AECOM

Prepared for:
National Grid
Brooklyn, New York

Remedial Investigation Work Plan

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-0606

AECOM, Inc.
February 2009
Document No.: 01765-075

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National Grid
287 Maspeth Avenue, Brooklyn, New York 11211

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Executive Summary

This Remedial Investigation Work Plan (RIWP) has been prepared for National Grid USA (Grid) by AECOM Environment (AECOM) for a site located at 124 - 136 2nd Avenue in Brooklyn, New York (Site). This site, known as the Metropolitan former MGP Site, was the former location of a manufactured gas plant (MGP) that was operated by Brooklyn Union Gas Company (BUG), a predecessor company to Grid, from the late 1880s until approximately 1938.

A portion of the site was the subject of previous extensive remedial/redevelopment activities undertaken by independent third parties with NYSDEC oversight. This RIWP details investigation activities for those portions of the site that were not addressed by the previous remedial/redevelopment activities. The site areas to be investigated in the current RIWP are completely developed in commercial use and include various retail operations and parking lot areas.

Results from the prior investigation activities at the site provide the following information:

- The site area formerly contained a tidal stream (that is now the navigable Gowanus Canal) and adjacent salt marsh that formed on a glacial outwash plain.
- Site soils are comprised of fill containing coal ash (surface to 16 feet below ground surface (bgs); a semi-confining “meadow mat” layer comprised of peat, clay, and silt (16 to 18 ft bgs); and a mixture of sands, clays, and silts with some gravel (to approximately 80 ft. bgs).
- Two aquifer zones have been identified at the site, including a water table aquifer within fill material above the meadow mat layer, and a lower aquifer beneath the meadow mat layer. Strong downward gradients exist between the water table and lower aquifers. Wells in proximity (approximately 300 feet) to the Gowanus Canal are tidally influenced in both aquifer zones.
- The construction of several of the former MGP structures penetrated the semi-confining “meadow mat” layer, providing a downward conduit for migration of residual coal tar. Although former MGP structures were addressed during the previous remedial activities (excavation and installation/operation of recovery wells), residual material has been identified at depths of approximately 65 to 70 feet bgs in portions of the site.

The investigation presented in this RIWP will focus on the delineation of residual coal tar and associated soil impacts and dissolved phase impacts in groundwater, and will have the following objectives:

- To collect additional data to more completely determine the surface and subsurface characteristics of the site.
- To determine the nature and extent of MGP-related residuals that are present at the site and surrounding areas in soils, soil vapor, and groundwater.
- To identify the potential routes of off-site migration from on-site sources of MGP-related residuals.
- To perform an exposure assessment to evaluate the pathways by which human receptors (either on-site or off-site) may be exposed to MGP-related residuals.
- To further develop the dataset necessary to allow preparation of a Feasibility Study to evaluate remedies that will eliminate the potential threat to public health or the environment posed by the site.

The program will provide for the collection/analysis of the following samples:

- Approximately 66 soil samples
- Approximately 20 groundwater samples
- Vapor intrusion samples including sub-slab soil gas, indoor air and ambient background

Sufficient flexibility will be incorporated into the project scope to allow additions to, or modifications of proposed investigation locations in real time to better delineate the nature and extent of MGP residuals in various media (soil, soil vapor/indoor air, and groundwater).

The results from the program will be compiled into a comprehensive report to provide a delineation of MGP impacts and an evaluation of potential risk. The information will be appropriate for the evaluation of potential remedies for the site.

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1.0 Introduction

This Remedial Investigation (RI) Work Plan has been prepared for National Grid USA (Grid) by AECOM Environment (AECOM) for a site located at 124 - 136 2nd Avenue in Brooklyn, New York (Site). The location of the site is shown on Figure 1-1. This site, known as the Metropolitan former Manufactured Gas Plant site was the former location of a manufactured gas plant (MGP) that was operated by Brooklyn Union Gas Company (BUG), a predecessor company to Grid, from the late 1880s until approximately 1938. A portion of the site has been extensively investigated and remediated under New York State Department of Environmental Conservation (NYSDEC) Spill numbers 9214380, 9704147, and 0107907, also known as the USPS Gowanus Site (Site No.: V00405-2), performed by FC Gowanus Associates, LLC. FC Gowanus Associates performed the work prior to property redevelopment at a portion of the former MGP site. The NYSDEC issued a Case Closure Letter for this work with stipulations on property use, including a requirement for ongoing operations, monitoring, and maintenance (OM&M) of site recovery wells. A summary their work and other historical investigation and remediation documents is discussed in later sections and summarized in Appendix A.

The investigation is being conducted by Grid pursuant to a Multi-site Order on Consent and administrative settlement with the NYSDEC, Index # A2-0552-0606, which was executed in February 2007, and in accordance with applicable guidelines of the NYSDEC, the New York State Department of Health (NYSDOH), the United States Environmental Protection Agency (USEPA) and the National Contingency Plan (NCP).

This RI Work Plan presents the project objectives, provides background information regarding historical site use and current conditions, summarizes the results of previous investigations, and outlines the strategies and methodologies that will be implemented during the investigation. The following four appendices have been developed which detail the procedures and protocols outlined in this Work Plan:

- The Field Sampling and Analytical Plan (FSAP) provides information regarding field sampling methods and procedures that will be used during the investigation.
- The Quality Assurance Project Plan (QAPP) specifies the quality assurance/quality control procedures that will be implemented during the fieldwork and in the laboratory which performs the chemical analyses of the samples collected during the RI.
- A Community Air Monitoring Program (CAMP) provides information regarding the procedures to be used to monitor and control, if necessary, the potential release of airborne constituents at the downwind perimeters of the investigation work areas. Included in the CAMP are procedures regarding the control of odors that may be present as a result of the intrusive site investigation activities.
- A Site-Specific Health and Safety Plan (HASP) has been prepared to outline procedures that will be undertaken to protect site workers and visitors from potential hazards that may exist as a result of the fieldwork performed at the site.

1.1 Project objectives

A site inspection and planning visit meeting was conducted by AECOM, Grid, and the NYSDEC on December 2, 2008 to facilitate agreement of the RI objectives and scope presented in this Work Plan.

In summary, the objectives of the RI include the following:

- Collect additional data to more completely determine the surface and subsurface characteristics of the site.

- Determine the nature and extent of MGP-related residuals that are present at the site and surrounding areas in soils, soil vapor, and groundwater at locations not previously addressed as part of the FC Gowanus, LLC work presented above.
- Identify the potential routes of off-site migration of MGP-related residuals from on-site sources.
- Perform an exposure assessment to evaluate the pathways by which human receptors (either on-site or off-site) may be exposed to a MGP-related residuals.
- Further develop the dataset necessary to allow preparation of a Feasibility Study to evaluate remedies that will eliminate the threat to public health or the environment posed by the site.

It was also agreed during the December 2, 2008 planning meeting with NYSDEC representatives that sufficient flexibility would be incorporated into the investigation scope to allow additions to or modifications of investigation locations proposed in this document. Such changes may be required in real time to better delineate the nature and extent of MGP residuals in various media (soil, soil vapor/indoor air, and groundwater). Any modifications to the work presented herein would be made following consultation with Grid and NYSDEC oversight personnel prior to work being performed.

1.2 Work plan organization

Following this introduction, the remainder of this Work Plan describes the proposed RI activities.

- Section 2 – provides a description of the site, summary information regarding site ownership and operational history, and the results of the previous investigation work performed at the site.
- Section 3 – presents the objectives for the investigation followed by a description of the specific tasks that will be undertaken to gather sufficient information to meet the project objectives.
- Section 4 – describes the companion documents that are included as appendices to this Work Plan, including the FSAP, QAPP, CAMP, and HASP.
- Section 5 – describes the Qualitative Human Health Exposure Assessment to be completed based on data collected during the RI that will be included as part of the RI Report.
- Section 6 – presents the approximate project schedule, with key milestones.
- Section 7 – provides a list of the references cited in the Work Plan.

Appendices to the Work Plan include the following:

- A summary of previous investigation reports and Sanborn Maps are included in Appendix A.
- Previous investigation soil boring and well completion logs are included in Appendix B.
- The FSAP is included as Appendix C.
- The QAPP is included as Appendix D.
- The CAMP is included as Appendix E.
- The HASP is included as Appendix F.
- The previous investigation reports are included as Appendix G (CD-ROM).

2.0 Site description and history

This section presents a description of the site, summary information regarding site ownership and operational history, and summarizes the results of the previous investigation work.

2.1 Site description

The Metropolitan former MGP site is located at 124 – 136 2nd Avenue, Brooklyn, Kings County, New York 11215, east of the Gowanus Canal, between the Gowanus Expressway (Highway 278) and the New York City Transit train bridge and associated subway rail line. The site is bounded by 10th Street and 11th Street to the north, 2nd Avenue to the east, 13th Street to the south, and the Gowanus Canal to the west. The location of the site and the surrounding features are shown on an aerial photograph on Figure 2-1.

A portion of the site was the subject of previous extensive remedial/redevelopment activities undertaken by independent third parties with NYSDEC oversight. This RIWP details investigation activities for those portions of the site that were not addressed by the previous remedial/redevelopment activities, i.e. the "current" site. The current site is comprised of the following seven parcels of land:

Block/Lot Number	Owner's Name and Address	Operator's Name and Address	Status
Block 1007 Lot 172	Hamilton Plaza Associates 560 Sylvan Avenue Englewood Cliffs, NJ 07632	1 – 27 12th Street Extension or 2 11th St. Brooklyn, NY 11215	Currently a retail shopping plaza (strip mall) including a large grocery store (Pathmark) and small retail shops.
Block 1007 Lot 269	Department of Business Services 110 Williams Street New York, NY 10038	12th St. Brooklyn, NY 11215	Currently part of the retail shopping plaza. Parcel contains a permanent sewer easement.
Block 1025 Lot 16	Hamilton Plaza Associates 560 Sylvan Avenue Englewood Cliffs, NJ 07632	22 – 42 12th St. or 21–41 13th St. Brooklyn, NY 11215	A parking lot, currently part of the retail shopping plaza.
Block 1025 Lot 18	Presumed to be Hamilton Plaza Associates 560 Sylvan Avenue Englewood Cliffs, NJ 07632	Hamilton Place Brooklyn, NY 11215	Presumed to be part of the retail shopping plaza as part of the parking lot.
Block 1025 Lot 20	Presumed to be Hamilton Plaza Associates 560 Sylvan Avenue Englewood Cliffs, NJ 07632	Hamilton Place Brooklyn, NY 11215	Presumed to be part of the retail shopping plaza as part of the parking lot.
Block 1025 Lot 100	Hamilton Plaza Associates 560 Sylvan Avenue Englewood Cliffs, NJ 07632	50 12th Street Brooklyn, NY 11215	Currently a retail parking lot selling used automobiles.
Block 1025 Lot 26	Milea Associates II, LLC 435 Hamilton Avenue Brooklyn, NY 11232	60 12th Street Brooklyn, NY 11215	Currently a two-story maintenance garage/retail offices.

Current and historic site features are shown on Figure 2-2. Figure 2-3 provides a map showing the locations of the parcels listed above as well as other adjacent properties.

2.1.1 Adjacent properties

The current site is bounded by the Gowanus Canal to the west, beyond which are commercial properties. Southeast of the property is 2nd Avenue, beyond which are commercial and residential properties. To the southwest is 13th Street, commercial properties and the Gowanus Expressway (Highway 278). To the north and east of the site lie the properties that were previously remediated by a third party under NYSDEC supervision and redeveloped as a Lowe's Supply Store (Block 1007, Lots 118, and 220), and associated parking lots (Block 1007, Lots 1 and 219). To the south of the site lie two properties (Block 1025, Lots 1 and 52) that were previously part of the Brooklyn Alcatraz Asphalt Company. A summary of environmental database search records for these and other local properties is provided in Table 2-1.

2.2 Site history

A review of the historical information available for the Metropolitan former MGP site (current site and previously remediated areas) has been performed with the results summarized in a report prepared by Nelson, Pope & Voorhis, LLC (NP&V) entitled "*Phase I Environmental Site Assessment*", dated May 15, 1997 (NP&V, 2003). The report included a review of the historic Sanborn Fire Insurance maps for the site as well as other available information (including tax records, zoning records, and United States Geologic Society (USGS) Topographic Maps). A copy of the Sanborn maps are included in Appendix A, and a summary of the historical information obtained from these sources is presented in Table 2-2. The following section discusses site usage based on a review of Sanborn Maps covering the 110 year period of 1886 through 1996.

In 1886 the site was occupied by Metropolitan Gas Light Company (listed as storage only on the 1886 Sanborn map) and included a coal shed, gasometer (No. 1 holder), and retorts. By 1904, the MGP was listed as the Metropolitan Works Branch and owned by BUG. By this time, the plant expanded to include two additional holders (Holders 2 and 3) and showed expansion of gas manufacture structures and tanks (mostly in the northern portion of the site).

Historical records suggest that the gas plant operated as a coal gas plant prior to 1915, by which time the plant appears to have converted to a carbonated water gas process. By this time, the plant had added an additional hydrogen holder (Holder 4) as well as oil storage tanks east of Holder 2. The facility expanded onto Block 1025 and added a large distribution holder (Holder 5). An asphalt plant (Brooklyn Alcatraz Asphalt Company) is shown to be located adjacent to the former MGP on two separate parcels.

By 1938, most of the operating structures and Holders 1 through 3 were removed and the site was listed as the BUG "12th Street Holder Department", suggesting that gas manufacturing had ceased and the site was used for gas storage only. At this time, the Ernst Zobel Pitch Paint Manufacturing Plant was reportedly in operation adjacent to and northeast of the site. However, the adjacent asphalt plant was no longer in operation by this time.

In 1950, the southern portion of the eastern parcel of the former MGP was listed as housing the US Post Office Garage and Repair shop, with some former MGP structures (a coal bunker where relief Holder 4 was previously shown and a boiler house) closer to the Gowanus Canal on the northern portion of this parcel. The western parcel of the former MGP still housed Holder 5 and the exhaust house, with the parcel listed as a storage area for old electric cables.

By 1969, all former MGP structures were removed from the surface of the eastern parcel of the former MGP, however BUG was still listed as the owner of the western parcel and Holder 5 was still present. In addition, a food products warehouse was shown as being present in the northern portion of the eastern parcel of the former MGP, adjacent to the Gowanus Canal. By 1972, all structures from the former MGP were removed

from the surface. Sanborns from 1982 through 1996 show no major changes in site usage, with the US Postal Service, the food packaging warehouse, and parking covering the footprint of the former MGP.

The southern half of the MGP parcel (Block 1007, Lots 1, 218, 219 and 220[Figure 2-3]) was investigated and remediated through extensive soil excavation of the former oil tanks and Holders 1 through 3. In addition, approximately 44 recovery wells were installed along the southern and western edges of this parcel to allow recovery of free phase non-aqueous phase liquid (NAPL). This work, completed in 2003 by FC Gowanus, LLC, allowed this portion of the former MGP footprint to be closed under NYSDEC oversight in September 2003. The remediation/closure of these areas, with subsequent redevelopment as a Lowe's Supply Store, provides the basis for the definition of the current site. Recent information on the current site is limited to a 2007 petroleum release for a maintenance and garage facility (Block 1025, Lot 26 [60 12th Street]). A list of available information related to the spill is provided in Appendix A.

2.3 Previous investigation work

Previous investigation activities have occurred at the Metropolitan MGP site (current site and previously remediated areas) between 1997 and 2007. A list of previous reports reviewed is provided in Appendix A and a copy of each report is provided in Appendix G. Information provided in these previous reports has been summarized in a series of figures, as outlined below:

- Figure 2-2 illustrates the locations of previous investigation locations, including surface soil, subsurface soil, monitoring wells and soil vapor locations. The majority of these locations are located near the southern portion of the main former MGP parcel, where three former gas holders (Holders 1 through 3) and historic above ground oil storage tanks (ASTs) and underground storage tanks (USTs part of the former US Postal Service building) were located. Also summarized on Figure 2-2 are areas that have been remediated and closed.
- Figure 2-3 shows the locations of the various parcels comprising the maximum extent of the former MGP site and the current site (defined previously), which does not include the parcels previously investigated and remediated (Block 1007, Lots 1, 118, 219, and 220). .
- Figure 2-4 shows locations where analytical laboratory data was generated from the locations shown in Figure 2-2. Note that several of the locations are within the areas that have been remediated. Table 2-3 through Table 2-5 provide summaries of the laboratory analytical parameters from the previous investigations.
- Figures 2-5 through 2-8 show locations where visible impacts were noted at various depths during previous investigation activities. Figure 2-5 shows visible impacts from locations ranging from the ground surface to 15 feet (ft) below ground surface (bgs). Visual impacts include coal tar impacted soil, a soil horizon described as a "black layer" in previous reports, or non-aqueous phase liquid (NAPL)/visible hydrocarbon impacts. Figures 2-6, 2-7, and 2-8 show NAPL impacts from 15 to 30 ft bgs, 30 to 50 ft bgs, and greater than 50 ft bgs, respectively. Figure 2-7 also shows locations where elevated hydrocarbon readings were detected when samples were screened with a photoionization detector (PID). Locations where no visible impacts were observed are also shown on these figures.
- Recovery well locations are shown on Figure 2-2. Note that many of the investigation locations, including monitoring wells, have been removed due to excavation activities associated with the FC Gowanus LLC work. The only remaining monitoring wells include the recovery wells (denoted by RW) RW-1 through RW-44 (located along the western edge of the current Lowe's Home Supply building) and three 4-inch monitoring wells (possibly including AMW-1 and AMW-2) located along 2nd Avenue near the intersection with 12th Street.

2.4 Site physical characteristics

Information obtained during the previous site investigations regarding the site topography, geology, and hydrogeology is summarized in the following sections.

2.4.1 Site topography and drainage

The ground surface in the area of the former MGP operations is approximately 10 ft above mean sea level (amsl). The area has been significantly altered due to industrial activities over the last century, and has likely been re-graded many times. The topography at the site is level, with a slight slope towards the Gowanus Canal, which forms the western boundary of the property and is classified as a NYSDEC Class D (SD) water body. The designated uses for a Class SD waters (the most degraded saline water body classification; GEI, 2007b) is for fishing and fish survival. Surface drainage generally follows surface topography, and is managed through an onsite storm water drainage system. Numerous outfall pipes have also been documented entering the Gowanus Canal (GEI, 2007b) from areas nearby the site.

2.4.2 Site geology

According to Mueser Rutledge (2002), the site area formerly contained a tidal stream (that is now the navigable Gowanus Canal) and adjacent salt marsh that formed on a glacial outwash plain. Gradual infilling of the salt marsh with fill materials (reported by ATC, 2007 to be largely comprised of coal ash from New York City incinerators) formed the current land surface. Bedrock at the site is reportedly over 150 feet below ground surface (bgs). Mueser Rutledge (2002) also report that glaciation initially scoured the existing soils over bedrock and deposited a relatively thick sequence of coarse grained outwash deposits (sands, gravels, and boulders) that were overlain by more recent glacially deposited marine clays (Gardiners Clay). The Gardiners Clay is overlain by sands, clays, and silts with some gravel. These deposits are present beneath a laterally continuous “meadow mat” layer comprised of peat, clay, and silt present at approximately 16 to 18 ft bgs. The meadow mat layer is approximately 2 ft thick in the eastern portion of the site, and increases in thickness to approximately 10 ft near the Gowanus Canal (AKRF, 2001). This meadow mat layer appears to be continuous across the site and reportedly forms the bottom layer of the Canal.

Available boring logs and well construction diagrams summarizing subsurface geology from previous investigation activities are provided in Appendix B.

2.5 Site hydrogeology

Water level measurements obtained during previous investigations indicate that the groundwater table is approximately 3 to 10 ft bgs (AKRF, January 2001). The existence of the meadow mat layer reportedly serves as semi-confining layer between the upper water table aquifer present in fill materials and a lower aquifer present in the glacial outwash deposits beneath the site. Previous investigation data (AKRF, July 2001) indicated a strong downward gradient between the upper and lower aquifers in most site wells, with the exception of well locations adjacent to the Gowanus Canal, where the downward vertical gradient was less pronounced. The upper aquifer flows toward the northwest with a head difference of over six ft between the eastern boundary of the site (at 2nd Avenue) and the Gowanus Canal. Groundwater flow in the lower aquifer appeared to flow in a more northerly direction, which a much lower gradient (less than one ft between 2nd Avenue and the Gowanus Canal; AKRF, July 2001)

Tidal fluctuations were measured in 2001 and indicated that in the lower aquifer water levels correlated with the New York harbor tides, fluctuating 0.5 ft during a complete tidal cycle at wells adjacent to and up to 350 feet east of the canal. In the upper aquifer, areas of the site closest to the canal were reported to be tidally influenced, but not at a shallow well location approximately 350 feet east of the canal (AKRF, July 2001).

3.0 Remedial investigation objectives and field activities

The overall objectives for the RI are to complete the investigation of the current site and lay the groundwork for the selection of a site remedy. The areas of the former Metropolitan MGP site to be investigated include:

- The former MGP structures on the western portion of the main MGP parcel where the Hamilton Plaza is currently located.
- The southern portion of the former MGP, which housed Holder 5 and additional gas storage (valve house) facilities.
- Along 12th Street between the Gowanus Canal and 2nd Avenue, adjacent to several former MGP structures.
- One upgradient area near the intersection of 12th Street and 2nd Avenue, and
- The downgradient property boundary areas along 13th Street and the Gowanus Canal.

The specific objectives for the RI and the activities that will be undertaken to meet these objectives are discussed below. The discussion of investigation activities has been grouped by environmental media of concern or field task in the following sections.

3.1 Underground utility clearance

Prior to the start of any intrusive fieldwork, clearance of underground utilities will be performed. The drilling subcontractor will contact Dig Safely New York to arrange for the location and marking of all underground utilities in the vicinity of the proposed soil boring and monitoring well locations. Copies of available city sewer and water maps from the site vicinity will also be obtained and reviewed during underground utility clearance procedures. Following review of the utilities in the site area, AECOM will contract a private company to locate all underground electric and gas utilities in the vicinity of each proposed subsurface sampling location using geophysical methods. Outlying areas where information is required to confirm the location of suspected utilities that may act as preferential migration pathways may also be surveyed using geophysical methods. Lastly, all boring/well locations will be hand or vacuum excavated to a depth of five feet to check for potential utilities not located by Dig Safely or geophysical methods.

3.2 Test pit excavation

Given the limited access in a number of areas of the site, the use of test pits will be focused in and around former Gas Holder No. 5 (Figure 3-1). Table 3-1 provides a summary of the proposed test pits, their designations, sampling rationale, the anticipated test pit excavation depth, and the number and type of the laboratory samples to be collected. The test pits will be excavated with a backhoe or excavator using methods presented in the FSAP (Appendix C), with samples collected from the bucket of the excavator. Details for the logging of the test pits and proposed analyses are provided in Section 3.4. In summary, the open excavations will be surrounded by temporary barricades to prevent unauthorized personnel from entering the excavation area and to protect site traffic. Soil removed during the excavation of each test pit will be temporarily stored on sheet plastic for return to the excavation. To the extent possible, clean soil will be segregated from impacted soil. Upon completion of each test pit, lightly impacted soil and debris will be returned to the excavation first, followed by clean soil and any additional clean backfill needed to return the excavation to original grade. Grossly contaminated material will not be returned to the excavation, but will be containerized and managed as investigation derived waste (IDW).

3.3 Surface soil sampling

Site reconnaissance has indicated that there are minimal areas of exposed surface soil at the Site. At a minimum, one surface soil sample will be collected from each of these areas. For purposes of this investigation, three surface soil samples have been proposed (SS-1 through SS-3) on Table 3-1. One known area of exposed surface soil is within a small parcel of land between the Hamilton Plaza building and the Gowanus Canal, where exposed soil and mixed vegetation were noted. In addition, there is an unpaved area adjacent to, and potentially within the defined Site, between the current Lowes building and Hamilton Plaza and a vegetated area approximately 10-12 feet wide adjacent to and northeast of the Hamilton Plaza and the Gowanus Canal bulkhead. Available surveying data will be used to determine if portions of these areas are within the defined Site boundary. Based on these findings, proposed sample SS-1 will be collected from the 0 to 2-inch bgs interval at the SB-9/MW-9 location using a steel shovel and stainless steel or disposable polyethylene trowel.. The specific locations of proposed surface soil samples SS-2 and SS-3 have not been identified on Figure 3-1 since their selection will depend on field conditions (e.g. obstructions, proximity to paved surfaces) and identified areas of exposed surface soil within the defined Site. Final locations of these surface soil samples will be confirmed with NYSDEC prior to collection. In the event that the parcel between the Hamilton Plaza building and the Gowanus Canal is the only area of identified surface soil, it is proposed that the remaining two samples (SS-2 and SS-3) be collected in this area. As shown in Table 3-1, surface soil samples will be analyzed for volatile organic compounds (VOCs) using US Environmental Protection Agency (USEPA) Method 8260B, semi-volatile organic compounds (SVOCs) using USEPA Method 8270C, RCRA 8 metals using USEPA Methods 6010 and 7000-series, and free cyanide (extraction by EPA method 9013A and analysis by Microdiffusion, ASTM International method D4282-02). One surface soil sample (SS-1) will be analyzed for the full Target Compound List (TCL) VOCs, SVOCs, pesticides (USEPA Method 8081A), herbicides (USEPA Method 8151A), PCBs (as Aroclors; USEPA Method 8082), Target Analyte List (TAL) metals, and free cyanide ASTM International method D4282-02. Additional information regarding the soil sampling methods and laboratory analyses is presented in the FSAP and QAPP.

3.4 Subsurface soil sampling and well installation

Subsurface soil borings will be advanced in order to obtain additional information regarding the thickness and composition of fill beneath the site; to determine the depth to the water table; to observe and screen subsurface soil in order to identify conditions that may be indicative of impacts by MGP or other residuals; and to install the monitoring wells proposed for the RI.

The locations of the proposed soil borings and wells are shown on Figure 3-1. Table 3-1 provides summary information regarding the borings and wells, including the boring or well designation, the sampling location or rationale, the anticipated completion depth, and the laboratory analyses to be performed. A total of 18 soil borings are proposed, with nine locations proposed for conversion to monitoring wells (shallow/intermediate well pairs or shallow/intermediate/deep well triplets). It was also agreed during the December 2, 2008 planning meeting and follow-up conversations that sufficient flexibility would be incorporated into the investigation scope to allow additions to, or modifications of proposed boring and well locations. For example, it was agreed that a minimum of one additional location will be installed northeast of the Pathmark building (which includes other merchants), on Lot 172, if survey indicates there is sufficient room between the building and the lot line. Such changes may be required in real time to better delineate the nature and extent of MGP residuals in subsurface soils and groundwater. Any modifications to the work presented herein would be made following consultation with Grid and NYSDEC oversight personnel prior to work being performed.

As shown on Table 3-1, it is anticipated that the borings completed in the overburden soil will be advanced to varying depths (maximum of 70 feet bgs) to delineate the vertical extent of MGP residuals previously observed at depths up to 67 feet bgs in soil at the site. However, as stated in the footnotes of Table 3-1, completion depths may be adjusted shallower in instances where 10 feet of clean soils are encountered below apparently contaminated soils. Likewise, if impacts are noted at the proposed termination depth in any boring, Grid will

consult with NYSDEC to determine the appropriate course of action, with a goal of obtaining vertical delineation in this RI mobilization.

Based on previous investigation methods, the subsurface borings will be advanced by either rotosonic drilling methods equipped with 4-inch diameter sampling cores or hollow-stem augers (HSAs) equipped with 2-inch or 3-inch diameter split-spoon samplers. In some instances, a direct-push (Geoprobe™) drilling rig equipped with Macro-Core™ samplers may be used if there are access limitations. Each of the methods will allow for continuous soil samples to be taken from the ground surface to the bottom of the borehole for both field characterization (photoionization detector screening and observations) and for the collection of samples for the chemical analyses.

The soil samples obtained by either method will be logged by a geologist recording such data as the presence of fill material or subsurface structures, the nature of each geologic unit encountered, observations regarding moisture content, the results of PID readings, and visual and olfactory observations regarding the presence of hydrocarbon-like residuals. The soils will be logged in accordance with the Grid protocols (KeySpan, 2005) detailed in the FSAP (Appendix C).

Three soil samples are proposed for laboratory analysis from each soil boring. The first sample will be collected at the depth of greatest apparent contamination from the 0 to 5 feet bgs interval. The sample will be collected beneath the pavement and road base (or other surface cover) during utility clearance activities performed prior to borehole advancement. The second soil sample for laboratory analysis, will be collected from the apparently most impacted interval, below 5 feet bgs, based on PID screening and field observations. If impacts are not encountered, the sample will be collected from the 1-foot interval immediately above the water table. The third sample will be collected at the first clean interval below impacts (if encountered) or the bottom of the boring to confirm “non-impacted” conditions. As outlined on Table 3-1, the majority of the subsurface soil samples will be analyzed for VOCs using USEPA Method 8260B, SVOCs using USEPA Method 8270C, RCRA 8 metals using USEPA Methods 6010 and 7000-series, and free cyanide (extraction by EPA method 9013A and analysis by Microdiffusion, ASTM International method D4282-02). A subset (20%) of the initial sample locations (Table 3-1)will be analyzed for the full Target Compound List (TCL) VOCs, SVOCs, pesticides (USEPA Method 8081A), herbicides (USEPA Method 8151A), PCBs (as aroclors; USEPA Method 8082), Target Analyte List (TAL) metals, and free cyanide ASTM International method D4282-02. The frequency of these additional analyses will be reviewed for subsequent samples.

Samples of grossly impacted soil containing visible tar-like or oil-like NAPL will generally not be sampled for laboratory analyses. These “MGP source” materials will be assumed to be impacted to the extent that management will be required by the NYSDEC. Information regarding the vertical extent of this material will be recorded on the boring logs by the field geologist and the areal extent of this material will be surveyed during the survey task. However, in some instances, e.g. locations adjacent to the site perimeter, samples may be collected for forensic analysis to better evaluate the potential source of the impacts.

Overburden monitoring wells will be installed in nine of the proposed RI soil borings. The monitoring well locations, shown on Figure 3-1, were selected to have a sufficient number of wells (along with the previously installed recovery wells) to evaluate groundwater in areas that are considered up gradient, crossgradient, and downgradient of the site. In general, the groundwater monitoring wells will be installed at two depth intervals: the water table (estimated to be screened from 5 to 15 feet bgs) so that the screen straddles the water table above the “meadow mat” layer; and from approximately 30-40 feet bgs in the intermediate portion of the glacial outwash aquifer underlying the meadow mat layer allowing the screen to straddle the most impacted soil layer (if present). This deeper interval will be most consistent with the screened intervals of the recovery wells installed by FC Gowanus, LLC at the current Lowe’s property.

In addition, four deep wells (estimated to be screened from approximately 60 to 70 feet bgs) are also proposed to provide good lateral coverage to evaluate deeper portions of the glacial aquifer at depths consistent with the maximum extent of impacts noted in previous investigations at the site near former Holders 1 through 3.

Actual well design will depend on site conditions encountered, such as thickness of the saturated zone, observed stratigraphy, and the presence, location, and thickness of NAPL, if any.

The wells will be constructed using a 2-inch diameter Schedule 40 PVC well riser with a 0.01 or 0.02-inch slotted screen (if NAPL present), and a 2-foot long sump for monitoring the presence of any denser than water non-aqueous phase liquid (DNAPL). Grout will be tremied into the borehole annulus above the sand pack and the bentonite seal to seal the borehole to grade (given the lack of significant confining units at the site, it is not envisioned that isolation casing would be beneficial in preserving well integrity). Grid may also evaluate the use of commercial nested wells for the well triplet locations in areas where no visible impacts or NAPL are detected. Additional details for monitoring well installation are provided in the FSAP.

Additionally, AECOM will conduct an on-site meeting with Grid and the NYSDEC during the later stages of field activities to review observations/findings and discuss the need and potential benefits of collecting additional data/samples to further the understanding of site conditions, or potentially complete the delineation of impacts. A review of the status of the program at this time provides the ability to improve the efficiency of the program and minimize the need for subsequent mobilizations of staff and equipment.

3.5 Well development

Each of the new monitoring wells will be developed not sooner than 24 hours after their installation to evacuate fine-grained sediments that may have accumulated within the well during installation. Well development methods are presented in the FSAP.

3.6 Groundwater sampling and aquifer conductivity testing

Following completion of the well development, the wells will be allowed to stabilize for at least two weeks, and then sampled. All new and selected existing wells, including perimeter locations, will be checked for the presence of light non-aqueous phase liquids (LNAPL) or dense non-aqueous phase liquid (DNAPL). Water levels will be measured in all the new and select existing wells, and a groundwater flow direction map will be prepared and included in the RI Report for each of the three aquifer depth zones. Groundwater samples will be collected from all newly installed wells using low-flow purging methods using either a peristaltic pump or submersible pump with the downhole tubing or the pump placed at the approximate midpoint of the screened interval. At the ground surface, the water will pass through a sealed chamber containing probes which will measure the water temperature, pH, specific conductivity, oxidation-reduction potential, and dissolved oxygen. Samples of water discharging from the chamber will be collected at regular intervals and analyzed for turbidity using a hand-held field meter. After passing through this chamber, the water will be discharged to a calibrated five-gallon bucket where the pumping rate will be calculated. When this bucket is full, the water will be transferred into a fifty-five gallon drum where it will be stored for future disposal. Pumping rates will be set below the maximum sustainable flow rate so as not to significantly lower the water level in the well. Groundwater analytical samples will be collected when water quality parameters have stabilized. Table 3-1 provides summary information for the groundwater samples to be collected including the sample designations, sample rationale, and the laboratory analyses to be completed. The majority of the groundwater samples will be analyzed for VOCs using USEPA Method 8260B, SVOCs using USEPA Method 8270C, RCRA 8 metals using USEPA Methods 6010 and 7000-series, and free cyanide (Microdiffusion, ASTM International method D4282-02). A subset (20%) of the initial sample locations (Table 3-1) will be analyzed for the full Target Compound List (TCL) VOCs, SVOCs, pesticides (USEPA Method 8081A), herbicides (USEPA Method 8151A), PCBs (as Aroclors; USEPA Method 8082), Target Analyte List (TAL) metals, and free cyanide ASTM International method D4282-02. The frequency of these additional analyses will be reviewed for subsequent samples.

Following groundwater sampling (and assuming that soil conditions are conductive, i.e. they do not recover too rapidly), conductivity tests (slug tests) will be performed at three well locations providing good lateral and

vertical coverage at the Site. These data will be used to calculate the hydraulic conductivity of the aquifer to support the evaluation of the fate and transport of Site impacts and potential remedial alternatives.

Prior to any slug testing, “trial” slug tests will be performed to evaluate probable groundwater recovery characteristics at the wells. During aquifer testing, a background continuous water level survey (at least 24 hours) may be performed at select wells to evaluate the extent of tidal influence documented in previous investigation reports. If the pre-screening evaluations show that slug tests are a viable method to evaluate aquifer conductivity at the site, the slug tests will be performed by slug removal (water table wells only) or pneumatic testing methods and timing the equilibration to the static water level. The general steps to be performed during pneumatic slug testing are as follows:

- Static water level will be measured to the nearest 0.01 foot.
- A pressure transducer, attached to a data logger, will be placed into the well and the water level allowed to equilibrate to static conditions.
- The water column in the well will be pressurized while simultaneously measuring and recording water levels with the pressure transducer and data logger until the water level has equilibrated (“falling head test”).
- The pressure in the well will then be rapidly removed and the water level will be measured and recorded (“rising head test”).

The data from these tests will be analyzed by AQTESOLV® according to the Bouwer and Rice method (1989) or equivalent methods to calculate average hydraulic conductivity values for the aquifer.

3.7 Sub-slab vapor/indoor air/ambient air sampling

A soil vapor intrusion survey will be performed at the Site since MGP-related compounds have been detected in soil vapor, soil, and groundwater samples collected from the Site. The work will be performed in accordance with Guidance for Evaluating Soil Vapor Intrusion in the State of New York (NYSDOH, 2006) and the USEPA document entitled *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Office of Solid Waste and Emergency Response* [US EPA, 2002]. The sampling event will be conducted in a one-time event during the heating season between November 1 and March 31 and will require two days to complete. The proposed sampling plan consists of the collection of a total of 10 samples, with two sub-slab vapor samples and matching indoor air samples collected in each of two buildings (eight total) plus one ambient outdoor air sample and one sample duplicate. The approximate sampling locations are shown on the Figure 3-1. Rationale for their placement is included on Table 3-1.

The indoor/ambient air and sub-slab vapor sampling will require two days to complete. On the first day, a chemical inventory check will be performed within each of the two site buildings to document current conditions with the regard to the storage of chemicals at each facility. On the second day, the ambient air sample, indoor air samples and sub-slab vapor samples will be collected concurrently.

Following utility clearance processes, sub-slab soil vapor samples will be collected from immediately below the concrete floor slabs of each building. The soil vapor samples will be collected from the immediately below the floor slab in accordance with NYSDEC Guidance. The sub-slab sampling implants will be installed by drilling a ¾-inch diameter hole through the concrete slab and placing Teflon tubing in the hole. An air-tight seal will be created by filling the space between the tubing and the concrete with hydrated bentonite clay or modeling clay. The integrity of the seals around the implants will be confirmed by placing a helium-filled “shroud” around the insertion points. One to three volumes of air will be purged with a helium meter at a rate not to exceed 0.2 liters per minute. Detections of helium will indicate a leak in the seal, requiring that the seal be repaired or replaced.

The sample tubing will be attached to the sample container (6-liter Summa canister) with Swagelok™ fittings. All samples will be collected in batch certified clean canisters through regulators set for an eight-hour sample

duration, which conforms to the NYSDOH Guidance. Following the sub-slab vapor sample collection, all concrete coring holes will be sealed and patched to match the existing grade. Additional information regarding the methods to be used for the soil vapor sampling is presented in the FSAP.

Indoor air samples will be collected at the same location as the sub-slab samples. All samples will be collected in batch certified, 6-liter Summa canisters through regulators set for an eight-hour sample duration, consistent with the soil vapor samples. The ambient air sample will be collected at a location determined to be upwind of the buildings at time of sampling. The air and soil gas samples will be shipped overnight to a NY ELAP-certified laboratory (Air Toxics, Ltd.) for analysis.

The laboratory samples will be analyzed for VOCs (including naphthalene) by USEPA SW846 Method TO-15, with an extended analyte list. The minimum reporting limit for the analysis will be at most one part per billion (1 to 7 micrograms per cubic meter depending on the molecular weight for each compound). The helium analysis will be performed using modified method ASTM D1945. The laboratory turn-around-time will be 14 days from the date the samples are received by the laboratory. The analytical results will be provided by the laboratory in a summary table, which will also include NYSDOH background concentrations for the respective target compounds.

The results of the indoor air and ambient air results will be evaluated by first comparing the VOC concentrations to typical background values published by NYSDOH. If compounds are detected above the typical range, the data will be evaluated to determine the sources of these compounds. For example, benzene may be associated with MGP residuals but is also widely found in urban soil gas and indoor air due to gasoline. To distinguish between these sources, and prevent the false attribution of the benzene to MGP residuals, compound ratios and the presence or absence of indicator compounds will be examined. In addition to the standard TO-15 list of compounds, several additional compounds will be analyzed for, including: indane, indene, thiophene, 2-methyl pentane, isopentane, 2,3-dimethyl pentane, isooctane, and methyl tert butyl ether (MTBE). This list of additional compounds was developed specifically for use in evaluation of soil vapor intrusion at MGP sites. Indane, indene, and thiophene are usually associated with MGP residuals. The presence or absence of these indicator compounds will be used as a line of evidence to distinguish between MGP and non-MGP sources in the soil vapor and indoor air. Similarly, inclusion of the pentane compounds and MTBE will allow the presence of gasoline sources to be identified. In some cases, statistical analysis of the data may be used to distinguish among the sources.

3.8 Site survey

A survey of the investigation sampling points and important site features (buildings, streets, etc.) will be conducted at the end of the fieldwork by a licensed NY-State surveying contractor. All horizontal locations will be reported in the New York State Plane Coordinate System, Long Island Zone (NAD83) in feet. All vertical measurements will be reported in NAVD88 in feet, to the nearest 0.1 ft. and 0.01 ft. for soil borings and monitoring wells respectively.

3.9 Investigation-derived waste management

All investigation waste generated during the RI will be collected in properly labeled USDOT approved storage containers (55-gallon drums) or a small bulk roll-off container and grouped by environmental matrix (soil, water, PPE/plastic, construction debris). If drums are used, as they are filled they will be tracked and given unique identification codes based on the following:

- A prefix indicating the site where the drum was generated and the drum's contents: i.e., M – Metropolitan plus S – Soil, W – Water, P – PPE/Plastic, and C&D – Construction Debris.
- Following the prefix and a hyphen will be the drum's chronological number of generation. For example, drum MS-1 is the first drum of the project generated and is filled with soil. Drum MW-8 is the eighth drum generated and contains water.

- As drums are generated, their identification code, date of generation, contents, source (i.e., drill cuttings from location x, purge water from well y), and date sampled will be entered on a tracking table.

The drums (or roll-off container) will be stored at a locked, temporary fenced location to be decided during the kickoff meeting, which will be completed prior to the start of the field investigation. Subsequently, the waste soils will be characterized with laboratory analyses including full TCLP, corrosivity, ignitability, reactivity, TPH, and PCBs. Waste transportation and disposal of all contaminated wastes will be managed by Grid.

3.10 Analytical program summary

The laboratory samples for each media and the chemical analyses to be performed are included in Table 3-1. Requisite quality assurance/quality control (QA/QC) samples are presented in the QAPP (Appendix D).

3.10.1 Surface and subsurface soil analyses

The majority of the soil samples will be analyzed for the following parameters:

- VOC compounds by USEPA Method 8260B;
- Semi-volatile organic compounds (SVOCs) by USEPA Method 8270C;
- RCRA 8 metals by USEPA Method 6000-7000 Series; and
- Free Cyanide (extraction by EPA method 9013A and analysis by Microdiffusion, ASTM International method D4282-02).

A subset (approximately 20%) of the total number of soil samples will be analyzed for an expanded list of the following parameters:

- Full TCL VOCs by USEPA Method 8260B;
- Full TCL SVOCs by USEPA Method 8270C;
- TAL Metals by USEPA Method 6000-7000 Series;
- TCL Pesticides by USEPA Method 8081A;
- TCL Herbicides by USEPA Method 8151A;
- PCBs (as Aroclors) by USEPA Method 8082; and
- Free Cyanide (extraction by EPA method 9013A and analysis by Microdiffusion, ASTM International method D4282-02)

3.10.2 Groundwater analyses

Similar to soils, the majority of groundwater samples will be analyzed for the following parameters:

- VOC compounds by USEPA Method 8260B;
- SVOC compounds by USEPA Method 8270C;
- TAL Metals by USEPA Method 6000-7000 Series; and
- Free Cyanide (Microdiffusion, ASTM International Method D4282-02).

A subset (approximately 20%) of the total number of groundwater samples will be analyzed for an expanded list of the following parameters:

- Full TCL VOCs by USEPA Method 8260B;
- Full TCL SVOCs by USEPA Method 8270C;
- TAL Metals by USEPA Method 6000-7000 Series;
- TCL Pesticides by USEPA Method 8081A;
- TCL Herbicides by USEPA Method 8151A;
- PCBs (as Aroclors) by USEPA Method 8082; and
- Free Cyanide (Microdiffusion, ASTM International method D4282-02)

3.10.3 Soil vapor/indoor air/ambient air analyses

The soil vapor/indoor air/ambient air samples will be analyzed for VOCs by USEPA Method TO-15 (including naphthalene). The soil vapor samples will also be analyzed for helium by ASTM Method ASTM D-1945. In addition to the standard TO-15 list of compounds, several additional compounds will be analyzed for, including: indane, indene, thiopene, styrene, 2-methyl pentane, isopentane, 2,3-dimethyl pentane, isooctane, and MTBE.

3.10.4 Waste characterization/profiling

Sufficient samples (a minimum of two) will be collected during the investigation and analyzed for full RCRA Hazardous Characteristics testing to determine if materials exhibiting hazardous characteristics may be present at the site and to support waste disposal profiling purposes. The analyses to be performed may include, but not be limited to, the following, depending on the medium and the selected disposal facility:

- Total Metals by USEPA Method 6010B (Mercury 7470A);
- Total Petroleum Hydrocarbons (DRO and GRO) by USEPA Method 8015 modified;
- PCBs by USEPA 8020;
- TCLP ZHE Extraction – U.S. EPA Method 1311;
- TCLP VOC – USEPA Method 8260B;
- TCLP SVOC – USEPA Method 8270C;
- TCLP RCRA Metals – USEPA Method 6010B (Mercury 7470A);
- Corrosivity – USEPA Method 9045C;
- Ignitability/Flashpoint – USEPA SW-846 Method 1010A
- Reactive Cyanide and Reactive Sulfide by USEPA SW-846 Chapter 7, Sections 7.3.3.2/7.3.4.2; and
- Total Organic Halogens – USEPA SW-846 Method 9020B

3.10.5 Quality assurance/quality control sampling

Field and laboratory quality control samples for the investigation will be collected and analyzed to document the accuracy and precision of the samples. The QA/QC samples, summarized in the QAPP (Appendix D), include trip blanks, field equipment blanks, field duplicates and matrix spikes, and matrix spike duplicates. The data quality level for the investigation will be consistent with procedures outlined in the NYSDEC Analytical Services Protocol (ASP) July 2005 methodologies. A full ASP Category B data package will be prepared by the laboratory for all samples. The data will be reviewed, and a Data Usability Summary Report (DUSR) will be prepared by a qualified chemist. Additional QA/QC information is provided in the QAPP.

3.11 Fish and wildlife resource impact assessment

A fish and wildlife resource impact assessment (FWRIA) has been conducted as part of the Gowanus Canal Investigation performed for Grid by GEI and summarized in report dated April 2007 (Appendix G). In summary, there does not appear to be a significant risk as a result of the former MGP. Due to rapid sedimentation in the canal from the numerous combined sewer overflows (CSOs), the upper three feet of sediment has been isotopically dated to post-date the operation of the former MGP. Therefore, any inputs to the canal from the former MGP have been buried beneath this rapidly accumulating CSO sediment/sewage beneath the biologically active zone. A complete copy of the FWRIA will be included in the RI report.

4.0 Additional work plan documents

Four companion documents have been prepared to detail the methods and procedures to be used during the RI. Each of the documents is included as an Appendix to this Work Plan.

4.1 Field sampling and analytical plan

All sampling and analyses will be conducted in accordance with the methods described in the site-specific FSAP. The FSAP provides a description of the objectives and methods for each of the investigation field activities, and details concerning the project organization. The FSAP is provided in Appendix C.

4.2 Quality assurance project plan

In addition to the FSAP, a full QAPP has been developed for use on this project. The QAPP identifies the quality assurance objectives for the measurement data, the QA/QC procedures to be used in the field, the sample chain-of-custody methods to be used, and the analytical procedures to be followed. The QAPP will also include a description of the manner in which each type of data is to be used. The QAPP is provided in Appendix D.

4.3 Community air monitoring plan

A CAMP has been developed for this project that will be followed during all invasive fieldwork (soil borings, borings for well installations, and test pitting). Included in the CAMP is a description of methods that may be used to control odors during the RI if needed. The CAMP is provided in Appendix E.

4.4 Site-specific health and safety plan

A site specific HASP has been prepared to outline health and safety risks and procedures for all site workers and visitors. Included in the HASP is information regarding physical and chemical hazards at the site, emergency procedures and contact information, incident reporting procedures, and the route to the hospital. The HASP is provided in Appendix F.

5.0 Qualitative Human Health Exposure Assessment

A Qualitative Human Health Exposure Assessment (QHHEA) will be conducted following New York Department of Environmental Conservation (NYSDEC) guidance (Appendix 3B of NYSDEC, 2002). The QHHEA will characterize the exposure setting, identify potentially complete exposure pathways, and qualitatively evaluate potential fate and transport of constituents from one medium to another (i.e., soil-to-air or soil-to-groundwater).

An exposure pathway is considered complete when the following five conditions are met:

1. Source (i.e., MGP residuals);
2. Release and transport mechanism from source to environmental media (i.e., leaching of MGP residuals into the subsurface or volatilization to the air of an overlying building);
3. Point of human exposure (i.e., an occupied building or surface soil);
4. A route of exposure (ingestion, dermal contact, or inhalation);
5. A receptor population (i.e., on-site workers).

Once potentially complete exposure pathways are identified, the QHHEA will characterize site conditions to determine whether the site poses an existing or potential future hazard to the potentially exposed population. The evaluation will include a qualitative discussion of potential fate and transport mechanisms at the site. The results of the QHHEA will be included as part of the RI Report.

6.0 Project schedule and deliverables

6.1 Schedule

The RI field work will be initiated following approval of the scope of work presented in this Work Plan by NYSDEC. A general timeline for the project includes the following milestones:

- Field Mobilization – within 45 days of the approval of the work plan.
- Duration of Currently Proposed Field Activities – approximately 45 days.
- Draft Report to Grid – within 60 days of the completion of field activities.
- Final Report to NYSDEC – within 90 days of the completion of field activities.

The milestones presented above are subject to change based on delays caused by access limitations and/or weather and unforeseen circumstances. However, it is intended to maintain a schedule to complete the project as expeditiously as possible. A more specific schedule will be submitted upon approval of the Work Plan.

6.2 Deliverables

6.2.1 RI Report

Upon completion of the field activities, an RI Report will be prepared to document the findings of the investigations performed at the site. The report will be consistent with the specifications presented in the Draft DER-10 (NYSDEC, 2002) document and will include:

- An executive summary
- A site description and history
- Summary information regarding previous investigations and remedial work performed at the site
- Descriptions of all field activities performed
- A summary of all field observations, field measurements, and laboratory analytical data summarized in tabular format. Data will be managed in a database. Soil and groundwater analytical results will be compared to appropriate NYSDEC guidance and standards. The results of the indoor air and ambient air results will be evaluated by first comparing the VOC concentrations to typical background values published by NYSDOH
- Plan view and cross-section figures presenting laboratory analytical data and field observations of surface and subsurface soil and groundwater impacts. A minimum of two profiles will be developed, one perpendicular to and one parallel with groundwater flow direction at the Site
- A qualitative human health risk assessment which assesses the sources of impact, on and off-site human and ecological receptors, and exposure pathways
- A summary of FWRIA findings based on previous Gowanus Canal investigation work
- An integration of field observations and measurements with laboratory analytical data to evaluate the nature and extent of impacts and to develop a site conceptual model of potential contaminant migration
- A set of conclusions for the investigation

- Recommendations

Appendices to the report will include all pertinent data used to support the RI effort, including validated laboratory analytical results (Form 1s), data usability reports, stratigraphic boring and monitoring well construction logs, and all field sampling sheets (monitoring well development forms, aquifer testing results, groundwater sampling sheets, etc.).

The RI Report will be reviewed and approved by a qualified senior geologist. The report and site data will be prepared and organized such that it can be used for the preparation of a feasibility study for the site. If appropriate, recommendations for additional site activities will be provided.

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USEPA, 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, EPA/540/S-95/504, April 1996.

USEPA, 2002. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Office of Solid Waste and Emergency Response, 2002.

Tables

Table 2-1
Adjacent Property Details
Metropolitan Former MGP
124 - 136 Second Avenue, Brooklyn, NY

Property	Database	Description	Source
Eastern Abutters across 2nd Ave			
NYCDS (127 2nd Ave)	HIST UST	7 closed-in-place USTs in Dec 2000 of unleaded gas, diesel, kerosene, and unknown contents. Also 5 in-service USTs. One 6000-gal Used oil, 4,000-gal diesel, 550-gal used oil, and 2 2000-gal unknown content USTs.	EDR Report
NYCDS (127 2nd Ave)	HIST AST	Two 275-gal unknown content ASTs were closed in 1993.	EDR Report
NYCDS (127 2nd Ave)	NY Spill	9-27-00 - #2 heating oil leak. Soil and GW contamination limited to area along 2nd Ave. VOC contaminants and a system was installed at the site which was shut down on July 2006. Soil sampling performed Jun/July 2007 and elevated VOC results. Last report mentioned was a progress report submitted June 2008. No Closure	EDR Report
NYCDS (127 2nd Ave)	Manifests	1993 and 2008 - for non-listed ingnitable wastes	EDR Report
NYCDS (127 2nd Ave)	RCRA - NonGen	no violations found.	EDR Report
NYCDS (127 2nd Ave)	NY Spill	12-14-94 - Petroleum - vent pipe overflowed - closure date 10-30-03.	EDR Report
NYCDS (127 2nd Ave)	NY Spill	12-6-93 - This relates to above spill that had the remediation system. This entry describes correspondence regarding extraction wells and sampling frequency. The end of the entry matched the one above.	EDR Report
NYCDS (127 2nd Ave)	LTANK	2-22-01 - tank test failure of #2 fuel oil. Memo says to uncover and inspect, no other update -	
11th St. and 2nd Ave	NY Spill	9-11-02 - Clean up unknown material on vacant lot - once was US postal facility and MGP site. It is no listed what the "material" was.	EDR Report
MH 52966 - 2nd Ave. and 10th St.	NY Spill	2-2-05 - Approx 1 quart of unknown oil found in 50 gals of water at manhole. Structure was double washed and spill closed 7-22-05.	EDR Report
2nd and 10th St.	NY Spill	7-7-94 - unknown petroleum spill of 10 gal. Memo states NYC DEP cleaned up site - no other info - spill closed 7-7-94.	EDR Report
2nd and 10th St. (construction site)	NY Spill	6-19-03 - caller stated that there was oil coming out of the ground at the construction site. Spill closure date 6-25-03. Not other info about corrective action	EDR Report
10th St. substation	NY Spill	8-19-1999 - transformer failed from unknown cause and material spilled to soil. Spill was contained to 100 gals. Closure date of 11-9-04.	EDR Report
137 Gowanus Refuse facility	RCRA - NonGen	no violations found.	EDR Report
Across Second Street	1996-1904	No Sanborn coverage	Sanborn
Across Second Street	1886	unlabeled store buildings	Sanborn
Across Second Street	2006, 1994	Buildings encompass entire abutters	Aerial
Across Second Street	1984, 1975, 1966, 1953, and 1943	Buildings encompass most of abutting properties beyond 2nd street, and one parking area	Aerial

Table 2-1
Adjacent Property Details
Metropolitan Former MGP
124 - 136 Second Avenue, Brooklyn, NY

Property	Database	Description	Source
Southeastern Abutter (on Block 1025)			
SE of NYC PS Office Building	1996, 1995, 1993	Unlabeled lots	Sanborn
SE of NYC PS Office Building	1992, 1991, 1988	"Sanitation Chemicals" to the south-southeast before 2nd Ave	Sanborn
SE of NYC PS Office Building	1987, 1986, 1982, 1981, 1980, 1979	"Sanitation Chemicals" to the south-southeast - Auto Salvage yard to the east-southeast	Sanborn
SE of NYC PS Office Building	1977, 1969, 1950	"Sanitation Chemicals" to the south-southeast - dwellings present 1950 to east-southeast	Sanborn
SE of NYC PS Office Building	1938	furniture warehouse to south-southeast - trucking property to east-southeast	Sanborn
SE of NYC PS Office Building	1915	unlabeled buildings and dwellings	Sanborn
SE of NYC PS Office Building	1904	Carpet Cleaning business and dwellings	Sanborn
SE of NYC PS Office Building	1886	Stone cutting yard and dwellings	Sanborn
SE of NYC PS Office Building	2006, 1994, 1984	Parking area and one smaller building	Aerial
SE of NYC PS Office Building	1975, 1966	Parking area and two smaller buildings	Aerial
SE of NYC PS Office Building	1954	Four buildings	Aerial
SE of NYC PS Office Building	1943	Three buildings	Aerial
Northeastern Abutter (across 11th)			
Vault at 58-74 10th Street	NY Spill	12/12/2000 Approx. 6-gals of soil on 800-gals of water in vault. Sample had PCB hits, vault was drained and pressure washed. Case closed 4-19-01.	EDR Report
Lowes - 118 2nd Ave	UST and HIST UST	7 USTs closed-removed between May 1993 and April 1994. (3 5,000-gal Diesel (93), 1 5,000-gal unleaded gasoline (93) and 3 20,000-gal Fuel oil (94).) One AST of unlisted content was closed in June 1999. There is one AST showing as in-service with no listing of content or size.	EDR Report
Across 11th Street	1996-1904	No Sanborn Coverage	Sanborn
Across 11th Street	1886	undeveloped	Sanborn
Block 1007, lots 1 and 118	2006	Connecting building to subject site building on Lot 220 and parking on lot 1	Aerial
Block 1007, lots 1 and 118	1994	One large building on lot 118 and clear area on lot 1	Aerial
Block 1007, lots 1 and 118	1984, 1975, 1966, 1953	One large building on lot 118 and two structures located at the SE side of Lot 1 parking area to the north of Lot 1	Aerial
Block 1007, lots 1 and 118	1943	One building at the eastern side of Lot 118 and rest of lot 118 and Lot 1 are cleared	Aerial

Table 2-1
Adjacent Property Details
Metropolitan Former MGP
124 - 136 Second Avenue, Brooklyn, NY

Property	Database	Description	Source
Northern western Abutter			
	1996-1886	Gowanus Canal	Sanborn
	2006 - 1943	Canal	Aerial
Southern western Abutter close to Gowanus Expressway			
Bruno Truck Sales (435 Hamilton Ave)	RCRA-CESQG	No violations found.	EDR Report
Bruno Truck Sales (435 Hamilton Ave)	Manifests	1998, 1999 - Non-listed ignitable wastes	
Bruno Truck Sales (435 Hamilton Ave)	UST	3 1,000-gal USTs of unknown content, 1 4,00-gal Unleaded gas, 1 4,000-gal diesel USTs in service. Not on LTANK list	Sanborn
Southern abutter of parking area	1996, 1995, 1993, 1992, 1991, 1988,	unlabeled building	Sanborn
Southern abutter of parking area	1982, 1981, 1980, 1979, 1977	Vacant	Sanborn
Southern abutter of parking area	1969, 1950	Machine Shop and manufacturing Chemists	Sanborn
Southern abutter of parking area	1938	Paint and varnish warehouse, pipe storage and a Brooklyn Alcatraz Asphalt building	Sanborn
Southern abutter of parking area	1915	Brooklyn Alcatraz Asphalt building and two vacant buildings containing boilers and terminal ornamental Iron Works	Sanborn
Southern abutter of parking area	1904, 1886	Saw and planing mill building and F.J.W. Bursch Co Salt building	Sanborn
Southern abutter of parking area	2006, 1994, 1984	Building, appears to be a shipping/receiving building	Aerial
Southern abutter of parking area	1975, 1966, 1953, 1943	Three smaller buildings	Aerial
Southern western Abutter Block 1025 Lot 52			
Block 1025, Lot 52	1996, 1995, 1993, 1992, 1991, 1988,	Unlabeled 2 story building	Sanborn
Block 1025, Lot 52	1950	Andro Waste Material Inc. - cotton waste - picking and cleaning - paper storage and bailing	Sanborn
Block 1025, Lot 52	1938	Cooperage Work - storage yard	Sanborn
Block 1025, Lot 52	1915	Cooperage and Purcell Bros' Cut Stone Works	Sanborn
Block 1025, Lot 52	1904, 1886	Undeveloped	Sanborn
Block 1025, Lot 52	2006, 1994	Parking area	Aerial
Block 1025, Lot 52	1984, 1975, 1966, 1953, 1943	"L" shaped building at the NE and NW side of the lot with parking	Aerial

Table 2-1
Adjacent Property Details
Metropolitan Former MGP
124 - 136 Second Avenue, Brooklyn, NY

Property	Database	Description	Source
Southern western Abutter across from Block 1025, lot 100			
Block 1031, Lot 1	1996, 1995, 1993, 1992, 1991, 1988,	Truck Sales and Service building	Sanborn
Block 1031, Lot 1	1981, 1980, 1979, 1977	Vacant	Sanborn
Block 1031, Lot 1	1969, 1950, 1938	Machine Shop and welding buildings with Gas Tanks	Sanborn
Block 1031, Lot 1	1915	Vacant	Sanborn
Block 1031, Lot 1	1904	Roebuck window screens Co with finishing Machine Paint Shop - and a generic storage and shipping building	Sanborn
Block 1031, Lot 1	1886	Lumber yard	Sanborn
Block 1031, Lot 1	2006, 1994, 1984	One building encompasses Lot	Aerial
Block 1031, Lot 1	1975, 1966, 1953, 1943	Several smaller buildings with parking areas	Aerial
Southern Abutter			
NYC Sanitation (465 Hamilton Ave)	RCRA-Non Gen	No violations found.	EDR Report

Table 2-2
Historical Information Summary
Metropolitan Former MGP
124 – 136 Second Avenue, Brooklyn, NY

Year(s)	Comments
1896	The area of the subject property southwest of 11th Street was occupied by the Metropolitan Gas Light Company (used for storage only). A coal shed, gasometer and retorts existed on the subject property. The area northeast of 11th Street, between 10th Street was vacant.
1904	The area of the subject property southwest of 11th Street was in use as a manufactured gas plant, Brooklyn Union Gas Company. Iron oil and fuel oil tanks exist on the property. The manufactured gas plant appears to have operated as a coal gas plant. A coal shed, gasometers (3), gas purifying facilities and retorts existed on the subject property.
1915	The area of the subject property southwest of 11th Street was still in use as a manufactured gas plant, Brooklyn Union Gas Company. The Brooklyn Union Gas Company has expanded to the southwest of the subject property. It appears the plant has converted to a carbonated water process due to the increased number of oil storage tanks. One iron oil and the fuel oil tank have been removed. One iron oil tank is now listed as a iron tar tank. An asphalt plant was located on two parcels and included a vehicle maintenance facility with 150 gallon and 250 gallon underground gasoline storage tanks.
1938	The area of the subject property southwest of 11th Street was still in use by Brooklyn Union Gas Company (listed as 12th Street Holder Dept.). The maps show several changes in the plant process or layout. The oil storage tanks, manufactured gas holding tanks, and all equipment have been removed. A hydrogen holder is listed as "To Be Coal Bunker." An underground gasoline tank appears in the vicinity of the future coal bunker. The asphalt plant is no longer in operation.
1950	The area of the subject property southwest of 11th Street has been subdivided. The northwest portion is still listed as Brooklyn Union Gas Company. A former hydrogen holder is listed as a coal bunker. The southeastern portion is listed as the U.S. Post Office Department (lessee) garage and repair shops identified as the vehicle maintenance facility (VMF). Two locations of UST gasoline tanks were presented in the U.S. Post Office Building. The area of the subject property northeast of 11th Street has not significantly changed since 1938.
1977	The existing detached mail unit (DMU) appears on the subject property northeast of 11th Street. UST gasoline tanks were listed at the northwestern end of the subject property. The area of the subject property southwest of 11th Street no longer is occupied by the Brooklyn Union Gas Company. The UST gas tank which was located near the coal bunker is not shown.
1981 –1996	The area of the subject property northeast of 11th Street and southwest of subject property has not significantly changed.

