thallium	150	1-300	1.4 <b>UJ</b>	1.7 <b>UJ</b>	1.9 U	1.5 U	1.5 U	1.9 U	1.7 U	1.7 U
Vanadium	SB	N/A	25.6	18.6	24.1	17.1	26.2	22.8	16.2	21.2 <b>J</b>
Zinc	20 or SB	9-50	<b>87.7 J</b>	<b>183 J</b>	<b>1,100</b>	<b>284</b>	<b>1,740</b>	<b>809</b>	<b>1,070</b>	<b>442 J</b>

**TABLE 5D**  
**METALS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID	NYSDEC	Eastern US	B-14(15-17)	B-14(20-22)	B-15(0-2)	B-15(13-13.5)	B-16(0-2)	B-16(10-12)	B-16(24-26)
Lab Sample ID	RSCO <sup>1</sup>	Background <sup>2</sup>	210941-012	210941-013	210941-003	210941-004	210785-008	210785-011	210785-012
Dilution			1	1	1	1	1	1	1
Date Sampled			9/23/2005	9/23/2005	9/19/2005	9/19/2005	9/14/2005	9/14/2005	9/14/2005
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Aluminum	SB	33,000	8,340	9,110	8,050	11,400	6,140 J	7,960 J	12,900 J
Antimony	SB	N/A	1.3 UJ	1.3 UJ	1.3 UJ	1.2 UJ	1.3 UJ	1.1 UJ	1.4 UJ
Arsenic	7.5 or SB	3-12	1.4 U	3.1 J	5.5 J	4.6 J	9.6	3.7 J	2.4 J
Barium	300 or SB	15-600	103	87.4	166 J	102 J	139 J	99.9 J	75.7 J
Beryllium	0.16 or SB	0-1.75	0.57 U	0.73 J	0.57 U	0.53 U	0.57 U	0.49 U	0.61 U
Cadmium	1 or SB	0.1-1	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	0.97 U	1.2 U
Calcium	SB	130-35,000	4,970 J	2,830	62,300	11,700	52,200	9,350	1,750
Chromium	10 or SB	1.5-40	179	14.2	27 R	17.3 R	20.4	17.5	25.2
Cobalt	30 or SB	2.5-60	10	9	6 J	8.6 J	3.5	6.2	12.6
Copper	25 or SB	1-50	67.8	12.8	22.1 J	14.4 J	21.5	27.1	20.1
Iron	2,000 or SB	2,000-550,000	37,300	13,800	17,400	28,800	13,700	15,900	28,400
Lead	SB <sup>3</sup>	200-500 <sup>3</sup>	20.6	31.8	232 J	7.7 J	84.2	134	27
Magnesium	SB	100-5,000	4,410	1,640	3,970	3,320	4,790	3,250	5,240
Manganese	SB	50-5,000	301	293	193	1,020	178	240	314
Mercury	0.1 or SB	0.001-0.2	0.064 J	0.11 J	0.13 J	0.021 J	0.087	0.7	0.051
Nickel	13 or SB	0.5-25	21.2	18.2	11.6 J	17 J	14.1	13.7	22
Potassium	SB	8,500-43,000	5,550 J	360 J	1,140 J	726 J	1,260	1,530	2,240
Selenium	2 or SB	0.1-3.9	1.8 UJ	1.9 UJ	1.8 U	1.7 U	1.8 U	1.6 U	1.9 U
Silver	SB	N/A	0.37 U	0.38 U	0.37 UJ	0.34 U	0.36 U	0.31 U	0.39 U
Sodium	SB	6,000-8,000	169 J	108 J	809 J	224 J	1,000 J	221 J	216 J
Thallium	150	1-300	1.5 R	1.6 R	1.5 U	2.2 J	1.5 UJ	1.3 UJ	1.6 UJ
Vanadium	SB	N/A	25	16	35.4 J	21.1 J	20.6	20.1	30.2
Zinc	20 or SB	9-50	90.9 J	49.9 J	127 J	35.9 J	103 J	118 J	56 J

**TABLE 5D**  
**METALS IN SOIL**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units	NYSDEC RSCO <sup>1</sup>  mg/Kg	Eastern US Background <sup>2</sup>  mg/Kg	B-17(0-2) 210810-001 1 9/16/2005 mg/Kg	B-17(14-16) 210810-002 1 9/16/2005 mg/Kg	B-17(18-20) 210810-003 1 9/16/2005 mg/Kg	B-18(0-2) 210785-003 5 9/12/2005 mg/Kg	B-18(14.5-16.5) 210785-004 1 9/12/2005 mg/Kg	B-18(28-30) 210785-005 1 9/12/2005 mg/Kg
Aluminum	SB	33,000	3,070 J	2,950 J	46,600 J	7,240 J	7,390 J	7,170 J
Antimony	SB	N/A	1 UJ	1.2 UJ	1.3 UJ	1.3 UJ	1.6 UJ	1.1 UJ
Arsenic	7.5 or SB	3-12	1.8 J	7.7 J	3.5 J	3.8 J	1.7 U	1.6 J
Barium	300 or SB	15-600	27.7 J	936 J	278 J	119 J	62.5 J	36.2 J
Beryllium	0.16 or SB	0-1.75	0.46 U	0.54 U	0.58 U	0.56 U	0.69 U	0.69 J
Cadmium	1 or SB	0.1-1	0.92 U	1.2 J	3.2 J	1.1 U	1.4 U	0.96 U
Calcium	SB	130-35,000	27,200	66,100	5,180	55,400	1,170	870
Chromium	10 or SB	1.5-40	7.6	15.1	278	15.1	12.1	13.9
Cobalt	30 or SB	2.5-60	2.9	2.8	38	4.5	6	11.7
Copper	25 or SB	1-50	15.2	17	28.5	26.8	14.2	22.2
Iron	2,000 or SB	2,000-550,000	6,480	6,380	70,600	11,800	13,100	22,800
Lead	SB <sup>3</sup>	200-500 <sup>3</sup>	27.9	2,580	18.9	88.2	25.6	6.8 J
Magnesium	SB	100-5,000	6,560	1,970	38,700	4,980	2,440	3,390
Manganese	SB	50-5,000	196	147	1,420	177	150	402
Mercury	0.1 or SB	0.001-0.2	0.077	0.81	0.029 J	0.096	0.21	0.013 U
Nickel	13 or SB	0.5-25	6.9	14.1	135	12.9	19.6	25.3
Potassium	SB	8,500-43,000	499	726	20,200	1,660	564	1,480
Selenium	2 or SB	0.1-3.9	1.5 U	1.7 U	1.9 U	1.8 U	2.2 U	1.5 U
Silver	SB	N/A	0.29 U	0.35 U	0.37 U	0.36 U	0.44 U	0.31 U
Sodium	SB	6,000-8,000	132 J	560 J	1,580 J	582 J	72.9 J	98.1 J
Thallium	150	1-300	1.2 UJ	1.4 UJ	1.5 UN	1.5 UJ	1.8 UJ	1.3 UJ
Vanadium	SB	N/A	13.7	10	165 R	21.7	13.3	12.8
Zinc	20 or SB	9-50	43.9 J	461 J	125 J	310 J	38.2 J	68.6 J

**TABLE 5D  
METALS IN SOIL  
WEST 61<sup>st</sup> STREET SITE  
NEW YORK, NEW YORK  
NOTES**

**Notes:**

1 - Recommended Soil Clean-up Objectives listed in NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046

2 - From TAGM #4046 (exceedances indicated in bold).

3 - Background levels for lead vary widely. Average background levels in metropolitan or suburban areas or near highways typically range from 200-500 ppm.

SB - Site Background

mg/kg - milligrams per kilogram = parts per million (ppm)

U - Compound not detected.

B - Value obtained from a reading that was less than the Contract Required Detection Limit (CRDL).

N - MS/MSD spike recovery exceeds control limits.

N/A - Not Available.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**U** - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

**R** - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)

**TABLE 5E**  
**VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	Class GA Ambient Water Qual. Standards <sup>1</sup>  ug/L	MW-1 210941-015 1 9/28/2005 ug/L	MW-2 210941-014 1 9/28/2005 ug/L	MW-3 210941-016 1 9/28/2005 ug/L	MW-4 211066-007 1 10/7/2005 ug/L	MW-5 211066-005 1 10/6/2005 ug/L	MW-6 210941-017 1 9/28/2005 ug/L	MW-7 211066-002 1 10/10/2005 ug/L
Carbon disulfide	50	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Acetone	50	1.4 <b>UJ</b>	1.4 <b>UJ</b>	1.4 <b>UJ</b>	1.4 <b>UJ</b>	1.4 <b>UJ</b>	1.5 <b>UJ</b>	1.4 <b>UJ</b>
Methylene chloride	5	0.4 <b>UJ</b>	0.4 <b>UJ</b>	0.4 <b>UJ</b>	0.4 <b>U</b>	0.4 <b>U</b>	0.76 <b>UJ</b>	0.4 <b>U</b>
Methyl-tert-butyl-ether (MTBE)	10	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	2.6 J	0.3 U
2-Butanone (MEK)	50	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Chloroform	7	0.7 U	0.7 U	2.8 J	0.7 U	1.1 J	0.7 U	0.7 U
Benzene	1	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.76 J
Trichloroethene	5	0.7 U	1.5 J	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Toluene	5	0.3 U	0.3 U	0.3 U	0.44 J	0.64 J	0.3 U	1.5 J
Ethylbenzene	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes (total)	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U
<b>Total VOCs</b>	10,000	ND	1.5	2.8	0.44	1.74	2.6	2.26



**TABLE 5E**  
**VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>Class GA Ambient</b>	<b>MW-7D</b>	<b>MW-8</b>	<b>MW-9</b>	<b>UST</b>	<b>TB -1</b>	<b>FB - 1</b>
<b>Lab Sample ID</b>	<b>Water Qual.</b>	211066-003	211066-004	211066-006	211066-008	210723-006	210723-007
<b>Dilution</b>	<b>Standards<sup>1</sup></b>	1	1	1	200	1	1
<b>Date Sampled</b>		10/10/2005	10/10/2005	10/7/2005	10/10/2005	9/8/2005	9/9/2005
<b>Units</b>	<b>ug/L</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
<b>Compound</b>							
Carbon disulfide	50	0.9 U	0.9 U	0.9 U	180 <b>UJ</b>	0.9 <b>UJ</b>	0.9 <b>UJ</b>
Acetone	50	24 <b>UJ</b>	1.4 <b>UJ</b>	5.4 <b>UJ</b>	<b>12,000 J</b>	1.4 <b>UJ</b>	1.4 <b>UJ</b>
Methylene chloride	5	0.4 <b>U</b>	0.4 <b>U</b>	0.4 <b>U</b>	<b>280 U</b>	2.5 <b>J</b>	0.7 <b>J</b>
Methyl-tert-butyl-ether (MTBE)	10	6.5	0.3 U	0.3 U	60 U	0.3 U	0.3 U
2-Butanone (MEK)	50	16	1.2 U	1.2 U	<b>9,400</b>	1.2 <b>UJ</b>	6.3 <b>J</b>
Chloroform	7	0.7 U	0.7 U	1.5 J	140 U	0.7 U	0.7 U
Benzene	1	<b>2 J</b>	<b>20</b>	0.44 J	<b>15,000</b>	0.4 U	0.4 U
Trichloroethene	5	0.7 U	0.7 U	0.7 U	140 U	0.7 U	0.7 U
Toluene	5	1.9 J	<b>5.8</b>	0.55 J	<b>16,000</b>	0.3 U	0.3 U
Ethylbenzene	5	1 U	<b>8.2</b>	1 U	<b>740 J</b>	1 U	1 U
Xylenes (total)	5	2.3 J	<b>33</b>	1.1 J	<b>4,100</b>	1 U	1 U
<b>Total VOCs</b>	10,000	28.7	67	3.59	<b>57,240</b>	2.5	7

**TABLE 5E**  
**VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	Class GA Ambient Water Qual. Standards <sup>1</sup>  ug/L	FB - 2 210785-009 1 9/14/2005 ug/L	TB - 2 210785-010 1 9/14/2005 ug/L	FB - 3 210785-019 1 9/16/2005 ug/L	TB - 3 210785-020 1 9/15/2005 ug/L	FB - 4 210941-009 1 9/23/2005 ug/L	TB - 4 210941-010 1 9/23/2005 ug/L
Carbon disulfide	50	0.9 U	2 J	0.9 U	0.9 U	0.9 U	0.9 U
Acetone	50	2.4 J	1.9 J	2.4 J	1.8 J	4.2 J	2.8 UJ
Methylene chloride	5	3.6 UJ	4.3 UJ	1.3 UJ	1.4 UJ	1.1 UJ	1.2 UJ
Methyl-tert-butyl-ether (MTBE)	10	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-Butanone (MEK)	50	8.4 J	1.2 U	8 J	1.2 U	9.4 J	1.2 U
Chloroform	7	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Benzene	1	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Trichloroethene	5	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U	0.7 U
Toluene	5	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Ethylbenzene	5	1 U	1 U	1 U	1 U	1 U	1 U
Xylenes (total)	5	1.1 J	1 U	1 U	1 U	1 U	1 U
<b>Total VOCs</b>	10,000	11.9	3.9	10.4	1.8	13.6	ND

**TABLE 5E**  
**VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	Class GA Ambient Water Qual. Standards <sup>1</sup>  ug/L	FB - 5 210941-018 1 9/30/2005 ug/L	TB - 5 210941-019 1 9/30/2005 ug/L	FB - 6 211066-001 1 10/10/2005 ug/L
Carbon disulfide	50	0.9 U	0.9 U	0.9 U
Acetone	50	3.6 J	2.7 J	4.4 J
Methylene chloride	5	0.65 UJ	2.8 UJ	0.47 U
Methyl-tert-butyl-ether (MTBE)	10	0.3 U	0.3 U	0.3 U
2-Butanone (MEK)	50	7.7 J	1.2 U	1.2 U
Chloroform	7	0.7 U	0.7 U	0.7 U
Benzene	1	0.4 U	0.4 U	0.4 U
Trichloroethene	5	0.7 U	0.7 U	0.7 U
Toluene	5	0.3 U	0.3 U	0.3 U
Ethylbenzene	5	1 U	1 U	1 U
Xylenes (total)	5	1 U	1 U	1 U
<b>Total VOCs</b>	10,000	11.3	2.7	4.4

**TABLE 5E**  
**VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes:**

1 - NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values for Class GA groundwater (exceedances indicated in bold).

ug/L - micrograms per liter = parts per billion (ppb)

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria.

The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**U** - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)

**TABLE 5F**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	Class GA Ambient Water Qual. Standards <sup>1</sup>  ug/L	MW-1 210941-015 1 9/28/2005 ug/L	MW-2 210941-014 1 9/28/2005 ug/L	MW-3 210941-016 1 9/28/2005 ug/L	MW-4 211066-007 1 10/7/2005 ug/L	MW-5 211066-005 1 10/6/2005 ug/L	MW-6 210941-017 1 9/28/2005 ug/L	MW-7 211066-002 1 10/10/2005 ug/L
Phenol	1	0.6 J	0.4 U	0.4 U	0.4 U	0.4 UJ	0.5 J	0.4 U
Benzyl alcohol	NS	1 UJ	1 UJ	1 UJ	1 U	1 UJ	1 UJ	1 U
2-Methylphenol	5	0.6 U	0.6 U	0.7 U	0.6 U	0.6 UJ	0.6 U	0.6 U
4-Methylphenol	50	0.3 U	0.3 U	0.4 U	0.4 U	0.3 UJ	0.3 U	0.3 U
2 4-Dimethylphenol	NS	0.7 U	0.7 U	0.9 U	0.8 U	0.7 UJ	0.7 U	0.7 U
Naphthalene	10	3 J	0.7 U	0.8 U	0.7 U	0.7 UJ	2 J	0.8 J
2-Methylnaphthalene	50	0.6 U	0.6 U	0.8 U	0.7 U	0.6 UJ	0.6 U	0.6 U
Bis(2-ethylhexyl)phthalate	50	1 U	1 U	2 U	1 U	1 UJ	1 U	2 J
<b>Total VOCs</b>	10,000	3.6	ND	ND	ND	ND	2.5	2.8

**TABLE 5F**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	Class GA Ambient Water Qual. Standards <sup>1</sup>  ug/L	MW-7D 211066-003 1 10/10/2005 ug/L	MW-8 211066-004 1 10/10/2005 ug/L	MW-9 211066-006 1 10/7/2005 ug/L	UST 211066-008 200 10/10/2005 ug/L	FB - 1 210723-007 1 9/9/2005 ug/L	FB - 2 210785-009 1 9/14/2005 ug/L	FB - 3 210785-019 1 9/16/2005 ug/L
Phenol	1	0.4 U	0.4 U	0.4 U	<b>4,100</b>	0.4 U	0.4 U	0.4 U
Benzyl alcohol	NS	1 U	1 U	1 U	<b>1,200</b>	1 U	1 U	1 U
2-Methylphenol	5	0.6 U	0.6 U	0.6 U	<b>2,300</b>	0.6 U	0.6 U	0.6 U
4-Methylphenol	50	0.3 U	0.4 U	0.4 J	<b>3,700</b>	0.4 U	0.3 U	0.3 U
2 4-Dimethylphenol	NS	0.7 U	0.8 U	0.8 U	<b>760 J</b>	0.8 U	0.7 <b>UJ</b>	0.7 <b>UJ</b>
Naphthalene	10	5 J	<b>13</b>	1 J	<b>640 J</b>	0.7 U	0.7 U	0.7 U
2-Methylnaphthalene	50	1 J	1 J	0.7 U	<b>420 J</b>	0.7 U	0.6 U	0.6 U
Bis(2-ethylhexyl)phthalate	50	1 U	1 U	1 U	140 U	1 U	1 U	1 U
<b>Total VOCs</b>	10,000	6	14	1.4	<b>13,120</b>	ND	ND	ND

**TABLE 5F**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	Class GA Ambient Water Qual. Standards <sup>1</sup>  ug/L	FB - 4 210941-009 1 9/23/2005 ug/L	FB - 5 210941-018 1 9/30/2005 ug/L	FB - 6 211066-001 1 10/10/2005 ug/L
Phenol	1	0.4 <b>UJ</b>	0.4 U	0.4 U
Benzyl alcohol	NS	1 <b>UJ</b>	1 <b>UJ</b>	1 U
2-Methylphenol	5	0.6 <b>UJ</b>	0.6 U	0.6 U
4-Methylphenol	50	0.3 <b>UJ</b>	0.3 U	0.3 U
2 4-Dimethylphenol	NS	0.7 U	0.7 U	0.7 U
Naphthalene	10	0.7 <b>UJ</b>	0.7 U	0.7 U
2-Methylnaphthalene	50	0.6 <b>UJ</b>	0.6 U	0.6 U
Bis(2-ethylhexyl)phthalate	50	1 U	1 U	1 U
<b>Total VOCs</b>	10,000	ND	ND	ND

**TABLE 5F**  
**SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes:**

1 - NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values for Class GA groundwater (exceedances indicated in bold).

ug/L - micrograms per liter = parts per billion (ppb)

U - The compound was not detected at the indicated concentration.

J - Data indicates the presence of a compound that meets the identification criteria.

The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

NS - No standard.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)



**TABLE 5G**  
**PESTICIDES AND PCBs IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>Class GA Ambient</b>	<b>MW-1</b>	<b>MW-2</b>	<b>MW-3</b>	<b>MW-4</b>	<b>MW-5</b>	<b>MW-6</b>	<b>MW-7</b>
<b>Lab Sample ID</b>	<b>Water Qual.</b>	210941-015	210941-014	210941-016	211066-007	211066-005	210941-017	211066-002
<b>Dilution</b>	<b>Standards<sup>1</sup></b>	1	1	1	1	1	1	1
<b>Date Sampled</b>		9/28/2005	9/28/2005	9/28/2005	10/7/2005	10/6/2005	9/28/2005	10/10/2005
<b>Units</b>	<b>ug/L</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
<b>Pesticides</b>								
alpha-BHC	ND (<0.05)	0.011 U	0.011 U	0.013 U	0.012 U	0.011 <b>UJ</b>	0.011 U	0.014 <b>U</b>
delta-BHC	ND (<0.05)	0.0047 <b>J</b>	0.0022 <b>UJ</b>	0.0026 <b>UJ</b>	0.0023 U	0.0022 <b>UJ</b>	0.0022 <b>UJ</b>	0.0024 U
Heptachlor	ND (<0.01)	0.0078 U	0.0078 U	0.0092 U	0.0083 U	0.0078 <b>UJ</b>	0.0078 U	0.015 <b>U</b>
Heptachlor epoxide	ND (<0.01)	0.0057 U	0.0057 U	0.0067 U	0.0061 U	0.0057 <b>UJ</b>	0.0057 U	0.0063 U
4 4'-DDD	ND (<0.01)	0.014 U	0.014 U	0.017 U	0.015 U	0.014 <b>UJ</b>	0.014 U	<b>0.037 J</b>
Endrin ketone	NS	0.016 U	0.016 U	0.019 U	0.017 U	0.016 <b>UJ</b>	0.016 U	0.02 <b>U</b>
<b>Total PCBs</b>	0.09	ND	ND	ND	ND	ND	ND	ND

**TABLE 5G**  
**PESTICIDES AND PCBs IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>Class GA Ambient</b>	<b>MW-7D</b>	<b>MW-8</b>	<b>MW-9</b>	<b>FB - 1</b>	<b>FB - 2</b>	<b>FB - 3</b>	<b>FB - 4</b>
<b>Lab Sample ID</b>	<b>Water Qual.</b>	211066-003	211066-004	211066-006	210723-007	210785-009	210785-019	210941-009
<b>Dilution</b>	<b>Standards<sup>1</sup></b>	1	1	1	1	1	1	1
<b>Date Sampled</b>		10/10/2005	10/10/2005	10/7/2005	9/9/2005	9/14/2005	9/16/2005	9/23/2005
<b>Units</b>	<b>ug/L</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
<b>Pesticides</b>								
alpha-BHC	ND (<0.05)	0.011 U	0.011 U	0.011 U	0.012 <b>UJ</b>	0.011 U	0.011 U	0.011 U
delta-BHC	ND (<0.05)	0.0022 U	0.0022 U	0.0044 J	0.0024 <b>UJ</b>	0.0022 <b>UJ</b>	0.0022 <b>UJ</b>	0.0022 <b>UJ</b>
Heptachlor	ND (<0.01)	0.0078 U	0.0078 U	0.0082 U	0.0085 U	0.0078 U	0.0078 U	0.0078 U
Heptachlor epoxide	ND (<0.01)	<b>0.013</b> J	0.0057 U	0.006 U	0.0062 <b>UJ</b>	0.0057 U	0.0057 U	0.0057 U
4 4'-DDD	ND (<0.01)	0.014 U	0.014 U	0.015 U	0.016 <b>UJ</b>	0.014 U	0.014 U	0.014 U
Endrin ketone	NS	0.016 U	0.016 U	0.017 U	0.018 U	0.016 U	0.016 U	0.016 U
<b>Total PCBs</b>	0.09	ND	ND	ND	ND	ND	ND	ND

**TABLE 5G**  
**PESTICIDES AND PCBs IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>Class GA Ambient</b>	<b>FB - 5</b>	<b>FB - 6</b>
<b>Lab Sample ID</b>	<b>Water Qual.</b>	210941-018	211066-001
<b>Dilution</b>	<b>Standards<sup>1</sup></b>	1	1
<b>Date Sampled</b>		9/30/2005	10/10/2005
<b>Units</b>	<b>ug/L</b>	ug/L	ug/L
<b>Pesticides</b>			
alpha-BHC	ND (<0.05)	0.011 U	0.011 U
delta-BHC	ND (<0.05)	0.0022 <b>UJ</b>	0.0022 U
Heptachlor	ND (<0.01)	0.0078 U	0.0078 U
Heptachlor epoxide	ND (<0.01)	0.0057 U	0.0057 U
4 4'-DDD	ND (<0.01)	0.014 U	0.014 U
Endrin ketone	NS	0.016 U	0.016 U
<b>Total PCBs</b>	0.09	ND	ND

**TABLE 5G**  
**PESTICIDES AND PCBs IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes**

1 - NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values for Class GA groundwater (exceedances indicated in bold).

ug/L - micrograms per liter = parts per billion (ppb)

J - Data indicates the presence of a compound that meets the identification criteria.

U - The compound was not detected at the indicated concentration.

NS - No standard.

ND - Not detected.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**U** - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)

**TABLE 5H**  
**DISSOLVED METALS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units	Class GA Ambient Water Qual. Standards <sup>1</sup> ug/L	MW-1 210941-015 1 9/28/2005 ug/L	MW-2 210941-014 1 9/28/2005 ug/L	MW-3 210941-016 1 9/28/2005 ug/L	MW-4 211066-007 1 10/7/2005 ug/L	MW-5 211066-005 1 10/6/2005 ug/L	MW-6 210941-017 1 9/28/2005 ug/L	MW-7 211066-002 1 10/10/2005 ug/L
Aluminum-Dissolved	100	92 U	92 U	92 U	<b>591</b>	<b>103 J</b>	92 U	<b>254 J</b>
Antimony-Dissolved	3	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U
Arsenic-Dissolved	25	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U
Barium-Dissolved	1,000	91.9	60.6	49.7	64.2	55.1	120	125
Beryllium-Dissolved	3*	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U
Cadmium-Dissolved	5	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	3.6 J
Calcium-Dissolved	NS	97,600	196,000	133,000	224,000	165,000	185,000	383,000
Chromium-Dissolved	50	1.3 U	1.3 U	1.3 U	1.8 J	2.4 J	1.3 U	1.5 J
Cobalt-Dissolved	NS	2.8 J	1.8 U	4.2 J	2.3 J	1.8 U	1.8 U	11.9
Copper-Dissolved	200	4.3 U	<b>11.9 R</b>	11.8	4.3 U	6.3 J	4.3 U	20.2
Iron-Dissolved	300	97 J	130 J	54 U	<b>781</b>	293	71 J	<b>564</b>
Lead-Dissolved	25	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ	3 UJ
Magnesium-Dissolved	35,000*	15,700	33,100	10,600	27,600	34,500	35,300	124,000
Manganese-Dissolved	300	<b>478</b>	35.1	73.5	<b>1,040</b>	72.2	<b>1,650</b>	<b>380</b>
Mercury-Dissolved	0.7	0.07 U	0.07 U	0.07 UN	0.07 U	0.07 U	0.07 U	0.098 J
Nickel-Dissolved	100	1.9 U	3.4 J	5.6 J	3.5 J	17.3	3.6 J	<b>183</b>
Potassium-Dissolved	NS	19,400 J	15,800 J	16,700 J	21,300 J	19,300 J	23,000 J	69,100 J
Selenium-Dissolved	10	6.9 J	<b>35.3</b>	25.9 J	<b>11.3 J</b>	<b>16 J</b>	6.3 J	<b>42.4</b>
Silver-Dissolved	50	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Sodium-Dissolved	20,000	<b>209,000 J</b>	<b>42,600 J</b>	<b>43,900 J</b>	90,700 J	55,900 J	<b>83,500 J</b>	168,000 J
Thallium-Dissolved	0.5*	10 U	10 U	10 U	10 UJ	10 UJ	10 U	10 UJ
Vanadium-Dissolved	NS	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	5.9 J
Zinc-Dissolved	2,000*	11 U	13.8 J	11 U	11 U	11.4 J	11 U	79.4

**TABLE 5H**  
**DISSOLVED METALS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units	Class GA Ambient Water Qual. Standards <sup>1</sup>  ug/L	MW-7D 211066-003 1 10/10/2005 ug/L	MW-8 211066-004 1 10/10/2005 ug/L	MW-9 211066-006 1 10/7/2005 ug/L
Aluminum-Dissolved	100	92 U	<b>174 J</b>	92 U
Antimony-Dissolved	3	5.4 U	5.4 U	5.4 U
Arsenic-Dissolved	25	3.9 U	<b>18.3 J</b>	3.9 U
Barium-Dissolved	1,000	177	112	67.6
Beryllium-Dissolved	3*	0.54 U	0.54 U	0.54 U
Cadmium-Dissolved	5	1.1 U	1.1 U	1.1 U
Calcium-Dissolved	NS	122,000	218,000	111,000
Chromium-Dissolved	50	1.3 U	1.3 U	<b>7.6 J</b>
Cobalt-Dissolved	NS	<b>3.6 J</b>	1.8 U	<b>1.9 J</b>
Copper-Dissolved	200	4.3 U	4.3 U	<b>7.4 J</b>
Iron-Dissolved	300	<b>355</b>	<b>581</b>	54 U
Lead-Dissolved	25	<b>3 UJ</b>	<b>3.2 J</b>	<b>3 UJ</b>
Magnesium-Dissolved	35,000*	<b>49,900</b>	32,300 <b>J</b>	26,800
Manganese-Dissolved	300	<b>3,460</b>	<b>1,490 J</b>	<b>897</b>
Mercury-Dissolved	0.7	0.07 U	<b>0.075 J</b>	0.07 U
Nickel-Dissolved	100	52.3	<b>2.6 J</b>	<b>7 J</b>
Potassium-Dissolved	NS	19,000 <b>J</b>	25,100 <b>J</b>	21,300 <b>J</b>
Selenium-Dissolved	10	5 U	5 U	5 U
Silver-Dissolved	50	1.1 U	1.1 U	1.1 U
Sodium-Dissolved	20,000	95,100 <b>J</b>	121,000 <b>J</b>	144,000 <b>J</b>
Thallium-Dissolved	0.5*	<b>10 UJ</b>	<b>10 UJ</b>	<b>10 UJ</b>
Vanadium-Dissolved	NS	1.5 U	1.5 U	<b>1.7 J</b>
Zinc-Dissolved	2,000*	11 U	11 U	11 U

**TABLE 5H**  
**DISSOLVED METALS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes:**

1 - NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values for Class GA groundwater (exceedances indicated in bold).

U - Compound not detected.

\* Value is a guidance value.

NS - No standard.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

**R** - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)

**TABLE 5I**  
**TOTAL METALS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units	Class GA Ambient Water Qual. Standards <sup>1</sup> ug/L	MW-1 210941-015 1 9/28/2005 ug/L	MW-2 210941-014 1 9/28/2005 ug/L	MW-3 210941-016 1 9/28/2005 ug/L	MW-4 211066-007 1 10/7/2005 ug/L	MW-5 211066-005 1 10/6/2005 ug/L	MW-6 210941-017 1 9/28/2005 ug/L	MW-7 211066-002 1 10/10/2005 ug/L	MW-7D 211066-003 1 10/10/2005 ug/L
Aluminum	100	<b>1,810</b>	<b>448 J</b>	92 U	<b>941</b>	<b>315 J</b>	<b>2,360</b>	<b>5,720</b>	<b>257 J</b>
Antimony	3	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U	5.4 U
Arsenic	25	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	<b>6.5 J</b>	<b>4.9 J</b>
Barium	1,000	112	69.4	49.8	67.6	56.7	145	288	246
Beryllium	3*	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U
Cadmium	5	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	<b>5.7 J</b>	1.1 U
Calcium	NS	102,000	213,000	129,000	223,000	160,000	192,000	381,000	126,000
Chromium	50	<b>4 J</b>	1.3 U	1.3 U	<b>1.5 J</b>	1.3 U	<b>4.7 J</b>	<b>62.1</b>	<b>3.1 J</b>
Cobalt	NS	<b>4.2 J</b>	<b>2.1 J</b>	<b>2.8 J</b>	<b>3 J</b>	<b>1.9 J</b>	<b>4.2 J</b>	50	<b>6.7 J</b>
Copper	200	<b>5.9 J</b>	<b>6.1 R</b>	11.6	4.3 U	<b>9.4 J</b>	<b>8.6 J</b>	61.2	4.3 U
Iron	300	<b>2,970</b>	<b>760</b>	<b>84.5 J</b>	<b>1,440</b>	<b>596</b>	<b>4,850</b>	<b>19,300</b>	<b>17,200</b>
Lead	25	<b>3 UJ</b>	<b>3 UJ</b>	<b>3 UJ</b>	<b>3 UJ</b>	<b>3 UJ</b>	<b>6 J</b>	<b>109 J</b>	<b>7.5 J</b>
Magnesium	35,000*	17,000	<b>36,100</b>	10,400	27,800	33500	<b>37,700</b>	<b>145,000</b>	<b>51,700</b>
Manganese	300	<b>554 UJ</b>	46.1	86.5	<b>1,070</b>	88.3	<b>1,770</b>	<b>661</b>	<b>3650</b>
Mercury	0.7	0.07 UN	0.07 <b>UJ</b>	0.07 <b>UJ</b>	<b>0.9</b>	0.07 U	0.07 <b>UJ</b>	0.07 U	0.07 U
Nickel	100	<b>4.7 J</b>	<b>5.4 J</b>	<b>5.5 J</b>	<b>3.6 J</b>	16.9	<b>8.5 J</b>	<b>544</b>	86.9
Potassium	NS	20,700 <b>J</b>	17,300 <b>J</b>	16,400 <b>J</b>	21,600 <b>J</b>	18600 <b>J</b>	24,700 <b>J</b>	71,200 <b>J</b>	18,500 <b>J</b>
Selenium	10	<b>6.5 J</b>	37.5	<b>23.3 J</b>	<b>19.1 J</b>	<b>9.2 J</b>	<b>7 J</b>	<b>42.6</b>	5 U
Silver	50	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Sodium	20,000	<b>217,000 J</b>	<b>46,100 J</b>	<b>43,900 J</b>	<b>90,100 J</b>	<b>53400 J</b>	<b>87,200 J</b>	<b>169,000 J</b>	<b>95,300 J</b>
Thallium	0.5*	10 U	10 U	10 U	10 <b>UJ</b>	10 <b>UJ</b>	10 U	10 <b>UJ</b>	10 <b>UJ</b>
Vanadium	NS	6.4	<b>2 J</b>	1.5 U	<b>2 J</b>	1.5 U	8.6	27.6	1.5 U
Zinc	2,000*	11 U	11 U	11 U	11 U	12.1 <b>J</b>	15.1 <b>J</b>	258	11 U



**TABLE 5I**  
**TOTAL METALS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units	Class GA Ambient Water Qual. Standards <sup>1</sup> ug/L	MW-8 211066-004 1 10/10/2005 ug/L	MW-9 211066-006 1 10/7/2005 ug/L	FB - 1 210723-007 1 9/9/2005 ug/L	FB - 2 210785-009 1 9/14/2005 ug/L	FB - 3 210785-019 1 9/16/2005 ug/L	FB - 4 210941-009 1 9/23/2005 ug/L	FB - 5 210941-018 1 9/30/2005 ug/L	FB - 6 211066-001 1 10/10/2005 ug/L
Aluminum	100	<b>2,060</b>	92 U	92 U	92 U	92 U	92 U	92 U	92 U
Antimony	3	5.4 U	5.4 U	5.4 U	5.4 <b>UJ</b>	5.4 U	5.4 U	5.4 U	5.4 U
Arsenic	25	9.8 <b>J</b>	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U
Barium	1,000	172	71.4	0.74 U	0.74 U	0.74 U	0.74 U	1 <b>J</b>	0.74 U
Beryllium	3*	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U
Cadmium	5	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Calcium	NS	207,000	115,000	58.7 <b>J</b>	156 <b>J</b>	74.3 <b>J</b>	56 U	88.2 <b>J</b>	63.3 <b>J</b>
Chromium	50	4.1 <b>J</b>	2.2 <b>J</b>	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Cobalt	NS	2.4 <b>J</b>	2.1 <b>J</b>	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U
Copper	200	6.8 <b>J</b>	10.4	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U	4.3 U
Iron	300	<b>5,790</b>	92.7 <b>J</b>	54 U	54 <b>U</b>	54 U	54 U	54 U	54 U
Lead	25	<b>29.6 J</b>	3 <b>UJ</b>	3 U	3 U	3 U	3 U	3 <b>UJ</b>	3 <b>UJ</b>
Magnesium	35,000*	31,200	27,900	26 U	26 U	26 U	26 U	26 U	26 U
Manganese	300	<b>1,200 J</b>	<b>953</b>	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U	6.9 U
Mercury	0.7	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 <b>UJ</b>	0.07 <b>UJ</b>	0.07 U
Nickel	100	7.4 <b>J</b>	4.7 <b>J</b>	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Potassium	NS	24,400 <b>J</b>	23,000 <b>J</b>	191 <b>UJ</b>	191 <b>UJ</b>	191 U	191 <b>UJ</b>	191 <b>UJ</b>	191 U
Selenium	10	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Silver	50	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Sodium	20,000	<b>114,000 J</b>	<b>148,000 J</b>	98 U	98 U	98 U	98 U	98 <b>UJ</b>	98 <b>U</b>
Thallium	0.5*	<b>11.1 J</b>	10 <b>UJ</b>	10 U	10 U	10 U	10 <b>UJ</b>	10 U	10 <b>UJ</b>
Vanadium	NS	6.6	2.1 <b>J</b>	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Zinc	2,000*	18.7 <b>J</b>	11 U	11 U	11 U	11 U	11 U	11 U	11 U

**TABLE 5I**  
**TOTAL METALS IN GROUNDWATER**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes:**

1 - NYSDEC Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values for Class GA groundwater (exceedances indicated in bold).