Note:
Information extracted from the Nelson, Pope & Voorhis, LLC. Phase I Environmental Site Assessment Report dated May 15, 1997.

Table 2-3
Historic Laboratory Sample Summary - Soils
Metropolitan Former MGP
124 - 136 Second Avenue, Brooklyn, NY

						SOIL											
Location Type	Location ID	Sample Depth (ft bgs)	Boring Log Available	Total Boring Depth (ft bgs)	Excavation Depth (ft bgs)	VOC	SVOC	PAH	METALS	CYANIDE	TCLP METALS	H2S RELEASED FROM WASTE	LEACHABLE AMENABLE CYANIDE	LEACHABLE TOC	DRO/GRO	Comments	Source
Monitoring Well	*SP-1/GWP-1*	*4 - 8*			*15*	*X*	*X*		*X*	*X*							*Nelson, Pope and Voorhis, June 1997*
Monitoring Well	*SP-2/GWP-2*	*4 - 8*			*11*	*X*	*X*		*X*	*X*							*Nelson, Pope and Voorhis, June 1997*
Monitoring Well	SP-3/GWP-3	4 - 8				X	X		X	X							Nelson, Pope and Voorhis, June 1997
Monitoring Well	SP-4/GWP-4	4 - 8				X	X		X	X							Nelson, Pope and Voorhis, June 1997
Monitoring Well	*SP-5/GWP-5*	*4 - 8*			*22*	*X*	*X*		*X*	*X*							*Nelson, Pope and Voorhis, June 1997*
Monitoring Well	SP-6/GWP-6	4 - 8				X	X		X	X							Nelson, Pope and Voorhis, June 1997
Boring	*SP-7*	*3 - 8*	*Yes*	*7*	*16*										*X*	*Note total depth and sample depth does not match.*	*Nelson, Pope and Voorhis, June 1997*
Boring	SP-10	4 - 10	Yes	7.5		X	X		X	X							Nelson, Pope and Voorhis, June 1997
Boring	SP-11	4 - 10	Yes	10		X	X		X	X							Nelson, Pope and Voorhis, June 1997
Boring	SP-12	5 - 11	Yes	10		X	X									Note total depth and sample depth does not match.	Nelson, Pope and Voorhis, June 1997
Boring	SP-13	5 - 11	Yes	10		X	X									Note total depth and sample depth does not match.	Nelson, Pope and Voorhis, June 1997
Boring	SP-14	4 - 8				X											Nelson, Pope and Voorhis, June 1997
Boring	SP-15	4 - 8				X											Nelson, Pope and Voorhis, June 1997
Boring	DP-2	6 - 8	Yes	28		X	X					X	X				ARKF, Jan. 2001
	DP-2	20 - 24	Yes	28		X	X					X	X				ARKF, Jan. 2001
Boring	DP-4	4 - 6	Yes	18	8	X	X					X	X				ARKF, Jan. 2001
	DP-4	16 - 18	Yes	18	8	X	X					X	X				ARKF, Jan. 2001
Boring	*DP-6*	*8 - 10*	*Yes*	*18*	*22*	*X*	*X*					*X*	*X*				*ARKF, Jan. 2001*
	DP-6	*16 - 18*	*Yes*	*18*	*22*	*X*	*X*					*X*	*X*				*ARKF, Jan. 2001*
Boring	*DP-7*	*12 - 14*	*Yes*	*18*	*24*	*X*	*X*					*X*	*X*				*ARKF, Jan. 2001*
	DP-7	*16 - 18*	*Yes*	*18*	*24*	*X*	*X*					*X*	*X*				*ARKF, Jan. 2001*
Boring	DP-10	15 - 16	Yes	28	8	X	X					X	X				ARKF, Jan. 2001
	DP-10	24 - 28	Yes	28	8	X	X					X	X				ARKF, Jan. 2001
Monitoring Well	MW-2/DP-1	8 - 12	Yes	28		X	X					X	X				ARKF, Jan. 2001
	MW-2/DP-1	20 - 24	Yes	28		X	X					X	X				ARKF, Jan. 2001
Monitoring Well	MW-3/DP-9	24 - 28	Yes	40		X	X					X	X				ARKF, Jan. 2001
	MW-3/DP-9	28 - 32	Yes	40		X	X					X	X				ARKF, Jan. 2001
Monitoring Well	*MW-4/DP-3*	*6 - 8*	*Yes*	*28*	*24*	*X*	*X*					*X*	*X*				*ARKF, Jan. 2001*
	MW-4/DP-3	24 - 28	Yes	28	24	X	X					X	X				ARKF, Jan. 2001
Monitoring Well	MW-5/DP-11	0 - 2	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
	MW-5/DP-11	6 - 8	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
	MW-5/DP-11	24 - 26	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
Monitoring Well	MW-6/DP-12	0 - 2	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
	MW-6/DP-12	4 - 6	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
	MW-6/DP-12	31.5 - 32	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
Monitoring Well	MW-7/DP-13	0 - 2	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
	MW-7/DP-13	2 - 4	Yes	32			X					X	X	X		VOC data not on data table	ARKF, Jan. 2001
	MW-7/DP-13	4 - 6	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
	MW-7/DP-13	24 - 26	Yes	32		X	X					X	X	X			ARKF, Jan. 2001
Surface Soil	S-1	3 - 5							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-2	3 - 5							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-3	3 - 5				X			X		X					Sample collected below 3-ft thick floor; VOC data also collected.	ARKF, Jan. 2001
Surface Soil	S-4	3 - 5							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-5	3 - 5							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001

Table 2-3
Historic Laboratory Sample Summary - Soils
Metropolitan Former MGP
124 - 136 Second Avenue, Brooklyn, NY

						SOIL											
Location Type	Location ID	Sample Depth (ft bgs)	Boring Log Available	Total Boring Depth (ft bgs)	Excavation Depth (ft bgs)	VOC	SVOC	PAH	METALS	CYANIDE	TCLP METALS	H2S RELEASED FROM WASTE	LEACHABLE AMENABLE CYANIDE	LEACHABLE TOC	DRO/GRO	Comments	Source
Surface Soil	S-6	3 - 5							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-7	3 - 5							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-8	0 - 2							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-9	0 - 2							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-10	2 - 4							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-11	2 - 4							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Surface Soil	S-12	2 - 4							X		X					Sample collected below 3-ft thick floor.	ARKF, Jan. 2001
Boring	GP-1	8 12	Yes	16		X		X									ARKF, July 2001
Boring	GP-2	6 8	Yes	8	8	X		X									ARKF, July 2001
Boring	GP-3	8 12	Yes	16	8	X		X									ARKF, July 2001
Boring	GP-4	4 8				X		X									ARKF, July 2001
Boring	GP-5	8 11				X		X									ARKF, July 2001
Boring	GP-6	8 11	Yes	11		X		X									ARKF, July 2001
Boring	GP-10	8 12			11	X		X									ARKF, July 2001
Boring	GP-15	8 12	Yes	16	15	X		X									ARKF, July 2001
Boring	GP-16	12 16	Yes	16	11	X		X									ARKF, July 2001
Boring	GP-17	12 16	Yes	16		X		X									ARKF, July 2001
Boring	GP-18	4 8	Yes	16		X		X									ARKF, July 2001
Boring	GP-19	12 16	Yes	16		X		X									ARKF, July 2001
Boring	GP-20	12 16	Yes	16		X		X									ARKF, July 2001
Boring	GP-21	8 12	Yes	16		X		X									ARKF, July 2001
Boring	GP-22	4 8	Yes	16		X		X									ARKF, July 2001
Boring	GP-23	6 8	Yes	16	8	X		X									ARKF, July 2001
Boring	GP-24	10 12	Yes	16	8	X		X									ARKF, July 2001
Boring	GP-25	12 16	Yes	16	8	X		X									ARKF, July 2001
Boring	GP-26	15 16	Yes	16	8	X		X									ARKF, July 2001
Boring	GP-28	15 16	Yes	16		X		X									ARKF, July 2001
Boring	GP-29	4 5	Yes	12	22	X		X									ARKF, July 2001
Boring	GP-31	8 12	Yes	16	6	X		X									ARKF, July 2001
Boring	GP-32	4 8	Yes	16	8	X		X									ARKF, July 2001
Boring	GP-33	4 8	Yes	16	8	X		X									ARKF, July 2001
Boring	GP-35	6 8			12	X		X									ARKF, July 2001
Boring	GP-36	4 8				X		X									ARKF, July 2001
Boring	GP-38	10 12				X		X									ARKF, July 2001
Boring	GP-39	12 16				X		X									ARKF, July 2001
Boring	GP-44	9 11	Yes	16		X		X									ARKF, July 2001
Boring	GP-46	6 7	Yes	20		X		X									ARKF, July 2001
Boring	GP-52	6 8				X		X									ARKF, July 2001
Boring	GP-54	5 8	Yes	16		X		X									ARKF, July 2001

Table 2-4
Historic Laboratory Sample Summary - Groundwater
Metropolitan Former MGP
124 - 136 Second Avenue, Brooklyn, NY

								GROUNDWATER					
Location Type	**Location ID**	**Screened interval (ft bgs)**			**Boring Log Available**	**Total Boring Depth (ft bgs)**	**Excavation Depth (ft bgs)**	**VOC**	**SVOC**	**PAH**	**METALS**	**Comments**	**Source**
Monitoring Well	SP-1/GWP-1						15	X	X		X	Document text states metals were analyzed; and although the analysis for metals was requested on COC, no lab data provided anywhere in report.	Nelson, Pope and Voorhis, June 1997
Monitoring Well	SP-2/GWP-2						11	X	X		X	Document text states metals were analyzed; and although the analysis for metals was requested on COC, no lab data provided anywhere in report.	Nelson, Pope and Voorhis, June 1997
Monitoring Well	SP-3/GWP-3							X	X		X	Document text states metals were analyzed; and although the analysis for metals was requested on COC, no lab data provided anywhere in report.	Nelson, Pope and Voorhis, June 1997
Monitoring Well	SP-4/GWP-4							X	X		X	Document text states metals were analyzed; and although the analysis for metals was requested on COC, no lab data provided anywhere in report.	Nelson, Pope and Voorhis, June 1997
Monitoring Well	SP-6/GWP-6							X	X		X	Document text states metals were analyzed; and although the analysis for metals was requested on COC, no lab data provided anywhere in report.	Nelson, Pope and Voorhis, June 1997
Monitoring Well	MW-1							X	X				Nelson, Pope and Voorhis, June 1997
Monitoring Well	MW-2							X	X				Nelson, Pope and Voorhis, June 1997
Monitoring Well	MW-3							X	X				Nelson, Pope and Voorhis, June 1997
Monitoring Well	MW-4							X	X				Nelson, Pope and Voorhis, June 1997
Monitoring Well	MW-5						24	X	X				Nelson, Pope and Voorhis, June 1997
Monitoring Well	AMW-1							X	X				ARKF, Jan. 2001
Monitoring Well	AMW-2							X	X				ARKF, Jan. 2001
Monitoring Well	MW-2/DP-1	5	-	25	Yes	28		X	X				ARKF, Jan. 2001
Monitoring Well	MW-3/DP-9	5	-	25	Yes	40		X	X				ARKF, Jan. 2001
Monitoring Well	MW-4/DP-3	5	-	25	Yes	28	24	X	X				ARKF, Jan. 2001
Monitoring Well	MW-5/DP-11	3	-	30	Yes	32		X	X				ARKF, Jan. 2001
Monitoring Well	MW-6/DP-12	5	-	25	Yes	32		X	X				ARKF, Jan. 2001
Monitoring Well	MW-7/DP-13	5	-	25	Yes	32		X	X				ARKF, Jan. 2001
Monitoring Well	MW-8/DP-14							X	X			Data provided in summary table for MW-8. However, text states that DP-14 could not be advanced due to refusal and concrete in location. But then the text states a well was installed and sampled at MW-8, and the log in in Appendix A - which is not included.	ARKF, Jan. 2001
Monitoring Well	C-1S/D							X		X		Shallow and deep well.	ARKF, July 2001
Monitoring Well	C-2S/D							X		X		Shallow and deep well.	ARKF, July 2001
Monitoring Well	C-3S/D							X		X		Shallow and deep well.	ARKF, July 2001
Monitoring Well	C-4S/D							X		X		Shallow and deep well.	ARKF, July 2001
Monitoring Well	C-5S/D							X		X		Shallow and deep well.	ARKF, July 2001
Monitoring Well	C-6S/D						11	X		X		Shallow and deep well.	ARKF, July 2001
Monitoring Well	MW-9							X		X		Deep well.	ARKF, July 2001
Monitoring Well	MW-10							X		X		Deep well.	ARKF, July 2001

Table 2-5
Historic Laboratory Sample Summary - Soil Gas
Metropolitan Former MGP
124 - 136 Second Avenue, Brooklyn, NY

			SOIL GAS			
Location Type	**Location ID**	**Excavated**	**VOC**	**SVOC**	**Comments**	**Source**
Soil Gas	SG-3		X	X		ARKF, Jan. 2001
Soil Gas	SG-4		X	X		ARKF, Jan. 2001
Soil Gas	SG-5		X	X		ARKF, Jan. 2001
Soil Gas	SG-6		X	X		ARKF, Jan. 2001
Soil Gas	SG-8			X		ARKF, Jan. 2001

Notes:

Due to shallow groundwater, soil gas samples were collected < 4 feet.

Table 3-1
Proposed RI Sample Location, Rationale, and Analytical Sample Summary
Metropolitan Former MGP, 124-136 Second Avenue, Brooklyn, New York

Location ID	Sample ID	Completion Depth*	Sample Depth	No. of Samples	Analyses	Rationale
Surface Soil/Subsurface Soil						
SS-1	SS-1 (depth)	2 inches	Surface (0 - 2 inches)	1	TCL VOCs, TCL SVOCs, TAL Metals, Free CN, PCBs (as Aroclors), TCL Pesticides & Herbicides	Evaluate existing surface soil on Site. Located on west side of Pathmark building between building and canal at SB-9/MW-9 location.
SS-2	SS-2 (depth)	2 inches	Surface (0 - 2 inches)	1	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate existing surface soil on Site. Location to be determined pending areas of surface soil identifed on Site.
SS-3	SS-3 (depth)	2 inches	Surface (0 - 2 inches)	1	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate existing surface soil on Site. Location to be determined pending areas of surface soil identifed on Site.
SB-1	SB-1 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Anticipated upgradient location. Evaluate background soil quality in site area near eastern edge of former MGP footprint and elevated PID at LB-8 (35-55 feet bgs).
SB-2	SB-2 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate soils adjacent to former Holders 2 and 3. Likely downgradient from former bulk oil storage beneath Lowes building. Evaluate extent of elevated PID at LB-7 (33-55 feet bgs).
SB-3	SB-3 (depth)	Est. 70 feet max	Uper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate soils adjacent to former Holder 5 and downgradient of primary NAPL producing recovery wells RW9 through RW-13 and RW-39 and 40.
SB-4	SB-4 (depth)	Est. 50 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate soils adjacent to former generator house and tar tank area along western site boundary. Likely down-gradient boundary of former MGP footprint by Gowanus Canal. Evaluate potential inputs from Brooklyn Alcatraz Asphalt Company.
SB-5	SB-5 (depth)	Est. 50 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	TCL VOCs, TCL SVOCs, TAL Metals, Free CN, PCBs (as Aroclors), TCL Pesticides & Herbicides	Evaluate soils along western site boundary. Likely down-gradient boundary of former MGP footprint by Gowanus Canal. Evaluate potential inputs from Brooklyn Alcatraz Asphalt Company.
SB-6	SB-6 (depth)	Est. 50 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	TCL VOCs, TCL SVOCs, TAL Metals, Free CN, PCBs (as Aroclors), TCL Pesticides & Herbicides	Evaluate soil adjacent to former gas holder in southern portion of former MGP footprint. Likely cross-gradient/down-gradient location.
SB-7	SB-7 (depth)	Est. 50 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate soil adjacent to former operations and gas holder in southern portion of former MGP footprint. Likely cross-gradient/down-gradient location. Evaluate potential inputs from Brooklyn Alcatraz Asphalt Company.
SB-8	SB-8 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	TCL VOCs, TCL SVOCs, TAL Metals, Free CN, PCBs (as Aroclors), TCL Pesticides & Herbicides	Evaluate soils adjacent to former operations area/Holder 4 in central/western portion of former MGP footprint. Attempt to delineate deep impacts noted at RB-1 to east adjacent to Holder 1.
SB-9	SB-9 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate former tar tank area adjacent to Gowanus Canal along western boundary of former MGP.
SB-10	SB-10 (depth)	Est. 50 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Previously un-investigated area W/SW of former MGP. Evaluate possible inputs from Brooklyn Alcetraz Asphalt Company.
SB-11	SB-11 (depth)	Est. 50 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Previously un-investigated area west of former Holders 1 and 2 and N/NW of former Holder 5.
SB-12	SB-12 (depth)	Est. 50 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate former Holder 5 along southern boundary of former MGP footprint. Delineate LB-5 impacts at 27-32 feet bgs.
SB-13	SB-13 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate soils W/SW of former Holders 1 and 2. Evaluate deep impacts to east at RB-1, LB-2, and LB-5, where impacts noted at depths up to 67 feet bgs.
SB-14	SB-14 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	TCL VOCs, TCL SVOCs, TAL Metals, Free CN, PCBs (as Aroclors), TCL Pesticides & Herbicides	Evaluate soils west of Holders 2 and 3 and downgradient of primary NAPL producing recovery wells RW9 through RW-13 and RW-39 and 40.
SB-15	SB-15 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate contents of edge of Holder 5 foundation (if present). Evaluate soils west of former Holder 2 and downgradient of primary NAPL producing recovery wells RW9 through RW-13 and RW-39 and 40.
SB-16	SB-16 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate soils west of former Holder 1 and adjacent to former shaving scrubbers. Evaluate potential extent of deep impacts to east at RB-1, LB-2, and LB-5, where impacts noted at depths up to 67 feet bgs.
SB-17	SB-17 (depth)	Est. 50 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate soils adjacent to former tar extractors and condensers along 12th Street.
SB-18	SB-18 (depth)	Est. 70 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate soils downgradient of former tar extractors and condensers along 12th Street.
TP-1	TP-1 (distance/ depth)	Est. 8-10 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate location and contents of former Holder 5, valve house area, and coal line along 12th Street.
TP-2	TP-2 (distance/ depth)	Est. 8-10 feet max	Upper 5 feet, zone of worst-case impacts, and first clean or bottom	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Evaluate location and contents of former Holder 5 and valve house area adjacent to current building.

Table 3-1
Proposed RI Sample Location, Rationale, and Analytical Sample Summary
Metropolitan Former MGP, 124-136 Second Avenue, Brooklyn, New York

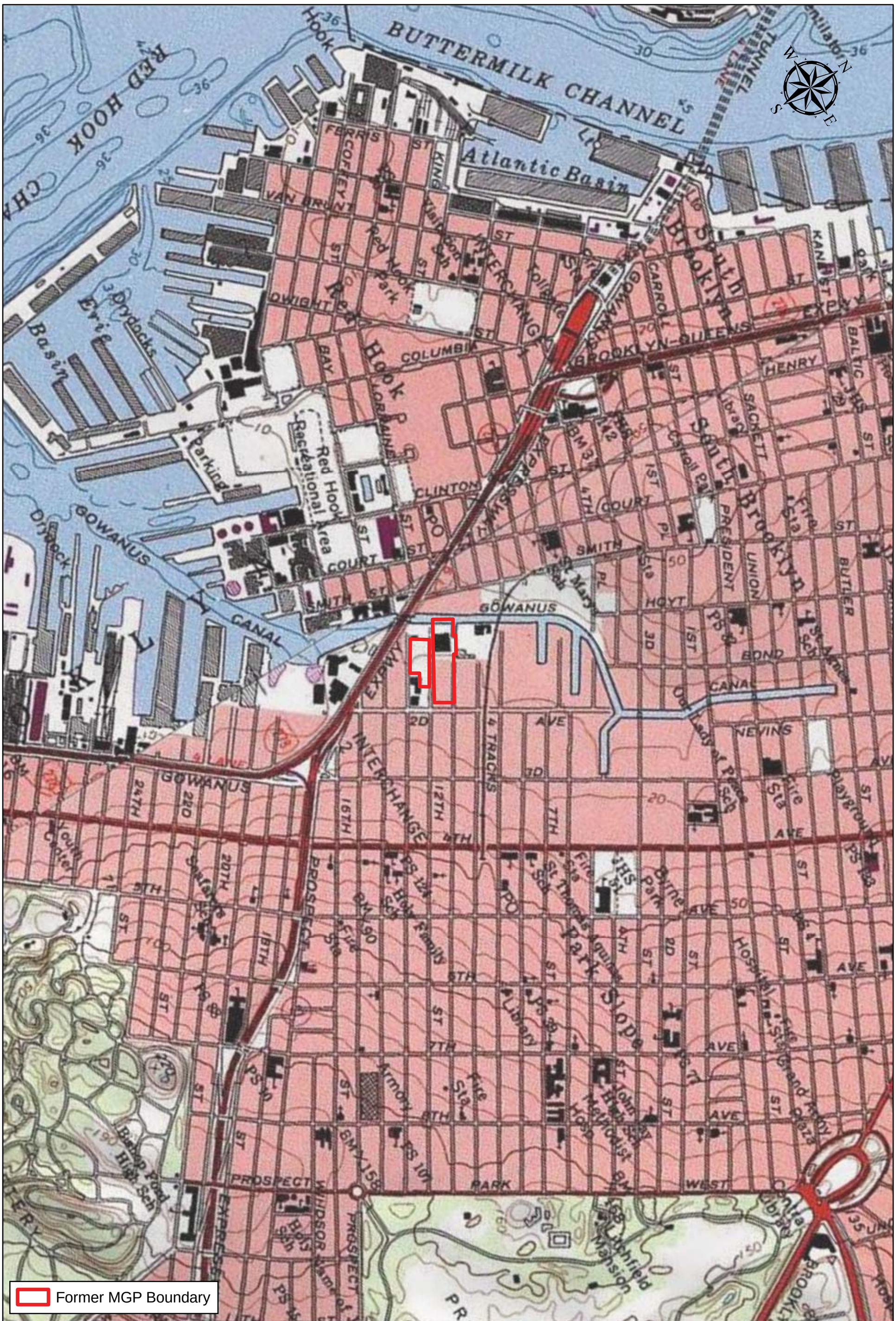
Location ID	Sample ID	Completion Depth*	Sample Depth	No. of Samples	Analyses	Rationale
Groundwater						
MW-1	MW-1S/I/D (date)	S-est. 15 ft, I est. 40 ft, D est. 70 ft	S ~ 5-15 ft., I ~ 30-40 ft., D ~ 60-70 ft.	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Anticipated upgradient/background location. Evaluate background groundwater quality in site area above "meadow mat", in upper portion of semi-confirmed aquifer, and deeper zone within lower aquifer.
MW-2	MW-2D (date)	Est 70 feet	Est. 60-70 ft.	1	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Anticipated cross-gradient location adjacent to former Holders 2 and 3. Evaluate deeper zone within lower aquifer. Shallow and intermediate groundwater data available from adjacent site RWs.
MW-3	MW-3S/I (date)	S-est. 15 ft, I est. 50 ft	S ~ 5-15 ft., I ~ 25-50 ft.	2	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Anticipated downgradient location of primary NAPL producing recovery wells RW9 through RW-13 and RW-39 and 40. Evaluate possible lateral extent of impacts noted in these RWs. Screened interval set to be consistent with RWs.
MW-4	MW-4S/I (date)	S-est. 15 ft, I est. 40 ft	S ~ 5-15 ft., I ~ 30-40 ft.	2	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Anticipated downgradient site boundary location adjacent to Gowanus Canal. Evaluate potential inputs from Brooklyn Alcatraz Asphalt Company. Evaluate groundwater flux/gradients into canal above "meadow mat" and in upper portion of semi-confirmed aquifer.
MW-5	MW-5S/I/D (date)	S-est. 15 ft, I est. 40 ft, D est. 70 ft	S ~ 5-15 ft., I ~ 30-40 ft., D ~ 60-70 ft.	3	TCL VOCs, TCL SVOCs, TAL Metals, Free CN, PCBs (as Aroclors), TCL Pesticides & Herbicides	Anticipated downgradient site boundary location adjacent to Gowanus Canal. Evaluate potential inputs from Brooklyn Alcatraz Asphalt Company. Evaluate groundwater flux/gradients into canal above "meadow mat" and in upper portion of semi-confirmed aquifer.
MW-6	MW-6S/I (date)	S-est. 15 ft, I est. 40 ft	S ~ 5-15 ft., I ~ 30-40 ft.	2	TCL VOCs, TCL SVOCs, TAL Metals, Free CN, PCBs (as Aroclors), TCL Pesticides & Herbicides	Anticipated downgradient/cross-gradient site boundary location adjacent to former southern gas holder along southern/western boundary of site.
MW-7	MW-7S/I (date)	S-est. 15 ft, I est. 40 ft	S ~ 5-15 ft., I ~ 30-40 ft.	2	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Anticipated downgradient/cross-gradient site boundary location adjacent to former southern gas holder and operations area along southern/western boundary of site. Evaluate potential inputs from Brooklyn Alcatraz Asphalt Company.
MW-8	MW-8S/I (date)	S-est. 15 ft, I est. 40 ft	S ~ 5-15 ft., I ~ 30-40 ft.	2	TCL VOCs, TCL SVOCs, TAL Metals, Free CN, PCBs (as Aroclors), TCL Pesticides & Herbicides	Anticipated downgradient location. Evaluate impacts noted near former Holder 1 to the east. Potential centerline plume location adjacent to Pathmark building.
MW-9	MW-9S/I/D (date)	S-est. 15 ft, I est. 40 ft, D est. 70 ft	S ~ 5-15 ft., I ~ 30-40 ft., D ~ 60-70 ft.	3	VOCs, SVOCs, RCRA 8 Metals, and Free CN	Anticipated downgradient site boundary location adjacent to Gowanus Canal and former tar tanks. Evaluate groundwater flux/gradients into canal at three aquifer depth intervals.
Soil Vapor/Indoor Air/Ambient Air						
SV-1/IA-1	SV-1 (date); IA-1 (date)	Immediately below floor slab		2	VOCs (TO-15) + Naphthalene	Satisfy requirements of the NYSDOH Soil Vapor Intrusion Guidance. The sample will be collected with co-located indoor air sample in Pathmark building.
SV-2/IA-2	SV-2 (date); IA-2 (date)	Immediately below floor slab		2	VOCs (TO-15) + Naphthalene	Satisfy requirements of the NYSDOH Soil Vapor Intrusion Guidance. The sample will be collected with co-located indoor air sample inside Pathmark building.
SV-3/IA-3	SV-3 (date); IA-3 (date)	Immediately below floor slab		2	VOCs (TO-15) + Naphthalene	Satisfy requirements of the NYSDOH Soil Vapor Intrusion Guidance. The sample will be collected with co-located indoor air sample inside building.
SV-4/IA-4	SV-4 (date); IA-4 (date)	Immediately below floor slab		2	VOCs (TO-15) + Naphthalene	Satisfy requirements of the NYSDOH Soil Vapor Intrusion Guidance. The sample will be collected with co-located indoor air sample inside building.
AMB-1	AMB-1 (date)	Ambient air		1	VOCs (TO-15) + Naphthalene	Satisfy requirements of the NYSDOH Soil Vapor Intrusion Guidance. The sample will be taken in representative background/ambient location.

Notes

1. No. - number
2. ID - identification
3. NA - Not applicable
4. NYSDOH - New York State Department of Health
5. MGP - Manufactured Gas Plant
6. RCRA - Resource Conservation and Recovery Act
7. SS - Surface Soil
8. SB - Soil Boring (Subsurface Soil)
9. MW - Monitoring Well (Groundwater Sample)
10. SV - Soil Vapor
11. IA- Indoor Air
12. AMB - Ambient Air
13. VOCs - volatile organic compounds
14. SVOCS - semi-volatile organic compounds
15. CN - cyanide
16. * - Depths may be adjusted shallower if 10 feet into clean achieved.

Indicates interval is proposed for inclusion in the 20% of originally proposed sample to be analyzed for an expanded list of analytes.

Figures



AECOM

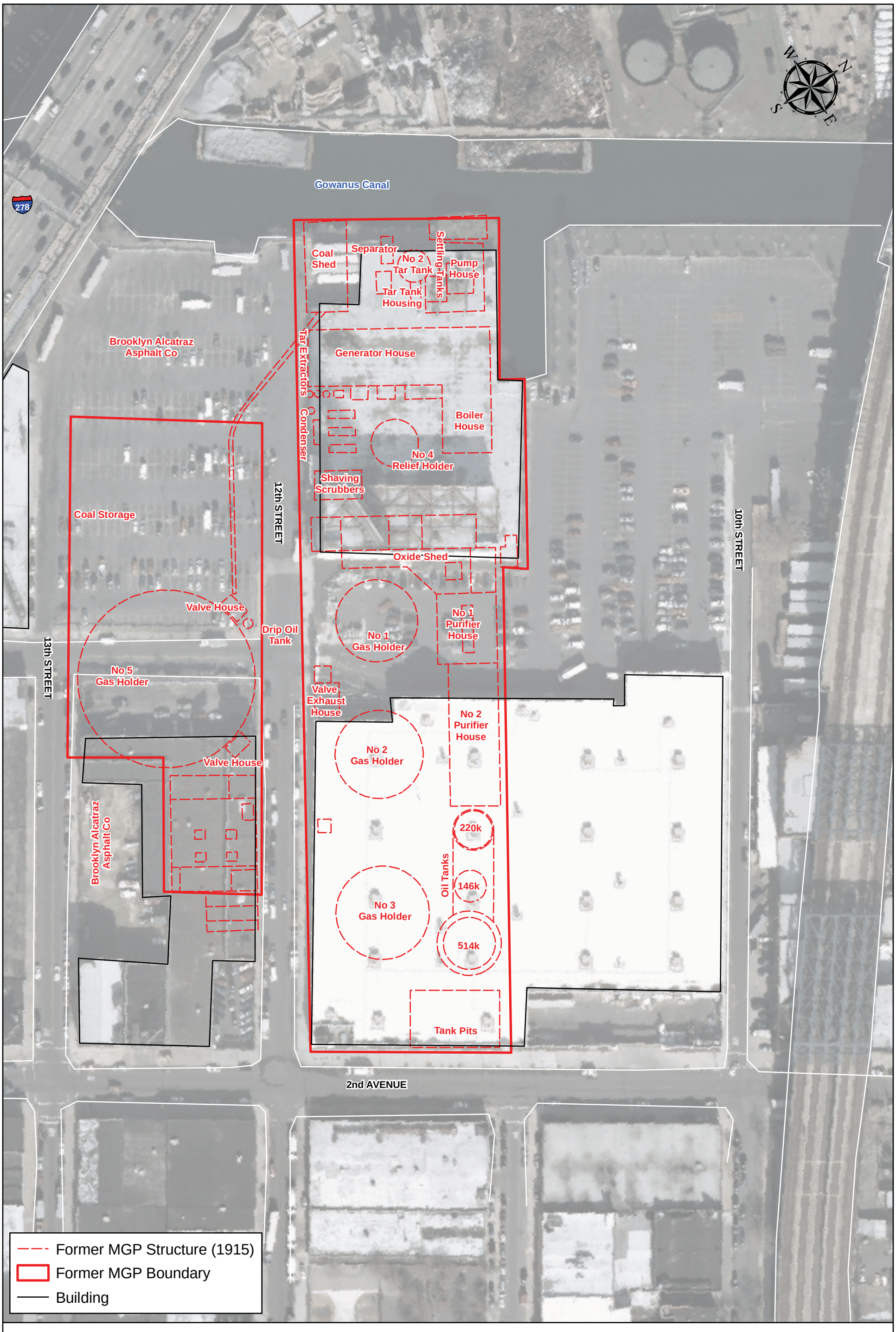
NATIONAL GRID
METROPOLITAN FORMER MGP SITE

1:12,000 1 Inch = 1000 ft

0 500 1,000 2,000 Feet

Site Location Map

Figure 1-1



AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
1:1200 1 Inch = 100 ft
0 50 100 200 Feet

Historic and Current Site Features

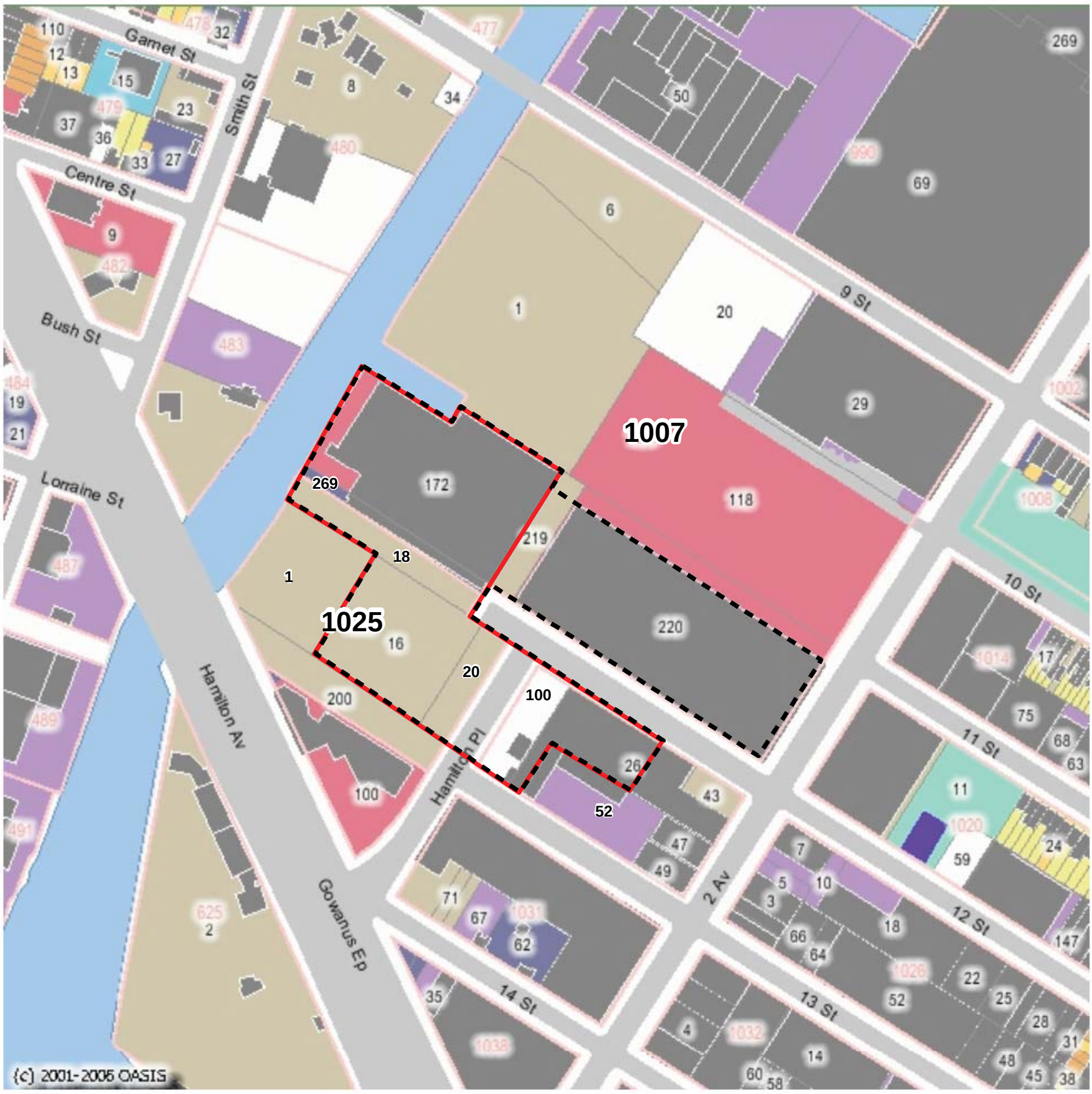
Figure 2-1

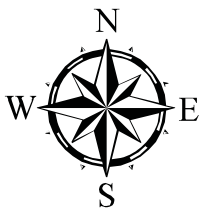
AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
1:1200 1 Inch = 100 ft
0 50 100 200 Feet

Previous Investigation Locations

Figure 2-2





Legend

- Block/Lot Boundaries
- Buildings
- Historic Houses
- Current Site
- 1 & 2 Family Residential
- Multi-family Residential
- Mixed Use
- Former MGP Boundary (Maximum Extent)
- Commercial
- Institutions
- Transportation & Parking
- Industrial
- Vacant Lots

Tax Block & Tax Lot files are copyrighted by the New York City Department of City Planning (2006 Release 06C)

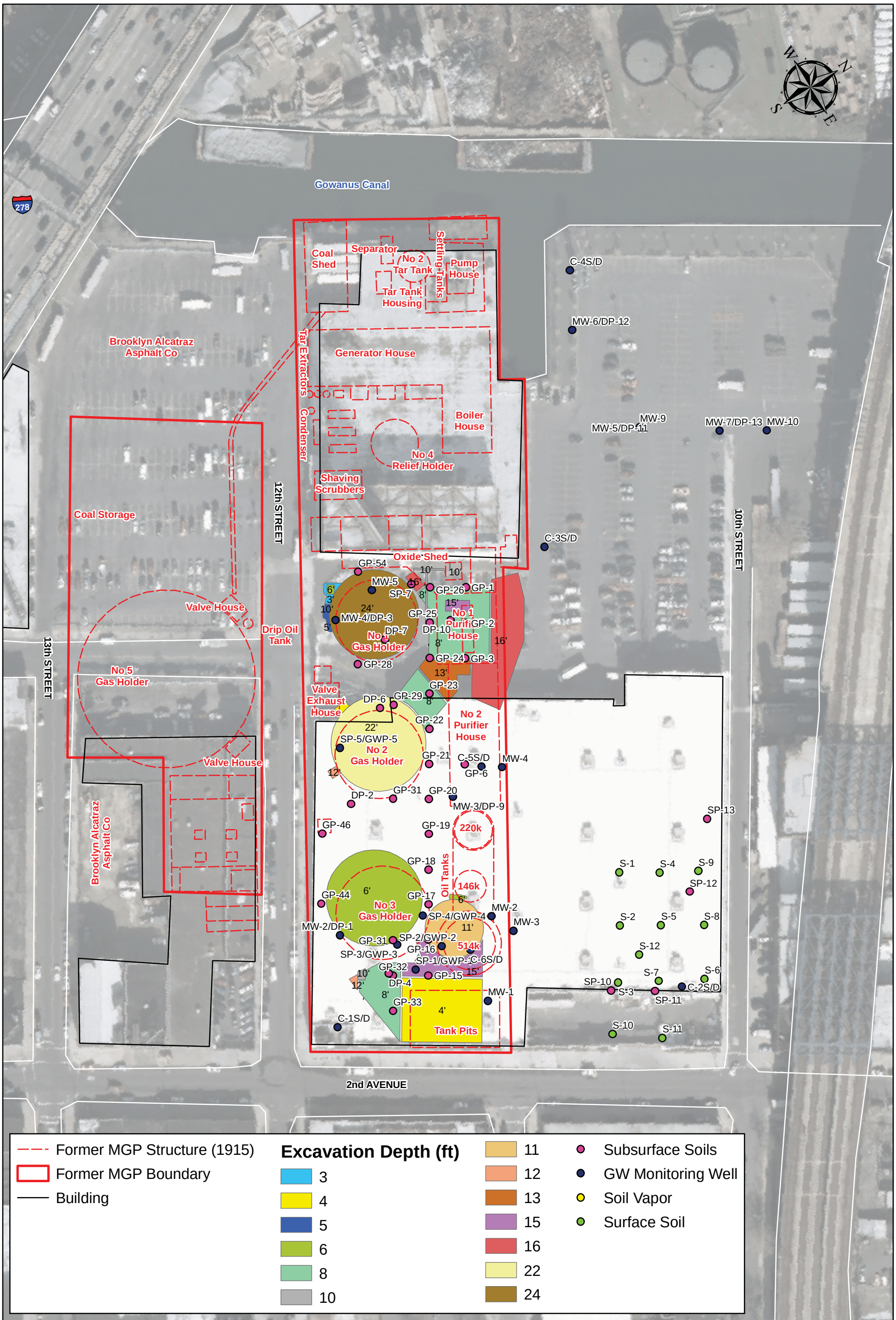
AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
Not to Scale

Data Source: http://www.oasisnyc.com/oasismap.htm

Parcel Locations

Figure 2-3

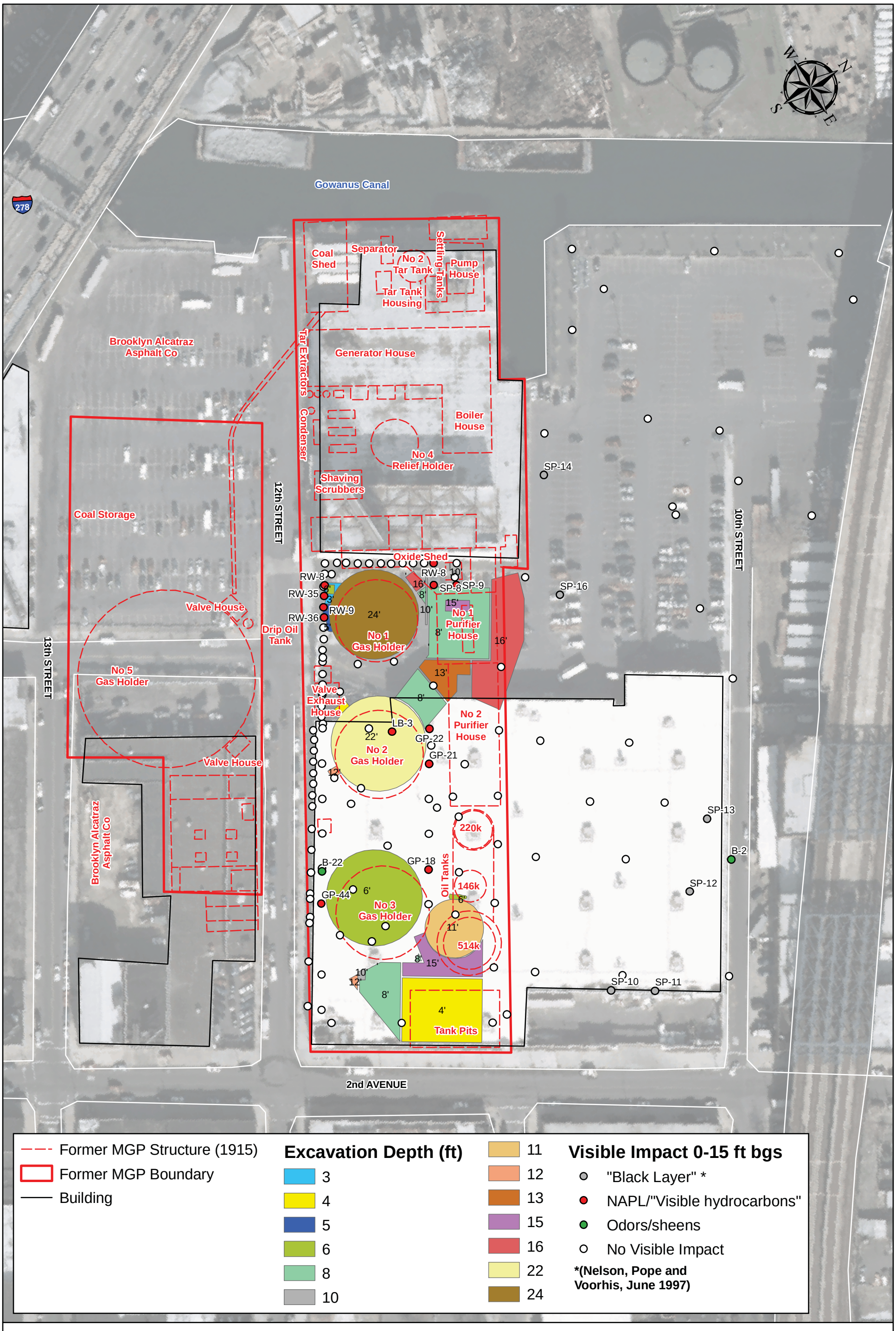


AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
1:1200 1 Inch = 100 ft
0 50 100 200 Feet

Previous Investigation Locations with Laboratory Data

Figure 2-4

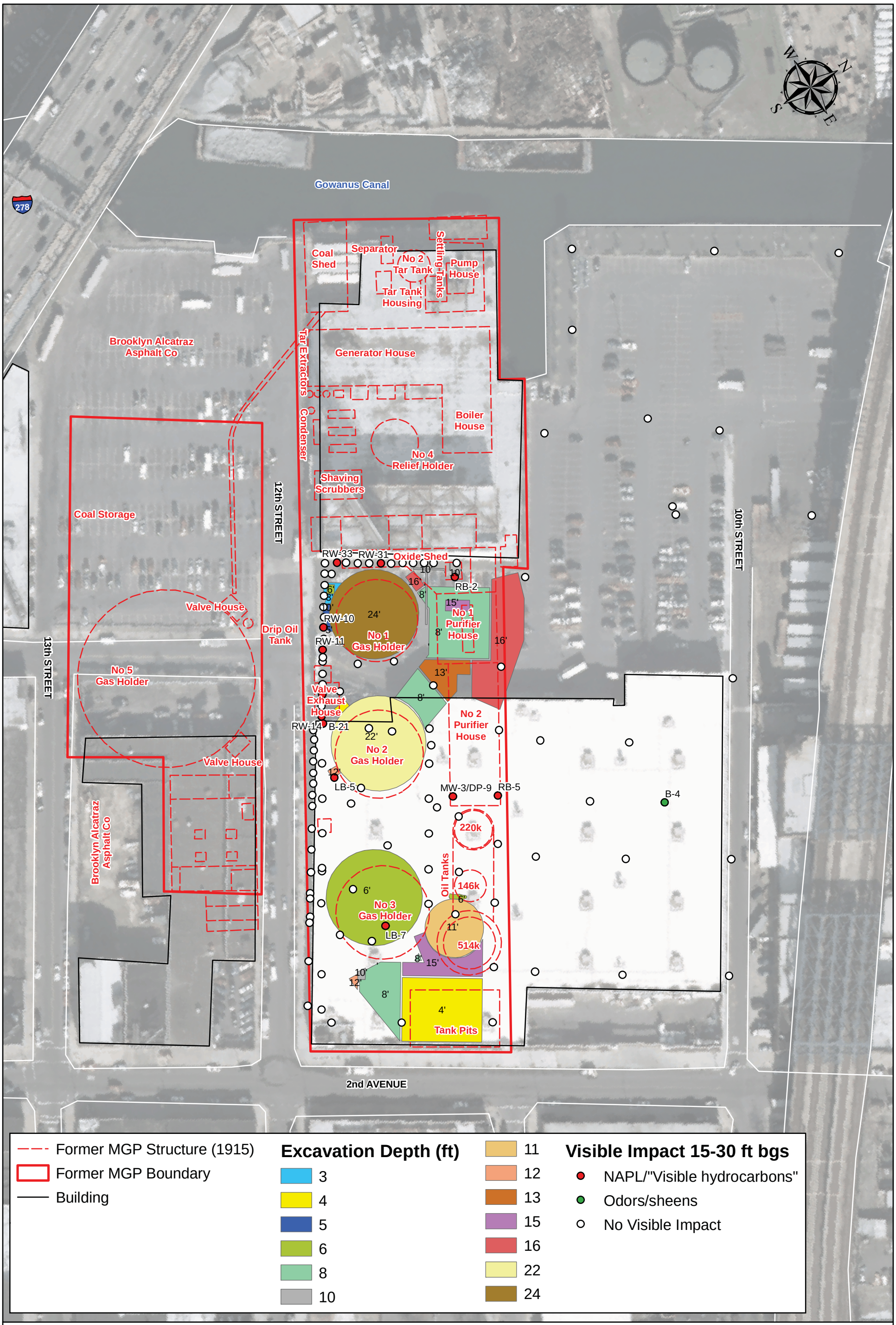


AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
1:1200 1 Inch = 100 ft
0 50 100 200 Feet

Visible Impacts (0-15 Feet bgs)

Figure 2-5

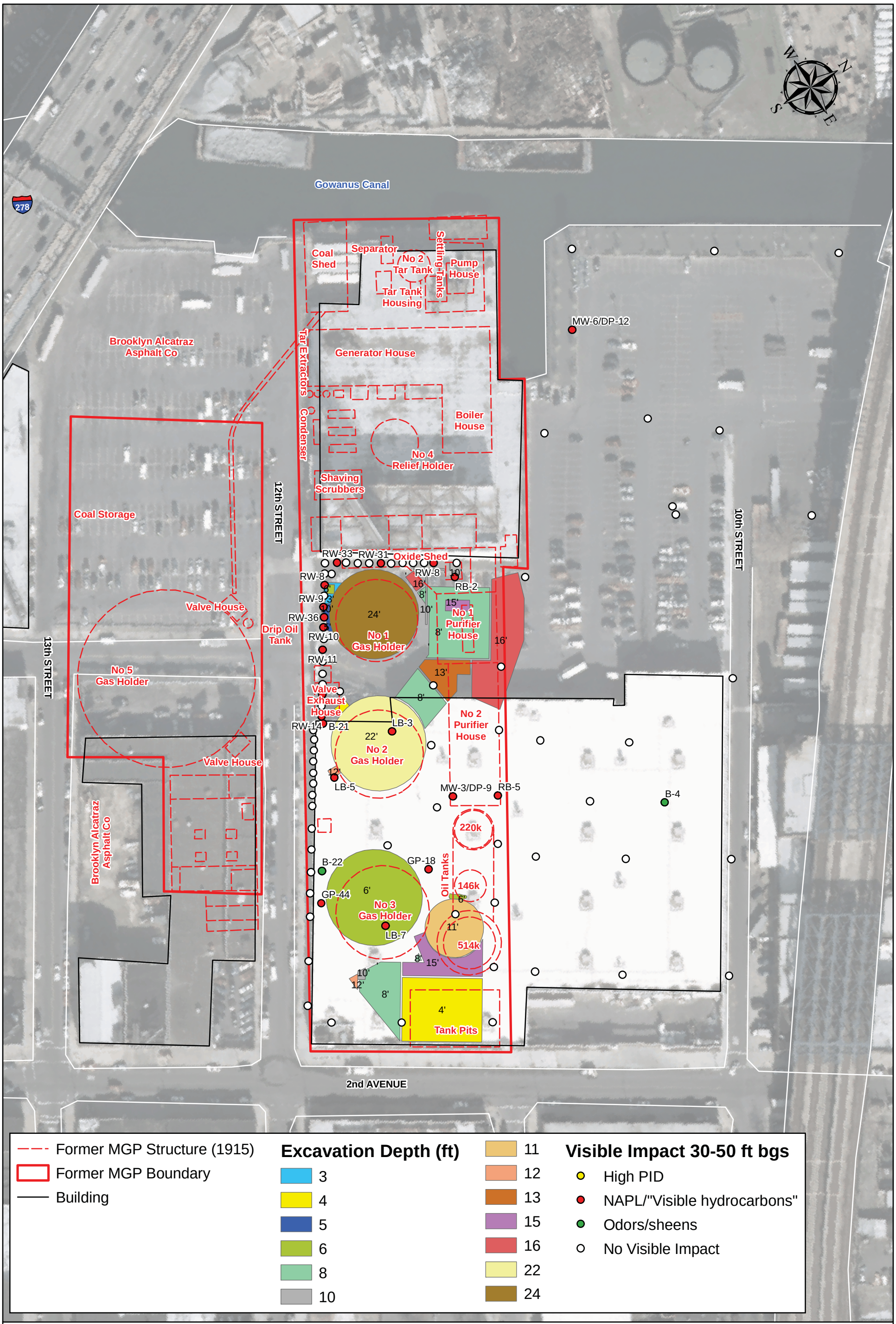


AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
1:1200 1 Inch = 100 ft
0 50 100 200 Feet

Visible Impacts (15-30 Feet bgs)

Figure 2-6

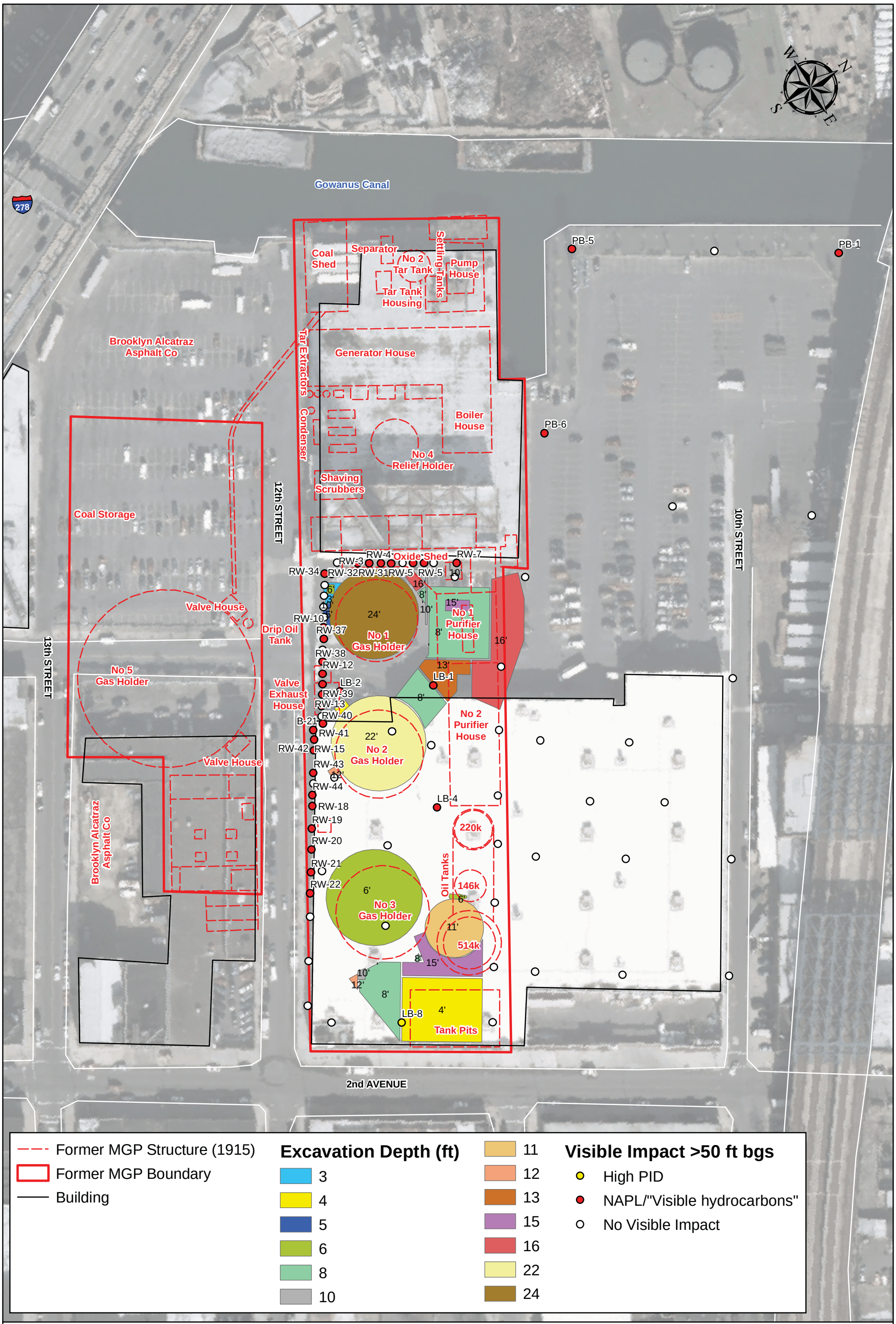


AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
1:1200 1 Inch = 100 ft
0 50 100 200 Feet

Visible Impacts (30-50 Feet bgs)

Figure 2-7

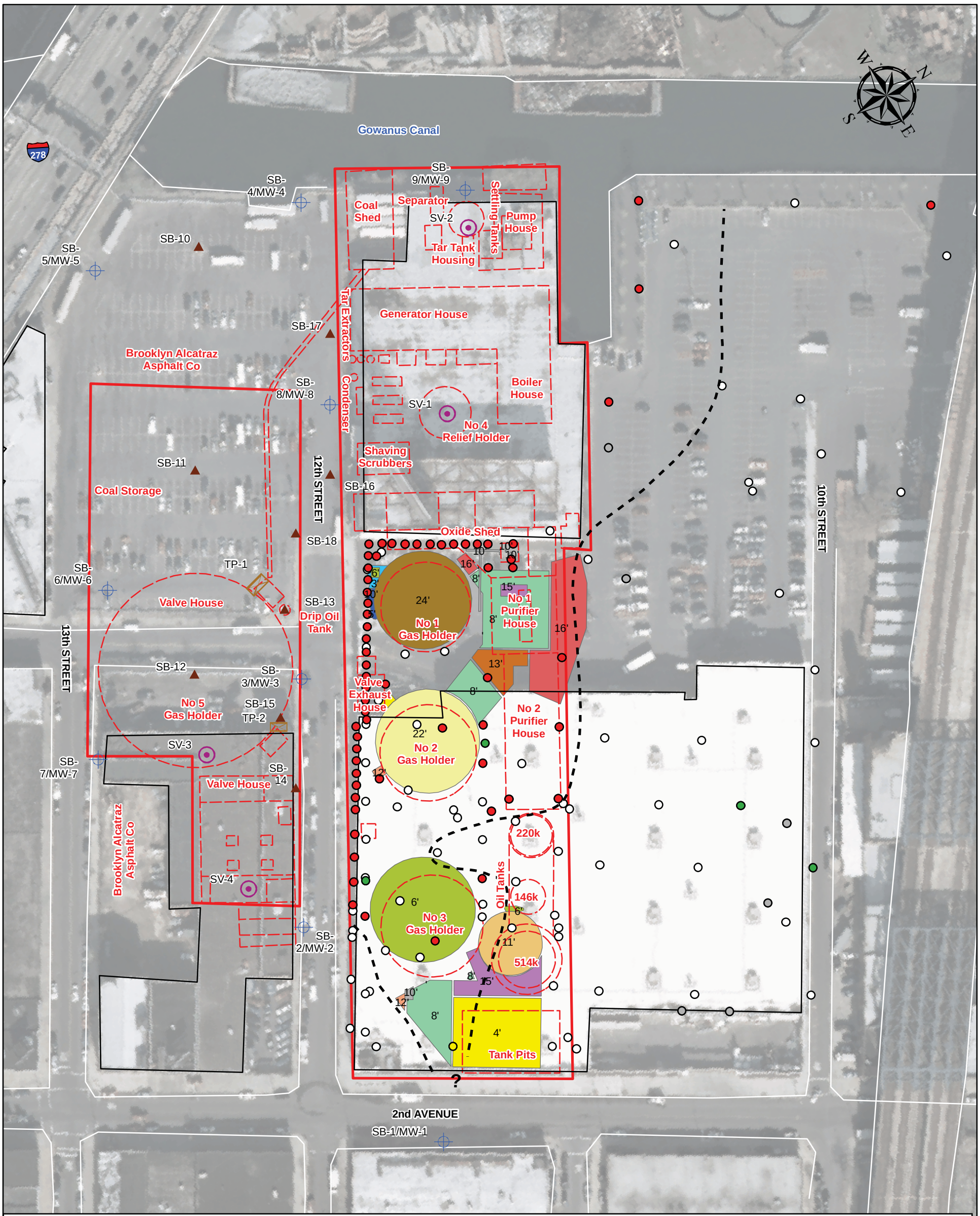


AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
1:1200 1 Inch = 100 ft
0 50 100 200 Feet

Visible Impacts (>50 Feet bgs)

Figure 2-8



AECOM

NATIONAL GRID
METROPOLITAN FORMER MGP SITE
1:1200 1 Inch = 100 ft
0 50 100 200 Feet

Proposed Remedial Investigation Sampling Locations

Figure 3-1

Appendix A

Previous Investigation Report Summary and Sanborn Maps

Table A-1
Summary of Documents
Former Metropolitan MGP
124 - 136 Second Avenue, Brooklyn, New York

Report Name	Report Date	Consultant	File Name
NYSDEC Spill Investigation Report 136 2nd Avenue Brooklyn, New York	4/23/1997	Nelson, Pope and Voorhis	NYSDEC Spill Inv Rpt Apr 1997.pdf
Phase I Environmental Site Assessment 124/136 Second Avenue Brooklyn, New York	5/15/1997	Nelson, Pope and Voorhis	124-126SecondAvenue Ph I ESA_May15-1997.pdf
Phase II Environmental Site Assessment (Limited Subsurface Investigation) 124/136 Second Avenue Brooklyn, New York	6/2/1997	Nelson, Pope and Voorhis	Ph II ESA June2-1997.pdf
Remedation Plan for Spill Nos. 9214380 VMF Site, 9704147 DMU Site 124/136 Second Avenue Brooklyn, New York	9/30/1997	Nelson, Pope and Voorhis	124_136 Second Ave Rem Plan 1997.pdf
Closure Report Brooklyn Commons 124/136 2nd Avenue	6/7/1999	Nelson, Pope and Voorhis	Closure Rpt Brooklyn Commons 1999.pdf
Supplemental Phase II Environmental Site Assessment Brooklyn Commons DMU Building Gowanus, New York	7/2/1999	Nelson, Pope and Voorhis	Supplemental Ph II ESA 1999.pdf
Voluntary Cleanup Program Site Assessment Report and Conceptual Remedial Work Plan 124-136 Second Avenue Brooklyn, New York Site #V00405-2	Jan-01	AKRF Engineering	Site Assessment Rpt Concept Work Plan Jan 2001.pdf
Remedial Investigation Results 124-136 Second Avenue Brooklyn, New York Site #V00405-2	7/10/2001	AKRF Engineering	Remedial Inv Rpt July 2001.pdf
Voluntary Cleanup Program Remedial Workplan Supplement Hot Spot Removal 124-136 Second Avenue Brooklyn, New York Site #V00405-2	10/1/2001	AKRF Engineering	Vol Clnup Prgm Hot Spot Oct 2001.pdf
Revised Remedial Work Plan 124-139 Second Avenue Brooklyn, New York Site #V00405-2	12/5/2001	AKRF Engineering	Revised Remedial Work Plan Dec 2001.pdf
Geotechnical Investigation Lowe's Home Center Brooklyn, New York	1/14/2002	Mueser Rutledge Consulting Engineers	Geotech Inv Rpt Jan 2002.pdf
Hot Spot Delineation and Gasholder Characterization Results 2nd Avenue Former MGP Site Brooklyn, New York	4/26/2002	Roux Associates	Roux Hot Spot Delin Apr 2002.pdf
Installation of Product Recovery Wells and Completion of Well Monitoring and Product Recovery Activities during May 2002 124-136 Second Avenue Brooklyn, New York Site No. V00405-2	6/11/2002	Roux Associates	Install of Product Rec Wells June 2002.pdf
Detached Mail Unit (DMU) Subsurface Investigation Results and Recommendations Former Manufactured Gas Plant (MGP) 124-136 Second Avenue, Brooklyn, New York	11/27/2002	Roux Associates	DMU Subsurface Inv November27-2002.pdf
Addendum to Geotechnical Report, Supplemental Borings Lowe's Home Center	12/24/2002	Mueser Rutledge Consulting Engineers	Addendum to Geotech Rpt Dec 2002.pdf
Detached Mail Unit (DMU) Subsurface Remediation Results and Evaluation Former Manufactured Gas Plant (MGP) 124-136 Second Avenue, Brooklyn, New York	2/24/2003	Roux Associates	DMU Subsurface Remediation Results February24-2003.pdf

Table A-1
Summary of Documents
Former Metropolitan MGP
124 - 136 Second Avenue, Brooklyn, New York

Report Name	Report Date	Consultant	File Name
Final Completion Report 124-136 Second Avenue Brooklyn, New York Site No. V00405-2	5/23/2003	Remedial Engineering and Roux Associates	124-136SecondAvenue Final Completion_May23-2003.pdf
DRAFT Gowanus Canal Investigation Executive Summary Report AOC Index No. A2-0523-0705	Apr-07	GEI Consultants, Inc.	Draft Gowanus Invest Executive Summ Report 4-12-07.pdf
DRAFT Remedial Investigation Technical Report Gowanus Canal Brooklyn, New York AOC Index No. A2-0523-0705	Apr-07	GEI Consultants, Inc.	DraftGowanusCanalInvestigation Report-April2007.pdf
Phase II Environmental Site Investigation Former Department of Education Garage 60 12th Street, Brooklyn, NY 11215	12/7/2007	ATC Associates Inc.	ATC_60-12thStreetPhase_II_July2007.pdf

Metropolitan
124-136 2nd Avenue
Brooklyn, NY 11215

Inquiry Number: 2278472.3s
July 29, 2008

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

7/29/08

Site Name:
Metropolitan
124-136 2nd Avenue
Brooklyn, NY 11215

EDR Inquiry # 2278472.3s

Client Name:
ENSR Consulting &
78 Main Street, Suite 3
Nyack, NY 10960

Contact: Jennifer Koch

EDR® Environmental Data Resources Inc

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Certified Sanborn Results:

Site Name: Metropolitan
Address: 124-136 2nd Avenue
City, State, Zip: Brooklyn, NY 11215
Cross Street:
P.O. # NA
Project: NA
Certification # F339-41C9-AA06

Sanborn® Library search results
Certification # F339-41C9-AA06

Maps Identified - Number of maps indicated within "( )"

1996 (1)	1987 (1)	1977 (1)	1886 (1)
1995 (1)	1986 (1)	1969 (1)	
1993 (1)	1982 (1)	1950 (1)	
1992 (1)	1981 (1)	1938 (1)	
1991 (1)	1980 (1)	1915 (1)	
1988 (1)	1979 (1)	1904 (1)	

Total Maps: 19

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- ✔ Library of Congress
- ✔ University Publications of America
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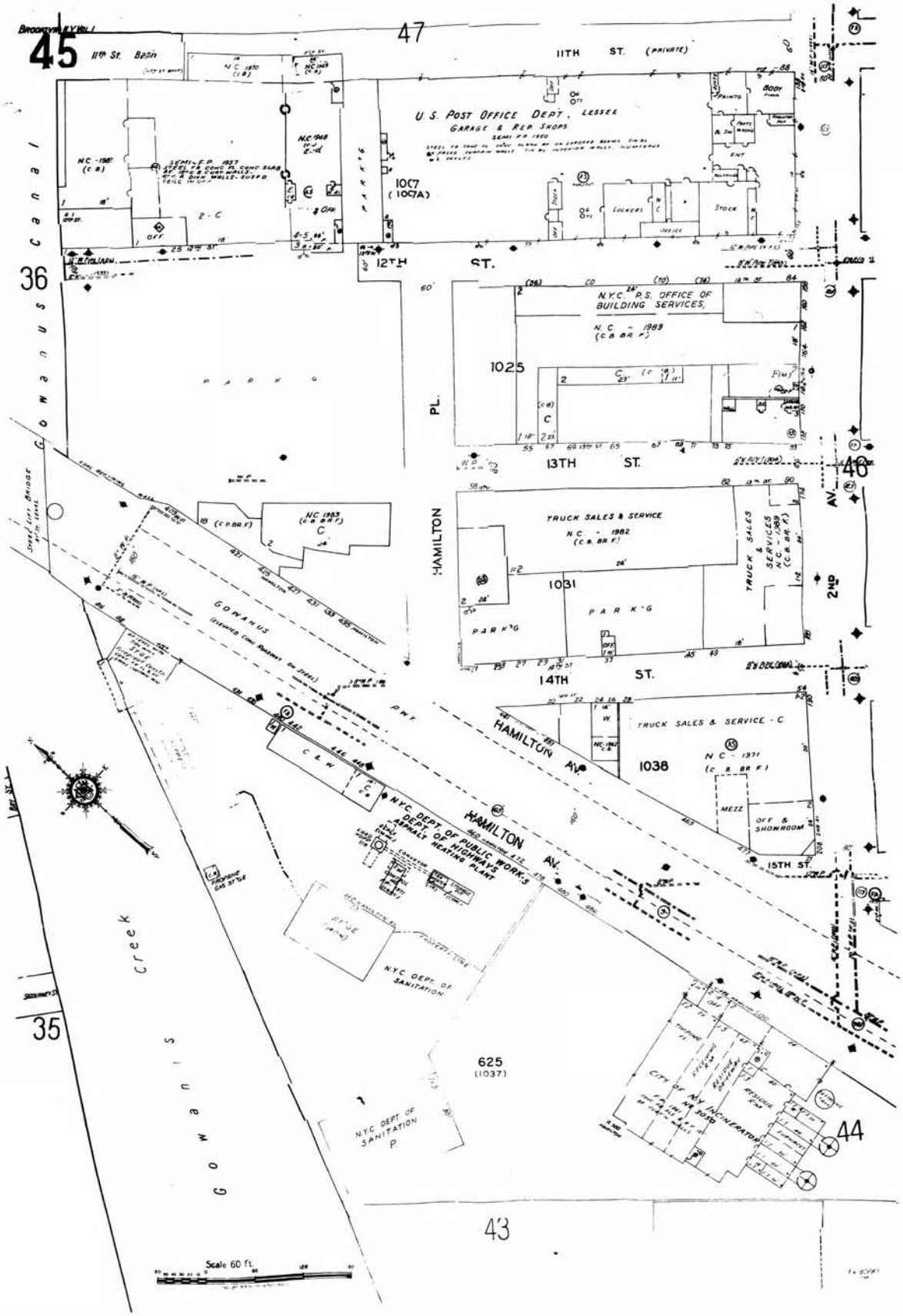

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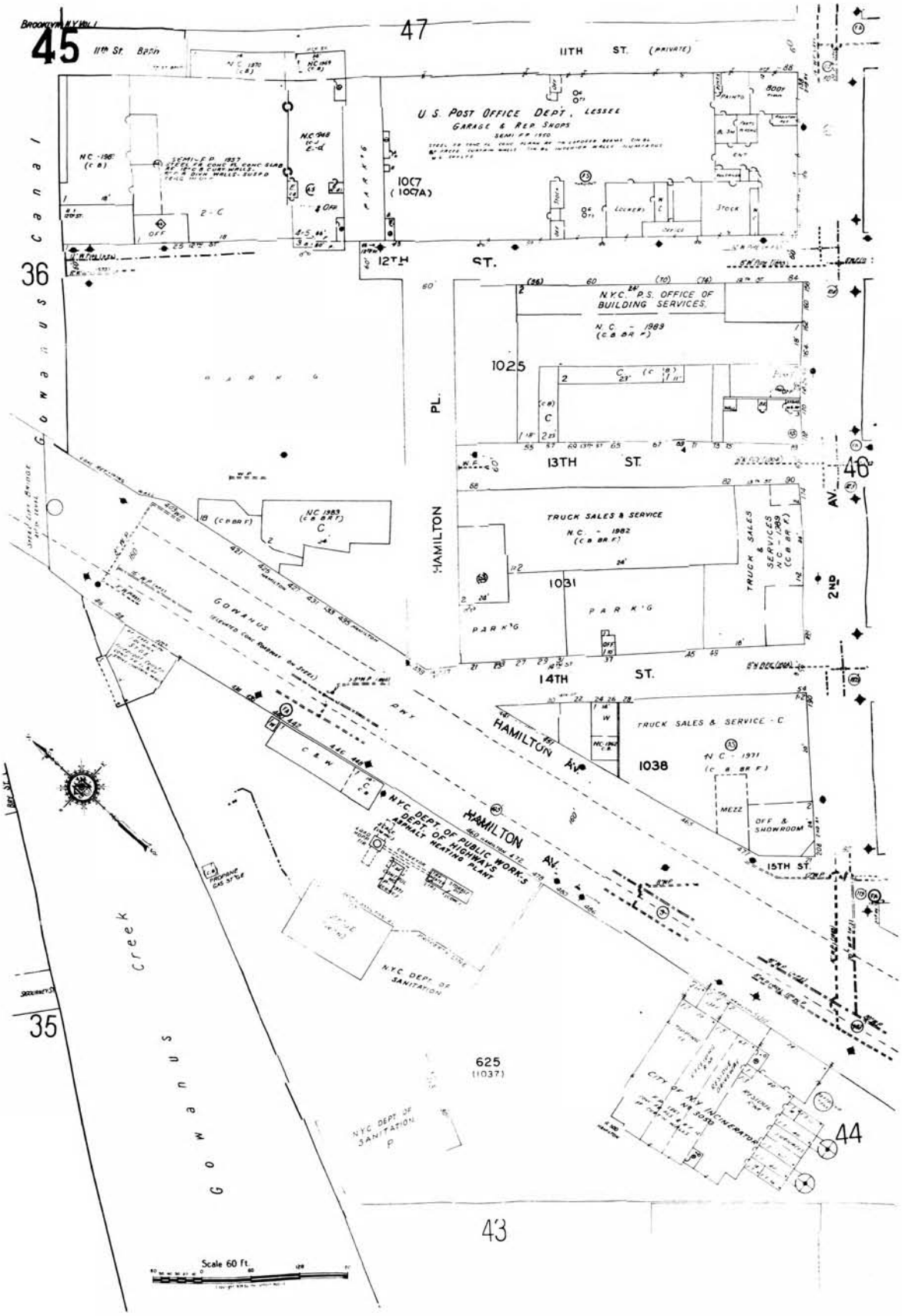
Copyright: 1996



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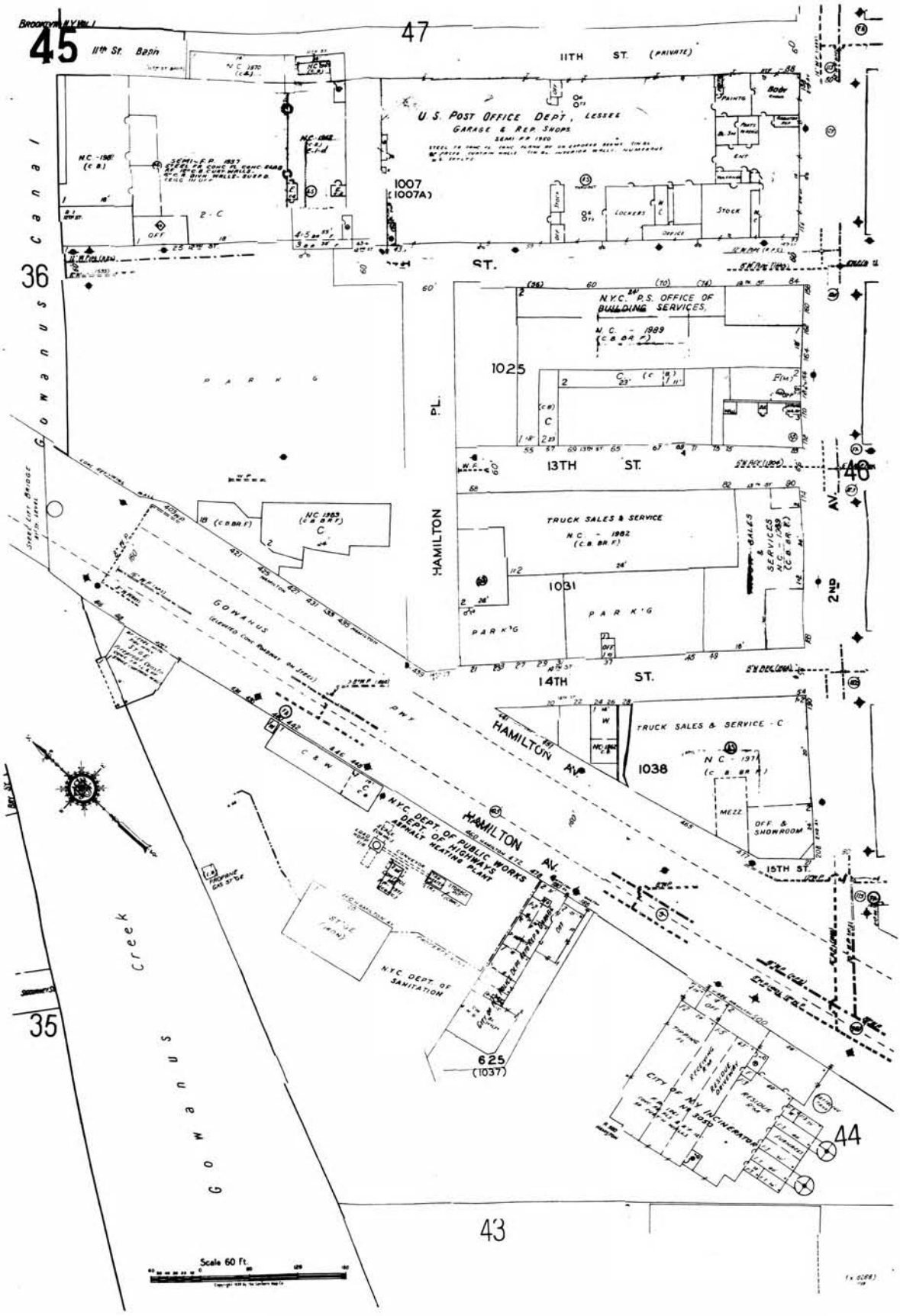
Copyright: 1995



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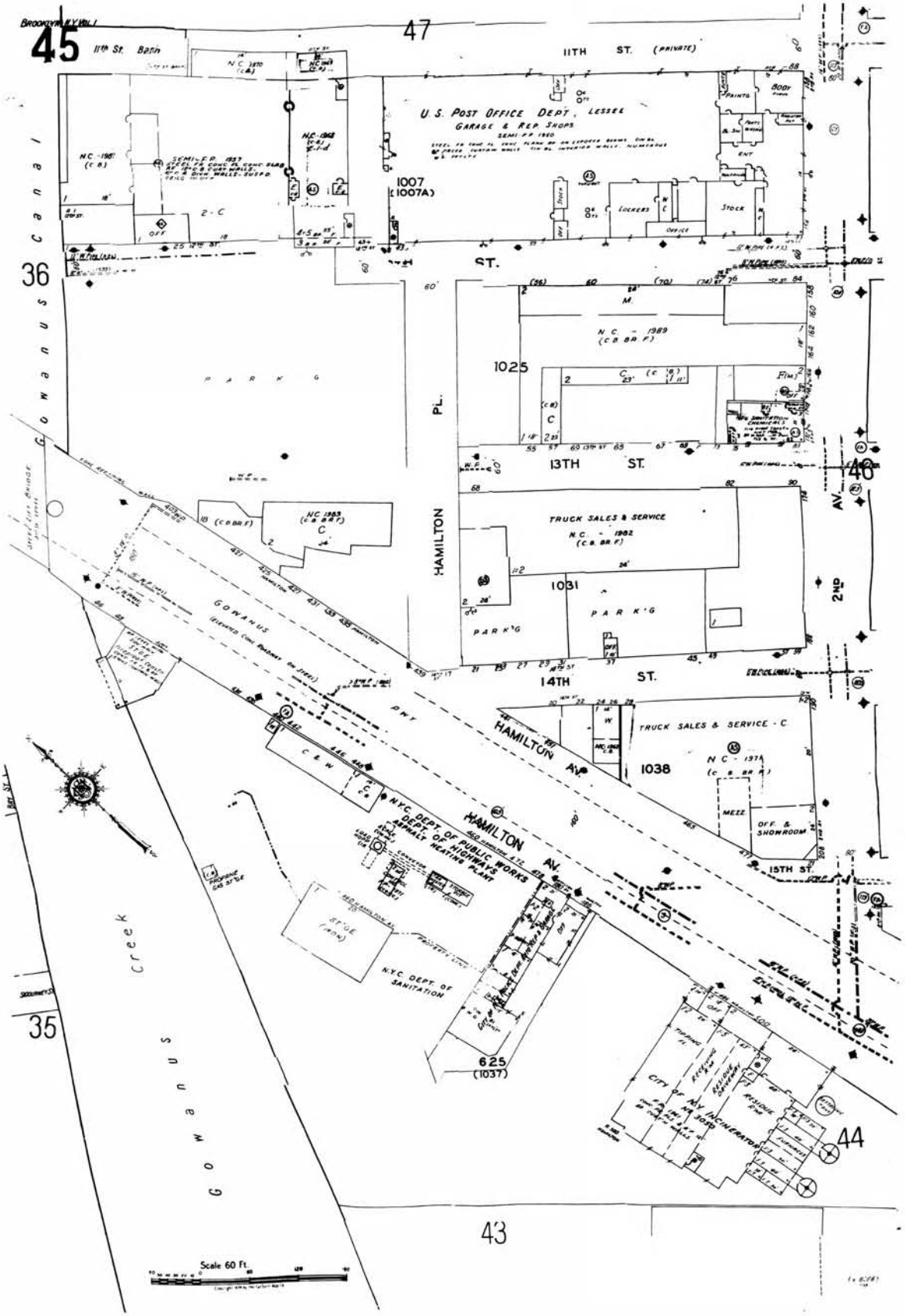
Copyright:	1993



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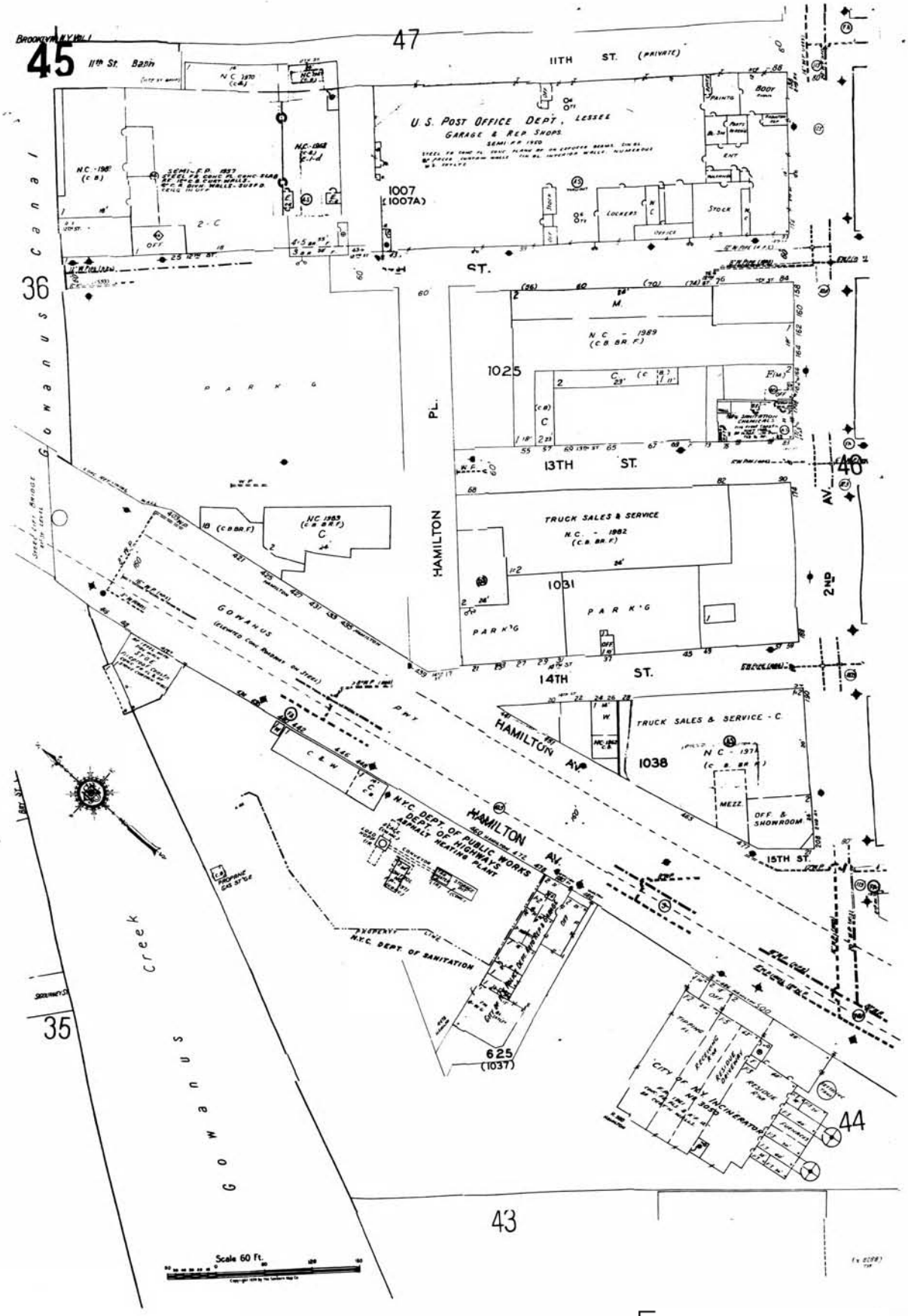
Copyright:	1992



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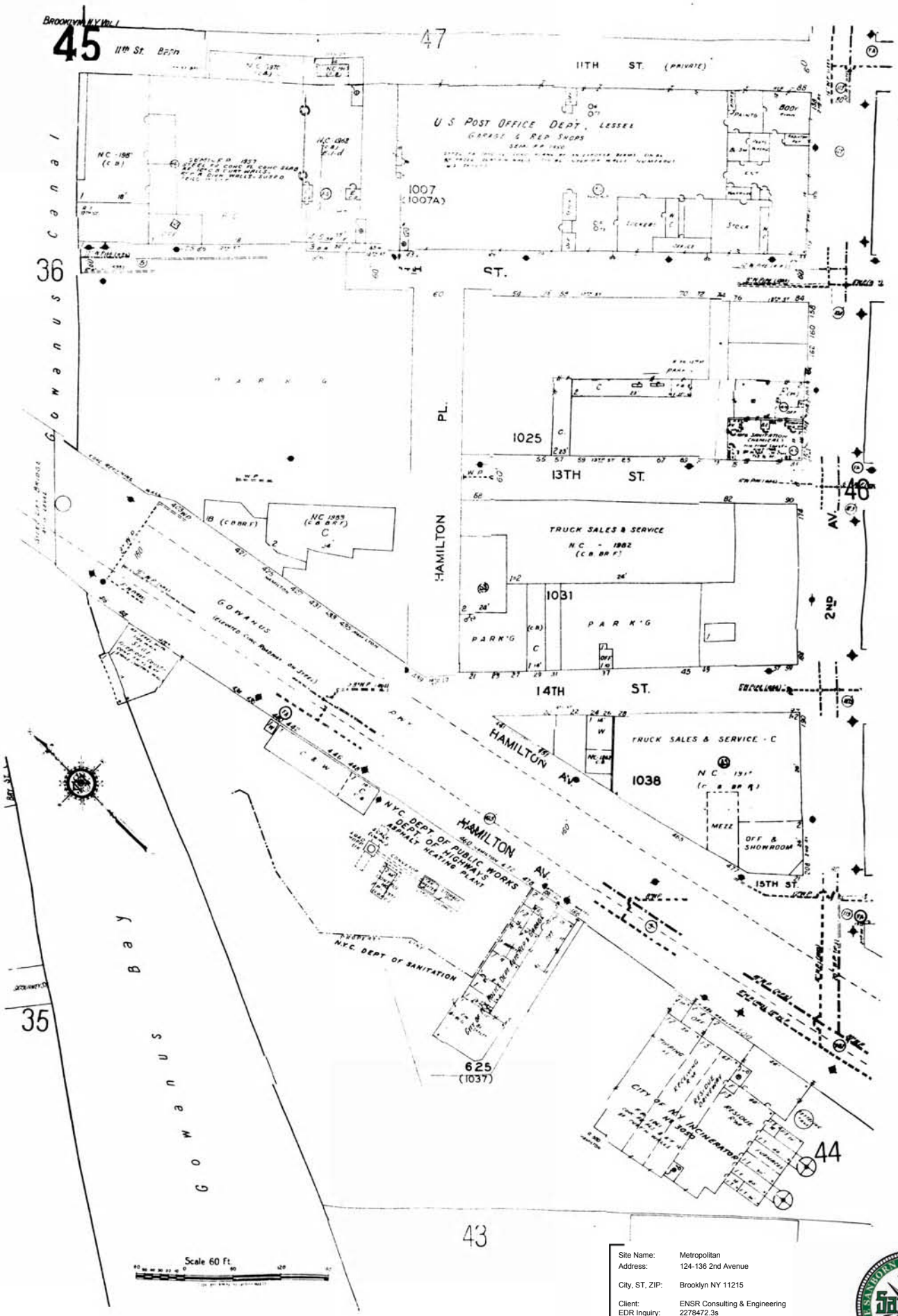
Copyright:	1991



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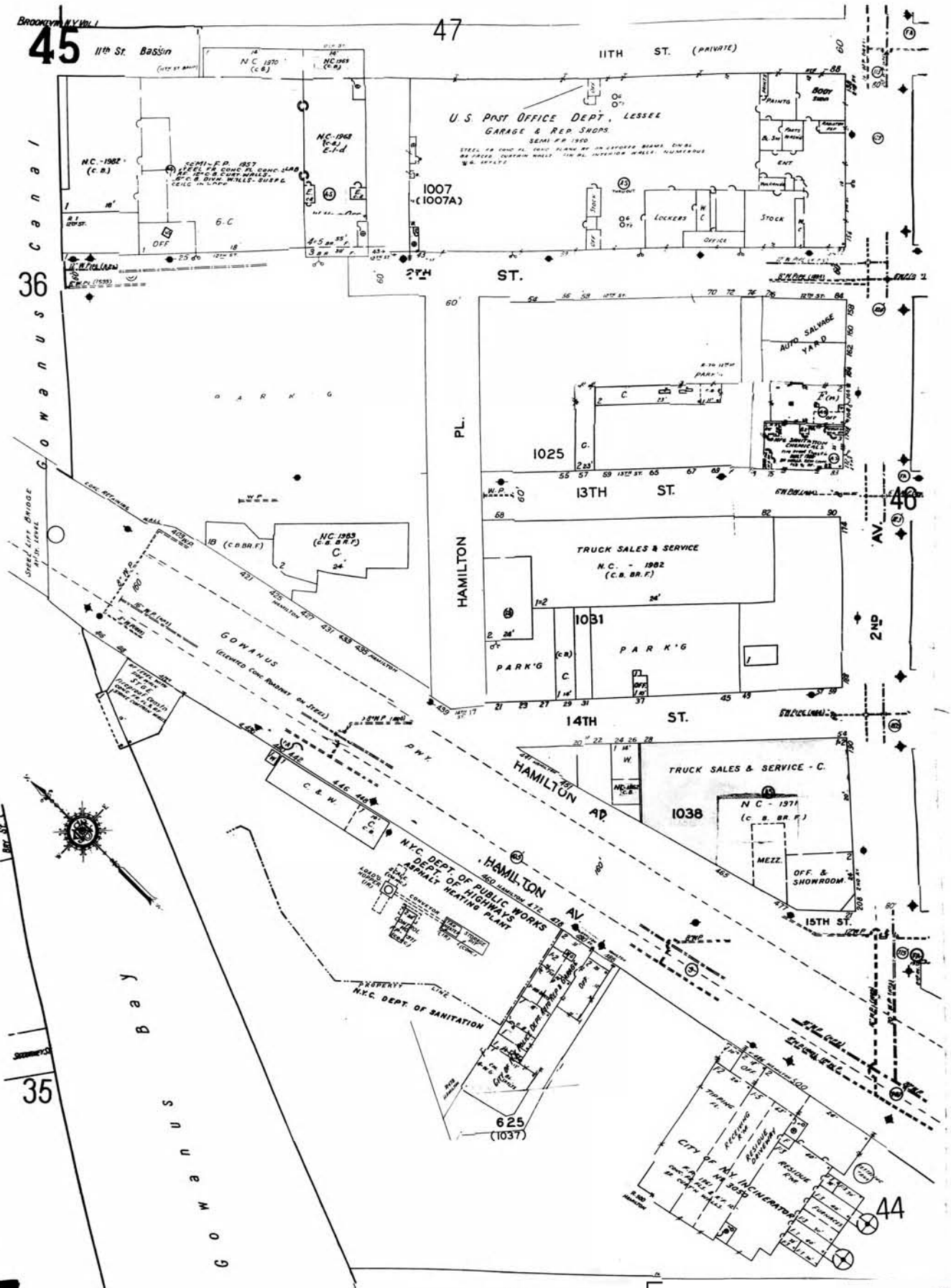
Copyright: 1988



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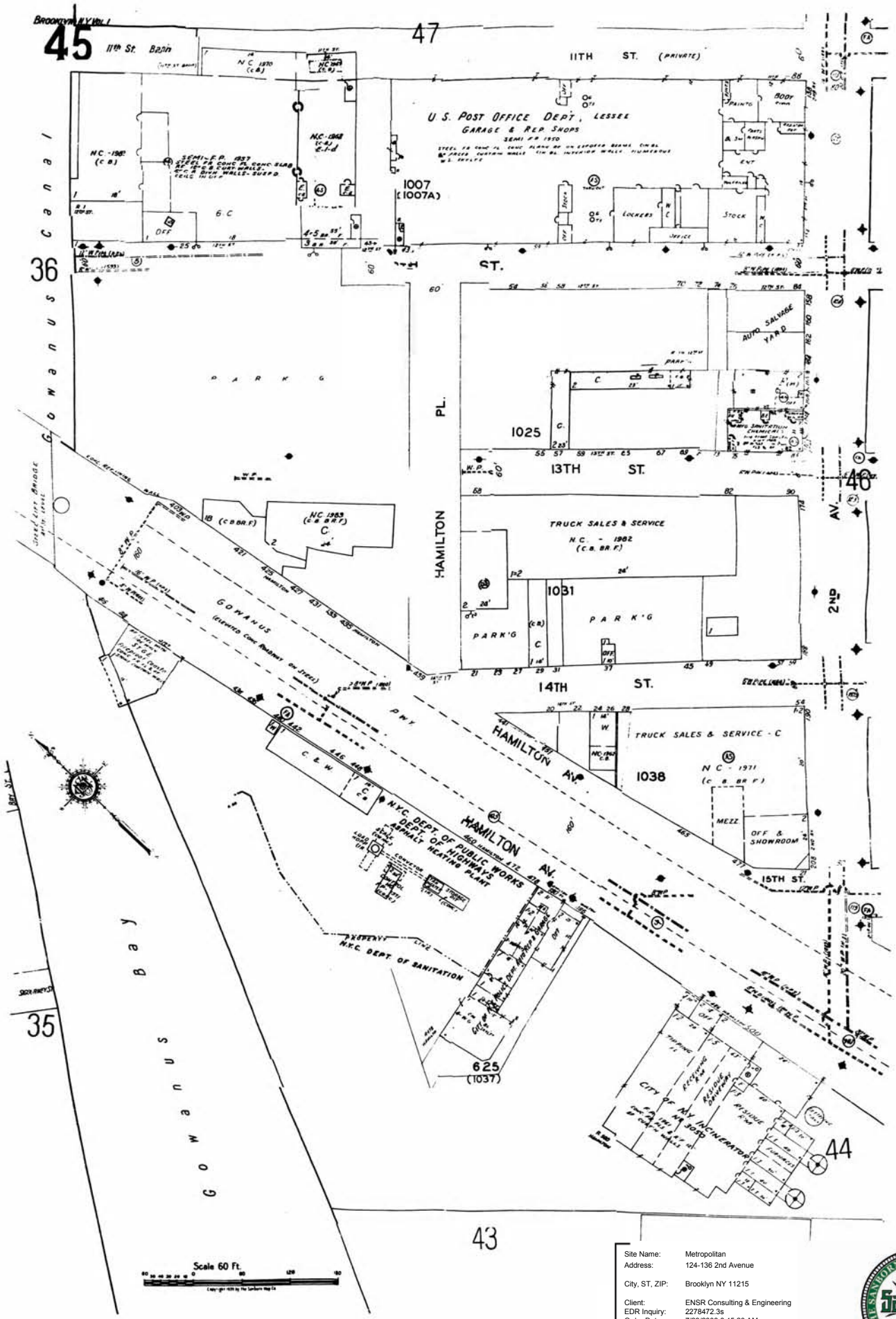
Copyright: 1987



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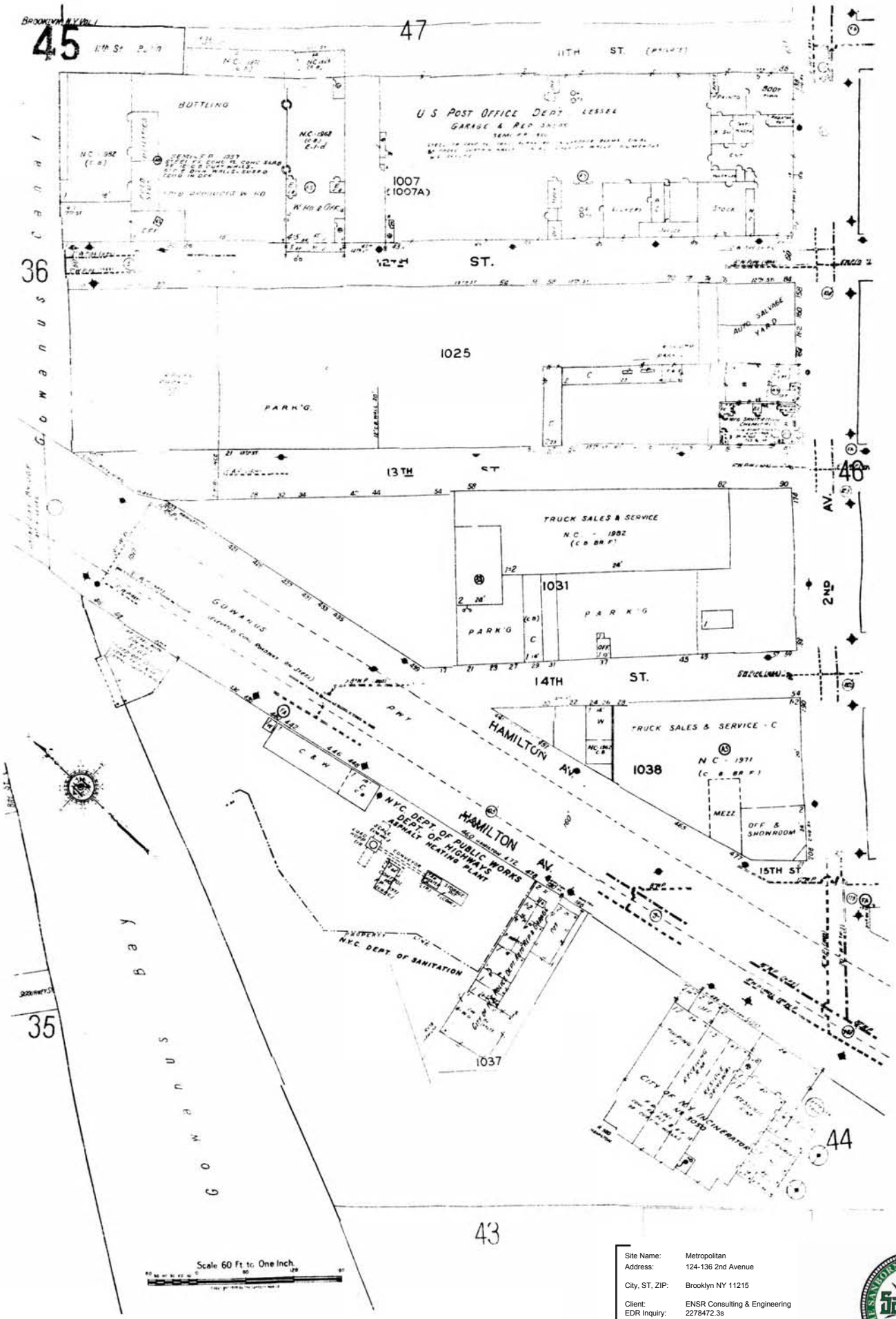
Copyright: 1986



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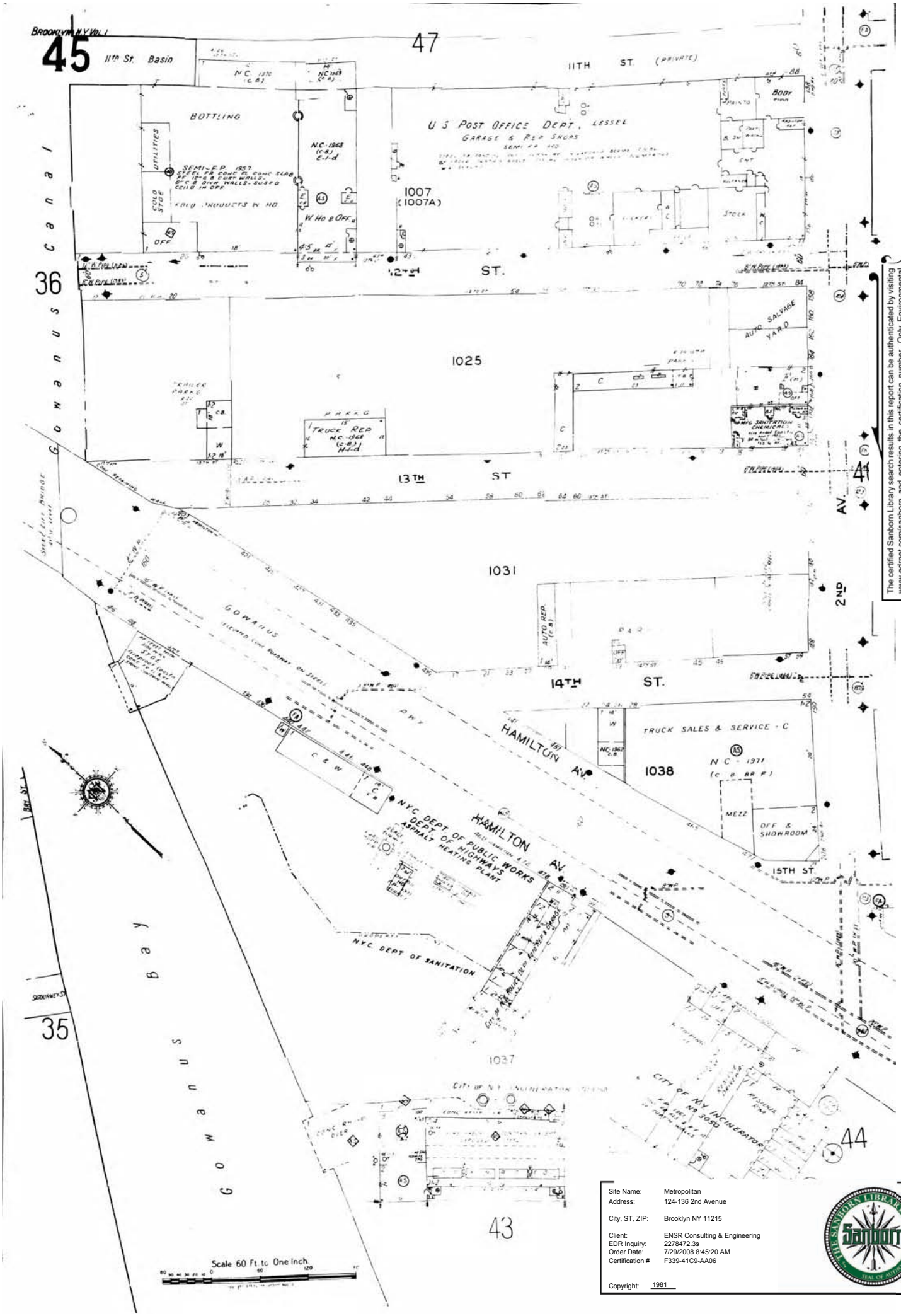
Copyright: 1982



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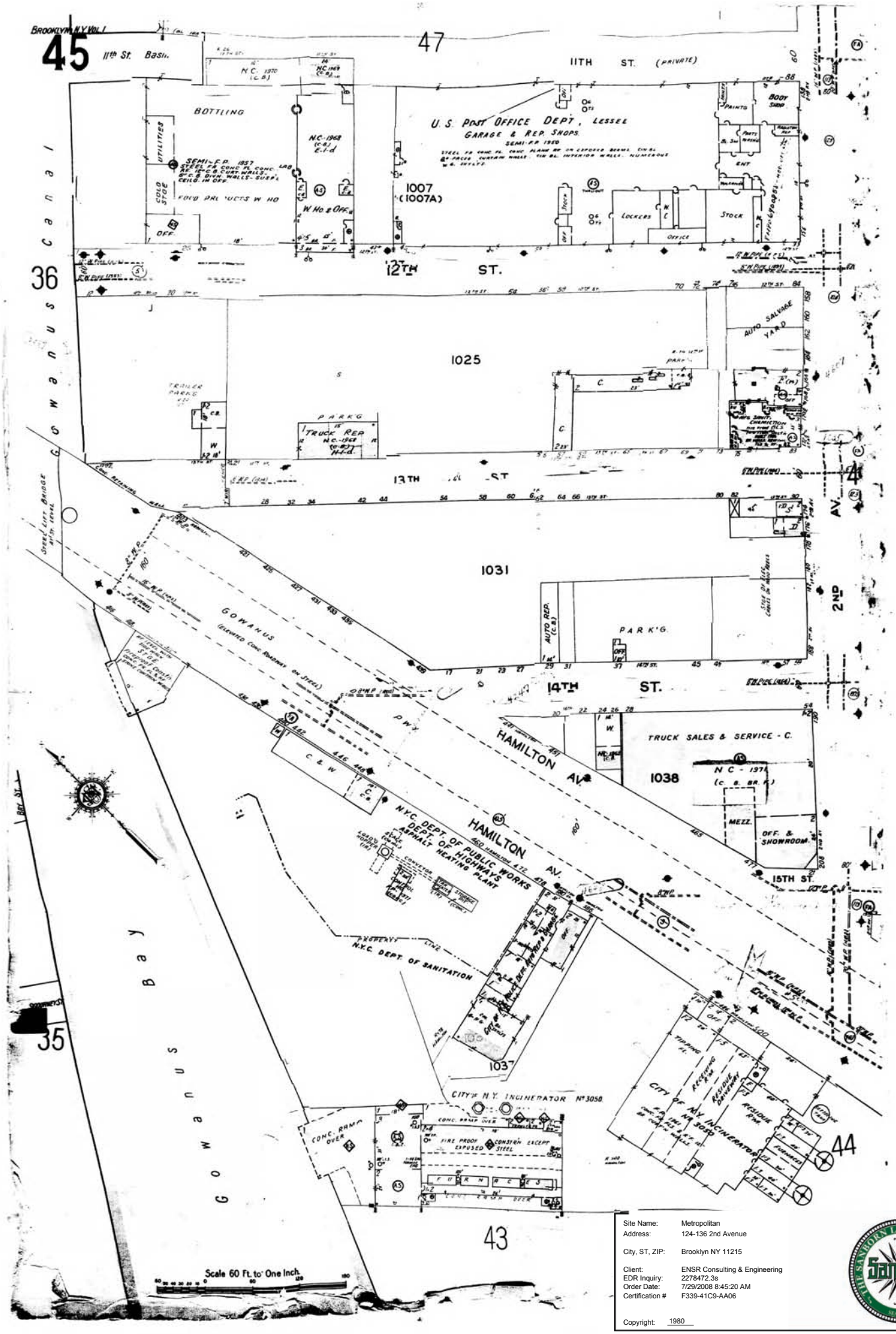
Copyright: 1981



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Copyright: 1980

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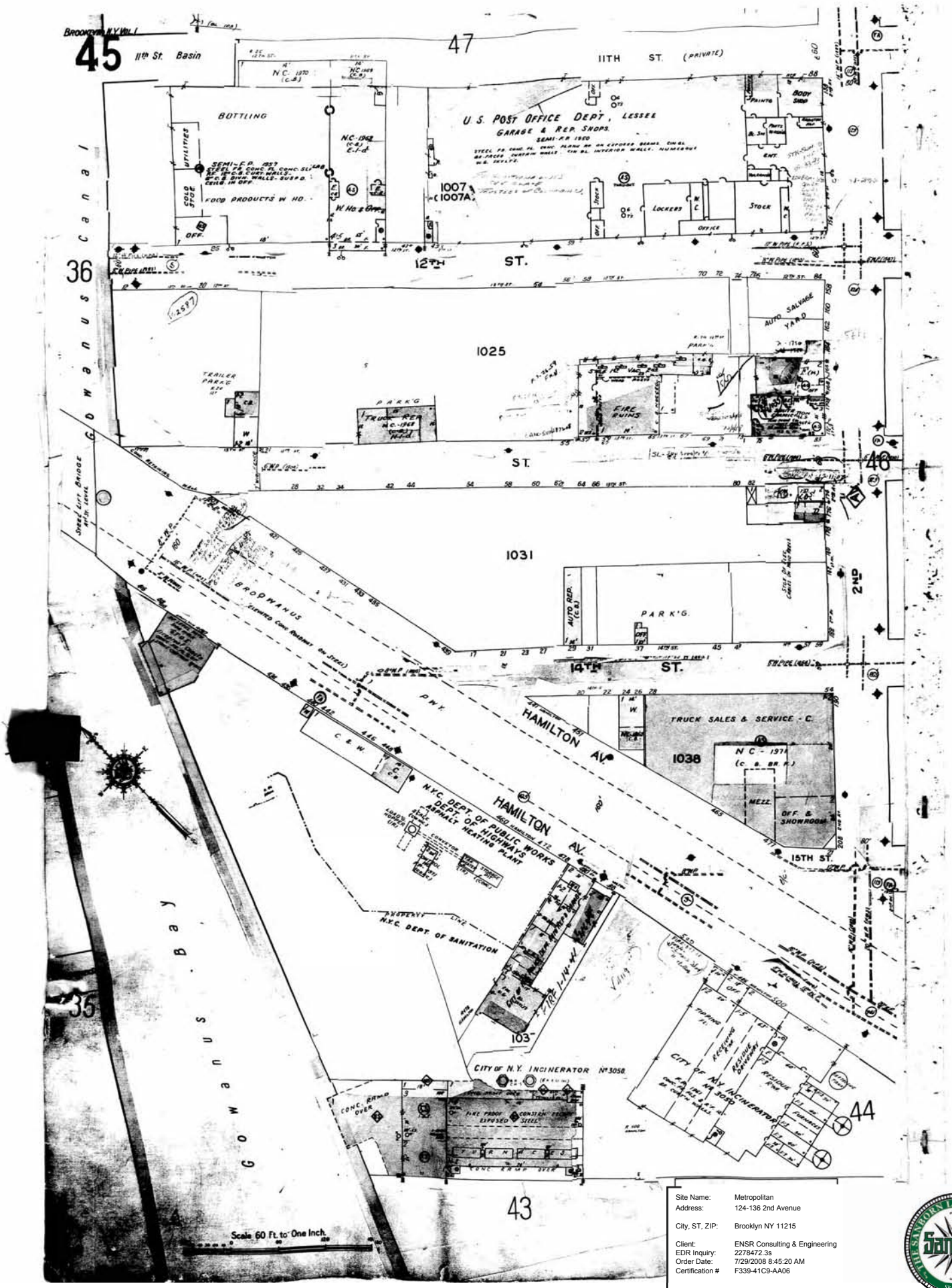

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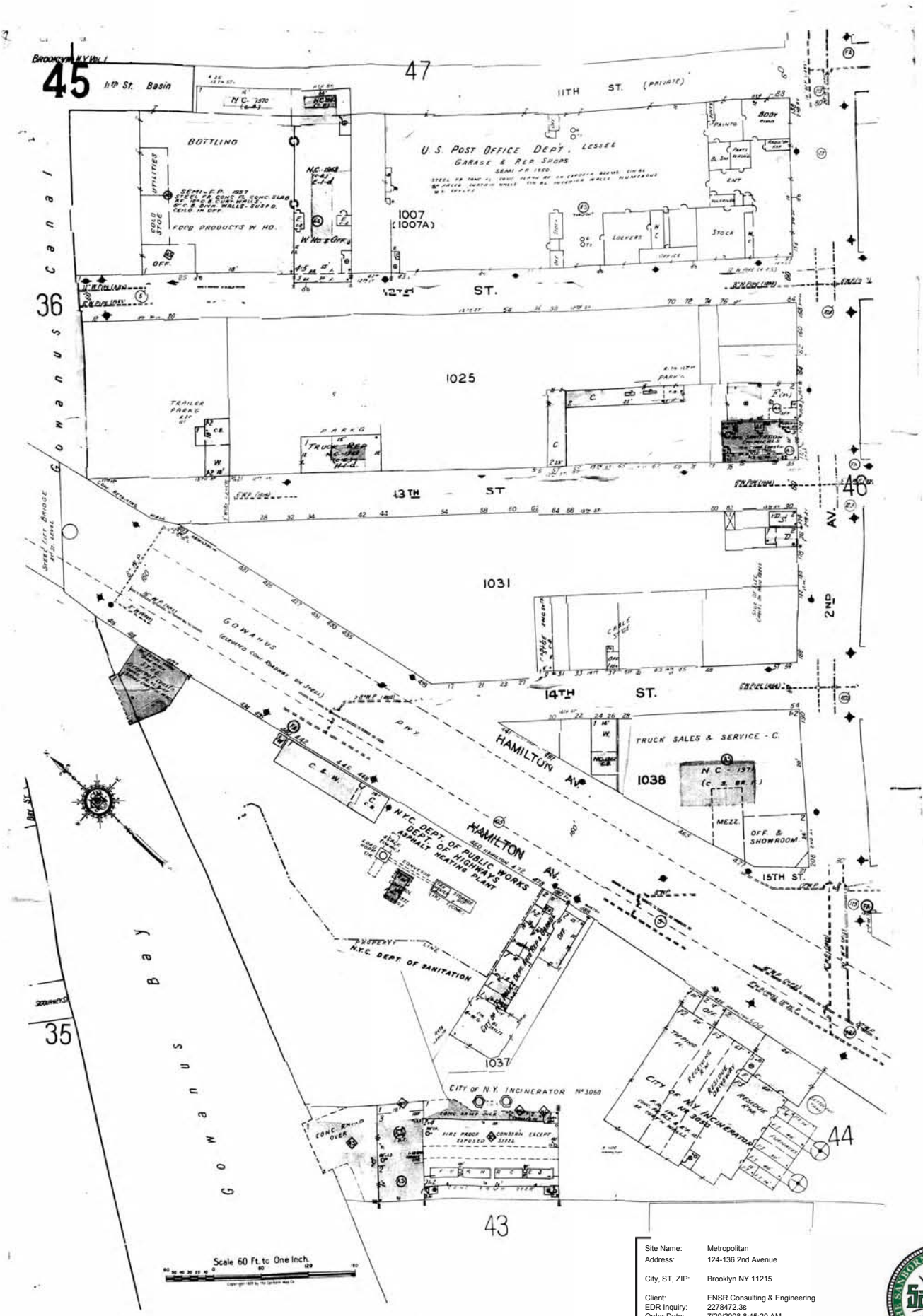
Copyright: 1979



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Copyright: 1977

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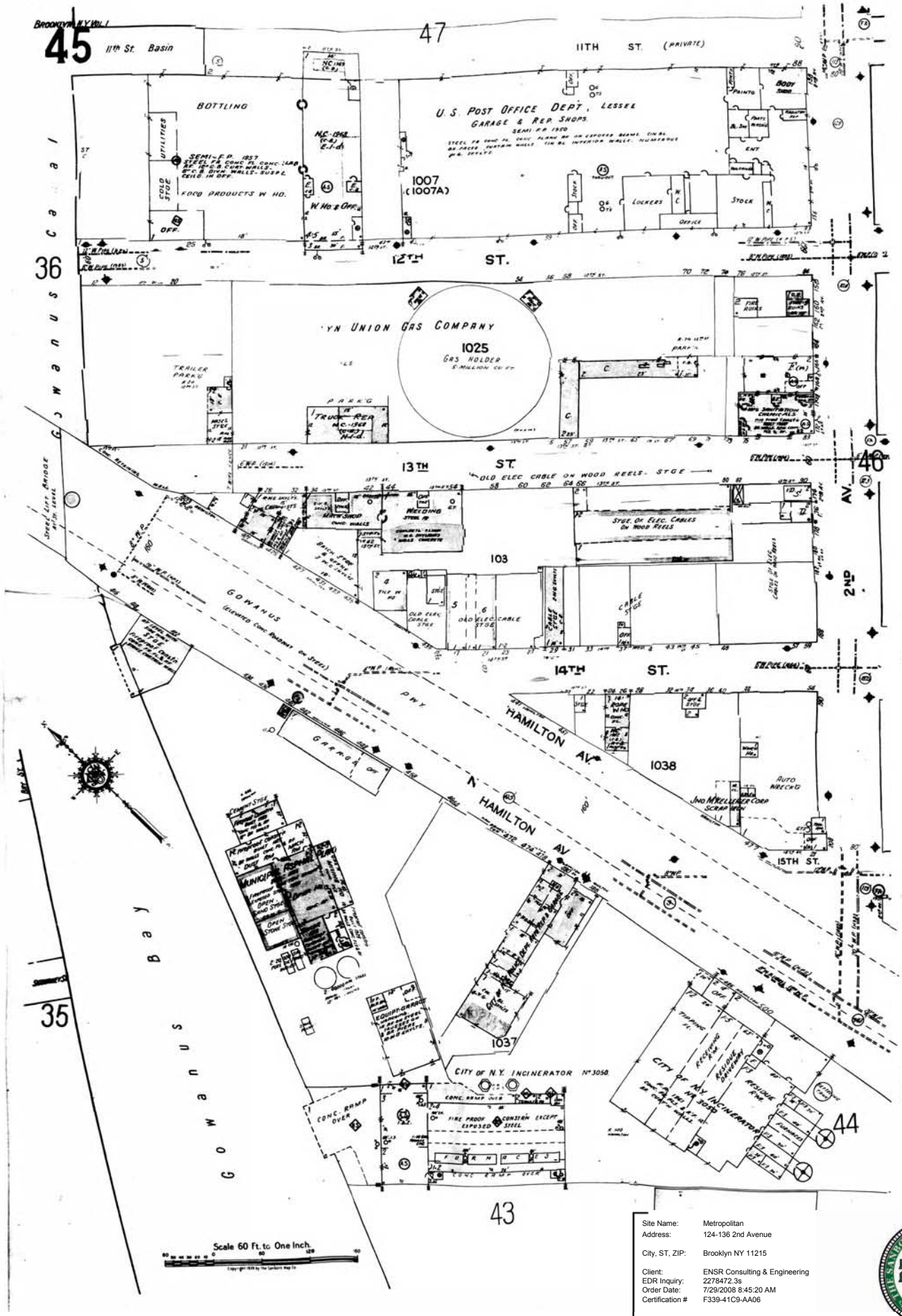