U - Compound not detected.

N - MS/MSD spike recovery exceeds control limits.

\* Value is a guidance value.

NS - No standard.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**U** - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

**R** - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)

**TABLE 5J**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL GAS**  
**ALGIN PROPERTIES/WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	SG-1S 642258 1 10/05/2005 ug/m3	SG-1D 642259 1 10/05/2005 ug/m3	SG-2S 642255 4 10/05/2005 ug/m3	SG-2D 642254 1 10/05/2005 ug/m3	SG-2D Duplicate 642257 1 10/05/2005 ug/m3	SG-3D 642260 20 10/05/2005 ug/m3
1,1,1-Trichloroethane	1.1 U	1.1 U	4.4 U	9.8	8.2	22 U
1,2,4-Trimethylbenzene	4.9	1.8	6.9	4	3.6	20 U
1,2-Dichloroethane	0.81 U	0.81 U	5.7	2.1	1.7	16 U
1,3,5-Trimethylbenzene	2.5	0.98 U	5.4	1.5	1.2	20 U
1,3-Butadiene	0.44 U	0.44 U	1.8 U	0.44 U	0.62	8.8 U
1,4-Dichlorobenzene	1.6	1.7	4.8 U	1.6	1.7	24 U
2,2,4-Trimethylpentane	0.93 U	0.98	3.7 U	0.93 U	1.1	19 U
4-Ethyltoluene	3.9	1.5	6.9	2.9	2.8	20 U
Acetone	33	16	260 J	15	21	240 U
Benzene	1.1	1.6	28	2.9	2.9	13 U
Bromodichloromethane	1.3 U	1.3 U	5.4 U	1.3 U	1.3 U	27 U
Carbon Disulfide	16	1.7	120	40	31	31 U
Chloroform	1.9	1.6	8.8	15	12	20 U
Chloromethane	1 U	1 U	4.1 U	1 U	1 U	21 U
Cyclohexane	0.69 U	0.69 U	33	0.69 U	0.69 U	14 U
Dichlorodifluoromethane	4.2	3.8	16	16	13	49 U
Ethylbenzene	3.1	1.6	13	2.6	2.7	17 U
Freon TF	1.5 U	1.5 U	6.1 U	3.6	2.8	31 U
Methyl Butyl Ketone	2 U	2 U	8.2 U	2 U	2 U	41 U
Methyl Ethyl Ketone	5.3	2.9	22	2.4	2.9	29 U
Methylene Chloride	7.6	1.7 U	15	2.6	2.4	35 U
n-Heptane	0.86	1	39	1.4	1.4	16 U
n-Hexane	0.92	2	33	2	2.1	14 U
Tetrachloroethene	81	11	5.9	16	15	27 U
Tetrahydrofuran	15 U	15 U	59 U	15 U	15 U	290 U
Toluene	11	8.7	150	14	15	17
Trichloroethene	1.2	1.1 U	4.3 U	1.1 U	1.1 U	21 U
Trichlorofluoromethane	3.3	4.3	7.3	12	9	22 U
Xylene (m,p)	12	4	38	7.8	7.8	17 U
Xylene (o)	4.8	1.7	11	3.1	2.8	17 U

**TABLE 5J**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL GAS**  
**ALGIN PROPERTIES/WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>SG-1S</b>	<b>SG-1D</b>	<b>SG-2S</b>	<b>SG-2D</b>	<b>SG-2D Duplicate</b>	<b>SG-3D</b>
<b>Lab Sample ID</b>	<b>642258</b>	<b>642259</b>	<b>642255</b>	<b>642254</b>	<b>642257</b>	<b>642260</b>
<b>Dilution</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>20</b>
<b>Date Sampled</b>	<b>10/05/2005</b>	<b>10/05/2005</b>	<b>10/05/2005</b>	<b>10/5/2005</b>	<b>10/05/2005</b>	<b>10/05/2005</b>
<b>Units</b>	<b>ug/m3</b>	<b>ug/m3</b>	<b>ug/m3</b>	<b>ug/m3</b>	<b>ug/m3</b>	<b>ug/m3</b>
<b>Compound</b>						
Xylene (total)	17	5.6	52	11	10	17 U
Unknown (TIC in ppbv)	490 J	1.9 J	14 J	4 J	3.7 J	87 J
Unknown (TIC in ppbv)	17 J	2.6 J	8.1 J	5.8 J	5.5 J	50 J
Unknown (TIC in ppbv)	40 J	1.4 J	26 J	250 J	220 J	14000 J
Unknown (TIC in ppbv)	5.3 J	1 J	640 J	6.7 J	6.1 J	86 J
Unknown (TIC in ppbv)	21 J	9.6 J	690 J	17 J	13 J	
Unknown (TIC in ppbv)	5.8 J	1 J	84 J	2.6 J	2.3 J	
Unknown (TIC in ppbv)	4.6 J		160 J	5.9 J	4.8 J	
Unknown (TIC in ppbv)	5.1 J		37 J	3.1 J	2.6 J	
Unknown (TIC in ppbv)	5.6 J		8 J	2.4 J	2 J	
Unknown (TIC in ppbv)	12 J		8.2 J	2.7 J	2.3 J	

**TABLE 5J**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL GAS**  
**ALGIN PROPERTIES/WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

Client ID Lab Sample ID Dilution Date Sampled Units Compound	SG-4D 642264 3 10/06/2005 ug/m3	SG-5S 642261 4 10/06/2005 ug/m3	TripBlank 642262 1 10/05/2005 ug/m3	Background-1 642256 1 10/05/2005 ug/m3	Background-2 642263 1 10/06/2005 ug/m3	MBLK102005VA MBLK102005VA 1 ug/m3
1,1,1-Trichloroethane	55	8.2	1.1 U	3	1.1 U	1.1 U
1,2,4-Trimethylbenzene	3.5	5.4	0.98 U	0.98 U	0.98 U	0.98 U
1,2-Dichloroethane	2.4 U	3.2 U	0.81 U	0.81 U	0.81 U	0.81 U
1,3,5-Trimethylbenzene	2.9 U	3.9 U	0.98 U	0.98 U	0.98 U	0.98 U
1,3-Butadiene	1.3 U	1.8 U	0.44 U	0.44 U	0.44 U	0.44 U
1,4-Dichlorobenzene	3.6 U	4.8 U	1.2 U	1.3	1.2 U	1.2 U
2,2,4-Trimethylpentane	2.8 U	3.7 U	0.93 U	1.5	1.2	0.93 U
4-Ethyltoluene	2.9 U	5.9	0.98 U	1.1	0.98 U	0.98 U
Acetone	36 UJ	48 UJ	12 UJ	16 J	21 J	12 U
Benzene	1.9 U	2.6 U	0.64 U	2.1	1.4	0.64 U
Bromodichloromethane	4.5	12	1.3 U	1.3 U	1.3 U	1.3 U
Carbon Disulfide	15	6.2 U	1.6 U	1.6 U	1.6 U	1.6 U
Chloroform	340	390	0.98 U	0.98 U	0.98 U	0.98 U
Chloromethane	3.1 U	4.1 U	1 U	1 U	1.3	1 U
Cyclohexane	2.1 U	2.8 U	0.69 U	0.69 U	0.69 U	0.69 U
Dichlorodifluoromethane	7.4 U	9.9 U	2.5 U	2.9	3.3	2.5 U
Ethylbenzene	3	14	0.87 U	1.7	0.96	0.87 U
Freon TF	4.6 U	6.1 U	1.5 U	1.5 U	1.5 U	1.5 U
Methyl Butyl Ketone	6.1 U	8.2 U	2 U	2.3	2 U	2 U
Methyl Ethyl Ketone	4.7	16	1.5 U	5	3.5	1.5 U
Methylene Chloride	5.2 U	6.9 U	1.7 U	2.3	1.7 U	1.7 U
n-Heptane	2.5 U	3.3 U	0.82 U	1.2	1.1	0.82 U
n-Hexane	2.1 U	2.8 U	0.7 U	2.6	1.9	0.7 U
Tetrachloroethene	75	67	1.4 U	4.5	2.4	1.4 U
Tetrahydrofuran	44 U	80	15 U	15 U	15 U	15 U
Toluene	3.3	4.5	0.75 U	9.8	6	0.75 U
Trichloroethene	3.5	8.6	1.1 U	1.1 U	1.1 U	1.1 U
Trichlorofluoromethane	10	17	1.1 U	2	1.7	1.1 U
Xylene (m,p)	8.3	43	0.87 U	4	1.8	0.87 U
Xylene (o)	6.1	24	0.87 U	1.5	0.87 U	0.87 U

**TABLE 5J**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL GAS**  
**ALGIN PROPERTIES/WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>SG-4D</b>	<b>SG-5S</b>	<b>TripBlank</b>	<b>Background-1</b>	<b>Background-2</b>	<b>MBLK102005VA</b>
<b>Lab Sample ID</b>	<b>642264</b>	<b>642261</b>	<b>642262</b>	<b>642256</b>	<b>642263</b>	<b>MBLK102005VA</b>
<b>Dilution</b>	<b>3</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>Date Sampled</b>	<b>10/06/2005</b>	<b>10/06/2005</b>	<b>10/05/2005</b>	<b>10/05/2005</b>	<b>10/06/2005</b>	
<b>Units</b>	<b>ug/m3</b>	<b>ug/m3</b>	<b>ug/m3</b>	<b>ug/m3</b>	<b>ug/m3</b>	<b>ug/m3</b>
<b>Compound</b>						
Xylene (total)	14	69	0.87 U	5.6	1.9	0.87 U
Unknown (TIC in ppbv)	8.6 J			1.3 J	1.1 J	
Unknown (TIC in ppbv)	3.4 J			1.6 J	1.4 J	
Unknown (TIC in ppbv)	4.1 J			2.1 J	1.5 J	
Unknown (TIC in ppbv)	4.2 J			1.2 J	1.5 J	
Unknown (TIC in ppbv)	3.6 J			1.6 J	2 J	
Unknown (TIC in ppbv)					1.1 J	
Unknown (TIC in ppbv)						
Unknown (TIC in ppbv)						
Unknown (TIC in ppbv)						
Unknown (TIC in ppbv)						

**TABLE 5J**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL GAS**  
**ALGIN PROPERTIES/WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>mblk102005ba</b>
<b>Lab Sample ID</b>	<b>mblk102005ba</b>
<b>Dilution</b>	<b>1</b>
<b>Date Sampled</b>	
<b>Units</b>	<b>ug/m3</b>
<b>Compound</b>	
1,1,1-Trichloroethane	1.1 U
1,2,4-Trimethylbenzene	0.98 U
1,2-Dichloroethane	0.81 U
1,3,5-Trimethylbenzene	0.98 U
1,3-Butadiene	0.44 U
1,4-Dichlorobenzene	1.2 U
2,2,4-Trimethylpentane	0.93 U
4-Ethyltoluene	0.98 U
Acetone	12 U
Benzene	0.64 U
Bromodichloromethane	1.3 U
Carbon Disulfide	1.6 U
Chloroform	0.98 U
Chloromethane	1 U
Cyclohexane	0.69 U
Dichlorodifluoromethane	2.5 U
Ethylbenzene	0.87 U
Freon TF	1.5 U
Methyl Butyl Ketone	2 U
Methyl Ethyl Ketone	1.5 U
Methylene Chloride	1.7 U
n-Heptane	0.82 U
n-Hexane	0.7 U
Tetrachloroethene	1.4 U
Tetrahydrofuran	15 U
Toluene	0.75 U
Trichloroethene	1.1 U
Trichlorofluoromethane	1.1 U
Xylene (m,p)	0.87 U
Xylene (o)	0.87 U

**TABLE 5J**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL GAS**  
**ALGIN PROPERTIES/WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Client ID</b>	<b>mblk102005ba</b>
<b>Lab Sample ID</b>	<b>mblk102005ba</b>
<b>Dilution</b>	<b>1</b>
<b>Date Sampled</b>	
<b>Units</b>	<b>ug/m3</b>
<b>Compound</b>	
Xylene (total)	0.87 U
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	
Unknown (TIC in ppbv)	



**TABLE 5J**  
**VOLATILE ORGANIC COMPOUNDS IN SOIL GAS**  
**ALGIN PROPERTIES/WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**  
**NOTES**

**Notes:**

ug/m<sup>3</sup> - micrograms per cubic meter of air.

ppbv - parts per billion per one liter of air.

**U** - The compound was not detected at the indicated concentration.

**J** - Data indicates the presence of a compound that meets the identification criteria. The result is less than the quantitation limit but greater than zero. The concentration given is an approximate value.

**UJ** - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

**U** - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

**J** - The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

(Letters in bold indicate updated qualifiers based on the data usability report provided by Environmental Data Services Inc.)

**TABLE 5K**  
**TOXICITY CHARACTERISTIC LEACHING PROCEDURE**  
**WEST 61<sup>st</sup> STREET SITE**  
**NEW YORK, NEW YORK**

<b>Method Blank</b>	<b>NYSDEC</b>	<b>MB-57201</b>	<b>MB-57201</b>	<b>MB-57201</b>	<b>MB-57201</b>
<b>Client ID</b>	<b>Section 371.3</b>	<b>B/MW-3(0-2)</b>	<b>B-12(11-13)</b>	<b>B-17(14-16)</b>	<b>MW-8(13-15)</b>
<b>Lab Sample ID</b>	<b>Maximum</b>	<b>211281-001</b>	<b>211281-002</b>	<b>211281-003</b>	<b>211281-004</b>
<b>Date Sampled</b>	<b>Contaminant</b>	<b>9/8/2005</b>	<b>9/8/2005</b>	<b>9/16/2005</b>	<b>9/19/2005</b>
<b>Units</b>	<b>Concentration</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>	<b>mg/L</b>
<b>Compound</b>					
Arsenic-TCLP	5.0	0.0195 U	0.0195 U	0.0195 U	0.0195 U
Barium-TCLP	100.0	0.89	0.491	0.719	0.512
Cadmium-TCLP	1.0	0.031 J	0.009 J	0.0072 J	0.0055 U
Chromium-TCLP	5.0	0.0065 U	0.0065 U	0.0065 U	0.0065 U
Lead-TCLP	5.0	<b>6.82</b>	0.282	1.41	1.97
Selenium-TCLP	1.0	0.025 U	0.025 U	0.025 U	0.025 U
Silver-TCLP	5.0	0.0055 U	0.0055 U	0.0055 U	0.0055 U

**Notes:**

**J** - Indicates an estimated value. (Based on changes provided in the Data Usability Report supplied by Environmental Data Services Inc.)

**APPENDIX H**  
**CITIZEN PARTICIPATION ACTIVITIES DURING REMEDIAL CONSTRUCTION**

## **CITIZEN PARTICIPATION DURING REMEDIAL CONSTRUCTION**

Consistent with the New York State Department of Environmental Conservation (NYSDEC)-approved June 2005 Revised Citizen Participation Plan, the following activities will occur prior and during the implementation of the Remedial Work Plan.

- At the request of Ms. Lynn Opinante, the new Director of the Riverside Branch of the New York Public Library, AKRF, Inc. will provide information to her about the Brownfield Cleanup Program and the role of the library as a repository. AKRF will furnish Ms. Opinante a list of documents that should be presently available for public inspection at the library, and promptly provide any documents not present for public inspection.
- Consistent with Sections 4.5 and 4.6 of the June 2005 Revised Citizen Participation Plan, AKRF will prepare and submit to the NYSDEC and the New York State Department of Health (NYSDOH) for approval, a Fact Sheet that will provide: information summarizing the results of the Remedial Investigation, including the determination of no significant threat to public health or the environment; announce the availability of the January 2006 Remedial Investigation Report for public review; summarize the results of the Alternatives Analysis; state the selected tentative method of site remediation, and announce the availability of the Remedial Work Plan, including the Alternatives Analysis for public review; provide the location and hours of public access for document review at the two document repositories; and advise the public of the comment period and the possibility of holding a public meeting for the Site. The state-approved Fact Sheet will be distributed to the Project Mailing List. A Certification of Mailing will be submitted to NYSDEC, accompanied by the Fact Sheet and Distribution List.
- Prior to the commencement of remedial activities at the Site, AKRF will prepare and submit to the NYSDEC and NYSDOH a Notice and Fact Sheet announcing the intended start date and activities that will occur. The state-approved Notice and Fact Sheet will be distributed to the Project Mailing List. A Certification of Mailing will be submitted to the NYSDEC, accompanied by the Fact Sheet and the Distribution List.
- At the direction of the NYSDEC and/or NYSDOH, any pertinent analytical data or other information gathered will be placed in the document repositories.

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**PROJECT MAILING LIST**

**West 61<sup>st</sup> Street Site, New York, NY  
BCP Site #C231043**

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Paul Hastings Janofsky & Walker, LLP  
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Mayor Michael R. Bloomberg  
City Hall  
New York, NY 10007

Honorable Charles Schumer  
State Senator  
757 Third Avenue, Suite 17-02  
New York, NY 10017

Honorable Hillary Clinton  
State Senator  
780 Third Avenue, Suite 2601  
New York, NY 10017

Honorable Jerrold Nadler  
Congressman – 8<sup>th</sup> Congressional District  
201 Varick Street Suite 669  
New York, NY 10014

Honorable Scott Stringer  
Assemblyman – 67<sup>th</sup> Assembly District  
230 West 72<sup>nd</sup> Street  
New York, NY 10023

Honorable Richard N. Gottfried  
Assemblyman – 75<sup>th</sup> Assembly District  
242 West 27<sup>th</sup> Street  
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Ms. C. Virginia Fields  
Manhattan Borough President  
1 Centre Street 19<sup>th</sup> Floor  
New York, NY 10007

Mr. Shaun Donovan  
Commissioner of Dept. of Housing Preservation and Development  
100 Gold Street  
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Ms. Hope Cohen  
Chair, Community Board 7  
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Mr. Robert Kulikowski, PhD, Director  
New York City Office of Environmental Coordination  
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Ms. Amanda M. Burden, AICP  
Chair of the City Planning Commission and  
Director of Department of City Planning  
NYC Department of City Planning  
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New York, NY 10007-1216

Commissioner Emily Lloyd  
NYC Department of Environmental Protection  
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Corona, NY 11368-5107

Michael Lesser  
Division of Environmental Enforcement  
New York State Department of Environmental Conservation  
625 Broadway  
Albany, NY 12233

Mr. Daniel Walsh  
New York State Department of Environmental Conservation  
Division of Environmental Remediation, Region 2  
47-40 21<sup>st</sup> Street  
Long Island City, N.Y. 11101-5407

Mr. Shaminder Chawla  
New York State Department of Environmental Conservation  
47-40 21<sup>st</sup> Street  
Long Island City, NY 11101

West 60<sup>th</sup> Street Associates, LLC; West End Enterprises, LLC  
Bennet Schonfeld, Esq., c/o Algin Management Co., LLC  
64-35 Yellowstone Boulevard  
Forest Hills, NY 11375

Seventh Frogmouth Corp., Cohen 101  
3900 Galt Ocean Dr.  
Fort Lauderdale, FL 33308-6631

250 West 61<sup>ST</sup> Street  
35 Longvue Ave.  
New Rochelle, NY 10804-4118

AJH 61 Corp.  
270 West 89<sup>th</sup> St.  
New York, NY 10024-1705

225-227 West 60<sup>TH</sup> Street  
575 Lexington Ave.  
New York, NY 10022-6102

NYC Department of Education  
1 Centre St, 19<sup>th</sup> Fl.  
New York, NY 10007-1602

Hasko Utilities Co., Inc.  
80 Main St.  
Mineola, NY 11501

240 West 60<sup>TH</sup> Street, C/O Louis DeStephanis  
P.O. Box 400  
Southampton, NY 11969-0400

Parks and Recreation-Arsenal West  
16 West 61<sup>st</sup> St.  
New York, NY 10023-7604

Paul Alpuche  
46 Blauvelt Rd.  
Blauvelt, NY 10913-1204

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555 California St. Suite 8  
San Francisco, CA 94104-1502

211 W. 61<sup>st</sup> St. Associates, LP  
187 Millburn Ave. Suite 6  
Millburn, NJ 07041-1845

Resident  
242 West 61<sup>st</sup> St.  
New York, NY 10023

Resident  
244 West 61<sup>st</sup> St.  
New York, NY 10023

Occupant  
246 West 61<sup>st</sup> St.  
New York, NY 10023

Occupant  
34 West End Ave.  
New York, NY 10023

Occupant  
20 West End Ave.  
New York, NY 10023

Occupant  
225 West 60<sup>th</sup> St.  
New York, NY 10023

P.S. 191  
210 West 61<sup>st</sup> St.  
New York, NY 10023

Occupant  
555 West 59<sup>th</sup> St.  
New York, NY 10019

Occupant  
240 West 60<sup>th</sup> St.  
New York, NY 10023

Occupant  
533 West 59<sup>th</sup> St.  
New York, NY 10023



Occupant  
236 West 60<sup>th</sup> St.  
New York, NY 10023

Occupant  
238 West 60<sup>st</sup> St.  
New York, NY 10023

Resident  
227 West 61<sup>st</sup> St.  
New York, NY 10023

Resident  
211 West 61<sup>st</sup> St.  
New York, NY 10023

Daily News  
220 East 42<sup>nd</sup> Street  
New York, NY 10017

New York City Department of Environmental Protection  
59-17 Junction Boulevard, 10<sup>th</sup> Floor  
Elmhurst, New York 11373

Elementary/Middle School PS 191  
210 West 61<sup>st</sup> St.  
New York, NY 10023

Yeshivat Chovevei Torah Rabbinical School  
20 West End Avenue  
New York, NY 10023

New York Public Library- Riverside Branch  
127 Amsterdam Avenue  
New York, NY 10023-6447

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**APPENDIX I**  
**ESTIMATED REMEDIATION COSTS AND SCHEDULE**

**PROJECTED COST FOR EASTERN AREA REMEDIATION  
WEST 61<sup>ST</sup> STREET SITE  
NEW YORK, NEW YORK**

**Cost Estimate - Removal of Fill and Contaminated Material - Track 1 Cleanup**

<u>Activity</u>	<u>Area</u>	<u>Depth</u>	<u>Volume</u>
Historic Fill	15,075 square feet	6 feet	4,100 cubic yds.
Petroleum Contamination	2 locations	10 feet	272 cubic yds.
Lead Contaminated Soil	36 square feet	6 feet	8 cubic yds.

<u>Material Classification</u>	<u>Cubic yards</u>	<u>Tons</u>	<u>Cost / Ton</u>	<u>Cost</u>
Fill - Beneficial Use	4,790	7185	\$36	\$258,660
Historic Fill - Waste	3,340	5,010	\$62	\$310,620
Petroleum Contamination	272	408	\$50	\$20,400
Lead-Contaminated Soil	8	12	\$135	\$1,620
Tank Removal - 2 days to remove 4 tanks				\$5,000

**Transportation and Disposal of On-Site Soil Subtotal** **\$596,300**

This estimate is based on a Track1 cleanup, which will result in the historic fill being removed to bedrock. The wastes identified include historic fill, lead contamination, and possible petroleum contamination. Except for the lead-contaminated waste around MW-3, all material is assumed to be a non-hazardous waste. Depending on post-excavation testing around MW-3, additional soil may have to be removed as hazardous waste. The amount of petroleum-contaminated material may increase depending upon post-excavation sampling results. This estimate is based on a Track 4 cleanup. The disposal facility receiving the historic fill requires one full test every 900 tons (600 cubic yards) and volatile organic compound (VOC) tests every 180 tons (120 cubic yards). Petroleum cleanup will be verified through endpoint samples for VOCs. Petroleum testing for disposal facilities will occur only if petroleum is encountered. Endpoint sampling will be undertaken consistent with NYSDEC guidelines.

<u>Parameter</u>	<u>Samples</u>	<u>Cost/Sample</u>	<u>Cost</u>
<u>Contaminated Soil Disposal at Philadelphia, PA Facility</u>			
Volatile Organics (VOCs)	30	\$80	\$2,400
TCLP - VOCs	30	\$85	\$2,550
Composite Samples	6	\$1,020	\$6,120
<u>Petroleum Contaminated Soil Disposal at Carteret, NJ Facility</u>			
TPH - GRO	34	\$65	\$2,210
Composite Samples	5	\$505	\$2,525
<u>Beneficial Use Soil - Allied Signal Facility in Elizabeth, NJ</u>			
Priority Pollutants + 40	6	\$595.00	\$3,570
Additional parameters	6	\$180.00	\$1,080
<u>NYSDEC Endpoint Samples - Category B Deliverables</u>			
Standard Analysis	6	\$490	\$2,940
QA/QC Analysis	1	\$1,065	\$1,065
TCLP - Metals	5	\$85	\$425
Lead (Metals)	5	\$85	\$425

**Sample Analysis Subtotal** **\$25,310**

<u>Cost - AKRF Staff</u>	<u>Hours</u>	<u>Cost/Hr</u>	
Professional 1 - Sampling and H+S	100	\$105.00	10,500
Technical Director - Oversight	20	\$180.00	3,600
Senior Vice President	8	\$240.00	1,920
Field Costs- sampling and monitoring equipment, and automobile.			5,000

**AKRF Subtotal** **\$21,020**

**Total Cost For Track 1 Cleanup** **\$642,630**

The laboratory analytical fees may change prior to the commencement of the remedial work. Additional samples and parameters may be required by the facility receiving the waste.

**PROJECTED COST FOR EASTERN AREA REMEDIATION  
WEST 61<sup>ST</sup> STREET SITE  
NEW YORK, NEW YORK**

**Cost Estimate - Removal of Fill and Contaminated Material - Track 4 Cleanup**

<u>Activity</u>	<u>Area</u>	<u>Depth</u>	<u>Volume</u>
Historic Fill	15,075 square feet	6 feet	4,100 cubic yds.
Petroleum Contamination	2 locations	10 feet	272 cubic yds.
Lead Contaminated Soil	36 square feet	6 feet	8 cubic yds.

<u>Material Classification</u>	<u>Cubic yards</u>	<u>Tons</u>	<u>Cost / Ton</u>	<u>Cost</u>
Fill - Beneficial Use	1,676	2514	\$36	\$90,504
Historic Fill - Waste	3,340	5,010	\$62	\$310,620
Petroleum Contamination	272	408	\$50	\$20,400
Lead-Contaminated Soil	8	12	\$135	\$1,620
Tank Removal - 2 days to remove 4 tanks				\$5,000

**Transportation and Disposal of On-Site Soil Subtotal                      \$428,144**

The wastes identified include historic fill, lead contamination, and possible petroleum contamination. Except for the lead-contaminated waste around MWV-3, all material is assumed to be a non-hazardous waste. Depending on post-excavation testing around MWV-3, additional soil may have to be removed as hazardous waste. The amount of petroleum-contaminated material may increase depending upon post-excavation sampling results. This estimate is based on a Track4cleanup. The disposal facility receiving the historic fill requires one full test every 900 tons (600 cubic yards) and volatile organic compound (VOC) tests every 180 tons (120 cubic yards). Petroleum cleanup will be verified through endpoint samples for VOCs. Petroleum testing for disposal facilities will occur only if petroleum is encountered. Endpoint sampling will be undertaken consistent with NYSDEC guidelines.

<u>Parameter</u>	<u>Samples</u>	<u>Cost/Sample</u>	<u>Cost</u>
<u>Contaminated Soil Disposal at Philadelphia, PA Facility</u>			
Volatile Organics (VOCs)	30	\$80	\$2,400
TCLP - VOCs	30	\$85	\$2,550
Composite Samples	6	\$1,020	\$6,120
<u>Petroleum Contaminated Soil Disposal at Carteret, NJ Facility</u>			
TPH - GRO	34	\$65	\$2,210
Composite Samples	5	\$505	\$2,525
<u>Beneficial Use Soil - Allied Signal Facility in Elizabeth, NJ</u>			
Priority Pollutants + 40	2	\$595.00	\$1,190
Additional parameters	2	\$180.00	\$360
Field Costs- sampling equipment, particulate monitors, PID, vehicle			\$5,000
<u>NYSDEC Endpoint Samples - Category B Deliverables</u>			
Standard Analysis	6	\$490	\$2,940
QA/QC Analysis	1	\$1,065	\$1,065
TCLP - Metals	5	\$85	\$425
Lead (Metals)	5	\$85	\$425

**Sample Analysis Subtotal                      \$27,210**

<u>Cost - AKRF Staff</u>	<u>Hours</u>	<u>Cost/Hr</u>	
Professional 1 - Sampling and H+S	80	\$105.00	\$8,400
Technical Director - Oversight	16	\$180.00	\$2,880
Senior Vice President	8	\$240.00	\$1,920
Field Costs- sampling and monitoring equipment, and automobile.			\$3,000

**AKRF Subtotal                      \$16,200**

**Cost For Track 4 Cleanup                      \$471,554**

The laboratory analytical fees may change prior to the commencement of the remedial work. Additional samples and parameters may be required by the facility receiving the waste.

**PROJECTED COST FOR MAIN AREA REMEDIATION  
WEST 61<sup>ST</sup> STREET SITE  
NEW YORK, NEW YORK**

**Cost Estimate - Removal of Contaminated Soil and C+D Material - Track 1 Cleanup**

Total Site area		47737.5 square feet		
Excavation depth		Varies from 24 feet to 32.5 feet for sub-cellar excavation (elevation 14.0)		
<b>Material Classification</b>	<b>Cubic yards</b>	<b>Tons</b>	<b>Cost / Ton</b>	<b>Cost</b>
Petroleum Contaminated	7,062	10,593	\$50	\$529,650
Uncont. fill, soil and bedrock	36,400	54,600	\$36	\$1,965,600
Waste fill and soil	3,432	5,148	\$62	\$319,176
C+D - Lot 8	2,224	3,336	\$62	\$206,832
Industrial Waste - acetone	15	28	\$62	\$1,736
Tank Removal - 4 tanks				\$5,000

**Transportation and Disposal of On-Site Soil Subtotal** **\$3,027,994**

This estimate addresses the removal of native soil and various waste materials to the anticipated vertical and horizontal limits of excavation for the project. Wastes identified for off-site disposal include: fill and native soil destined for beneficial use; petroleum-contaminated soil; underground storage tanks; construction and demolition debris in Lot 8; potential acetone-affected soil; and soil unacceptable for beneficial use. Additional soil would be removed to meet TAGM # 4046 Cleanup objectives in the courtyard and along West 60th Street and the removal of petroleum-contaminated soil in the southwestern corner of the Site, from the bottom of the project excavation downward to petroleum-free soil.

<u>Parameter</u>	<u>Samples</u>	<u>Cost/Sample</u>	<u>Cost</u>
<u>Contaminated Soil Disposal at Philadelphia, PA Facility</u>			\$2,720
Volatile Organics (VOCs)	34	\$80	\$2,890
TCLP - VOCs	34	\$85	\$9,180
Composite Samples	9	\$1,020	
<u>Petroleum-Contaminated Soil Disposal at Carteret, NJ Facility</u>			\$5,005
TPH - GRO	77	\$65	\$7,575
Composite Samples	15	\$505	
<u>Beneficial Use Soil - Allied Signal Facility in Elizabeth, NJ</u>			\$27,370
Priority Pollutants + 40	46	\$595.00	\$8,280
Additional parameters	46	\$180.00	
<u>NYSDEC Endpoint Samples - Category B Deliverables</u>			\$10,780
Standard Analysis	22	\$490	\$2,130
QA/QC Analysis	2	\$1,065	

**Sample Analysis Subtotal** **\$75,930**

<b>AKRF Staff</b>	<b>Hours</b>	<b>Cost/Hr</b>	
Professional 1 - Sampling and H+S	480	\$105.00	\$50,400
Technical Director- Coordination	60	\$180.00	\$10,800
Senior Vice President	25	\$240.00	\$6,000
Field Costs- sampling equipment, particulate monitors, PID, vehicle			\$12,500

**AKRF Subtotal** **\$79,700**

<b>Drilling Contractor</b>	<b>Unit</b>	<b>@</b>	<b>Cost/Unit</b>	
Mob/Demob	1 LS	@	\$750	\$750
Hollow stem auger drill rig	22 days	@	\$1,600	\$35,200
Drums	10 drums	@	\$50	\$500
Drum disposal	10 drums	@	\$150	\$1,500

**Drilling Subtotal** **\$37,950**

**Total Cost For Track 1 Cleanup** **\$3,221,574**

The laboratory analytical fees may change prior to the commencement of the remedial work.  
Additional samples and parameters may be required by the facility receiving the waste.

**PROJECTED COST FOR MAIN AREA REMEDIATION  
WEST 61<sup>ST</sup> STREET SITE  
NEW YORK, NEW YORK**

**Cost Estimate - Removal of Contaminated Soil and C+D Material - Track 4 Cleanup**

Total Site area	47737.5 square feet			
Excavation depth	Varies from 24 feet to 32.5 feet for sub-cellar excavation (elevation 14.0)			
<b>Material Classification</b>	<b>Cubic yards</b>	<b>Tons</b>	<b>Cost / Ton</b>	<b>Cost</b>
Petroleum Contaminated	6,462	9,693	\$50	\$484,650
Uncont. fill, soil and bedrock	30,468	45,702	\$36	\$1,645,272
Waste fill and soil	3,432	5,148	\$62	\$319,176
C+D - Lot 8	2,224	3,336	\$62	\$206,832
Industrial Waste - acetone	15	28	\$62	\$1,736
Tank Removal - 4 tanks				\$5,000

**Transportation and Disposal of On-Site Soil Subtotal** **\$2,662,666**

This estimate addresses the removal of native soil and various waste materials to the anticipated vertical and horizontal limits of excavation for the project. Wastes identified for off-site disposal include: fill and native soil destined for beneficial use; petroleum-contaminated soil; underground storage tanks; construction and demolition debris in Lot 8; potential acetone-affected soil; and soil unacceptable for beneficial use.

<b>Parameter</b>	<b>Samples</b>	<b>Cost/Sample</b>	<b>Cost</b>
<u>Contaminated Soil Disposal at Philadelphia, PA Facility</u>			\$2,720
Volatile Organics (VOCs)	34	\$80	\$2,890
TCLP - VOCs	34	\$85	\$9,180
Composite Samples	9	\$1,020	
<u>Petroleum Contaminated Soil Disposal at Carteret, NJ Facility</u>			\$4,680
TPH - GRO	72	\$65	\$7,070
Composite Samples	14	\$505	
<u>Beneficial Use Soil - Allied Signal Facility in Elizabeth, NJ</u>			\$23,800
Priority Pollutants + 40	40	\$595.00	\$7,200
Additional parameters	40	\$180.00	
<u>NYSDEC Endpoint Samples - Category B Deliverables</u>			\$10,780
Standard Analysis	22	\$490	\$2,130
QA/QC Analysis	2	\$1,065	

**Sample Analysis Subtotal** **\$70,450**

<b>AKRF Staff</b>	<b>Hours</b>	<b>Cost/Hr</b>	
Professional 1 - Sampling and H+S	480	\$105.00	\$50,400.00
Technical Director- Coordination	50	\$180.00	\$9,000.00
Senior Vice President	25	\$240.00	\$6,000.00
Field Costs- sampling equipment, particulate monitors, PID, vehicle			\$12,500

**Total sampling and analysis**

<b>Drilling Contractor</b>	<b>Unit</b>	<b>@</b>	<b>Cost/Unit</b>	
Mob/Demob	1 LS		\$750	\$750
Hollow stem auger drill rig	22 days		\$1,600	\$35,200
Drums	10 drums		\$50	\$500
Drum disposal	10 drums		\$150	\$1,500

**Drilling Subtotal** **\$37,950**

**Total Cost For Track 4 Cleanup** **\$2,778,516**

The laboratory analytical fees may change prior to the commencement of the remedial work.  
Additional samples and parameters may be required by the facility receiving the waste.