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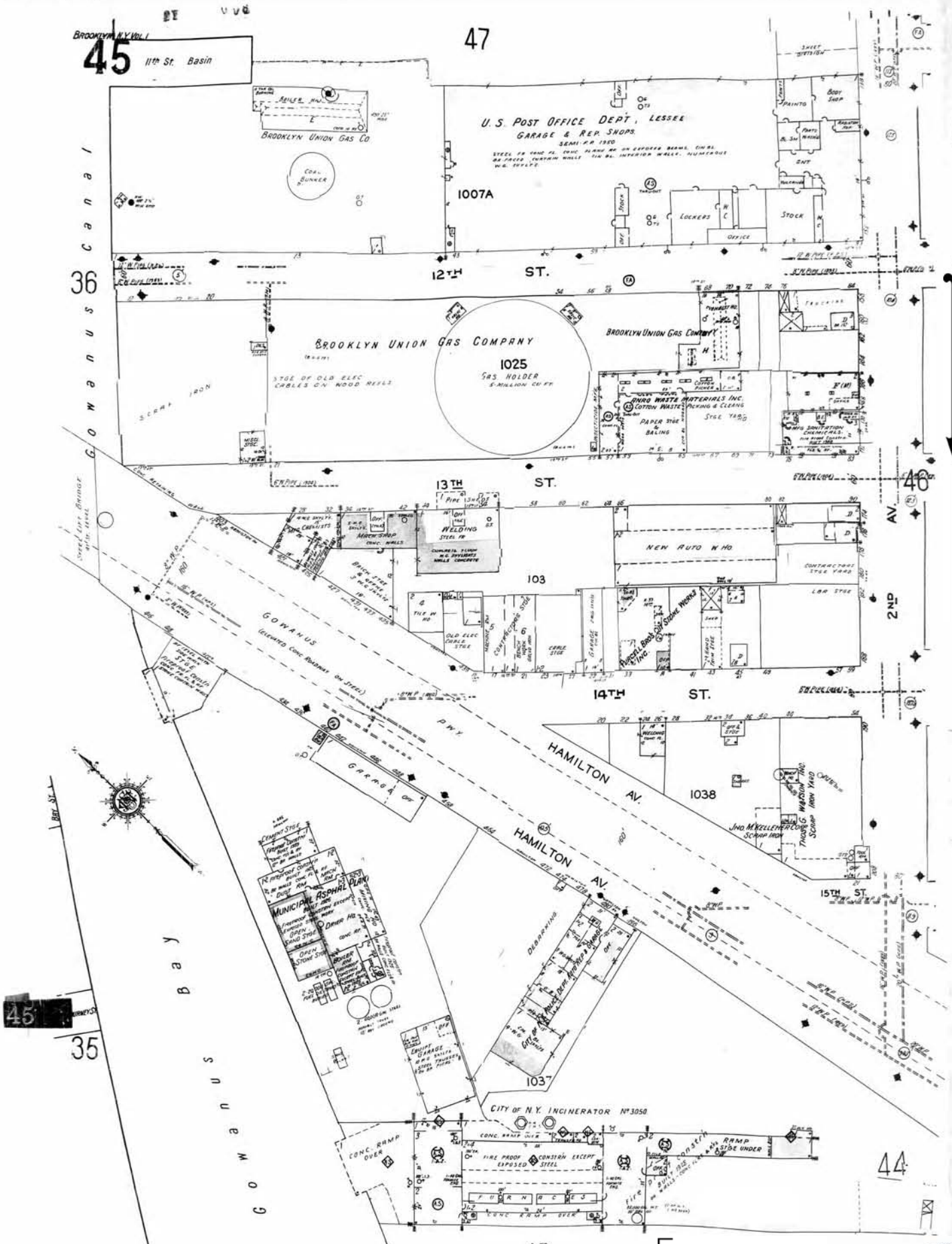
Certification #	F339-41C9-AA06

Copyright: 1969



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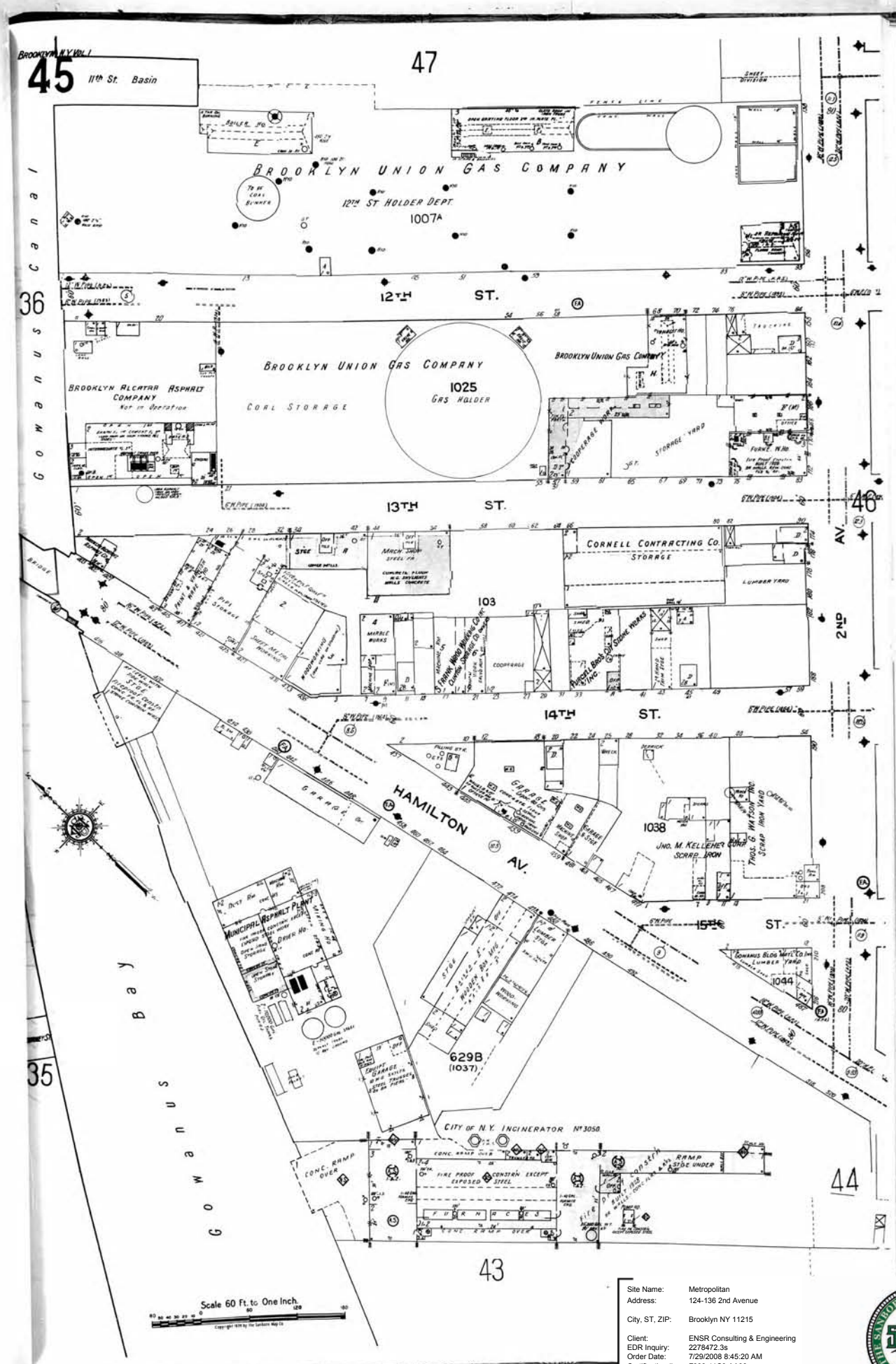
Copyright: 1950



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Copyright:	1938

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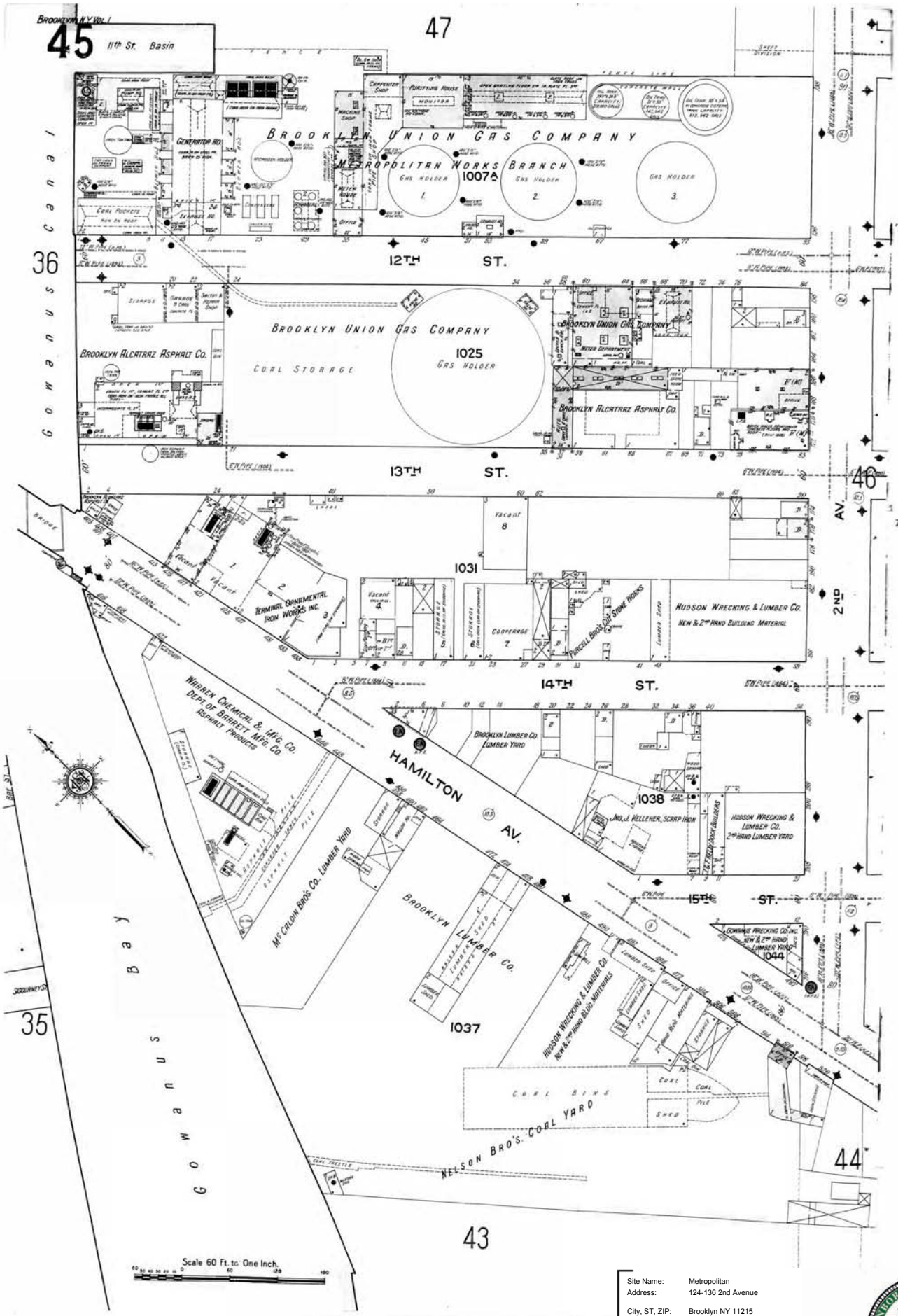

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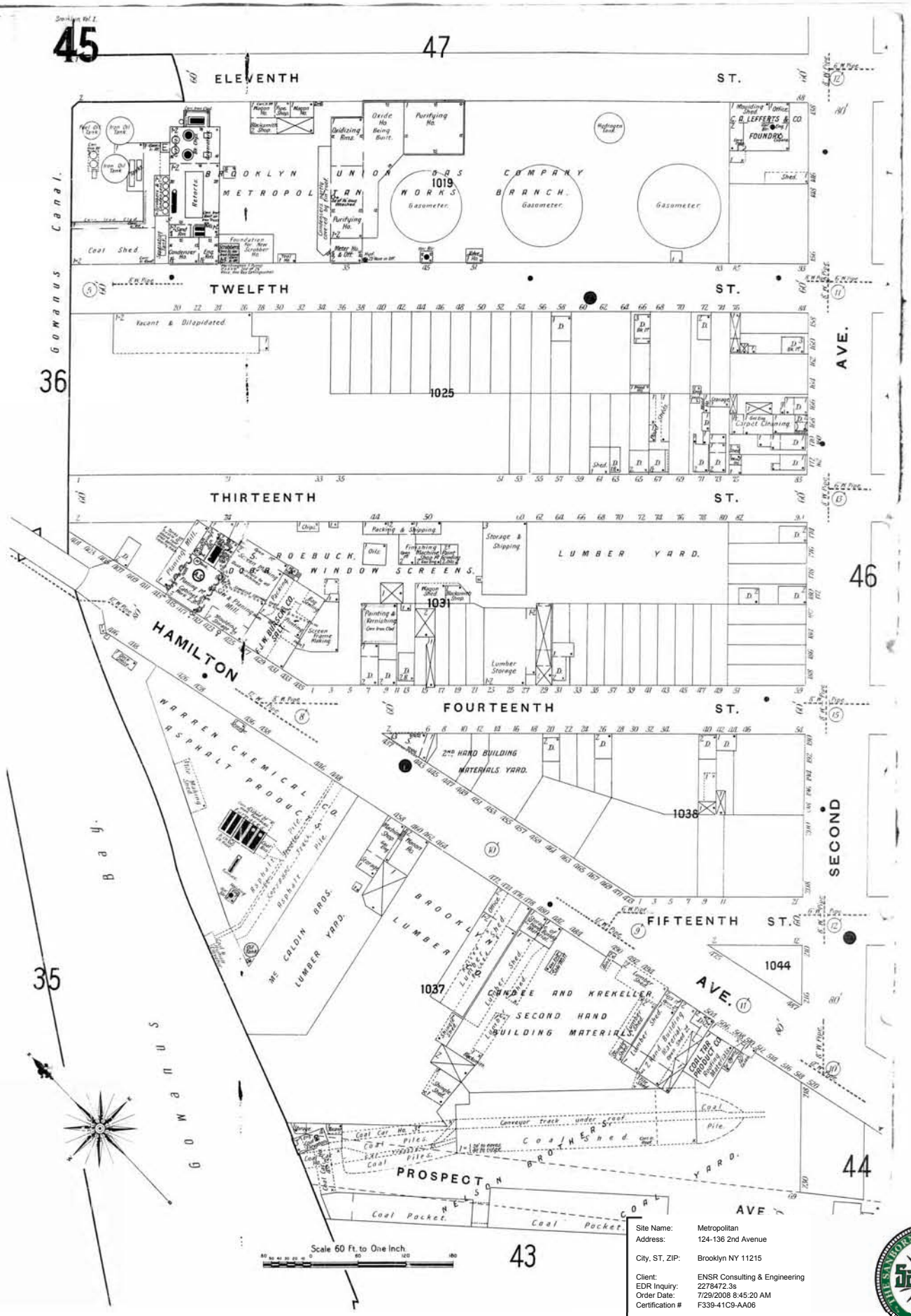
Copyright: 1915



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Certification #	F339-41C9-AA06

Copyright: 1886

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Address: 124-136 2nd Avenue

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EDR Inquiry: 2278472.3s
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Copyright: 1886

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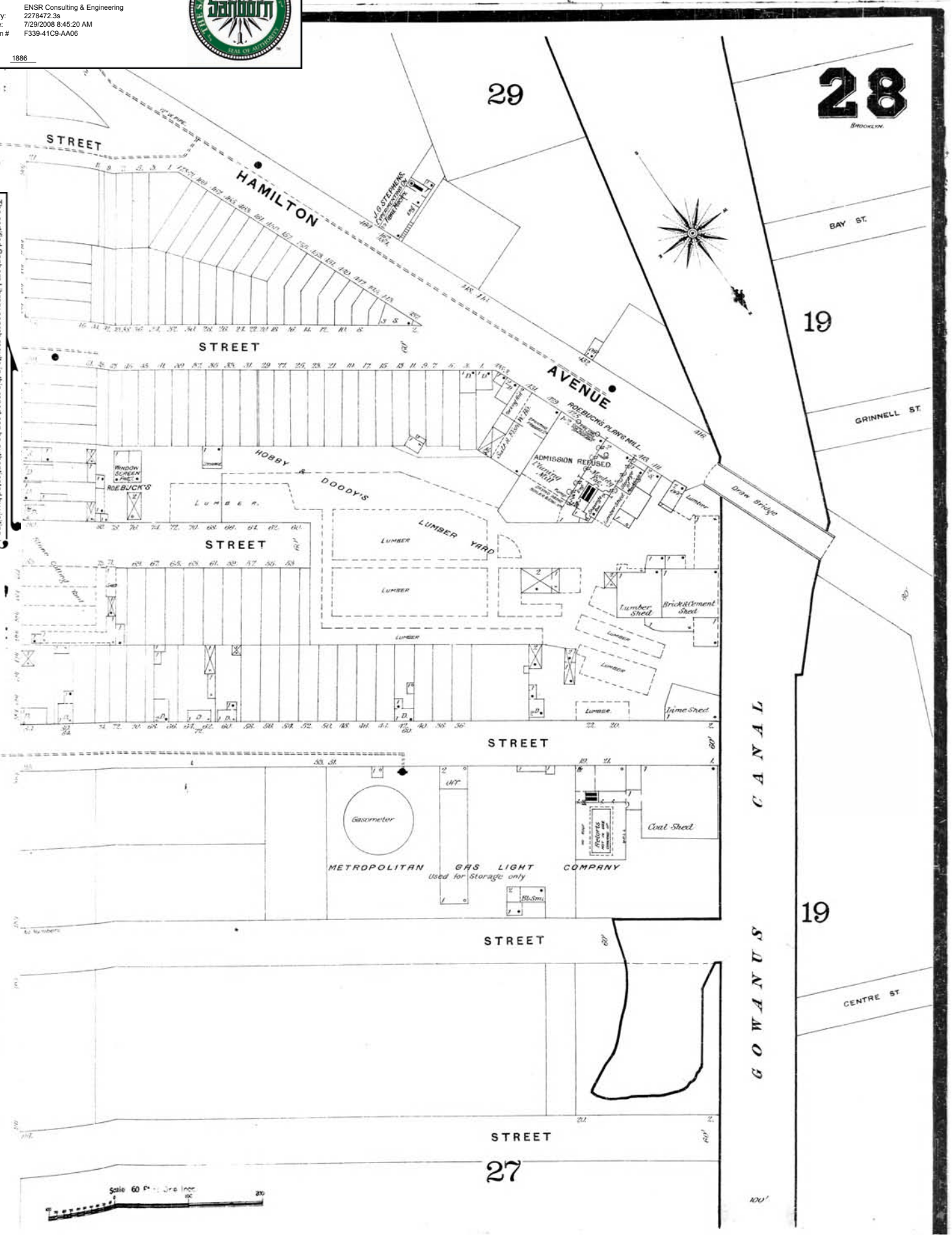

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SECO

Appendix B

Previous Investigation Boring Logs and Well Construction Logs

Mueser Rutledge Consulting Engineers Logs – 2002

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. B-14
SURFACE ELEV.

PROJECT Lowe's Home Cntr
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/03/00							Drilled	Automatic Hammer
Wed.	1D	1	10-6	Blk c-f sand, sm silt, tr. gvl, wood (sm)			Ahead	8" concrete surface
20's of		3	3-2	(fill)(cinders)				2" asphalt.
1350	2D	3	3-3	Brn-blk m-f sand, sm silt, tr. gvl,	(f)			
		5	3-3	cinders (fill)(sm)		5		
	3D	5	2-2	DO-2D (fill)(sm)			MW	
		7	1-1					
	4D	7	2-1	DO-2D (fill)(sm)				
		9	1-1					
1420						10		
01/04/01	5D	10	WOH/12"	Gray brk c-f sand, sm cinders, tr. silt,				
Thurs.		12	1-1	gvl, brick (fill)(sp-sm)				
20's of	6D	12	WOH/12"	Gray brn c-f sand, sm silt, cinders,				
Cloudy		14	1-1	tr. brick (fill)(sm)				
0640	7D	14	2-1	Top(5")-DO-6D (fill)(sm)		14.7		
		16	1-2	Bot(16")-Soft gray org. silty clay, tr. veg. f-sand (OH)	(O)			
	8U	16	Push=24"	Soft gray org. silty clay, tr. f-sand, veg.				SBU Rat @ Bot of
		18	Rec=24"	Peat (OH)				Tube.
	9D	18	1-2	Top(6")-Brn Peat (Pt)		18.9		
		20	1-2	Bot(13")-Brn silty f-sand, tr. veg (sm)		20		
	10D	20	3-1	DO-9D (Bot) (sm)				
		22	3-3					
						25		
	11D	25	7-7	Gray m-f sand, sm silt (sm)				
		27	9-11					
						30		
	12D	30	2-4	Top(3")-Gray silty f-sand, tr. clay (sm)	(S)			
		32	8-12	Bot(5") Brn m-f sand, tr. silt (sp-sm)				
						35		
	13D	35	8-16	Brn m-f sand, tr. silt (sp-sm)				
		37	13-15					
						40		
	14D	40	5-6	DO-12D, tr. gvl (sp-sm)				
		42	6-5					
						45		
	15D	45	1-1	Brn clayey silt, sm f-sand, tr. mica (mH)				
		47	1-1					
						48.5		
						50		
	16D	50	11-14	Red-Brn f-s sand, tr. silt, gvl, silt seams	(T)			
		52	14-12	(sp-sm)				

BORING NO. B-14

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. R-1
SURFACE ELEV.

PROJECT Lowe's Home Ctr.
PROJECT LOCATION Brooklyn NY
RES. ENGR. E. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
						55		
170	55	12-14		Top(6") - Brn C-f sand, Tr silt, silt (Sp-SM)				
	57	14-15		Bot(11") - Red-Brn silty, f-sand, Tr mica (SM)				
					T	60		
180	60	8-21		Brn silty f-M sand, sm gvl (SM)				
	62	19-13						
						62		Hard drilling @ 63 FT.
					B	64		
						65		
190	65	15-21		Red-Brn C-f sand, sm gvl, Tr silt (Sp-SM)				
	67	24-34						Hard drilling @ 67.5
						67.5		
					B	68.5		
						70		
200	70	33-34		Lod Brn f-M sand, sm silt, gvl (SM)				
	71.6	36-100/1"				71.6		
					B			
						73.5		
						75		
210	75	40-34		Red Brn C-f sand, sm silt, gvl (SM)				
	77	35-35						
						80		
220	80	23-30		200-210 (SM)				
1330	82	40-31				82		E.O.B @ 82 FT.

BORING NO. R-1

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B14
SHEET 3 **OF** 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME 75	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER Shelby Tube
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 4 7/8, 3 7/8, 2 15/16"
TYPE OF DRILLING MUD Quik Gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT. 79.1	NO. OF 3" SHELBY TUBE SAMPLES	—
3.5" DIA. U-SAMPLE BORING	LIN. FT. —	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT. —	OTHER: obstructions (boulders)	2.9

BORING CONTRACTOR JRD Co.
DRILLER M. Rojas HELPERS T. Sellon / D. Keith
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER E. Nunez DATE 01/04/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. B2
SURFACE ELEV.

PROJECT Lowe's Home Cntr
PROJECT LOCATION Brooklyn, NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/03/01 WED. 0940 18°F clear	1D	1	12-9	Blk f-m sand, sm silt, Tr. gvl, cinders (fill) (SM)			Drilled	Safety Hammer
		3	6-3				Ahead	1'± Asphalt at surface and cobble stone.
	2D	3	5-6	DO-1D (fill) (SM)				
		5	4-4					
					F	5		
	3D	5	3-1	gray m-f sand, sm gvl, silt, Tr. cinders (fill) (SM)				Petroleum odor.
		7	2-2					
	4D	7	3-9	DO-3D (fill) (SM)				
		9	10-11					
						10		
	5D	10	4-1	DO-3D (fill) (SM)				R=3"
		12	1-1					
	6D	12	3-3	Top (1") - Blk cinders, Tr. gvl (fill) (cinders)				R=5" Petroleum odor
		14	2-2	Bot (4") - Brn Peat		13.7		sheen
						15		
	7D	15	3-2	soft gray org silty clay, Tr. veg (OH)	O			
		17	1-1					
	8D	17	2-2	Top (16") - DO-7D (OH)				
		19	4-4	Bot (6") - Brn Peat (Pt)		19.5		
						20	▽	
	9D	20	2-4	gray f-sand, sm silt, Tr. mica (SM)				
		22	4-5					
						25		
	10D	25	8-9	Gray-Brn m-f sand, Tr. silt (SP-SM)				
		27	17-13					
						28.5		
						30		
	11D	30	3-4	stiff gray clayey silt, Tr. f-sand (MH)	M			
		32	7-7					
						33.5		
						35		
	12D	35	12-15	Brn m-f sand, Tr. silt (SP-SM)	S			
		37	25-20					
						40		
	13D	40	10-10	DO-12D (SP-SM)				
		42	17-14					
						45		
	14D	45	12-13	Gray Brn f-sand, Tr. silt (SP-SM)				
		47	15-7					
						50		
	15D	50	12-18	Brn m-f sand, Tr. silt, gvl (SP-SM)				
		52	21-23					

BORING NO. B2

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. B-2
SURFACE ELEV.

PROJECT Lowe's Home Cntr
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
	16D	55 57	30-43 55-56	BRN f-c SAND, Tr. silt (SP-SM)	S	55		
						58.5		
	17D	60 62	47-42 75-71	RED-BRN f-c SAND, SM gvl, silt (SM)		60		
1415								
01/09/01 Thurs. 20's of cloudy 0645					T	65		
	18D	65 65.5	100/6"	RED-BRN f-M SAND, SM silt, gvl (SM)				R=2"
	19D	70 72	28-29 30-34	RED-BRN f-c SAND, Tr. silt, gvl (SP-SM)		70		
	20D	75 77	30-38 42-43	RED-BRN c-f SAND, SM gvl, Tr. silt (SP-SM)		75		
	21D	80 82	24-31 37-43	RED-BRN f-M SAND, SM silt, Tr. gvl, mica (SM)		80		
	22D	85	30-33 35-35	DO-21D (SM)		85		
	23D	90 92	30-36 51-44	RED-BRN silty f-M SAND, Tr. gvl, clay (SM)		90		
	24D	95 97	25-32 41-53	DO-23D (SM)		95		
	25D	100 102	37-33 40-34	RED-BRN c-f SAND, Tr. silt (SP-SM)		100 102		E.O.B @ 102 FT.
1230								

BORING NO. B-2

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-2
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CHESS	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" OD. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 4 1/8, 3 7/8"
TYPE OF DRILLING MUD Quik-gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT. 82.6	NO. OF 3" SHELBY TUBE SAMPLES	—
3.5" DIA. U-SAMPLE BORING	LIN. FT. —	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT. —	OTHER:	—

BORING CONTRACTOR JBD
DRILLER R. Lynch HELPERS E. Feliciano
REMARKS Grouted borehole upon completion.
RESIDENT ENGINEER R. Nunez DATE 01/04/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. B-3
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn NY RES. ENGR. R. NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/02/01	1D	0	76-45	Brn m-f sand, sm silt, Tr. brick, gvl (fill)(sm)			Drilled	2"± asphalt surface
Thus.		2	27-24				Ahead	
clear	2D	2	15-19	DO-1D, Tr. cinders (fill)(sm)				Automatic Hammer
windy		4	10-9					
18°F	3D	4	5-5	gray-brn m-f sand, sm silt, Tr. veg (fill) (sm)	(F)	5		
		6	3-3					
5°F	4D	6	3-2	gray blk m-f sand, Tr. silt, cinders, shells, ceramic (fill)(sp-sm)				R=3", sample saturated w/water.
wind chill		8	1-1					
	5D	8	1-2	gray blk m-f sand, sm silt, Tr. gvl, veg, cinders, shells (fill)(sm)				
		10	3-3			10	MUD	
	6D	10	2-2	gray blk m-f sand, Tr. gvl, silt, shells, cinders, brick (fill)(sp-sm)				
		12	1-2					
	7D	12	1-2	DO-6D (fill)(sm)				
		14	1-1					
						15		
	8D	15	1-1	Top (8") gry-brn silty f-sand, Tr. veg (fill)(sm)		15.7		
		17	2-2	Bot (16") - brn peat (pt)	(Pt)			
	9D	17	2-2	DO-8D bot. (pt)				
		19	2-3					
						19.5		
	10D	20	1-2	brn f-sand, sm silt (sm)				
		22	3-3		(S)			
						25		
	11D	25	6-8	brn m-f sand, Tr. silt, c. sand (sp-sm)				
		27	9-8					
						30		
	12D	30	3-3	gray-brn m-f sand, sm silt (sm)				
		32	6-4					
						35		
	13D	35	3-5	gray-brn silty f-m sand, Tr. mica (sm)				
		37	5-5					
						40		
	14D	40	5-6	gray-brn m-f sand, Tr. silt (sp-sm) Tr. mica				
1415		42	9-9					
1/03/01								
0700						45		
wed.	15D	45	5-5	DO-14D (sp-sm)				
3°F		47	5-7					
clear								
						50		
	16D	50	7-10	brn f-c sand, sm gvl, Tr. silt (sp-sm)				
		52	14-15					

BORING NO. B-3

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. B-3
SURFACE ELEV.

PROJECT Lowe's Home Cntr
PROJECT LOCATION Brklyn, NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					S			
						53.5		
						55		
	17D	55	16-11	Red-Brn f-c sand, sm grvl, silt (SM)	T			
		57	21-40					
						60		
	18D	60	21-17	DO-17D (SM)				
		62	16-20					
						65		
	19D	65	21-17	DO-17D (SM)				
		67	25-42					
						70		
	20D	70	31-19	Red-Brn f-c sand, sm grvl, tr. silt (SM)				
		72	25-24					
						75		
	21D	75	29-24	Red-Brn f-c sand, sm grvl, silt (SM)				
		77	30-34					
						80		
	22D	80	15-15	DO-21D (SM)				
13 hours		82	24-36			82		E.O.B @ 82 FT.

BORING NO. [illegible]

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-3
SHEET 3 OF 3
FILE NO. 94410
SURFACE ELEV.
DATUM

PROJECT Lewis Home Center
LOCATION Brooklyn NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME 75	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 5 7/8", 2 15/16"
TYPE OF DRILLING MUD QUIK GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 350 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
01/02/01		8	5	7	observed sample 40 saturated with water

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT. 82	NO. OF 3" SHELBY TUBE SAMPLES	—
3.5" DIA. U-SAMPLE BORING	LIN. FT. —	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT. —	OTHER:	—

BORING CONTRACTOR JBD Co.
DRILLER M. Biswas HELPERS D. Keith / Terry Sutton
REMARKS Grouted borehole upon completion.
RESIDENT ENGINEER Z. NUNEZ DATE 01/03/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. B-3

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 94446
BORING NO. B4U
SURFACE ELEV.

PROJECT Lowe's Home Center
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/10/01 WED. 25°F windy 0645					CONC.		Drilled AWOD	7": Conc. slab.
	1D	1	2-4	Brn M. f SAND, Tr. gvl, silt, cinders,				
		3	6-7	Brick (fill) (Sp-Sm)				
	2D	3	9-9	Blk-Brn M. f SAND, Sm silt, Tr. wood,	(4)			
		5	12-21	cinders, Brick (fill) (SM)		5		Rope broke, changed
	3D	5	19-25	Blk M. f SAND, Sm gvl, silt, Tr. cinders,			HWD	rope to Hammer.
		6-4	100/5"	Brick (fill) (Sm)				SD-Rock fragments in the
	4D	7	8-4	Blk M. f SAND, Sm cinders, silt, Tr. gvl,				tip of the spoon.
		9	5-15	Brick (fill) (Sm)				
						10		
	5D	10	14-4	No Recovery				2nd attempt no
		12	4-4					recovery, new trap.
	6D	12	4-1	No Recovery				
		14	3-1					
						15		
	7D	15	7-6	Blk gravel, Tr. wood (fill) (Sp) (Cinders)				Possible wash, R=1"
		17	11-6					
	8D	17	2-4	Blk M. f SAND, Sm cinders, Tr. gvl, silt				Petroleum odor, strong
		19	4-3	(fill) (Sp-Sm)				
						20		
	9U	20	P=24"	Stiff gray org. silty clay, Tr. f SAND (OH)				
		22	R=21		(0)			
	10D	22	WOH/24"	Do - 9U (OH)				
		24						
						24.5		
	11D	25	WOH-5	Brn Silty f - SAND, Tr. Mica (SM)	(5)			
		27	6-7					
						30		
	12D	30	15-20	Brn-Gray M. f SAND, Tr. silt (SP-SM)				
		32	22-27					
						33.5		
				Stiff.		35		
	13D	35	9-6	Gray org. silty clay, Sm f SAND, Tr mica.	(6)			P.P. = 1.0 TSF
		37	7-11	(OH)				
1400 01/11/01 THURS. 32°F SNOW windy cloudy	14U	37	P=12"	Top - DO - 13D (OH)				Tube Stopped @ 38 FT.
		39	R=12"	Bot - Stiff gray silt and M. f SAND Tr. clay		39		
				(ML) (Sp-Sm)		40		
	15D	40	32-40	Brn M. f SAND, Tr. silt, Mica (SP-SM)				
		42	41-39					
					(5)	45		
	16D	45	12-13	DO - 15D (Sp-Sm)				
		47	18-12					
						50		
	17D	50	13-11	DO - 15D (Sp-SM)				
		52	16-14					

BORING NO. B4U

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9442
BORING NO. B-44
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn, NY RES. ENGR. E. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					S			
						55		
	180	55	6-5	BRN gray clayey f-M sand, SM silt				
		57	10-9	(SC)				
						60		
	190	60	24-19	BRN M-f sand, Tr. silt (SP-SM)				
		62	30-26					
						65		
	200	65	24-31	BRN f sand, SM silt, Tr. mica (SM)				
		67	45-33					
								Rod chattering @ 68 FT
						68.5		Hard drilling
						70		
	210	70	100/5"	Red-BRN f-M sand, Tr. silt, Tr. gvl, mica	T			Rod chattering
		70.4		(SP-SM)				
						73		Hard drilling @ 73 FT
								cobbles.
						75		
	220	75	37-42	Red BRN f-M sand, SM silt, gvl, Tr. clay				
		77	47-42	(SM)				
								Change rope, rope broke
						80		
Larche	230	80	35-58	DO-220				spoon bouncing
		81.2	100/5"			81.2		E.O.B @ 81.2 FT

BORING NO. B-44

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-4U
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION offset → 1 ft south

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN. 4	DEPTH, FT. FROM 0	TO 20	
SKID	Acker	HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM	TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER Shelby Tube
S-SAMPLER
CORE BARREL
CORE BIT Thinwall bit
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2 15/16, 3 7/8"
TYPE OF DRILLING MUD Quik-Gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT. 78.2	NO. OF 3" SHELBY TUBE SAMPLES	2
3.5" DIA. U-SAMPLE BORING	LIN. FT. 3	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT. —	OTHER:	—

BORING CONTRACTOR TRDG
DRILLER R. Lynch HELPERS E. Feliciano
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER E. Nunez DATE 6/11/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. B-4U

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. B-6U
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn, NY RES. ENGR. R. NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/05/00					Conc		Drilled	7" Conc. slab.
Frid.	1D	1	9-9	Brn f-M sand, sm silt, Tr. gvl, cinders,			AHEAD	
20's of		3	29-44	brick (fill) (sm)	(F)			
cloudy.	2D	3	22-25	Brn-Blk f-c sand, sm silt, Tr. gvl,				
0945 hrs.		4.4	100/5"	cinders brick (fill) (sm)		5		
	3D	5	70-41	Brn M-f gravel, sm f-sand, Tr. silt (fill)			MOD	R=1"
		6.3	100/4"	(sp-sm)				
	4D	7	12-8	wood (fill)				
		9	6-5					
						10		
	5D	10	9-6	gray-Blk c-f sand, sm silt, Tr. gvl,				
		12	3-3	cinders (fill) (sm)				
	6D	12	7-10	70-50 (fill) (sm)				R=2"
		14	3-2					
						15		
	7D	15	14-3	No recovery				
		17	2-2					
	8D	17	1-2	Blk c-f sand, sm gvl, cinder, Tr. silt,				
		19	1-2	brick (fill) (sm)				
1400 hrs						20		Peat/clay in wash @ appx
01/08/01	9U	20	R=24"	soft gray org. silty clay, Tr. veg (OH)	(O)			19.5 ft.
Mon.		22	R=16"					
cloudy	10D	22	4-3	Top (12") Brn Peat, sp org. silty clay (PL)				
35°F		24	3-5	Bot (8") Brn silty f-sand, Tr. veg (sm)		23.3		
0645						25		
	11D	25	6-6	Brn f-sand, sm silt, Tr. mica (sm)				
		27	7-12					
					(S)			
						30		
	12D	30	19-17	gray M-f sand, Tr. silt, mica (sp-sm)				
		32	27-22					
						35		
	13D	35	9-13	70-80, Tr. silt pckts (sp-sm)				
		37	15-17					
						40		
	14D	40	17-25	Brn M-f sand, Tr. silt (sp-sm)				
		42	33-36					
						45		
	15D	45	10-21	Brn f-sand, sm silt, Tr. mica (sm)				
		47	29-24					
						50		
	16D	50	16-28	Brn f-m sand, Tr. silt, gvl, (sp-sm)				
		52	34-34	mica				

BORING NO. B-6U

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9440
BORING NO. B-6U
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn NY RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					S			
						55		
	17D	55	24-49	Brn silty f-m sand, Tr. gvl (SM)				
		57	37-30					
						60		
	18D	60	38-41	Brn m-f sand, Tr. silt (SP-SM)				
1410 hrs		62	51-47					
01/09/01								
Tues.								
0648 hrs						65		
30°F	19D	65	29-33	Brn f-c sand, SM silt (SM)				
Windy		67	50-49					
Cloudy								
						68.5		
					T	70		
	20D	70	100/5"	Red-Brn f-sand, SM silt (SM)		70.5		
		70.4			B			Hard drilling @ 70.5 FT
						73		to 73 FT±. Rods chatter
								to 75 FT. Hard drilling @
						75		75 FT. Rig L. fled up.
					B	76		Cont. drilling from 75 FT.
	21D	76	100/5"	Red-Brn f-m sand and gvl, SM silt (SM)				to 76 FT. Boulder.
		76.4						
						80		
	22D	80	48-59	Red-Brn clayey silt, Tr. gvl, f-sand (MH)				
1345 hrs.		81.2	100/3"			81.2		E.O.B @ 81.2 FT.

BORING NO.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-6U
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Cntr.
LOCATION Brooklyn, NY
BORING LOCATION As planned

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED		[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO 20
SKID	Acker	HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER Shelby Tube
S-SAMPLER
CORE BARREL
CORE BIT Thin wall bit (for conc. floor)
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2 15/16, 3 7/8"
TYPE OF DRILLING MUD Quik Gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING LIN. FT. 75.7
3.5" DIA. U-SAMPLE BORING LIN. FT. 2
CORE DRILLING IN ROCK LIN. FT. —
NO. OF 3" SHELBY TUBE SAMPLES 1
NO. OF 3" UNDISTURBED SAMPLES —
OTHER: obstruction: (boulders) 3.5 FT±

BORING CONTRACTOR JBD Co.
DRILLER E. Lynch HELPERS E. Feliciano
REMARKS Grouted borehole upon completion.
RESIDENT ENGINEER E. Nunez DATE 01/09/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. B-6U

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF
FILE NO. 94446
BORING NO. B74
SURFACE ELEV.

PROJECT Lowe's Home Center
PROJECT LOCATION Brooklyn NY
RES. ENGR. E. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/15/01 Mobilize drilling 3245 (Lt snow) 1230 hrs					Surf.		Drilled Hand	8" conc. slab
	10	1	7-8	Brn f-m sand sm silt, gvl, Tr. cinders,	F			
		3	40-34	Brick (fill) (sm)				
	20	3	40-23	Do-10, Tr. conc. (fill) (sm)				
		5	17-12			5		
	30	5	21-15	Brn-blk m-f sand, sm silt, Tr. gvl, cinders			Hand	
		7	9-11	(fill) (sm)				
	40	7	13-10	30-30 (fill) (sm)				
		9	14-14					
						10		
	50	10	26-19	Do-30 (fill) (sm)				
		12	11-9					
	60	12	12-11	Brn c-f sand, sm gvl, Brick, Tr.				
		14	6-4	cinder, (fill) (sp-sm)				
						15		
	70	15	4-7	No recovery				wash w/ complete.
		17	5-2					
	80	17	2-2	Med. gray org. silty clay, Tr. veg, f sand				P.P. = .5 tsf
		19	2-1	(OH)		18.3		
						20		
	90	20	P=24"	Do-80 (OH)	O			
		22	R=18"					
	100	22	P=24"	Top - Do 80 (OH)				
		24	R=22"	Bot - Brn peat (Pt)				
	110	24	Wor-2	Top (11") Soft gray org. silty clay, Tr. f sand,		24.9		
		26	2-3	Peat (OH)				
				Bot (13") Brn silty m-f sand, Tr. veg (sm)	S			
						30		
	120	30	20-21	Brn m-f sand, Tr. silt, mica (sp-sm)				P.P. = 0.75 tsf
		32	26-17					
						33.5		
						35		
	130	35	Wor-4	Med. gray org. silty clay, Tr. f sand, veg (OH)				
		37	8-11		O			
						38.5		
						40		
	140	40	15-21	Gray-Brn m-f sand, Tr. silt (sp-sm)	S			
		42	23-25					
						45		
	150	45	11-14	Do-140 (sp-sm)				
1400		47	19-17					
01/15/01 0800 Begin drill								
	160	50	19-13	Do-140 (sp-sm)				
		52	18-19					

BORING NO. 07

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. B74
SURFACE ELEV.

PROJECT Lowe's Home Cntr
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					(S)			
						53.5		
	170	55	WOR/12"	soft gray org silty clay, Tr. f sand (OH)	(O)	55		P.P. < 0.5 T.S.F
		57	6-16					
						58.5		
	180	60	27-27	Brn f-c sand, Tr silt (sp-sm)	(S)	60		
		62	34-37					
						62.5		Rod chattering @ 62.5
					(B)	64		Hard drilling to 64 FT±
	190	65	39-37	Red-brn f-c sand, sm silt, Tr. gvl (sm)		65		
		67	34-45					
					(T)			Rods chattering @ 67.5 FT. to 70 FT±
						70		
	200	70	100/5"	Red-brn f-c sand, sm silt, gvl (sm)				
		70.4						
						75		
	210	75	100/4"	DD-20D, sm rock frag. (sm)				rock frag in the tip of the spoon - Rod chattering @ 75.5 FT.
		75.3						
						80		
	220	80	44-40	Red brn f-c sand, sm silt, gvl (sm)				
1535		82	40-26			82		E.O. 1 @ 92 FT.

BORING NO. B74

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-74
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn Ny
BORING LOCATION As Planned

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN. 4	DEPTH, FT. FROM 0	TO 20	
SKID	Acker	HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM	TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER Shelby tube
S-SAMPLER
CORE BARREL
CORE BIT Thinwall bit
DRILL RODS NJ

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 2 15/16"
TYPE OF DRILLING MUD Quikgel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT. 75.5	NO. OF 3" SHELBY TUBE SAMPLES	2
3.5" DIA. U-SAMPLE BORING	LIN. FT. 4	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT. —	OTHER: obstructions (boulder)	2.5 FT

BORING CONTRACTOR JBD Co.
DRILLER R. Lynch HELPERS E. Feliciano / Louie Abbate
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER R. Nunez DATE 01/19/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. B8
SURFACE ELEV.

PROJECT Lowe's Home Cntr

PROJECT LOCATION Brooklyn NY RES. ENGR.

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/22/01 MON. SUNNY 25°F 0710 hrs					CONC		Drilled	8" conc slab.
	1D	1	16-20	Gray BRN f-m SAND, SM silt, Tr. gvl, cinders (fill)(SM)			Ahead	
		3	27-45					
	2D	3	10-15	DO-1D (fill)(SM)	(F)			
		5	24-32			5		
	3D	5	17-19	Gray-BLK C-f SAND, SM silt, cinders, Tr. gvl, Brick (fill)(SM)			MUD	
		7	24-10					
	4D	7	7-8	DO-3D, SM Brick (fill)(SM)				
		9	12-7					
						10		
	5D	10	23-8	Gray-BRN C-f SAND, SM silt, cinder, Tr. gvl, Brick (fill)(SM)				
		12	9-3					
	6D	12	2-2	Gray-BRN M-f SAND, SM silt, Tr. veg, cinders, Brick (fill)(SM)				
		14	7-8					
						15		
	7D	15	12-8	Gray-BLK M-f SAND, SM cinder, silt, Tr. gvl, Metal (fill)(SM)				
		17	8-5					
	8D	17	4-3	Gray-BLK C-f SAND, SM cinders, silt, Tr. gvl, Wood (fill)(SM)				R=3"
		19	4-3					
						19.5		
	9D	20	3-4	BRN Peat (PL)	(PL)			
		22	7-7					
						23.5		
						25		
	10D	25	8-7	BRN f-m SAND, Tr. silt, veg (sp-sm)	(S)			
		27	9-10					
						30		
	11D	30	18-20	BRN C-f SAND, Tr. silt (sp-sm)				
		32	23-17					
						35		
	12D	35	7-4	TOP (15") - gray orn, clayey silt, sm f. sand (MH)				
		37	11-9	BOT (9") - gray silty f-m sand, Tr. clay (SM)				
						40		
	13D	40	20-25	Gray M-f SAND, Tr. silt, mica (sp-sm)				
1415 01/22/00 TUES. SUNNY 20°F 0645		42	25-24					
						45		
	14D	45	12-15	DO-13D (sp-sm)				
		47	22-21					
						50		
	15D	50	12-14	BRN M-f SAND, Tr. silt, mica (sp-sm)				
		52	14-15					

BORING NO. 1

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. B8
SURFACE ELEV.

PROJECT Lowe's Home Cntr
PROJECT LOCATION Brklyn NY
RES. ENGR. R. Nunez

SS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					C			
						55		
	160	55	7-11	Brn m-f sand, sm silt, Tr. mica				
		57	16-16	(SM)				
						60		
	170	60	10-11	DO-160, Tr. clay (SM)				
			12-15					
								Red chattering.
								Hard drilling @ 64.5 FT
						64.5		to 66 FT.
					B	66		
	180	66	23-27	Red-brn f-c sand, sm gvl, Tr. silt (sp. SM)				
		67	24-25					
					T	70		
	190	70	34-42	Red-brn f-c sand, sm gvl, silt (SM)				
		71.1	100/1"			74.5		Hard drilling @ 71.5±FT
								to 75 FT boulder
					B			
						75		E.O.B. @ 75 FT.
						80		

BORING NO. T

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-8
SHEET 3 OF 3
FILE NO. 94446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Ctr
LOCATION Brooklyn NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID	Acker	HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" OD. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8, 4 7/8
TYPE OF DRILLING MUD Quikgel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING LIN. FT. 70.0
3.5" DIA. U-SAMPLE BORING LIN. FT. —
CORE DRILLING IN ROCK LIN. FT. —
NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER: obstruction (boulder) 5 FT

BORING CONTRACTOR STENCO.
DRILLER R. Lynch HELPERS E. Fellerano
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER E. Nunez DATE 8/24/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type: dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9440
BORING NO. B4U
SURFACE ELEV.

PROJECT Lowe's Home Center
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/16/01					Conc.		Drilled	8" Conc. slab
0645	1D	1	7-17	Brn M-f sand, Sm silt, Tr. gvl, Brick			AHRAD	
Pores.		3	18-12	cinders (fill)(SM)				
35°F	2D	3	20-10	Blk-Brn f-c sand, Sm silt, cinders, gvl,	(F)			
cloudy		3.9		Tr. brick (fill)(SM)		5		
	3D	5	21-27	Brn f-m sand, Sm silt, cinders, Tr. gvl				
		7	29-15	(fill)(SM)				
	4D	7	7-6	Blk-Brn M-f sand, Sm brick, Tr. cinders, gvl,				
		9	11-6	silt (Sp-SM)(fill)				
						10		
	5D	10	32-22	Brn C-f sand, Sm silt, Tr. brick, gvl, cinders				
		12	20-8	(fill)(SM)				
	6D	12	4-2	gry-Blk C-f sand, Sm silt, cinders, Tr. gvl				
		14	3-4	(fill)(SM)				
						15		
	7D	15	5-5	DO-6D (fill)(SM)				
		17	2-2					
	8D	17	2-5	DO-6D, Tr. veg (fill)(SM)				
		19	4-2					
						20		
	9D	20	3-4	Blk-C-f sand, Tr. brick, silt (fill)(cinders)				R=1"
		22	5-4					clay in wash @ 23FT.
	10U	23	P=24"	Top-gray org. silty clay, SM f sand (OL)				
		25	R=21"	Bot-Brn silty M-f sand, Tr. veg. (SM)	@ 3			
	11D	25	7-8	DO-10U-Bot (SM)		25		
		27	18-16					
					(S)			
						30		
	12D	30	15-15	Brn M-f sand, Tr. silt (Sp-SM)				
		32	22-21					
						35		
	13D	35	8-12	Brn silty f-m sand (SM)				
		37	12-11					
						40		
	14D	40	23-24	Brn M-f sand, Tr. silt (Sp-SM)				
		42	23-28					
						45		
	15D	45	10-10	DO-14D, Tr. mica (Sp-SM)				
		47	13-12					
	16D	50	10-14	Brn clayey f-sand, Sm silt, Tr. mica				
410		52	9-11	(SM&I)				

BORING NO. B4U

FORM NO. B-1

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. B9u
SURFACE ELEV.

PROJECT Lowe's Home Center
PROJECT LOCATION Brooklyn, NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
04/17/01								
0645 Partly cloudy 38°F					(3)			
						55		
	17D	55	32-28	BRN f-M SAND, SM silt (SM)				
		57	41-34					
						60		
	18D	60	28-32	BRN M-f SAND, Tr. silt (sp-sm)				
		62	30-29					
					?	63.5		
						65		
	19D	65	100/0"	NO RECOVERY				Spoon bouncing. Hard drilling from 65' to 69 FFT, cobbles
					(T)			
						70		
	20D	70	100/4"	NO RECOVERY				2nd attempt, NO REC. Rod chattering @ 70.3'
		70.3						
						75		
	21D	75	56-41	RED-BRN f-c SAND, SM silt, gvl (SM)				Rock fragm. in the tip of the spoon.
			30-32					
						80		
	22D	80	23-29	RED-BRN f-M SAND, SM silt, Tr. mica (SM)				
1230		82	41-34			82		

FORM NO. B-1

BORING NO. D 3'1

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B9U
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION As planned

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO			
TRUCK		MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO 20
SKID	Acker	HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER Shelby Tube
S-SAMPLER
CORE BARREL
CORE BIT Thinwall bit
DRILL RODS NJ

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 2 15/16"
TYPE OF DRILLING MUD Quik Gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
01/17/01	1245	82	—	7.2	Upon Completion

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	80	NO. OF 3" SHELBY TUBE SAMPLES	1
3.5" DIA. U-SAMPLE BORING	LIN. FT.	2	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT.	—	OTHER:	—

BORING CONTRACTOR SBD Co.
DRILLER R. Lynch HELPERS E. Feliciano
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER R. Nungs DATE 01/17/01

NOTES:
1. Make a seperate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. B9U

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 94442
BORING NO. B-11
SURFACE ELEV.

PROJECT Lowe's Home Centre
PROJECT LOCATION Brooklyn, NY
RES. ENGR. R. Purnell

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12/19/00 Tues. 50°F Cloudy 12 Crews.	10	1	19-33	Dk. f-m sand, Sm silt, Tr. [illegible], Brick			Drilled	Safety Harness
		3	24-37	Ad (Fill) (Sm)			10	Refusal @ 5.5' at time.
	20	3	10-4	DO-10 (Fill) (Sm)				
		5	12-15					
					(4)	5		
	30	5	3-3	Wood Sample			WO	R=2"
		7	4-4					
	40	7	3-4	Gray m-f sand, Sm silt, [illegible]				
		9	6-3					
						10		Wood in mash, Raw lot [illegible].
	50	10	2-1	Gray f-m sand, Sm silt, Tr. [illegible]				
		12	1-1					
	60	12	2-1	DO-50, Tr. mica (Fill) (Sm)				
		14	1-1					
						15		
	70	15	3-4	Soft gray org. silty clay, Tr. veg. [illegible]				R=2",
		17	4-8		(5)			
	80	17	2-2	DO-70 (OA)				PP = <0.5 TSF
		19	2-2					
						20		
	90	20	1-1	Gray silty f-m sand, Tr. veg, clay (Sm)				
1480 lbs		22	1-1					
1/20/00 WED Overcast Windy Cloudy 30°F					(3)			
						25		
	100	25	8-10	Brn m-f sand, Sm silt (Sm)				
		27	15-10					
						30		
	110	30	5-4	Gray Brn clayey silt, Tr. f-sand, veg (ML)				
		32	4-5					
						35		
	120	35	10-12	Brn m-f sand, Tr. silt, veg (Sp-Sm)				
		37	12-15					
						40		
	130	40	16-14	Brn m-f sand, Tr. silt, Mica (Sp-Sm)				
		42	21-17					
						45		
	140	45	10-13	Brn silty f-sand, Tr. mica (Sm)				
		47	17-17					
						50		
	150	50	12-14	DO-140 (Sm)				
		52	13-12					

FORM NO. B-1

BORING NO. B-11

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. B-11
SURFACE ELEV.

PROJECT Lowe's Home Ctr.
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. Nunez

SS	SAMPLE NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
						55		
160	55	26-19		BRN C-f SAND, Tr. Silt, mica (SP-SM)	(5)			
	57	23-25						
						60		
170	60	9-12		DKO-RED, Tr. gvl (SP-SM)				
	62	27-22						
						65		
180	65	10-11		BRN M-f SAND, Tr. C SAND mica (SP-SM)				
	67	11-12						
						68.5		
						70		
190	70	41-30		RED-BRN Silty f-c SAND, sm gvl (SM)	(7)			
	72	45-49						
						75		
200	75	46-43		RED-BRN f-c SAND, Sm silt, gvl (SM)				
	77	56-44						
						80		
210	80	80-65		Rock fragments, RED BRN Silty f-M SAND, Tr. gvl (SM)				2-3" rock fragments in the tip of the spoon.
	81.2	100/2"						
						85		
220	85	37-40		RED-BRN f-C SAND, Sm silt, gvl, Tr. rock frag (SM)				Rock frag. in the tip of the spoon.
	87	41-50						
						90		
230	90	13-13		RED-BRN C-f SAND, Sm gvl, Tr. silt (SP-SM)				
	92	18-16						
						95		
240	95	16-14		BRN M-f SAND, Tr. Silt gvl (SP-SM)				
	97	27-20						
						100		
250	100	20-20		RED-BRN Silty f-M SAND, Sm gvl (SM)				
	102	25-23						E.O.B. @ 102 FT.

BORING NO. B-11

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-11
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION West -> East

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME 55	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" o.d. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 5 7/8, 3 7/8, 2 13/16
TYPE OF DRILLING MUD Quik Gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 340 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT. 102	NO. OF 3" SHELBY TUBE SAMPLES	–
3.5" DIA. U-SAMPLE BORING	LIN. FT. –	NO. OF 3" UNDISTURBED SAMPLES	–
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR SBD Co.
DRILLER R. Lynch HELPERS E. Felicano
REMARKS Grouted borehole upon completion.
RESIDENT ENGINEER R. Nunez DATE 12/20/00

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. B-12
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn NY RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12/19/00 30' up Tues cloudy 1215 hrs	1D	0.5	5-10	Blk-Brn M-f sand, Sm silt, Tr. gvl, cinders			Drilled	Automatic Hammer
		2	23	Brick (fill)(SM)			Ahead	Concrete @ surface
	2D	2	9-19	DO-1D (fill)(SM)				4" thick
		4	12-6					1D-1.5FT sample.
	3D	4	1-1	Blk-f-m sand, Sm silt, Tr. peat, brick	(5)	5		
		6	1-1	(fill)(SM)			MUD	
	4D	6	2-2	Blk-gray f-m sand, Sm silt, cinders, Tr. brick,				
		8	2-2	wood (fill)(SM)				
	5D	8	2-3	Blk-gray f-m sand, Sm silt, cinder, Tr. gvl				
		10	3-4	(fill)(SM)		10		
	6D	10	2-2	DO-5D (fill)(SM)				
		12	1-1					
	7D	12	2-2	DO-5D (fill)(SM)				
		14	2-1					
	8D	14	1-1	Top(6")-DO-5D (fill)(SM)		15		R-12"
		16	1-1	Bot(6") gray org silty clay, Sm veg, Tr. f sand (OH)				
	9D	16	1-1	DO-8D-Bot (OH)	(0)			
		18	1-1					
						19		
						20		
1415	10D	20	1-1	Gray silty f-m sand, Tr. veg (SM)	(5)			
		22	1-2					
12/20/00 WED 0630 hrs windy cloudy 10°F								
						25		
	11D	25	4-6	Brn-M-f sand, Tr. silt (SP-SM)				
		27	8-8					
						30		
	12D	30	3-3	Top(9")-Brn c-f sand, Tr. silt (SP-SM)				
		32	2-2	Bot(8")-Stiff gray-Brn silt, Sm f-sand (ML)				Bot. PP=1.5 T.S.F.
						35		
	13D	35	5-8	Brn M-f sand, Tr. silt, mica (SP-SM).				
		37	12-15					
						40		
	14D	40	6-8	DO-13D (SP-SM)				
		42	11-11					
						<45		
	15D	45	3-3	DO-13D, Tr. gvl. (SP-SM)				
		47	5-4					
						50		
	16D	50	4-4	Brn silty f-sand, Tr. mica (SM)				
		52	6-5					

BORING NO. B-12

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. B-12
SURFACE ELEV.

PROJECT Lowe's Home Cntr.