**APPENDIX J**  
**NYSDEC GENERIC LIST OF AGREEMENTS**



**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

<b>Generic Agreement Number and Description</b>	<b>Section Addressed in RWP</b>
1) Remedial Actions will be in compliance with DER-10.	DER-10 was used as guidance in preparing the West 61st Street RWP as stated in Section 1.0
2) An emergency contact sheet will be submitted to NYSDEC's Project Manager that will define the specific project contacts for use by NYSDEC and NYSDOH in the case of a day or night emergency.	Emergency contact list is included in Appendix E Health and Safety Plan (Section 5.2).
3) Pertinent data and information from the Remedial Investigation Report will be incorporated into the Remedial Work Plan.	Pertinent data from previous site investigations are included in RWP Appendix G.
4) Composite of all Sanborn maps, including a summary presentation of all historical structures of environmental significance, must be submitted.	Select Sanborn Maps and summary presentation are included in RWP Appendix L.
(5) A site map showing the defined Areas of Concern with an overlay of the site development plan will be submitted.	RWP Figure 4 shows the site development plan with the limits of the contamination shown as an overlay.
(6) A separate list of all local, regional and national governmental permits, certificates or other approvals or authorizations required to perform the remedial and development work will be submitted in the RWP and updated in the Final Remedial Report.	A list of required permits is provided in RWP Section 4.1.4
(7) A comprehensive project schedule including all proposed activities will be provided in the RWP.	A proposed remediation schedule is included in RWP Appendix I
(8) The specific details of minimum required technical elements of the Remedial Action will be included in the RWP and associated design documents and will not be shifted to the contractor for submission in contractor documents.	The RWP includes minimum technical specifications included in the bid package for the remediation contractor (Appendix F), Contract Plans for the foundation and the cellar/sub-cellar walls (Appendix O), and requirements for soil handling (Soil Management Plan [Appendix E]).
(9) The Applicant's Remediation Engineer is responsible to insure that the contractor documents for remedial work conform to the terms defined in the final approved RWP and the final Interim Remedial Measures Work Plan.	The technical specifications for the waterproofing/vapor barrier are included in the contractor bid documents, and are included in RWP-Appendix F. AKRF will monitor all on-site excavation activities.
(10) All documents and reports submitted in fulfillment of consent orders and agreements made with NYSDEC will be submitted in both hard copy and in digital format on CD.	Digital copies of all documents will be submitted upon finalization of reports.
(11) All digital and hard copy submittals will be addressed to Project Managers for both the NYSDEC and NYSDOH.	All documents will be submitted in accordance with this requirement, and will be included in RWP Appendix K.
(12) A digital site map(s) will be submitted to the Department and will show site structures, environmental monitoring apparatus and sampling points, and a recent aerial photo of the site and immediate surrounding area.	A digital site map will be submitted upon finalization of the report. An aerial photo is provided as Figure 1 in RWP Appendix K.
(13) A surveyed site map showing the metes and bounds for the subject site as described in the governing agreement with New York State will be submitted.	A site survey is included as RWP Figure 13.

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

<b>Generic Agreement Number and Description</b>	<b>Section Addressed in RWP</b>
(14) Metes and bounds description of the site will include a global positioning system coordinate for the starting point for the description.	Coordinates for southwestern property corner are: 73° 59' 22.5" W and 40° 46' 19.0" N.
(15) Project numbers will appear on the cover and face page of all reports.	The BCP number (231043) appears on the RWP cover.
(16) A glossary will be provided to provide an explanation of all acronyms used in each report.	A List of Acronyms is provided in RWP Appendix B.
(17) Photographs will be taken of all remedial action activities and submitted to NYSDEC in digital form on a CD(s).	Photographs will be taken as described in RWP Section 4.8.2 Final Remedial Report.
(18) The Remedial Investigation Report will include a conceptual site model that explains the occurrence of contaminant sources and their fate and transport at the site in the context of the local site stratigraphy and hydrogeology. The conceptual model will utilize both plan and cross-sectional views of the site.	A conceptual site model is included in RWP Appendix N. Figures 6, 9, 10, 11, 12, 12A, 12B, 12C, and 12D provide plan and cross-section views.
(19) An itemized summary of projected costs for the proposed remedial activity will be submitted as an appendix to the RWP. Actual final costs will be reported as an appendix to the Final Remediation Report.	Itemized project costs are Included in RWP Appendix I. Actual final costs will be included in the Final Remedial Report (as described in RWP Section 4.8.2)
(20) A general description of hours (i.e. 7 A.M. to 3 P. M.) and days of operation (Monday to Friday) for performance of remedial actions will be submitted. Early morning, evening, and weekend remedial work will be prohibited.	Daily work schedule will be 7 AM to 5 PM as described in RWP Section 4.10 Schedule and Costs
(21) For all BCP projects, the Track 1 alternative must be considered in the feasibility assessment of the RWP.	Alternative #1 in RWP Section 3.5 evaluates a Track 1 Cleanup.
(22) The RWP will include a complete and thorough description of the remedy.	Complete description of remedy provided in RWP Section 3.0.
(23) The RWP will specify whether additional design documents will be prepared for the project or for elements of the project.	Design for implementation of the RWP is included in the waterproofing/vapor barrier specifications and in RWP Soil Management Plan (Appendix E). No additional design documents will be submitted.
(24) A detailed map of the proposed end usage (Development Plan) of the site will be submitted.	RWP Figure 4 shows the proposed development plan.
(25) A site map will be submitted showing contour lines indicating the cut (soil removal) thicknesses that will be required into soil/fill as part of the site wide development plans.	RWP Figure 14 shows the bottom elevations of the excavation and cut thickness contour lines.
(26) Details regarding the proposed end usage of buildings and structures, particularly the lower floors and will be submitted and will be coordinated with NYSDOH.	Details of proposed end usage are described in RWP Section 2.6 and are shown on RWP Figure 4.
(27) NYSDEC will be provided the opportunity to participate in a pre-remediation/construction meeting at the site.	NYSDEC and NYSDOH will be notified of and invited to attend a pre-remediation/construction meeting to be held prior to the start of remediation.

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

<b>Generic Agreement Number and Description</b>	<b>Section Addressed in RWP</b>
(28) Site development activities are prohibited from interfering or otherwise impairing remedial activities proposed in the RWP.	Site development activities will not be allowed to interfere with site remediation as described in RWP – end of first paragraph in Section 4.0.
(29) All hotspots and structures to be remediated will be removed and end-point remedial performance sampling completed before excavations related to site-wide development commence.	Endpoint sampling will be conducted as described in RWP Section 4.2.6 and RWP Sampling Plan (Appendix D).
(30) Removal of free product and grossly contaminated soils will be performed.	NAPL was not detected in the Remedial Investigation.
(31) Underground Storage Tanks will be identified and removed from the site in accordance with STARS.	USTs will be removed during the undertaking of a NYSDEC-approved February 2006 Interim Remedial Measure Work Plan.
(32) Depths and other dimensions of initial remedial hotspot excavations will be defined.	The Areas of Concern are shown on RWP Figure 4.
(33) A table will be provided showing planned location identification number, depth, and Site-Specific Soil Action Level (SSSAL) triggers for all proposed excavations for site specific soil action level-based Areas of Concern. TCLP failure and other hazardous waste containing areas will be identified.	Locations of areas exceeding SSSALs are noted in RWP Table 3.
(34) A site map showing locations of all SSSAL-based Areas of Concern (hotspots) will be submitted with note or code identifying specific contaminant trigger(s) for each hotspot.	RWP Figure 15 shows all AOCs.
(35) A scaled map will be submitted showing all proposed remedial excavation areas for hotspots and structures to be removed.	RWP Figures 4 and 15 show the areas where soil will be removed all hot spots and AOCs are within these areas.
(36) For projects with a major IRM program, a site-wide RWP will still be required for the entire project.	The portions of the Site being addressed in the Interim Remedial Measure are within the boundaries of the Site remediation.
(37) Major IRM that constitute a substantial part of the overall remedy are subject to a formal 45-day public review.	The comment period for the February 2006 IRM Work Plan ends on April 9, 2006.
(38) Plan for decommissioning historic subterranean systems will be submitted.	Not applicable. All on-site USTs and piping encountered during the IRM and the Site remediation will be removed.
(39) The Applicant, Volunteer, Responsible Party and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all invasive work and the structural integrity of excavations and structures that may be affected by those excavations.	The Applicant, AKRF, and selected remediation subcontractor will be responsible for the safe implementation of the RWP.
(40) The Final Remediation Report will include a certification by a Professional Engineer that all invasive work done during the remediation and development was performed in accordance with the contaminant field screening methodology defined in the Soil Management Plan.	Final Remedial Report will include a P.E. certification that all work was in accordance with Soil Management Plan as described in RWP Section 4.8.2

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

Generic Agreement Number and Description	Section Addressed in RWP
(41) Resumes should be provided for all personnel responsible for field screening of invasive work during the IRM and subsequent remediations and all invasive development work for unknown contaminant sources.	Resumes are included in the Appendix A of the RWP Soil Management Plan (Appendix E).
(42) A plan will be submitted for screening of all excavations during invasive work that may penetrate residual contamination, including excavations for remediation and development.	Soil screening plan is provided in the Section 3.1 of the RWP Sampling Plan (Appendix D) and Section 4.3.5 of the RWP Soil Management Plan (Appendix E).
(43) Post-excavation sampling following hot-spot or other mandatory soil removal is required. A plan for post-excavation samples to be collected for all hotspot and other remedial excavations will be submitted.	Endpoint sampling will be conducted as described in the sampling Plan (Appendix D).
(44) A plan for monitoring down-gradient wells to assess the success of remedial measures to be taken during the IRMs and Remedial Actions will be submitted.	Future Off-site monitoring is not warranted at this Site..
(45) A monitoring plan for groundwater at the down-gradient site perimeter to evaluate site-wide post-remedial performance will be submitted.	Future off-Site monitoring is not warranted at this Site.
(46) Appropriately placed groundwater monitor wells will be installed immediately down-gradient of all volatile organic carbon remediation areas for the purpose of evaluation of the effectiveness of the remedy that is implemented.	Future off-Site monitoring is not warranted at this Site.
(47) A plan for site-wide, soil gas monitoring to be performed after the completion of remediation will be submitted and will be coordinated with NYSDOH.	Future on-site soil gas monitoring is not warranted at this Site.
(48) Sites with identified methane and other contaminated soil vapors will be required to construct utility seals at all underground entry points for utilities into onsite buildings and all utility departures from the site to prevent preferential migration of methane and other soil gasses along utility pathways.	Methane was not identified as a potential problem at this Site.
(49) All remedial plan involving the capture and release of soil vapors known or suspected to be contaminated must demonstrate that the atmospheric emissions of those contaminants is consistent with requirements defined in NYSDEC Division of Air document Air Guide One.	Soil vapors will not be captured and released at this Site.
(50) Sites containing historic fill or other organic-rich fill material will require testing of soil vapor for methane.	Not applicable - site characterization did not identify subsurface materials that would be indicative of methane generation. Methane samples collected at the Site contained less than or equal to 0.1% methane.
(51) Proposed design of the sub-slab portion of the proposed development will be provided and will be coordinated with NYSDOH.	A waterproofing/vapor barrier membrane will be used beneath the floor slabs of the three buildings to be constructed. Due to the presence of groundwater above the sub-cellular floor level, and the level of the VOC concentrations detected, vapor intrusion is not an issue.

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

<b>Generic Agreement Number and Description</b>	<b>Section Addressed in RWP</b>
(52) After the completion of soil removal and other invasive remedial activities, a land survey will be performed by a New York State licensed surveyor.	As-built drawings described in RWP Section 4.8.2 will be based upon a survey performed by an New York licensed surveyor.
(53) Demarcation layer will be placed over on-site soils at all locations outside the footprint of buildings to be included in the final development.	A demarcation layer will be installed as described in RWP Section 4.4.1 in areas where a Track 4 Cleanup is selected.
(54) A site map and plan will be submitted that shows the design detail and location for each of the proposed final surfaces contemplated for the site.	RWP Figure 4 shows the proposed final surfaces contemplated for the site.
(55) A description will be submitted of the nature of surface cover that will be in place after the remediation is complete but before development commences	Not applicable – site development will commence concurrent with and immediately following remediation.
(56) Double layers of minimum 8-mil plastic sheeting will be used at the base of all stockpiles.	Double layers of 8-mil plastic will be used as described in Section 4.2.8 of the RWP Soil Management Plan (Appendix E)).
(57) Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.	Stockpiles will be covered with tarps as described in Section 4.2.8 of the RWP Soil Management Plan (Appendix E).
(58) Soil stockpiles will be continuously encircled with silt fences. Hay bales will be used as needed near catch basins, surface waters and other discharge points.	All stockpiles will have silt fence or a hay-bale berm around the perimeter as described in RWP Section 4.2.8 of the Soil Management Plan (Appendix E).
(59) A stockpile management plan will be submitted and will address historic fill, clean fill for reuse and imported of offsite soil.	Section 4.2.8 of the RWP Soil Management Plan (Appendix E) describes the stockpile management practices.
(60) All liquids to be removed from the site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable local, state, and federal regulations. Liquids discharged into city sewer systems will be addressed through approval by NYCDEP.	Dewatering fluids will be treated on-site, using a sedimentation tank, and discharged to the City sewer under a NYCDEP permit as described in RWP Section 4.2.3.
(61) Dewatered fluids will not be recharged back to the land surface or subsurface of the site.	Dewatering fluids will be treated on-site and discharged to the City sewer under a NYCDEP permit as described in RWP Section 4.2.3. Dewatering fluids will not be discharged to the land surface or subsurface.
(62) Characterization plan for onsite reuse of grading cut soils will be submitted and will be consistent with the sampling protocol defined in DER-10 or otherwise approved by NYSDEC.	Soil characterization procedures are described in the Section 4.2.5 of the RWP Soil Management Plan (Appendix E).
(63) Onsite soils removed for grading or other purposes will not be reused within a cover soil layer, within landscaping berms, or as backfill above subsurface utility lines.	Soil cap will consist of clean imported fill as specified in RWP Section 4.4.1.
(64) Development-related grading cuts and fills for development must not interfere with, or otherwise compromise, the performance of remediation necessary at the site.	Development activities will not interfere with site remediation.

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

Generic Agreement Number and Description	Section Addressed in RWP
(65) Organic matter or other solid waste derived from on-site or from offsite is prohibited from reuse or use on-site.	Organic matter/solid waste will not be used as fill as described in Section 4.3.1 and Section 4.3.7 of the RWP Soil Management Plan (Appendix E).
(66) Historical fill is prohibited from being reused as backfill in utility trenches or landscape berms.	Soil cap will consist of clean imported fill as specified in RWP Section 4.4.1.
(67) Mechanical processing of historical fill on-site is prohibited.	Mechanical processing will not be conducted without prior approval from the NYSDEC, as described in the Soil Management Plan (Appendix E).
(68) A plan for composite sampling for reuse of site soils will be provided. The plan will describe the sampling frequency, analytes, sampling methods and stockpile management plan.	Waste/re-use characterization will be conducted during the Waste Characterization sampling as described in Section 3.2.1 of the RWP Soil Sampling Plan (Appendix D) and RWP Section 4.3.1.
(69) Plan for all material to be removed from the site will be submitted and will include excavated soil, historic fill and other solid waste and hazardous waste, showing that the material will be handled, transported and disposed in accordance with applicable Part 360 regulations and other applicable local, state, and federal regulations.	Included in the RWP Sampling Plan (Appendix D) and the RWP Soil Management Plan (Appendix E).
(70) Non-hazardous historic fill taken off-site will be handled as a Municipal Solid Waste per 6NYCRR Part 360-1.2	Sections 4.3 and 5.0 of the RWP Soil Management Plan (Appendix E). All excavated on-site material being transported to an off-site facility, will be transported to facilities located in New Jersey and/or Pennsylvania
(71) Historical fill (Municipal Solid Waste) can be received by permitted Part 360-2 or Part 360-11 facilities without modification of their permits. These materials are prohibited from Part 360-16 Registration Facilities (also known as Soil Recycling Facilities).	All excavated on-site material being transported to an off-site facility, will be transported to facilities located in New Jersey and/or Pennsylvania.
(72) Native soils that are contaminated and non-hazardous that are being removed from remediation sites are considered Construction and Demolition (C/D) materials with contamination not typical of virgin soils by the Division of Solid & Hazardous Materials (DSHM) in NYSDEC. These soils may be sent to a permitted Part 360 landfill.	All soil removed off-site will be disposed of out of state in accordance with applicable requirements of the state regulatory agency. Section 5.1 of the RWP Soil Management Plan (Appendix E) states that native soil will be transported to either a beneficial use site or a disposal facility, based on the soil analysis.
(73) The Final Remediation Report will include an accounting of the destination of all material removed from the site, including excavated contaminated soil, historic fill, solid waste, and hazardous waste, and fluids, and documentation associated with that disposal showing requisite approvals for receipt of the material.	The Final Remedial Report will included an accounting of all material removed from the site including manifests/bills of lading and certificates of disposal, as described in RWP Section 4.8.2.
(74) Bill of Lading system or equivalent will be used for offsite movement of non-hazardous wastes and contaminated soils. This information will be reported in the Final Remediation Report.	The Final Remedial Report will included an accounting of all material removed from the site including manifests/bills of lading and certificates of disposal, as described in RWP Section 4.8.2.

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

<b>Generic Agreement Number and Description</b>	<b>Section Addressed in RWP</b>
(75) Hazardous wastes derived from on-site will be stored, transported, and disposed in full compliance with applicable local, state, and federal regulations.	Waste characterization data from the RI indicates that there is one location of on-site hazardous waste (B/MW-3). This lead-contaminated soil will be removed during the Interim Remedial Measure.
(76) Soils imported to the site for use for the final cover will meet TAGM 4046 criteria.	Imported fill will be tested for compliance with TAGM 4046, as described in Section 4.3.1 of the RWP Soil Management Plan (Appendix E).
(77) The Final Remediation Report will include a certification by a Professional Engineer that all import of soils from offsite, including source approval and sampling, has been performed in a manner that is consistent with the methodology defined in the RWP or other pertinent project plans.	Included in RWP Section 4.8.2 Final Remedial Report.
(78) Soil materials that exceed TAGM 4046 will not be imported onto the site.	Imported fill will be tested for compliance with TAGM 4046, as described in the Soil Management Plan (Sections 4.2.3, 4.2.4, and 4.3.3). Soil exceeding TAGM levels will not be used as backfill.
(79) For larger projects, an evaluation should be performed for the import of cover soils via alternatives to overland truck transport (barge, rail, etc.).	Not applicable.
(80) Solid waste will not be brought onsite. Solid waste will not be used for grading fill or cover soil on-site.	Solid waste will not be used as backfill, as described in Section 4.3.7 of the RWP Soil Management Plan (Appendix E).
(81) A dust suppression plan that addresses dust management during invasive on-site work, including, at a minimum, the items listed below:	Water will be used to control dust as described in RWP Soil Management Plan (Appendix E).
(82) Dust suppression will be achieved through the use of a dedicated on-site water truck equipped with a water cannon to enable the spray of water into off-road areas including excavations and stockpiles.	Water will be used to control dust as described in RWP Soil Management Plan (Appendix E).
(83) Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils subject to dust production.	Complete clearing and grubbing of bushes and small trees will be required for one area (approximately 90' by 10') and a small structure (approximately 20' by 30'), both located on Lot 13. The rest of the Site is cleared. Water will be used to control dust as described in RWP Soil Management Plan (Appendix E).
(84) Gravel will be used on roadways to provide a clean and dust-free road surface.	Stabilized construction entrances and truck decontamination pads will be provided as specified in RWP Sections 4.2.4 and Appendix D
(85) On-site roads will be limited in total area in order to minimize the area required for water truck sprinkling.	Stabilized construction entrances and truck decontamination pads will be provided as specified in RWP Sections 4.2.4 Trucking and Disposal, and Appendix D.
(86) The Final Remediation Report will include a certification by a P.E. that all invasive work during the remediation (including IRM's) and all invasive development work was done in accord with dust and odor suppression methodology defined in the Interim Remedial Measures Work Plan or RWP.	Final Remedial Report will include P.E. certification that dust suppression and odor control was performed according to the Air Monitoring Work Plan (Appendix A).

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

<b>Generic Agreement Number and Description</b>	<b>Section Addressed in RWP</b>
(87) A truck wash will be constructed and used for all trucks and equipment departing the site	A decontamination pad and truck wash station will be installed as described in RWP Section 4.2.5.
(88) Proposed truck routes for ingress and egress to the site will be defined. Routes will consider: (a) limiting transport through residential areas; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; and (e) promoting safety in access to highways.	Truck routes are shown on Figures 1 and 2 of the RWP Soil Management Plan (Appendix E).
(89) Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.	Trucks will be prohibited from stopping in the west 61st Street neighborhood or between the Site and the Lincoln Tunnel Or Cross Bronx expressway, as stated in RWP Section 4.2.5.
(90) Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.	Stated in RWP Section 4.2.5.
(91) Queuing of trucks will be performed onsite. Offsite queuing will be prohibited.	Queuing of loaded trucks will be prohibited, as stipulated in RWP Section 4.2.5. Loaded trucks will be required to travel directly to the highway with no stops.
(92) Trucks exiting the site will be securely covered with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited.	Stated in RWP Section 4.2.5.
(93) An odor control plan will be submitted that is capable of controlling emissions of nuisance odors off-site, and on-site, where there are residents or tenants on the property.	This is addressed in RWP Remediation Health and Safety Plan (RHASP) (Appendix A) and an expanded Community air Monitoring Plan, included RHASP.
(94) Among the means to be considered for minimization of odors during remedial actions include, but are not limited to: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; (c) use of foams to cover exposed odorous soils; (d) use of chemical odorants in spray or misting systems; and, (e) use of staff to monitor odors in surrounding neighborhoods.	Addressed in Section 4.6 of the RWP Soil Management Plan (Appendix E) and the RWP RHASP (Appendix A).
(95) Where odor problems have developed during remedial work or where the release of nuisance odors cannot otherwise be avoided due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by containing excavation and handling areas through the use of tents containment structures.	The utilization of tents for the identified waste streams is not necessary.
(96) A plan for rodent control will be submitted and will be utilized prior and during site clearing and site grubbing, and during all remedial work.	Addressed in RWP Section 4.5.1.
(97) A plan will be submitted for noise control will be included in the Remedial Work Plan or Interim Remedial Measures for all remedial work and will conform, at a minimum, to NYCDEP noise control standards.	Addressed in RWP Section 4.5.2.
(98) A plan that conforms to the requirements of a Stormwater Pollution Prevention Plan will be submitted.	A Stormwater Pollution Prevention Plan (SWPPP) is not required.



**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

<b>Generic Agreement Number and Description</b>	<b>Section Addressed in RWP</b>
(99) The Applicant, Volunteer, Responsible Party and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the preparation of an appropriate Health and Safety Plan and for the appropriate performance of work according to that plan.	All work will be conducted in accordance with the RWP Remediation Health and Safety Plan (Appendix A).
(100) The Health and Safety Plan (HASP) and all agreements made related to invasive activities will be required for all work performed until the completion of the development of the site (including site grading and materials relocation).	The Remediation Health and Safety Plan (RHASP) is included as RWP Appendix A.
(101) The HASP will be submitted as a separate, standalone document independent from the project plans.	Although the RHASP is being submitted as an appendix to the RWP, it was prepared so that it can be a stand alone document.
(102) The Site Safety Coordinator will be identified. A resume will be provided.	The Site Safety Coordinator (called Field Safety Officer in the HASP), will be assigned before any remediation work commences at the site.
(103) Details of the Community Air Monitoring Program (CAMP) will be defined and will be coordinated with the NYSDOH.	The Community Air Monitoring Work Plan and Expanded Community Air Monitoring Plan is consistent with the NYSDOH Generic Community Air Monitoring Plan and the NYSDOH-approved RIHASP.
(104) Exceedences observed in the CAMP will be reported in the daily report to the NYSDEC Project Manager.	RWP Section 4.8.1.
(105) The HASP will include affirmative statements to indicate procedures to be followed.	Language in the RWP Remediation Health and Safety Plan (Appendix A) includes affirmative statements.
(106) The HASP will cover all invasive work performed for remediation and site development (including site grading and materials relocation).	This is addressed in Section 6.0 of the RWP Soil management Plan (Appendix E).
(107) Appropriate HAZWOPER training will be provided as required for remedial activities.	HAZWOPER Training will be provided for the remedial activities involving AOCs , but will not address the removal of non-petroleum-contaminated fill, construction and demolition debris, and native soil as stated in RWP RHASP (Appendix A).
(108) Institutional Controls necessary for appropriate management of residual contamination of the site will be defined in the Remedial Work Plan and finalized in the Site Management Plan in the Final Remedial Report for the site.	RWP Section 4.9.1.
(109) Engineering Controls necessary for appropriate management of residual contamination of the site will be defined in the final Remedial Work Plan for the site. Long-term management of engineering controls will be defined in the Site Management Plan in the Final Remediation Report.	RWP Sections 4.4 and 4.9.1.
(110) Fact Sheets are the property of New York State. The applicant will be requested to assist in their preparation (including the development of draft Fact Sheets) and their distribution.	RWP Section 4.6.

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

<b>Generic Agreement Number and Description</b>	<b>Section Addressed in RWP</b>
(111) All draft Fact Sheets will be provided to the Department in WordPerfect files and in the format used by Region 2, as dictated by the Project Manager.	RWP Section 4.6.
(112) A certification of mailing will be sent by the Applicant to the NYSDEC project manager following distribution of all Fact Sheets and notices, providing certification that the Fact Sheets were mailed, when they were mailed, a copy of the Fact Sheet, and a list of recipients.	RWP Section 4.6.
(113) CP Plans: check latest guidance on DER Website.	RWP Section 4.6.
(114) Daily Reports will be provided to the Project Manager for NYSDEC and NYSDOH by email during all periods of major invasive activity on remedial projects.	Daily reports will be emailed as described in RWP Section 4.8.1.
(115) Daily reports are not intended as a means to convey sensitive or time-critical information (i.e. notification of an accident, spill or emergency) or notification of changes to approved plans. These communications must be made directly with project managers.	Time-critical information will be communicated directly to the NYSDEC project manager as described in RWP Section 4.8.1 Daily Reports.
(116) Periodic reports will be required for site development that occurs prior to the issuance of State signoff for a project.	Such reports will be included in Daily Report as described in RWP Section 4.8.1.
(117) Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated to the NYSDEC's project manager. These findings will be included in daily or periodic electronic media reports.	Such identifications will be communicated in daily reports or directly to the project manager, as described in RWP Section 4.8.1.
(118) A site map will be submitted that shows a predefined grid for use to identify locations in reports provided to NYSDEC.	See RWP Section 4.8.1 Daily Reports and RWP Soil Sampling Plan (Appendix D) Figure 1.
(119) Mandatory job-site record keeping will be required. These records must be maintained onsite at all times during the project and be available for inspection by NYSDEC and NYSDOH staff.	The project log book will be maintained on-site for inspection as described in RWP Section 4.7 Record Keeping.
(120) The Final Remedial Report will include as-built drawings for all constructed elements, certifications, manifests and bills of lading; and the Site Management Plan (formerly the Operation and Maintenance Plan).	RWP Section 4.8.2. Final Remedial Report
(121) Where determined to be necessary by the Department, a Financial Assurance Plan will be required to insure the sufficiency of revenue to perform long-term operations, maintenance and monitoring tasks defined in the Site Management Plan and Environmental Easements.	Not applicable.

**NYSDEC GENERIC LIST OF AGREEMENTS**  
**61<sup>st</sup> Street, New York, New York**

Generic Agreement Number and Description	Section Addressed in RWP
(122) The Final Remediation Report will include an accounting of the destination of all material removed from the site, including excavated contaminated soil, historic fill and solid waste and fluids, and documentation associated with that disposal showing requisite approvals for receipt of the material.	RWP Section 4.8.2 Final Remedial Report.
(123) An itemized description of costs incurred during all aspects of the Remedial Action taken on the project will be provided as an appendix to the Final Remedial Report.	RWP Section 4.8.2 Final Remedial Report.
(124) Before completion of a project (before approval of a final Remedial Report and issuance of a Certificate of Completion), all project reports must be submitted in digital form (PDF).	All reports will be submitted in PDF format in accordance with this requirement.
(125) All primary contaminant sources (including but not limited to tanks and hotspots) identified during site characterization, remedial investigation, and remedial action will be surveyed by a surveyor licensed to practice in the State of New York.	As-built drawings described in RWP Section 4.8.2 Final Remedial Report will be created based on a survey performed by a NYS licensed surveyor.
(126) The Final Site Management Plan must be submitted in the Final Remedial Report and must include a Soil Management Plan and a listing of all Institutional Controls, Engineering Controls, operation, monitoring and maintenance for the site and Annual Certification that the controls are still in-place and effective.	A Site Management Plan will be submitted as described in RWP Section 4.8.2.
(127) Environmental Easements will be required for all residual contamination left onsite after the remedial action is complete at the site.	Environmental Easements will be recorded as described in RWP Section 4.9.1.
(128) The Environmental Easements must include the Site Management Plan including a listing of all Institutional Controls, Engineering Controls, and Operation, Monitoring and Maintenance, and Annual Certification for the site.	The Environmental Easements will include a copy of the Site Management Plan as described in RWP Section 4.9.1.

**APPENDIX K**  
**ELECTRONIC COPY OF WORK PLAN AND APPENDICES**

**APPENDIX L**  
**SANBORN MAPS AND SUMMARY PRESENTATION**

## **SUMMARY OF HISTORICAL STRUCTURES AND SANBORN MAPS**

A Phase I Environmental Site Assessment (ESA) was performed by AKRF on the project Site in June 2003. The ESA report included the findings of a site inspection, the evaluation of available historical information, and the interpretation of relevant federal and state environmental databases. The pertinent findings of the June 2003 report are summarized below.

### **Lot Uses:**

**Lot 5** was occupied by a building constructed prior to 1926 and had a partial basement used to house a fuel storage tank and a furnace. The most recent use of this structure was as a garage for the repair and maintenance of taxis. The most recent inspection prior to the remedial investigation identified three 275-gallon tanks on the first floor used to store engine oil, transmission fluid, and used engine oil. A 1,080-gallon vaulted above ground storage (AST) was observed in the basement. The building was demolished during the remedial investigation field activities.

**Lot 8** was occupied by two four-story brick residential buildings with basements. In 1926, the building was identified as containing one 550-gallon underground storage tank. In 1940, NYC Building Department's records indicated the installation of a gasoline tank, but site interviews did not confirm the presence of the underground storage tank. In 1961, a City permit for a fuel oil burner was issued and the presence of a 1,050-gallon tank was verified by a previous site inspection. The building also contained one 55-gallon drum and eight empty 55-gallon drums. This building was demolished prior to the remedial investigation.

**Lot 10** was occupied by a vacant one-story building constructed between 1926 and 1951. Historically, this parcel was initially occupied by a four-story residential building, followed by an auto repair shop, followed by a one-story packing case manufacturer, and then by unknown occupants. During the site visit, one 275-gallon waste oil aboveground storage tank was observed. The building contained piles of debris consisting of auto parts, garbage, and construction debris. Building Department records indicated that a permit application was filed in 1950 to install a gasoline tank. It is unknown whether this gasoline tank was installed and whether it was present at the time of the inspection. This building was demolished before the remedial investigation.

**Lot 11** contained a two-story brick building constructed between 1926 and 1951 and was occupied by N&P Auto Repair on the first floor with an employee break room on the second floor. Historically, this parcel was occupied by a four-story residential building, then residences and manufacturing, then a two-story auto repair shop, and finally by unknown occupants. During the site visit, the first floor garage contained small containers of spray paint, cases of motor oil, two hydraulic lifts with external hydraulic oil canisters, a small solvent degreasing station, and a radiator fluid wash bath. The floor was observed to be stained with automobile fluids and the shop was observed to generally practice poor housekeeping. The building reportedly had a crawl space but it was inaccessible at the time of the inspection. The building was demolished during the remedial investigation field activities.

**Lot 12** was occupied by a two-story brick building at the time of the inspection that contained an electrical contractor's office constructed between 1926 and 1951. Historically, this parcel was occupied by a four-story factory building with residences on the fourth floor, followed by a one-story iron works factory, and finally by unknown occupants. There was no evidence of current or historical on-site storage tanks. The building was demolished during the remedial investigation field activities.

**Lot 13** was occupied by a gravel parking lot used for taxi cab parking and a small elevated office in the rear of the lot. Historically, this parcel was occupied by a total of four separate four-story, store-fronted residential buildings. The lot was then used for two separate periods as a two-story auto repair shop and became a vacant lot in 2001. The 1926 historical (Sanborn) map indicated that a 1,000-gallon

gasoline underground storage tank was located on the Site. This parcel was listed for three 550-gallon diesel underground storage tanks installed in 1969 on the regulatory database. Their registration expired in 1993. Records maintained by the Fire Department revealed that a permit for three 550-gallon tanks filed in 1984 expired in 1989. These are likely the same tanks listed in the regulatory database. It is unknown whether or not these tanks had been removed or remained on the parcel at the time of the site inspection. During the site visit, no evidence of on-site tanks, such as fill caps or vent pipes, was observed. The Phase I ESA noted the presence of a manufacturer directly uphill and adjacent to this lot. Discharges from this adjacent off-site property, the former Emsig Manufacturing, may have affected on-site conditions. The building was demolished during the remedial investigation field activities.

**Lot 43** is presently occupied by a gravel and paved lot used for commercial parking. Historically, this parcel was occupied by nine, five-story, store-fronted residential buildings until 1926. The lot was then used for parking and as a gasoline station with a small one-story office. It was then a vacant lot from 1976 to 1986, at which time it became a commercial parking lot. NYC Buildings Department records indicated that an unspecified number of gasoline tank installation permits were applied for in 1947. These permits are most likely associated with the former on-site gasoline station noted on the 1951 Sanborn map. The Phase I ESA stated that these tanks apparently remained in place. The one-story office has not been demolished.

**Lot 52** contained a one-story concrete block and brick building used by 3G Studio Corporation for sound stage and set building activities. This building was constructed sometime between 1907 and 1926. There was no evidence to indicate the current presence of petroleum or chemical storage tanks on-site. Historically, this parcel was occupied by a one-to two-story building with a storefront, then a one-story auto repair shop, followed by a metal works factory (c. 1951), and then a one-story building with unknown occupants just prior to its most recent use by 3-G Studios. Storage tanks may have been in use on-site in the past, but there were no records to indicate any such tanks. The building was demolished during the remedial investigation field activities.

**Lot 53** contained a one-story brick building with a basement. It was attached to the building on Lot 52 and was also most recently used by 3G Studio Corporation for sound stage and set building activities. This building was constructed between 1926 and 1951, and was occupied by two five-story residential buildings, followed by a one-to two-story garage, and finally the one-to two-story sound stage. NYC Buildings Department records indicated that a gasoline tank installation permit was applied for in 1950. Site interviews indicated that there were no active gasoline tanks on-site. The Phase I ESA was unable to ascertain whether this tank was installed, and if so, whether it was subsequently removed. The building was demolished during remedial investigation field activities.

**Lot 55** was most recently occupied by a gravel and paved lot containing parked trucks and cars. This parking area was used by the east-adjacent 3G Studio Corporation. There was no evidence to suggest the presence of chemical or petroleum storage tanks. Historically, this parcel was occupied by a five-story residential building and then used as a parking lot. The former residential building may have utilized a fuel oil storage tank; however, no records indicated such usage.

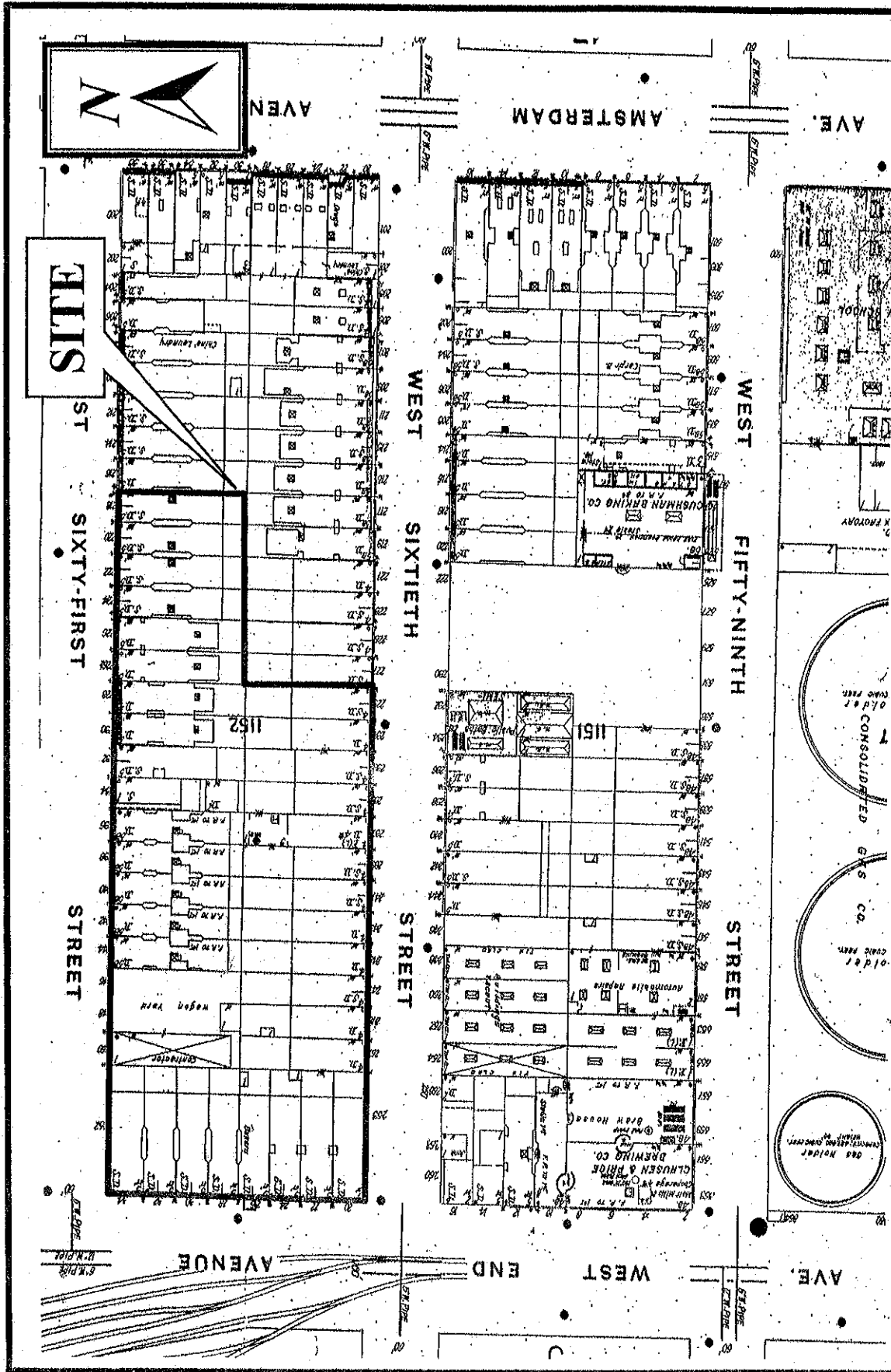
The following table summarizes the tanks identified in the Phase I Environmental Site Assessment.

### On-Site Underground (UST) and Aboveground Storage Tanks (AST) Identified in Phase I ESA

Lot	Source	Date	Capacity (gallons)	Contents	UST/AST
5	Sanborn Maps	1926	550	GT	UST
	Site Visit, Fire/Bldg Dept	1940	1,080	FO	AST
	Site Visit	*	275	Motor Oil	AST
		*	275	Waste Oil	AST
*		275	Transmission Oil	AST	
8	Sanborn Maps	1926	550	GT	UST
	Bldg Dept	1940	*	GT Permit	*
	Site Visit, Bldg Dept	1961	1,050	Fuel Oil	AST (Vaulted)
10	Site Visit	*	275	Waste Oil	AST
	Bldg Dept	1950	*	GT Permit	*
11	No Evidence of Tanks				
12	No Evidence of Tanks				
13	Sanborn Maps	1926	1,000	GT	UST
	Fire Dept, Regulatory Database	1969	3 (550)	Diesel	U ST
Part 43	Sanborn Maps	1951	*	Gasoline Station	*
	Bldg Dept	1947	*	GT Permit	*
52	No Evidence of Tanks				
53	Bldg Dept	1950	*	GT Permit	*
55	No Evidence of Tanks				
Notes: AST = Aboveground Storage Tank UST = Underground Storage Tank * = Unknown FO = Fuel Oil GT = Gasoline Tank Non-Shaded Lots are part of the proposed project Site.					

Sanborn Maps for the years 1907, 1926, 1951, 1976, 1986, and 2001 are included in this Appendix.





DATE  
June 2003

DRAWING No.

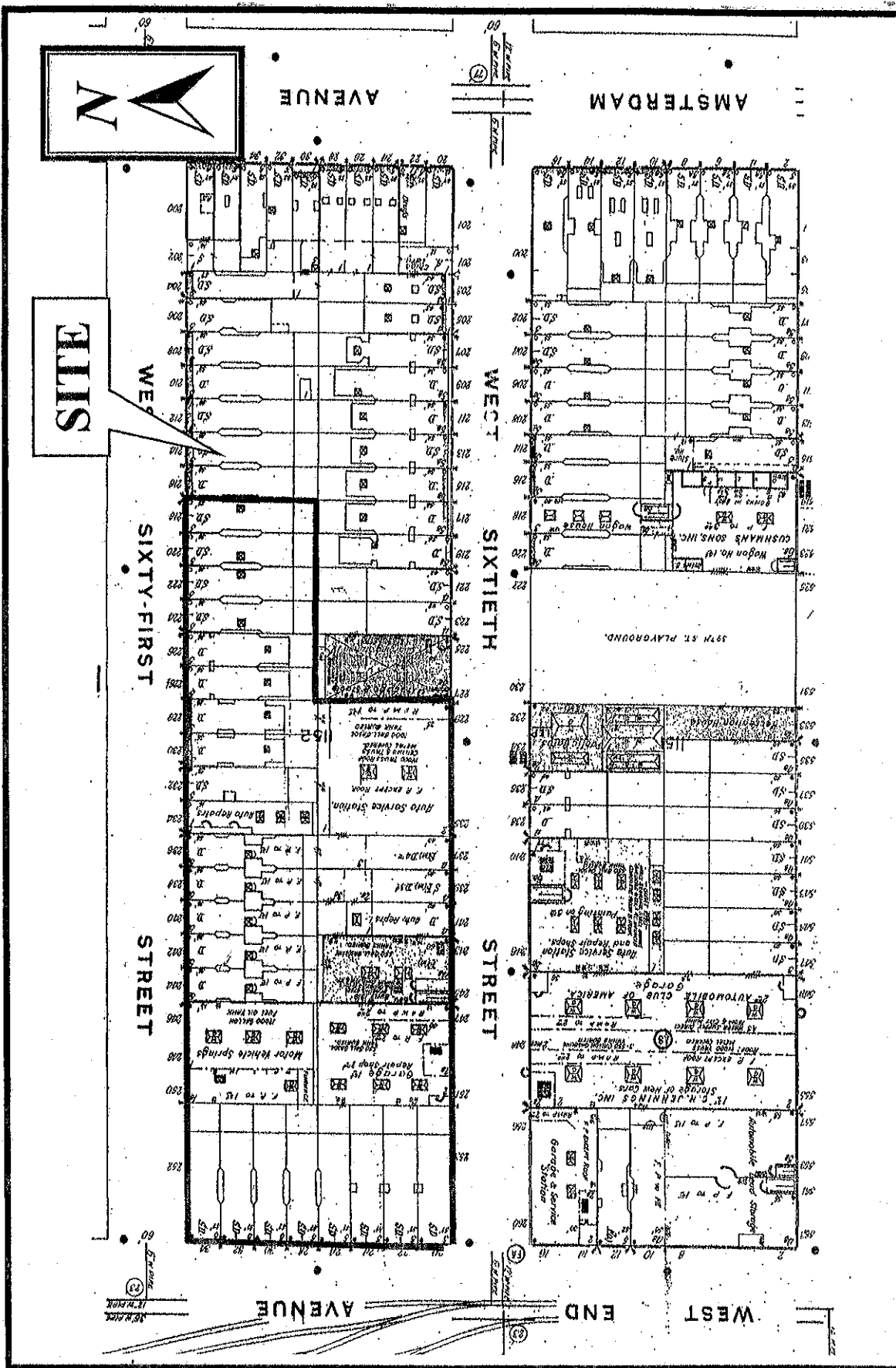
PROJECT No.  
10321

FIGURE No.

**AKRF, Inc.**  
Environmental Consultants  
116 East 27th Street, New York, New York 10016

Algin Properties, West 61st Street Project  
New York, New York

**1907 SANBORN MAP**



DATE  
June 2003

DRAWING NO.

PROJECT No.  
10521

FIGURE No.

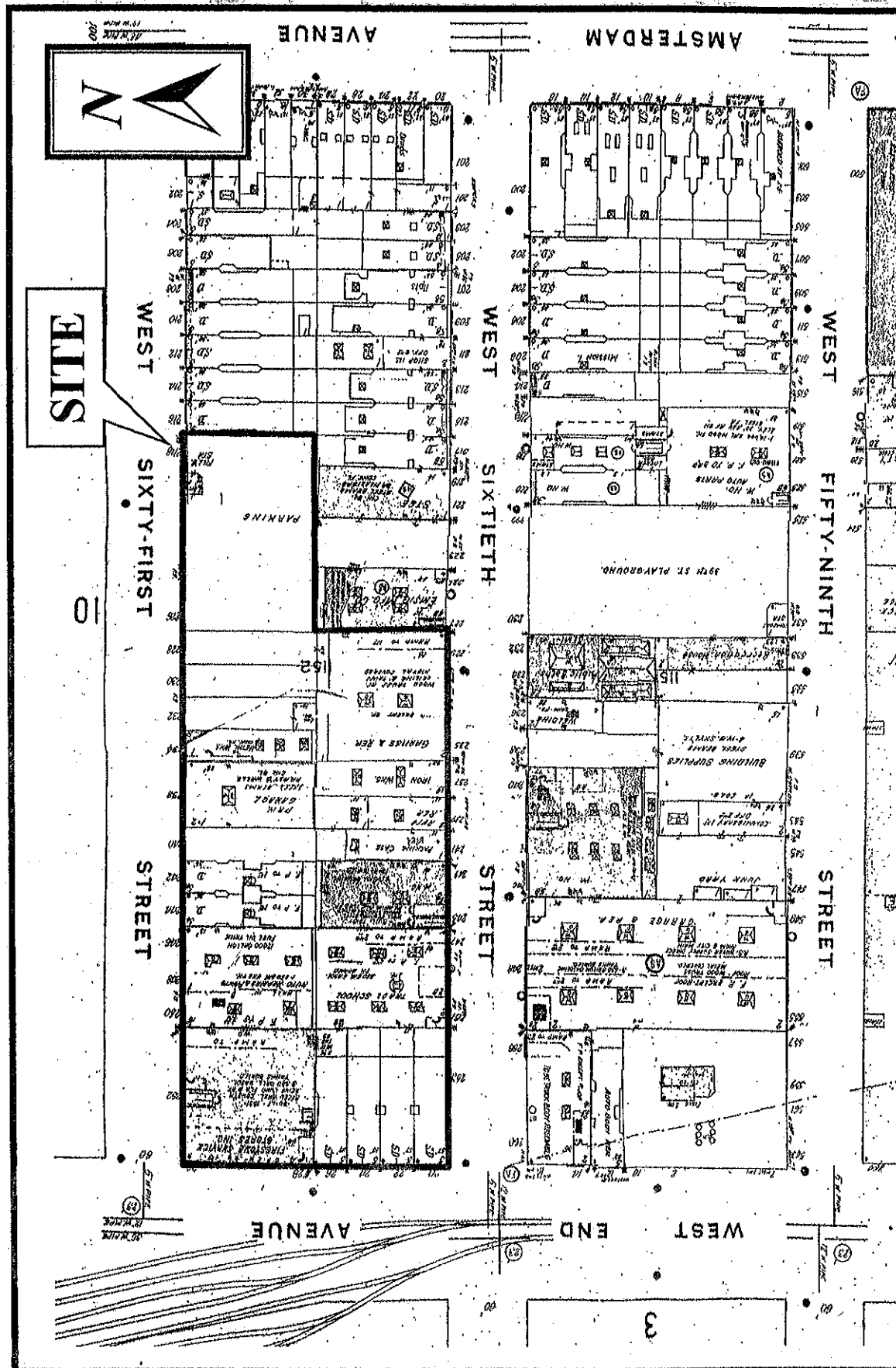
**AKRF, Inc.**

Environmental Consultants

116 East 27th Street, New York, New York 10016

Algin Properties, West 61st Street Project  
New York, New York

1926 SANBORN MAP

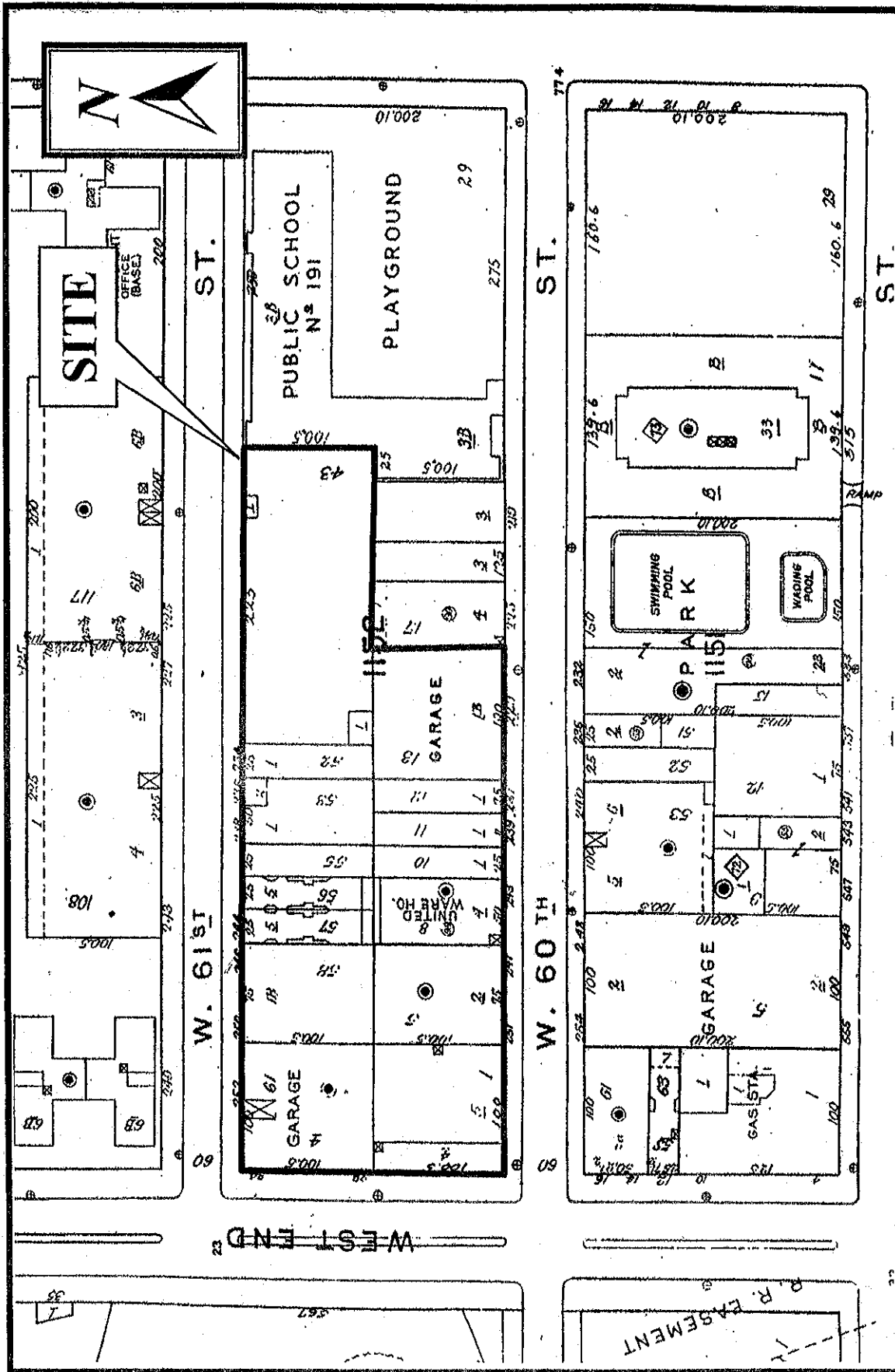


DATE June 2003
DRAWING No.
PROJECT No. 10521
FIGURE No.

**AKRF, Inc.**  
Environmental Consultants  
116 East 27th Street, New York, New York 10016

Algin Properties, West 61st Street Project  
New York, New York

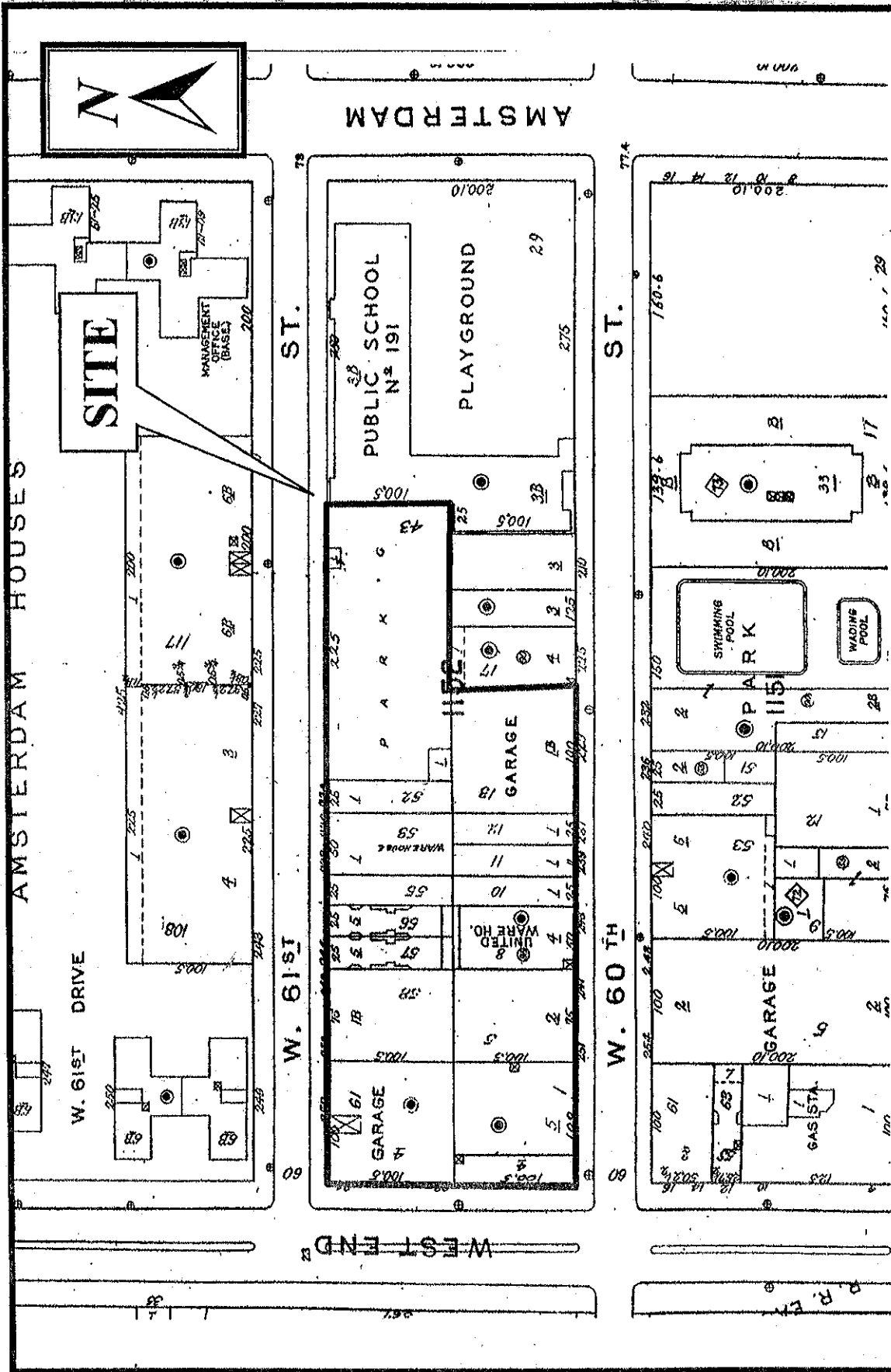
1951 SANBORN MAP



DATE June 2003
DRAWING NO. 10321
PROJECT NO. 10321
FIGURE NO.

**AKRF, Inc.**  
Environmental Consultants  
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Algin Properties, West 61st Street Project  
New York, New York

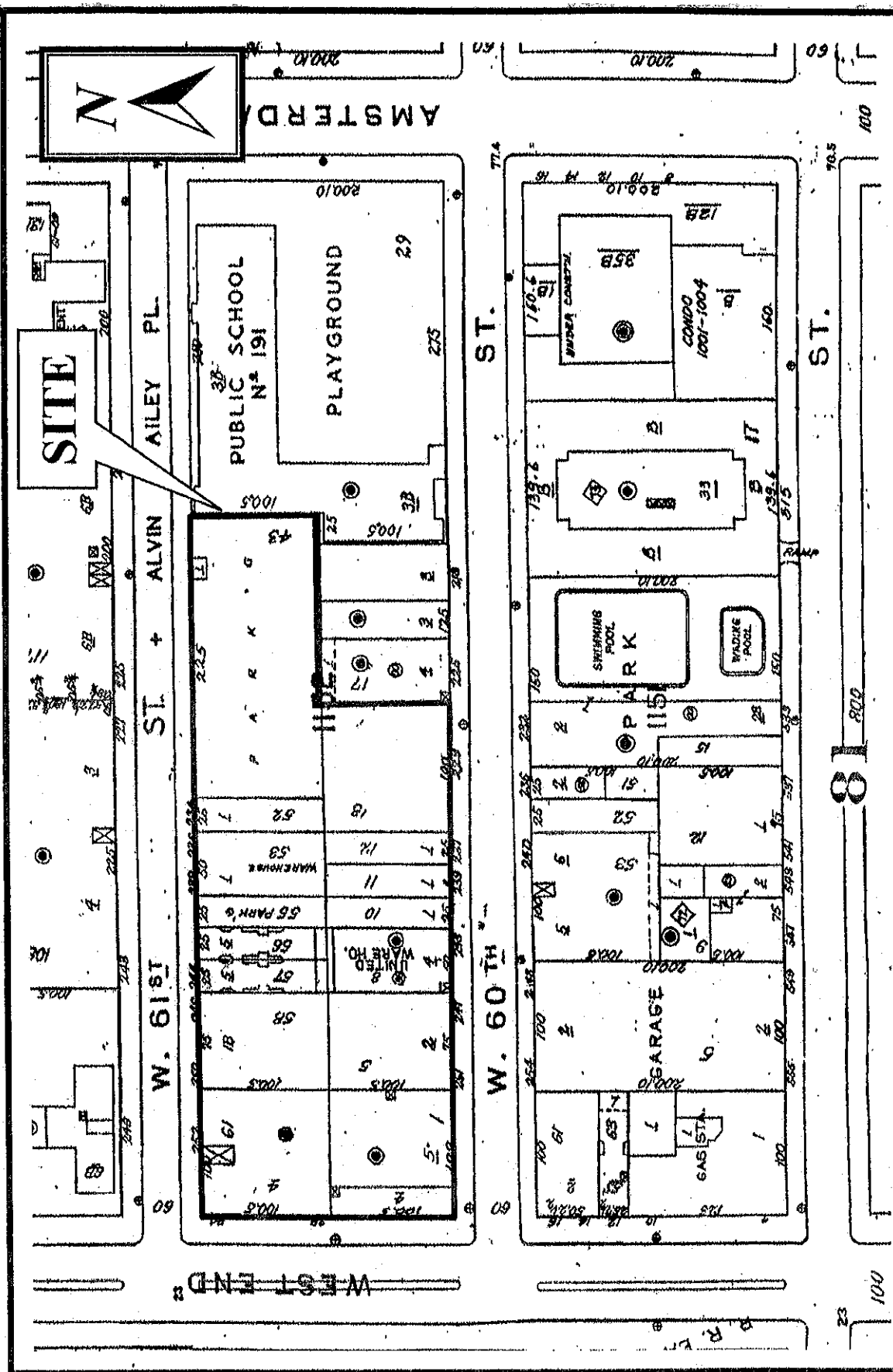


DATE June 2003
DRAWING NO. 10321
PROJECT NO. 10321
FIGURE NO.

**AKRF, Inc.**  
Environmental Consultants  
116 East 27th Street, New York, New York 10016

Algin Properties, West 61st Street Project  
New York, New York

1986 SANBORN MAP



DATE June 2003
DRAWING NO.
PROJECT NO. 10521
FIGURE NO.

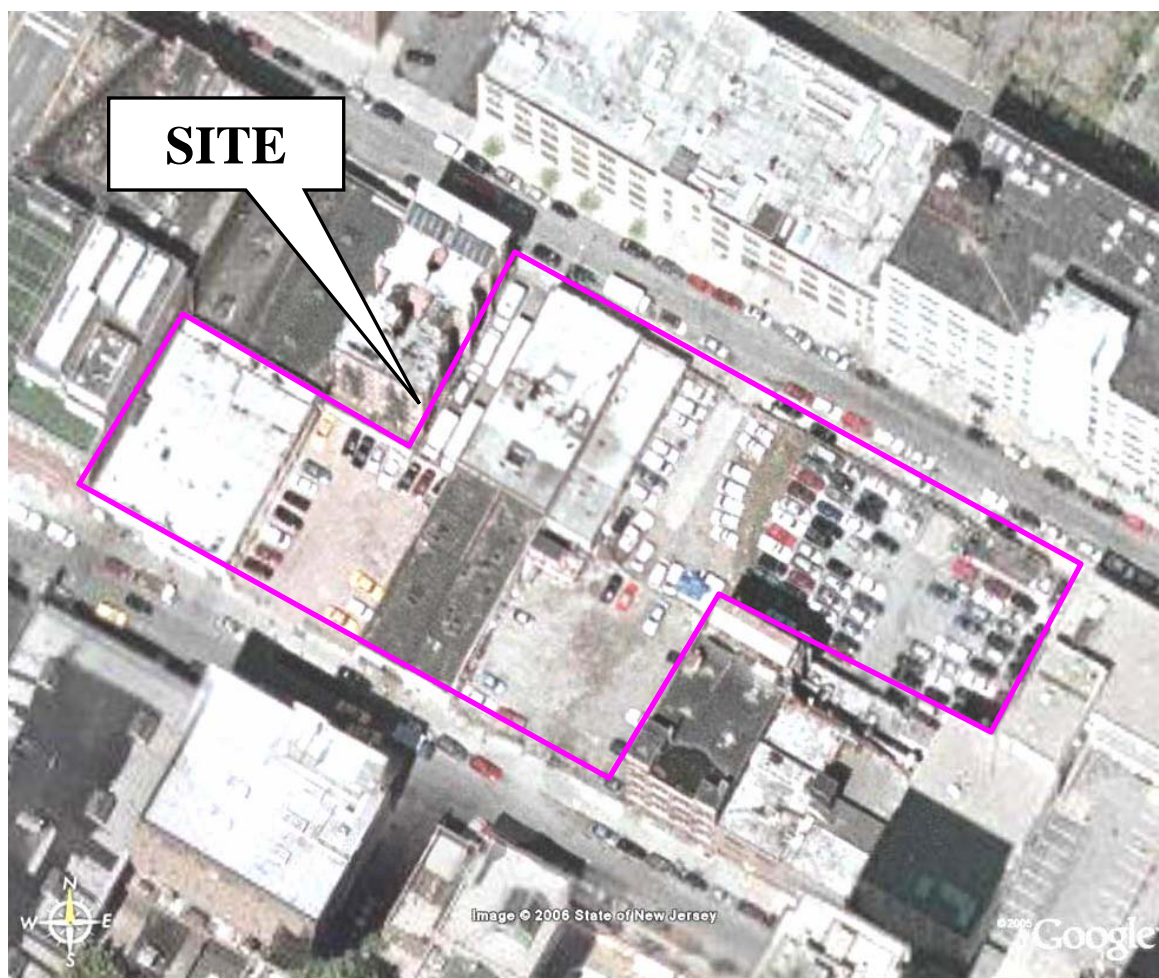
**AKRF, Inc.**  
Environmental Consultants  
116 East 27th Street, New York, New York 10016

Algin Properties, West 61st Street Project  
New York, New York

**2001 SANBORN MAP**

**APPENDIX M**  
**AERIAL PHOTOGRAPH**





**West 61st Street Site**  
New York, New York

**AERIAL PHOTOGRAPH OF SITE**

**AKRF, Inc.**

**Environmental Consultants**

*440 Park Avenue South, New York, New York 10016*

DATE  
**March 16, 2006**

SCALE  
**N/A**

PROJECT No.  
**10321**

FIGURE No.  
**M-1**



**APPENDIX N**  
**CONCEPTUAL SITE MODEL**

## **Conceptual Site Model**

The Site is located between West 60<sup>th</sup> and 61<sup>st</sup> Streets on the side of a hill that slopes downward to the west towards the Hudson River. The Site consists of two distinct areas: the Eastern Area or portion of the Site being used as a parking lot, located on West 60<sup>th</sup> Street in the northeastern corner of the Site; and the Main Area, located between West 60<sup>th</sup> and West 61<sup>st</sup> Streets. These have been separated for discussion based on bedrock topography, subsurface soils, present usage, intended use, and cleanup track.

### **Eastern Area (Parking Lot Portion of Lot 43):**

The eastern or upper portion of the Site is an elevated piece of property, presently being used as a parking lot. This 100 by 150-foot area slopes gently from east to west (Figure 6 of the Remedial Work Plan [RWP]). At present, the majority of this area is covered with blacktop. Historically, this area was used as a gasoline station. The geophysical survey revealed the presence of one or more underground storage tanks in the northeastern corner of the area and the potential presence of one or more underground storage tanks in the southwestern corner of the area, in proximity to the retaining wall.

The bedrock is located approximately 7 feet below the surface on the eastern boundary and slopes towards the west, increasing in depth to approximately 15 to 20 feet below the surface at the retaining wall along the western border of the area (Figure 9 of the RWP). The data gathered from borings and groundwater monitoring wells indicates that fill material appears to have been placed directly on the bedrock. No groundwater was observed in the overburden fill material. Groundwater flows into the Site in the bedrock aquifer, approximately ten feet below the surface along the eastern boundary (Figure 11 of the RWP). No volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, or polychlorinated biphenyls (PCBs) in concentrations exceeding groundwater quality standards were found in the groundwater entering the Site. One metal, sodium, exceeded groundwater standards in one of the wells. Due to the elevation of this area above West 61<sup>st</sup> Street and the presence of a basement in the school adjacent to the area, the only source of water entering this area is rainfall entering the fill through cracks and openings in the blacktop surface. This water then percolates downward to the bedrock and flows along the bedrock surface, westward, to the lower, or Main Area, of the Site.

The overburden material contains sand, silt, brick, concrete, ash, slag, wood, glass, and asphalt. Chemical analysis (Appendix G of the RWP) revealed the presence of various metals in concentrations above Eastern US Background Ranges and SVOCs in the form of carcinogenic polycyclic aromatic hydrocarbons (cPAHs) above the NYSDEC Technical and Administrative Guidance (TAGM) 4046 Recommended Soil Cleanup Objectives (RSCOs) in the subsurface soils. Soil vapor analytical results revealed the presence of a number of VOCs. Since many of the VOCs found in the soil vapor were not found in the on-site soil or groundwater, these vapors likely originated off-site. Any movement of the metals and SVOCs in this area would be minimal, only occurring after the limited amount of rainwater percolated through the fill material. This leachate would flow westward along the bedrock interface towards the Main Area, thus mixing with both the groundwater flowing out of the bedrock and groundwater in the overburden aquifer in the vicinity of monitoring well MW-2.

### **Main Area:**

The Main Area of the Site slopes sharply towards the west. It is primarily uncovered due to the recent demolition of the buildings and subsequent site grading. Two areas are covered with concrete slabs of former buildings on Lots 5 and 53. The Main Area of the Site had many past uses, which involved numerous storage tanks, shown on Figure 3 of the Remedial Work Plan (RWP). Uses included an apartment house with fuel tanks, auto repair, metal works, iron works, and chemical storage. Tanks were identified and/or suspected on Lots 5, 8, 10, 13, and 53. Three tanks were removed from Lots 5 and 12.

One tank location containing one or more underground storage tanks was identified during the geophysical survey.

The bedrock in the northern portion of this area, along West 61<sup>st</sup> Street, slopes sharply from elevation 40 to elevation 5 in approximately 100 feet. There appears to be a bedrock “trough” heading towards the northwest beneath Lots 52 and 53 (Figure 9 of the RWP). The slope along the southern portion is more gradual, going from elevation 35 to elevation 5 in approximately 250 feet (Figure 9 of the RWP). The groundwater in the overburden aquifer flows towards the southwestern corner of the Site (Figure 10 of the RWP), apparently due to some type of drawdown, such as a basement sump-pump, or construction dewatering, or the sewer system acting as an under drain collection system. The groundwater flow is from east to west along the southern portion of the Site, near West 60<sup>th</sup> Street. The groundwater flows west to southwest towards MW-7 along the northern portion of the Site by West 61<sup>st</sup> Street, as shown on Figure 10 of the RWP. The groundwater changes in elevation from 29.4 in the northeastern corner of the Main Area (MW-2) to 15.2 in the southwestern corner (MW-7).

The overburden consists of historic fill material on top of native soil, both varying in thickness (Figures 12, 12A, 12B, 2C, and 12D of the RWP). The fill material, based on observations of the borings, consists of sand, silt, brick, concrete, ash, slag, wood, glass, and asphalt. It varies in thickness from 7 to 16 feet. The bricks, broken concrete, and masonry in the upper areas of the fill originated from the buildings demolished on the Site prior to and during the remedial investigation field activities. The native soil consists of sand and silt with some gravel. It varies in thickness from 4 to 26 feet. The native soil slopes from east to west across the Site (Figure 7 of the RWP).

One or more tanks were confirmed on Lot 53 through the geophysical survey and observations after the building was demolished and the wood floor removed. A liquid, which protruded through the concrete floor slab, was collected from the center fill port and analyzed and was found to contain VOCs and acid-extractable SVOCs. A second tank is believed to exist on Lot 8. Test pits were excavated, but the tank was not uncovered. Eight anomalies were detected during the geophysical survey in this area, but were not identified as tanks when using ground penetrating radar.

Subsurface analytical results indicate the presence of VOCs in one or two areas in concentrations above TAGM 4046 RSCOs, several SVOCs in concentrations above RSCOs, and several metals in concentrations above the Eastern US Background Ranges. Based on observations from geotechnical borings, soil borings, and groundwater monitoring well installation and sampling, there appears to be on-site petroleum contamination in an area in the southern section of the Site along West 60<sup>th</sup> Street. Soil vapor testing indicated the presence of several VOCs in each of the well locations; however, many of the VOCs identified in the soil vapor were not detected in the soil or groundwater, indicating that there may be an off-site source of this contamination. A tentatively identified compound (TIC) was detected at a large concentration of 14,000 ppbv at one location (SG-3D) indicating an on-site source in the soil or groundwater near the vapor probe in the area of the suspected petroleum contamination. An acetone concentration of 270 micrograms per kilogram ( $\mu\text{g/kg}$ ) was reported in the deep soil sample at MW-4.