PROJECT LOCATION Brooklyn, NY RES. ENGR. R. NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					S	55		
	17D	55	7-11	Gray BRN M-f SAND, SM silt, Tr. MICA (SM)				
		57	11-12					
						60		
	18D	60	12-16	DO-17D (SM)				
		62	19-18					
						65		
	19D	65	23-19	Gray Silty f-m SAND, AND Rock frag. (SM)				Rock fragments in the tip of the spoon
		67	22-22					
						68.5		
						70		
	20D	70	20-40	RED-BRN Silty f-c SAND, SM gvl (SM)				
		72	35-22					
						73		Bulder, Hard drilling from 73'-74.5'
					B			
						74.5		
	21D	75	19-15	RED BRN f-m SAND, SM gvl, silt (SM)				
		77	19-21					
					T	80		
	22D	80	20-24	DO-21D (SM)				
		82	29-25					Hard drilling @ 82.5 ft Possible bulder.
					B	82.5		
						83.5		
						85		
	23D	85	30-26	RED BRN silty f-m SAND, SM gvl (SM)				
		87	31-28					
						90		
	24D	90	20-20	RED-BRN f-c SAND, SM silt, gvl (SM)				2-2"
		92	17-21					
						95		
	25D	95	15-30	NO REC. (WASH)				
		97	30-28					
						100		
	26D	100	34-33	RED-BRN f-c SAND, SM silt, gvl (SM)				
345		102	21-32			102		E.O.B @ 102 FT

FORM NO B-1

BORING NO. B-12

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-12
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION offset → 16 FT SW

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED		[X] YES	[ ] NO	
TRUCK	CME 75	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 5 7/8", 2 1/8"
TYPE OF DRILLING MUD Quik gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING LIN. FT. 99.5
3.5" DIA. U-SAMPLE BORING LIN. FT. —
CORE DRILLING IN ROCK LIN. FT. —
NO. OF 3" SHELBY TUBE SAMPLES —
NO. OF 3" UNDISTURBED SAMPLES —
OTHER: obstruction (boulders) 2.5

BORING CONTRACTOR JBDCo.
DRILLER M. Blejwas HELPERS D. Keith
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER R. Nuner DATE 12/20/00

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. B-12

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9440
BORING NO. B-13
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn NY RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12/20/00	1D	0.5	24-15	Blk f-c sand, Sm silt, Tr. cinder, gvl,			Drilled	Automatic Hammer
Wed.		2	17	Brick (fill) (SM)			AHAD	4" thick concrete
Windy	2D	2	7-11	DO-1D (fill) (SM)				Surface.
Clear		4	16-6					
30°	3D	4	4-4	DO-1D (fill) (SM)	(f)	5		Slight petroleum ptr.
3.50 hrs		6	2-2				MWD	
	4D	6	1-1	gray blk f-m sand, Sm silt, Tr. veg, gvl,				
		8	1-1	Brick (fill) (SM)				
	5D	8	2-1	DO-4D, Tr. cinders (fill) (SM)				
		10	2-2			10		
	6D	10	4-2	Blk-gray c-f sand, Sm silt, cinders, Tr. gvl,				
		12	2-1	Brick (fill) (SM).				
	7D	12	1-1	Blk-gray c-f sand, Sm silt, cinders, Tr.				
		14	1-1	Brick, shells (fill) (SM)				
						15		
	8D	15	8-6	Black cinders, Sm f-m sand, Tr. shells				E=1"
		17	5-5	(fill) (cinders)		17		
	9D	17	2-1	Brn Peat (Pt)	(Pt)			
		19	1-1					
						19.5	↓	
	10D	20	WOH/18"	gray silty f-m sand, Tr. Peat (SM)				
1615 hrs		22	1					
12/21/00								
Tues						23.5		
20°					(f)	25		
4.50 hrs	11D	25	4-5	Brn f-c sand, Tr. silt, mica (Sp-SM)				
cloudy		27	5-9					
						30		
	12D	30	8-7	Brn silty f sand, Tr. mica (SM)				
		32	4-4					
						33.5		
						35		
	13D	35	2-2	stiff gray org. silty clay, Sm f-sand				PP=1.25 T.S.F
		37	7-5	(OH)	(O)			
						38.5		
						40		
	14D	40	3-5	Gray m-f sand, Tr. silt, mica (Sp-SM)	(S)			
		42	4-6					
						45		
	15D	45	4-4	DO-14D (Sp-SM)				
		47	4-7					
						50		
	16D	50	2-4	gray f-m sand, Sm silt (SM)				
		52	4-6					

BORING NO. B-13

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. B-13
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn, NY RES. ENGR. F. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					(S)			
						53.5		
	17D	55	WOR/24" soft	Gray org. silty clay, with f-sand seams (OH)	(O)	55		P.P. = <0.5 T.S.F.
		57						
						58.5		
	18D	60	6-3	Red-brn silty f-c sand, tr. gvl, rock frag (SM)	(T)	60		R=2"
		62	10-9					
						65		
	19D	65	9-10	DO-18D (SM)				R=3" Rock frag in the tip of the spoon.
		67	11-17					
						70		
	20D	70	13-22	Red-brn f-c sand, sm silt, gvl (SM)				
		72	27-49					
						73		Hard drilling @ 73 ft. boulder.
					(B)	74		
						75		
	21D	75	12-14	DO-20D (SM)				
		77	17-21					Borehole caved in, boulder rolled into borehole.
						80		
	22D	80	21-25	DO-20D, SM Rock frag (SM)				R=3" Rock frag in the tip of the spoon.
		82	25-34					
						85		Borehole caved in due to boulder to 70 FT. Reamed borehole to 85 FT.
	23D	85	24-17	Red-brn f-c sand, sm silt, gvl (SM)	(T)			
		87	21-18					
						89		Hard drilling from 89'-90'.
					(B)	90		
	24D	90	20-17	DO-23D (SM)				
		92	13-13					
						95		
	25D	95	20-23	DO-23D (SM)				
		97	26-25					
						100		
	26D	100	21-25	DO-23D (SM)				
1410		102	23-23			102		E.O.B @ 102

BORING NO. B-13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-13
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn, NY
BORING LOCATION ~~See~~ DFR #7

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED		[X] YES [ ] NO			
TRUCK	CME 75	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO	20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO	
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO	
OTHER									

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2 15/16", 3 7/8", 4 7/8"
TYPE OF DRILLING MUD Quik Gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
12/21/00	NRO	102	20	11.0±	Mud/water level upon completion.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING LIN. FT. 100
3.5" DIA. U-SAMPLE BORING LIN. FT. —
CORE DRILLING IN ROCK LIN. FT. —
NO. OF 3" SHELBY TUBE SAMPLES —
NO. OF 3" UNDISTURBED SAMPLES —
OTHER: Obstruction (boulders) 2 FT

BORING CONTRACTOR JBD Co.
DRILLER M. Bletwas HELPERS D. Keith
REMARKS Grouted borehole upon completion.
RESIDENT ENGINEER R. Nunez DATE 12/21/00

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. B-13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-14
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 10.4
RES. ENGR. RANDOLPH NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
06:30	1D	0.0	20-23	Black fine to medium sand, some silt, trace			DRILLED	
12-12-00		2.0	15-18	gravel, cinders (Fill) (SM)			AHEAD	
Friday	2D	2.0	10-21	Black brown coarse to fine sand, some silt,			4"	
Light Snow		4.0	18-23	trace cinders, gravel, brick (Fill) (SM)				
30°F						5		
	3D	5.0	1-1	Blk brn silty fine to coarse sand, tr gravel,				
		7.0	1-2	cinders, brick, vegetation (Fill) (SM)				
	4D	7.0	3-1	Do 3D (Fill) (SM)	F			
		9.0	3-3					
						10		
	5NR	10.0	1-1	No recovery				
		12.0	1-1					
	6D	12.0	1-1	Black cinders (Fill)				
		14.0	1-1					
						15		
	7D	15.0	1-1	Gray coarse to fine sand, some silt, trace				
		17.0	1-1	clay, cinders (Fill) (SM)				
	8D	17.0	2-2	Soft gray organic silty clay, trace		17		
		19.0	2-2	vegetation (OH)				WC=73
					O	20		
	9D	20.0	1-1	Do 8D (OH)				WC=58
		22.0	2-2			22		
					S1			
						25		
	10D	25.0	8-13	Brown fine to medium sand, some silt (SM)				
		27.0	16-18					
						28.5		
					M	30		
	11D	30.0	7-5	Gray brown fine to medium sandy silt, trace				WC=24
		32.0	7-7	clay pocket (ML)				Percent Passing
								No. 200 Sieve=76
						33.5		11D: Petroleum
	12D	35.0	12-17	Brown fine to medium sand, some silt (SM)		35		odor.
		37.0	21-22					
						40		
	13D	40.0	11-12	Gray brown fine to medium sand, some silt				
		42.0	12-11	(SM)	S1			
						45		
	14D	45.0	10-11	Gray brown silty fine sand, trace clay (SM)				
		47.0	14-13					
						50		
	15D	50.0	9-12	Gray brown silty fine sand (SM)				
		52.0	17-14					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-14
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 10.4
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 12-12-00 Friday Light Snow 30°F						55		
	16D	55.0	15-16	Do 15D, trace fine to medium sand seams (SM)				
		57.0	25-20					
						60		
	17D	60.0	100/5"	Brown fine to medium sand, trace silt (SP-SM)	S1			REC=3"
		60.4						
						65		
	18NR	65.0	100/0"	No recovery				
						70		
	19D	70.0	84-100/4"	Brown gravelly fine to coarse sand, some silt (SM)				19D-20D: Rock fragments in tip of spoon. 19D: REC=4"
		70.9						
						75		
						76		
	20D	75.0	61-75	Top: Brown coarse to fine sandy gravel, trace silt (GP-GM)				
		76.2	100/3"	Bot: Red brown silt, trace fine sand (ML)	M			
						80		
	21D	80.0	21-30	Do 20D, Bottom (ML)				WC=25
		82.0	38-40			82		Percent Passing No. 200 Sieve=96
4:30								End of Boring at 82'.
						85		
								WC=Water Content in percent of dry weight.
						90		
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT	LOWE'S HOME CENTER	BORING NO.	B-14
LOCATION	BROOKLYN, NEW YORK	SHEET	3 OF 3
BORING LOCATION	SEE PLAN	FILE NO.	9446
		SURFACE ELEV.	10.4
		DATUM	BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-55	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	N

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3-7/8, 2-15/16

TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO

TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24

*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

*SAFETY HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	80.3	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: OBSTRUCTION (BOULDERS)	1.7

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.

DRILLER RAY LYNCH HELPERS EDWIN FELICIANO

REMARKS BOREHOLE GROUTED UPON COMPLETION.

RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-22-00

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-15
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 10.7
RES. ENGR. RANDOLPH NUNE

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
06:30	1D	0.0	13-5	Brown fine to coarse sand, some silt, trace			DRILLED	
02-22-00		2.0	8-6	brick, cinders (Fill) (SM)			AHEAD	
Friday	2D	2.0	6-5	Brown medium to fine sand, trace silt (Fill)			4"	
Light		4.0	4-5	(SP)				
Snow	3D	4.0	3-2	Gray brown medium to fine sand, trace silt,		5		
30°F		6.0	2-2	brick, cinders (Fill) (SP-SM)				
	4D	6.0	2-2	Gray brown fine to coarse sand, some silt,	F			
		8.0	2-2	trace cinders, vegetation (Fill) (SM)				
	5D	8.0	3-2	Black fine to coarse sand, some cinders,				
		10.0	2-2	silt, trace gravel, brick, clay (Fill) (SM)		10		
	6D	10.0	1-1	Brown silty fine to medium sand, trace				
		12.0	1-1	cinders, vegetation, gravel (Fill) (SM)				
	7D	12.0	1-1	Gray brown fine to coarse sand, sm cinders,				
		14.0	1-1	tr silt, gravel, brick (Fill) (SP-SM)		14		
	8D	14.0	1-1	Brown soft organic silty clay, some		15		WC=214
		16.0	2-1	vegetation (OH)				
	9D	16.0	2-2	Do 8D (OH)	O			REC=4"
		18.0	2-2					Water in jar.
						19		
	10D	20.0	1-2	Gray brown fine sand, some silt, trace		20		
		22.0	3-3	vegetation (SM)				
					S1			
	11D	25.0	6-6	Brown fine sand, some silt (SM)		25		
		27.0	10-11					
						28.5		
	12D	30.0	3-2	Brown fine sandy silt (ML)		30		
		32.0	2-5		M			WC=23
						33.5		
	13D	35.0	3-4	Gray brown fine sand, some silt (SM)		35		
		37.0	9-12					
	14D	40.0	6-7	Brown fine sand, some silt (SM)	S1	40		
		42.0	9-9					
	15D	45.0	5-4	Brown fine to medium sand, trace silt		45		
		47.0	6-8	(SP-SM)				
						48.5		
	16D	50.0	1-1	Soft gray clayey silt, trace fine sand (ML)	M	50		WC=39
		52.0	1-1					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-15
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 10.7
RES. ENGR. RANDOLPH NU

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
02-22-00								
Friday					M			
Light								
Snow								
30°F						53.5		
	17D	55.0	10-14	Gray brown fine sand, some silt (SM)	S1	55		
		57.0	15-17					
								Hard drilling at 58'.
						58		
	18D	60.0	11-12	Red brown silty fine to medium sand, some gravel (SM)		60		
		62.0	11-10					Hard drilling at 62'.
	19D	65.0	10-13	Red brown silty fine to medium sand, trace gravel (SM)		65		
		67.0	12-14					Hard drilling at 67.5'.
	20D	70.0	24-15	Red brown fine to coarse sand, some gravel, silt (SM)	S2	70		
		72.0	17-37					
	21D	75.0	29-65	Do 20D (SM)		75		
		77.0	40-38					
	22D	80.0	25-21	Red brown gravelly coarse to fine sand, some clay (SC)		80		
4:30		82.0	46-52			82		End of Boring at 82'.
						85		WC=Water Content in percent of dry weight.
						90		
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-15
SHEET 3 **OF** 3
FILE NO. 9446
SURFACE ELEV. 10.7
DATUM BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO			
TRUCK	CME-75	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM	0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2-15/16, 3-7/8, 5-7/8
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

*AUTOMATIC HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	79.1	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: OBSTRUCTION (BOULDERS)	2.9

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.
DRILLER MIKE BLEJWAS HELPERS DENNIS KEITH
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-22-00

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-15AS
SHEET 1 OF 2
FILE NO. 9446
SURFACE ELEV. 10.7
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:00							DRILLED	Drilled ahead to 50';
01-24-01							AHEAD	obtained 1S tube.
Wednesday							4"	No sampling in the
Partly								top 50'.
Cloudy						5		For strata, see
30°F								Boring Log B-15.
					F			
						10		
						14		
						15		
					O			
						19		
						20		
					S1			
						25		
						28.5		
						30		
					M			
						33.5		
						35		
						40		
					S1			
						45		
						48.5		
						50		
	1S	50.0	PUSH=24"	Soft gray organic silty clay, some fine sand	M/O			End of Boring at
12:00		52.0	REC=24"	(OH)		52		52'.

BORING NO. B-15AS

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-15AS
SHEET 2 OF 2
FILE NO. 9446
SURFACE ELEV. 10.7
DATUM BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK CME-55
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC X
OTHER

CASING USED [X] YES [ ] NO
DIA., IN 4 DEPTH, FT. FROM 0 TO 20
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER
U-SAMPLER
S-SAMPLER SHELBY TUBE
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. AVERAGE FALL, IN.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING LIN. FT. 52
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES 1
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.
DRILLER RAY LYNCH HELPERS EDWIN FELICIANO
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER RANDOLPH NUNEZ DATE 1-24-01

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-16
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 11.1
RES. ENGR. RANDOLPH NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
06:30	1D	0.0	55-100/5"	Gray white gravel, trace concrete, coarse			DRILLED	4" Asphalt at
12-27-00		0.9		to fine sand, cinders (Fill) (GP-GM)			AHEAD	surface.
Wednesday	2D	1.0	34-26	Black coarse to fine sand, some silt, trace			4"	
		3.0	7-5	gravel, cinders (Fill) (SM)				
19°F	3D	3.0	3-3	Brown fine to coarse sand, some silt, trace		5		
		5.0	2-3	gravel, cinders, brick (Fill) (SM)				
	4D	5.0	3-3	Black brown coarse to fine sand, some silt,				
		7.0	3-6	cinders, trace gravel, brick (Fill) (SM)	F			
	5D	7.0	3-4	Do 4D (Fill) (SM)				
		9.0	3-3			10		
	6D	9.0	1-1	Brown silty fine to coarse sand, trace				
		11.0	2-1	gravel, brick (Fill) (SM)				
	7D	11.0	1-1	Brown gray fine to coarse sand, some silt,				
		13.0	1-1	trace gravel, wood, cinders (Fill) (SM)				
	8D	13.0	3-2	Brown fine to coarse sand, some silt,		15		
		15.0	2-3	gravel, trace wood, cinders (Fill) (SM)		16		
	9D	15.0	1-2	Brown peat, trace vegetation (Pt)				WC=286
		17.0	1-2		O			
	10D	17.0	2-2	Do 9D (Pt)				WC=322
		19.0	2-2			19.5		
	11D	20.0	2-2	Red brown fine sand, some silt, trace				
		22.0	1-1	vegetation (SM)				
						25		
	12D	25.0	5-7	Red brown fine to medium sand, trace silt				
		27.0	7-9	(SP-SM)				
						30		
	13D	30.0	2-4	Brown fine sand, some silt, silt layers (SM)				
		32.0	4-4					
					S1			
						35		
	14D	35.0	2-3	Gray medium sand, some silt (SM)				
		37.0	7-8					
						40		
	15D	40.0	4-4	Gray fine to medium sand, trace silt				
		42.0	7-10	(SP-SM)				
						45		
	16D	45.0	3-4	Gray fine sand, some silt (SM)				
		47.0	3-3					
						48.5		
					M	50		
	17D	50.0	WH/18"	Top 18": Gray fine sandy silt (ML)				17D Top: WC=32
		52.0	4	Bot 6": Gray silty fine sand (SM)		51.5		

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-16
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 11.1
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd					M			
12-27-00						51.5		
Wednesday								
19°F					S1	55		
	18D	55.0	8-11	Gray brown fine sand, some silt, gravel (SM)				
		57.0	12-12					
						58.5		
						60		
	19NR	60.0	30-39	No recovery				Wash in sample.
		62.0	50-47					
								Hard drilling at 63.5'.
						65		
	20D	65.0	20-20	Red brown fine to coarse sand, some gravel, silt, trace clay (SM)				
		67.0	25-27					
								Hard drilling at 69'.
					S2	70		
	21D	70.0	18-19	Red brown fine to coarse sand, some gravel, silt (SM)				
		72.0	19-21					
						75		
	22D	75.0	27-23	Do 21D (SM)				
		77.0	25-26					
						80		
	23D	80.0	24-22	Do 21D (SM)				End of Boring at 82'.
14:15		82.0	19-28			82		
								WC=Water Content in percent of dry weight.
						85		
						90		
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT	LOWE'S HOME CENTER	**BORING NO.**	B-16
LOCATION	BROOKLYN, NEW YORK	**SHEET**	3 OF 3
BORING LOCATION	SEE PLAN	**FILE NO.**	9446
		SURFACE ELEV.	11.1
		DATUM	BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-75	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 25
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	N

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3-7/8, 4-7/8

TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO

TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24

*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

*AUTOMATIC HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
12-27-00	14:15	82	25	9	MUD/WATER UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE	ID, IN.	LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE	OD, IN.	LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL	OD, IN.	LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	79.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: OBSTRUCTION (BOULDERS)	2.5

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.

DRILLER MIKE BLEJWAS HELPERS DENNIS KEITH

REMARKS BOREHOLE GROUTED UPON COMPLETION.

RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-27-00

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-17
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
06:45	1D	0.0	77-100/1"	Gray white fine to coarse sand, gravel,			DRILLED	Drilled ahead to 1'.
12-18-00		0.5		trace silt, concrete (Fill) (SP-SM)			AHEAD	2D-4D, 13D-14D:
Monday	2D	1.0	6-4	Black brown fine to coarse sand, sm gravel,			4"	Petroleum odor.
		3.0	4-5	tr silt, brick, cinders (Fill) (SP-SM)				
30°F	3D	3.0	4-3	Black brown coarse to fine sand, some silt,		5		
		5.0	6-6	trace gravel, cinders, brick (Fill) (SM)			MUD	
	4D	5.0	3-3	Gray brown fine to coarse sand, some silt,				
		7.0	2-5	trace gravel, cinders, brick (Fill) (SM)				
	5D	7.0	2-2	Gray brown coarse to fine sand, some silt,				
		9.0	6-5	gravel, trace cinders, brick (Fill) (SM)	F	10		
	6D	9.0	1-1	Gray black fine to coarse sand, some silt,				REC=5"
		11.0	1-1	cinders, trace shells (Fill) (SM)				
	7D	11.0	1-1	Gray silty fine to coarse sand, trace gravel,				
		13.0	1-2	shells, brick, cinders (Fill) (SM)				
	8D	13.0	2-1	Gray silty fine sand, trace wood, mica (Fill)		15		
		15.0	1-3	(SM)				
	9D	15.0	1-2	Gray silty fine sand, trace vegetation (Fill)				
		17.0	2-2	(SM)				
	10D	17.0	1-2	Gray silty fine sand, some silt, trace organic				
		19.0	2-1	clay layers, brick (Fill) (SM)		20	∇	
	11D	20.0	1-2	Gray fine sand, some silt, trace vegetation				
		22.0	1-1	(Fill) (SM)				
						23.5		
						25	∇	
	12D	25.0	4-6	Gray fine sand, some silt, trace mica (SM)				
		27.0	8-11		S1			
						28.5		
						30		
	13D	30.0	5-3	Gray silt, trace fine sand (ML)	M			WC=23
		32.0	5-5					
						33.5		
						35		
	14D	35.0	4-8	Gray fine sand, some silt, trace silt layers,				
		37.0	11-13	trace mica (SM)				
						40		
	15D	40.0	6-5	Brown silty fine sand, trace clay pockets,				
		42.0	9-7	mica (SM)	S1			
						45		
	16D	45.0	9-10	Do 15D (SM)				
		47.0	13-13					
						50		
	17D	50.0	10-12	Red brown silty fine sand with medium to				Sand layer in
		52.0	13-20	fine sand layers (SM)				middle of sample.

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-17
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
12-18-00								
Monday								
30°F								
						55		
	18D	55.0	5-11	Top 10": Red brown silty fine sand, trace mica (SM)	S1			
		57.0	13-14	Bot 8": Brown fine to medium sand, trace silt, gravel (SP-SM)				
						60		
	19D	60.0	13-12	Brown fine to medium sand, some gravel, trace silt (SP-SM).				
		62.0	12-12					
						63.5		
						65		
	20D	65.0	19-37	Brown fine to coarse sand, some silt, gravel, decomposed rock fragments, trace mica (SM)				Decomposed mica schist fragments.
		67.0	28-25					
						70		
	21D	70.0	17-21	Red brown silty fine to medium sand, trace gravel, clay, mica (SM)	S2			
		72.0	16-20					
						75		
	22D	75.0	20-25	Red brown gravelly fine to coarse sand, some silt, trace clay (SM)				
		77.0	22-30					
						80		
	23D	80.0	23-26	Red brown gravelly fine to coarse sand, some clay (SC)				
14:00		82.0	19-15			82		End of Boring at 82'.
						85		WC=Water Content in percent of dry weight.
						90		
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT: LOWE'S HOME CENTER
LOCATION: BROOKLYN, NEW YORK
BORING LOCATION: SEE PLAN

BORING NO. B-17
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
DATUM BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK CME-75
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC X
OTHER

CASING USED [X] YES [ ] NO
DIA., IN 4 DEPTH, FT. FROM 0 TO 20
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8, 4-7/8
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*AUTOMATIC HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING LIN. FT. 82
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.
DRILLER MIKE BLEJWAS HELPERS DENNIS KEITH
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-18-00

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION: BROOKLYN, NEW YORK

BORING NO. B-18
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. +10.5
RES. ENGR. RANDOLPH NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
06:30	1D	0.0	19-24	Brown fine to coarse sand, some silt, trace			DRILLED	
12-15-00		2.0	22-18	gravel, brick, cinders (Fill) (SM)			AHEAD	
Friday	2D	2.0	15-15	Gray coarse to fine sand, trace silt, brick,			4"	
		4.0	12-10	cinders, concrete (Fill) (SP-SM)				
30°F	3D	4.0	2-2	Brown fine to coarse sand, some silt, trace		5		
		6.0	4-2	brick, cinders (Fill) (SM)				
	4D	6.0	2-2	Black brown fine to coarse sand, some silt,	F			
		8.0	5-5	trace cinders (Fill) (SM)				
	5D	8.0	4-3	Black fine to coarse sand, some silt, trace				
		10.0	5-7	gravel, cinders (Fill) (SM)				5D-6D: Petroleum
	6D	10.0	2-3	Black gray fine to coarse sand, some silt,		10		odor.
		12.0	4-3	trace brick, cinders (Fill) (SM)				REC=6"
	7D	12.0	4-3	Red brown silty fine to medium sand, trace				
		14.0	1-1	gravel (Fill) (SM)				
	8D	15.0	WH/18"	Top 7": Brn f-m sand, sm silt, tr gvl (SM)		15		
		17.0	1	Bot 6":Soft gray brn org si cl, sm veg (OH)				
	9D	17.0	1-1	Do 8D, Bottom (OH)		16.4		8D Bot: WC=236
		19.0	3-2		O			WC=302
	10D	20.0	1-1	Gray silty fine sand, trace vegetation (SM)		19.5		
		22.0	1-2					WC=23
					S1			
	11D	25.0	5-7	Gray fine sand, some silt (SM)		25		
		27.0	6-9					
						28.5		
	12D	30.0	4-1	Gray silt, some fine sand, trace clay (ML)		30		
		32.0	1-2					WC=27
					M			
	13D	35.0	1-2	Medium clayey silt, trace fine sand (ML)		35		
		37.0	3-5					WC=31
						38.5		
	14D	40.0	6-7	Gray brown fine sand, trace silt (SP-SM)	S1	40		
		42.0	9-11					
						43.5		
	15D	45.0	1-4	Top 14": Medium gray clayey silt, trace	M	45		
		47.0	13-12	mica, fine sand (ML)				15D Top: WC=32
				Bot 10": Gray fine sand, some silt, trace		46.2		
				mica (SM)	S1			
						48.5		
	16D	50.0	9-12	Red brown micaceous fine sand, some silt		50		
		52.0	13-16	(SM)	S2			

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-18
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. +10.5
RES. ENGR. RANDOLPH NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 12-15-00 Friday 30°F								
								Hard drilling from 54' to 55'.
						55		
	17D	55.0	17-12	Red brown fine to medium sand, some silt, gravel, trace clay, mica (SM)				
		57.0	9-14					
								Hard drilling from 59' to 60'; possible boulder.
						60		
	18D	60.0	18-5	Red brown fine to medium sand, some gravel, silt (SM)				
		62.0	15-11					
						65		
	19D	65.0	34-17	Red brown coarse to fine sandy gravel, some silt (GM)				
		67.0	30-19					
								Hard drilling from 67.5' to 69'; possible boulder.
						70		
	20D	70.0	14-44	Red brown fine to medium sand, some silt, gravel, trace clay (SM)				
		72.0	82-37					
								Hard drilling boulder from 74' to 75'.
					S2	75		
	21D	75.0	100/5"	Red brown fine to medium sand, some gravel, silt, trace coarse sand (SM)				REC=5"
		77.0						Rods chattering at 76'. Hard drilling from 76' to 77.5'; possible boulder.
						80		
	22D	80.0	20-25	Red brown fine to medium sand, some silt, gravel (SM)				
		82.0	24-25					
						85		
	23D	85.0	100/3"	Red brown fine to medium sand, some silt, gravel, trace clay (SM)				
		87.0						REC=3"; hard drilling from 85.2' to 87.5'; possible boulder.
						90		
	24D	90.0	46-26	Red brown gravelly fine to medium sand, some silt, trace clay (SM)				
		92.0	23-27					
						95		
	25D	95.0	53-41	Gray brown gravel, trace fine to medium sand, silt (GP-GM)				
		97.0	52-39					Rock fragments in tip of spoon. WC=Water Content in percent of dry weight.
						100		
	26D	100.0	29-30	Red brown fine to medium sand, some gravel, silt, trace clay (SM)				
15:40		102.0	23-20			102		End of Boring at 102'.

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT	LOWE'S HOME CENTER	BORING NO.	B-18
LOCATION	BROOKLYN, NEW YORK	SHEET	3 OF 3
BORING LOCATION	SEE PLAN	FILE NO.	9446
		SURFACE ELEV.	+10.5
		DATUM	BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-75	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	N

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN.

TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO

TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24

*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

*AUTOMATIC HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
12-15-00	15:40	102	20	10	MUD/WATER UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE	ID, IN.	LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE	OD, IN.	LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL	OD, IN.	LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	102	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: OBSTRUCTIONS	6

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.

DRILLER MIKE BLEJWAS HELPERS DENNIS KEITH

REMARKS BOREHOLE GROUTED UPON COMPLETION.

RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-15-00

BORING NO. B-18

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-19
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUN

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
06:30	1D	0.0	5-6	Brown coarse to fine sand, some gravel silt,			DRILLED	
12-13-00		2.0	4-4	trace brick, concrete (Fill) (SM)			AHEAD	
Wednesday	2D	2.0	4-5	Light gray coarse to fine sand, some gravel,			4"	2D-4D, 8D, 13D:
Sunny		3.6	25-50/1"	silt (Fill) (SM)				Petroleum odor.
20°F						5		Hard drilling from
								4' to 7'.
	3D	7.0	5-3	Black brown silty fine to coarse sand, trace				
		9.0	2-3	gravel, vegetation (Fill) (SM)				
	4D	9.0	2-1	Black coarse to fine sand, some silt,	F			
		11.0	2-2	cinders, trace shells (Fill) (SM)		10		REC=6"
	5D	11.0	2-2	Do 4D (Fill) (SM)				
		13.0	1-2					
	6D	13.0	2-2	Do 4D (Fill) (SM)				
		15.0	3-6					
	7D	15.0	1-2	Black cinders (Fill)		15		
		17.0	3-1					REC=1"
	8D	17.0	2-2	Brown peat (Pt)		17		
		19.0	2-2		O			WC=289
								Sheen in wash at
	9D	20.0	2-2	Brown fine sand, some silt, trace		19.5	▽	20'.
		22.0	3-2	vegetation, mica (SM)				
	10D	25.0	8-9	Gray brown fine sand, some silt, trace mica		25		
		27.0	12-12	(SM)	S1			
	11D	30.0	8-8	Gray brown fine sand, some clay pockets,		30		
		32.0	6-7	silt (SM)				
						33.5		
	12D	35.0	4-4	Medium gray clayey silt, some micaceous		35		
		37.0	3-4	fine sand (ML)	M			pp=1.0, WC=30
						37.5		
	13D	40.0	6-4	Gray fine to medium sand, some silt, trace		40		
		42.0	3-17	mica (SM)	S1			
	14D	45.0	6-8	Gray fine to medium sand, trace silt		45		
		47.0	10-7	(SP-SM)				
						48.5		
	15D	50.0	4-2	Gray brown micaceous fine sandy silt, trace		50		15D: WC=20
		52.0	2-3	clay (ML)	M			Percent Passing No.
								200 Sieve=74

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-19
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
12-13-00								
Wednesday								
Sunny								
20°F								
						55		
	16D	55.0	WR-2	Gray micaceous fine sandy silt (ML)	M			WC=29
		57.0	1-3					Percent Passing No.
								200 Sieve=59
						60		
	17D	60.0	7-11	Do 16D (ML)				
		62.0	16-12					
						63.5		
						65		
	18D	65.0	22-18	Brown fine to coarse sand, some gravel, silt	S1			
		67.0	23-15	(SM)				
						68.5		
						70		
	19D	70.0	19-16	Top 12": Red brown silty fine to medium				
		72.0	10-18	sand, trace gravel (SM)				
				Bot 4": Red brown fine to medium sand,				
				some silt, trace silt (SM)				
					S2	75		
	20D	75.0	35-24	Red brown some fine to coarse sand, silt,				
		77.0	100/4"	gravel (GM)				REC=8"
								Roller bitted
								boulder from 76.4'
								to 78.2'.
						80		End of Boring at
	21D	80.0	20-22	Red brown fine to coarse sandy gravel,				82'.
14:00		82.0	22-19	some silt (GM)		82		
								pp=Pocket
								Penetrometer
						85		Unconfined Compres-
								sive Strength in tsf.
								WC=Water Content
								in percent of dry
						90		weight.
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT	LOWE'S HOME CENTER	**BORING NO.**	B-19
LOCATION	BROOKLYN, NEW YORK	**SHEET**	3 OF 3
BORING LOCATION	SEE PLAN	**FILE NO.**	9446
		SURFACE ELEV.	10.5
		DATUM	BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-75	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	N

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3-7/8, 4-7/8

TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO

TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24

*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

*AUTOMATIC HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
12-13-00	14:00	82		10	CASING REMOVED UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE		ID, IN.	LENGTH, FT.	TOP ELEV.
INTAKE ELEMENT: TYPE		OD, IN.	LENGTH, FT.	TIP ELEV.
FILTER: MATERIAL		OD, IN.	LENGTH, FT.	BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	80.2	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: BOULDER	1.8

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.

DRILLER MIKE BLEJWAS HELPERS DENNIS KEITH

REMARKS BOREHOLE GROUTED UPON COMPLETION.

RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-13-00

BORING NO. B-19

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-20
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:45	1D	0.0	11-38	Brown fine to coarse sand, some silt, trace			DRILLED	
12-20-00		2.0	49-56	brick, cinders, gravel (Fill) (SM)			AHEAD	
Wednesday	2D	2.0	100/6"	Do 1D (Fill) (SM)			4"	2D, 4D-5D, 7D:
Windy,		2.5						REC=3"
Clear						5		
30°F-50°F	3D	5.0	8-2	Black brown coarse to fine sand, some silt,				3D, 18D: REC=2"
		7.0	4-5	trace cinders, brick (Fill) (SM)				Petroleum odor.
	4D	7.0	7-3	Do 3D (Fill) (SM)				
		9.0	3-2		F			
						10		
	5D	10.0	2-1	Do 3D (Fill) (SM)				
		12.0	1-1					
	6D	12.0	1-2	Black silty fine to coarse sand, trace gravel,				REC=1"
		14.0	1-1	cinders (Fill) (SM)				
						15		
	7D	15.0	3-3	Black coarse to fine sand, some silt,				
		17.0	3-3	cinders, trace brick (Fill) (SM)		17		
	8D	17.0	4-5	Top 22": Brown peat (Pt)	O			8D Top: WC=292
		19.0	8-5	Bot 2": Brown silty fine sand, trace peat		18.9		
16:15				(SM)		20		
06:30	9D	20.0	2-2	Gray silty fine sand, trace concrete,				
12-21-00		22.0	4-4	vegetation (Fill) (SM)				
Thursday								
Cloudy								
20°F						25		
	10D	25.0	10-17	Brown fine sand, some silt (SM)	S1			
		27.0	20-14					
						30		
	11D	30.0	3-6	Brown silty fine sand (SM)				
		32.0	5-5					
						33.5		
						35		
	12D	35.0	5-4	Soft gray clayey silt, trace fine sand, mica				WC=38
		37.0	2-2	(ML)				
						40		
	13D	40.0	2-2	Soft gray clayey silt, trace fine sand, trace				pp=0.5, WC=44
		42.0	2-2	mica (ML)				
					M			
						45		
	14D	45.0	WR/12"	Do 13D (ML)				WC=39
		47.0	2-2					
						50		
	15D	50.0	WR-2	Do 13D (ML)				WC=38
		52.0	2-3					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

BORING NO. B-20
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
12-21-00								
Thursday								
Cloudy					M			
20°F								
						54.5		
	16D	55.0	14-15	Gray brown fine to medium sand, some silt, trace mica (SM)				
		57.0	18-19		S1			Hard drilling at 57.9'.
						58		Boulder from 58' to 60'.
						60		
	17D	60.0	20-20	Red brown silty fine to coarse sand, trace gravel (SM)				
		62.0	35-37					
						65		
	18D	65.0	100/2"	Do 17D (SM)				
		65.2						
					S2			
						70		
	19D	70.0	20-100/5"	Gray brown gravel, trace fine to coarse sand, silt (GP-GM)				REC=4" Possible wash.
		70.9						
						75		
	20D	75.0	41-32	Red brown silty fine to medium sand, trace gravel (SM)				
		77.0	32-43					
						80		
	21D	80.0	36-38	Red brown fine to medium sand, some gravel, silt (SM)				
12:45		82.0	56-51			82		Rock fragments in tip of spoon. End of Boring at 82'.
						85		
								pp=Pocket Penetrometer Unconfined Compressive Strength in tsf.
						90		
								WC=Water Content in percent of dry weight.
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-20
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
DATUM BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-55	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8, 2-15/16
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*SAFETY HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	100	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: OBSTRUCTION (BOULDERS)	2

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.
DRILLER RAY LYNCH HELPERS EDWIN FELICIANO
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-21-00

BORING NO. B-20

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 2
FILE NO. 9446
BORING NO. B20AM
SURFACE ELEV.

PROJECT Lowe's Home Cntr.

PROJECT LOCATION Brooklyn NY RES. ENGR. R. NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
1/24/01 WED. 0715 Partly cloudy 30' SOF				Drilled AHEAD to 35 FT, obtained 2-U-TUBES, No sampling in the top 35 FT.			Drilled AHEAD	
						5	MUD	
						10		
						15		
						20		
						25		
						30		
						35		
	1U	35 37	P=24" R=20	soft gray org. silty clay, Tr. f. sand (OH)				
					⊙	40		
						45		
0930	2U	45 47	P=24" R=19"	DO-1U (OH)		47		E.O.B @ 47 FT

BORING NO. B-20AU

FORM NO. B-1

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-20AU
SHEET 2 OF 2
FILE NO. 94460
SURFACE ELEV.
DATUM

PROJECT Lewis Home Site
LOCATION Brooklyn NY
BORING LOCATION 5 FT. EAST of B20

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	☒ YES ☐ NO		
TRUCK	CME 55	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER
U-SAMPLER Shelby Tube
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED ☒ YES ☐ NO
DIAMETER OF ROTARY BIT, IN. 3 7/8"
TYPE OF DRILLING MUD Gvillgel

AUGER USED ☐ YES ☒ NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. — AVERAGE FALL, IN. —
SAMPLER HAMMER, LBS. — AVERAGE FALL, IN. —

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					no observation

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	43	NO. OF 3" SHELBY TUBE SAMPLES		2
3.5" DIA. U-SAMPLE BORING	LIN. FT.	7	NO. OF 3" UNDISTURBED SAMPLES		—
CORE DRILLING IN ROCK	LIN. FT.	—	OTHER:		—

BORING CONTRACTOR SBOC
DRILLER E. Lynch HELPERS G. Fabricaro
REMARKS Started borehole open (Bentonite)
RESIDENT ENGINEER E. Lawrence DATE 09/24/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type: dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. B20AU

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-20P
SHEET 1 OF 4
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:00							DRILLED	Drilled to 30' for
12-21-00							AHEAD	piezometer instal-
Thursday							4"	lation.
Cloudy								Drilled borehole with
20°F						5		water.
								For strata, see
								Boring Log B-20.
					F			
						10		
						15		
						17		
					O			
						18.9		
						20		
					F			
						25		
								End of Boring at
						30		30'.
						35		
						40		
						45		
						50		

BORING NO. B-20P

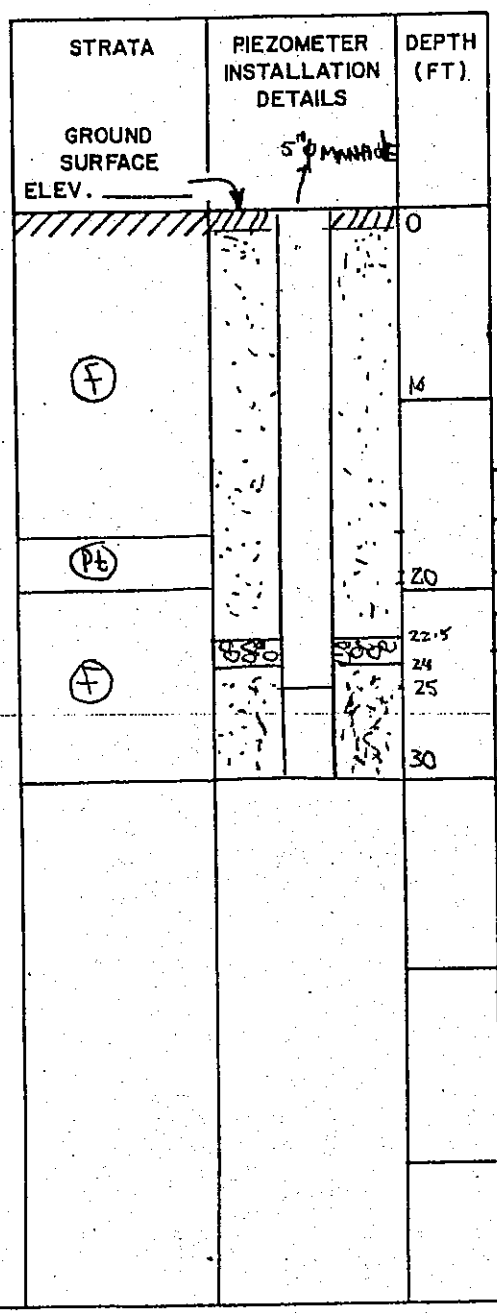
SHEET 2 OF 4
FILE NO. 9446
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Lowe's Home Center
PIEZOMETER NO. B-20P
LOCATION Brooklyn NY
PIEZOMETER LOCATION 4 ft ± Northeast from boring B-20
DATE OF INSTALLATION 12/21/00
☐ SEE SKETCH ON BACK
RES. ENG. K. Nunez

PIEZOMETER TYPE SCH40 slotted PVC



INTAKE POINT

depth to bottom, ft = 30
depth to top, ft = 24
length, ft = 6 = L
diameter, in = 4, ft = = 2R

STANDPIPE/RISER

elevation of rim, ft = 10.2
diameter, in = 1 1/4, ft = = 2r

READING TIME DATE	CLOCK	DEPTH – RIM TO WATER (ft)	ELEVATION OF WATER	REMARKS
12/27/00	0850	7.6		Riser → 0.3 ft. below ground surface.
12/27/00	0915	7.6		
12/27/00	1300	7.55		
12/28	0715	7.5		
12/29	0710	7.7		
01/02	1135	7.9		
01/03	1024	7.8		
	1245	7.85		
01/04	0720	7.7		
01/05	0940	7.7		
01/08	0754	7.8		
01/09	0813	7.75		
01/10	1210	7.9		
01/12	0915	7.9		
01/16	1123	7.5		
01/19	1120	7.2		
01/23	1150	7.2		

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. 10.5

PIEZOMETER NO. B-20P

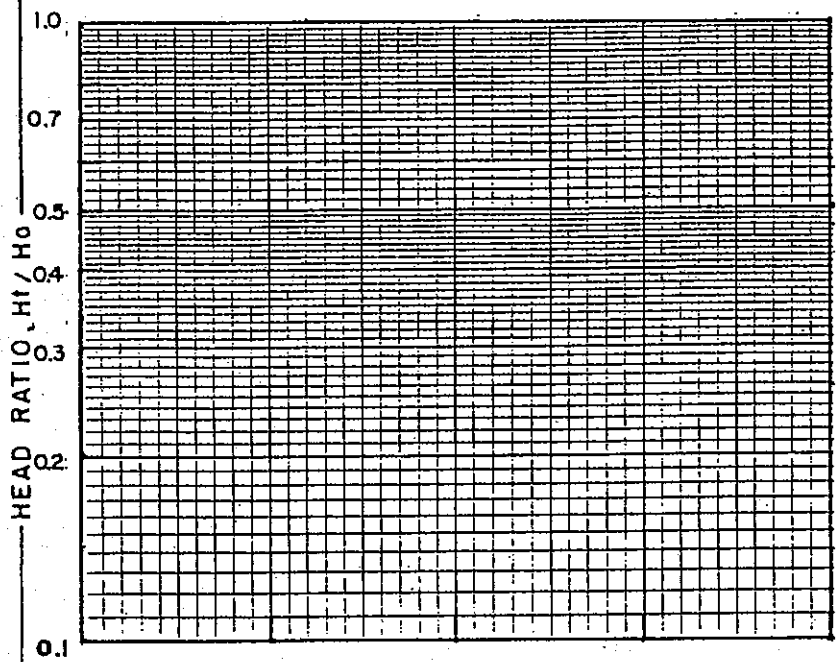
SHEET 3 OF 4
FILE NO. 9446
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

VARIABLE HEAD PERMEABILITY TEST

☐ BOREHOLE OR ☒ PIEZOMETER NO. B-20P
TEST NO. 1

PROJECT Lowe's Home Center — RES.ENG. R. Nunez
LOCATION Brooklyn, NY — CALC.BY ____ DATE ____
PIEZOMETER LOCATION ____ CH'KD BY ____ DATE ____



INTAKE POINT

depth to bottom, ft = 30
depth to top, ft = 24
length, ft = 6 = L
diameter, in = 4, ft = ____ = 2R

STANDPIPE/RISER

diameter, in = 1¼, ft = ____ = 2r

depth of casing, ft = ____

depth to which standpipe was bailed, ft = ____ = Z

READING TIME DATE	CLOCK	Δt MIN.	TEST DEPTH-RIM TO WATER ft.	DEPTH-RIM TO TIDE OR GWL ft.	UNBALANCED HEAD H ft.	HEAD RATIO Ht/Ho	REMARKS
12/27/00	0855	—	0.0	7.6	0		STATIC WATER LEVEL
		0.5	0.8				River is 0.3 ft. below ground surface
		1	1.8				
		2	2.4				min / depth (can't test)
		3	3.1				15 / 7.3
		4	4.0				16 / 7.35
		5	4.9				17 / 7.45
		6	5.4				18 / 7.5
		7	5.8				19 / 7.5
		8	6.0				20 / 7.6
		9	6.3				
		10	6.55				
		11	6.9				
		12	7.0				
		13	7.1				
		14	7.2				

PIEZOMETER NO. B-20P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-20P
SHEET 4 OF 4
FILE NO. 9446
SURFACE ELEV. 10.5
DATUM BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-55	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. AVERAGE FALL, IN.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
12-27-00	8:50			7.6	PIEZOMETER READING.
12-27-00	9:15			7.6	AFTER FALLEN HEAD TEST.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SEE SHEET 3 OF 4

STANDPIPE:	TYPE	SCHEDULE 40 PVC	ID, IN.		LENGTH, FT.	TOP ELEV.
INTAKE ELEMENT:	TYPE	SLOTTED PVC	OD, IN.		LENGTH, FT.	TIP ELEV.
FILTER:	MATERIAL	SAND	OD, IN.		LENGTH, FT.	BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.		NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: BORING WITHOUT SAMPLING	30 LIN. FT.

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.
DRILLER RAY LYNCH HELPERS EDWIN FELICIANO
REMARKS PLACED MANHOLE COVER 5" DIAMETER.
RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-21-00

BORING NO. B-20P

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-21
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
06:45	1D	0.0	40-29	Brown fine to coarse sand, some silt, trace			DRILLED	
12-18-00		2.0	32-31	gravel, brick (Fill) (SM)			AHEAD	
Monday	2D	2.0	9-20	Brown coarse to fine sand, some gravel,			4"	
		4.0	23-15	silt, trace brick (Fill) (SM)				
30°F						5		
	3D	5.0	1-3	Brown fine to coarse sand, some silt, trace				
		7.0	3-3	brick, cinders, vegetation (Fill) (SM)				
	4D	7.0	1-1	Brown gray peat, some silty clay (Pt)				WC=125
		9.0	1-1		F			
						10		
	5D	10.0	1-1	Brown peat, trace vegetation (Pt)				WC=281
		12.0	1-1					
	6D	12.0	5-7	Top 7": Do 5D, tr gravel, bricks, glass (Pt)				6D Top: WC=351
		14.0	9-6	Bot 12": Gray brown fine to medium sand,				
				some silt, trace gravel, mica (SM)		15		
	7D	15.0	1-1	Brown fine sand, some silt (SM)				Sample saturated
		17.0	2-2					with water.
	8D	17.0	3-1	Top 11" Do 7D, trace vegetation (SM)		17.9		
		19.0	2-2	Bot 13": Brown peat, trace vegetation (Pt)	O			8D Bot: WC=259
						19.5		
	9D	20.0	1-1	Gray silty fine sand, trace peat (SM)				
		22.0	2-1					
					S1			
						25		
	10D	25.0	10-12	Gray silty fine sand, trace mica (SM)				Petroleum odor.
		27.0	16-19					
						28.5		
						30		
	11D	30.0	5-3	Soft gray clayey silt, trace fine sand (ML)				WC=25
		32.0	6-5		M			
						35		
	12D	35.0	WH/12"	Top 10": Do 11D (ML)		36		12D Top: pp=0.5,
		37.0	13-17	Bot 7": Gray brown fine sand, some silt,	S1			WC=33
				mica (SM)				
						38.5		
						40		
	13D	40.0	WR-4	Soft gray clayey silt, some fine sand, trace	M			WC=32
		42.0	4-3	mica (ML)				
						43.5		
						45		
	14D	45.0	15-20	Brown fine sand, some silt, trace gravel				Petroleum odor;
		47.0	21-23	(SM)				sheens.
					S1			
						50		
	15D	50.0	18-26	Brown fine sand, some silt, trace mica (SM)				
		52.0	24-26					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-21
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 12-18-00 Monday 30°F						55		
	16D	55.0	16-19	Brown fine sand, some silt, vegetation, mica (SM)				Petroleum odor.
		57.0	28-21					
						60		
	17D	60.0	17-19	Brown fine sand, some silt, mica (SM)				
		62.0	22-24					
					S1			
						65		
	18D	65.0	16-18	Brown fine to medium sand, some silt, trace gravel (SM)				
		67.0	22-20					
						70		
	19D	70.0	19-18	Brown gravelly coarse to fine sand, some silt (SM)				Heavy petroleum odor.
		72.0	26-31					
						75		
	20D	75.0	36-37	Do 19D (SM)				
		77.0	48-36					
						80		
	21D	80.0	50-100/3"	Brown silty fine to coarse sand, some gravel (SM)		80.8		REC=5"
		80.8						End of Boring at 80.8'.
						85		pp=Pocket Penetrometer Unconfined Compressive Strength in tsf.
						90		WC=Water Content in percent of dry weight.
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-21
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV. 10.5
DATUM BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-55	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

*SAFETY HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	82	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.
DRILLER RAY LYNCH HELPERS EDWIN FELICIANO
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-18-00

BORING NO. B-21

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-22
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 10.4
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:00	1D	0.0	33-26	Brown fine to coarse sand, some gravel,			DRILLED	
12-13-00		2.0	21-34	silt, trace brick (Fill) (SM)			AHEAD	
Wednesday	2NR	2.0	100/1"	No Recovery			4"	
		2.1					MUD	
30°F	3D	4.0	2-1	Black fine to coarse sand, some silt, trace		5		3D, 5D, 9D: Petrol-
		6.0	2-2	gravel, brick (Fill) (SM)				leum odor.
	4D	6.0	4-6	Do 3D (Fill) (SM)				Sheen in wash.
		8.0	19-14					
					F			
						10		
	5D	10.0	3-5	Brown fine to coarse sand, some silt, trace				REC=5"
		12.0	4-4	gravel (Fill) (SM)				
	6D	12.0	4-10	Brown silty fine sand, trace gravel, trace				
		14.0	10-7	wood (Fill) (SM)				
	7D	14.0	11-8	Brown silty fine sand, some gravel, trace		15		
		16.0	9-2	vegetation (Fill) (SM)				
	8D	16.0	1-1	Brown fine sand, some silt, gravel (Fill) (SM)				REC=1"
		18.0	1-1					Driller placed new
						19		trap; 19' clay
						20		in wash.
	9D	20.0	1-1	Brown silty fine sand, trace vegetation (SM)				
		22.0	3-3					
					S1			
						25		
	10D	25.0	10-13	Gray fine sand, some silt (SM)				
14:30		27.0	22-16					
06:30								
12-15-00						28.5		
Friday						30		Percent Passing
	11D	30.0	5-5	Gray fine sandy silt, trace fine sand (ML)				No. 200 Sieve=90
30°F		32.0	5-10					WC=36
						35		
	12D	35.0	4-3	Medium gray clayey silt, some fine sand	M			pp=0.75, WC=31
		37.0	6-6	(ML)				
						40		
	13D	40.0	2-3	Stiff gray clayey silt, some fine sand (ML)				pp=1.0, WC=35
		42.0	3-4					
						43.5		
						45		
	14D	45.0	9-13	Brown fine sand, some silt (SM)				
		47.0	19-13					
					S1			
						50		
	15D	50.0	7-20	Brown silty fine sand, trace micaceous (SM)				
		52.0	19-22					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-22
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 10.4
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
12-15-00								
Friday								
					S1			
30°F						55		
	16D	55.0	11-15	Gray brown fine sand, some silt (SM)				
		57.0	20-24					
						58.5		
						60		
	17D	60.0	18-30	Red brown silty fine sand, trace gravel, trace micaceous (SM)				
		62.0	28-20					
						65		
	18D	65.0	16-23	Red brown fine sand, some silt, trace gravel (SM)				REC=6"
		67.0	38-43					
						70		
	19D	70.0	28-35	Red brown fine to medium sand, some gravel, silt (SM)				
		72.0	40-22					
						75		
					S2			
								Driller overdrilled to 80'.
						80		
	20D	80.0	23-30	Red brown fine to medium sand, some gravel, silt (SM)				
		82.0	22-24					
						85		
	21D	85.0	60-88	Red brown fine to coarse sand, some gravel, silt (SM)				Rock fragments in the tip of spoon.
		86.3	100/4"					
						90		
	22D	90.0	62-53	Red brown fine to coarse sand, some gravel, silt (SM)				REC=5"
		92.0	50-31					pp=Pocket Penetrometer Unconfined Compressive Strength in tsf.
						95		
	23D	95.0	46-68	Red brown fine to coarse sand, some gravel, silt (SM)				
		96.0	100/2"					WC=Water Content in percent of dry weight.
						100		REC=7"
	24D	100.0	76-64	Do-23D (SM)				End of Boring at 102'.
15:00		102.0	55-36			102		

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. B-22
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV. 10.4
DATUM BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NEW YORK
BORING LOCATION SEE PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-55	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 25
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN.
TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
*SAMPLER HAMMER, LBS 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

*SAFETY HAMMER USED.

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	98.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: OBSTRUCTION (BOULDERS)	3.5

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.
DRILLER RAY LYNCH HELPERS EDWIN FELICIANO
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-15-00

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-23
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 10.4
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:00	1D	0.0	5-9	Brown fine to coarse sand, some silt,			DRILLED	REC=13"
02-12-00		2.0	23-32	gravel, trace brick, concrete (Fill) (SM)			AHEAD	
Tuesday	2D	2.0	36-50	Do 1D (Fill) (SM)			4"	
Windy		4.0	38-100/3"					
						5		
	3NR	5.0	100/0"	No recovery				Spoon bouncing.
								Hard drilling from
	4NR	7.0	100/0"	No recovery	F			5' to 7'. Spoon
								bouncing.
						10		4NR: Rock frag-
								ments in wash.
								Hard drilling from
	5D	12.0	1-2	Gray silty fine to coarse sand, trace peat,				5' to 11.5'.
		14.0	2-2	wood (SM)				5D: WC=46
						15		
	6D	15.0	4-2	Soft gray organic silty clay, some				WC=124
		17.0	2-2	vegetation, fine sand layers (OH)				
	7D	17.0	1-2	Soft gray organic silty clay, some	O			WC=107
		19.0	1-1	vegetation, trace fine sand (OH)				
						19.5		
	8D	20.0	4-6	Gray brown silty fine sand, trace mica (SM)				
		22.0	10-13					
					S1			
						25		
	9D	25.0	9-18	Do 8D (SM)				
		27.0	24-26					
						28.5		
						30		
	10D	30.0	5-6	Red brown fine sandy silt, trace fine sand				WC=23
		32.0	6-7	seams (ML)				
						35		
	11D	35.0	1-2	Soft gray clayey silty trace micaceous fine				WC=33
		37.0	2-5	sand (ML)				Percent Passing
								No. 200 Sieve=93
					M			
						40		
14:30	12D	40.0	1-2	Soft gray fine sandy silt (ML)				WC=37
06:30		42.0	2-2					Percent Passing
12-13-00								No. 200 Sieve=64
Wednesday								
Sunny						45		
20°F	13D	45.0	4-3	Do 12D (ML)				WC=31
		47.0	4-4					
						48.5		
						50		
	14D	50.0	4-15	Brown fine sand, some silt, trace mica (SM)	S1			
		52.0	19-23					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. B-23
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 10.4
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
12-13-00					S1			
Wednesday								
Sunny						53.5		
20°F						55		
	15D	55.0	15-13	Red brown silty fine to medium sand, trace gravel (SM)				
		57.0	18-21					
						60		
	16D	60.0	50-28	Do 15D (SM)				Hard drilling from 62.5' to 65'; possible boulders. Spoon bouncing.
		62.0	15-14					
						65		
	17NR	65.0	100/2"	No recovery				Possible boulder. Hard drilling from 65' to 69'.
		65.2			S2			
						70		
	18D	70.0	40-67	Red brown fine to medium sand, some gravel, silt, trace coarse sand, clay pockets, mica (SM)				
		72.0	38-32					
						75		
	19D	75.0	45-51	Red brown fine to medium sand, some gravel, silt, trace coarse sand, mica (SM)				
		77.0	43-41					
						80		End of Boring at 81'.
12:30	20D	80.0	41-100/6"	Red brown fine to medium sand, some silt, gravel, trace coarse sand (SM)		81		
		81.0						WC=Water Content in percent of dry weight.
						85		
						90		
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

		BORING NO.	B-23
		SHEET	3 OF 3
PROJECT	LOWE'S HOME CENTER	FILE NO.	9446
LOCATION	BROOKLYN, NEW YORK	SURFACE ELEV.	10.4
BORING LOCATION	SEE PLAN	DATUM	BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-55	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 15
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	N

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3-7/8, 4-7/8

TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO

TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24

*SAMPLER HAMMER, LBS 140 AVERAGE FALL, IN. 30

*SAFETY HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.		TOP ELEV.
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.		TIP ELEV.
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.		BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	81	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.

DRILLER RAY LYNCH HELPERS EDWIN FELICIANO

REMARKS BOREHOLE GROUTED UPON COMPLETION.

RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-13-00

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. PB-1
SURFACE ELEV.

PROJECT Lowe's Home center
PROJECT LOCATION Brooklyn, NY
RES. ENGR. E. NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					(Conc)		Drilled with Mud	Safety Hammer 3 [illegible] at surface
	10	3	35-31	Concrete (Fill) (Conc)				
		5	38-34		(F)			
	20	5	11-17	Brn M-f sand, Sm silt, gvl, Tr. Brick (Fill)(Sm)		5		R=2"
		7	18-18				4/ft	
	30	7	15-14	Red-Brn silty m-f sand, Sm Brick, Tr. gvl (Fill)(Sm)				
		9	15-17					
	40	10	4-2	Brn silty m-f sand, Sm Cinders, Tr. Brick (Fill)(Sm)		10		R=2"
		12	2-1					
	50	12	2-2	No Recovery				
		14	2-2					
								Wood in winch.
						14.5		
	60	15	6-4	Gray org silty clay, Sm f-sand, Tr. wood (OH)	(O)			
		17	2-2					
	70	17	1-2					
		19	2-1					
						20	V	
	80	20	1-1	Gray org silty clay, Sm f-sand (OH)				
		22	1-1					
						25		
	90	25	1-2	Do 80, Tr. shells (OH)				
		27	1-1					
						28.5		
						30		
	100	30	7-10	gray f-c sand, Tr. silt (SP-SM)	(S)			
		32	12-14					
						35		
	110	35	5-8	gray-Brn c-f sand, Tr. silt (SP-SM)				Petroleum in sample
		37	17+16					
						40		
	120	40	14-9	Gray m-f sand, Tr. silt (SP-SM)				
		42	22-15					
						45		
	130	45	10-11	Gray f-c sand, Tr. silt, gvl (SP-SM)				
		47	12-14					
						50		
	140	50	7-9	Do 130 (SP-SM)				
		52	14-16					

BORING NO. PB-1

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. PB-1
SURFACE ELEV.