The main off-site transport for the contaminants in the subsurface is through the overburden groundwater aquifer. The groundwater level appears to be at the waste material/native soil interface. Sources of water coming into the Main Area of the Site include: the bedrock aquifer from the upper (Eastern Area) of the Site; the bedrock aquifer on the adjacent property (Lot 17) on West 60<sup>th</sup> Street; the area north of the Site on West 61<sup>st</sup> Street; the area south of the Site on West 60<sup>th</sup> Street; and percolation of rainwater through the Site itself. Based on the groundwater analysis from monitoring wells MW-7 and MW-7D, there appears to be minimal off-site movement of the contaminants. Benzene (detected at a concentration of 2 micrograms per liter [ $\mu\text{g/L}$ ] versus the groundwater standard of 1  $\mu\text{g/L}$ ), 4-4'-DDD (detected at a concentration of 0.037 $\mu\text{g/L}$  versus a groundwater standard of non-detect), six metals in filtered samples (aluminum, iron, manganese, magnesium, nickel, and selenium) and five additional metals in unfiltered samples (cadmium, chromium, lead, mercury, and sodium) exceeded groundwater quality standards. The

Site is located approximately 500 feet west of the Hudson River. The groundwater is not potable in this area and it is relatively close to the anticipated brackish groundwater found in areas located next to bodies of salt water. There does not appear to be any direct exposure from the groundwater. The VOC concentration in the groundwater leaving the Site will not pose a soil vapor issue. The Site is fenced-in, preventing access from children at the neighboring schools. There is no evidence of a blowing dust at the Site. Therefore, there is no dermal contact from the on-site exposed surfaces. The perimeter wells on the north, west, and east indicate the presence of VOCs, but they are not in concentrations sufficient to pose an off-site threat for inhalation. Analytical data from the well along the southern Site boundary along West 60<sup>th</sup> Street (soil gas sample SG-3D) indicates the presence of an unknown volatile organic compound, likely from the petroleum contamination at a depth of 12 feet below the surface and approximately three to four feet above the groundwater level. There is no indication that the vapor is leaving the Site from testing data gathered for this study. The first floor of the building across the street is presently empty; there are no potential receptors in that building

In summation, the only active pathway for off-site transport of contaminants is via the groundwater in the southwestern corner of the Site. The contaminants leaving the Site via the groundwater are in low concentrations and are not adversely affecting public health or the environment. This area will be remedied through the excavation of known and discovered sources of contamination as part of the Site development. All surfaces of the Main Area will be covered by buildings, pavement, and/or two feet of clean imported soil.

**APPENDIX O**  
**FOUNDATION CONSTRUCTION DRAWINGS**

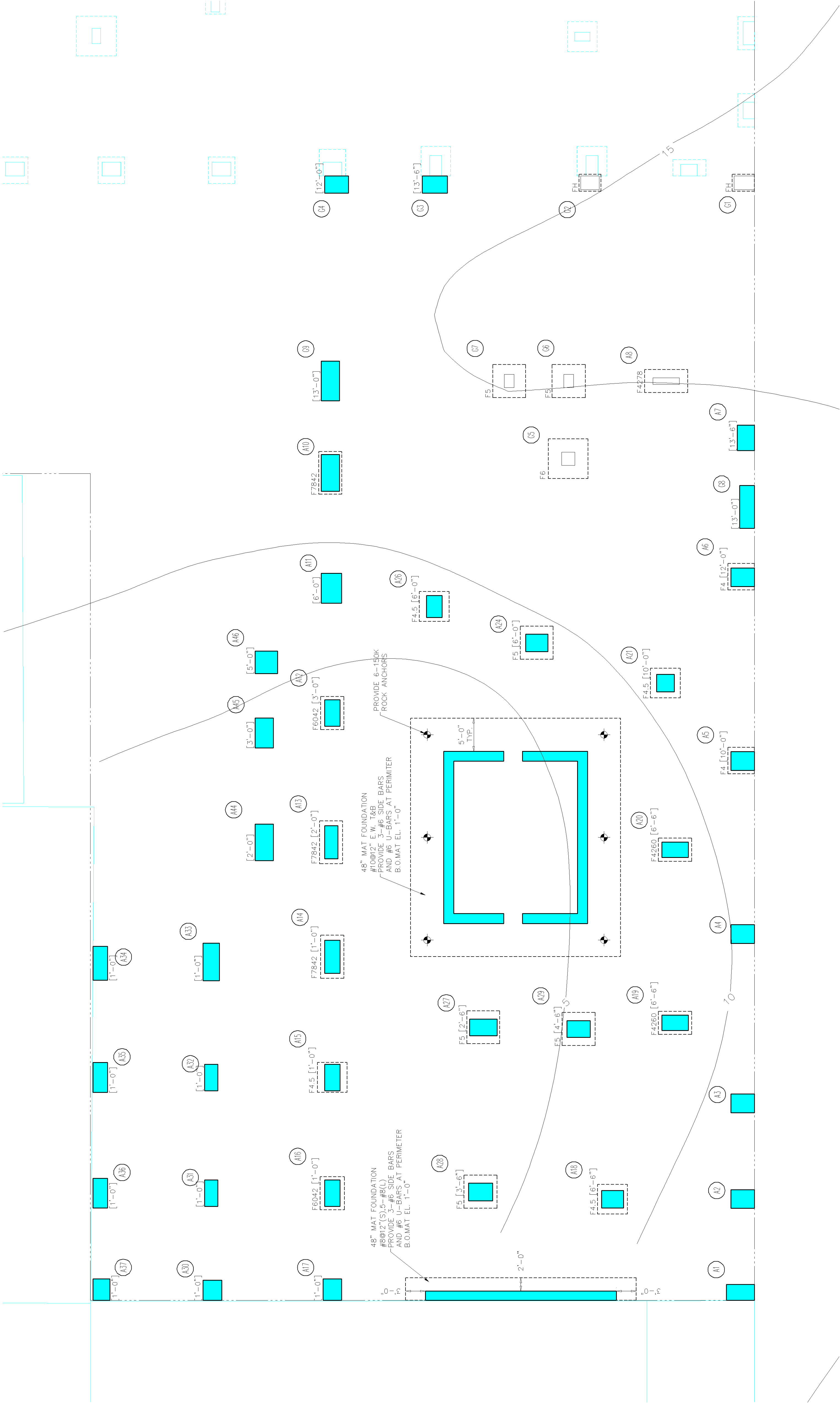






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FOUNDATION BID
no. issued revisions
drawing title:

FOUNDATION PLAN



DRAWING NOTES:

1. FOR GENERAL NOTES SEE DRAWING S-001.
2. FOR FOUNDATION SCHEDULE AND DETAILS SEE DRAWING S-111.
3. TOP OF FOOTING ELEVATION +14'-4" UNLESS BOTTOM OF FOOTING/PIER NOTED AS [X'-X"].
4. FOUNDATION BOTTOM MAY NEED TO BE LOWERED DUE TO UNCOVERED ROCK CONDITIONS. SEE GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION. FOUNDATION GROUPS SHOWN AS GUIDE. ACTUAL FIELD CONDITIONS MAY VARY.
5. REFER TO S-102 FOR CELLAR SLAB INFORMATION.
6. FOR COLUMN SCHEDULE SEE DRAWING S-201.
7. FOR SHEAR WALL SCHEDULE SEE DRAWING S-202.
8. DENOTES COLUMN ABOVE
9. DENOTES COLUMN PIER - SEE DRAWING S-111 FOR TYP. PIER DETAILS.

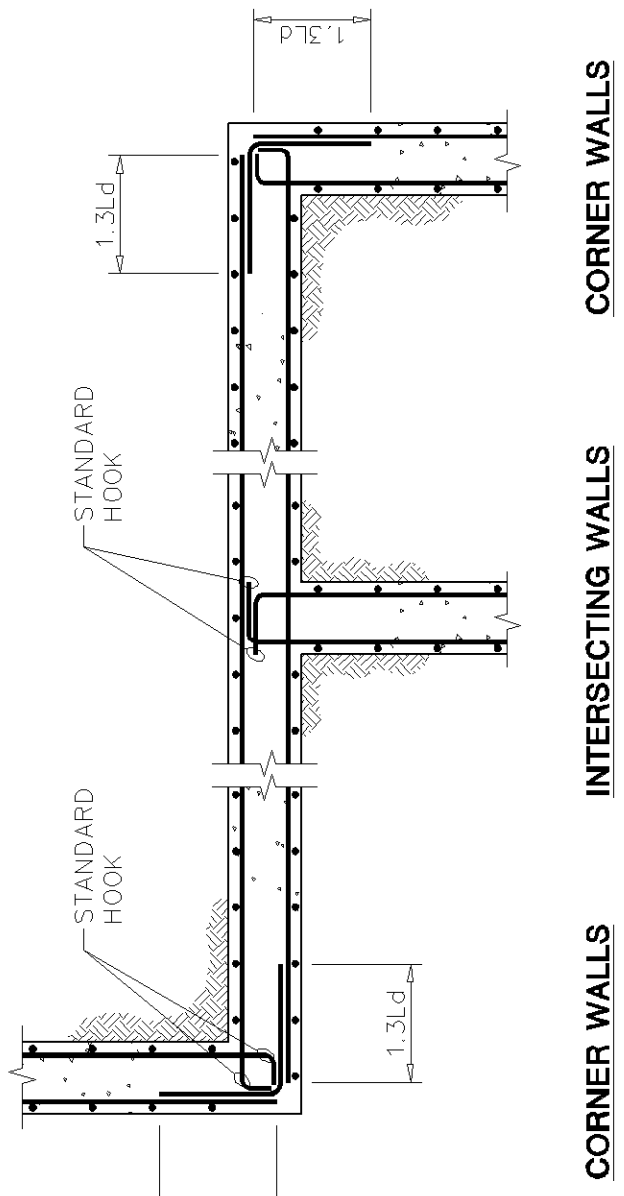




FOOTING SCHEDULE				
MARK	SIZE	DEPTH	BOTTOM REINFORCING EACH WAY (O.N.)	REMARKS
F4	4'-0" x 4'-0"	24"	#7 @ 12"	
F4.5	4'-6" x 4'-6"	24"	#8 @ 12"	
F5	5'-0" x 5'-0"	30"	#7 @ 8"	
F6	6'-0" x 6'-0"	36"	#10 @ 12"	
F4260	3'-6" x 5'-0"	24"	#7 @ 12"	
F4278	3'-6" x 6'-0"	24"	#9 @ 12"	
FH				SEE 4/5-111

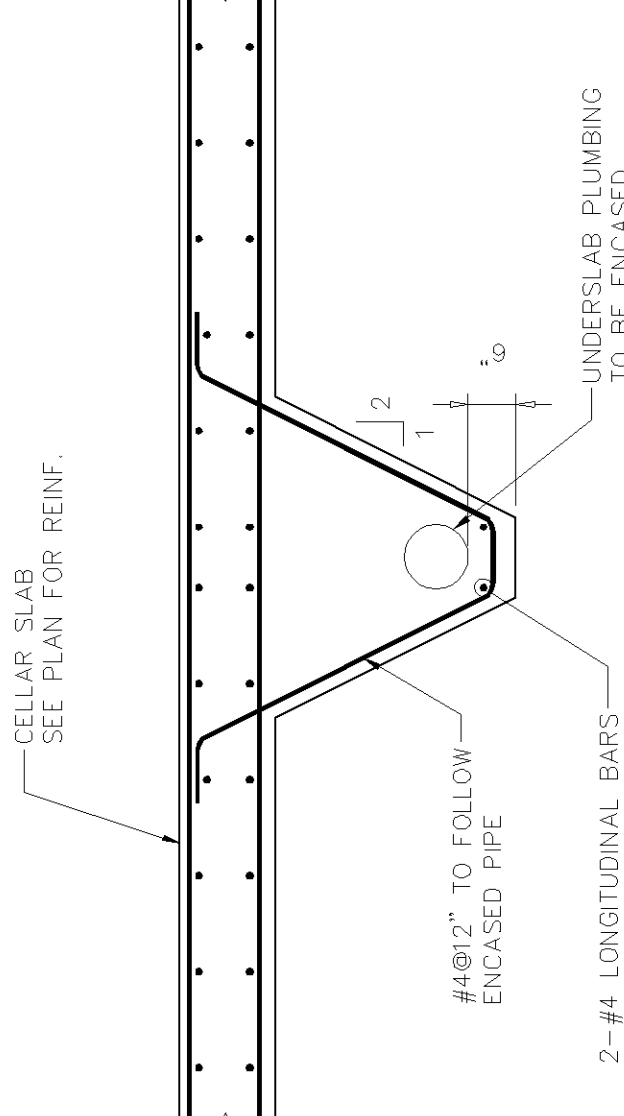
1 FOOTING SCHEDULE

SCALE: N.T.S.



6 FOUNDATION WALL CORNER DETAILS

SCALE: N.T.S.

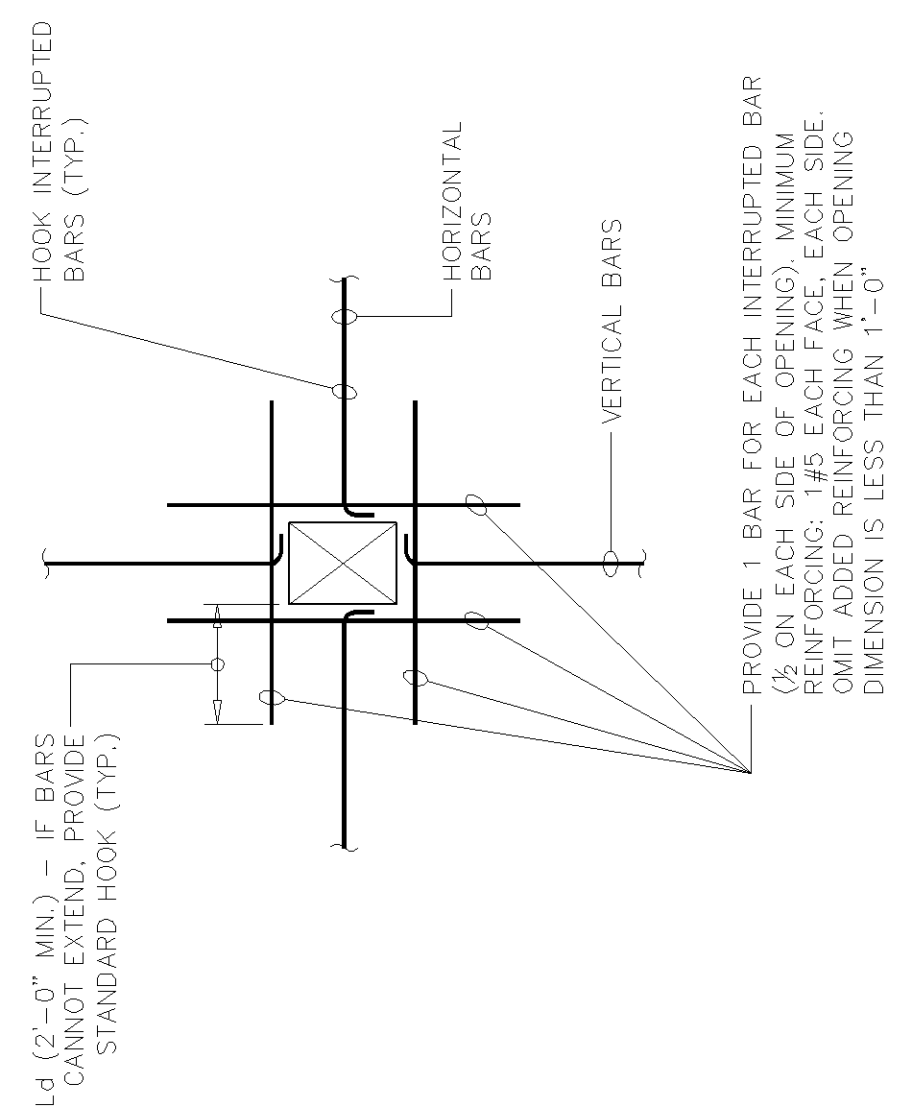


12 TYPICAL UNDERSLAB PLG ENCASEMENT

SCALE: 1/2"=1'-0"

2 TYPICAL INTERIOR FOOTING DETAIL

SCALE: N.T.S.

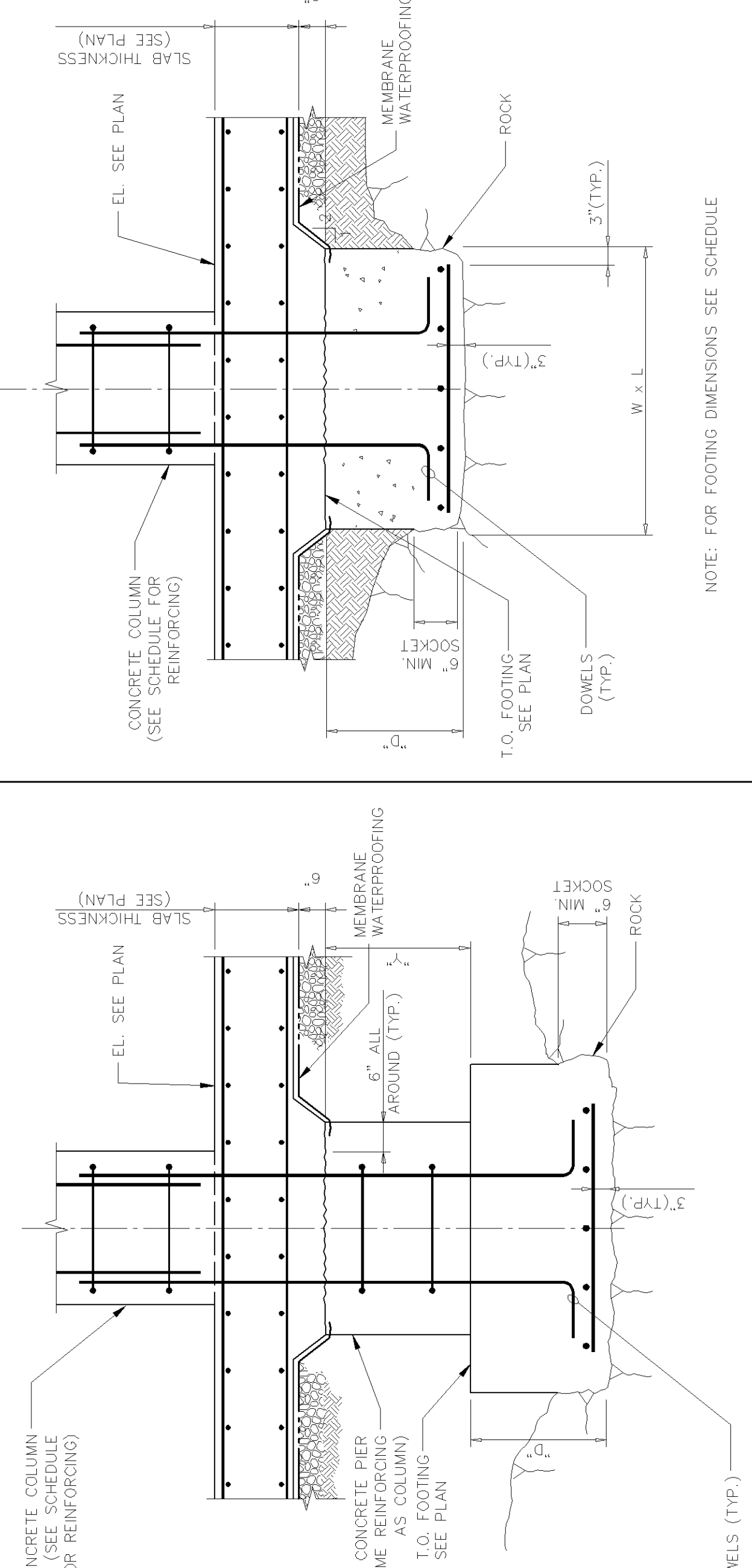


7 TYPICAL FOUNDATION WALL OPENING

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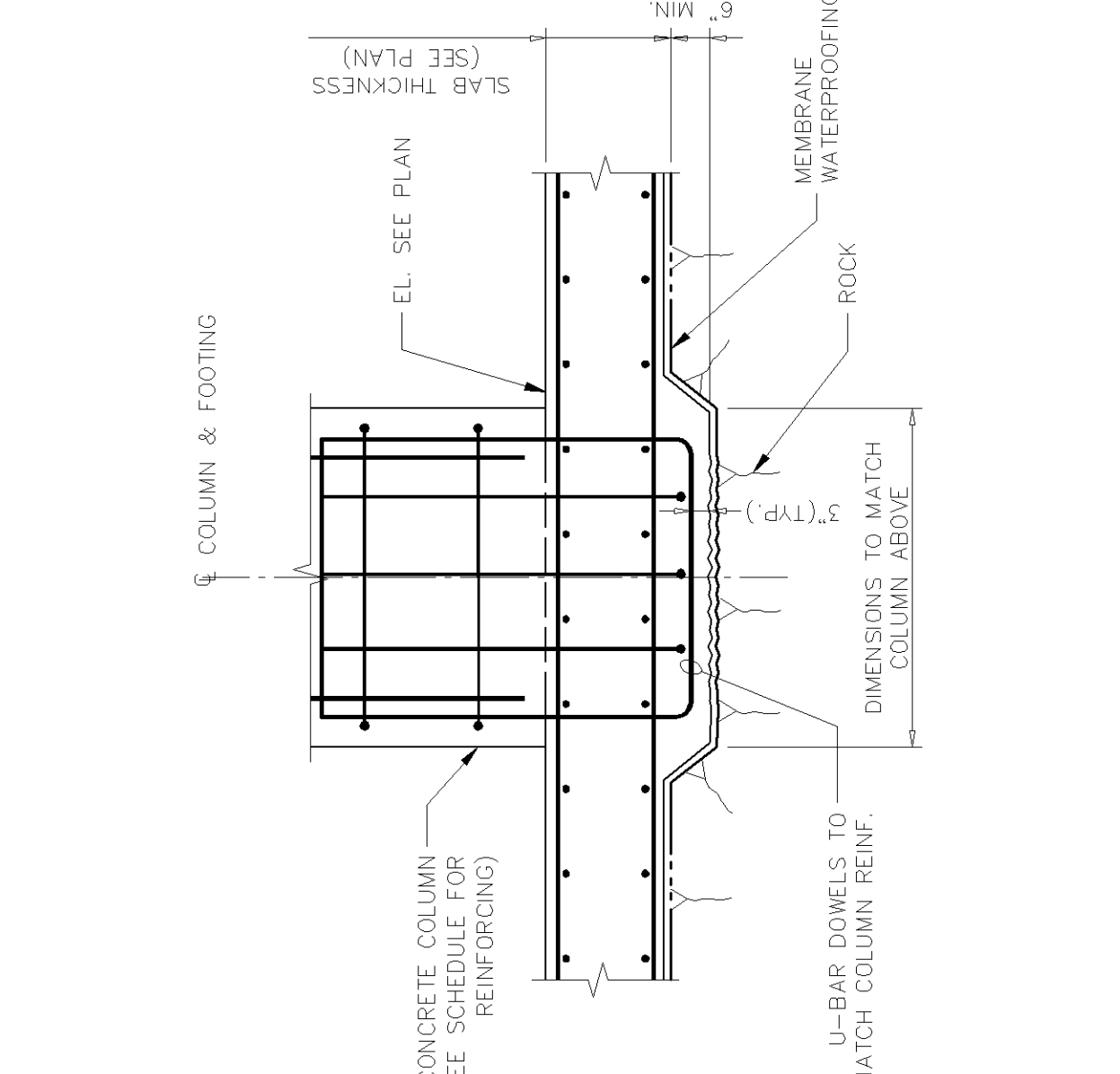
3 TYPICAL INTERIOR FOOTING DETAIL

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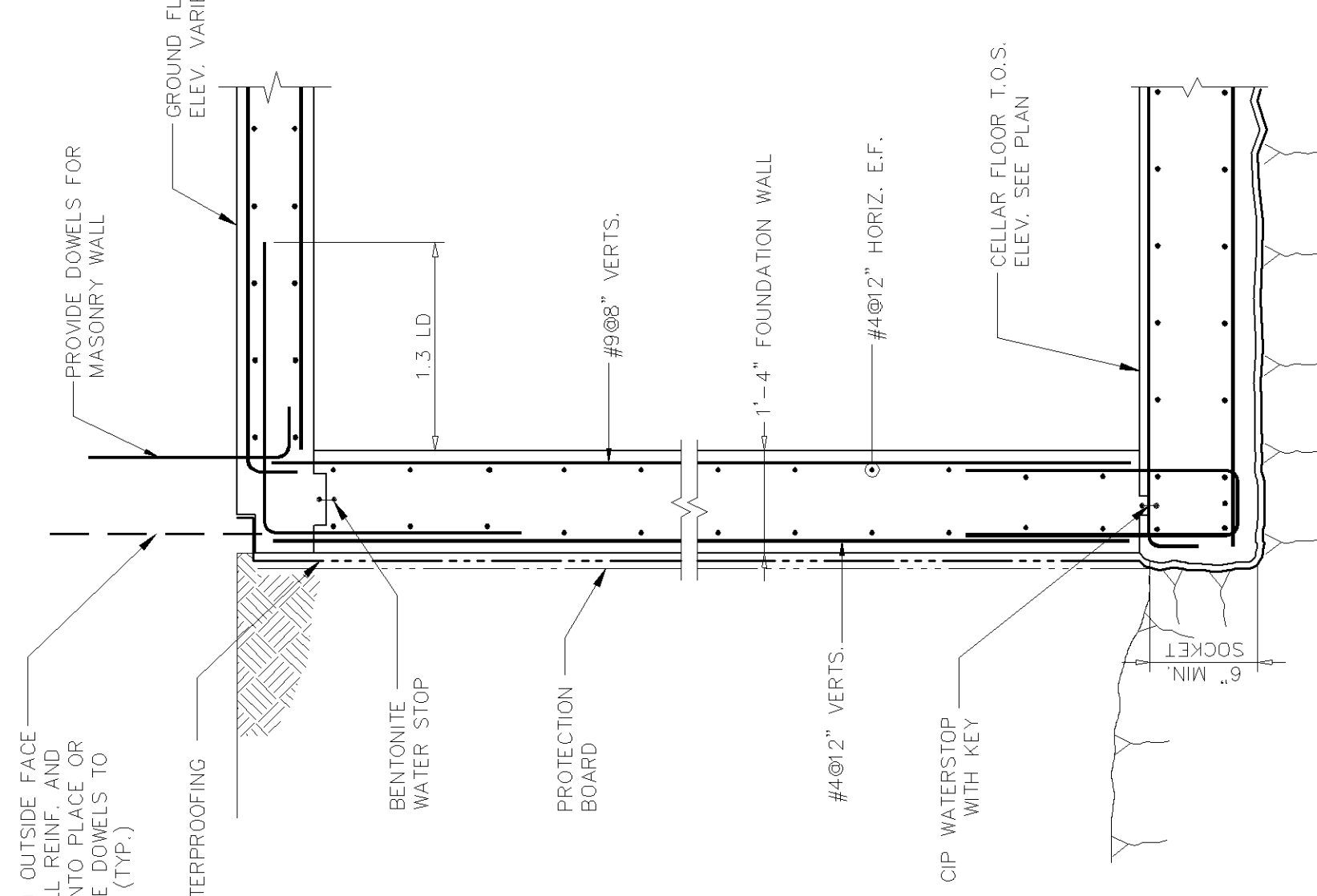
4 TYPICAL INTERIOR HAUNCH FOOTING DETAIL

SCALE: N.T.S.



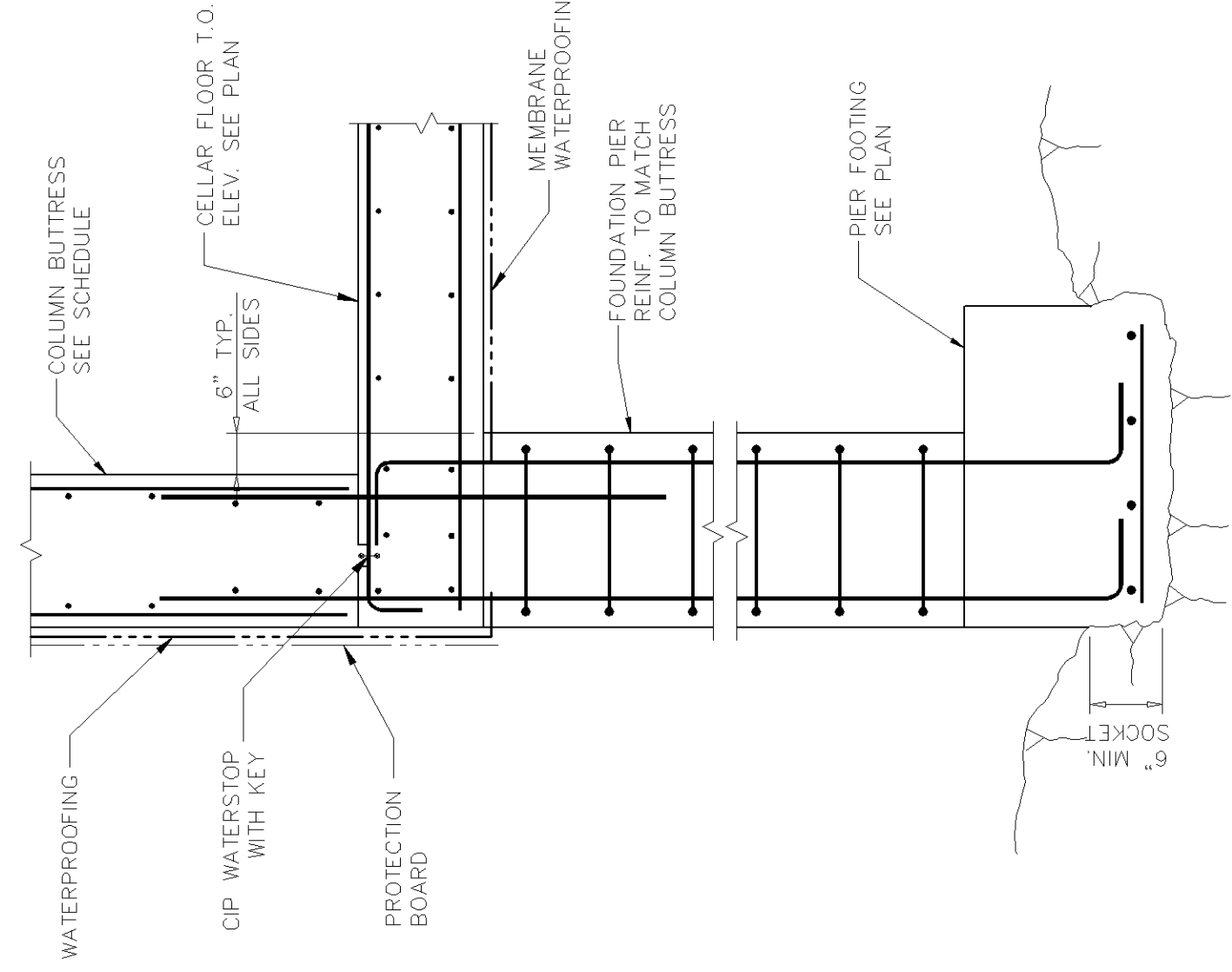
5 TYPICAL FOUNDATION WALL SECTION

SCALE: 1/2"=1'-0"



10 TYPICAL FOUNDATION WALL PIER DETAIL

SCALE: 1/2"=1'-0"



X SECTION - X

SCALE: XX'=1'-0"

X SECTION - X

SCALE: XX'=1'-0"

X SECTION - X

SCALE: XX'=1'-0"

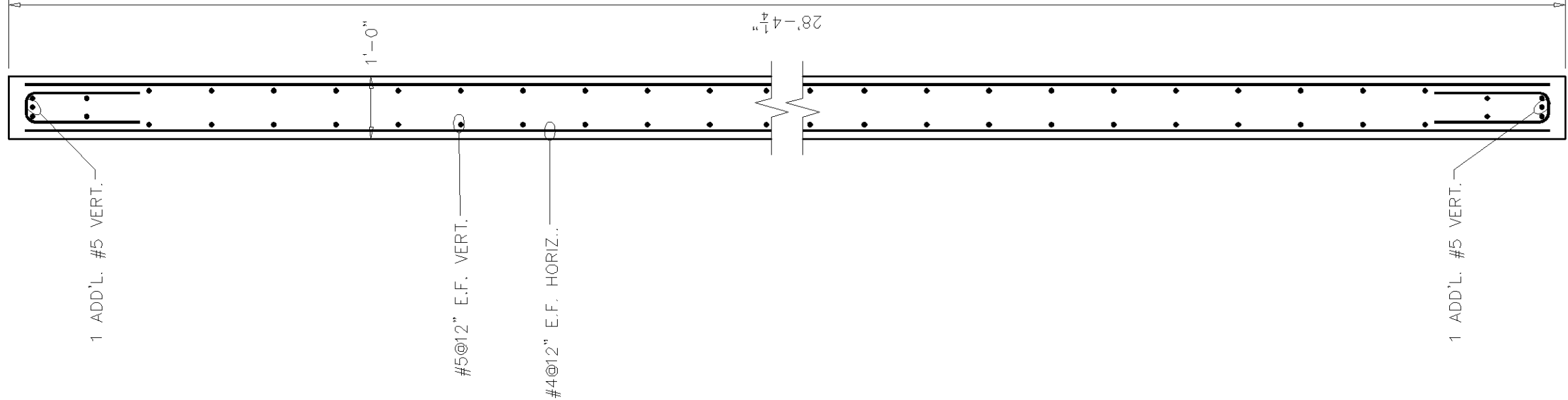
X SECTION - X

SCALE: XX'=1'-0"

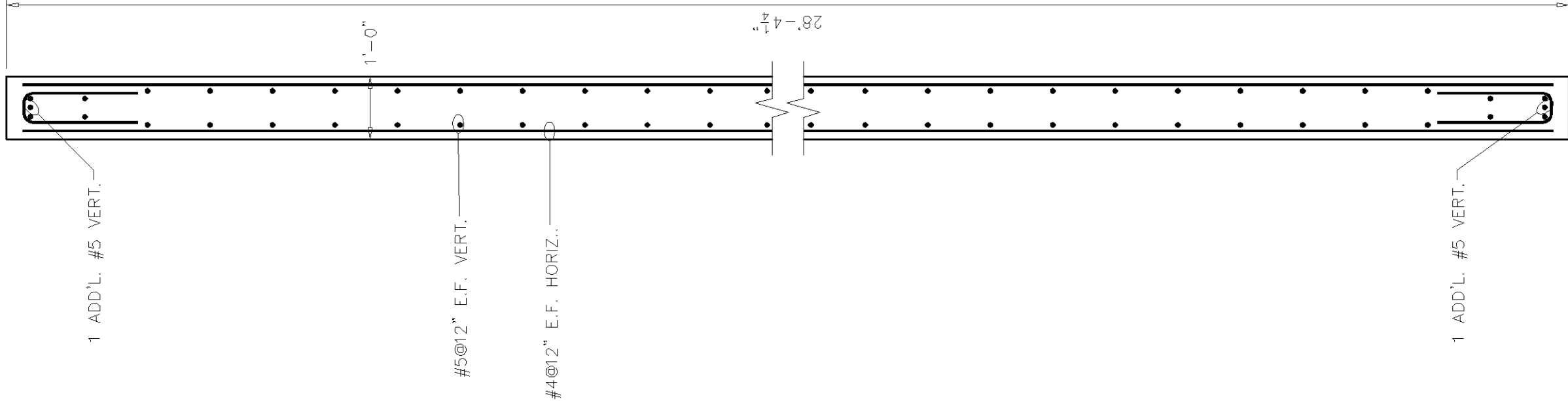


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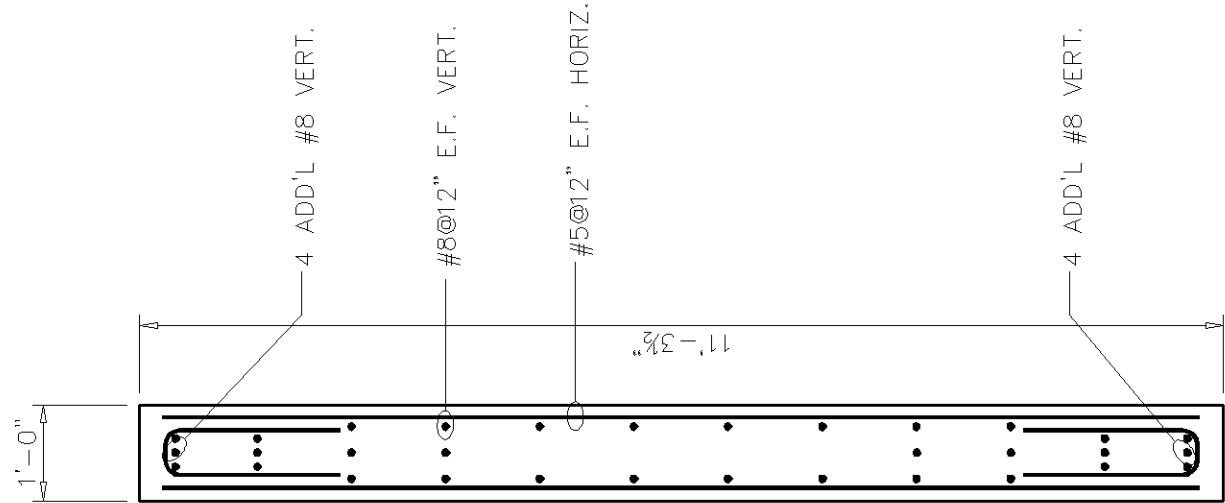
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1 SHEAR WALLS SUPPORTING GROUND  
SCALE: 1/2"=1'-0"



2 SHEAR WALLS SUPPORTING 2ND  
SCALE: 1/2"=1'-0"











GENERAL NOTES:

- I - CODES**
- BUILDING CODE OF THE CITY OF NEW YORK, INCLUDING LATEST AMENDMENTS ("N.Y.C. CODE")
  - AMERICAN INSTITUTE OF STEEL CONSTRUCTION, "SPECIFICATION FOR PLASTIC DESIGN," JUNE 1, 1989 ("AISC SPECIFICATION"), AS MODIFIED BY SUBCHAPTER 10 ARTICLE 6 OF THE NYC BUILDING CODE.
  - AMERICAN CONCRETE INSTITUTE, "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE," ACI 318-99 ("ACI") AS MODIFIED BY SUBCHAPTER 10 ARTICLE 5 OF THE N.Y.C. BUILDING CODE.
  - AMERICAN CONCRETE INSTITUTE, "BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES," ACI 530-99 ("ACI 530"), AS MODIFIED BY REFERENCE STANDARD RS 10 - 18 OF THE N.Y.C. BUILDING CODE.
  - STEEL JOIST INSTITUTE, "STANDARD SPECIFICATIONS, LOAD TABLES AND WELDING TABLES FOR STEEL JOISTS AND JOIST GIRDERS," 1994 ("SJI"), AS MODIFIED BY SUBCHAPTER 10 ARTICLE 6 OF THE N.Y.C. BUILDING CODE.

II - MATERIALS

- UNLESS OTHERWISE SHOWN OR NOTED ON DRAWINGS:
- STRUCTURAL STEEL: ASTM A572 OR A992.
  - ALL ROLLED SHEET: GRADE 50
  - ALL PLATES AND CONNECTION MATERIAL: ASTM A500, GRADE B
  - ANCHOR BOLTS, U.O.N.: ASTM F1554
  - METAL DECK:
    - FABRICATE FROM ASTM A611 OR ASTM A653 STEEL WITH ASTM A653 660 GALVANIZING. SIZE AND GAGE AS NOTED ON DRAWINGS.
    - WELD JOINTS SHALL BE WELDED TO THE SAME METAL DECK WITH CONTINUATION THAT PERMITS FULL TENSILE SHEAR CONNECTOR VALUE.
  - SHEAR CONNECTORS:
    - ¾" DIAMETER x 1" HEADED STUDS, U.O.N.
  - CAST-IN-PLACE CONCRETE:
    - 5 KSI NORMAL WT. FOUNDATIONS.
    - 5 KSI NORMAL WT. FORMED SLABS.
    - 5 KSI NORMAL WT. COLUMNS AND WALLS.
  - REINFORCEMENT:
    - DEFORMED BARS: ASTM A615, GRADE 60.
    - WELDED WIRE FABRIC: ASTM A185, GRADE 60.
    - MELDED DEFORMED WIRE FABRIC: E70XX LOW HYDROGEN.
  - WELDING ELECTRODES:
    - ASTM A525 OR A490, U.O.N.
  - BOLTING MATERIALS:
    - ASTM A653, GRADE 50
    - ASTM A657, GRADE 60
    - FOR 16 GAGE AND LIGHTER, WITH 660 GALVANIZING
  - LIGHT GAGE FRAMING:

III - GENERAL

- NOTES, TYPICAL DETAILS AND SCHEDULES APPLY TO ALL STRUCTURAL WORK UNLESS OTHERWISE NOTED. FOR CONDITIONS NOT SPECIFICALLY SHOWN, PROVIDE DETAILS OF A SIMILAR NATURE. VERIFY APPLICABILITY BY SUBMITTING SHOP DRAWINGS FOR REVIEW.
- SPECIFICATION DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE SPECIFICATIONS, ARCHITECTURAL AND MECHANICAL DRAWINGS. IF THERE IS A DISCREPANCY BETWEEN DRAWINGS, IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE ENGINEER PRIOR TO PERFORMING WORK.
- DO NOT SCALE DRAWINGS TO OBTAIN DIMENSIONAL INFORMATION.
- SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR WATER/UMPROOFING AND FIREPROOFING DETAILS AND REQUIREMENTS.
- TOP OF CONCRETE SLABS ARE AT FLOOR REFERENCE ELEVATION EXCEPT AS NOTED. FOR FLOOR REFERENCE ELEVATIONS SEE COLUMN SCHEDULE.
- THESE DRAWINGS DO NOT DEFINE THE SCOPE OF CONTRACTS. SEE CONSTRUCTION MANAGER'S (or CONTRACTOR'S) CONTRACT DOCUMENTS.
- AT ALL TIMES THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONDITIONS OF THE ARBSITE INCLUDING SAFETY OF PERSONS AND PROPERTY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND INCLUDE THE ADEQUACY OF THE CONTRACTOR'S MEANS OR METHODS OF CONSTRUCTION.
- SHORING, BRACING AND PROTECTION OF EXISTING AND ADJACENT STRUCTURES DURING CONSTRUCTION IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. PROTECT AND MAINTAIN THE INTEGRITY OF ADJACENT STREETS, BUILDINGS AND STRUCTURES.
- ALL EXISTING DIMENSIONS AND LOCATIONS OF EXISTING STRUCTURES SHOWN ON THE DRAWINGS SHALL BE VERIFIED BY FIELD MEASUREMENTS. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER.
- DRAWINGS HAVE BEEN PREPARED BASED ON AVAILABLE KNOWLEDGE OF EXISTING CONDITIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY EXISTING CONDITIONS, INCLUDING EXCAVATION OR CONSTRUCTION, PRIOR TO CONSTRUCTION. ANY DISCREPANCIES OR DIFFERENCES FROM THOSE INDICATED ON DRAWINGS, ENGINEER SHALL BE NOTIFIED.

IV - FOUNDATION NOTES

- THE DESIGN OF THE FOUNDATIONS SHOWN HEREIN IS BASED ON THE INFORMATION PROVIDED IN THE PRELIMINARY GEOTECHNICAL INFORMATION PREPARED BY RA CONSULTANTS DATED 02.19.05
- PIERS, MATS, FOOTINGS, AND WALLS SHALL BEAR ON ROCK WITH A MINIMUM BEARING CAPACITY OF 20TSF.
- NO BACKFILL SHALL BE PLACED AGAINST FOUNDATION WALLS UNLESS SUPPORTING SLABS ARE IN PLACE AND SET OR THE WALLS ARE ADEQUATELY BRACED.
- UNDERPINNING OF THE EXISTING ADJACENT FOUNDATION MAY BE REQUIRED EXCEPT OF UNDERPINNING WORK. IF SHOWN ON DRAWINGS, ITS BASED ON THE INFORMATION PROVIDED IN THE PRELIMINARY GEOTECHNICAL INFORMATION. FOUNDATION CONTRACTOR TO BE RESPONSIBLE FOR DESIGN AND CONSTRUCTION OF UNDERPINNING IF REQUIRED.
- DEWATERING OF THE SITE DURING CONSTRUCTION IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. PRECAUTIONS SHALL BE TAKEN BY THE CONTRACTOR TO PROTECT ADJACENT FOUNDATIONS AND STRUCTURES. ALL DEWATERING AND CALCULATIONS FOR THE APPROPRIATE SYSTEM ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- ALL FOOTINGS AND/OR PIERS ARE TO BE CENTERED ON COLUMNS ABOVE, U.O.N.
- PROVIDE DOWELS IN FOUNDATIONS FOR ALL WALLS, COLUMNS, AND SHEAR WALLS OF SAME NUMBER AND SIZE AS THE VERTICAL REINFORCEMENT ABOVE, U.O.N.
- PROVIDE WATERSTOPS IN ALL VERTICAL CONSTRUCTION JOINTS IN BASEMENT WALLS.
- SLABS ON GROUND SHALL BE PLACED ON SELECT FILL COMPACTED TO 95 PERCENT MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D1557).
- FOOTING AND/OR PIER ELEVATIONS SHOWN ON THE DRAWINGS HAVE BEEN ESTIMATED USING THE AVAILABLE GEOTECHNICAL INFORMATION. ACTUAL ELEVATIONS OF FOOTING AND PIER BOTTOMS WILL BE DETERMINED BY FIELD CONDITIONS.

V - UNDERPINNING NOTES

- CONTRACTOR SHALL RETAIN THE SERVICE OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF [STATE NAME] TO PREPARE SIGNED AND SEALED DESIGN DRAWINGS AND CALCULATIONS FOR ALL REQUIRED UNDERPINNING OF ADJACENT STRUCTURES. THE CONTRACTOR SHALL FILE THE DRAWINGS WITH THE BUILDING DEPARTMENT.
- SUBMIT COPY OF FILED DRAWINGS TO ODE FOR INFORMATION ONLY. ALL UNDERPINNING WORK SHALL BE SUBJECT TO SPECIAL INSPECTION IN ACCORDANCE WITH LOCAL CODE REQUIREMENTS.
- THE FULL SCOPE OF THIS WORK IS TO BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF ALL EXISTING ADJACENT STRUCTURES AND THE LIVE AND BY SITE REPAIR PRIOR TO BIDDING. GEOTECHNICAL REPORTS AND THE LIVE AND BY SITE REPAIR PRIOR TO BIDDING.
- THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE SAFETY OF ALL EXISTING ADJACENT STRUCTURES AND THE LIVE AND BY SITE REPAIR PRIOR TO BIDDING AND AS A RESULT OF UNDERPINNING OPERATIONS.

VI - CONCRETE NOTES

- REINFORCING STEEL SHALL HAVE A MINIMUM CLEAR COVER AS FOLLOWS, U.O.N. IN DRAWINGS:
  - CONCRETE POURED AGAINST EARTH.....3"
  - CONCRETE EXPOSED TO EARTH OR WEATHER.....1½"
  - #5 OR SMALLER.....1½"
  - #6 OR LARGER.....2"
- CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND:
  - COLUMNS (TIES AND MAIN REINFORCING).....1½"
  - COLUMNS, WALLS, JOISTS.....1½"
  - SLABS, WALLS, JOISTS.....1½"
  - #14 OR #16 BARS.....1½"
  - ANCHOR BOLTS.....1½"
  - BEAMS (STRIPS AND MAIN REIN).....1½"
- CLEAR COVER SHALL BE CLEARLY SHOWN ON ALL REBAR DETAIL DRAWINGS.
- ALL REINFORCEMENT SHALL BE SECURELY HELD IN POSITION WHILE PLACING CONCRETE. IF NECESSARY, ADDITIONAL BARS SHALL BE PROVIDED BY THE CONTRACTOR TO FURNISH SUPPORT.
- THE CONTRACTOR SHALL VERIFY THE DIMENSIONS AND LOCATIONS OF ALL OPENINGS, PIPE SLEEVES, ETC. AS REQUIRED BY ALL TRADES, BEFORE THE REINFORCEMENT IS PLACED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE MECHANICAL AND ELECTRICAL DRAWINGS, AS WELL AS THE STRUCTURAL DRAWINGS FOR THE LOCATION, NUMBER, AND SIZE OF ALL OPENINGS.
- REINFORCING STEEL SHALL BE INSTALLED IN ACCORDANCE WITH THE DRAWINGS. REINFORCING STEEL SHALL BE INSTALLED ONLY AFTER APPROVAL BY THE STRUCTURAL ENGINEER IS OBTAINED.
- LOCATION OF ALL CONSTRUCTION JOINTS NOT SHOWN IN DRAWINGS SHALL BE SUBMITTED TO ALL ENGINEER FOR APPROVAL PRIOR TO DETAILING OF REINFORCING. ALL CONSTRUCTION JOINTS TO BE CLEARLY SHOWN IN REBAR DETAIL DRAWINGS. ENGINEER MAY REQUIRE ADDITIONAL REINFORCING AT CONSTRUCTION JOINTS.
- DIMENSIONS "10" AS NOTED ON DRAWINGS SHALL BE AS FOLLOWS:

BEAMS			COLUMNS		
BAR SIZE	BOTTOM BARS	OTHER BARS	BAR SIZE	14	
#3	13	17	#3	13	
#4	17	23	#4	17	
#5	22	28	#5	22	
#6	26	34	#6	26	
#7	38	49	#7	38	
#8	43	56	#8	43	
#9	48	63	#9	48	
#10	54	71	#10	54	
#11	60	78	#11	60	

WALLS

BAR SIZE	VERTICAL BARS		HORIZONTAL BARS	
	CASE 1	CASE 2	CASE 1	CASE 2
#3	13	20	17	25
#4	17	26	23	34
#5	22	32	28	42
#6	26	39	34	50
#7	38	56	49	73
#8	43	64	56	83
#9	48	72	63	94
#10	54	81	70	106
#11	60	90	78	117

FOR:

$f'c = 3 \text{ ksi}$   $Ld = 1.29 \times \text{TABLE VALUE}$

$f'c = 4 \text{ ksi}$   $Ld = 1.33 \times \text{TABLE VALUE}$

$f'c = 6 \text{ ksi}$   $Ld = 0.92 \times \text{TABLE VALUE}$

$f'c = 8 \text{ ksi}$   $Ld = 0.79 \times \text{TABLE VALUE}$

$f'c = 10 \text{ ksi}$   $Ld = 0.71 \times \text{TABLE VALUE}$

$f'c = 12 \text{ ksi}$   $Ld = 0.65 \times \text{TABLE VALUE}$

- ALL LAP SPLICES SHALL BE 1:3D UNLESS NOTED OTHERWISE ON DRAWINGS.
- FOR LIGHTWEIGHT AGGREGATE CONCRETE, MULTIPLY THE TABULATED VALUES BY 1.3.
- FOR EPOXY-COATED BARS, MULTIPLY THE TABULATED VALUES BY 1.5.
- DOWEL BAR SUBSTITUTIONS SHALL BE PERMITTED PROVIDED THAT MANUFACTURER'S DATA SUPPORTS FULL TENSION SPLICES.
- ALL SLEEVES AND PENETRATIONS SHALL BE PROVIDED BY THE SUB-CONTRACTOR REQUIRING THE OPENING.
- CONCRETE COLUMN LENGTH ADJUSTMENT FOR ELASTIC SHORTENING, SHRINKAGE AND CREEP EFFECTS SHALL BE DISCUSSED WITH THE CONCRETE CONTRACTOR.
- CONDUIT PLACED IN CONCRETE SLABS MUST BE PLACED IN ACCORDANCE WITH THE FOLLOWING GUIDELINES:
  - CONTRACTOR SHALL NOT INSTALL CONDUIT THAT IS NOT SHOWN IN ANY GIVEN AREA.
  - DO NOT CROSS MORE THAN ONE LAYER OF CONDUIT OVER ANOTHER.
  - MID-HEIGHT OF THE SLAB.
  - MIDDLE ¾ OF THE SLAB.

- MAINTAIN A MINIMUM CLEAR SPACING BETWEEN THE CONDUIT. CONDUITS ACCUMULATE AT "TURN DOWNS". THE CONDITIONS AT "TURN DOWN" LOCATIONS MUST BE EVALUATED AT EACH LOCATION. CONDUITS SHALL BE PLACED IN SUCH A MANNER THAT THEY CANNOT OCCUR AT COLUMN OR ENTRENCH LOCATIONS.
- DO NOT PLACE ANY CONDUIT IN THE SLAB WITHIN 36" FROM THE EDGE OF ANY COLUMN OR WALL ABOVE OR BELOW THE SLAB.
- ACCOMMODATE CONDUIT PLACEMENT, ADDED, CUT, OR BENT TO CONDUIT IS NOT TO RUN THROUGH OR WITHIN A COLUMN OR WALL. IF IT IS EFFECTIVELY COATED.
- IF THE ABOVE REQUIREMENTS ARE ALL MET, CONDUIT LOCATIONS NEED NOT BE REVIEWED BY THE STRUCTURAL ENGINEER. ANY REVISIONS MUST BE SUBMITTED ON A SHOP DRAWING FOR APPROVAL BY THE STRUCTURAL ENGINEER PRIOR TO CONDUIT PLACEMENT.
- THE FOLLOWING CASES MUST BE SUBMITTED FOR REVIEW BY THE STRUCTURAL ENGINEER:
  - LOCATIONS OF ANY CONDUIT LARGER THAN 2" IN OUTSIDE DIAMETER.
  - LOCATIONS OF ANY BUNDLED CONDUITS.

VII - STEEL NOTES

- BOLTED CONNECTIONS: BOLTS ARE TO BE A325 OR A490 SLIP CRITICAL. MINIMUM TENSILE STRENGTH SHALL BE 120 KSI. MINIMUM DIAMETER OF ALL BOLTS SHALL BE ¾". MAX. DIA. 1-1/8". PROVIDE AT LEAST 2 BOLTS PER CONNECTION. UNLESS OTHERWISE NOTED IN REBAR DETAIL FLOOR MEMBER CONNECTIONS FOR THE FOLLOWING VERTICAL REACTIONS:

SHAPE	MINIMUM REACTIONS TO GIRDER (KIPS)	TO COLUMNS	MINIMUM NUMBER OF ROWS
WB C10	12	17	2
WB C12	15	20	2
WB C14	20	25	3
WB C16	25	30	3
WB C18	30	38	4
WB C20	46	58	4
WB C24	57	72	4
W27	70	85	5
W30	85	100	5
W33	100	120	7
W36	115	135	8
- END CONNECTIONS OF FLOOR MEMBERS SHALL ACCOMMODATE END ROTATIONS OF SIMPLE, UNRESTRAINED BEAMS. FOR THIS PURPOSE, INELASTIC ACTION IN THE CONNECTION IS PERMITTED.
- COPED OR CUT ENDS OF MEMBERS SHALL BE REINFORCED WHERE REQUIRED TO SUSTAIN THE SPECIFIED REACTIONS.
- FABRICATE AND ERECT FLOOR MEMBERS WITH NATURAL CAMBER UP.
- SHORING OF FLOOR MEMBERS TO CONTROL SLAB THICKNESS, FLOOR LEVEL AND OTHER TOLERANCES, AND CONCRETE POURING IS THE CONTRACTOR'S OPTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING SLAB THICKNESS ABOVE TOP OF STEEL MEMBERS.
- STRUCTURAL STEEL CONTRACTOR TO PROVIDE DECK SUPPORT ANGLES AS REQUIRED.
- UNLESS OTHERWISE SHOWN ON DRAWINGS, SIZE OF WELDS SHALL NOT BE SMALLER THAN ¼".
- FABRICATION AND ERECTION CONSIDERATIONS - THE FOLLOWING ITEMS WILL BE DEFINED AT A PRE-DETAILING CONFERENCE WITH THE STEEL CONTRACTOR:
  - STEEL COLUMN LENGTH ADJUSTMENT FOR ELASTIC SHORTENING EFFECTS.
- STEEL TRUSS CAMBERING.
  - 1.1) ELEMENTS AFFECTED BY STEEL ERECTION PROCEDURE, SUCH AS MEMBER SIZES, CONNECTIONS, SPLICES, BASE PLATES, ANCHOR BOLTS, ROCK ANCHORS, ETC.
  - 1.2) ERECTION PROCEDURES AND SEQUENCES WITH REGARD TO TEMPERATURE EFFECTS.
- THE CONTRACTOR SHALL PROVIDE, AT NO ADDITIONAL COST, ALL ADDITIONAL STEEL, CONNECTIONS, CUTTING, ETC. REQUIRED FOR ERECTION.
- UNLESS SPECIFICALLY NOTED, STEEL DETAILS SHOWN ON THE DRAWINGS ARE FOR CONCEPT ONLY AND DO NOT INDICATE REQUIRED NUMBER OF BOLTS, SIZE OF WELDS, ETC.
- MEMBERS MAY ONLY BE SPliced WHERE SPECIFICALLY DETAILED ON ACCEPTED SHOP DRAWINGS.
- FLOOR CUTTING OF STRUCTURAL STEEL IS NOT PERMITTED EXCEPT WITH THE PRIOR APPROVAL OF THE ENGINEER.
- BOLTS, NUTS AND WASHERS FOR STEEL PERMANENTLY EXPOSED TO WEATHER SHALL BE GALVANIZED. SEE SPECIFICATIONS.

VIII - METAL DECK NOTES

- U.O.N., ALL METAL DECKING HAS BEEN DESIGNED FOR UNSHORED CONSTRUCTION. WHERE POSSIBLE, DECK SHALL EXTEND OVER TWO OR MORE SPANS.
- DECK SUPPLIER SHALL FURNISH ANY AND ALL SPEEDS, CLOSURES, FOUR STOPS, COLUMN CLOSURES, CANT STRIPS, RIDGE AND VALLEY PLATES, SAMPS, ETC. AS REQUIRED FOR COMPLETE INSTALLATION OF DECK.
- COMPOSITE FLOOR DECK SHALL BE WELDED TO ALL SUPPORTING MEMBERS WITH ¾" DIA. PIGDIE WELDS OR #12 TENS SELF-DRILLING FASTENERS AT 12" O.C. SHEAR STUDS SHALL BE CONSIDERED TO REPLACE WELDS. FASTEN SIDE LAPS AS REQUIRED IN SPECIFICATIONS.
- ROOF DECK SHALL BE WELDED TO ALL SUPPORTING MEMBERS WITH ¾" DIA. PIGDIE WELDS AT 18" O.C. OR #12 TENS SELF-DRILLING FASTENERS AT 12" O.C. FASTEN SIDE LAPS AS REQUIRED IN SPECIFICATIONS FOR SPANS OVER 5'-0".
- FORM DECK SHALL BE WELDED TO ALL SUPPORTING MEMBERS USING 16 GAGE PIGDIE WELDS AT 18" O.C. FASTEN SIDE LAPS WITH SPACERS AT 36" MAX FOR SPANS OVER 5'-0".
- PROVIDE 2" MIN LAPS AND END BEARING FOR ALL BECKING.
- UNPAID OPENINGS, IN FLOOR OR ROOF DECKS, LARGER THAN 6" PERPENDICULAR TO SPAN OF DECK SHALL BE REINFORCED.

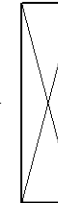
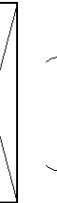
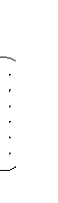
IX - MASONRY NOTES

- STRUCTURAL CONCRETE MASONRY, AS SHOWN ON THESE DRAWINGS, SHALL HAVE A COMPRESSIVE STRENGTH (F'M) OF 1500 PSI.
- MASONRY UNITS SHALL CONFORM TO ASTM C90, TYPE 11, NORMAL WEIGHT, HOLLOW UNLESS SPECIFICALLY NOTED OTHERWISE ON THESE DRAWINGS. MINIMUM COMPRESSIVE STRENGTH AS REQUIRED TO ACHIEVE COMPRESSIVE STRENGTH SPECIFIED ABOVE.
- MORTAR SHALL CONFORM TO ASTM C270, TYPE M OR S FOR ABOVE GRADE, TYPE N FOR BELOW GRADE..
- GROUT FOR FILLED CELLS SHALL CONFORM TO ASTM C476 WITH 3000 PSI COMPRESSIVE STRENGTH. FILL ALL CELLS WITH GROUT. IF CELLS ARE NOT EXCEEDING 5 FEET VERTICALLY, FILL ALL CELLS BELOW GRADE.
- VERTICAL REINFORCING SHALL BE ASTM A615, GRADE 60 DEFORMED BARS. MINIMUM LAP SPLICES SHALL BE AS FOLLOWS:
  - # 3 BARS - 1'-3"
  - # 4 BARS - 2'-0"
  - # 5 BARS - 2'-6"
  - # 6 BARS - 3'-0"
- HORIZONTAL REINFORCING SHALL BE NO. 9 GAGE "DURAWALL" OR EQUIVALENT AND SHALL BE PLACED EVERY OTHER COURSE U.O.N.
- ALL BLOCK SHALL BE PLACED IN RUNNING BOND.

X - CONTROLLED INSPECTION

- OWNER WILL ENGAGE AND PAY FOR AN INDEPENDENT TESTING AGENCY TO PERFORM THE FOLLOWING INSPECTION AND TESTING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ADEQUATE PRIOR NOTICE FOR COMPLETION OF SUCH INSPECTION AND TESTING.
- CONCRETE: ALL CONCRETE WORK SHALL BE SUBJECT TO CONTROLLED INSPECTION BY OR UNDER THE DIRECT SUPERVISION OF A LICENSED PROFESSIONAL ENGINEER AS REQUIRED BY SUBCHAPTER 17 OF THE N.Y.C. BUILDING CODE. PARAGRAPH 27-200 OF THE N.Y.C. BUILDING CODE SHALL BE FILLED WITH THE BUILDING DEPARTMENT FOR APPROVAL OF SAID ENGINEER.
    - THE OWNER SHALL ENGAGE A LICENSED PROFESSIONAL ENGINEER, APPROVED BY THE BUILDING DEPARTMENT, TO CONDUCT INSPECTION OF THE MATERIALS AND THE INSPECTION OF CONCRETE CONSTRUCTION.
    - THE PRELIMINARY TEST FOR CONTROLLED CONCRETE SHALL BE MADE IN ACCORDANCE WITH SUBCHAPTER 10 PARAGRAPH 27-605 OF THE N.Y.C. BUILDING CODE AND THE RESULTS FILED ON TECHNICAL REPORT TR-3.
    - NO CONCRETE SHALL BE PLACED BEFORE ACCEPTANCE BY ENGINEER.
    - QUALITY CONTROL AND INSPECTION OF MATERIALS AND OF BATCHING SHALL BE MADE IN ACCORDANCE WITH SUBCHAPTER 10 PARAGRAPH 27-605 OF THE N.Y.C. BUILDING CODE.
    - ALL FIELD TESTS AND INSPECTIONS SHALL BE PERFORMED AS REQUIRED BY SUBCHAPTER 10 PARAGRAPH 27-607 OF THE N.Y.C. BUILDING CODE.
  - INSPECT SUBGRADE FOR FOUNDATIONS, PIERS AND WALLS PER SUBCHAPTER 11 PARAGRAPH 27-723 OF THE N.Y.C. BUILDING CODE.

XI - SYMBOLS USED ON DRAWINGS

- U.O.N. DENOTES "UNLESS OTHERWISE NOTED".
-  DENOTES FINISHED (MILLED) SURFACES.
-  DENOTES CAMBER OF FLOOR MEMBERS.
-  DENOTES MEMBER ELEVATION IF OTHER THAN BASE LINE ESTABLISHED ON DRAWING OR TOP OF PILE CAP ELEVATION.
- LD DENOTES LENGTH AS PREVIOUSLY DEFINED IN CONCRETE NOTES.
- LD DENOTES FEED-424 ELEVATION QUOTE RAIL OVERHEAD BEAM TOP OF STEEL IS 3" BELOW TOP OF SUPPORTING STEEL MEMBERS. SEE TYPICAL DETAIL WHEN SUPPORTED BY CONCRETE ELEMENTS. PAINT PER SPECIFICATIONS. 4" DIMENSION IS PLAN DIMENSION.
- T.O. STL. DENOTES "TOP OF STEEL".
- T.O. SL. DENOTES "TOP OF SLAB".

S-400 - SUPERSTRUCTURE SECTIONS AND DETAILS - CONCRETE

S-401	TYPICAL CONCRETE SECTIONS AND DETAILS
S-402	TYPICAL CONCRETE SECTIONS AND DETAILS
S-403	TYPICAL CONCRETE SECTIONS AND DETAILS
S-404	CONCRETE SECTIONS AND DETAILS
S-405	CONCRETE SECTIONS AND DETAILS
S-406	CONCRETE SECTIONS AND DETAILS
S-407	SEVENTH FLOOR PLAN
S-408	EIGHTH FLOOR PLAN
S-409	NINTH FLOOR PLAN
S-410	TENTH FLOOR PLAN
S-411	ELEVENTH FLOOR PLAN

**Owner:** West End Enterprises  
64 - 35 Yellowstone Blvd.  
Forest Hills, NY 11375

**Project:** WEST 60TH / 61ST STREET  
NEW YORK, NY 10023  
BUILDINGS B&C

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2	09.13.05 FOUNDATION BID
<b>no.</b>	<b>issued</b> <i>revisions</i>

**Drawing title:**

GENERAL NOTES AND DRAWING INDEX

**project number:** *drawing number:*

**date:** 8/29/05

**scale:** NTS

**drawing by:** checked by: *DATE*

**\$-001**

DRAWING INDEX

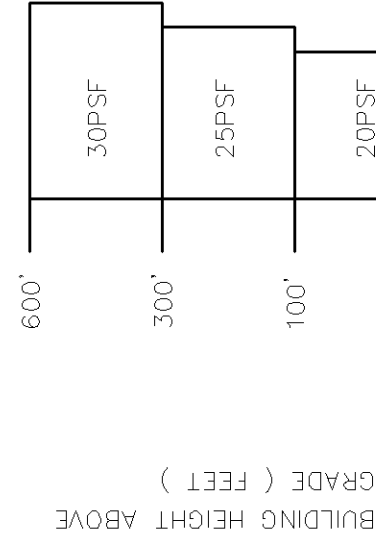
<b>S-000 - GENERAL NOTES</b>	
S-201	INDEX OF DRAWINGS, GENERAL NOTES, SYMBOLS AND ABBREVIATIONS
<b>S-100 - FOUNDATION PLANS, SECTIONS AND DETAILS</b>	
S-101	FOUNDATION PLAN
S-102	SUB-CELLAR LAYOUT PLAN
S-102.1	SUB-CELLAR REINFORCEMENT PLAN
S-103	CELLAR LAYOUT PLAN
S-103.1	CELLAR REINFORCEMENT PLAN
S-104	PARKING RAMP PART PLANS
S-111	TYPICAL FOUNDATION SECTIONS AND DETAILS
S-112	FOUNDATION COMPLETE SECTIONS AND DETAILS

<b>S-200 - SHEAR WALLS COLUMNS AND BRACING SCHEDULES</b>	
S-201	BUILDING B COLUMN SCHEDULE AND TYPICAL DETAILS
S-202	BUILDING C COLUMN SCHEDULE
S-203	SHEAR WALL PART PLANS

<b>S-300 - SUPERSTRUCTURE PLANS</b>	
S-301	GROUND FLOOR LAYOUT PLAN
S-301.1	GROUND FLOOR REINFORCEMENT PLAN
S-302	SECOND FLOOR PLAN
S-303	THIRD FLOOR PLAN
S-304	FORTH FLOOR PLAN
S-305	FIFTH FLOOR PLAN
S-306	SIXTH FLOOR PLAN
S-307	SEVENTH FLOOR PLAN
S-308	EIGHTH FLOOR PLAN
S-309	NINTH FLOOR PLAN
S-310	TENTH FLOOR PLAN
S-311	ELEVENTH FLOOR PLAN

WIND LOAD DIAGRAM

WIND LOAD DIAGRAM DEVELOPED IN ACCORDANCE WITH SUBCHAPTER 9 - ARTICLE 5 AND REFERENCE STANDARDS RS 9-5 OF THE NEW YORK CITY BUILDING CODE



DESIGN LOADS

SEISMIC DESIGN CRITERIA

REF: LOCAL 17/95; SECTION 27-569, RS9-6 AND RS 10-5C.

SEISMIC ZONE FACTOR, Z = .15	
SOIL PROFILE TYPE AND SIZE COEFFICIENT, S = .47	
IMPORTANCE FACTOR, I = 1.0	
Rw = 8 (SHEAR WALLS)	
BUILDING HEIGHT, hn = 305 FT.	
COEFFICIENT, C = .6	
BASE SHEAR, V = (2C/Rw)W	
W = BUILDING WEIGHT	





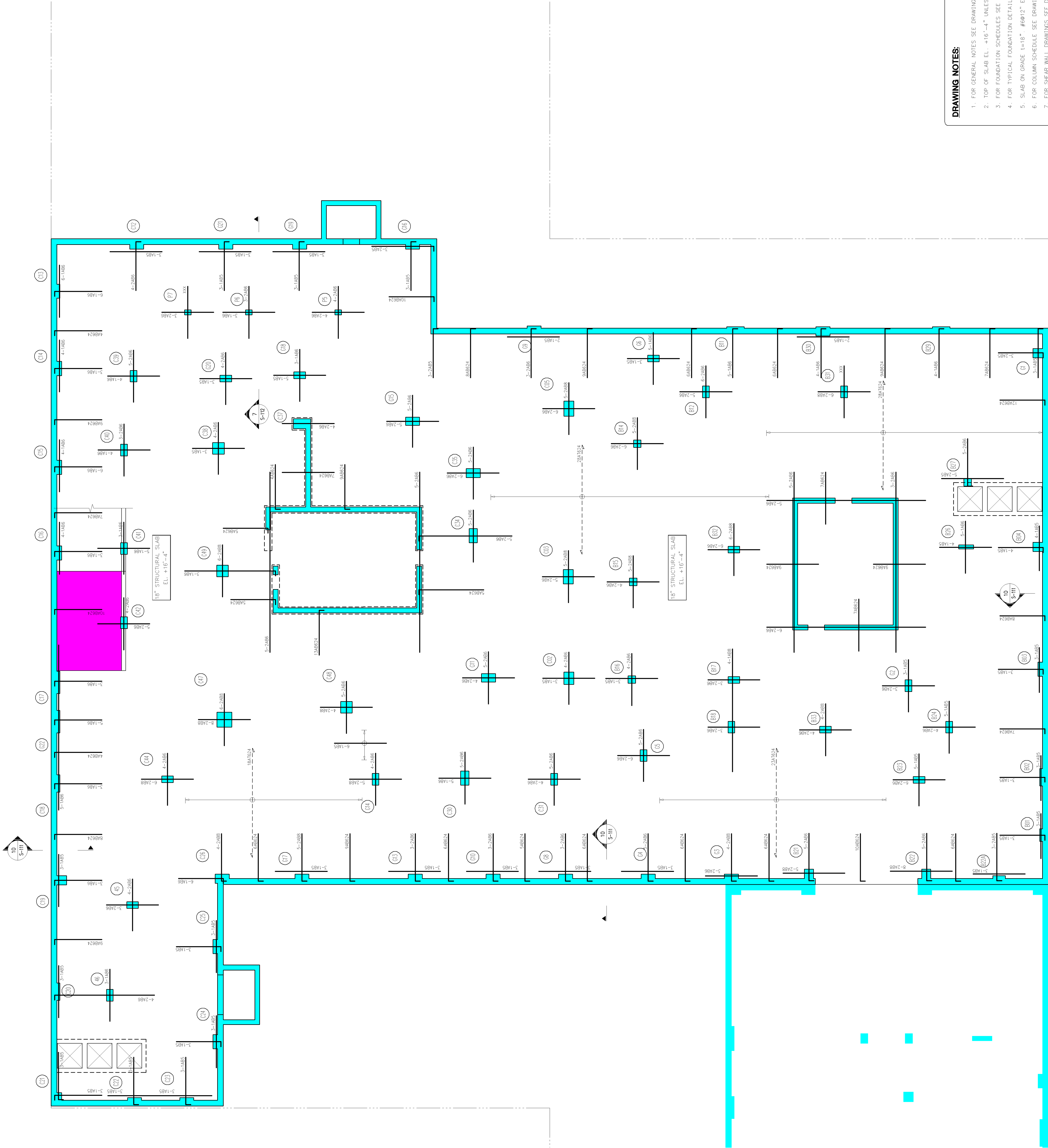
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1	09/13/05	FOUNDATION BID

Sub-cellar  
REINFORCEMENT PLAN

DRAWING NOTES:

1. FOR GENERAL NOTES SEE DRAWING S-001.
2. TOP OF SLAB EL. +16'-4" UNLESS OTHERWISE NOTED.
3. FOR FOUNDATION SCHEDULES SEE DRAWING S-111.
4. FOR TYPICAL FOUNDATION DETAILS SEE DRAWING S-111.
5. SLAB ON GRADE 1=18" #6@12" E.W. TAB.
6. FOR COLUMN SCHEDULE SEE DRAWINGS S-201 & S-202.
7. FOR SHEAR WALL DRAWINGS SEE DRAWING S-203.
8. OUTERMOST REINFORCING IN SLAB RUNS NORTH-SOUTH.
9. REFER TO S-101 FOR FOOTING INFORMATION.