PROJECT Lowe's Home Cntr

PROJECT LOCATION Brooklyn, NY RES. ENGR. R. Nunez

ESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
	15D	55	14-14	DU-14D (SP-SM)	(S)	55		Petroleum in sample
		57	13-12					
						60		
	16D	60	11-20	BRN silty f-sand (SM)				
		62	18-18					
						65		
	17D	65	10-15	BRN c-f sand, SM gvl, Tr. silt (SP-SM)				
		67	15-11					
						70		
	18D	70	9-14	BRN c-f sand, Tr. gvl, silt (SP-SM)				
		72	15-12					
						75		
	19D	75	12-17	BRN silty f-c sand, Tr. gvl (SM)				
		77	34-14					
						80		
	20D	80	10-13	BRN f-c sand, SM silt, Tr. gvl (SM)				
		82	17-21			82		B.O.B @ 82 FT

BORING NO. PB-1

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. PB-1
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION As Planned

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME 55	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" OD split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8, 5 7/8
TYPE OF DRILLING MUD Quikgel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	82	NO. OF 3" SHELBY TUBE SAMPLES	—
3.5" DIA. U-SAMPLE BORING	LIN. FT.	—	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT.	—	OTHER:	—

BORING CONTRACTOR JBD Co.
DRILLER R. Lynch HELPERS E. Feliciano
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER E. Nunez DATE 12/29/00

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. PB-2
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn, NY RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/02/01	1D	0	14-16	Blk. M.f sand, sm silt, Tr. gvl, cinders			Drilled	Safety Hammer
Res.		2	19-19	(fill) (SM)			Ahead	
clear	2D	2	48-100/2"	Blk-Brn M.f sand, Tr. gvl, silt, cinders,	(F)			
windy		2.7		concrete (fill) (sp-sm)				
18°F						5		
	3D	5	14-16	gray gravel, Tr. metal (GP) (fill)			MUD	R=3"
5°F		7	10-12					
wind chill	4D	7	8-8	gray gravel, Tr. conc. (fill) (GP)				R=4"
0805		9	11-13					
						10		
	5D	10	10-9	Red-Brn M.f sand, sm gvl, Tr. silt (sp-sm)				
		12	12-20			12		
	6D	12	8-2	gray org. silty clay, sm veg, f-sand				
		14	2-2	(OH)	(O)			
						15		
	7D	15	1-1	soft gray org. silty clay, Tr. f-sand,				
		17	1-1	shells (OH)				
	8D	17	1-1	DO-7D, Tr. veg. (OH)				
		19	1-1					
						20		
	9D	20	1-1	no recovery				Drilled ahead to next
		22	3-3					sample depth, unable
								to take spoon below
					?	23.5		sample 9D.
						25		
	10D	25	WOH/12"	gray silty M.f sand, Tr. mica (SM)	(S)			
		27	3-4					
						30		
	11D	30	13-22	Brn M.f sand, Tr. silt, mica (sp-sm)				
		32	28-21					
						33.5		
						35		
	12D	35	10-12	Red-Brn silty f-sand (SM)				
		37	13-16					
						40		
	13D	40	12-18	Red-Brn M.f sand, Tr. silt, mica (sp-sm)	(S)			
		42	13-14					
						45		
	14D	45	9-9	Brn M.f sand, Tr. silt, mica (sp-sm)				
		47	12-12					
						50		
	15D	50	12-13	DO-14D (sp-sm)				
		52	14-15					

FORM NO. R-1

BORING NO. PB-2

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. P-B2
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brklyn, NY RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					E	55		
	16D	55	23-24	Brn m-f sand, Tr. silt, gvl (SP-SM)				R=3"
		57	24-21					
						58.5		
						60		
	17D	60	9-8	Red-Brn m-f sand, Sm silt (SM)				
1410		62	9-9		T			
01/03/01								
WGD.								
18°F						65		
0700	18D	65	41-36	Red-Brn silty f-sand, SM gvl (SM)				
		67	21-32					
						70		
	19D	70	21-35	DO-18D (SM)				
		72	38-40					
						75		
	20D	75	19-16	Red-Brn f-sand, Sm silt (SM)				
		77	26-28					
						80		
	21D	80	10-11	DO-20D, Tr. gvl (SM)				
0915		82	14-18			82		E.O.B @ 82 FT.

BORING NO. PB-7

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. PB-2
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Ctr.
LOCATION Brooklyn NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME 55	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 4 7/8", 6 1/4"
TYPE OF DRILLING MUD Quikgel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT. 82	NO. OF 3" SHELBY TUBE SAMPLES	—
3.5" DIA. U-SAMPLE BORING	LIN. FT. —	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT. —	OTHER:	—

BORING CONTRACTOR JBDia.
DRILLER R. Lynch HELPERS G. Feliciano
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER R. Nunez DATE 01/03/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. PB-3
SURFACE ELEV.

PROJECT Lowe's Home Center
PROJECT LOCATION Brooklyn, NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12/20/00 Thurs. 0745hrs Windy 35°F, Wind 15mph	10	0.5	5-6	Blk-C-f sand, sm silt, Tr. gvl, cinders (fill)(sm)			Drilled	Automatic Hammer
		2	6				W/HSA	4" conc. at surface
	20	2	5-8	Blk-Brn C-f sand, sm silt, asphalt, Tr. gvl (fill)(sm)				
		4	17-16					
	30	4	4-7	Blk-f-c sand, sm silt, gvl, Tr. cinders (fill)(sm)	(f)	5		
		6	21-15					
	40	6	10-12	Brn C-f sand, sm silt, Tr. gvl, cinders (fill)(sm)			WO	
		8	13-16					
	50	8	8-7	Blk C-f sand, sm cinders, Tr. silt, gvl (fill)(sp-sm)				
		10	7-4			10		
	60	10	2-1	Gray Brn C-f sand, sm gvl, silt, cinders, wood (fill)(sm)				
		12	2-2					
	70	12	2-4	DO-60, Tr. Brick (fill)(sm)				
		14	1-1					
						15		
	80	15	2-1	Fg(7")-DO-70 (fill)(sm)				
		17	2-1	Bot(6")-Med gray org. silty clay, Tr. f sa (OH)		16.5		P.P. = .75 T.S.F.
	90	17	2-1	DO-80 (Bot), Tr. wood (OH)				
		19	2-2					
						20		
	100	20	WOH/18"	Soft gray org. silty clay, Tr. f sand, Tr. shells (OH)	(o)			P.P. < 0.5 T.S.F.
		22	1					
						25		
	110	25	WOH/18"	Med gray org. silty clay, Tr. f sand (OH)				P.P. = 0.75 T.S.F.
		27	1					
						30		
	120	30	2-2	DO-110 (OH)				
		32	1-2					
						33.5		
						35		
	130	35	9-6	Brn M-f sand, sm silt (sm)	(s)			
		37	8-8					
						40		
	140	40	5-8	Brn M-f sand, Tr. silt (sp-sm)				
		42	8-7					
						45		
	150	45	5-7	Brn C-f sand, sm gvl, Tr. silt (sp-sm)				
		47	6-6					
						50		
	160	50	5-9	DO-150 (sp-sm)				
		52	5-6					

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 2
FILE NO. 9416
BORING NO. PB-3
SURFACE ELEV.

PROJECT Lewis House Cntr
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					S	55		
	17D	55	5-6	Brn M-f sand, Tr. silt, gvl (Sp-Sm)				
		57	7-7					
						60		
	RD	60	5-8	Brn C-f sand, Sm gvl, Tr. silt, mica				
		62	7-7	(Sp-Sm)				
						67.5		
						65		
	19D	65	5-7	Red-Brn C-f sand, Sm gvl, Tr. silt, mica				
		67	8-8	(Sp-Sm)				
						70		
	20D	70	12-9	Red-Brn f-c sand, Sm silt, gvl (Sm)	T			Rock fragments in the top of the spoon.
		72	11-15					
						75		
	21D	75	8-7	Red-Brn M-f sand, Tr. silt (Sp-Sm)				
		77	9-8					
						80		
	22D	80	10-11	Red-Brn C-f sand, Tr. silt (Sp-Sm)				
1430 hrs.		82	13-15			82		E.O.B. @ 82 Ft.

BORING NO. PB-3

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. PB-3
SHEET 3 OF 3
FILE NO. 9946
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Cntr.
LOCATION Brooklyn NY
BORING LOCATION At planned

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME 55	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2 7/8", 5 7/8", 3 7/8"
TYPE OF DRILLING MUD Quik gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	NO. OF 3" SHELBY TUBE SAMPLES	—
3.5" DIA. U-SAMPLE BORING	LIN. FT. —	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT. —	OTHER:	

BORING CONTRACTOR JBD Co.
DRILLER M. Blejwas HELPERS D. Keith
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER E. Nunez DATE 12/28/00

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. PB-4
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn, NY RES. ENGR. K. Nunez

DAILY PROGRESS	SAMPLE NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12/8/86 Rig off Windy clear 0645	1D	0	100/6"	Brn c-f sand, Tr. silt, gvl, conc (Fill) (Sp-Sm)			Drilled	Automatic trip
		0.5					NWD	
	2D	2	22-18	Brn c-f sand, sm silt, cinders, Tr. brick (Fill) (Sm)	(F)			
		4	12-7					
	3D	4	3-2	Do-2D (Fill) (Sm)		5		
		6	2-2				MUD	
	4D	6	1-1	Gray Blk-m-f sand, sm silt, Tr. veg, cinders (Fill) (Sm)				
		8	1-1					
	5D	8	2-1	Do-4D (Fill) (Sm)				
		10	2-1			10		
6D		10	2-2	Brn f-c sand, sm silt, Tr. brick, cinders (Fill) (Sm)				Sample saturated w/ water R=5"
		12	2-2					
7D	12	2-2		Do-6D (Fill) (Sm)				R=6"
	14	3-3				14.5		
						15		
8D	15	wh/18"		Soft gray org. silty clay, Tr. f sand, shells (OH)	(O)			
	17	2-2						
9D	17	wh/6"		Soft gray org. silty clay, Tr. f sand, veg. (OH)				
	19	wh/18"						
						20		
10D	20	1-3		Do-9D (OH)				
	22	3-3						
						23.5		
						25		
11D	25	1-1		Gray m-f sand, sm silt, Tr. clay, shells (Sm)				
	27	2-1						
						30		
12D	30	13-19		Brn c-f sand, Tr. silt (Sp-Sm)	(S)			
	32	23-24						
						35		
13D	35	5-7		Red Brn silty f-sand (Sm)				
	37	9-8						
						40		
14D	40	6-8		Brn m-f sand, Tr. silt (Sp-Sm)				
	42	10-10						
						45		
15D	45	5-6		Brn c-f sand, Tr. gvl, silt (Sp-Sm)				
		6-7						
						50		
16D	50	4.5		Brn m-f sand, Tr. silt (Sp-Sm)				
	52	6-8						

BORING NO. PB-4

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. PB-4
SURFACE ELEV.

PROJECT Lowe's Home CNTR
PROJECT LOCATION Brooklyn NY
RES. ENGR. E. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					(S)			
	170	55	5-5	BRN M-f SAND, Tr. silt (SP-SM)		55		
		57	5-5					
	180	60	6-7	DO-TTD (SP-SM)		60		
		62	10-12					
	190	65	8-9	Rock fragments		65		Rock frag. in the
		67	8-6					tip of the spoon.
	200	70	8-9	RED BRN M-f SAND, Tr. c. sand silt		70		
		72	11-11	(SP-SM)				
	210	75	8-10	RED-BRN M-f SAND, Tr. silt (SP-SM)		75		
		77	11-10					
						78.5		
	220	80	10-12	RED BRN Silt, Tr. f sand, clay (MH)	(M)	80		
		82	17-15			82		E.O.B @ 82 FT.

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. PB-4
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Cntr
LOCATION Brooklyn NY
BORING LOCATION As planned

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED		[X] YES [ ] NO		
TRUCK	CME 75	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 4 7/8"
TYPE OF DRILLING MUD Quikgel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					no observation

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING LIN. FT. 82
3.5" DIA. U-SAMPLE BORING LIN. FT. –
CORE DRILLING IN ROCK LIN. FT. –
NO. OF 3" SHELBY TUBE SAMPLES –
NO. OF 3" UNDISTURBED SAMPLES –
OTHER: –

BORING CONTRACTOR JBD Co.
DRILLER M. Blejuas HELPERS D. Keith
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER R. Nunez DATE 12/29/00

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. PB-4

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 4
FILE NO. 9446
BORING NO. PB-4P
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn, NY RES. ENGR. T. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
01/02/01				Piezometer installation			Drilled	
Tues,							Ahead	
clear				Drilled to 30 FT.				
windy						5		
18°F				No sampling.				
5°F wind chill								
0800								
						10		
						15		
						20		
						25		
1040 hrs						30		E.O.B @ 30 FT

BORING NO. PB4P

FORM NO. B-1

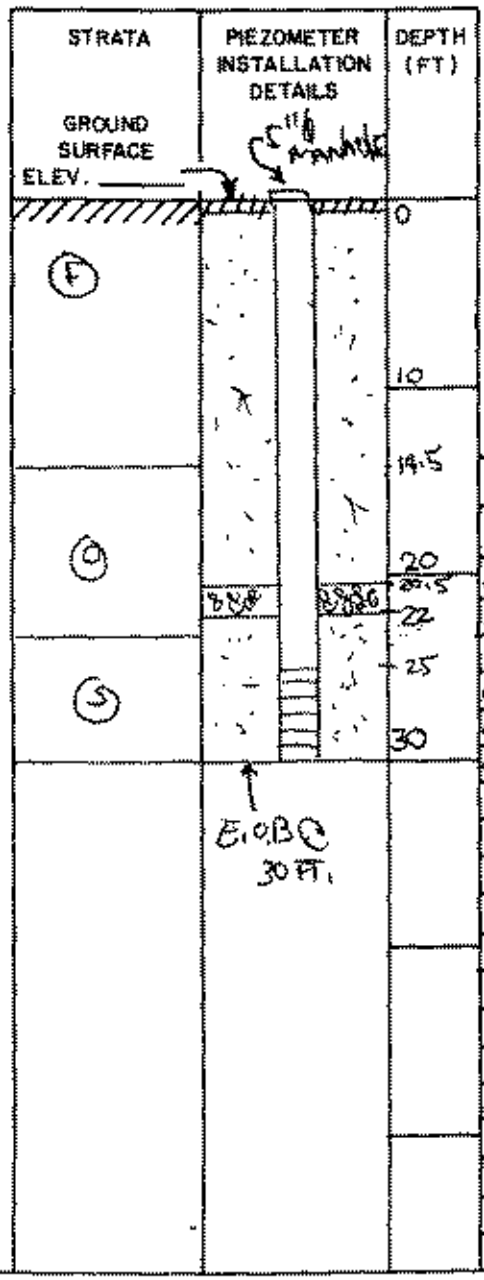
SHEET 2 OF 4
FILE NO. 9446
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Lowe's Home Center
PIEZOMETER NO. PB-4P
LOCATION Brooklyn NY
PIEZOMETER LOCATION
DATE OF INSTALLATION 01/02/01
☐ SEE SKETCH ON BACK
RES. ENG. R. NUNEZ

PIEZOMETER TYPE slotted PVC



INTAKE POINT

depth to bottom, ft = 30
depth to top, ft = 22
length, ft = 8 = L
diameter, in = 4, ft = = 2R

STANDPIPE/RISER

elevation of rim, ft =
diameter, in = 1¼, ft = = 2r

READING TIME DATE	READING TIME CLOCK	DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
01/02/01	1147	7.5		
01/02/01	1030	7.3		
↓	1250	7.2		
01/04/01	0725	7.1		
01/05/01	0930	7.1		
01/08/01	0946	6.8		

Sand
Bentonite
Gravel
Grout

GROUND SURFACE ELEV.

PIEZOMETER NO. PB-4P

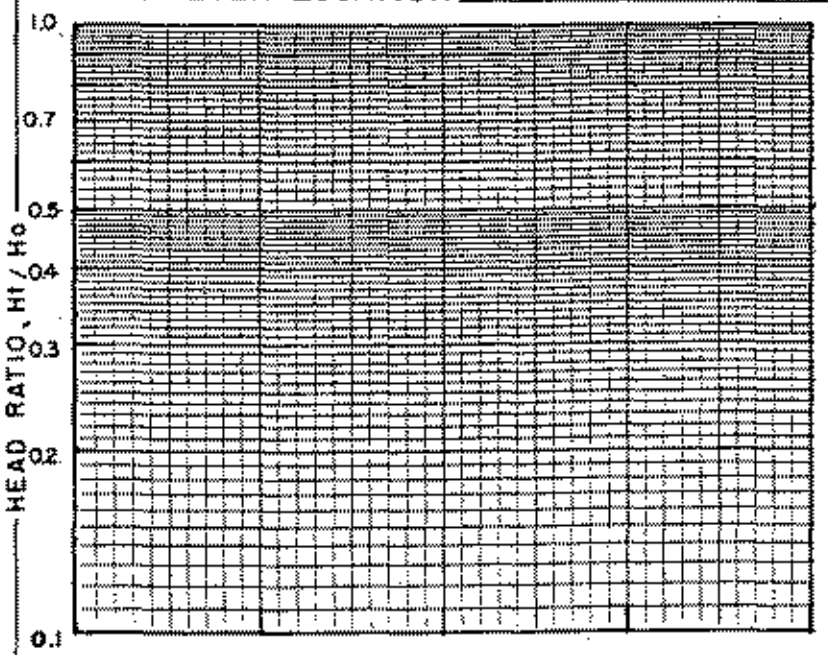
SHEET 2 OF 4
FILE NO. 9446
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

VARIABLE HEAD PERMEABILITY TEST

☐ BOREHOLE OR ☒ PIEZOMETER NO. PB-4P
TEST NO. 1

PROJECT Lowe's Home Center
RES. ENG. R. NUNEZ
LOCATION Brooklyn NY
CALC. BY ____ DATE ____
PIEZOMETER LOCATION ____
CH'KD BY ____ DATE ____



ELAPSED TIME, Δt, MIN.

INTAKE POINT

depth to bottom, ft = 30
depth to top, ft = 22
length, ft = 8 = L
diameter, in = 4, ft = ____ = 2R

STANDPIPE/RISER

diameter, in = 1¼, ft = ____ = 2r

depth of casing, ft = ____

depth to which standpipe was bailed, ft = ____ = Z

READING TIME DATE	CLOCK	Δt MIN.	TEST DEPTH-RIM TO WATER ft.	DEPTH-RIM TO TIDE OR GWL ft.	UNBALANCED HEAD H ft.	HEAD RATIO Ht/Ho	REMARKS
01/06/01	0948	0		6.8	0		STATIC WATER LEVEL
		0.5	0.8				
		1	1.8				
		2	3.2				
		3	4.3				
		4	5.0				
		5	5.6				
		6	5.8				
		7	5.9				
		8	6.1				
		9	6.4				
		10	6.45				
		11	6.55				
		12	6.6				
		13	6.7				
		14	6.75				
		15	6.75				
		16	6.8				

PIEZOMETER NO. PB-4P

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. PB4P
SHEET 4 OF 4
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME 75	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. — AVERAGE FALL, IN. —
SAMPLER HAMMER, LBS. — AVERAGE FALL, IN. —

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
01/02/01	1147			7.3	Piezo. Reading, approx. one hour after installation

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON

STANDPIPE:	TYPE	SCH 40	ID, IN.	1 1/4"	LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE	Slotted PVC	OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL	SAND	OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	30	NO. OF 3" SHELBY TUBE SAMPLES	—
3.5" DIA. U-SAMPLE BORING	LIN. FT.	—	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT.	—	OTHER:	—

BORING CONTRACTOR SBD
DRILLER M. Blagrove HELPERS D. Keith
REMARKS
RESIDENT ENGINEER D. Nunez DATE 01/02/01

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. PB-5
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn NY RES. ENGR. J. Nuner

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
2/25/00 Times, 50 hrs (wind) Sleet 20°F 10° wind-chill	10	1	6-28	Top(8") - Wht f-c sand, Tr. silt (Fill) !			Drilled	Safety Hammer
		3	56-37	Bot(8") - Blk-f-c sand, Sm silt, Tr. Cinders (Fill) (SM)			Ahead	4" Conc. at surface.
	20	3	100/6"	No Recovery	F			
		3.5						
	30	5	4-3	Rock frag., Tr. Conc. (Fill)		5		
		7	2-1				MUD	
	40	7	1-1	No Recovery				Rock frag in the tip of the spoon.
		9	1-1					
						10		
	50	10	1-1	Blk-c-f gvl, Tr. f-sand, Shells (Fill) (Cinders)				R=3"
		12	1-1					
	60	12	2-2	Rock frag., Tr. wood (Fill)				R=2"
		14	3-7					
						15		
	70	15	4-2	No Recovery				Loose fill spoons.
		17	2-2					Have new tips
	80	17	2-4	Top(5") - Soft gray-Blk org. silty clay, Tr. f-sand, Tr. wood (OH)				
		19	4-3	Bot(9") - Gray silty f-m sand, Tr. cinders, wood (Fill) (SM)		20		
	90	20	2-1	Gray gravel, Tr. org clay (Fill) (GP)				R=1"
		22	2-1					
						25		
	100	25	1-1	Gray silty m-f sand, Tr. clay (SM)				
		27	1-1					
						27.5		
						30		
	110	30	WOR-2	Med gray org silty clay, Tr. f sand, very (OH)	O			KP=0.75 Tsf.
		32	2-3					
						32.5		
						35		
	120	35	WOR-12	Brn c-f sand, Tr. silt, gvl (SP)	S			
		37	16-22					
						40		
	130	40	8-10	Brn f-c sand, Tr. silt (SP-SM)				
		42	13-16					
						45		
	140	45	10-10	Brn c-f sand, Tr. silt (SP-SM)				
		47	16-19					
						48.5		
						50		
	150	50	9-17	Brn gravelly c-f sand, Tr. silt (SP-SM)	T			Refusal on sample
		52	18-13					

BORING NO. PB-5

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9440
BORING NO. PB-5
SURFACE ELEV.

PROJECT Lowe's Home Ctr
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					(3)	55		
	160	55	12-14	DO-150 (SP-SM)				Petroleum in sample
		57	15-17					
						60		
	170	60	11-20	DO-150 (SP-SM)				
		62	20-24					
						65		
	180	65	27-29	BRN C-f SAND, Tr. SILT, gvl (SP-SM)				
		67	31-38					
						70		
	190	70	14-17	BRN M-f SAND, Tr. SILT, (SP-SM)				
		72	21-23					
						75		
	200	75	12-10	BRO-BRN f-c SAND, SM SILT, (SM)				
		77	14-16					
						80		
	210	80	25-45	DO-200 (SM)				
1410 hrs.		82	32-36			82		E.O.A. @ 82 FT.

BORING NO. PB-5

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. PB-5
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Cntr
LOCATION Brooklyn NY
BORING LOCATION As planned

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	ME 55	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 25
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. Split Spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2 7/16, 4 5/16, 3 7/8"
TYPE OF DRILLING MUD Quikgel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	82	NO. OF 3" SHELBY TUBE SAMPLES	—
3.5" DIA. U-SAMPLE BORING	LIN. FT.	—	NO. OF 3" UNDISTURBED SAMPLES	—
CORE DRILLING IN ROCK	LIN. FT.	—	OTHER:	—

BORING CONTRACTOR JBD Co.
DRILLER R. Lynch HELPERS E. Feliciano
REMARKS Grouted borehole upon completion
RESIDENT ENGINEER TC. NUNEZ DATE 12/28/00

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9446
BORING NO. PB6
SURFACE ELEV.

PROJECT Lowe's Home Center

PROJECT LOCATION Brooklyn NY RES. ENGR. R. NUNEZ

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12/27/00 0630 WED. 19°F	1D	1	2-4	Blk-Brn f-c sand, sm silt, Tr. sul. Brick (fill)(sm)			Drilled	Safety Hammer
		3	4-5				Ahead	
	2D	3	2-3	Blk-Brn m-f sand, sm sul, Tr. Cinder, silt	(5)			
		5	4-4	Fsr. ck (fill)(sm)				
	3D	5	1-1	Gray-Brn f-c sand, sm silt, Tr. veg (fill)(sm)		5		
		7	1-1				M.O	
	4D	7	1-1	Gray-Brn m-f sand, sm silt, Tr. brick (fill)(sm)				
		9	1-1					
						9.5		
						10		
	[illegible]	10	1-1	soft Gray org. silty clay, Tr. veg, f-sand (OH)				
		12	1-1					
	6D	12	2-1	Soft gray org. silty clay, Tr. f sand (OH)				
		14	2-1					
						15		
	7D	15	1-1	DO-6D (OH)	(0)			
		17	1-1					
	8D	17	1-2	DO-6D (OH)				
		19	1-1					
						19.5		
						20		
	9D	20	3-4	Gray-Brn silty f-sand, Tr. clay (sm)				
		22	8-16					
						25		
	10D	25	5-7	Brn-gray silty m-f sand (sm)				
		27	8-10		(5)			
						30		
	11D	30	11-20	Brn f-c sand, Tr. silt (sp-sm)				
		32	20-10					
						35		
	12D	35	12-13	DO-11D (sp-sm)				
		37	11-12					
						40		
	13D	40	14-26	DO-11D (sp-sm)				
		42	31-38					
						45		
	14D	45	15-20	Brn m-f sand, Tr. silt (sp-sm)				
		47	21-25					
						50		
	15D	50	13-11	Brn f-c sand, Tr. silt (sp-sm)				
		52	13-14					

BORING NO. PR-6

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 2 OF 3
FILE NO. 9446
BORING NO. PB-6
SURFACE ELEV.

PROJECT Louie's Home Center
PROJECT LOCATION Brooklyn NY
RES. ENGR. R. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
						55		
	60	55	14-14	BRN M-f SAND Tr. Silt, gvl (SP-SM)				
		57	15-17		(S)			
						58.5		
						60		
	170	60	15-18	RED-BRN C-f SAND, Sm gvl, Tr. Silt (SP-SM)				
		62	17-9					
						65		
	180	65	12-13	DO-170 (SP-SM)	(T)			
		67	23-20					
						70		
	190	70	14-18	BLK-BRN C-f SAND, Sm gvl, Tr. Silt (SP-SM)				Sample is saturated w/ Petroleum.
		72	28-30					
						75		
	200	75	18-12	RED-BRN M-f SAND, Tr. Silt (SP-SM)				Petroleum odor.
		77	14-17					
						78.5		
						80		
	210	80	12-14	RED-BRN Silt, Tr. f-sand, clay (ML)	(M)			
1400 hrs.		82	27-25			82		E.O.B. @ 82 ft.

BORING NO. PB-6

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. PB-6
SHEET 3 OF 3
FILE NO. 9446
SURFACE ELEV.
DATUM

PROJECT Lowe's Home Center
LOCATION Brooklyn NY
BORING LOCATION offset → 15 ft NE

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED		[X] YES [ ] NO		
TRUCK	CME 55	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM	0	TO 15
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. split spoon
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 4 7/8"
TYPE OF DRILLING MUD Quik Gel

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					No observation

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING LIN. FT. 82 NO. OF 3" SHELBY TUBE SAMPLES —
3.5" DIA. U-SAMPLE BORING LIN. FT. — NO. OF 3" UNDISTURBED SAMPLES —
CORE DRILLING IN ROCK LIN. FT. — OTHER: —

BORING CONTRACTOR JBD Co.
DRILLER R. Lynch HELPERS E. Feliciano
REMARKS Grouted borehole upon completion.
RESIDENT ENGINEER R. Nunez DATE 12/27/00

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

BORING NO. PB-6

MUESER RUTLEDGE CONSULTING ENGINEERS

SHEET 1 OF 3
FILE NO. 9416
BORING NO. PB-7
SURFACE ELEV.

PROJECT Lowe's Home Center
PROJECT LOCATION Brooklyn, NY
RES. ENGR. Nunez

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
12/18/00	1D	0	11-13	Brn m-f sand, Tr. silt, gvl (fill)(sp-sm)			Drilled	automatic Hammer
		2	15-16					
30°C	2D	2	9-26	Blk-gray c-f sand, Sm gvl, Tr. silt, c-gray (fill)(sp-sm)	1		Mud	
1430hrs		4	26-16					
	3D	4	6-8	Gray f-m sand, Sm silt, Tr gvl (fill)(sm)		5		
		6	7-5					
	4D	6	1-1	Gray f-m sand, Sm silt, Tr veg, wood (fill)(sm)			mud	
		8	1-1					
	5D	8	1-1	DO-4D (fill)(sm)				
		10	1-1			10		
	6D	10	WOR-1	Brn f-c sand, Tr. silt, gvl, veg, brick (fill)(sp-sm)				
		12	1-1					
	7D	12	1-1	Blk-gray, f-m sand, Sm silt, Tr. veg, wood (fill)(sm)				R=2"
		14	1-2					
	8D	14	WOR-1	Gray-brn org silty clay, Tr f sand, veg (OH)	2	15		R.P. <0.5 T.S.F.
		16	1-1					
	9D	16	WOR/12"	DO-8D (OH)				
		18	WOR/12"					
						18.5		
1645						20		
12/19/00	10D	20	1-3	Brn f-m sand, Sm silt (sm)				
TVCS.		22	2-3					
30" of								
clayey								
0645hrs						25		
	11D	25	4-7	Brn m-f sand, Tr silt, gvl (sp-sm)				
		27	7-8					
					3			
						30		
	12D	30	6-5	Brn m-f sand, Sm silt (sm)				
		32	8-9					
						35		
	13D	35	8-10	Brn m-f sand, Tr. silt, mica (sp-sm)				
		37	4-3					
						40		
	14D	40	5-8	Brn f-m sand, Sm silt, Tr gvl, mica (sm)				
		42	11-11					
						45		
	15D	45	5-5	Brn m-f sand, Tr. silt, gvl, mica (sp-sm)				
		47	6-5					
						50		
	16D	50	3-5	Brn c-f sand, Tr. silt, gvl, mica (sp-sm)				
		52	5-7					

FORM NO. B-1

BORING NO. B-7

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. PB-7
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 8.9
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
12-19-00								
Tuesday								
Cloudy					S1			
30°F						55		
	17D	55.0	6-6	Brown fine to medium sand, trace silt				
		57.0	8-7	(SP-SM)				
						58.5		
						60		
	18D	60.0	13-13	Red brown fine to medium sand, some				
		62.0	12-10	gravel, silt, trace mica (SM)				
						65		
	19D	65.0	9-8	Red brown fine to medium sand, some silt,				
		67.0	6-7	trace gravel (SM)				
					S2	70		
	20D	70.0	18-15	Red brown fine to medium sand, some				
		72.0	22-20	gravel, silt, trace clay, mica (SM)				
						75		
	21D	75.0	18-37	Red brown fine to medium sand, some				
		77.0	17-16	gravel, silt (SM)				
						80		
	22D	80.0	14-15	Do 21D, trace clay (SM)				End of Boring at
11:35		82.0	24-19			82		82'.
								pp=Pocket
						85		Penetrometer
								Unconfined Compres-
								sive Strength in tsf.
								WC=Water Content
						90		in percent of dry
								weight.
						95		
						100		

MUESER RUTLEDGE CONSULTING ENGINEERS

		BORING NO.	PB-7
		SHEET	3 OF 3
PROJECT	LOWE'S HOME CENTER	FILE NO.	9446
LOCATION	BROOKLYN, NEW YORK	SURFACE ELEV.	8.9
BORING LOCATION	SEE PLAN	DATUM	BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-75	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 20
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	N

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3-7/8, 4-7/8

TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO

TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24

*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

*AUTOMATIC HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
12-19-00		82	20	11	MUD/WATER UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE	ID, IN.	LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE	OD, IN.	LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL	OD, IN.	LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	82	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.

DRILLER MIKE BLEJWAS HELPERS DENNIS KEITH

REMARKS BOREHOLE GROUTED UPON COMPLETION.

RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-19-00

BORING NO. PB-7

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. PB-8
SHEET 1 OF 3
FILE NO. 9446
SURFACE ELEV. 7.4
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
	1D	0.0	16-26	Brown medium to fine sand, some silt, trace			DRILLED	
12-18-00		2.0	30-31	gravel, brick, cinders (Fill) (SM)			AHEAD	
Monday	2D	2.0	17-19	Do 1D, some gravel (Fill) (SM)			4"	
		4.0	16-14					
30°F						5		
	3D	5.0	2-2	Brown fine to medium sand, some silt, trace				3D,7D, 10D-12D &
		7.0	2-2	gravel (Fill) (SM)				17D: Petroleum
	4D	7.0	2-2	Do 3D (Fill) (SM)				odor.
		9.0	3-4					
						10		
	5D	10.0	2-3	Red brown fine to medium sand, some silt,	F			
		12.0	6-6	trace gravel (Fill) (SM)				
	6D	12.0	4-4	Do 5D (Fill) (SM)				
		14.0	6-8					
						15		
	7D	15.0	3-2	Gray brown fine to medium sand, some silt,				
		17.0	3-3	trace gravel, metal, cinders (Fill) (SM)				
	8D	17.0	5-16	Brown fine to medium sand, some silt, rock				
		19.0	31-14	fragments, trace wood (Fill) (SM)				
						20		
	9D	20.0	12-7	Rock fragments (Fill)				REC=1"; rock
16:15		22.0	9-9					fragments in tip of
06:45								spoon.
12-19-00						23.5		
Tuesday						25	▼	
Cloudy	10D	25.0	9-14	Brown fine to medium sand, some silt (SM)				
30°F		27.0	20-16		S1			
						29		
						30		
	11D	30.0	5-9	Stiff gray brown clayey silt, trace fine sand				Silt & clay in wash
		32.0	14-18	(MH)	M			at 29'.
						33.5		
						35		
	12D	35.0	7-12	Brown gray silty fine to medium sand (SM)				
		37.0	12-12					
						40		
	13D	40.0	9-13	Brown silty fine sand (SM)				
		42.0	14-13					
					S1			
						45		
	14D	45.0	10-12	Brown fine sand, some silt (SM)				Heavy petroleum
		47.0	12-14					odor oil in sample.
						50		
	15D	50.0	11-15	Brown fine to medium sand, some silt (SM)				
		52.0	26-29					

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. PB-8
SHEET 2 OF 3
FILE NO. 9446
SURFACE ELEV. 7.4
RES. ENGR. RANDOLPH NUNEZ

PROJECT: LOWE'S HOME CENTER
LOCATION : BROOKLYN, NEW YORK

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
12-19-00								
Tuesday								
Cloudy								
30°F						55		
	16D	55.0	8-14	Brown fine to medium sand, trace silt				
		57.0	15-19	(SP-SM)				
					S1			
						60		
	17D	60.0	5-15	Gray brown fine to medium sand, some silt,				Hard drilling at
		62.0	38-55	gravel (SM)				62.5'.
								Possible boulder &
								cobbles from 62.5'
						65		to 65'.
	18D	65.0	18-15	Gray fine to medium sand, some gravel, silt,				
		67.0	15-8	trace coarse sand (SM)				
						68.5		
						70		
	19D	70.0	22-18	Red brown silt, some fine sand, trace clay				
		72.0	18-18	seams, gravel (ML)				
					S2	75		
	20D	75.0	27-27	Red brown silty fine to medium sand, trace				
		77.0	25-16	gravel, coarse sand, clay (SM)				
						80		
	21D	80.0	48-26	Red brown fine to medium sand, some silt,				End of Boring at
11:45		82.0	28-15	trace gravel, coarse sand (SM)		82		82'.
						85		
						90		
						95		
						100		

BORING NO. PB-8

MUESER RUTLEDGE CONSULTING ENGINEERS

PROJECT	LOWE'S HOME CENTER	BORING NO.	PB-8
LOCATION	BROOKLYN, NEW YORK	SHEET	3 OF 3
BORING LOCATION	SEE PLAN	FILE NO.	9446
		SURFACE ELEV.	7.4
		DATUM	BOROUGH PRESIDENT OF BROOKLYN HIGHWAY

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	CME-55	MECHANICAL		DIA., IN	4	DEPTH, FT. FROM 0	TO 25
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:

D-SAMPLER	2" O.D. SPLIT SPOON
U-SAMPLER	
S-SAMPLER	
CORE BARREL	
CORE BIT	
DRILL RODS	N

DRILLING MUD USED [X] YES [ ] NO

DIAMETER OF ROTARY BIT, IN. 3-7/8, 2-15/16

TYPE OF DRILLING MUD QUIK - GEL

AUGER USED [ ] YES [X] NO

TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24

*SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

*SAFETY HAMMER USED.

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE	ID, IN.	LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE	OD, IN.	LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL	OD, IN.	LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

2.5" DIA. DRY SAMPLE BORING	LIN. FT.	79.5	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER: OBSTRUCTION (BOULDER)	2.5

BORING CONTRACTOR JERSEY BORING & DRILLING CO. INC.

DRILLER RAY LYNCH HELPERS EDWIN FELICIANO

REMARKS BOREHOLE GROUTED UPON COMPLETION.

RESIDENT ENGINEER RANDOLPH NUNEZ DATE 12-19-00

BORING NO. PB-8

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Engineering and Environmental Services

LOG OF BORING RB1

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 7.4 [BBHDD]
DRILLING EQUIPMENT: Mobile B61 Truck Mounted Rig	DATE STARTED: 10/20/98 / DATE FINISHED: 10/20/98 / COMPLETION DEPTH: 80 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-3') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 16 / UNDIST. -------- / CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID / CASING DEPTH(ft): 18	WATER LEVEL (ft.): FIRST ▽ 8 / COMPL. ▼ ----- / 24 HR. ▼ -----
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Ernest Thomas/Desmond Williams
SAMPLER HAMMER / WEIGHT(lbs): 140 / DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
pprox. el. 7.4	Surficial ASPHALT								* New York City BC Classification numbers in parenthesis Added water D = 0'
	Brown f.-c. SAND, trace silt and red brick (11-65)*		5	S1	SS	14	4 3 3 2	6	PID = 0 ppm
	Brown f.-c. SAND, trace f.-m. gravel/coal, silt, and red brick (11-65)		10	S2	SS	4	1 6 2 2	8	PID = 196 ppm, visible "Copper" brown petroleum like material Trace wood in wash
	Brown f.-c. SAND, trace silt, f.-m gravel, and wood (11-65)		15	S3	SS	13	8 5 3 2	8	PID = 290 ppm, visible petroleum like material Added mud D = 15'
	Inferred WOOD FIBERS and brown clayey SILT, trace f. sand (11-65)		20	S4	SS	0	6 2 2 1	4	PID = 25 ppm Sample S4 spoon tip material
	WOOD FIBERS, trace brown silt and f. sand (11-65)		25	S5	SS	9	21 29 38 41	67	PID = 52 ppm Very slow/hard drilling and wood fibers in wash D = 23' - 28'
	Green brown SILT, trace clay, wood fibers, and f.-m. sand (11-65)		30	S6	SS	16	8 10 11 12	21	PID = 9.6 ppm
	Brown/gray f.-m SAND, some silt and clay (7-65)		35	S7	SS	19	4 7 15 13	22	PID = 168 ppm, slightly visible petroleum like material
	Brown silty f. SAND (8-65)		40	S8	SS	14.5	10 13 10 10	23	PID = 20 ppm

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LOG OF BORING RB1

SHEET 2 OF 2

PROJECT	PROJECT NO.
Gowanus Development	1503701
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	Approx. el. 7.4 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Gray/brown f.-m SAND (7-65)		45	S9	SS	13	9 12 15 21	27	PID = 410 ppm, petroleum like material very visible
	Gray/brown f.-m. SAND, trace silt (8-65)		50	S10	SS	15	12 15 18 20	33	PID = 188 ppm, visible petroleum like material
	Brown f.-m. SAND (7-65)		55	S11	SS	12	6 9 11 11	20	PID = 7.1 ppm, visible petroleum like material
	Brown f.-m. SAND, trace silt (7-65)		60	S12	SS	16	11 14 16 18	30	PID = 330 ppm, very visible petroleum like material
									Rig chatter D = 62'
	Red/gray f.-c. GRAVEL and f.-c. SAND, trace silt (6-65)		65	S13	SS	4	77 62 22 18	84	Slow/hard drilling D = 62' - 63' PID = 25 ppm Minor rig chatter D = 63' to 68'
	Inferred Gray f.-c. GRAVEL, some red/brown silty clay and f.-c. sand (6-65)		70	S14	SS	0	21 28 22 26	50	Petroleum like material floating on the surface of wash tub PID = 19.8 ppm Sample S14 spooon tip material
	Red brown f.-c. SAND, trace silt, f.-m. gravel, and clay (6-65)		75	S15	SS	12	33 27 19 19	46	PID = 3 ppm Rig chatter D = 77'
	Red brown f.-c. SAND, some clay, trace silt and f.-m. gravel (6-65)		80	S16	SS	9.5	14 12 14 12	26	PID = 5.1 ppm
	Boring terminated D = 80'		85 90						Borehole grouted upon completion

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LOG OF BORING RB2

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 9.0 [BBHDD]
DRILLING EQUIPMENT: CME 75 Truck Mounted Rig	DATE STARTED: 10/19/98 · DATE FINISHED: 10/20/98 · COMPLETION DEPTH: 85 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-3') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 16 · UNDIST. -------- · CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID · CASING DEPTH(ft): 14	WATER LEVEL (ft.): FIRST ▽ 10 · COMPL. ▼ ----- · 24 HR. ▼ -----
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Tommy Gregorey/Chris Mitchell
SAMPLER HAMMER · WEIGHT(lbs): 140 · DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
pprox. el. 9.0	Surficial ASPHALT								*New York City BC Classification numbers in parenthesis Added water D = 2'
	Brown f.-c. GRAVEL, trace f.-c. sand, silt, and red brick (11-65)*		5	S1	SS	4	4 4 5 5	9	PID = 0.1 ppm
	Brown/black f.-m. SAND, trace silt, coarse sand, and f. gravel/coal (11-65)	▽	10	S2	SS	3.5	4 2 5 2	7	PID = 14 ppm
	Gray silty CLAY, trace roots and shell (11-65)		15	S3	SS	24	2 1 1 1	2	PID = 0.4 ppm
	Gray silty CLAY, some roots/wood (11-65)		20	S4	SS	24	WOH WOH 2 1	2	WOH: Weight of hammer Added mud D = 20' PID = 0.2 ppm
	Brown f.-m. SAND, trace silt and m. gravel (7-65)		25	S5	SS	13	9 14 18 19	32	PID = 17.2 ppm, visible petroleum like material sheen
	Brown f.-m. SAND (7-65)		30	S6	SS	24	19 29 38 30	67	PID = 250 ppm, visible petroleum like material
	Brown silty f. SAND (8-65)		35	S7	SS	17	10 16 13 14	29	PID = 40 ppm, visible petroleum like material
	Brown SILT, trace f. sand and clay (10-65)		40	S8	SS	15	20 17 17 18	34	PID = 32 ppm

NG 1503701.GPJ LANGANFL.GDT 24/11/98

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LOG OF BORING RB2

SHEET 2 OF 2

PROJECT	PROJECT NO.
Gowanus Development	1503701
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	Approx. el. 9.0 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG.	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
			45						
	Gray/brown f.-m. SAND, trace silt (7-65)			S9	SS	17	7 6 12 14	18	PID = 8 ppm, visible petroleum like material Minor rig chatter
			50						
	Gray/brown f.-m. SAND (7-65)			S10	SS	20	12 13 13 15	26	PID = 20 ppm, slightly visible petroleum like material
			55						
	Gray/brown f.-m. SAND (7-65)			S11	SS	20	9 7 8 10	15	PID = 10.8 ppm
			60						
	Brown f.-m. SAND, some silt, trace clay (7-65)			S12	SS	18	9 12 10 11	22	PID = 5.9 ppm
									Rig chatter D = 63.5' - 65'
			65						
	Red brown f.-c. sandy SILT, some clay, trace f. gravel (10-65)			S13	SS	15	31 16 19 27	35	"Copper" brown petroleum like material floating on the surface of wash tub PID = 6.2 ppm
									Major rig chatter D = 65' - 70'
			70						
	Red brown f.-m. SAND,trace silt, clay, and m. gravel (7-65)			S14	SS	14	24 29 27 21	56	PID = 8.8 ppm
									Minor rig chatter D = 70' - 75'
			75						
	Red brown f.-m. SAND, trace silt, clay, and f. gravel (7-65)			S15	SS	14	23 22 21 28	43	PID = 43 ppm
			80						Rig chatter D = 75' - 83'
	Red brown f.-m. SAND, trace silt, clay, and c. sand (7-65)			S16	SS		43 30 39 38	69	PID = 6 ppm
			85						
	Boring terminated D = 85'								Borehole grouted upon completion
			90						

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LOG OF BORING RB3A

SHEET 1 OF 1

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx el. 10.1 [BBHDD]
DRILLING EQUIPMENT: Mobile B61 Truck Mounted Rig	DATE STARTED: 10/19/98 / DATE FINISHED: 10/19/98 / COMPLETION DEPTH: 1 ft.
SIZE AND TYPE OF BIT: 4 7/8" Tri-Cone Roller Bits w/water	NUMBER OF SAMPLES: DIST. -------- / UNDIST. ------- / CORE --------
CASING DIAMETER (in): ----- / CASING DEPTH(ft):	WATER LEVEL (ft.): FIRST ----- / COMPL. ----- / 24 HR. -----
SAMPLER: --------	DRILLING FOREMAN: Ernest Thomas/Desmond Williams
SAMPLER HAMMER / WEIGHT(lbs): ----- / DROP(in): -----	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
pprox el. 10.1	2.5" ASPHALT 6.5" Black f.-c. SAND and GRAVEL (11-65)* 3" COBBLE/BOULDER (6-65)								*New York City BC Classification numbers in parenthesis Added water D = 0.5' Hard/slow drilling D = 0.75' - 1' Drill equiptment refusal D = 1'
	Boring terminated D = 1'		5						
			10						
			15						
			20						
			25						
			30						
			35						
			40						

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LOG OF BORING RB3B

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 10.1 [BBHDD]
DRILLING EQUIPMENT: Mobile B61 Truck Mounted Rig	DATE STARTED: 10/19/98 · DATE FINISHED: 10/19/98 · COMPLETION DEPTH: 80 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-3') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 13 · UNDIST. -------- · CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID · CASING DEPTH(ft): 13	WATER LEVEL (ft.): FIRST ▽ 8 · COMPL. ▼ ----- · 24 HR. ▼ -----
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Ernest Thomas/Desmond Williams
SAMPLER HAMMER · WEIGHT(lbs): 140 · DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
Approx. el. 10.1	Surficial ASPAHLT								*New York City BC Classification numbers in parenthesis Rig chatter D = 0' - 3'
	Black f.-c. SAND, trace silt, f. gravel, and red brick (11-65)*		5	S1	SS	13	10 6 9 9	15	PID = 5 ppm, petroleum like material oder
	Inferred miscellaneous FILL (11-65)		10	-	SS	0	2 1 1 1	2	Added mud D = 10'
	Gray/brown organic SILT/PEAT, trace f. gravel (11-65)		15	S2	SS	10	2 2 2 1	4	PID = 0.1 ppm, petroleum like material oder
	Gray silty CLAY, trace shell and organics/root (11-65)		20	S3	SS	21	WOH WOH WOH WOH	WOH	WOH: Weight of hammer PID = 0 ppm
	Gray silty CLAY, trace shell and organics (11-65)		25	S4	SS	15	2 2 2 2	4	PID = 0 ppm
	Brown silty f. SAND, trace clay (8-65)		30	S5	SS	15	3 4 7 8	11	PID = 0.5 ppm, slight pertroleum like material oder
	Gray f.-m. SAND (7-65)		35	S6	SS	20	13 18 18 15	36	PID = 95 ppm, visible petroleum like material w/oder
	Brown/gray f. sandy SILT, trace clay (10-65)		40	S7	SS	15	9 12 9 16	21	PID = 8 ppm, petroleum like material oder

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LOG OF BORING RB3B

SHEET 2 OF 2

PROJECT	PROJECT NO.
Gowanus Development	1503701
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	Approx. el. 10.1 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown silty f. SAND, trace clay (8-65)		45	S8	SS	14	8 11 13 14	24	PID = 5.2 ppm, petroleum like material oder
	Brown silty f.-m. SAND, trace clay (7-65)		50	S9	SS	17	12 13 18 24	31	PID = 6.5 ppm, petroleum like material oder
	Brown/gray f.-c. SAND, trace f. gravel (7-65)		55	S10	SS	13	9 12 14 15	26	PID = 0.6 ppm, slight petroleum like material oder
	Gray/brown f.-c. SAND (7-65)		60	S11	SS	14	13 18 18 20	36	PID = 1.2 ppm, petroleum like material oder
	Gray/brown SILT, some clay, trace f. sand (10-65)		65	S12	SS	15	10 9 18 20	27	PID = 0.2 ppm
	Red brown f.-c. SAND, trace silt and f. gravel (6-65)		70	S13	SS	7	21 24 80 100/3"	104	PID = 0.7 ppm, petroleum like material oder Spoon refusal D = 69.5' Rig chatter D = 69.5' and 73'
	Red brown f.-c. SAND, some silt and clay, trace f. gravel (7-65)		75	S14	SS	7	28 21 15 18	36	PID = 0.1 ppm Minor rig chatter D = 73' - 78'
	Red brown clayey SILT, trace f. sand, trace m. gravel (10-65)		80	S15	SS	18	18 19 13	32	PID = 0.3 ppm, petroleum like material oder
	Boring terminated D = 80'		85 90						Borehole grouted upon completion

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LOG OF BORING RB4

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 10.4 [BBHDD]
DRILLING EQUIPMENT: CME 75 Truck Mounted Rig	DATE STARTED: 10/16/98 / DATE FINISHED: 10/19/98 / COMPLETION DEPTH: 73 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-3') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 14 / UNDIST. -------- / CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID / CASING DEPTH(ft): 10	WATER LEVEL (ft.): FIRST ----- / COMPL. ----- / 24 HR. 6.5
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Tommy Gregorey/Chris Mitchell
SAMPLER HAMMER / WEIGHT(lbs): 140 / DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
prox. el. 10.4	Surficial ASPHALT								*New York City BC Classification numbers in parenthesis Black drill water w/ petroleum like material oder D = 1.5' - 5'
	Black/brown f.-c. SAND, some silt, trace f. gravel/coal, wood/organics, and red brick (11-65)*		5	S1	SS	5	2 8 6 8	14	PID = 0.2 ppm, petroleum like material oder
	Black and white f. GRAVEL/COAL, trace m.-c. sand (11-65)		10	S2	SS	TRACE	1 1 WOH WOH	1	WOH: Weight of hammer PID = 3 ppm, petroleum like material oder Over drove spoon to aid in Sample recovery
	Black and white f. GRAVEL/COAL, trace m.-c. sand and glass (11-65)		15	S3	SS	TRACE	1 2 1 1	3	PID = 4 ppm, petroleum like material oder Added mud D = 15'
	Gray silty CLAY, trace shell and f. gravel (11-65)		20	S4	SS	14	1 WOH WOH WOH	WOH	PID = 0.4 ppm, petroleum like material oder
	Gray silty CLAY, trace shell (11-65)		25	S5	SS	8	1 WOH WOH WOH	WOH	PID = 7.2 ppm, petroleum like material oder
	Gray SILT, trace clay, f.-m. sand, f.-m. gravel/coal, and shell (10-65)		30	S6	SS	22	9 12 12 9	24	PID = 8 ppm, slight petroleum like material odor
	Brown f.-m. SAND (7-65)		35	S7	SS	16	22 23 22 13	45	PID = 190 ppm, visible petroleum like material w/ oder
	Brown f.-m. SAND, trace silt and coal (7-65)		40	S8	SS	19	20 15 15 20	30	PID = 2.5 ppm, petroleum like material

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LOG OF BORING RB4

SHEET 2 OF 2

PROJECT	Gowanus Development	PROJECT NO.	1503701
LOCATION	Brooklyn, NY	ELEVATION AND DATUM	Approx. el. 10.4 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
			45	S9	SS	15	16 14 18 16	32	PID = 5 ppm, petroleum like material oder Added mud D = 46'
	Brown f. SAND, trace silt (8-65)		50	S10	SS	12	18 20 26 28	46	PID = 1.6 ppm, petroleum like material oder
	Gray f.-m. SAND (7-65)		55	S11	SS	24	17 14 15 21	29	PID = 1 ppm, petroleum like material oder
	Brown f.-c. SAND (7-65)		60	S12	SS	13	29 32 25 21	57	PID = 9 ppm, petroleum like material oder
	Gray/brown f.-c. SAND, trace f.-m. gravel (6-65)		65	S13	SS	13	28 41 59 63	100	PID = 0.6 ppm, slight petroleum like material oder Rig chatter D = 66.5' - 68.5'
	Red brown SILT, some f. sand, trace clay (10-65)								
	Red brown f.-c. SAND, trace silt, f.-m. gravel, and clay (6-65)		70	S14	SS	10	30 37 47 50	84	Rig chatter D = 70' - 73' PID = 0.9 ppm, slight petroleum like material odor Very hard/slow drilling D = 72' - 73' Drilling equiptment refusal D = 73'
	Boring terminated D = 73'		75						Bore hole grouted upon completion
			80						
			85						
			90						

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LOG OF BORING RB5

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 10.6 [BBHDD]
DRILLING EQUIPMENT: Mobile B61 Truck Mounted Rig	DATE STARTED: 10/15/98 / DATE FINISHED: 10/16/98 / COMPLETION DEPTH: 79.5 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-1') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 16 / UNDIST. -------- / CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID / CASING DEPTH (ft): 13	WATER LEVEL (ft.): FIRST 9 / COMPL. ----- / 24 HR. -----
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Ernest Thomas/Desmond Williams
SAMPLER HAMMER: WEIGHT (lbs) 140 / DROP (in) 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
prox. el. 10.6	Surficial ASPHALT								*New York City BC Classification numbers in parenthesis Added water D = 0.5' Rig chatter D = 1' Petroleum like material/oder and color in drill water D = 1' to 3'
	Black/gray f.-c. SAND, some f-c. gravel/coal, trace silt and red brick (11-65)*		5	S1	SS	10	13 14 4 3	18	PID = 6 ppm, petroleum like material odor Trace wood in wash WOH: Weight of hammer
	Inferred Black/gray f.-c. GRAVEL, trace f.-c. sand, silt, and metal (11-65)		10	S2	SS	0	2 1 WOH 1	1	PID = 3 ppm, petroleum like material oder Sample S2 spoon tip material PID = 1 ppm, petroleum like material oder
	Gray silty CLAY, some woody roots, trace shell (11-65)		15	S3	SS	17	2 2 2 2	4	WOR: Weight of rods
	Gray silty CLAY, trace organics/root (11-65)		20	S4	SS	14	WOR WOR WOR WOR	WOR	PID = 0.2 ppm, petroleum like material oder
	Brown f. SAND, trace silt and wood (8-65)		25	S5	SS	18	5 8 12 13	20	PID = 6.5 ppm, petroleum like material oder
	Brown/gray f.-c. SAND (7-65)		30	S6	SS	18	13 14 10 6	24	PID = 4 ppm, visible petroleum like material and odor
	Gray/brown f. SAND (8-65)		35	S7	SS	13	9 18 21 20	39	PID = 13 ppm, petroleum like material oder
	Brown/gray f.-m. SAND (7-65)		40	S8	SS	17	11 14 8 13	22	PID = 0.4 ppm, petroleum like material oder

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LOG OF BORING RB5

SHEET 2 OF 2

PROJECT	PROJECT NO.
Gowanus Development	1503701
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	Approx. el. 10.6 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Gray/brown f. SAND, trace silt (8-65)		45	S9	SS	18	13 13 14 15	27	PID = 3.9 ppm, petroleum like material oder
	Brown f.-m. SAND, trace silt (7-65)		50	S10	SS	18	10 12 15 18	27	PID = 0.5 ppm, slight petroleum like material oder
	Brown SILT, trace f. sand and clay (10-65)		55	S11	SS	18	11 14 18 20	32	PID = 0.3 ppm, slight petroleum like material oder
	Brown f.-m. SAND, trace silt (7-65)		60	S12	SS	14	17 21 100/3"	121/9"	PID = 0.4 ppm, petroleum like material oder Spoon refusal D = 59' Major rig chatter D = 60'
	Red brown f.-c. SAND, some f.-m. gravel, trace silt and clay (6-65)		65	S13	SS	14	35 51 62 24	113	Rig chatter D = 60' - 63' PID = 0.2 ppm, slight petroleum like material oder Rig chatter D = 63' - 68'
	Red brown f.-c. SAND, trace f.-m. gravel, silt, and clay (7-65)		70	S14	SS	14	41 40 66 100	106	Rig chatter D = 68' - 73' PID = 0.4 ppm, slight petroleum like material oder
	Red brown f.-c. SAND, trace silt, f.-m. gravel, and clay (6-65)		75	S15	SS	16	56 35 50 35	85	PID = 0.1 ppm Major rig chatter D = 76' - 77'
	Red brown f.-c. SAND, trace silt, f. gravel, and clay (6-65)		80	S16	SS	10	41 89 100/5"	189/11"	Spoon refusal D = 79.5' PID = 0 ppm, slight petroleum like material oder
	Boring terminated D = 79.5'		85 90						Borehole grouted upon completion

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LOG OF BORING RB6

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 10.6 [BBHDD]
DRILLING EQUIPMENT: CME 75 Truck Mounted Rig	DATE STARTED: 10/15/98 / DATE FINISHED: 10/16/98 / COMPLETION DEPTH: 82 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-3') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 16 / UNDIST. -------- / CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID / CASING DEPTH(ft):	WATER LEVEL (ft.): FIRST ----- / COMPL. ----- / 24 HR. 8
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Robert Danielson/Tommy Gregorey/Chris Mitchell
SAMPLER HAMMER / WEIGHT(lbs): 140 / DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
prox. el. 10.6	Surficial ASPHALT								*New York City BC Classification numbers in parenthesis Added water D = 3'
	Inferred miscellaneous FILL with coal (11-65)*		5	S1	SS	0	3 1 1 1	2	Sample S1 spoon tip material
									WOH: Weight of hammer
	Black/gray f.-m. GRAVEL/COAL, trace f.-c. sand and wood (11-65)		10	S2	SS	2	1 1 WOH WOH	1	PID = 40 ppm, petroleum light material odor
	Gray silty CLAY, some wood/root, trace shell (11-65)		15	S3	SS	24	1 WOH 1 1	1	PID = 0.1 ppm, petroleum like material odor
	Gray silty CLAY, trace root (11-65)		20	S4	SS	22	1 1 1 1	2	PID = 0 ppm
	Brown/gray f.-m. SAND, trace silt (7-65)		25	S5	SS	20	16 20 19 18	39	PID = 0.2 ppm Added mud D = 27'
	Gray/brown clayey SILT, trace f.-m. sand (10-65)		30	S6	SS	12	6 9 8 13	17	PID = 0.2 ppm
	Gray f.-m. SAND (7-65)		35	S7	SS	12	20 22 18 19	40	PID = 0.1 ppm, slight petroleum like material odor
	Gray f.-m. SAND (7-65)		40	S8	SS	14	11 13 12 12	25	PID = 0.5 ppm, petroleum like material odor

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LOG OF BORING RB6

SHEET 2 OF 2

PROJECT	PROJECT NO.
Gowanus Development	1503701
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	Approx. el. 10.6 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Gray/brown f.-m. SAND, trace silt (7-65)		45	S9	SS	14	S13 12 8 7	20	PID = 0.2 ppm, slight petroleum like material odor
	Brown f. SAND (8-65)		50	S10	SS	15	12 15 25 27	40	PID = 0.4 ppm, petroleum like material odor
	Brown f.-m. SAND, trace silt (8-65)		55	S11	SS	18	18 30 34 41	64	PID = 0.2 ppm
	Brown SILT, trace f. sand and clay (10-65)		60	S12	SS	15	25 34 31 44	65	PID = 0.8 ppm, petroleum like material odor Rig chatter D = 63.5'
	Red brown c.-f. SAND, some f.-c. gravel, trace silt and clay (6-65)		65	S13	SS	12	82 64 50 54	114	PID = 0.6 ppm Rig chatter D = 65' - 70'
	Red brown silty f.-m. SAND, trace f.-m. gravel and clay (6-65)		70	S14	SS	8	34 50 100/5"	150/11"	PID = 0 ppm Spoon refusal D = 71.5' Rig chatter and slow drilling D = 70' - 75'
	Red brown f.-c. SAND and GRAVEL, trace silt and clay (6-65)		75	S15	SS	3	100/3"	R"	PID = 0.7 ppm Major rig chatter Slow drilling
	Red brown fine GRAVEL and f.-c. SAND, some silt, trace clay (6-65)		80	S16	SS	7	38 72 100	172	PID = 0.6 ppm, slight petroleum like material odor
	Boring terminated D = 82'		85						Borehole grouted upon completion
			90						