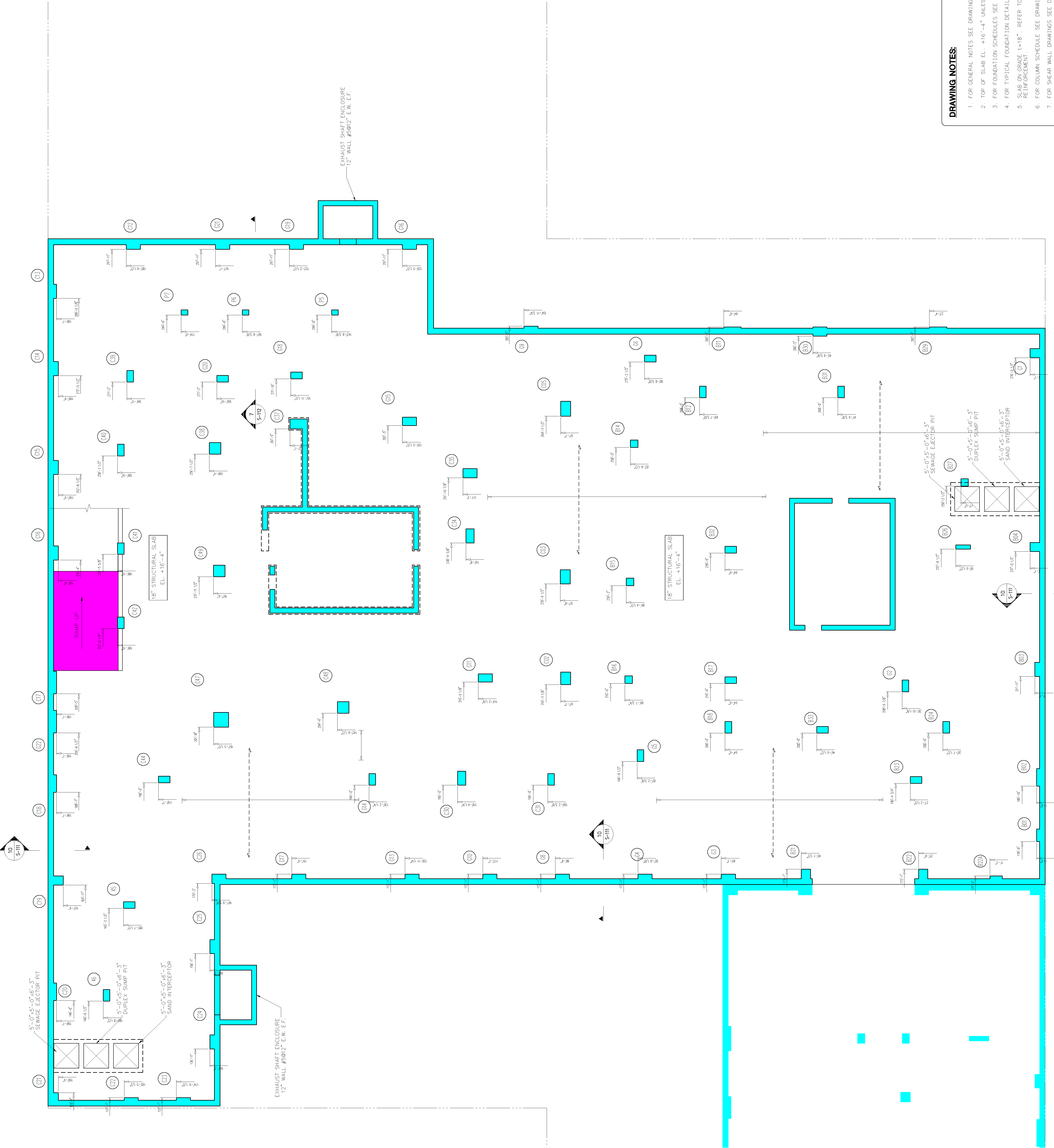


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1	09.13.05 FOUNDATION BID
no.	issued revisions

SUB-CELLAR  
LAYOUT PLAN

DRAWING NOTES:

1. FOR GENERAL NOTES SEE DRAWING S-001.
2. TOP OF SLAB EL. +16'-4" UNLESS OTHERWISE NOTED
3. FOR FOUNDATION SCHEDULES SEE DRAWING S-111
4. FOR TYPICAL FOUNDATION DETAILS SEE DRAWING S-111.
5. SLAB ON GRADE L=18". REFER TO S-102.1 FOR REINFORCEMENT.
6. FOR COLUMN SCHEDULE SEE DRAWINGS S-201 & S-202.
7. FOR SHEAR WALL DRAWINGS SEE DRAWING S-203.
8. REFER TO S-101 FOR FOOTING INFORMATION.



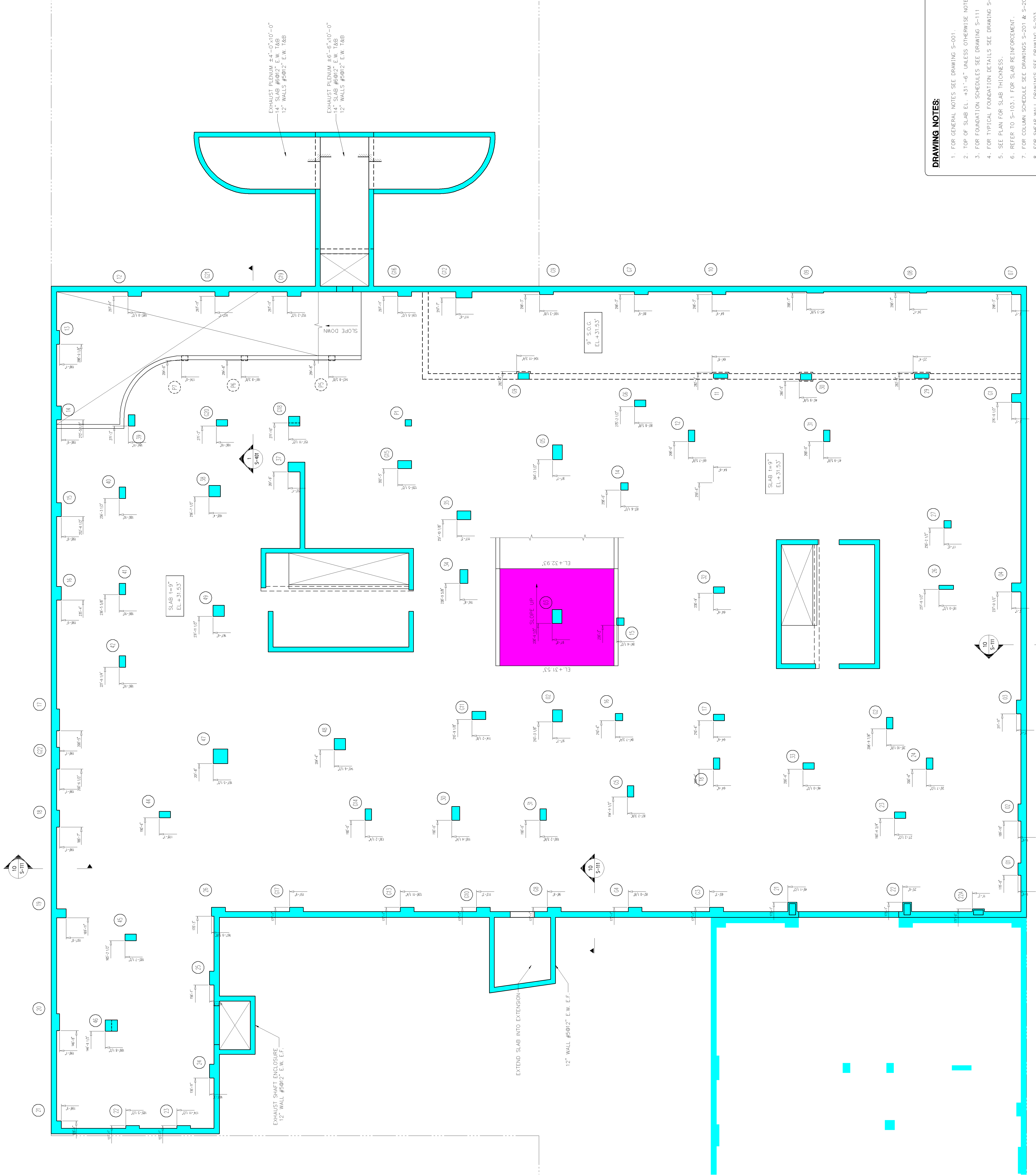
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no.	issued	revisions
1	09.13.05	FOUNDATION BID

CELLAR  
LAYOUT PLAN

DRAWING NOTES:

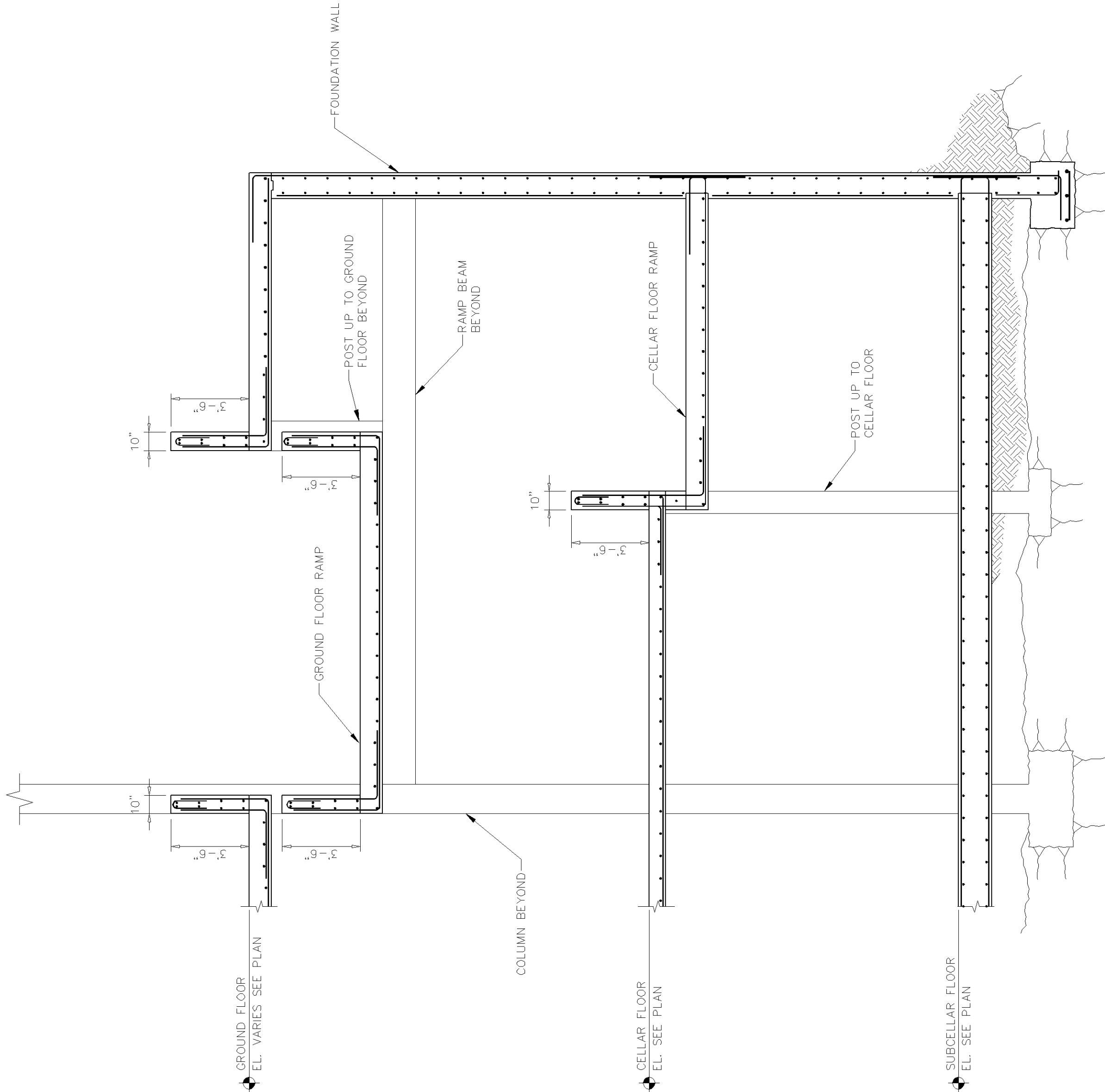
1. FOR GENERAL NOTES SEE DRAWING S-001.
2. TOP OF SLAB EL. +31'-6" UNLESS OTHERWISE NOTED.
3. FOR FOUNDATION SCHEDULES SEE DRAWING S-111.
4. FOR TYPICAL FOUNDATION DETAILS SEE DRAWING S-111.
5. SEE PLAN FOR SLAB THICKNESS.
6. REFER TO S-103.1 FOR SLAB REINFORCEMENT.
7. FOR COLUMN SCHEDULE SEE DRAWINGS S-201 & S-202.
8. FOR SHEAR WALL DRAWINGS SEE DRAWING S-203.











X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

7 SECTION AT RAMP  
SCALE: 1/4"=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

X SECTION - X  
SCALE: XX'=1'-0"

135 West 34th Street  
12th Floor  
New York, NY 10018  
212 693 3117  
212 693 3118 fax

Structural Engineer:  
DeSimone Consulting  
Engineers, PLLC

18 West 18th Street  
10th Floor  
New York, NY 10011  
212 532 2211  
212 481 6108 fax

MEP Engineer:

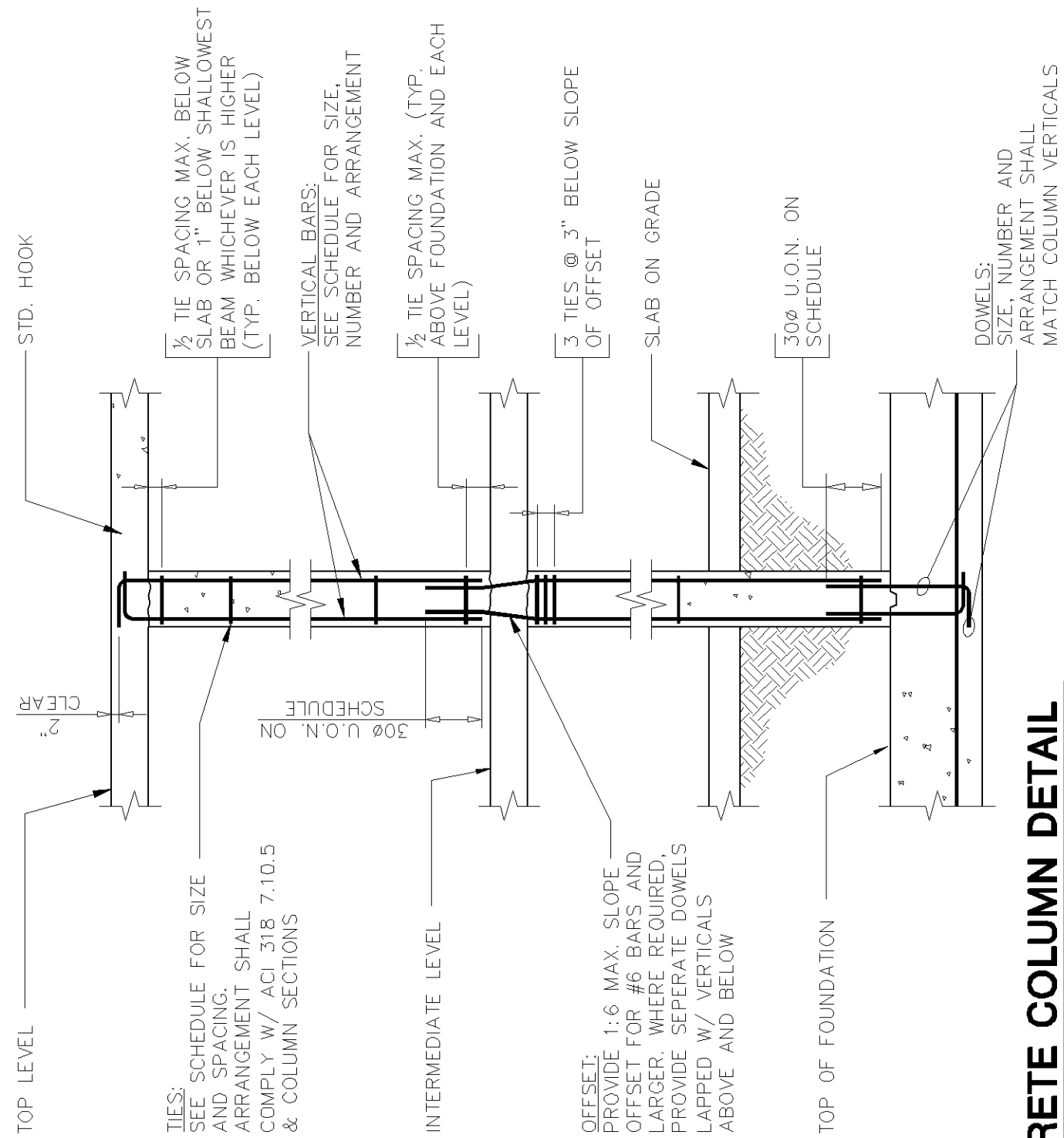
T/S Associates  
2 West 32nd Street  
5th Floor  
New York, NY 10001  
212 693 4666 tel  
212 693 7424 fax

Site Planning & Zoning Architect  
Michael Kvariter  
and Associates

116 West 29th Street  
11th Floor  
New York, NY 10001  
212 532 2211 tel

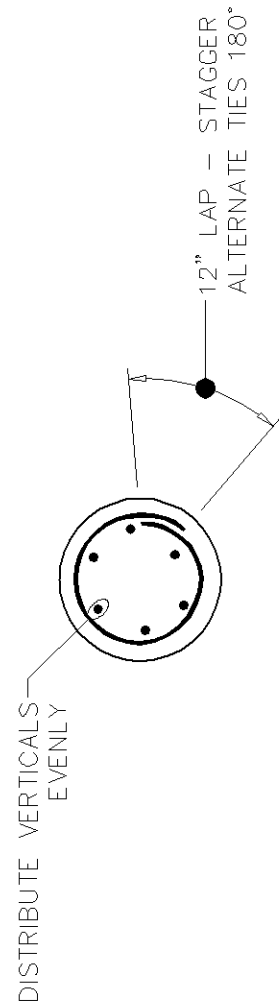
Construction Management

VJB Construction  
555 Eighth Avenue  
15th Floor  
New York, NY 10018  
212 268 7544 tel  
212 268 7574 fax



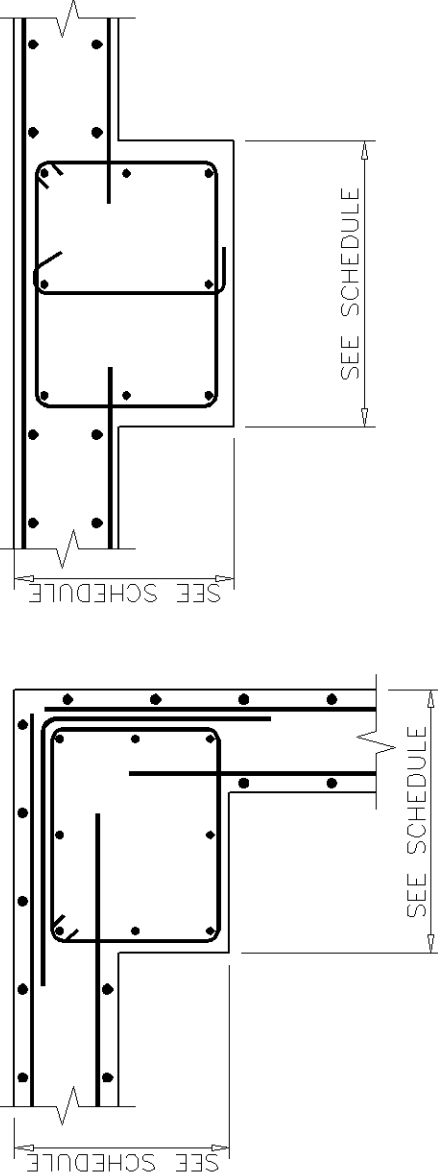
1 TYPICAL CONCRETE COLUMN DETAIL

SCALE: N.T.S.



2 TYPICAL CONCRETE COLUMN SECTIONS

SCALE: N.T.S.



5 COLUMN SCHEDULE

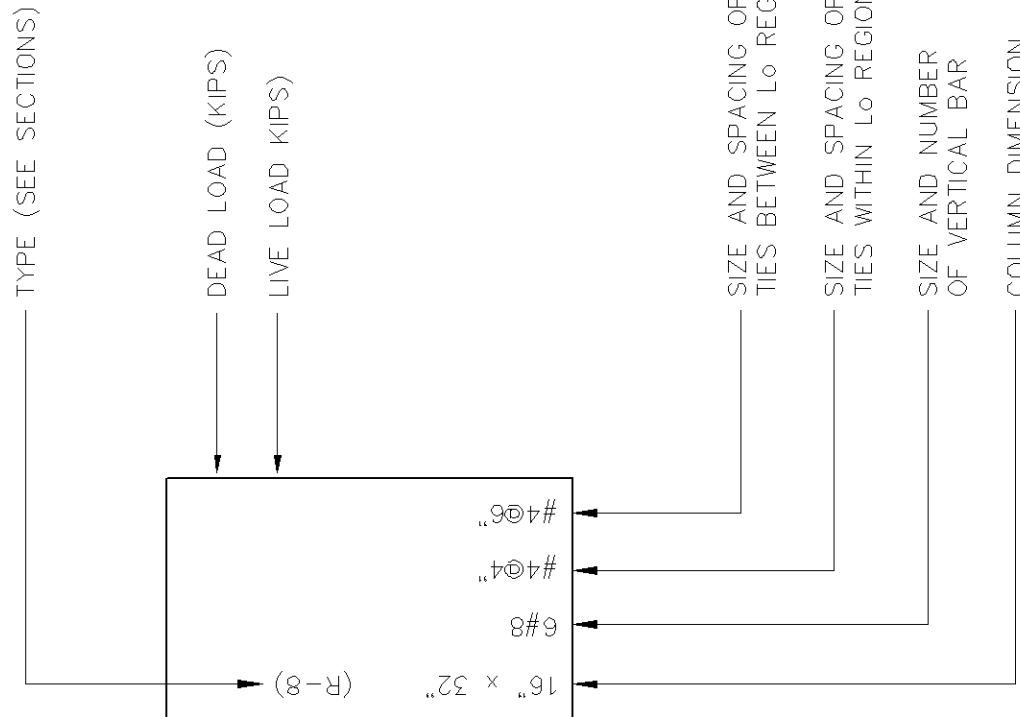
SCALE: N.T.S.

LEVEL	COLUMN		B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20A	B21	B22	B22A	B23	B24	B26	B27	B28	B29	B30	B31	B32	B33	B34
BULKHEAD ROOF																																				
EL. +																																				
10'-0"																																				
MAIN ROOF																																				
EL. +																																				
10'-0"																																				
14TH FLOOR																																				
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10'-0"																																				
GROUND FLOOR																																				
EL. SEE PLAN																																				
VARIES																																				
CELLAR																																				
EL. +31'-6"																																				
15'-2"																																				
SUBCELLAR																																				
EL. +16'-4"																																				
15'-2"																																				
LEVEL																																				

LEVEL	COLUMN		G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21	G22
2ND FLOOR																								
EL. +																								
10'-0"																								
GROUND FLOOR																								
EL. + SEE PLAN																								
VARIES																								
CELLAR																								
EL. +31'-6"																								
15'-2"																								
SUBCELLAR																								
EL. +16'-4"																								
15'-2"																								
LEVEL																								

6 GARAGE COLUMN SCHEDULE

SCALE: N.T.S.









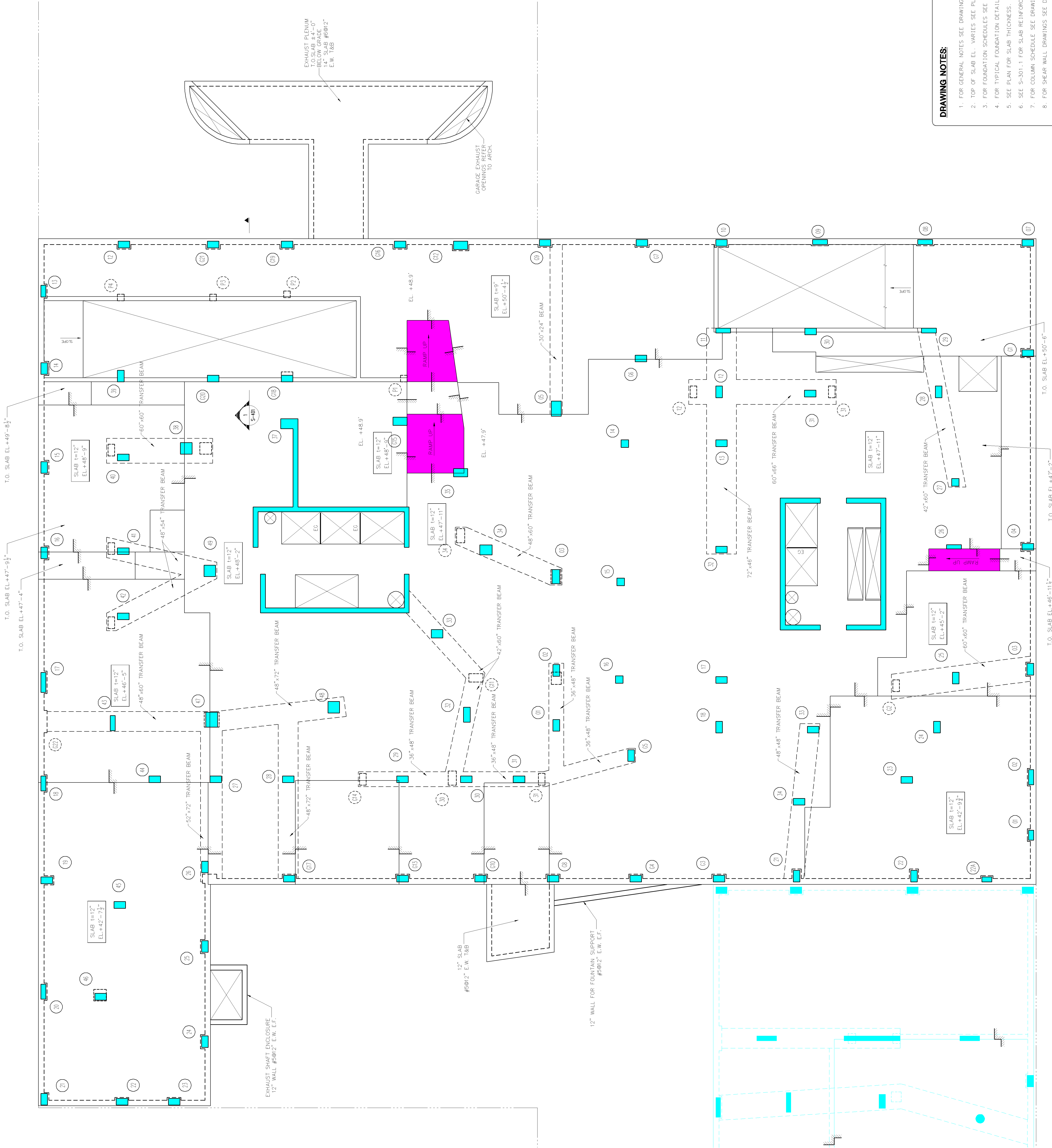


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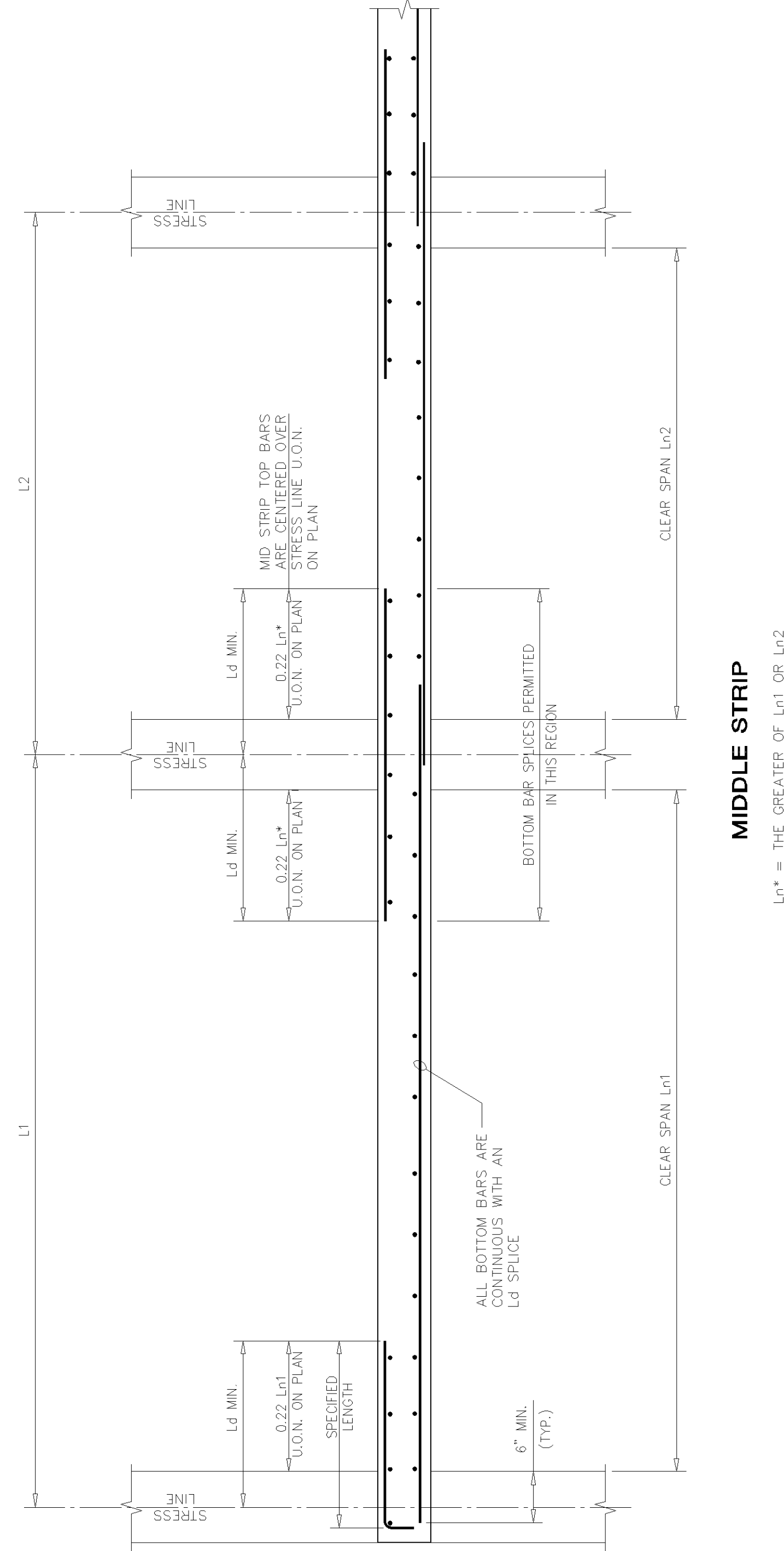
GROUND FLOOR  
LAYOUT PLAN

DRAWING NOTES:

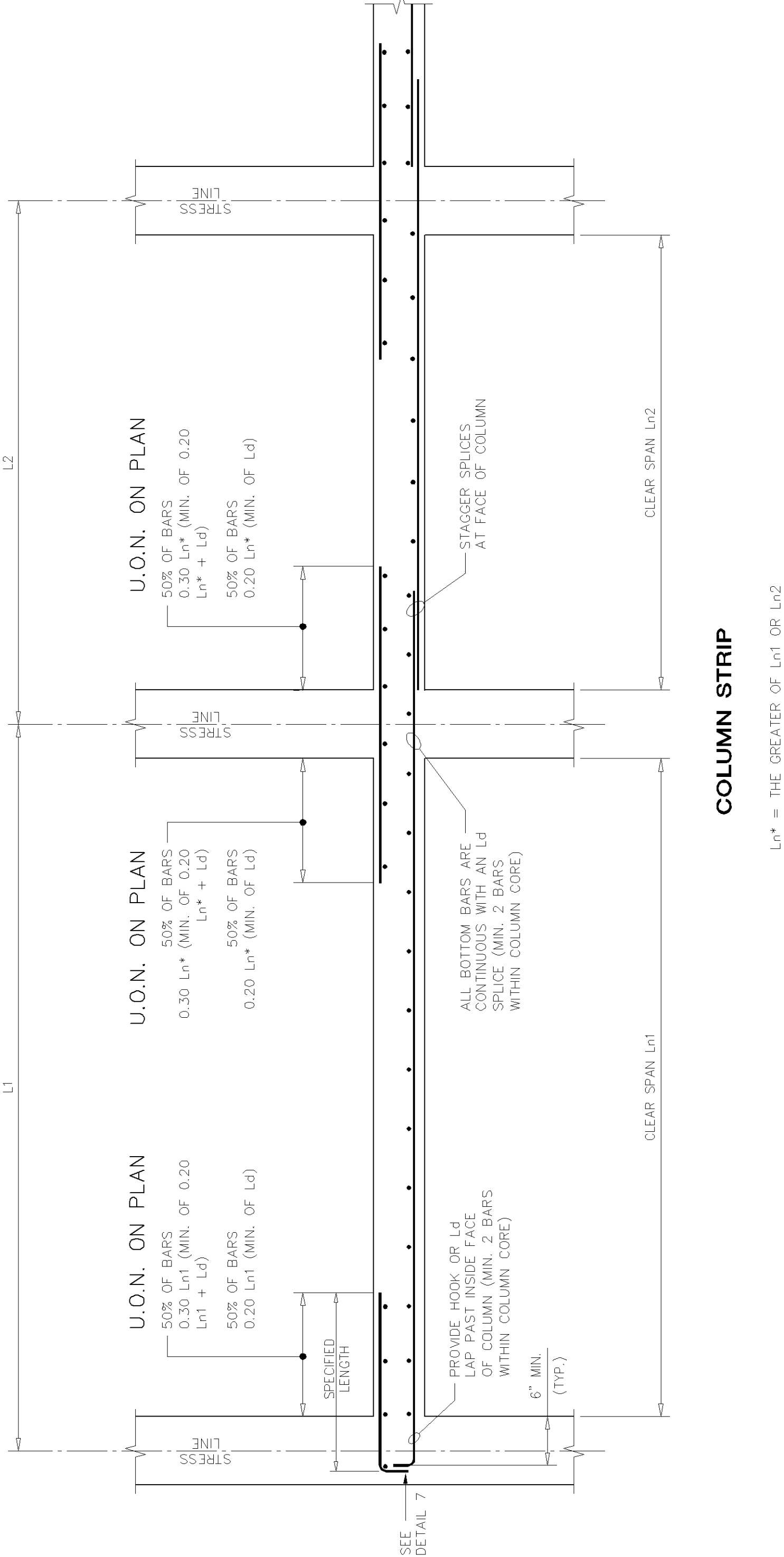
1. FOR GENERAL NOTES SEE DRAWING S-001.
2. TOP OF SLAB EL. VARIES SEE PLAN.
3. FOR FOUNDATION SCHEDULES SEE DRAWING S-111.
4. FOR TYPICAL FOUNDATION DETAILS SEE DRAWING S-111.
5. SEE PLAN FOR SLAB THICKNESS.
6. SEE S-301.1 FOR SLAB REINFORCEMENT.
7. FOR COLUMN SCHEDULE SEE DRAWINGS S-201 & S-202.
8. FOR SHEAR WALL DRAWINGS SEE DRAWINGS S-203.