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LOG OF BORING RB7

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 10.6 [BBHDD]
DRILLING EQUIPMENT: Mobile B61 Truck Mounted Rig	DATE STARTED: 10/15/98; DATE FINISHED: 10/15/98; COMPLETION DEPTH: 80 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-3') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 17; UNDIST. --------; CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID; CASING DEPTH(ft): 13	WATER LEVEL (ft.): FIRST ▽ 8; COMPL. ▼ -----; 24 HR. ▼ -----
SAMPLER: 2" OD 1 3/4" ID Split Spoon	DRILLING FOREMAN: Ernest Thomas/Desmond Williams
SAMPLER HAMMER; WEIGHT(lbs): 140; DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in.	N-VALUE BLOWS PER FT.	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
Approx. el. 10.6	Surficial ASPHALT								*New York City BC Classification numbers in parenthesis Added water D = 0'
	Brown/black f.-c. SAND, trace silt, m. gravel/coal, and red brick (11-65)*		5	S1	SS	5	2 3 3 2	6	PID = 0.1 ppm
	Gray/black f.-c. SAND, trace silt, f. gravel/coal, and glass (11-65)		10	S2	SS	5	4 3 2 2	5	PID = 0 ppm
	Brown/black PEAT (11-65)		15	S3	SS	0	4 1 1 1	2	PID = 0.9 ppm, organic odor Sample S3 from second recovery attempt WOH: Weight of hammer
	Gray/brown/black f.-m. sandy PEAT, trace silt (11-65)		20	S4	SS	24	WOH 4 3 6	7	PID = 0 ppm PID = 0 ppm
	Gray/brown f. SAND, trace silt (8-65)								Sample S5 6" Lense of Gray/brown SILT, trace clay and f. sand in top of sample
	Brown f.-m. SAND, trace silt (7-65)		25	S6	SS	18	12 16 18 17	34	PID = 0 ppm PID = 0 ppm
	Brown f.-m. SAND (7-65)		30	S7	SS	15	9 10 10 5	20	
	Gray f.-m. SAND, some clay, trace silt (7-65)		35	S8	SS	19	3 3 8 14	11	
	Brown/gray f.-m. SAND (7-65)		40	S9	SS	16	8 14 18 18	32	

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LOG OF BORING RB7

SHEET 2 OF 2

PROJECT	PROJECT NO.
Gowanus Development	1503701
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	Approx. el. 10.6 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Gray f.-m. SAND (7-65)			S10	SS	16	12 14 19 16	33	
			45						
	Gray/brown f.-m. SAND, trace silt (7-65)			S11	SS	24	10 9 7 8	16	Sample S11 12" Lense of Gray/brown silty CLAY, trace f. sand in bottom of sample
			50						
	Brown/gray f.-m. SAND, trace silt (7-65)			S12	SS	16	17 21 27 30	48	
			55						
	Brown/gray f.-c. SAND, trace f.-m. gravel and silt (6-65)			S13	SS	15	27 40 31 33	71	
			60						
	Red brown silty f.-c. SAND, trace f.-m. gravel (6-65)			S14	SS	8	19 29 38 30	67	
			65						
	Red brown f.-c. SAND, trace f.-m. gravel, silt, and clay (6-65)			S15	SS	8	50 95 28 37	123	
			70						Rig chatter
	Red brown f.-c. SAND, trace silt, clay, and f.-c. gravel (6-65)			S16	SS	12	37 48 33 40	81	
			75						Rig chatter
	Red brown f.-c. SAND, trace f.-c. gravel, silt, and clay (6-65)			S17	SS	9	21 37 62 48	99	
	Boring terminated D = 80'		80						Borehole grouted upon completion
			85						
			90						

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LOG OF BORING RB8

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 10.9 [BBHDD]
DRILLING EQUIPMENT: CME 75 Truck Mounted Rig	DATE STARTED: 10/14/98 · DATE FINISHED: 10/15/98 · COMPLETION DEPTH: 82 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-4') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 19 · UNDIST. -------- · CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID · CASING DEPTH(ft): 8	WATER LEVEL (ft.): FIRST ▽ 8 · COMPL. ▼ ----- · 24 HR. ▼ -----
SAMPLER: 2" OD 1 3/4" ID Split Spoon	DRILLING FOREMAN: Greg Marney/Robert Danielson/Tommy Gregorey
SAMPLER HAMMER · WEIGHT(lbs): 140 · DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
prox. el. 10.9	2" ASPHALT								
	Black f.-c. SAND, some f.-m. gravel/coal and red brick, trace silt (11-65)*			S1	SS	6	25 26 39	65	*New York City BC Classification numbers in parenthesis PID = 21 ppm, petroleum like material odor
	Black f.-c. SAND, trace f.-m. gravel/coal, red brick, silt, and wood (11-65)			S2	SS	7	80 85 42 47	127	PID = 4.5 ppm, petroleum like material odor Added water/mud D = 4'
	Black/brown f.-m. GRAVEL/COAL, some f.-c. sand, trace silt and glass (11-65)		5	S3	SS	7	8 11 2 2	13	PID = 4.5 ppm, petroleum like material odor
	Black/brown f.-c. silty SAND, trace f. gravel/coal (11-65)			S4	SS	3.5	3 3 2 3	5	PID = 1.5 ppm, petroleum like material odor
	Black/gray f.-c. SAND, some silt and wood, trace f. gravel/coal (11-65)			S5	SS	3	4 3 3 3	6	PID = 0 ppm, petroleum like material odor
			10						
	WOOD, some black/gray f.-c. sand and f. gravel/coal, trace silt and glass (11-65)		15	S6	SS	2	6 3 3 2	6	PID = 2 ppm, petroleum like material odor
			20						
	Gray/brown f. sandy SILT, trace roots, shell, and clay (11-65)			S7	SS	18	2 3 6 6	9	PID = 0 ppm
			25						
	Brown f.-m. SAND (7-65)			S8	SS	22	20 19 17 17	36	PID = 0 ppm
									Sample S9 6" Lense brown clayey SILT, trace f. sand (10-65) in bottom of sample
	Brown f.-m. SAND (7-65)		30	S9	SS	11	10 5 7 8	12	PID = 0.1 ppm
			35						
	Gray f.-m. SAND, trace silt and clay (7-65)			S10	SS	20	8 11 13 13	24	PID = 0.1 ppm
			40						
	Brown/gray f.-m. SAND (7-65)			S11	SS	16	8 8 7 6	15	PID = 0.3 ppm

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LOG OF BORING RB8

SHEET 2 OF 2

PROJECT	PROJECT NO.
Gowanus Development	1503701
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	Approx. el. 10.9 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown/gray silty f. SAND sand, trace clay (8-65)		45	S12	SS	19	6 7 8 8	15	PID = 0.2 ppm PID = 0.3 ppm
	Brown/gray f.-m. SAND, trace silt (7-65)								
	Brown/gray clayey SILT, trace f.-m. sand (10-65)		50	S13	SS	19	3 3 4 5	7	PID = 0.1 ppm Rig chatter D = 53'
	Inferred Red brown f.-c. SAND, some f.-m. gravel, trace silt and clay (6-65)		55	S14	SS	0	40 39 39 35	78	Sample S14 spoon tip material Rig chatter D = 55' - 60'
	Red brown f.-c. SAND, some silt, trace f.-m. gravel and clay (6-65)		60	S15	SS	4	27 43 37 39	80	PID = 0 ppm Rig chatter D = 60' - 65'
	Red brown silty f.-c. SAND, some f.-c. gravel, trace clay (6-65)		65	S16	SS	4	26 33 34 41	67	
	Red brown f.-m. GRAVEL, some f.-c. sand, trace silt (6-65)		70	S17	SS	3	29 65 54 76	119	
	Red brown f.-m. GRAVEL, trace f.-c. sand, silt, and clay (6-65)		75	S18	SS	2	29 58 52 73	110	
	Red brown f.-c. GRAVEL, some f.-c. sand, trace silt and clay (6-65)		80	S19	SS	3	31 32 47 36	79	
	Boring terminated D = 82'		85						Borehole grouted upon completion
			90						

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LOG OF BORING RB9

SHEET 1 OF 2

PROJECT: Gowanus Development	PROJECT NO.: 1503701
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: Approx. el. 11.2 [BBHDD]
DRILLING EQUIPMENT: Mobile B61 Truck Mounted Rig	DATE STARTED: 10/14/98 · DATE FINISHED: 10/15/98 · COMPLETION DEPTH: 82 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0'-4') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 19 · UNDIST. -------- · CORE --------
CASING DIAMETER (in): 4 1/2" OD 4" ID · CASING DEPTH(ft): 14	WATER LEVEL (ft.): FIRST ▽ 6 · COMPL. ▼ ----- · 24 HR. ▼ -----
SAMPLER: 2" OD 1 3/4" ID Split Spoon	DRILLING FOREMAN: Ernest Thomas/Desmond Williams
SAMPLER HAMMER · WEIGHT(lbs): 140 · DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	NUMBER	TYPE	RECOV. (in)	PENETR. RESIST. BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
Approx. el. 11.2	3" ASPHALT			S2	SS	7	28 21 100	121	"New York City BC Classification numbers in parenthesis Added water D = 0.5'
	Black/brown f.-c. GRAVEL/COAL, some f.-c. sand, trace silt (11-65)*			S2	SS	10	7 8 2 2	10	PID = 11 ppm, petroleum like material odor PID = 0.2 ppm, petroleum like material odor
	Black/brown f.-c. SAND, trace f.-m. gravel/coal, silt, and metal (11-65)								
	Black/brown f.-m. GRAVEL/COAL and f.-c. SAND, trace silt (11-65)		5	S3	SS	6	3 4 2 3	6	PID = 0.3 ppm, petroleum like material odor
	Gray/brown f.-c. SAND, some silt, trace f.-m. gravel/coal, one seed (11-65)			S4	SS	0.5	4 3 3 4	6	PID = 0 ppm
	Inferred miscellaneous FILL (11-65)			-	SS	0	4 2 2 2	4	
			10						
									Very hard drilling Added mud D = 14' - 15'
	Brown f.-c. SAND, trace f. gravel and silt (11-65)		15	S6 S5	SS	14	5 4 3 4	7	PID = 0.1 ppm, petroleum like material odor
	Brown/black PEAT (11-65)								PID = 1 ppm, petroleum like material odor
			20						
	Brown-silty f. SAND, trace clay (8-65)			S7	SS	10	2 2 5 7	7	PID = 0 ppm, petroleum like material odor
	Brown f. SAND, trace silt (8-65)		25	S8	SS	20	13 14 15 17	29	PID = 0.1 ppm
	Gray/brown f. SAND, some silt (8-65)		30	S9	SS	21	5 3 2 4	5	PID = 0 ppm Sample S9 10" Lense Gray clayey SILT, trace f. sand (10-65) w/ PID = 0 ppm in bottom of sample
	Gray clayey f.-m. SAND, trace silt (7-65)		35	S10	SS	19	12 15 19 20	34	PID = 0 ppm
	Brown/gray f.-m. SAND (7-65)								PID = 0 ppm
	Brown/gray f.-m. SAND (7-65)		40	S11	SS	17	5 7 8 9	15	PID = 0 ppm

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LOG OF BORING RB9

SHEET 2 OF 2

PROJECT	PROJECT NO.
Gowanus Development	1503701
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	Approx. el. 11.2 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
			45						
	Brown/gray f.-m. sandy SILT (10-65)			S12	SS	11119	2 3 5 7	8	PID = 0 ppm
			50						
	Brown/gray SILT, trace clay and f.-m. sand (10-65)			S13	SS	24	2 1 2 3	3	PID = 0 ppm
			55						
	Red brown silty f.-c. SAND, trace clay and f. gravel (7-65)			S14	SS	12	10 13 19 16	32	PID = 0 ppm PID = 0 ppm Slow/hard drilling D = 59'
			60						
	Red brown silty f.-c. SAND, some f.-m. gravel, trace clay (6-65)			S15	SS	16	17 25 26 28	51	PID = 0 ppm
			65						
	Red brown silty f.-c. SAND, some f.-m. gravel, trace clay (6-65)			S16	SS	16	21 49 67 100/5"	116	Spoon refusal D = 67'
			70						
	Red brown f.-c. SAND, some f.-m. gravel and silt, trace clay (6-65)			S17	SS	5	21 100/6"	100/6"	Spoon refusal 100/6" D = 71' Rig chatter
			75						
	Red brown f.-c. SAND, some f.-m. gravel, trace silt and clay (6-65)			S18	SS	14	40 53 58 38	111	
			80						
	Gray f.-c. GRAVEL and red brown f.-c. SAND, trace silt and clay (6-65)			S19	SS		66 83 100/5"	183/11"	Spoon refusal D = 81.5'
	Boring terminated D = 82'								Borehole grouted upon completion
			85						
			90						

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LOG OF BORING LB1

SHEET 1 OF 2

PROJECT	Loews @ Gowanus
LOCATION	Brooklyn, NY
DRILLING EQUIPMENT	Davey Kent DK50RA Track Rig
SIZE AND TYPE OF BIT	4 7/8" and 3 7/8" Tri-Cone Roller Bits
CASING DIAMETER (in)	4 1/2" OD 4" ID
CASING DEPTH (ft)	18.5
SAMPLER	Standard Split Spoon (SS) or Shelby Tube (ST)
SAMPLER HAMMER	WEIGHT (lbs) 140 / DROP (in) 30
PROJECT NO.	1531601
ELEVATION AND DATUM	approx. el 11 [BBHDD]
DATE STARTED	12/9/98
DATE FINISHED	12/11/98
COMPLETION DEPTH	81 ft.
NUMBER OF SAMPLES	DIST. 21 / UNDIST. ---- / CORE ----
WATER LEVEL (ft.)	FIRST ---- / COMPL. ---- / 24 HR. 8.5
DRILLING FOREMAN	Tom Gregory/Kurt Conlon
INSPECTING ENGINEER	Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BLS/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
el 11	Inferred 4.5" CONCRETE								*New York City BC Classification numbers in parenthesis
	Brown f.-m. SAND, trace c. sand, f. gravel, and silt (11-65)*			S1	SS	4.5	10 24 24 100/3"	48	Hard slow drilling on concrete first 4.5' S1 SS Tip plugged with rocklike material (in S1 jar) PID = 580 ppm Added water D=0.25' Spoon refusal D=2' Rig chatter D=2'
	Brown f.-m. SAND, trace c. sand (11-65)		5	S2	SS	8	10 11 7 8	18	Petroleum like material floating in wash tub D=5' PID = 820 ppm
	Brown f.-m. SAND, trace c. sand (11-65)		10	S3 S4	SS	11	2 3 3 2	6	Started casing D=10' PID = 320 ppm PID = 420 ppm
0.0	Brown f.-m. SAND, trace organics/root, f.-m. gravel, clay, silt, and c. sand (11-65)								Advanced casing D=10'-13.5'
	Gray silty CLAY, some organics/root (11-65)		15	S5	SS	16	2 1 1 2	2	PP = 0.3-0.6 tsf PID = 150 ppm
	Gray silty CLAY, trace organics/root (11-65)			T1	ST	30	PUSH PUSH PUSH PUSH WOH		PP = 0.2-0.3 tsf TV = 0.23 tsf WOH : Weight of Hammer
	Gray silty CLAY, trace organics/root (11-65)		20	S6	SS	24	2 3 2	5	PP = 0.2-0.3 tsf PID = 480 ppm
	Brown SILT, trace f. sand and clay (10-65)		25	S7	SS	17	8 7 14 21	21	PID = 860 ppm
	Brown/gray CLAY and SILT, trace f. sand (10-65)		30	S8 S9	SS	18	8 8 7 10	15	S8 4" Lense of Brown f. SAND, trace silt and clay (8-65) w/ PID = 580 ppm in top of SS PP = 1.2-2.1 tsf PID = 720 ppm S10 2" Gray f. SAND, trace clay and silt w/ PID = 850 ppm in bottom of SS Visible petroleum like material D=30'-32'
	Brown f. SAND, trace silt and clay (8-65)		35	S11	SS	15	14 20 22 18	42	PID = 380 ppm
	Brown f. SAND, trace silt and clay (8-65)		40	S12	SS	16	12 13 12 13	25	Brown f. sandy SILT, trace clay in SS tip PID = 330 ppm Trace visible petroleum like material

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LOG OF BORING LB1

SHEET 2 OF 2

PROJECT	Loews @ Gowanus
LOCATION	Brooklyn, NY
PROJECT NO.	1531601
ELEVATION AND DATUM	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE ft	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BLOWS	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown f. sandy SILT, trace clay (10-65)		45	S13	SS	17	17 17 15 20	32	PID = 570 ppm
	Brown SILT, trace clay and f. sand (10-65)		50	S14 S15	SS	15	14 15 22 26	37	PID = 540 ppm PID = 650 ppm Trace visible petroleum like material
	Brown f. SAND, trace silt (8-65)								
	Brown f. SAND, trace m. sand (7-65)		55	S16	SS	14.5	11 16 16 17	32	PID = 710 ppm
	Gray f. SAND, trace m.-c. sand (7-65)		60	S17	SS	13.5	15 23 20 23	42	Brown/gray SILT, trace f. sand and clay in SS tip PID = 530 ppm Trace visible petroleum like material near bottom of SS tip Minor on/off rig chatter D=60.5'-63'
	Brown f. sandy SILT, trace clay (10-65)		65	S18	SS	13	19 23 23 26	46	PID = 1240 ppm
	Red brown f. sandy SILT, some f. sand, trace clay (10-65)		70	S19	SS	15.5	20 29 28 28	57	PID = 950 ppm On/off rig chatter D=73'-74.5' Slow/hard drilling D=74.5'-75.5' w/ rig chatter
	Inferred Red brown f.-c. SAND, trace f.-m. gravel (7-65)								
	Inferred BOULDER (6-65)		75						
	Red brown f. SAND, trace silt, f. gravel, m.-c. sand, and clay (6-65)			S20	SS	13	51 55 100/5"	155/11"	PID = 900 ppm Spoon refusal D=77.5' Slow/hard drilling D=77.5'-78.75'
	Inferred BOULDER (6-65)								
	Red brown and brown f.-m. SAND, trace f.-m. gravel, c. sand, silt, and clay		80	S21	SS	24	19 41 36 36	77	PID = 1200 ppm
	Boring terminated D=81'		85						
			90						

BORING 1531601 GPJ LANGANFL.GDT 22/12/08

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LOG OF BORING LB2

SHEET 1 OF 2

PROJECT	Loews @ Gowanus
LOCATION	Brooklyn, NY
DRILLING EQUIPMENT	Davey Kent DK50RA Track Rig
SIZE AND TYPE OF BIT	4 7/8" and 3 7/8" Tri-Cone Roller Bits
CASING DIAMETER (in)	4 1/2" OD 4" ID
CASING DEPTH (ft)	13.5
SAMPLER	2" OD 1 3/4" ID Split Spoon (SS)
SAMPLER HAMMER	WEIGHT (lbs) 140 / DROP (in) 30
PROJECT NO.	1531601
ELEVATION AND DATUM	approx. el 11 [BBHDD]
DATE STARTED	12/8/98
DATE FINISHED	12/9/98
COMPLETION DEPTH	80 ft.
NUMBER OF SAMPLES	DIST. 20 / UNDIST. ---- / CORE ----
WATER LEVEL (ft.)	FIRST ---- / COMPL. ---- / 24 HR. 6.5
DRILLING FOREMAN	Tom Gregory/Kurt Conlon
INSPECTING ENGINEER	Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST. BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
									*New York City BC Classification numbers in parenthesis Started drilling w/ water
approx. el 11	4" CONCRETE								
	Brown and black f. SAND, trace silt, f.-c. sand, f. gravel, and coal (11-65)*			S1	SS	13.5	32 28 24 24	52	PID = 650 ppm On/off rig chatter D = 0.75'-5'
	Black and brown c. SAND and f. GRAVEL/COAL, trace f.-m. sand and silt (11-65)		5	S2	SS	13	10 7 9 7	16	PID = 102 ppm
0.0	Gray silty CLAY, some brown peat, trace f. sand (11-65)		10	S3 S4	SS	8	2 1 4 8	5	PID = 9 ppm PID = 10.2 ppm
	Brown/black f. SAND, some silt, trace clay (11-65)								
	Brown f. sandy SILT, trace clay (11-65)		15	S5 S6	SS	18	3 3 3 4	6	PID = 19.6 ppm PID = 400 ppm Added mud D = .15'
	Gray/brown PEAT, trace f. sand, silt, and clay (11-65)								
	Gray silty CLAY, trace organics/root (11-65)		20	S7 S8	SS	24	1 3 5 5	8	PP = 0.6 - 1.25 tsf PID = 19.7 ppm PID = 40 ppm
	Gray f. SAND, some clay, trace silt (8-65)								
	Brown/gray f. SAND, some silt, trace clay (8-65)		25	S9	SS	15	4 4 5 7	9	PID = 9 ppm
	Brown f.-m. sandy SILT, trace clay (10-65)		30	S10	SS	19.5	11 10 8 7	18	PID = 330 ppm Visible petroleum like material
	Brown f. SAND, trace m. sand (7-65)		35	S11	SS	16	14 16 22 24	38	PID = 800 ppm
	Brown/gray f. SAND, trace m. sand, clay, and silt (8-65)		40	S12	SS	18	5 7 12 18	19	PID = 20 ppm

BORING 1531601.GPJ LANGANFL.GDT 22/12/98

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LOG OF BORING LB2

SHEET 2 OF 2

PROJECT	Loews @ Gowanus	PROJECT NO.	1531601
LOCATION	Brooklyn, NY	ELEVATION AND DATUM	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST. BLOWS/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown f. sandy SILT, trace clay (10-65)		45	S13	SS	18	8 10 11 13	21	PID - 500 ppm
	Brown f. sandy SILT, trace clay (10-65)		50	S14	SS	14	16 19 22 28	41	PID = 1020 ppm
	Brown SILT, trace f. sand and clay (10-65)		55	S15	SS	17	19 24 24 25	48	PID - 830 ppm Gray/brown f. SAND, trace silt in S15 SS tip
	Brown f. SAND, trace m. sand and silt (7-65)		60	S16	SS	18	11 17 17 17	34	PID = 50 ppm Slightly visible petroleum like material
	Brown f. SAND, trace m.-c. sand, f. gravel, and silt (7-65)		65	S17	SS	14	17 44 44 24	88	PID = 600 ppm Visible petroleum like material
	Brown f.-m. SAND, trace c. sand, f. gravel, and silt (7-65)		70	S18	SS	5.5	14 13 16 22	29	PID = 880 ppm Rig chatter D = 72.5' - 75' Very slow/hard drilling D = 72.5' - 73.5'
	Inferred boulder (6-65)								
	Red brown f. SAND, some m.-c. gravel, trace silt, m.-c. sand, f. gravel, and clay (6-65)		75	S19	SS	11	22 26 32 23	58	PID = 500 ppm
	Red brown f. SAND, trace silt and clay (8-65)			S20	SS	6	32 32 25 25	57	PID > 2000 ppm
	Boring terminated D = 80'		80						Borehole grouted upon completion
			85						
			90						

BORING 1531601.GPJ LANGANFL.GDT 22/12/98

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LOG OF BORING LB3

SHEET 1 OF 2

PROJECT: Loews @ Gowanus	PROJECT NO.: 1531601
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: approx. el 11 [BBHDD]
DRILLING EQUIPMENT: Davey Kent DK50RA Track Rig	DATE STARTED: 12/8/98 · DATE FINISHED: 12/9/98 · COMPLETION DEPTH: 80.5 ft.
SIZE AND TYPE OF BIT: HW Rock Core and Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 18 · UNDIST. ---- · CORE ----
CASING DIAMETER (in): 4 1/2" OD 4" ID · CASING DEPTH (ft): 19.5	WATER LEVEL (ft.): FIRST ---- · COMPL. ---- · 24 HR. 2.6
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Gus Suri/Mike Chizmar
SAMPLER HAMMER: WEIGHT (lbs) 140 · DROP (in) 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
approx. el 11	6" CONCRETE w/ wire mesh								*New York City BC Classification numbers in parenthesis
	Inferred miscellaneous FILL (11-65)*								Started coring w/ water
	Black/gray f.-m. SAND, trace silt, c. sand, f. gravel, and coal (11-65)			S1	SS	8	25 33 44 93	77	PID = 125 ppm Slightly visible petroleum like material On/off rig chatter D = 1' - 5'
	Brown f.-m. SAND, trace red brick and silt (11-65)		5	S2	SS	3	21 28 20 12	48	Petroleum like material floating in wash tub D = 5' PID = 84 ppm
	Brown c. SAND, some f. gravel, trace clay, silt, and f.-m. sand (11-65)		10	S3	SS	8	15 4 4 7	8	PID = 155 ppm Slightly visible petroleum like material
	Brown f.-c. SAND, some gravel, trace clay and silt (11-65)		15	S4	SS	4	5 2 3 4	5	Added mud D = 15' PID = 55 ppm Slightly visible petroleum like material
	Brown f.-c. SAND and f. GRAVEL, some clay, trace silt (11-65)		20	S5	SS	2.5	102/2.5	Refusal	Refusal D = 20' Hard drilling D = 20.25' - 20.75' PID = 340 ppm Visible petroleum like material Added mud D = 20'
	Inferred CONCRETE								
	Brown SILT, trace clay, f. sand, and f. gravel (10-65)		25	S6	SS	7	6 10 8 13	18	PID = 220 ppm
	Brown/gray SILT, trace clay and f. sand (10-65)		30	S7	SS	11	5 8 7 7	15	Hole too tight D = 23' to get rods down so removed existing casing and drilled to D = 30' w/ 4 7/8" bit, then spun/cored casing to D = 19.5' PID = 45 ppm Slightly visible petroleum like material
	Brown f. SAND, trace silt and clay (8-65)		35	S8	SS	10	3 4 4 12	8	PID = 480 ppm
	Brown f. sandy SILT, trace clay (10-65)		40	S9	SS	14	7 12 12 14	24	PID = 640 ppm

BORING 1531601.GPJ LANGAKFL.GDT 22/12/98

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LOG OF BORING LB3

SHEET 2 OF 2

PROJECT	Loews @ Gowanus	PROJECT NO.	1531601
LOCATION	Brooklyn, NY	ELEVATION AND DATUM	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST Bl./6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown f. SAND, trace silt (8-65)		45	S11 S10	SS	12	11 10 10 10	20	PID 25 ppm S11 4" Lense of brown SILT, trace clay and f. sand (10-65) w/ PID = 55 ppm in bottom of SS
	Brown f.-m. SAND (7-65)		50	S12	SS	14	10 11 12 17	23	PID = 90 ppm
	Brown f. SAND, trace m.-c. sand (7-65)		55	S13	SS	8.5	11 14 19 17	33	PID = 9.8 ppm
	Brown f. SAND, trace m.-c. sand and silt (7-65)		60	S15 S14	SS	11.5	15 17 17 19	34	PID = 280 ppm PID = 210 ppm
	Brown/gray SILT, trace clay and f. sand (10-65)								
	Red brown f. SAND, some silt, trace f. gravel, m.-c. sand, and clay (7-65)		65	S16	SS	5	23 100/3"	100/3"	Spoon refusal D = 66' w/ bouncing Rig chatter D = 68' PID = 95 ppm
	Red brown f.-m. SAND, trace c. sand and f. gravel (7-65)		70	S18 S17	SS	8	17 40 22 21	62	PID = 510 ppm PID = 800 ppm
	Red brown SILT, trace f. gravel, f.-c. sand, and clay (10-65)								Minor on/off rig chatter D = 72' - 76.5'
	Inferred BOULDER		75						Slow/hard drilling D = 76.5' - 79' w/ minor rig chatter
	Inferred Red brown f.-c. SAND, trace f. gravel, silt, and clay (7-65)		80		SS	0	58 53 100/3"	53/11"	Spoon refusal D = 80.5' Borehole grouted upon completion
	Boring terminated D=80.5'		85						
			90						

BORING 1531601.GPJ LANGANFLGDT 2/11/2/98

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LOG OF BORING LB4

SHEET 1 OF 2

PROJECT: Loews @ Gowanus	PROJECT NO.: 1531601
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: approx. el 11 [BBHDD]
DRILLING EQUIPMENT: Davey Kent DK50RA Track Rig	DATE STARTED: 12/3/98 / DATE FINISHED: 12/7/98 / COMPLETION DEPTH: 80 ft.
SIZE AND TYPE OF BIT: HW and NQ Rock Cores and Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 16 / UNDIST. ---- / CORE ----
CASING DIAMETER (in): 4 1/2" OD 4" ID / CASING DEPTH (ft): 24	WATER LEVEL (ft.): FIRST ▽ ---- / COMPL. ▼ ---- / 24 HR. ▼ 6.7
SAMPLER: Standard Split Spoon (SS) or Shelby Tube (ST)	DRILLING FOREMAN: Gus Suri/Mike Chizmar
SAMPLER HAMMER / WEIGHT (lbs): 140 / DROP (in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST. BL/6in	N-VALUE BLOWS/6in	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
approx. el 11	5.5" CONCRETE w/ wire mesh								"New York City BC Classification numbers in parenthesis
	Inferred miscellaneous FILL (11-65)*								Started coring with water
0.0	Black/brown f.-c. SAND, trace silt, red brick, f.-c. gravel/coal (11-65)			S1	SS	8	17 92 85/1.5"	57/7.5	Spoon refusal D=2'
									PID = 400 ppm
	Very c. CONCRETE								COBBLE fragment in D=1'-3' SS tip
			5						Lost majority of water D=2'-12'
			10						
	Inferred CONCRETE								Hard/slow drilling D=12'-13.5'
									Broke through concrete D=13.5'
	Inferred WOOD (11-65)		15						WOOD in wash D=13.5'-25' w/ slow drilling
									One bend/dent in end of tube D=17'-19'
	WOOD FIBERS, trace gray f. sand (11-65)			S2	ST	5	PUSH PUSH PUSH PUSH		PID = 58 ppm Petroleum like material odor
			20						Added mud D=20'
	WOOD FIBERS (11-65)			S3	SS	3	12 10 10 11	20	PID = 7.2 ppm Petroleum like material odor
			25						Petroleum like material odor D=25'-25.5'
	WOOD FIBERS (11-65)			S4	SS	14	19 22 23 24	45	PID = 5.4 ppm
	Brown f. SAND, trace silt and clay (8-65)								
	Brown f. SAND, trace silt (8-65)		30	S5	SS	10	13 20 20 15	40	PID = 148 ppm Visible petroleum like material
									Visible petroleum like material
	Brown f. SAND, trace silt (8-65)		35	S6	SS	7	9 8 8 7	16	PID = 90 ppm Visible petroleum like material
									Visible petroleum like material
	Brown f. SAND, trace m. sand, silt, and clay (7-65)		40	S7	SS	14.5	10 10 12 12	22	PID = 9.2 ppm

BORING 1531601 GPJ LANGANFL.GDT 22/1/98

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LOG OF BORING LB4

SHEET 2 OF 2

PROJECT	Loews @ Gowanus	PROJECT NO.	1531601
LOCATION	Brooklyn, NY	ELEVATION AND DATUM	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown f. SAND, trace silt and clay (8-65)		45	S8	SS	16	9 12 17 12	29	PID = 1.8 ppm
	Brown SILT, some f. sand, trace m. sand and clay (10-65)		50	S9	SS	15.5	13 15 21 21	36	PID = 368 ppm
	Brown f. sandy SILT, trace m. sand (10-65)		55	S10 S11	SS	11	13 19 18 18	36	PID = 7 ppm PID = 13.5 ppm
	Brown f. SAND, trace m. sand and silt (7-65)								
	Brown/gray f. SAND, trace m. sand and silt (7-65)		60	S12	SS	11	12 16 16 15	32	PID = 5.2 ppm Slightly visible petroleum like material Rig chatter D=64.5'-65'
	Red brown f.-m. SAND, trace f. gravel, c. sand, silt, and clay (7-65)		65	S13	SS	11	25 39 32 45	72	PID = 780 ppm On/off rig chatter D=65'-70'
	Red brown f.-m. SAND, trace f.-m. gravel, c. sand, and silt (7-65)		70	S14	SS	12	32 55 56 87	111	Added mud D = 70' PID = 1 ppm On/off rig chatter D=70'-75'
	Red brown c. SAND, some f.-m. sand and f.-m. gravel, trace silt (6-65)		75	S15	SS	2.5	100/4.5	R*	*Spoon refusal D=75.5' PID = 4.6 ppm On/off rig chatter D=75'-78'
	Red brown f.-m. gravelly f.-m. SAND, trace c. sand and silt (6-65)			S16	SS	14.5	40 53 87 102	140	C. GRAVEL in S16 SS tip PID = 0.4 ppm Borehole grouted upon completion
	Boring terminated D=80'		80						
			85						
			90						

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LOG OF BORING LB5

SHEET 1 OF 2

PROJECT: Loews @ Gowanus	PROJECT NO.: 1531601
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: approx. el 11 [BBHDD]
DRILLING EQUIPMENT: Davey Kent DK50RA Track Rig	DATE STARTED: 12/4/98 · DATE FINISHED: 12/8/98 · COMPLETION DEPTH: 80 ft.
SIZE AND TYPE OF BIT: 4 7/8" and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 15 · UNDIST. ---- · CORE ----
CASING DIAMETER (in): 4 1/2" OD 4" ID · CASING DEPTH (ft): 30.5	WATER LEVEL (ft.): FIRST ---- · COMPL. ---- · 24 HR. 6.4
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Tom Gregory/Kurt Conlon
SAMPLER HAMMER · WEIGHT (lbs): 140 · DROP (in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	NUMBER	TYPE	RECOV. (in)	PENETR. RESIST. BL/6in	N-VALUE BLOWS/0.3 FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
approx. el 11	4.5" CONCRETE						*New York City BC Classification numbers in parenthesis
	5.5" DENSE GRADED AGGREGATE						Began drilling with water
	3.5" CONCRETE	S1	SS	0	50/0.5"	R*	*Spoon refusal D=1' 50/0.5" w/ bouncing
0.0	2.5" DENSE GRADED AGGREGATE						PID = 49 ppm
	Red BRICK (11-65)*						Sample S1 Gray f.-c. SAND and c. GRAVEL FRAGMENT, trace silt from SS tip
	Inferred Red BRICK						Hard/slow drilling w/ on/off rig chatter
	(Red f.-c. SAND, trace silt and clay) Inferred red BRICK (11-65)	S2	SS	4	90/4"	R*	D=1'-5' and Red wash water D=2.5'-5' *Spoon refusal D=5.5' 90/4" w/ bouncing PID = 20 + ppm
							Hard/slow drilling w/ on/off rig chatter and red wash water D=5'-10'
	(Red f.-c. SAND, trace f. gravel and silt) Inferred red BRICK (11-65)	S3	SS	3	100/3"	R*	*Spoon refusal D=10' 100/3" w/ bouncing PID = 21 ppm
							Hard/slow drilling w/ on/off rig chatter and red wash water D=10'-27.5'
	Inferred red BRICK (11-65)						
	Inferred red BRICK (11-65)						
	Inferred red BRICK (11-65)						Petroleum like material in wash water D=27.5'
							Hard drilling D=28'-28.5'
	Gray f.-m. SAND, trace c. sand (11-65)	S4	SS	17	3 3 9 18	12	PID = 20 ppm
							Visible petroleum like material
							Gray f. sandy SILT, trace clay and m. sand in S4 SS tip
							Added mud D=30'
	Gray silty CLAY, trace f. sand (11-65)	S6 SS	SS	19	4 5 23 28	28	PP = 1.2-1.5 tsf PID = 9.8 ppm
	Gray/brown f. SAND, trace m. sand and silt (7-65)						PID = 180 ppm
	Brown/gray silty f. SAND (8-65)	S7	SS	13	11 11 13 11	24	PID = 1.1 ppm

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40

BORING 1531601.GPJ LANGANFI.GDT 7/1/99

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LOG OF BORING LB5

SHEET 2 OF 2

PROJECT	Loews @ Gowanus
LOCATION	Brooklyn, NY
PROJECT NO.	1531601
ELEVATION AND DATUM	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown/gray SILT, some f. sand, trace clay (10-65)		45	S8	SS	12.5	11 15 15 24	34	PP = No reading PID = 400 ppm
	Gray/brown f. SAND, some silt, trace m. sand (7-65)		50	S9	SS	15	13 19 22 23	41	PID = 1.2 ppm
	Gray/brown f.-m. SAND, trace silt (7-65)		55	S10	SS	8	8 16 19 22	35	PID = 2.2 ppm Hard drilling D=58'-60'
	Brown f.-c. SAND, trace f.-m. gravel and silt (6-65)		60	S11	SS	9	12 17 27 28	44	PID = 0.4 ppm On/off rig chatter D=60'-65'
	Red brown f. SAND, some silt, trace m.-c. sand and f. gravel (7-65)		65	S12	SS	15	19 20 25 25	45	PID = 8.2 ppm On/off rig chatter D=65'-70'
	Red brown f.-m. SAND, some f.-m. gravel, trace c. sand and silt (6-65)		70	S13	SS	6	62 35 67 31	102	PID = 3.3 ppm On/off rig chatter D = 70'-75'
	Red brown f.-c. SAND, trace f.-m. gravel and silt (6-65)		75	S14	SS	7	22 49 25 13	74	PID = 0.4 ppm On/off rig chatter D=75'-78'
	Red brown f.-m. SAND, trace silt, c. sand, and f. gravel (7-65)		80	S15	SS	8	26 24 28 15	52	PID = 340 ppm Borehole grouted upon completion
	Boring terminated D=80'		85						
			90						

BORING 1531601.GPJ LANGANFLGDT 7/1/09

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LOG OF BORING LB6

SHEET 1 OF 2

PROJECT: Loews @ Gowanus	PROJECT NO.: 1531601
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: approx. el 11 [BBHDD]
DRILLING EQUIPMENT: Davey Kent DK50RA Track Rig	DATE STARTED: 11/24/98; DATE FINISHED: 11/25/98; COMPLETION DEPTH: 77 ft.
SIZE AND TYPE OF BIT: HW Rock Core and Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 16; UNDIST. ----; CORE ----
CASING DIAMETER (in): 4 1/2" OD 4" ID; CASING DEPTH (ft): 13.5	WATER LEVEL (ft.): FIRST ----; COMPL. ----; 24 HR. 3.8
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Gus Surl/Mike Chizmar
SAMPLER HAMMER: WEIGHT (lbs) 140; DROP (in) 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
approx. el 11	5" CONCRETE w/ wire mesh								*New York City BC Classification numbers in parenthesis
	Inferred Miscellaneous FILL (11-65)* Black/brown f.-c. SAND, trace f.-c. gravel/coal and silt (11-65)			S1	SS	14	24 21 14 12	35	Started coring w/ water; PID = 16.4 ppm
	Brown f.-c. SAND, trace f.-m. gravel/coal and silt (11-65)		5	S2	SS	4	7 7 5 5	12	Trace wood and red brick in wash D=6.25'-10'; PID = 5.5 ppm
									Rig chatter D=7.25'-8.25'; Lost some water D=7.25'-10'; Added mud D=10'
	Brown/black f.-c. SAND, trace silt, c. gravel/coal, and organics/wood fibers (11-65)		10	S3	SS	11.5	12 4 5 20	9	PID = 11.8 ppm
	Brown f.-c. SAND, some silt and clay, trace f.-m. gravel (11-65)		15	S5 S4	SS	16	1 2 2 2	4	PID = 4.2 ppm; PID = 18.3 ppm
	Brown, gray, and black PEAT, trace silt and clay (11-65)								
	Brown f. SAND, some silt, trace clay (8-65)		20	S6	SS	17	2 1 2 2	3	PID = 5 ppm
	Gray/brown f. SAND, trace silt (8-65)		25	S7	SS	13	11 12 16 15	28	PID = 20 ppm
	Brown and gray f.-m. SAND, some silt, trace clay (7-65)		30	S8	SS	14.5	7 8 8 7	16	PID = 30 ppm
	Gray/brown f.-m. SAND (7-65)		35	S9	SS	17	4 6 17 20	23	PP = 0.9-1.4 tsf; PID = 11.2 ppm
	Gray CLAY, trace f. sand and silt (9-65)								
	Brown f. SAND, trace silt (8-65)		40	S10	SS	16.5	10 17 15 16	32	0.5" of Gray CLAY, trace f. sand and silt (9-65) in top of S10 SS sample; PID = 550 ppm

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LOG OF BORING LB6

SHEET 2 OF 2

PROJECT	Loews @ Gowanus
PROJECT NO.	1531601
LOCATION	Brooklyn, NY
ELEVATION AND DATUM	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST. BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown SILT, some f. sand, trace clay (10-65)		45	S11	SS	14	16 19 13 14	32	PID = 1.4 ppm
	Gray/black f.-m. SAND, trace silt (7-65)		50	S12	SS	18	20 24 25 22	49	PID = 1.2 ppm
									Rig chatter D=53.75'-55'
	Inferred COBBLE (6-65)		55	-	SS	0	162/4"	R*	*Spoon refusal D=55' Rig chatter D=55'-55.25'
									Minor rig chatter D=58.75'
	Red brown f. SAND, some f.-c. gravel, trace m.-c. sand and silt (6-65)		60	S13	SS	111	150 58 51 65	109	PID = 400 ppm Slow/hard drilling D=62.25'-62.5' On/off rig chatter D=60'-65'
	Red brown f. SAND, some f.-c. gravel, trace m.-c. sand and silt (6-65)		65	S14	SS	6	96 39 25 26	65	PID = 155 ppm On/off rig chatter D=65'-70'
	Red brown f. SAND, some f.-m. gravel, trace m.-c. sand and silt (6-65)		70	S15	SS	13	62 100 93 93	193	PID = 410 ppm Minor on/off rig chatter D=70'-75'
	Red brown f.-c. GRAVEL and f.-c. SAND, trace silt (6-65)		75	S16	SS	14	100 88 77 55	165	PID = 380 ppm Borehole grouted upon completion
	Boring terminated D=77'		80						
			85						
			90						

BORING 1531601.GPJ LANGANFL.GDT 22/12/98

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LOG OF BORING LB7

SHEET 1 OF 2

PROJECT: Loews @ Gowanus	PROJECT NO.: 1531601
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: approx. el 11 [BBHDD]
DRILLING EQUIPMENT: Davey Kent DK50RA Track Rig	DATE STARTED: 11/19/98 · DATE FINISHED: 11/24/98 · COMPLETION DEPTH: 77 ft.
SIZE AND TYPE OF BIT: HW and NQ Rock Cores and Tri-Cone Roller Bit	NUMBER OF SAMPLES: DIST. 18 · UNDIST. 1 · CORE ----
CASING DIAMETER (in): 4 1/2" OD 4" ID · CASING DEPTH (ft): 7	WATER LEVEL (ft.): FIRST ---- · COMPL. ---- · 24 HR. 6.5
SAMPLER: Standard Split Spoon (SS) or Shelby Tube (ST)	DRILLING FOREMAN: Gus Suri/Mike Chizmar
SAMPLER HAMMER · WEIGHT (lbs): 140 · DROP (in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SAMPLE NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
approx. el 11	5" CONCRETE w/ wire mesh						"New York City BC Classification numbers in parenthesis
	5" CONCRETE						Started coring w/ water
	Inferred miscellaneous FILL (11-65)*						Lost some water D = 1.5'
	Gray/black f.-c. SAND, some silt (11-65)	S1	SS	7	28 47 54 20	101	PID = 400 ppm
							Petroleum like material odor
							On/off rig chatter D = 1.5' - 4.5'
	Black SILT/PETROLEUM LIKE MATERIAL, some c. sand, and white cement fragments, trace f.-m. sand and clay (11-65)						Petroleum like material in wash D = 4.75'
		S2	SS	2	4 2 1 50/1"	3	Spoon refusal 50/1" w/ bouncing D = 6'
							PID = 480 ppm
0.0	Piece of STEEL						A 16" x 4" x 1/4" piece of vertical steel on a 1/2" thick base plate D = 7' w/ 2" wide horizontal pieces of steel, which were cut, at the top inside and bottom outside D = 6' - 7'
	Inferred miscellaneous FILL (11-65)						
0.0	0.5" STEEL	S3					
0.0	CONCRETE						
	Petroleum like material treated WOOD (11-65)						Lost some water D = 8' - 9.25'
	Inferred WOOD (11-65)						Added mud D = 9.25'
	Inferred Brown PEAT, some silt (11-65)	-	SS	0	WOR WOR WOR WOR	WOR	Drilled through WOOD and lost circulation D = 9.75'
							WOR: Weight of rods
							WOR went from D = 10' - 15'
	Inferred Brown PEAT, some silt (11-65)	S4	SS	0	WOH WOH WOH WOH	WOH	WOH: Weight of hammer
							Sample S4 SS tip material
							PID = 590 ppm
							WOH went from D = 15' - 17.5'
	Brown PEAT, some silt (11-65)	T1	ST	24	PUSH PUSH PUSH PUSH	PUSH	Visible petroleum like material w/ odor
	Brown/gray f. SAND, some silt (8-65)						Pushing became more difficult D = 19.25'
	Brown f. SAND, some silt (8-65)	S5	SS	19	1 3 3 4	6	Added mud D = 20'
							PID = 920 ppm
	Brown f. SAND, trace silt and clay (8-65)	S6	SS	11	34 42 33 40	75	PID = 700 ppm
							Trace wood fibers in wash D = 27' - 30.5'
							Tight fit for bit D = 27' - 30.5'
	Brown f.-m. SAND, trace silt (7-65)	S8 S7	SS	7	18 19 11 12	30	1" of WOOD FIBERS, trace f.-m. sand w/
							PID = 170 ppm in top of SS
							PID = 750 ppm
							Brown SILT, trace clay and f. sand in SS tip D = 32.5'
	Brown SILT, trace clay and f. sand (10-65)	S10 S9	SS	18	3 3 2 3	5	PP = 0.1 - 0.3 tsf
							PID = 640 ppm
	Gray CLAY, some silt (9-65)						PP = 0.6 - 0.9 tsf
							PID = 320 ppm
	Gray/brown CLAY, some silt, trace f. sand (9-65)	S11	SS	17	WOR 2 2 4	4	PP = 0.4 - 0.65 tsf
							PID > 2000 ppm

SYMBOL LOG · DEPTH SCALE: 5, 10, 15, 20, 25, 30, 35, 40

BORING 1531601.GPJ LANGANFL.GDT 22/12/98

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LOG OF BORING LB7

SHEET 2 OF 2

PROJECT	PROJECT NO.
Loews @ Gowanus	1531601
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BLOWS	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown CLAY, some silt, trace f. sand (9-65)		45	S12	SS	13	8 4 4 4	8	PP = 0.5 - 0.65 tsf PID = 170 ppm
	Brown f. SAND, trace silt (8-65)		50	S13	SS	14	19 31 23 19	56	PID = 550 ppm Rig chatter D = 52.25' - 53'
	Brown f.-c. SAND, trace silt and f.-m. gravel (6-65)			S14	SS	10.5	20 20 24 24	44	PID = 710 ppm
			55						Added mud D = 57' - 58' Rig chatter D = 57.5 - 58'
	Red brown f.-c. SAND, trace silt and f.-m. gravel (6-65)		60	S15	SS	8	19 36 31 22	67	PID = 40 ppm On/off rig chatter D = 60' - 65'
	Red brown f.-c. SAND, some f.-m. gravel, trace silt (6-65)		65	S16	SS	8	28 42 22 19	64	PID = 640 ppm On/off rig chatter D = 65' - 70'
	Red brown f.-c. SAND, some f.-m. gravel, trace silt (6-65)		70	S17	SS	7.5	45 26 22 24	46	PID = 20 ppm On/off rig chatter D = 70' - 75'
	Red brown f.-c. SAND, some f.-m. gravel, trace silt (6-65)		75	S18	SS	8	50 28 22 25	50	PID = 540 ppm Borehole grouted upon completion
	Boring terminated D = 77'		80						
			85						
			90						

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LOG OF BORING LB8

SHEET 1 OF 2

PROJECT: Loews @ Gowanus	PROJECT NO.: 1531601
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: approx. el 11 [BBHDD]
DRILLING EQUIPMENT: Davey Kent DK50RA Track Rig	DATE STARTED: 11/18/98 · DATE FINISHED: 11/19/98 · COMPLETION DEPTH: 55 ft.
SIZE AND TYPE OF BIT: HW and NQ Rock Cores and Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 14 · UNDIST. ---- · CORE ----
CASING DIAMETER (in): 4 1/2" OD 4" ID · CASING DEPTH(ft): 19.5	WATER LEVEL (ft.): FIRST ---- · COMPL. ---- · 24 HR. 3.6
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Gus Suri/Mike Chizmar
SAMPLER HAMMER: WEIGHT(lbs) 140 · DROP(in) 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
approx. el 11	5" CONCRETE w/ wire mesh								*New York City BC Classification numbers in parenthesis
	CONCRETE DEBRIS and Inferrred miscellaneous FILL (11-65)*								Started coring w/ water
	Red BRICK, some gray c. sand, trace f. gravel, concrete, tan brick, gray f.-m. sand, and white tile (11-65)			S1	SS	4.5	12 9 10 24	19	Lost some water D = 2' PID = 82 ppm
0.0	Red BRICK, some c. sand, trace f.-m. sand and gravel (11-65)		5	S2	SS	1	25/5"	R*	Lost water D = 2' - 6.5' *Spoon refusal 28/5" w/ bouncing D = 4.5' Hard/slow drilling w/ rig chatter D = 4.5' - 5' PID = 135 ppm
0.0	CONCRETE								
	Inferred reinforced CONCRETE								
	Gray c. SAND, trace coal, concrete, red brick, gray f.-m. sand, f.-m. gravel, and glass (11-65)			S3	SS	3	9 7 4 4	11	PID = 15 ppm
			10						
	Gray c. SAND, trace coal, red brick, gray f.-m. sand, silt, and f. gravel (11-65)			S4	SS	1	5 3 2 4	5	PID = 260 ppm
	Gray c. SAND, some coal, trace red brick, gray f.-m. sand, silt, and f. gravel (11-65)		15	S5	SS	9	2 2 3 6	5	PID = 52 ppm
	Brown PEAT (11-65)								Added mud D = 20"
	Brown f. sandy SILT, trace clay (10-65)		20	S6	SS	6	4 4 6 6	10	PID = 30 ppm
	Brown f.-m. SAND, trace silt (7-65)		25	S7	SS	6	29 31 33 28	64	PID = 11 ppm
	Gray/brown SILT, some f. sand, trace m. sand and clay (10-65)		30	S8	SS	5	WOH 5 8 9	13	WOH: Weight of hammer Over drilled to D = 30'-5" resulting in WOH blow count PID = 36 ppm
	Brown/gray SILT, some clay, trace f. sand (10-65)		35	S10 S9	SS	17	4 3 3 6	6	PP = No reading PID = 420 ppm PP = 0.4 tsf PID = 340 ppm
	Brown/gray silty CLAY, trace f. sand (9-65)								
	Brown/gray silty CLAY, trace f. sand (9-65)		40	S11	SS	19	2 4 2 5	6	PP = 0.3 - 0.4 tsf PID = 108 ppm

Langan
Engineering and Environmental Services

LOG OF BORING LB8

SHEET 2 OF 2

PROJECT	PROJECT NO.
Loews @ Gowanus	1531601
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown/gray silty CLAY, trace f. sand (9-65)		45	S12	SS	19	2 1 WOH 1	1	PP = No reading - 0.2 tsf PID = 810 ppm
	Brown/gray silty CLAY, trace f. sand (9-65)		50	S13	SS	17	WOH WOH 9 17	9	PP = 0.2 - 0.7 tsf PID = 400 ppm
	Brown f.-m. SAND, trace gray silt and clay (7-65)			S14	SS	11	14 14 13 15	27	PID = 520 ppm
	Boring terminated D = 55'		55						Borehole grouted upon completion
			60						
			65						
			70						
			75						
			80						
			85						
			90						

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Engineering and Environmental Services

LOG OF BORING LB9

SHEET 1 OF 2

PROJECT: Loews @ Gowanus	PROJECT NO.: 1531601
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: approx. el 11 [BBHDD]
DRILLING EQUIPMENT: Davey Kent DK50RA Track Rig	DATE STARTED: 11/16/98 / DATE FINISHED: 11/18/98 / COMPLETION DEPTH: 57 ft.
SIZE AND TYPE OF BIT: 4 7/8" (0' - 5') and 3 7/8" Tri-Cone Roller Bits	NUMBER OF SAMPLES: DIST. 14 / UNDIST. ---- / CORE ----
CASING DIAMETER (in): 4 1/2" OD 4" ID / CASING DEPTH (ft): 13.5	WATER LEVEL (ft.): FIRST ---- / COMPL. ---- / 24 HR. 4.6
SAMPLER: 2" OD 1 3/4" ID Split Spoon (SS)	DRILLING FOREMAN: Gus Suri/Mike Chizmar
SAMPLER HAMMER: WEIGHT (lbs) 140 / DROP (in) 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
pprox. el 11	4" CONCRETE Inferred DENSE GRADED AGGREGATE CONCRETE								*New York City BC Classification numbers in parenthesis Started drilling w/ water Lost some water D=2.5' D=0'-4.5' : Slow/hard drilling and wash water Gray cement/concrete color NX Rock Core Barrel used D=4'-4.5' : 6" Concrete core recovered
0.0	Inferred miscellaneous FILL (11-65)*		5	S1	SS	0	4 7 5 4	12	Lost some water D=4.5' Attempted a 2nd SS to acquire some form a sample: Only gray sand wash was recovered, Sample S1
	Inferred Gray c. SAND/COAL, trace silt, f.-m. sand, clay, f. gravel, and organics (11-65)			S2	SS	0	3 2 2 2	4	PID = 2 ppm Overdrove SS 7'-10' to aid in recovery Sample S2 SS tip material
	Gray c. SAND/COAL, trace f.-m. sand, silt, and f. gravel (11-65)		10	S3	SS	4	3 3 2 2	5	Overdrove SS D=10'-13' to aid in recovery PID = 3.3 ppm Added mud D=15'
	Gray silty, organic/rooty CLAY (11-65)		15	S5 S4	SS	16.5	3 2 2 2	4	PID = 0 ppm PID = 0 ppm
	Brown/gray PEAT (11-65)								
	Brown SILT, trace clay and f. sand (10-65)		20	S8	SS	10.5	5 7 12 10	19	PID = 38 ppm
	Inferred Brown/gray f.-m. SAND, trace silt (7-65)		25	-	SS	0	27 32 37 34	59	
	Brown/gray f.-m. SAND, trace silt (7-65)			S7	SS	17	24 26 39	65	PID = 0 ppm
	Brown f.-m. SAND, trace silt and clay		30	S8	SS	7	11 11 9 10	20	PID = 0 ppm
	Gray/brown silty CLAY, trace f.-m. sand (9-65)		35	S9	SS	17.5	3 4 6 7	10	PID = 0.2 ppm
	Brown/gray f.-m. SAND, trace silt (7-65)		40	S10	SS	10.5	16 10 10 10	20	PID = 0 ppm

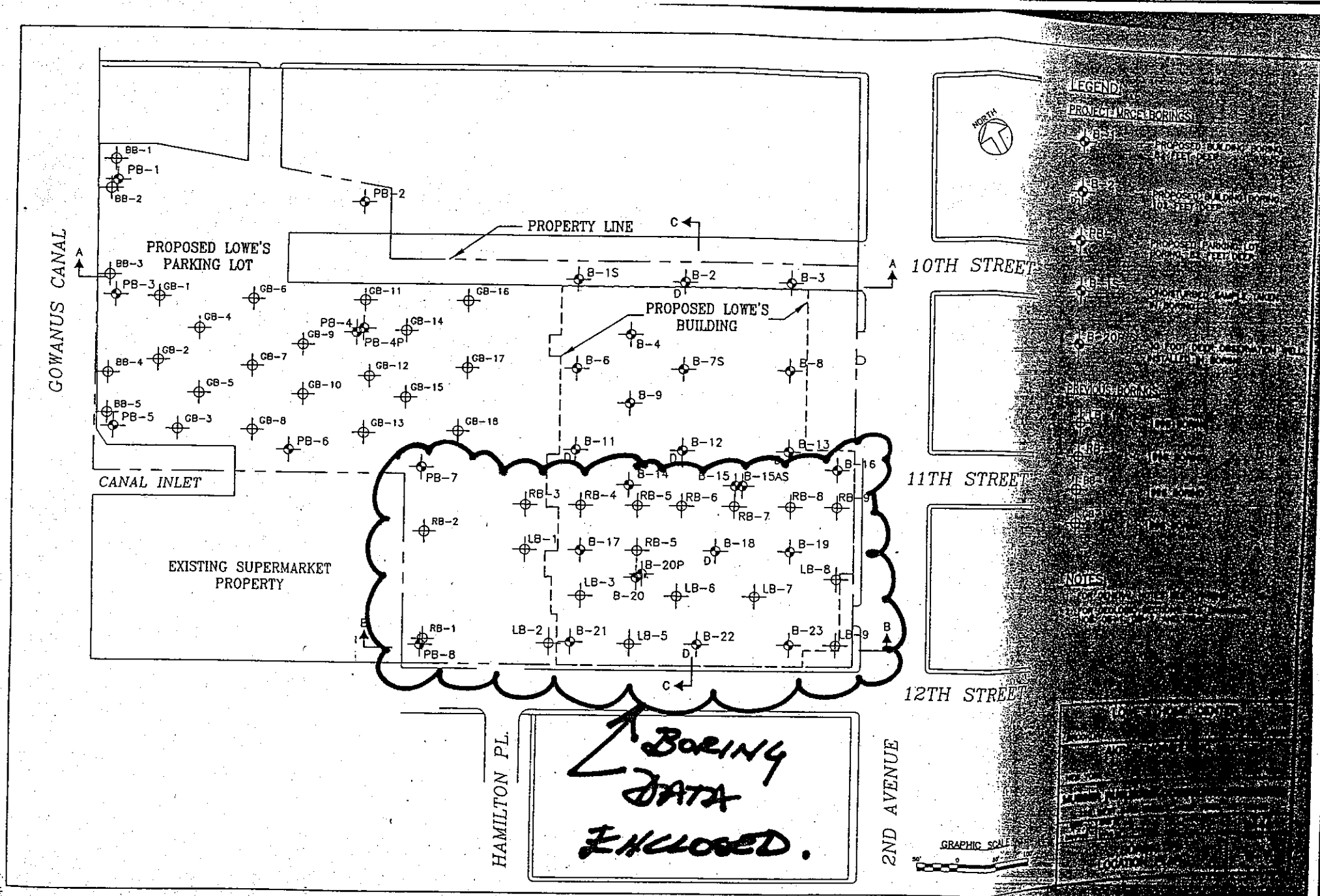
Langan
Engineering and Environmental Services

LOG OF BORING LB9

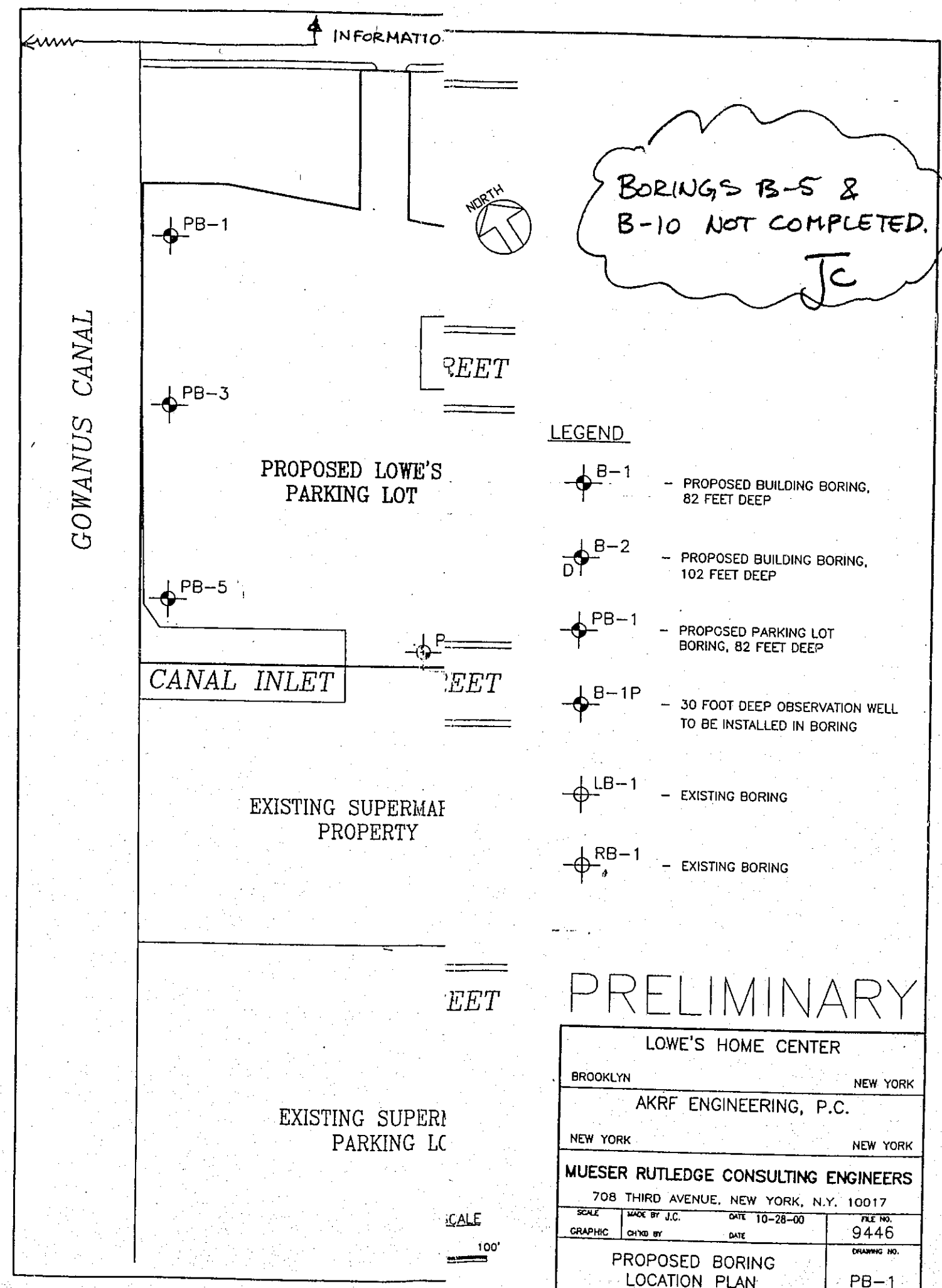
SHEET 2 OF 2

PROJECT	PROJECT NO.
Loews @ Gowanus	1531601
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	approx. el 11 [BBHDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BLS/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown/gray SILT, some f. sand, trace clay (10-65)		45	S11	SS	19	7 6 6 6	12	PID = 0 ppm
	Brown/gray f. sandy SILT, trace f. gravel (10-65)		50	S13 S12	SS	15	15 18 15 17	31	PID = 0 ppm
	Brown/gray f.-m. SAND, trace silt (7-65)								PID = 0 ppm
	Brown f.-m. SAND, trace silt (7-65)		55	S14	SS	15	17 19 23 32	42	PID = 0 ppm
	Boring terminated D=57'								Borehole grouted upon completion
			60						
			65						
			70						
			75						
			80						
			85						
			90						



GOWANUS CANAL
PROPOSED LOWE'S PARKING LOT
PROPERTY LINE
PROPOSED LOWE'S BUILDING
CANAL INLET
EXISTING SUPERMARKET PROPERTY
10TH STREET
11TH STREET
12TH STREET
HAMILTON PL.
2ND AVENUE
NORTH
LEGEND
PROJECT MRCE BORINGS
PREVIOUS BORINGS
NOTES
GRAPHIC SCALE
BORING DATA ENCLOSED.