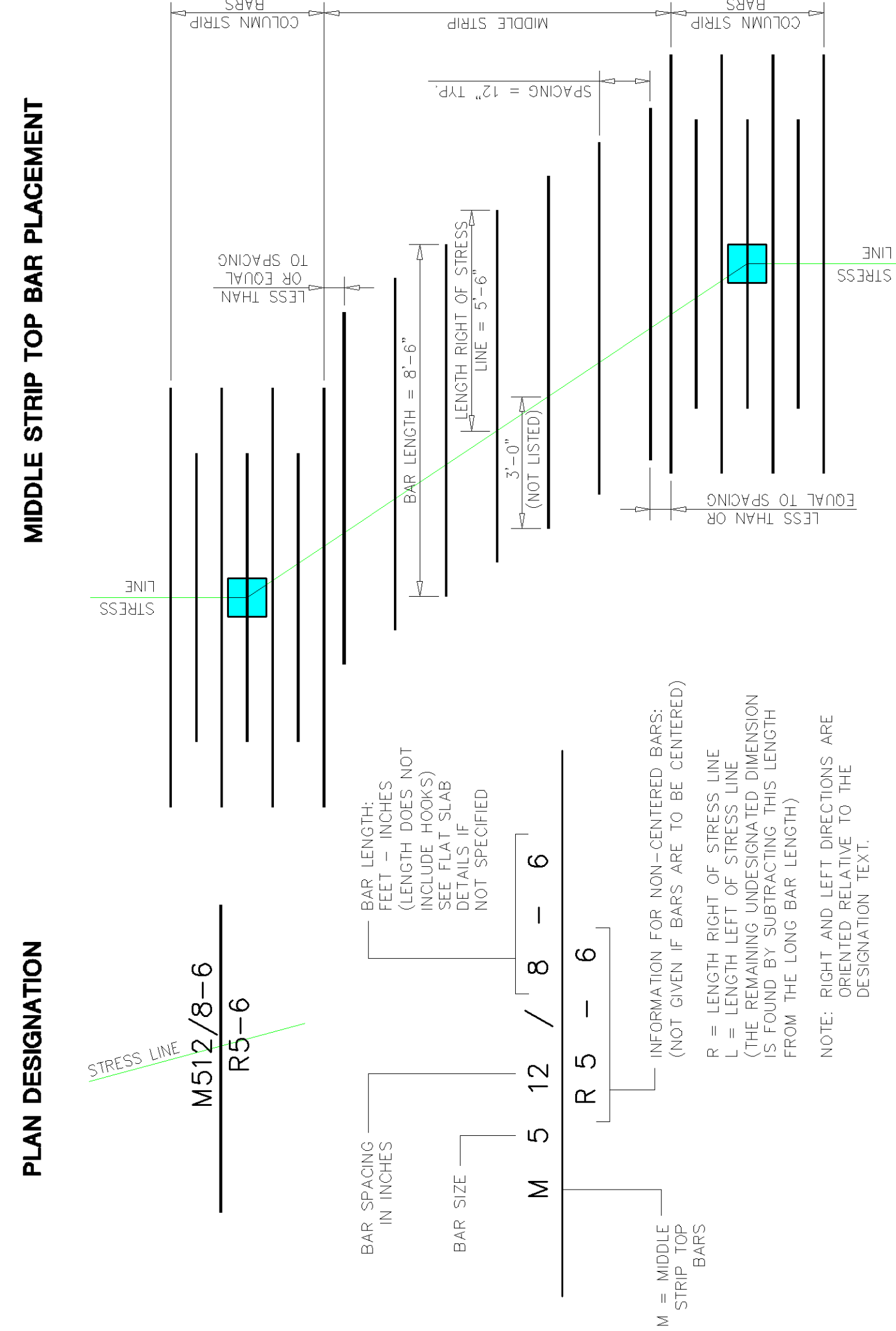
5 TYPICAL CONCRETE FLAT SLAB DETAIL



2 TYPICAL CONCRETE FLAT SLAB DETAIL

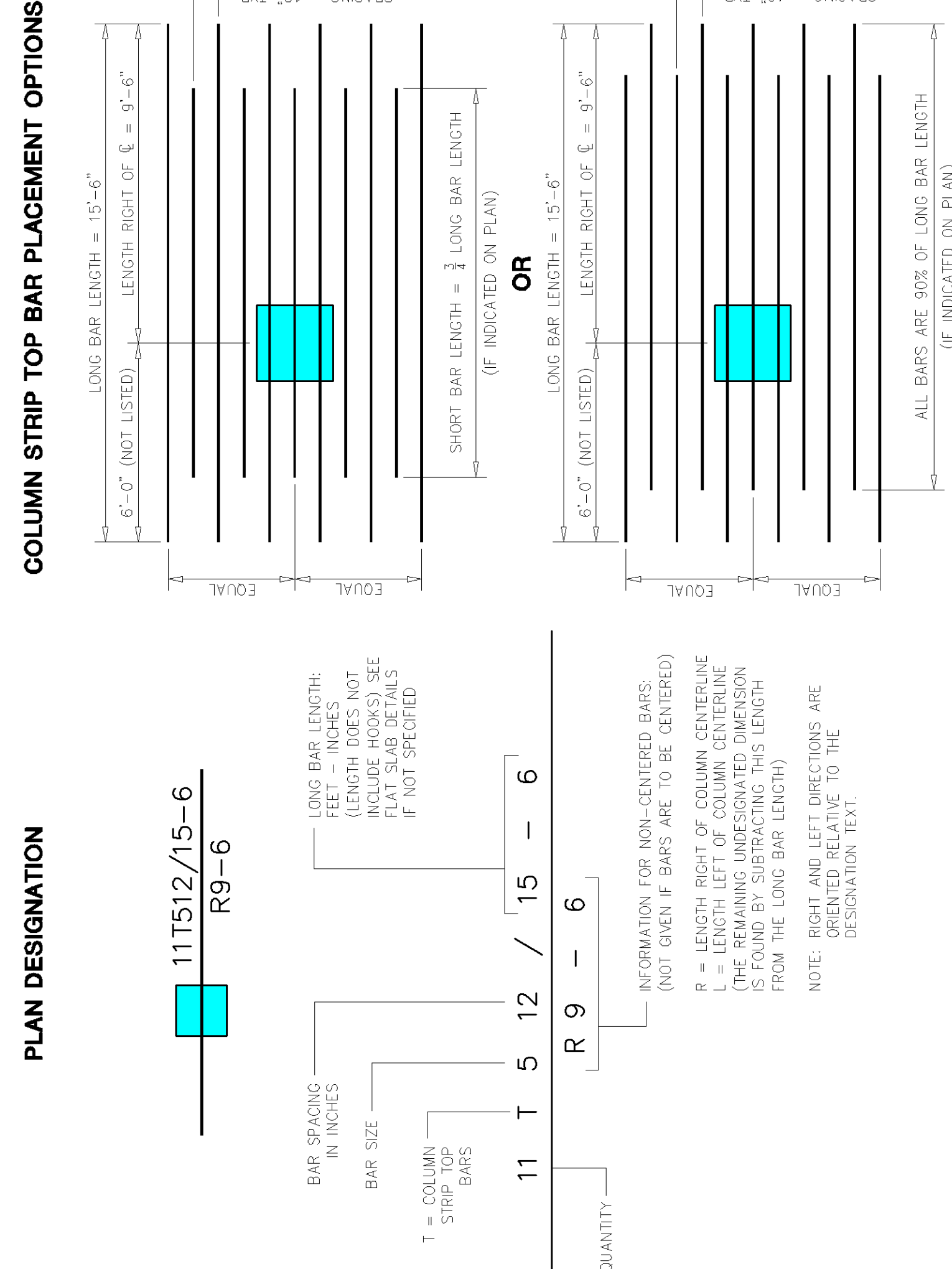


7 COLUMN STRIP TOP BAR PLACEMENT



PLAN DESIGNATION

MIDDLE STRIP TOP BAR PLACEMENT



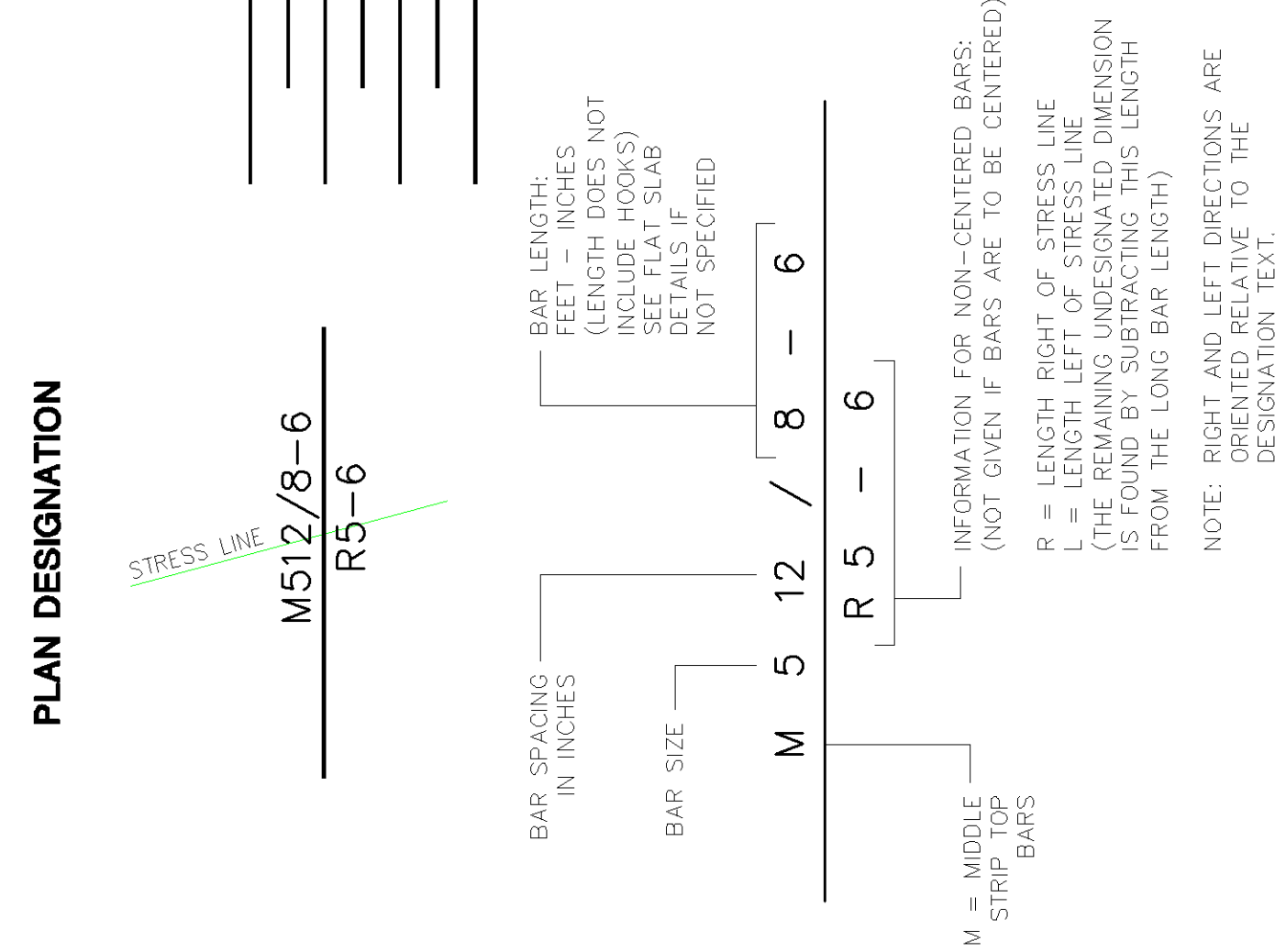
PLAN DESIGNATION

COLUMN STRIP TOP BAR PLACEMENT OPTIONS

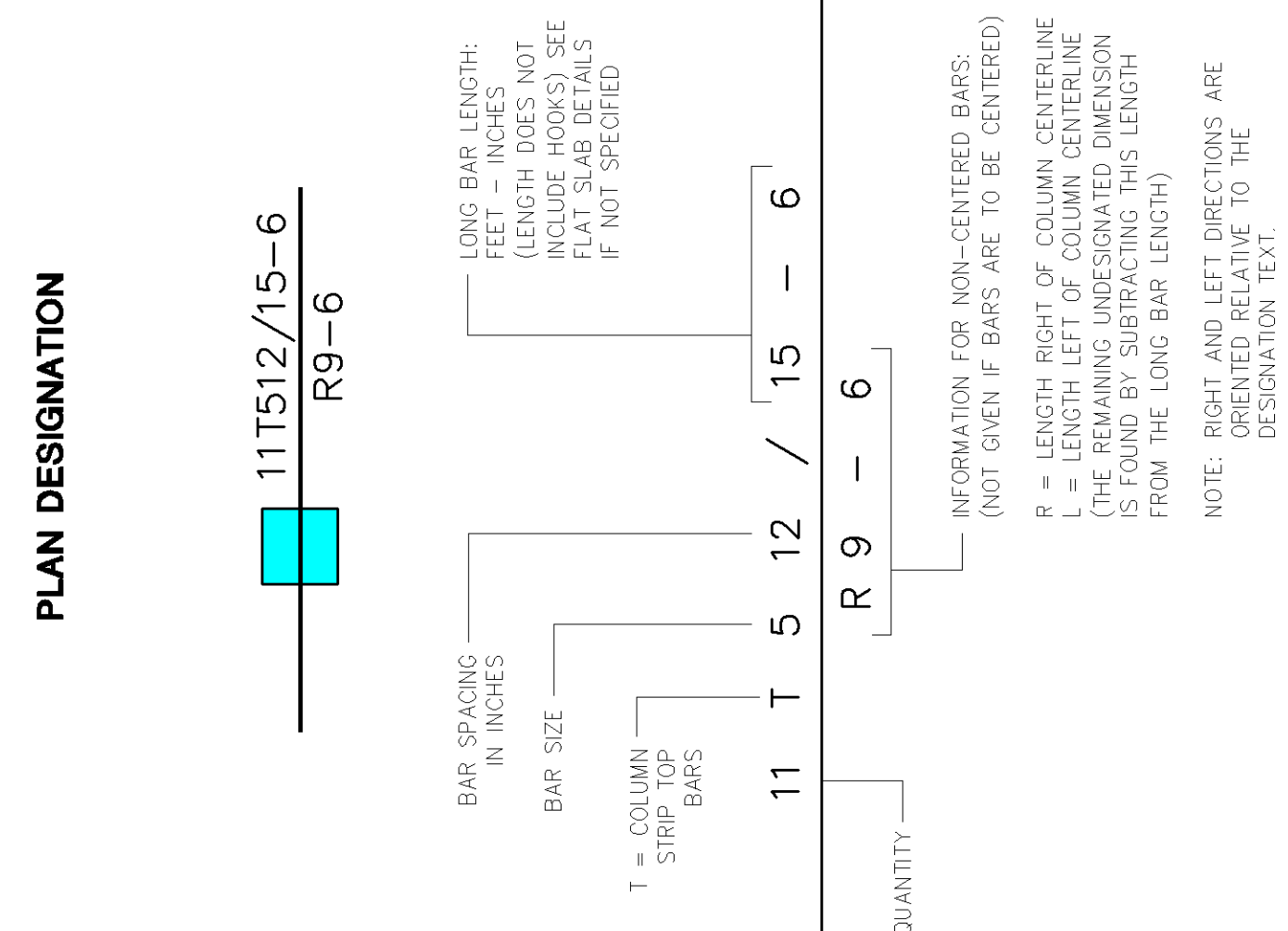
10 HOOK LENGTHS FOR CONNECTIONS

BAR #	Ldh (IN INCHES)			
	4000 psi	5000 psi	6000 psi	
3	5	5	5	
4	7	6	6	
5	9	8	7	
6	10	9	9	
7	12	11	10	
8	14	12	11	
9	15	14	13	
10	17	16	14	
11	19	17	16	

9 MIDDLE STRIP TOP BAR PLACEMENT



7 COLUMN STRIP TOP BAR PLACEMENT



7 COLUMN STRIP TOP BAR PLACEMENT

PLAN DESIGNATION

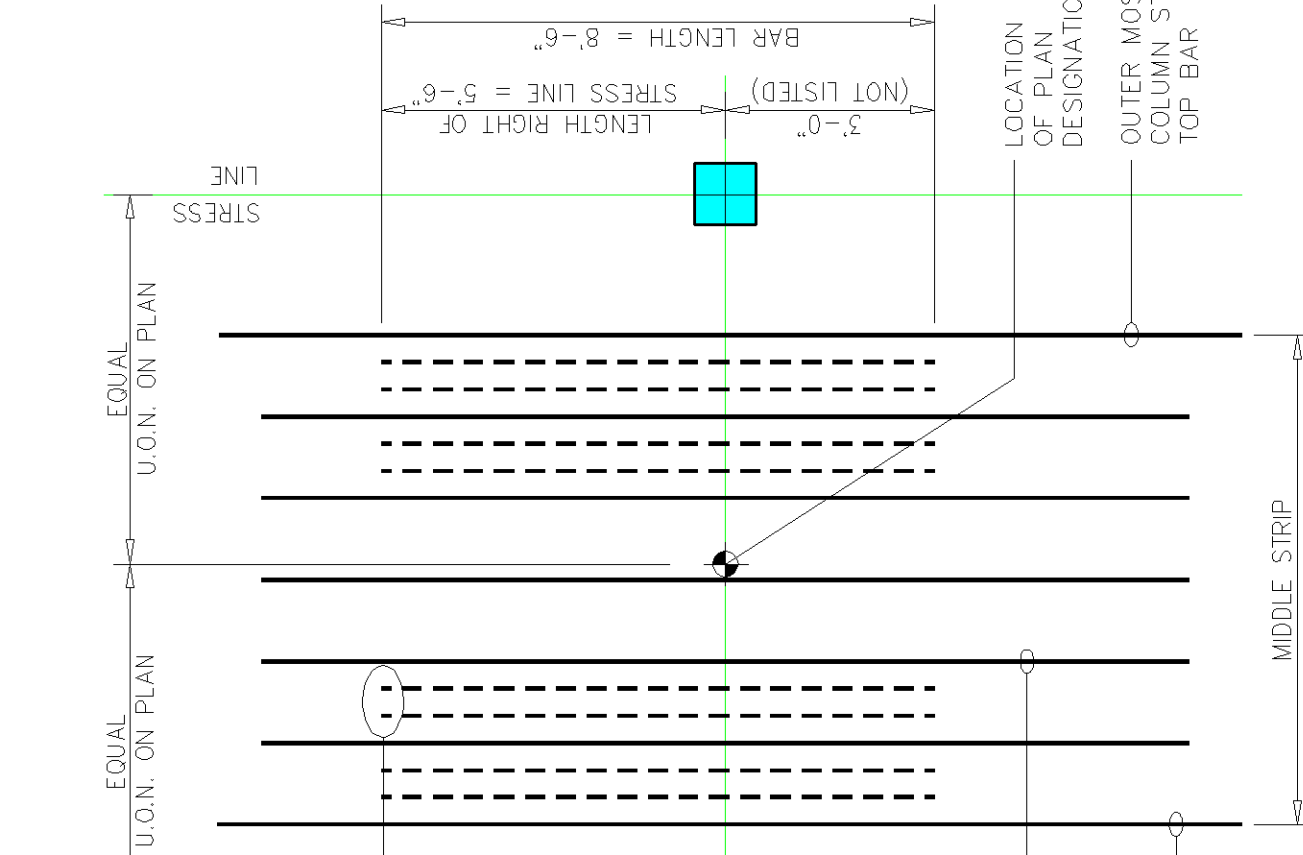
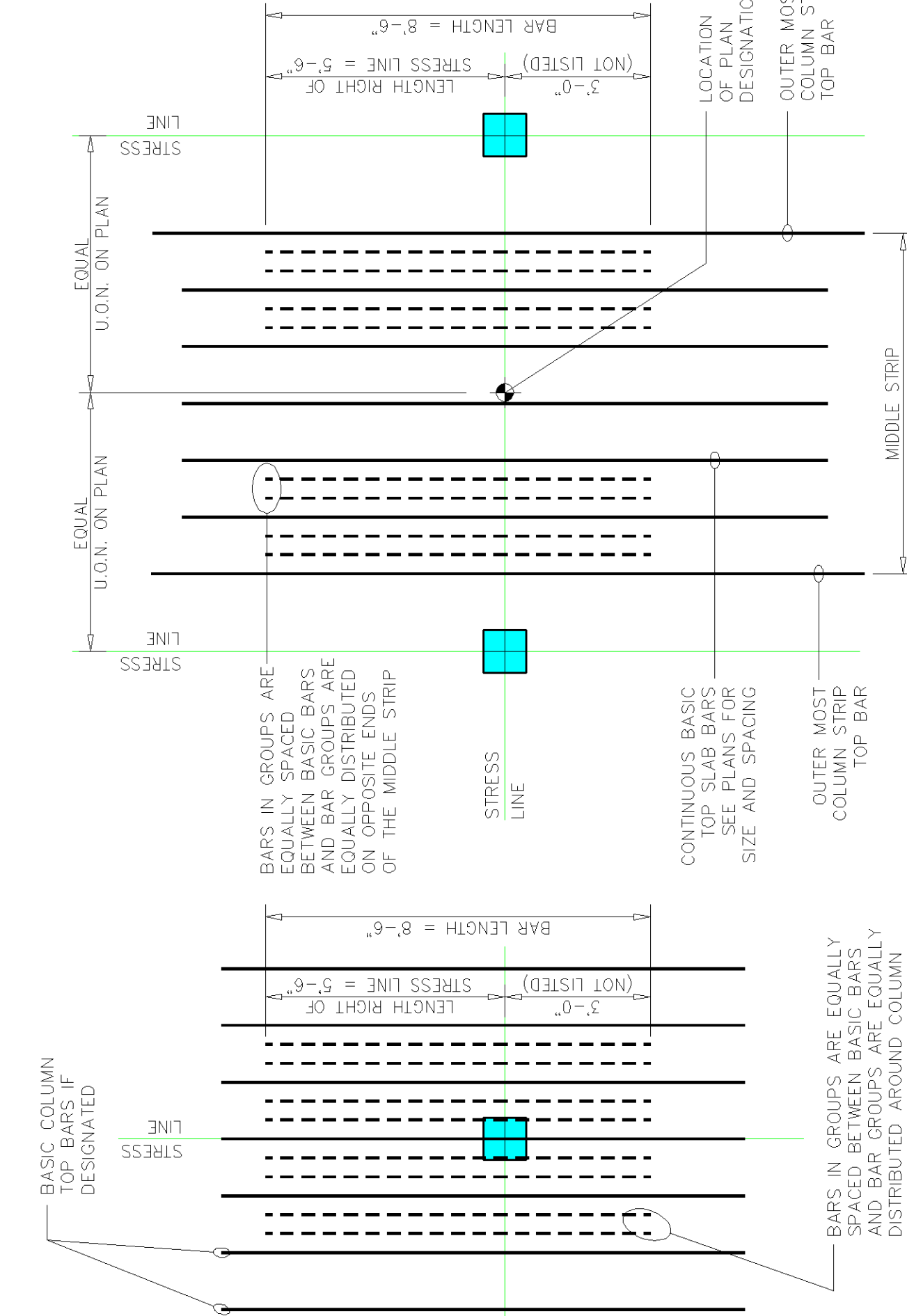
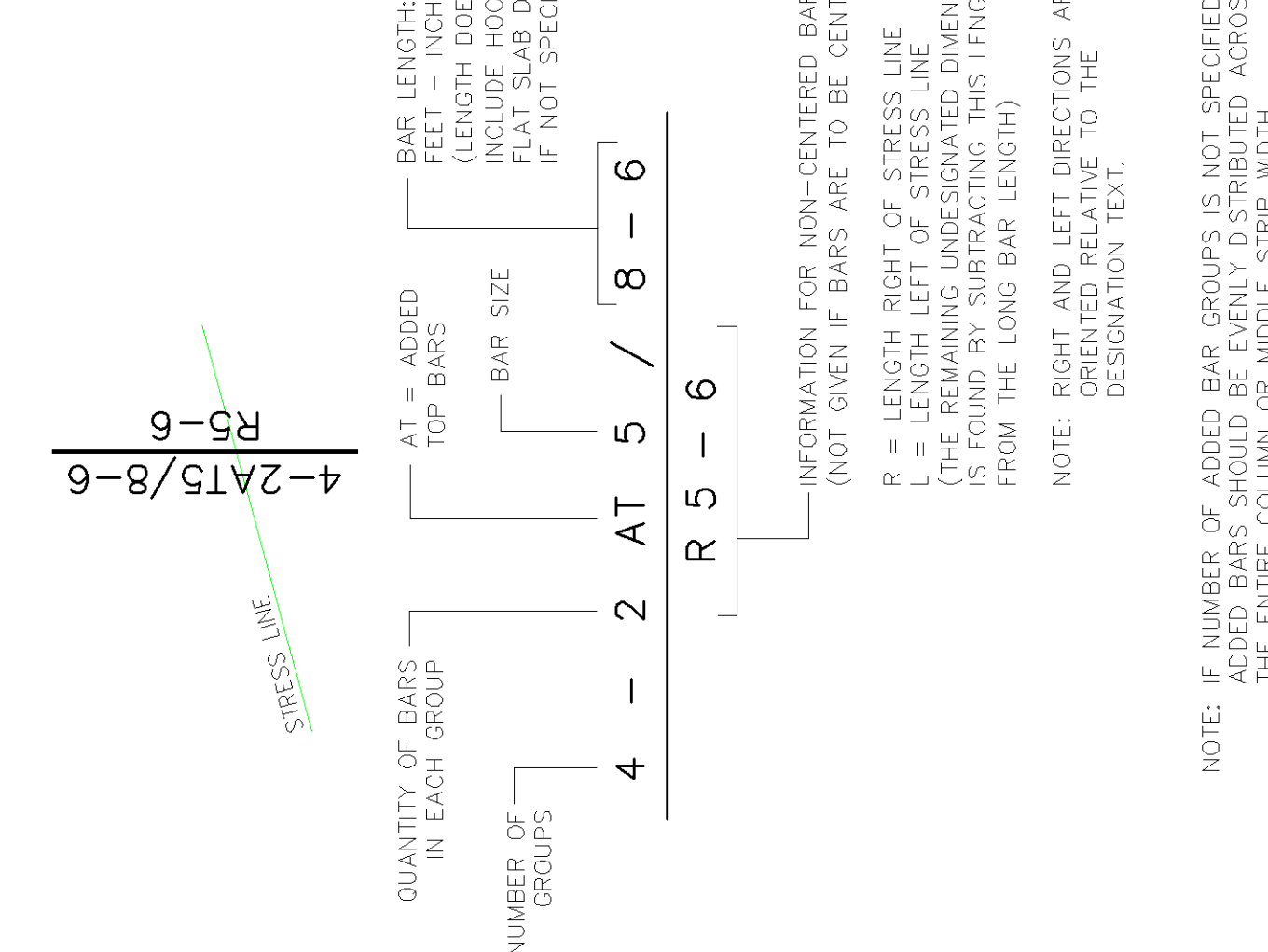
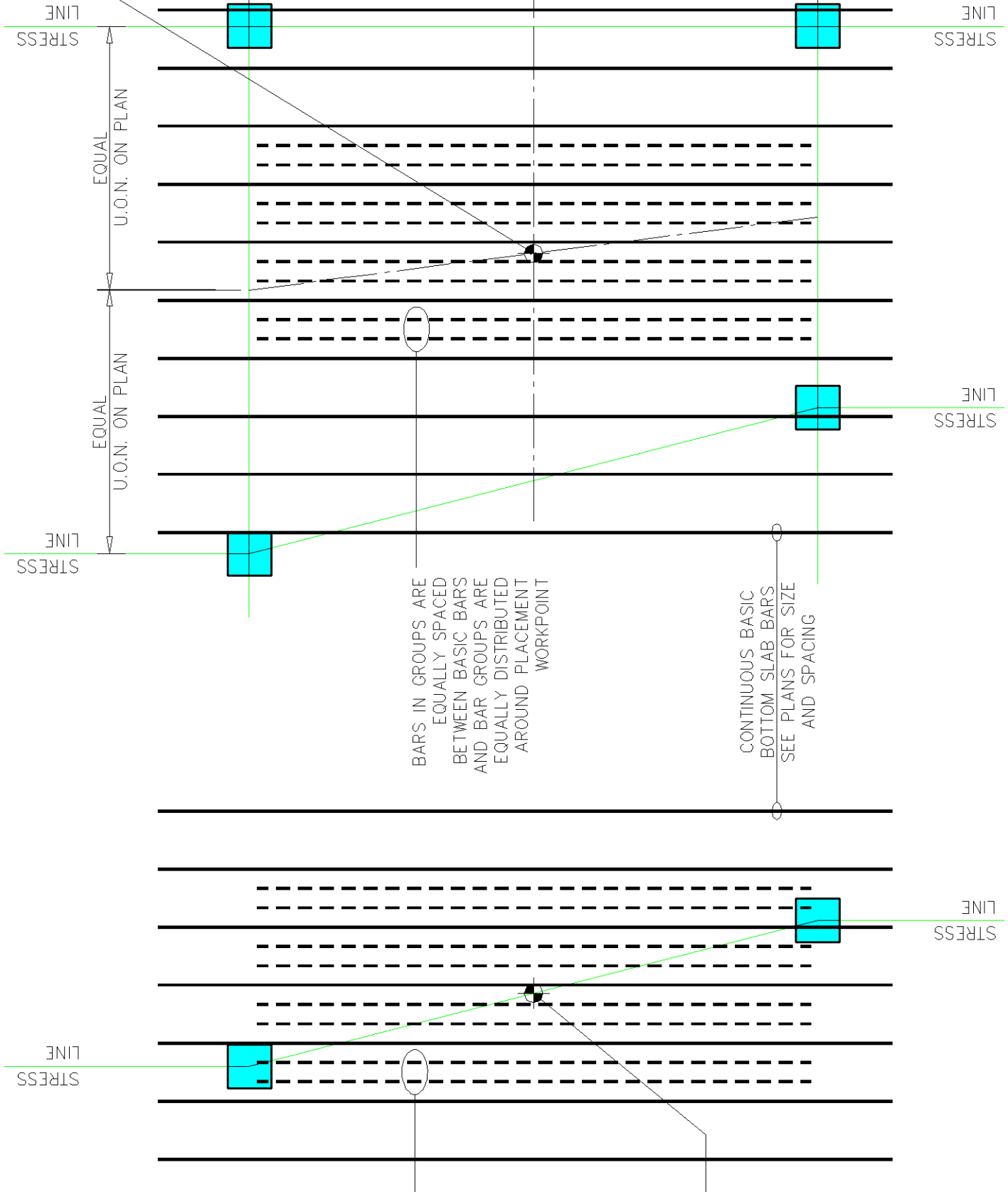
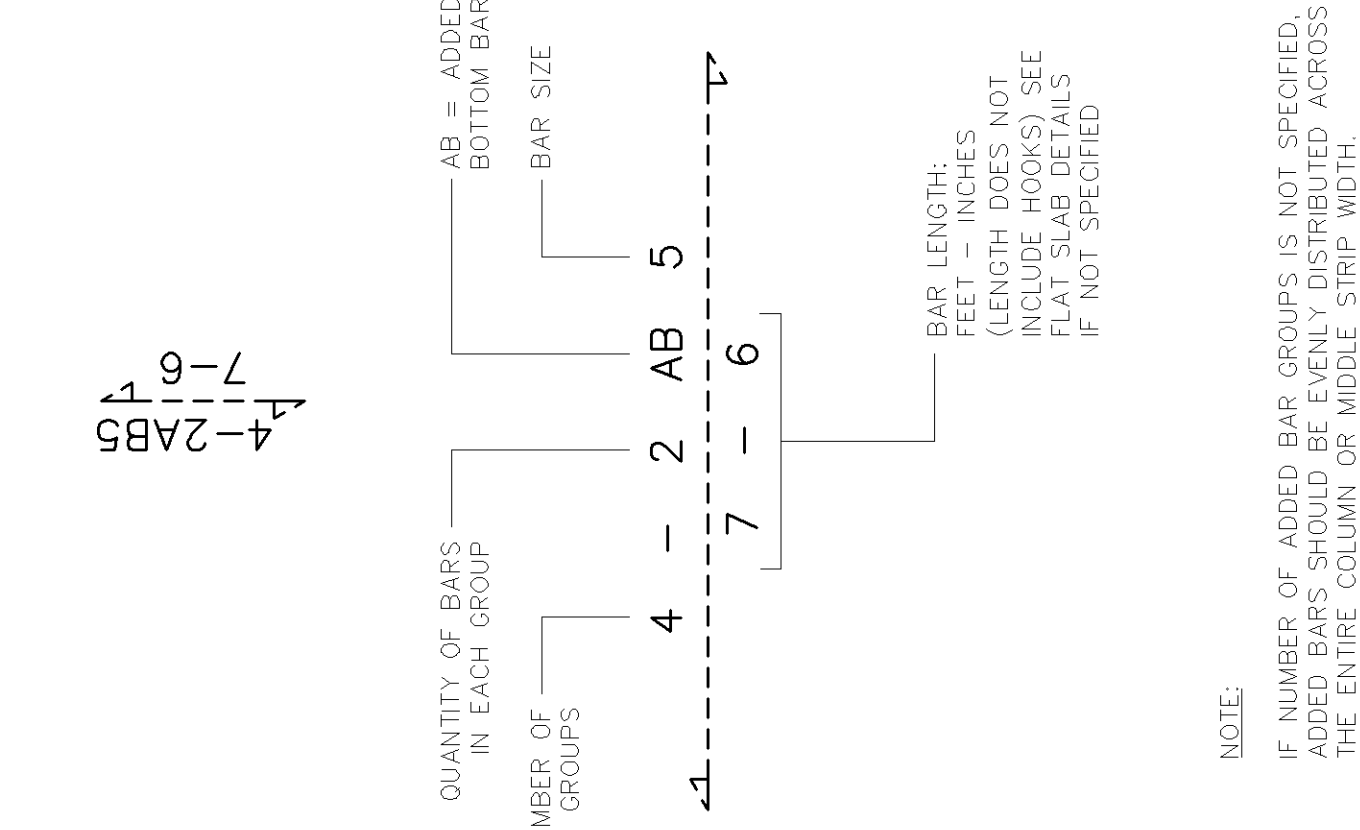
BARS ADDED IN COLUMN STRIP

BARS ADDED IN MIDDLE STRIP

PLAN DESIGNATION

BARS ADDED IN COLUMN STRIP

BARS ADDED IN MIDDLE STRIP



15 ADDED BOTTOM BAR PLACEMENT

12 ADDED TOP BAR PLACEMENT

BARS ADDED IN COLUMN STRIP

BARS ADDED IN MIDDLE STRIP