INFORMATIO
NORTH
BORINGS B-5 & B-10 NOT COMPLETED.
JC
PB-1
PB-3
PB-5
GOWANUS CANAL
REET
PROPOSED LOWE'S PARKING LOT
CANAL INLET
EET
EXISTING SUPERMAI PROPERTY
EET
EXISTING SUPERI PARKING LC
CALE
100'
LEGEND
B-1 - PROPOSED BUILDING BORING, 82 FEET DEEP
B-2 - PROPOSED BUILDING BORING, 102 FEET DEEP
PB-1 - PROPOSED PARKING LOT BORING, 82 FEET DEEP
B-1P - 30 FOOT DEEP OBSERVATION WELL TO BE INSTALLED IN BORING
LB-1 - EXISTING BORING
RB-1 - EXISTING BORING
PRELIMINARY
LOWE'S HOME CENTER
BROOKLYN
NEW YORK
AKRF ENGINEERING, P.C.
NEW YORK
NEW YORK
MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017
SCALE
GRAPHIC
MADE BY J.C.
DATE 10-28-00
CH'KD BY
DATE
FILE NO.
9446
PROPOSED BORING LOCATION PLAN
DRAWING NO.
PB-1

MUESER RUTLEDGE CONSULTING ENGINEERS

FIELD LOG

SHEET 1 OF 2
FILE NO. 9854
BORING NO. T1
SURFACE ELEV. 10.2 ±

PROJECT LOWE'S HOME CENTER

PROJECT LOCATION BROOKLYN, NY RES. ENGR. A. MODICA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
FRIDAY 8 NOV 02 PARTY CLOUDY ~55°F 1200	1D	0'-	8-11	BROWN C-F SAND, SM GVL, TR BRICK,	F		3" 4"	
		2'	10-7	SILT (FILL) (SP-SM)				
	2D	2'-	6-5	BROWN C-F SAND, SM GVL, TR BRICK,				
		4'	6-14	WOOD, CONCRETE, SILT (FILL) (SP-SM)				
	3D	4'-	17-17	BROWN C-F SAND, CONCRETE, SM GVL,		5		
		6'	18-21	TR BRICK, SILT (FILL) (SP-SM)				
	4D	6'-	13-11	GRAY C-F SAND, SM GVL, TR BRICK				
		8'	9-7	SILT (FILL) (SP-SM)				
	5D	8'-	9-6	GRAY C-F SAND, SM GVL, CONCRETE				
		10'	9-14	TR BRICK (FILL) (SM)		10		
	6D	10'-	10-16	GRAY C-F SAND, SM CONCRETE, GVL,				
		12'	23-56	TR BRICK, GLASS (FILL) (SM)				
	7D	12'-	11-9	CONCRETE, GVL, SM C-F SAND, TR				POOR RECOVERY
		14'	6-6	BRICK (FILL) (SM)				
	8D	14'-	11-14	GRAY C-F SAND, SM GVL, TR BRICK		15		POOR RECOVERY
		16'	10-8	(FILL) (SM)				
	9D	16'-	6-8	GRAY C-F SAND, SM GVL, TR				PETROLEUM ODOR
		18'	5-5	BRICK (FILL) (SM)				PRESENSE
	10D	18'-	6-100/4"	SPUN CASING THRU CONCRETE,		18.5		
		20'		CONCRETE IN BAG	CONC.	19.5		CONCRETE @ ~18.5'
	11NR	20'-	2-2	NO RECOVERY	?			CONCRETE ENDED @ ~19
		22'	3-5			22		REC: ~7" CONC.
	12D	22'-	6-5	GRAY SILTY F-SAND (SM)				+ 2" BRICK
		24'	6-10					22'-28' PETROLEUM
	13D	24'-	11-10	"DO 12D" (SM)	S	25		
		26'	13-15					
	14D	26'-	11-11	"DO 12D" (SM)				
1530		28'	16-10			28		EOB @ 28'

FORM NO. B-1

BORING NO. T1

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. T1
SHEET 2 OF 2
FILE NO. 9854
SURFACE ELEV. 10.2 ±
DATUM BROOKLYN HWY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK ☒
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC
OTHER

CASING USED ☒ YES ☐ NO
DIA., IN. 3 DEPTH, FT. FROM 0 TO 20
DIA., IN. 4 DEPTH, FT. FROM 0 TO 4
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF;
D-SAMPLER 2" O.D. S.S.
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED ☒ YES ☐ NO
DIAMETER OF ROTARY BIT, IN. 2 7/8", 3 7/8"
TYPE OF DRILLING MUD

AUGER USED ☐ YES ☒ NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NO OBSERVATIONS MADE

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING LIN. FT. 28
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.
NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER: SPUN CASING THRU 12" CONCRETE

BORING CONTRACTOR ADT, INC
DRILLER DAVID CARTER HELPERS LIONEL EDWARDS
REMARKS
RESIDENT ENGINEER A. MODICA DATE 15 NOV 02

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

FIELD LOG

SHEET 1 OF 2
FILE NO. 9854
BORING NO. T2
SURFACE ELEV. 10.0 ±

PROJECT LOWE'S HOME CENTER

PROJECT LOCATION BROOKLYN, NY RES. ENGR. A. MODICA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
'ONDAY NOV02 AIN ~65°F 500 500					F		4"	
	1D	3'- 5'	5-4 2-2	BROWN C-F SAND, SM GVL, TR BRICK (FILL) (SM)	STEEL	5		
ESDAY 12 NOV02 AIN ~50°F 1815	2NR	5'- 7'	50/0"	NO RECOVERY, SPUN CASING THRU 18" CONCRETE REC ≈ 11" IN BAG	CONC	6.5 ±		1½" STEEL PLATE 18" CONCRETE
					WOOD	7 ±		
	3NR	8'- 10'	—	FOUND VOID 8' TO 10'	VOID	10		
	4D	10'- 12'	1-1 2-2	BLACK Pt, TR WOOD, VEGETATION (Pt)	O			PETROLEUM ODOR
	5D	12'- 14'	WH/24"	BLACK Pt (Pt)				
	6D	14'- 16'	WR/24"	TOP 24" = "DO 5D" (Pt) TIP OF S.S. = GRY SILTY F-SAND, TR VEG (SM)		15 15.8'		
	7D	16'- 18'	WH/24'	GRAY, SILTY F-SAND, TR VEG (SM) BRN	S			
	8D	18'- 20'	3-4 4-3	GRAY, SILTY F-SAND, TR MICA (SM) BRN		20		
	9D	20'- 22'	WH/12" 2-4	"DO 8D" (SM)				
1330	10D	22'- 24'	4-8 11-11	GRAY F-SAND, SM SILT, TR MICA (SM)		24		EOB @ 24'

FORM NO. B-1

BORING NO. T2

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. T2
SHEET 2 OF 2
FILE NO. 9854
SURFACE ELEV. 10.0 ±
DATUM BROOKLYN HWY.

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	X	MECHANICAL		DIA., IN.	4"	DEPTH, FT. FROM 0	TO 12
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. S.S.
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 4 7/8"
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. AVERAGE FALL, IN.
* AUTOMATIC HAMMER

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING LIN. FT. 24 NO. OF 3" SHELBY TUBE SAMPLES
3.5" DIA. U-SAMPLE BORING LIN. FT. NO. OF 3" UNDISTURBED SAMPLES
CORE DRILLING IN ROCK LIN. FT. OTHER: SPUN CASING THRU 18" CONCRETE

BORING CONTRACTOR A.D.T., INC
DRILLER DAVID CARTER HELPERS LIONEL EDWARDS
REMARKS
RESIDENT ENGINEER A. MODICA DATE 13 NOV 02

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

FIELD LOG

SHEET 1 OF 2
FILE NO. 9854
BORING NO. T3
SURFACE ELEV. 10.5 ±

PROJECT LOWE'S HOME CENTER

PROJECT LOCATION BROOKLYN, NY RES. ENGR. A. Malick

DAILY PROGRESS	SAMPLE NO.	DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
1 DAY NOV. 02 SUNNY ~45°F 700	1D	0'-	37-67	BROWN C-F SAND, SM CONCRETE, GVL,			4" 3"	
		2'	100/5"	TR BRICK, SILT (FILL) (SP-SM)	F			
	2D	2'-	19-50	BROWN C-F SAND, SM GVL, TR CONCRETE,				
		4'	21-20	BRICK, SILT (FILL) (SP-SM)				
	3D	4'-	10-100/3"	OIL, BLACK C-M SAND, SM GVL, TR		4.5		CONCRETE SLAB @
		6'		CONCRETE (SM)	CONC.	5.5		4'-9" REC=6½"
	4NR	6'-	—	VOID, NO RECOVERY	VOID			IN BAG LABELED
		8'				7.5		C1 (CORED → 12")
	5D	8'-	3-3	BROWN C-F SAND, TR GVL, SILT				
		10'	6-3	(SP-SM)		10		
	6D	10'-	2-4	BROWN C-F SAND, SM GVL, TR MICA				
		12'	5-5	SILT (SP-SM)	F?			
	7D	12'-	5-5	BROWN C-F SAND, SM GVL, TR MICA				
		14'	11-9	SILT (SP-SM)				
	8D	14'-	3-3	GRAY CLAYEY F-M SAND, SM VEG.		15		8D - POOR RECOVERY
		16'	2-2	(CL)		16		
	9D	16'-	1-2	SOFT GRAY CLAY, SM VEG. (OH)	O			
		18'	2-3					
	10D	18'-	3-3	TOP 6" - "DO 9D" (OH)				
		20'	3-4	BOTTOM 18" GRY CLAYEY F-M SAND, SM VEG (CL)		20		
	11D	20'-	3-4	GRAY F-M SAND, SM SILT (SM)	S			
		22'	4-6					
	12D	22'-	6-6	"DO 11D" (SM)				
1130		24'	7-14			24		EOB @ 24'

FORM NO. B-1

BORING NO. T3

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. T3
SHEET 2 OF 2
FILE NO. 9854
SURFACE ELEV. 10.5 ±
DATUM BROOKLYN HWY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK ✓
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC
OTHER

CASING USED ☒ YES ☐ NO
DIA., IN. 3 DEPTH, FT. FROM 0 TO 13
DIA., IN. 4 DEPTH, FT. FROM 0 TO 4
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. S.S.
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED ☒ YES ☐ NO
DIAMETER OF ROTARY BIT, IN. 3 7/8, 2 7/8"
TYPE OF DRILLING MUD QUIK GEL

AUGER USED ☐ YES ☒ NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING LIN. FT. 24
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER: SPUN CASING THRU 12" CONCRETE

BORING CONTRACTOR ADT, INC
DRILLER DAVID CARTER HELPERS LIONEL EDWARDS
REMARKS
RESIDENT ENGINEER A. Moder DATE 15 NOV 02

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

FIELD LOG

SHEET 1 OF 2
FILE NO. 9854
BORING NO. T4
SURFACE ELEV. 10.5±

PROJECT LOWE'S HOME CENTER
PROJECT LOCATION BROOKLYN, NY
RES. ENGR. A. MODEA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
125. NOV 02 SUNNY ~50°F 200	1D	0'-	10-14	BROWN C-F SAND, SM GVL, CONCRETE,			3" 4"	
		2'	27-26	TR BRICK, GLASS (FILL) (SM)	F			
	2D	2'-	10-29	CONCRETE, BROWN C-F SAND, SM				
		4'	19-15	GVL, BRICK, TR SILT, GLASS (FILL) (SP-SM)				
	3D	4'-	4-7	CONCRETE		5		POOR RECOVERY,
		6'	10-100/2"			5.5		RECOVERED 2" OF
	4C	6'-	——	SPUN 3" CASING THRU 12" CONCRETE,	CONCRETE	6.5		CONCRETE IN TIP OF
		8'		IN BAG	VOID	7.5		S.S.
	4D	8'-	2-2	BRN C-F SAND, SM GVL, SILT				-STARTED CORING
		10'	3-2	(SM)		10		@ 5.5' STOPPED @ 6.5'
	5D	10'-	10-7	BRN C-F SAND, SM GVL, TR SILT	F?			REC = ~8" CONCRETE
		12'	4-8	(SP-SM)				-@ VOID RIG LOST
	6D	12'-	10-14	BRN M-F SAND, SM SILT, TR GVL				A LOT OF WATER
		14'	10-7	(SM)				
	7D	14'-	9-10	BRN M-F SAND, SM SILT, TR GVL		15		
		16'	5-4	(SM)				
	8D	16'-	4-12	SOFT GRAY CLAY, SM VEGETATION	O			
130		18'	6-7	(OH)		18		EOB @ 18'

FORM NO. B-1

BORING NO. T4

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. T4
SHEET 2 OF 2
FILE NO. 9854
SURFACE ELEV. 10.71
DATUM BROOKLYN HWY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC
OTHER

CASING USED [X] YES [ ] NO
DIA., IN. 3 DEPTH, FT. FROM 0 TO 8
DIA., IN. 4 DEPTH, FT. FROM 0 TO 4
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" OD S.S.
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8", 2 7/8"
TYPE OF DRILLING MUD QUIK GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24"
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES
3.5" DIA. DRY SAMPLE BORING LIN. FT. 18
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.
NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER: SPUN CASING THRU 12" CONCRETE

BORING CONTRACTOR ADT INC
DRILLER DAVID CARTER HELPERS LIONEL EDWARDS
REMARKS
RESIDENT ENGINEER A. Modica DATE 14 NOV 02

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

FIELD LOG

SHEET 1 OF 2
FILE NO. 9854
BORING NO. T5
SURFACE ELEV. 11.0 ±

PROJECT: LOWE'S HOME CENTER

PROJECT LOCATION: BROOKLYN, NY

RES. ENGR.: MODICA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
TUES. NOV 02 SHOWERS/ CLOUDY ~50°F 1030	1D	0'-	4-6	BROWN C-M SAND, SM GVL, CONCRETE	F		4"	
		2'	11-24	TR SILT, BRICK, GLASS (FILL) (SP-SM)				
	2D	2'-	17-10	BROWN C-M SAND, SM CONCRETE, GVL, TR				
		4'	12-14	BRICK, GLASS, SILT (FILL) (SP-SM)				
	3NR	4'-	5-5	NO RECOVERY, SILT (FILL) (SP-SM)		5		CONCRETE JAMMED
		6'	4-2					IN TIP OF SPOON
	4D	6'-	2-3	CONCRETE, BROWN C-M SAND, SM				
		8'	12-3	GVL, TR WOOD, BRICK, GLASS (FILL) (SM)				
	5D	8'-	4-7	GRAVEL				
		10'	5-4			10		
	6D	10'-	4-3	CONCRETE, SM BROWN C-M SAND, TR				
		12'	3-5⅝"	GVL, SILT (SP-SM)		11.5		CONCRETE @ 11'-6"
	1C	12'-		SPUN CASING THRU 24" CONCRETE,	CONCRETE			
		14'		REC 13" IN BAG		13.5		ENDS @ 13'-6"
	7NR	14'-	4-3	NO RECOVERY	WOOD	15		WOOD JAMMED IN
		16'	3-3					TIP OF S.S.
	8D	16'-	5-2	WOOD				POOR RECOVERY
		18'	3-3					
	9D	18'-	2-2	WOOD, SM BLACK M-C SAND, TR GVL	O W/ WOOD			POOR RECOVERY
1500 THURSDAY NOV 02 SUNNY ~45°F 0700		20'	2-2			20		
	10D	20'-	2-2	WOOD				
		22'	2-3					POOR RECOVERY
	11D	22'-	3-4	TOP 4" - WOOD				24" RECOVERY
		24'	3-5	BOTTOM 20" - BLACK PEAT (PT)		24		
	12D	24'-	4-8	GRAY SILTY F-SAND W/ POCKETS		25		HIT EDGE OF TIMBER
		26'	11-13	OF ORG. BLACK CLAYEY SILT	S/O			PILE ½ OF S.S. IS
	13D	26'-	10-13	DO 12D				WOOD, OTHER ½ IS
		28'	16-16					SAND (24' → 28')
	14D	28'-	7-10	BROWN F-M SAND, TR SILT (SP-SM)				
		30'	14-13			30		
	15D	30'-	6-12	BRN SILTY F-SAND (SM)				
900		32'	9-9			32		EOB @ 32'

FORM NO. B-1

BORING NO. T5

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. T5
SHEET 2 OF 2
FILE NO. 9854
SURFACE ELEV. 11.0 ±
DATUM BROOKLYN HWY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" OD. SS.
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 2 7/8", 3 7/8"
TYPE OF DRILLING MUD QUIK GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. — AVERAGE FALL, IN. —
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30
*AUTOMATIC HAMMER

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING LIN. FT. 32
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.
NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER: SPUN CASING THRU 24" CONCRETE

BORING CONTRACTOR ADT, INC
DRILLER DAVID CARTER HELPERS LIONEL EDWARDS
REMARKS
RESIDENT ENGINEER A. MODICA DATE

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

FIELD LOG

SHEET 1 OF 2
FILE NO. 9854
BORING NO. TO-1
SURFACE ELEV. 10.2 ±

PROJECT LOWE'S HOME CENTER

PROJECT LOCATION BROOKLYN, NY RES. ENGR. A. MODICA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
DNES. NOV 02 ONERS/ CLOUDY ~50°F 1900	1D	0'–	7-10	BROWN M-C SAND, SM GVL, TR BRICK,				
		2'	12-13	SILT (FILL) (SP-SM)	F			
	2D	2'–	13-14	CONCRETE, BROWN M-C SAND, SM GVL,				
		4'	11-12	TR BRICK, GLASS, SILT (FILL) (SP-SM)				
	3D	4'–	3-1	BLACK M-F SAND, SM SILT, TR VEG.	F	5		PETROLEUM ODOR &
		6'	1-2	(SM)				PRESENSE
	4D	6'–	2-2	GRAY SILTY F-M SAND, TR MICA				
		8'	2-3	(SM)				
	5D	8'–	1-1	GRAY SILTY F-SAND, TR VEGETATION,		9		
		10'	1-3	MICA (SM)		10		
	6D	10'–	WH-2	GRAY SILTY F-SAND VVD/W POCKET PEAT	F/O			
		12'	3-2	(SM-Pt)				
	7D	12'–	5-2	GRAY SILTY-F-SAND, TR MICA (SM)				
		14'	4-5		S			
	8D	14'–	2-3	"DO 7D" (SM)		15		
100		16'	4-6			16		EOB @ 16'

FORM NO. B-1

BORING NO. TO-1

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. TO-1
SHEET 2 OF 2
FILE NO. 9854
SURFACE ELEV. 10.21
DATUM BROOKLYN HWY

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG
TRUCK X
SKID
BARGE
OTHER

TYPE OF FEED DURING CORING
MECHANICAL
HYDRAULIC
OTHER

CASING USED ☐ YES ☒ NO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO
DIA., IN. DEPTH, FT. FROM TO

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. S.S.
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED ☒ YES ☐ NO
DIAMETER OF ROTARY BIT, IN. 2 7/8" 3 7/8
TYPE OF DRILLING MUD QUICK GEL

AUGER USED ☐ YES ☒ NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. — AVERAGE FALL, IN. —
SAMPLER HAMMER, LBS. AVERAGE FALL, IN.
* AUTOMATIC HAMMER

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE

PIEZOMETER INSTALLED ☐ YES ☒ NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING LIN. FT. 16
3.5" DIA. U-SAMPLE BORING LIN. FT.
CORE DRILLING IN ROCK LIN. FT.

NO. OF 3" SHELBY TUBE SAMPLES
NO. OF 3" UNDISTURBED SAMPLES
OTHER:

BORING CONTRACTOR A.D.T. INC
DRILLER DAVID CARTER HELPERS LIONEL EDWARDS
REMARKS
RESIDENT ENGINEER A. MODICA DATE 13 NOV 02

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
6. List changes of material in strata column and list generalized strata descriptions.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount and any unusual occurrences.
8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

MUESER RUTLEDGE CONSULTING ENGINEERS

FIELD LOG

SHEET 1 OF 2
FILE NO. 9854
BORING NO. TO-2
SURFACE ELEV. 10.7±

PROJECT LOWE'S HOME CENTER

PROJECT LOCATION BROOKLYN, NY RES. ENGR. A. MODKA

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
INDAY NOV 02 CLOUDY/SHOWERS ~65°F 1930	1D	0'-	8-26	BROWN M-C SAND, SM GVL, BRICK,			4"	
		2'	27-29	TR GLASS, PORCALAIN (FILL)(SM)				
	2D	2'-	17-13	BLK M-C SAND, SM GVL, TR BRICK				
		4'	13-10	(FILL)(SM)				
	3D	4'-	7-17	GRY-BLK C-M SAND, SM GVL, TR		5		PETROLEUM ODOR
		6'	15-19	CONCRETE, BRICK, SILT (FILL) (SP-SM)		6		
	4D	6'-	6-10	BROWN C-M SAND, SM GVL	F			PETROLEUM ODOR
		8'	6-3	(SM)				
	5D	8'-	4-3	BROWN M-F SILTY SAND, TR				
		10'	2-4	C-SAND (SM)		10		
	6D	10'-	3-2	BROWN M-F SAND UVD/W BLACK				
		12'	3/12"	F-SAND POCKETS (SM)				
	7D	12'-	WH	GRY SILTY F-SAND, TR GVL (SM)				
		14'						
	8D	14'-	WR	BLK PT, TR GVL, GRY F-SAND, SILT		15		POOR RECOVERY
		16'	1-1	(PT)		16		
	9D	16'-	WR-1	BLK-BROWN PEAT (PT)	O			
		18'	1-2			18		
	10D	18'-	WH/12"	GRY SILTY F-SAND (SM)				
		20'	2-2		S_2	20		
	11D	20'-	2-3	"DO 10D" (SM)				
		22'	4-6					
	12D	22'-	5-5	"DO 10D" (SM)				
1230		24'	6-12			24		EOB @ 24'

FORM NO. B-1

BORING NO. TO-2

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. TO-2
SHEET 2 OF 2
FILE NO. 9854
SURFACE ELEV. 10.7±
DATUM BROOKLYN HWY.

PROJECT LOWE'S HOME CENTER
LOCATION BROOKLYN, NY
BORING LOCATION

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED [X] YES [ ] NO			
TRUCK	X	MECHANICAL		DIA., IN.	4	DEPTH, FT. FROM 0	TO 8
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM	TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM	TO
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. S.S.
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3 7/8"
TYPE OF DRILLING MUD QUICK GEL

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. — AVERAGE FALL, IN. —
* AUTOMATIC HAMMER

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT. 24'	NO. OF 3" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR AQUIFER DRILLING & TESTING, INC
DRILLER DAVID CARTER HELPERS LIONEL EDWARDS
REMARKS
RESIDENT ENGINEER A. MODICA DATE 11 NOV 02

NOTES:
1. Make a separate log of each boring and each unsuccessful boring attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, day of week, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Assign NR to lost samples and record blows. Make another sample attempt immediately below the lost sample.
4. Mark each U-sample with job number, boring number, sample number, depth, penetration and recovery. Indicate method by which penetration of tube sampler was obtained.
5. Record blows on spoon sampler per six inches of penetration. Note all blows and penetrations when taken at less than six-inch interval.
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8. For rock core, the recovery and the RQD (Rock Quality Designation) should be shown in both inches and percent of run length in the blows per six inches column. All core runs shall be numbered in consecutive order. A run number is given even if recovery is zero.
9. Include sample description by Unified Soil Classification System.
10. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

Roux Associates Logs – 2002

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SOIL BORING LOG

WELL NO. AN-3	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue Brooklyn, New York		
APPROVED BY S. Glash	LOGGED BY T. Mills			
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. /		GEOGRAPHIC AREA Area A		
DRILL BIT DIAMETER/TYPE 4.25-in. / Auger	BOREHOLE DIAMETER 6-inches	DRILLING EQUIPMENT/METHOD / HSA	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 1/21/02-1/21/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to medium SAND, trace Gravel, trace Wood, trace Brick; dry (fill)	23		
			36		
			30		
			28		
		Brown to gray fine to medium Sand and Gravel, trace Brick, trace Concrete; dry (fill)	16	19.8	
			17		
			21		
			13		
		Brown to black stained fine to medium SAND, trace Silt; dry (fill)	10		
5			15	67.1	5
			10		Slight odor.
			9	101	
		Brown to black stained fine to medium SAND, trace Silt, trace Gravel; dry (fill)	8		
			8	58.2	
			5		
		Brown to reddish brown Silt and fine Sand; (fill)	12	40.2	
		Black stained fine to medium Sand and Silt; (fill)	5		
			6	30.1	
			5		Free product.
10			9	60.2	10
		Dark brown to reddish brown fine to medium Sand and Silt, trace Clay; (fill)	2		
			2	59.1	
			2		Sheen.
			2	24.9	
		Dark brown to black stained fine to medium Sand and Silt; (fill)	1		
			1	58.5	
			1		Sheen.
			1	55.9	
		Dark gray to black stained fine to medium Sand and Gravel; (fill)	2		
15			1	55.9	Free product. 15
		PEAT	3		
			3		

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. AN-4	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / J. Philbin		GEOGRAPHIC AREA Area A		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 2/7/02-2/7/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Dark brown to tan medium to coarse SAND, trace Gravel, trace Brick, trace Concrete; moist (fill)	15, 19, 18, 31		
		Dark brown to tan medium to coarse SAND, trace Gravel, trace Brick, trace Concrete; moist (fill)	15, 15, 30, 27	7.9	
		Black stained fine SAND, little Silt, trace Gravel, trace Coal Fragments; moist (fill)	6, 7, 6	55.2	
5					5
		Black stained fine SAND, some Coal Fragments, little Gravel, trace Silt; wet (fill)	10, 12, 10		
		Gray fine SAND, little Coal Fragments, little Silt, trace Gravel; wet (fill)	2, 2	52.3	Trace free product.
				12.8	Trace free product.
10					10
		Dark gray to black stained fine to coarse SAND, some Gravel, little Silt, trace Glass; wet (fill)		3.1	Odor.
		No recovery			
		Black stained medium to coarse SAND, little Silt, little Gravel; wet (fill)			Slight odor.
15					15
		PEAT		6.9	

Bottom of boring 16 feet below land surface

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SOIL BORING LOG

WELL NO. AN-6	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / J. Philbin		GEOGRAPHIC AREA Area A		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 2/19/02-2/19/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown to tan fine to coarse SAND, trace Silt, trace Brick, trace Concrete; dry (fill)	9, 17, 14, 21		
		7, 14, 21, 27	4.1	
	Brown fine to coarse SAND, little Silt, trace Gravel; moist to wet (fill)	9, 9, 10	4.3	
5				5
	Brown to black stained fine to medium SAND, little Silt, trace Gravel, trace coarse Sand; wet (fill)	6, 6, 5, 10	18.1	Odor and trace free product.
	Black stained medium SAND, little Silt, trace Gravel trace, Ashalt-like material; wet (fill)	10, 9, 9, 16	89.1	Odor and trace free product.
10				10
	Black stained medium to coarse SAND, some Gravel, trace Silt, trace Ashalt-like material; wet (fill)	17, 17, 22, 25	57.2	Odor and free product.
	CONCRETE	50/1		
	Black stained fine to medium SAND, little Silt, trace Gravel; wet (fill)		78.7	
15	No recovery			15
20	Peat and Clay; wet			20

Bottom of boring 20 feet below land surface.

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SOIL BORING LOG

WELL NO. AN-9	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / D. Pepe		GEOGRAPHIC AREA Area A		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-75 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 3/12/02-3/13/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Tan to brown fine to coarse SAND, trace Gravel, trace Brick, trace Concrete, trace Wood; dry (fill)	18		
			20		
			23		
			20		
		Tan to brown fine to coarse SAND, trace Gravel, trace Brick, trace Concrete, trace Wood; wet at 4 ft. (fill)	23		
			18		
			30		
			46		
		Brown to red Sand and Gravel, little Concrete, trace Silt; wet (fill)	10		
5			50/5		5
		CONCRETE			
		Black fiine SAND, some Silt, trace coarse Sand, trace Gravel; wet (fill)			
					Odor and Free product.
		Brown to black stained fine SAND, some Silt; wet (fill)	5		
			3		
			1		Slight odor.
10			1		10
		Brown to green fine Sand and Silt; wet (fill)			
		Light brown fine SAND, some Silt, trace Gravel; wet (fill)	1		
			1		
			1		
			1		
		Light brown fine SAND and Silt, trace Clay, trace Gravel; wet (fill)	2		
15			1		15
		Brown PEAT, and green to grey Clay	1		
			1		

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
AN-9N				
PROJECT NO./NAME		LOCATION		
92401Y02 / FCRC 2nd Avenue MGP Site		124-136 2nd Avenue		
APPROVED BY	LOGGED BY	Brooklyn, New York		
S. Glash	D.Moss			
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Aquifer Drilling & Testing, Inc. /		Area A		
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
3 7/8 inch / Tri-Cone	4-inches	CME-75 / Drive and Wash	2" Split Spoon	3/13/02-3/13/02
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
(FT.)	(Feet BLS)	Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Dark brown medium to coarse SAND, trace Gravel, trace brick, trace Concrete; moist (fill)	11		
			14		
			19		
			17		
		Dark brown medium to coarse SAND, trace Gravel, trace brick, trace Concrete; wet at 4 (fill)	14	8.9	
			12		
			12		
			8		
		Green to brown fine SAND, some Silt, trace Gravel; wet (fill)	6		
5			50/3	7.9	5
		CONCRETE			
		Black stained fine SAND, some Silt, trace Gravel; wet (fill)	6		
			6		
			3		
			7/12	160	Strong odor.
		Red to brown fine SAND, little Silt, trace coarse Sand; wet (fill)	8		
			7		
			6	4.9	
10			3		10
		Red to black stained SILT, some fine to medium Sand; wet (fill)	1		
			1		
			1	5.2	
			1		
		Red to brown medium SAND, some Silt, trace Gravel; wet (fill)	1		
			1		
			1	4.7	
			1		
		PEAT; wet	1		
15			1		15
			1/12		

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. ANE-1	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / J. Philbin		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 1/21/02-1/21/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Brick; dry (fill)	11		
			9		
			18	6.3	
			18		
		Gray fine to medium SAND, trace Gravel, trace Ash; moist (fill)	4		
			5		
		Black stained fine SAND, trace Gravel, trace Roots; moist (fill)	8	1735	Strong odor.
			20		
		CONCRETE			Slight odor.
5		Black stained fine to coarse SAND, little Silt, trace Gravel; wet (fill)	2		5
			1		
			2	81.3	Slight odor.
			1		
		No recovery			
		Black stained fine to coarse SAND, some Gravel, trace Silt, trace Shells, trace, Glass; wet (fill)	1		
			1		
			1	21.8	Slight odor.
10			1		10
		Black Coal Fragments, trace Silt; wet (fill)	2		
			2		
			1	7.8	Slight odor.
			1		
			1		
		PEAT	1	14.4	
			2		
			3		

Bottom of boring 14 feet below land surface.

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SOIL BORING LOG

WELL NO. ANW-1 (SB-3)	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Roux Associates Inc / P. Barczak		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/2/02-1/2/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to medium SAND, trace Silt, trace Gravel, trace Coal, trace Brick; dry (fill)		0.0	
				0.0	
5		Light brown to black stained fine to medium SAND, trace Silt, trace Gravel; dry (fill)		49.5	Slight odor.
		Black stained fine to coarse SAND, some Silt, trace Gravel, trace Coal; wet (fill)		91.5	
		Black stained fine to coarse Sand and Silt, trace Gravel; wet (fill)		7.2	Slight odor and sheen on water.
10					
		Black stained SILT, little fine to coarse Sand, trace Gravel; (fill)		35.2	Slight odor.
15					
		Black stained Silt and fine Sand; wet		0.0	
		PEAT, little green to gray Silt, trace Sand; wet (fill)			Sheen on water.
20					

Bottom of boring 20 feet below land surface.

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SOIL BORING LOG

WELL NO. AS-2	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Roux Associates Inc / P. Barczak		GEOGRAPHIC AREA Area A		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/8/02-1/8/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to black stained fine to coarse SAND, trace Gravel, trace Brick; dry (fill)			
				0.0	
		Black stained fine to medium SAND, trace Gravel; dry to wet (fill)		6.7	
5				4.9	
				56.8	Trace free product.
		Black stained fine to coarse SAND, little Gravel, trace Silt; wet (fill)			
10				22.3	
		No recovery			
15					

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. ASW-1 (SB-2)	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Roux Associates Inc / P. Barczak		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/2/02-1/2/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Fine to medium SAND, trace Silt, trace Gravel, trace Glass, trace Brick; dry (fill)		0.0	
				225	
		Black stained fine to coarse SAND, trace Brick; dry (fill)		71.2	Strong odor.
5				58.4	
		Black stained SILT, trace fine to medium Sand, trace brick; wet (fill)		201	
				221	Free product.
		Black stained coarse to fine Sand and Silt, trace Gravel, trace Brick; wet (fill)			
10		Brown coarse to fine Sand and Silt, trace Gravel; wet (fill)			
		Dark brown SILT, some fine to medium Sand, trace Gravel; wet			
15		PEAT			

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. ASW-2	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Roux Associates Inc / P. Barczak		GEOGRAPHIC AREA Area A		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/8/02-1/8/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to black stained fine to medium SAND, trace Gravel, trace Brick trace Coal Fragments; dry (fill)		3.5	
				3.5	Strong odor.
5		Brown to black stained SAND, some Silt, trace Gravel, trace Coal Fragments; dry to wet (fill)		148	
				237	Strong odor and free product.
10		Gray to green Silt and fine Sand; wet (fill)		32.9	
15		No recovery			

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. AN-11	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY C. Battista	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / S. Miller		GEOGRAPHIC AREA Area A		
DRILL BIT DIAMETER/TYPE 4.25-in. / Auger	BOREHOLE DIAMETER 8-inches	DRILLING EQUIPMENT/METHOD Mobile Drill B-61 / HSA	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 3/19/02-3/19/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Light brown medium to coarse SAND, trace Gravel, trace fine Sand, trace Coal Fragments; dry to moist (fill)	7		
		8	3.1	
		7		
		10	0.8	
	Dark brown fine to coarse SAND, trace Silt, trace Gravel, trace Coal Fragments, trace wood; moist (fill)	7		
		6	0.0	
		7		
		6	3.2	
	Light brown to dark brown fine to coarse SAND, little Silt, little Gravel; moist to wet (fill)	10		
5		2	0.0	5
		3		
		5	0.0	
	Dark brown fine to coarse SAND, some Wood, some Organic Material, trace Gravel; wet (fill)			
			2.4	
			4.7	
	Brown to dark brown fine to coarse Sand and Silt, little Organic Material, little Coal Fragments, trace Ash; wet (fill)	3		
		2		
		1	2.6	
10		1		10
	Dark brown to black stained SAND, some Gravel, some Silt; wet (fill)	3		
		2		
		4		
		6		
	Brown to black stained fine to coarse Sand and Cinders, and Ash, some Coal Fragments; wet (fill)			
			2.6	Organic odor.
15	Brown PEAT; moist			15
				Organic odor.

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. AN-12	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue Brooklyn, New York		
APPROVED BY S. Glash	LOGGED BY C. Battista			
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / S. Miller		GEOGRAPHIC AREA Area A		
DRILL BIT DIAMETER/TYPE 4.25-in. / Auger	BOREHOLE DIAMETER 8-inches	DRILLING EQUIPMENT/METHOD Mobile Drill B-61 / HSA	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 3/19/02-3/19/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Light brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; moist (fill)	11, 9, 8	0.0	
		Light brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; moist (fill)	12, 10, 6	0.0	
		Dark brown fine to coarse Sand and Gravel, trace Silt, trace Brick, trace Coal Fragments; moist (fill)	5, 7, 3	0.0	
5		Light brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; moist to wet (fill)	6, 9, 4	0.0	5
		Light brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; wet (fill)		0.0	
		Light brown to dark gray fine to coarse SAND, little Silt, trace Gravel; wet (fill)			
		Dark gray to brown and green Silt and fine Sand, some Organic Material; wet (fill)		2.4	Odor.
10		Brown to black stained fine to coarse SAND, little Silt, little Organic Material, trace Gravel, trace Coal Fragments; wet (fill)		3.6	Odor. 10
		Black stained fine to coarse SAND, trace Gravel, trace Silt, trace Coal Fragments; wet (fill)		4.0	Odor.

Bottom of boring 14 feet below land surface.

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SOIL BORING LOG

WELL NO. BNE-E-2	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Roux Associates Inc / C. Battista		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/11/02-1/11/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Dark brown fine to coarse SAND, trace Silt, trace Gravel, trace Brick; dry (fill)		2.1	
		Brown to black stained fine to coarse SAND, some Brick, some Concrete; moist (fill)		7.0	
5					5
		Black stained fine to coarse SAND, trace Silt, trace Coal Fragments, trace Ash; moist to wet (fill)		96.3	
				26.7	
		Black stained fine SAND; little Silt, trace Gravel; wet (fill)		5.5	
					Trace free product.
10					10
		Green to gray Peat and Clay, trace Silt; wet			
		Green to gray Peat and Clay, trace Sand, trace Silt; wet			
15					15

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. BNW-2 (BOW-2)	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Roux Associates Inc / P. Barczak		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/10/02-1/10/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Dark brown fine to coarse SAND, trace Gravel, trace Brick; dry (fill)			
				3.2	
					Free product.
		Gray to brown fine to medium SAND, some Silt, trace Gravel, trace Coal Fragments, trace Ash, trace Brick; moist to wet (fill)			
5				61.4	5
				126	
		Black stained fine to coarse SAND, some Silt, trace Gravel, trace Ash; wet (fill)			
10				665	Free product. 10
		Black stained fine to medium Sand and Silt, trace Gravel; wet (fill)			Odor and free product.
				175	
					Refusal at 13 feet below land surface.

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SOIL BORING LOG

WELL NO. BS-1 (SB-9)	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Zebra Environmental Inc / L. Davis		GEOGRAPHIC AREA Area B		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/4/02-1/4/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Brick; dry (fill)			
				1.8	
		Black stained coarse Sand and Gravel, trace Silt, trace Brick; dry (fill)			
5				253	5
		Black stained fine to medium Sand, and Silt, trace Gravel; wet (fill)		125	Strong odor.
		Gray Silt and Peat; wet		12.1	
		Gray SILT, little Sand, Little Clay; wet		11.8	
		Brown Peat and gray Silt, some Sand; wet		12.7	
10				6.1	10
				13.2	
		Gray to brown SILT, little Clay, trace Sand; wet			Free product.
		Brown SILT, little Sand, trace Gravel; wet		234	
				12.1	
		Black stained Sand and Silt; wet		59.5	
		Brown to black stained Sand and Silt; wet			
15				28.7	15
				37.2	

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. BS-2	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Roux Associates Inc / P. Barczak		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/10/02-1/10/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Orange to brown fine to coarse SAND, trace Silt, trace Gravel, trace Concrete, trace Brick; dry (fill)		3.4	
1					1
2					2
3					3
4		Green to grey Peat and Clay, some Sand, some Silt;		7.6	4
5					5
6					6
7					7
8					8

Bottom of boring 8 feet below land surface.

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SOIL BORING LOG

WELL NO. CB-1	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. /		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 4.25-in. / Auger	BOREHOLE DIAMETER 8-inches	DRILLING EQUIPMENT/METHOD CME-75 / HSA	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 1/17/02-1/17/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Concrete, trace Brick; dry (fill)			
1					
2					
			13	62.4	
3			26		
			38		
4			34		
		Green to black stained fine to medium SAND, some Silt, trace Gravel, trace Brick trace Coal; moist (fill)	8		
5			8		
			8	650	Strong odor.
6			8		
		Brick and Gravel, trace Sand; moist to wet (fill)	16		
7			31		
			46	960	Strong odor and free product.
8			29		
					Refusal at 8 feet below land surface.

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SOIL BORING LOG

WELL NO. CN-10N	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / J. Philbin		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 2/28/02-2/28/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to tan fine to medium SAND, trace Gravel, trace Brick, trace Concrete; dry (fill)	17, 32, 35, 42		
		Brown to tan fine to medium SAND, trace Gravel, trace Brick, trace Concrete; dry (fill)	48, 45, 39, 47	1.4	
		Brown and green to black stained SILT, trace Sand, trace Gravel; wet (fill)	6, 2, 2, 2	0.0	
5		No recovery	2, 3, 1, 1		5
		Gray SILT, trace fine Sand, trace Gravel; wet (fill)	4, 3, 1, 1	0.0	
10		Grey fine Sand and Silt, trace Gravel; wet (fill)		0.0	10
		No recovery	3, 2, 1/12		
		Peat and Clay; wet			
15					15

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. CN-12	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / J. Philbin		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 3/1/02-3/1/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to tan fine to coarse SAND, trace Gravel, trace Brick; dry (fill)	12		
			15		
			25		
			31		
		Brown to tan fine to coarse SAND, trace Gravel, trace Brick; dry (fill)	24	4.5	
			30		
			36		
			42		
		Green and brown to black stained fine Sand and Silt, trace coarse Sand, trace Gravel, trace Wood; wet (fill)	1		
5			1		5
			1	55.1	Slight odor.
			1		
		Brown to green fine to coarse SAND, little Silt, trace Gravel; wet (fill)	2		
			1		
			1	17.6	Slight odor.
			1		
		Dark brown to black stained fine to medium SAND, little Silt, trace Gravel; wet (fill)			
				37.8	
10		No recovery			10
		No recovery			
		Brown fine to medium SAND, some Gravel; wet (fill)			
15					15
				2.8	
		Green and gray Clay and Silt, little Peat; wet			

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
CN-5				
PROJECT NO./NAME: 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION: 124-136 2nd Avenue, Brooklyn, New York		
APPROVED BY: S. Glash	LOGGED BY: D.Moss			
DRILLING CONTRACTOR/DRILLER: Aquifer Drilling & Testing, Inc. / J. Philbin		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE: 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER: 4-inches	DRILLING EQUIPMENT/METHOD: CME-45 / Drive and Wash	SAMPLING METHOD: 2" Split Spoon	START-FINISH DATE: 2/20/02-2/20/02
LAND SURFACE ELEVATION: (FT.)	DEPTH TO WATER: (Feet BLS)	BACKFILL: Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Tan to fine to coarse SAND, trace Gravel, trace Brick, trace Concrete; dry (fill).	8, 21, 23		
		Tan to black stained fine to coarse SAND, trace Gravel, trace Brick, trace Concrete; dry (fill)	31, 15, 17	5.2	
			22		Slight odor.
		Brown to black stained fine to medium SAND, some Silt, trace Gravel; wet (fill)	37, 2, 2	33.0	
5			1, 1	4.0	Slight odor.
		Black stained medium to coarse SAND, little Gravel, trace Silt, trace fine Sand; wet (fill)		5.7	Slight odor.
		Brown to green SILT, little Clay, trace fine to coarse Sand, trace Gravel; wet (fill)		2.3	
10		Black stained medium to coarse SAND, little Gravel, trace Silt, trace Brick; wet (fill)		4.7	
		No recovery			
		Dark brown to black stained coarse Sand and Gravel, trace fine Sand, trace Silt; wet (fill)		3.8	
15		Peat and Clay; wet			

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. CN-6	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / J. Simmons		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 2/6/00-2/6/00
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		CONCRETE			
		Black stained fine to medium SAND, trace Silt, trace Gravel, trace Brick, trace Coal Fragments; moist (fill)	20		
			38		
			25	9.7	Slight odor.
			15		
		Dark brown to black stained fine to medium SAND, some Silt; moist (fill)	12		
			7		
		Dark brown to black stained fine SAND, some Silt; moist (fill)	2		
5			2	1.5	5
		Black stained coarse SAND, little Ash, trace Silt, trace Gravel; wet (fill)	3		
			1	2.1	
		No recovery	2		
			1		
			1		
			1		
		No recovery	1		
			1		
			1		
10			1		10
		Gray to black stained fine to coarse Sand and Gravel, trace Silt, trace Wood, trace Coal; wet (fill)			
				0.0	
		Black stained coarse Sand and Coal Fragments, trace Glass; wet (fill)	6		
			3		
			3	0.0	
			1		
		Black stained coarse SAND, some Coal Fragments, trace Silt, trace Glass; wet (fill)			
15				2.7	15
		PEAT			

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. CN-7	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / J. Philbin		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 2/20/02-2/20/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		CONCRETE			
		GRAVEL			
		Dark brown medium SAND, trace Silt, trace Gravel, trace Brick; moist (fill)			
		Black stained to tan medium SAND, little green Silt, trace Brick; moist (fill)		2.6	
		Black stained medium to coarse SAND, little Silt, trace Gravel; wet (fill)	7		
5			2		5
			2	1.9	
			4		
		Gray to black stained coarse Sand and Gravel, some Coal Fragments, trace Silt; wet (fill)	5		
			1		
			1	0.8	
			1		
		Gray coarse Sand and Gravel, trace Silt, trace Coal Fragments, trace Shell Fragments; wet (fill)			
				2.9	
10					10
		Gray coarse Sand and Gravel, little Silt, trace Coal Fragments, trace Ash; wet (fill)	4		
			2		
			1	2.1	
			1		
		Gray Gravel, little Sand, trace Shell Fragments, trace Ceramic Fragments; wet (fill)	4		
			3		
			2	5.3	
			1		
		Peat and Clay; wet			
15					15

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. CN-8	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / J. Philbin		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 2/8/02-2/8/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Gray to brown medium to coarse SAND, trace Gravel, trace Brick, trace Concrete; moist (fill)	8		
			16		
			17		
			26		
		Gray to brown medium to coarse SAND, trace Gravel, trace Brick, trace Concrete; moist (fill)	15		
			22		
			18		
			27		
		Grey coarse SAND, some Gravel, trace Silt; wet (fill)			
5					5
		Grey coarse SAND, some Gravel, some Silt, little Coal Fragments; wet (fill)			
		Grey coarse SAND, some Gravel, some Silt, little Coal Fragments; wet (fill)	1		
			1		
			1		
10			1		10
		No recovery			
		Grey medium to coarse Coal Fragments, little Silt; wet (fill)			
		Grey coarse Sand and Gravel, some Peat, little Clay; wet			
15					15

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. CNE-3	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / Kari Carli		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/22/02-1/22/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Brick; moist (fill)			
				2.1	
		Brown to black stained fine to coarse SAND, little Silt, trace Gravel; moist (fill)			
5				65.0	Slight odor.
		Black stained fine to coarse SAND, little Brick, little Concrete, trace Silt; moist (fill)		183	Trace free product.
		Black stained fine SAND, little Silt, trace Brick; wet (fill)		171	
				320	
10					Odor and trace free product.
				57.4	
		Black stained fine to coarse SAND, trace Silt, trace Gravel; wet (fill)			
				72.4	
		Red to black stained GRAVEL, little Sand, little Silt, trace Wood; wet (fill)			
15				121	Free product.
		No recovery			
20					Bottom of boring 20 feet below land surface.

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SOIL BORING LOG

WELL NO. CW-1 (SB-14)	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Zebra Environmental Inc / L. Davis		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/7/02-1/7/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to medium SAND, trace Gravel, trace Brick; dry (fill)			
				8.1	
		Light brown fine to medium SAND, dry (fill)			
5					5
		Black stained fine to medium SAND, trace Gravel, trace Silt; wet (fill)		272	
				63.2	Free product.
		Black stained Sand and Gravel, trace Silt; wet (fill)			
10					10
				37.1	Free product.
		Brown to green SILT, little Sand, trace Gravel; wet			
				75.2	
15					15
		PEAT			

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. SB-15-SW	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / Kari Carli		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/23/02-1/23/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to tan fine to coarse SAND, trace Gravel, trace Brick; moist (fill)			
				1.8	
		Brown to black stained fine to medium SAND, trace Gravel, trace Silt, trace Brick; moist (fill)			
5				44.7	5
		Green to black stained fine SAND, trace Silt, trace Gravel, trace Brick; moist (fill)			
				134	Odor and trace free product.
		Black stained to green Silt and fine Sand; wet (fill)			Odor and trace free product.
				108	
		Black stained to brown fine SAND, trace Silt, trace Gravel; wet (fill)			
10					10
				73.2	
		Brown to black stained fine Sand and Silt, trace Gravel; wet (fill)			
				127	
				138	Odor and free product.
15				58.0	15
		Red to black stained fine SAND, some Gravel, trace Silt; wet			
				139	Odor and free product.
		Black stained fine Sand and Silt, trace Gravel; wet (fill)			
				102	
					Free product.
				180	
20					20
					Bottom of boring 20 feet below land surface.

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SOIL BORING LOG

WELL NO. DN-2	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / Kari Carli		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/23/02-1/23/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to black stained fine to coarse SAND, trace Gravel, trace Brick; dry (fill)		23.4	
		Grey fine SAND, trace Silt; dry (fill)			
5		Tan to black stained fine SAND, trace Ash; moist (fill)		348	
		Black stained fine SAND; wet (fill)			
		Black stained SILT, some fine Sand, trace Gravel; wet (fill)		291	Free product.
		Black stained fine SAND, trace Silt, trace Gravel; wet (fill)		452	Strong odor and free product.
10		Dark green to tan fine Silt and fine Sand, trace Clay, trace Gravel; wet (fill)		88.2	Free product.
				37.8	
		Green to black stained fine SAND, some Silt, trace Gravel; wet (fill)		21.2	
				78.8	Slight odor and free product.
15		Green to tan fine SAND, little Silt; wet (fill)		27.2	
		Black stained fine SAND, some Silt; wet (fill)		237	Slight odor.
		Green to black stained Sand, and Silt; wet		522	
		Black stained fine SAND, trace Silt; wet		25.8	
20				179	Trace free product. Bottom of boring 20 feet below land surface.

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SOIL BORING LOG

WELL NO. DS-2	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue Brooklyn, New York		
APPROVED BY S. Glash	LOGGED BY D.Moss			
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / Kari Carli		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/22/02-1/22/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to gray medium to coarse SAND, trace Gravel, trace Ash; moist (fill)			
				12.7	
		Brown to black stained fine SAND, some black fine to medium Sand, little Silt; moist (fill)			Strong odor.
5				12.7	
		Brown SILT, little Sand, trace Gravel; wet (fill)			
				38.7	Trace free product.
		Brown to dark green SILT, little fine Sand; wet (fill)			
10				6.1	Sheen.
		Dark brown to black stained fine SAND, little Silt, trace Gravel; wet (fill)			
				31.7	
15					
		Dark brown fine SAND, little Silt; wet (fill)			
					Trace free product.
20					

Bottom of boring 20 feet below land surface.

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SOIL BORING LOG

WELL NO. GH-21 (SB-8)	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Zebra Environmental Inc / L. Davis		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/4/02-1/4/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown medium to coarse SAND, trace Silt, trace Gravel, trace Brick; dry (fill)		0.4	
		Black stained fine stained to coarse Sand and Silt, trace Gravel, trace Roots; moist (fill)		13.3	
5				32.2	
				20.1	Strong odor.
				59.9	
		Brown fine to medium Sand and Silt, trace Gravel, trace Brick; wet (fill)		19.4	
				38.3	
10		Black stained fine to medium Sand and Silt, trace Gravel, trace Coal Fragments, trace Brick; wet (fill)		10.2	Free product.
				55.8	
		Black stained fine to medium Sand and Silt, trace Gravel, trace Coal, trace Brick; wet (fill)		26.5	
				62.5	
				29.9	
15				49.4	
		PEAT			

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO.	NORTHING	EASTING		
SB7-N2				
PROJECT NO./NAME		LOCATION		
92401Y02 / FCRC 2nd Avenue MGP Site		124-136 2nd Avenue		
APPROVED BY	LOGGED BY			
S. Glash	D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER		GEOGRAPHIC AREA		
Roux Associates Inc / P. Barczak				
DRILL BIT DIAMETER/TYPE	BOREHOLE DIAMETER	DRILLING EQUIPMENT/METHOD	SAMPLING METHOD	START-FINISH DATE
2-in. / Drive Sampler	2-inches	/ Geoprobe	2" Macro-Core	1/9/02-1/9/02
LAND SURFACE ELEVATION	DEPTH TO WATER	BACKFILL		
(FT.)	(Feet BLS)	Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Brick; dry (fill)		1.9	
1					1
2					2
3		Black stained fine SAND, some Silt; moist (fill)			3
4		Black stained fine to coarse SAND, some Silt, little Gravel, trace Wood; moist (fill)		19.5	Slight odor. 4
5					Slight odor. 5

Refusal at 5 feet below land surface.

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SOIL BORING LOG

WELL NO. SB7-S2	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Roux Associates Inc / P. Barczak		GEOGRAPHIC AREA		
DRILL BIT DIAMETER/TYPE 2-in. / Drive Sampler	BOREHOLE DIAMETER 2-inches	DRILLING EQUIPMENT/METHOD / Geoprobe	SAMPLING METHOD 2" Macro-Core	START-FINISH DATE 1/9/02-1/9/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Cuttings/Bentonite Pellets		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Brick; dry (fill)			
		Black stained fine SAND, some Silt; moist (fill)		9.4	
		Black stained fine to medium SAND, trace Silt, trace Gravel, trace Brick; dry (fill)			
5				140	Strong odor.
		Brown fine Sand and Silt, trace Gravel; wet (fill)		56.8	
		Gravel and Brick, some gray Silt, some Sand; wet (fill)			
10					
		Brown to green Peat and Clay; wet			
15					

Bottom of boring 16 feet below land surface.

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SOIL BORING LOG

WELL NO. GH-1A	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY R. Kovacs	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / D. Pepe		GEOGRAPHIC AREA Gas Holder 1		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 3/15/02-3/20/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to dark brown fine to coarse SAND, little Brick; dry (fill)		13.1	
		Brown to dark brown fine to medium SAND, some Brick; dry (fill)		27.7	
		Brown to dark brown fine to medium Sand; dry (fill)		9.8	Odor.
5					5
		Light brown to dark brown fine to medium Sand, some Brick, little Ash; dry (fill)		11.7	
		Brown to reddish brown fine to medium SAND, some Brick, trace Gravel; dry (fill)		12.1	
10		Brown medium SAND, some Brick; dry (fill)		7.3	10
		Brown medium SAND, trace Cobbles; dry (fill)		9.2	
		Brown fine to medium SAND, trace Brick; dry (fill)		9.1	
15					15
		Brown fine to medium SAND, some Gravel, some Brick; dry (fill)		10.3	
		CONCRETE			
		Grey fine Sand and Silt, trace Gravel, trace Concrete; wet			
20					20
		Black stained fine SAND, trace Gravel, trace Concrete; wet		179	
					Free product.
		Black stained fine SAND, some Concrete; wet			

Bottom of holder at 24 feet below land surface.

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SOIL BORING LOG

WELL NO. GH-1B	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue Brooklyn, New York		
APPROVED BY S. Glash	LOGGED BY C. Battista			
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / S. Miller		GEOGRAPHIC AREA Gas Holder 1		
DRILL BIT DIAMETER/TYPE 4.25-in. / Auger	BOREHOLE DIAMETER 8-inches	DRILLING EQUIPMENT/METHOD Mobile Drill B-61 / HSA	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 3/18/02-3/18/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, some Gravel, little Brick, little Concrete; dry (fill)			
		Brown fine to coarse SAND, some Gravel, little Brick, little Concrete; dry (fill)			
		Brown fine to coarse SAND, some Gravel, trace Brick, trace Concrete; dry (fill)		6.5	
5					5
		Brown fine to coarse SAND, little Brick, trace Coal Fragments, trace Concrete, trace Gravel; dry (fill)		2.9	
		Brown fine to coarse SAND, little Brick, little Gavel, trace Coal Fragments; dry (fill)		5.2	
10					10
		Brown fine to coarse SAND, little Brick, little Gravel, trace Concrete, trace Coal Fragments; dry (fill)		8.7	
		Brown fine to coarse SAND, some Gravel, little Brick, trace Coal Fragments; dry (fill)		12.3	
		Brown fine to coarse SAND, some Gravel, little Brick, trace Coal Fragments; dry (fill)			
15					15
					Bottom of boring 15 feet below land surface.

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SOIL BORING LOG

WELL NO. GH-1C	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue		
APPROVED BY S. Glash	LOGGED BY D.Moss	Brooklyn, New York		
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / L. Adams		GEOGRAPHIC AREA Gas Holder 1		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-45 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 3/18/02-3/18/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Brick, trace Gravel, trace Concrete; moist (fill)			
		Brown fine to coarse SAND, trace Brick, trace Gravel, trace Concrete; moist (fill)			
5		Brown fine to coarse SAND, trace Brick, trace Gravel, trace Concrete; moist (fill)		2.3	
		Brown medium to coarse SAND, trace Gravel, trace Brick, trace Silt; moist (fill)		0.0	
		Brown medium to coarse SAND, trace Gravel, trace Brick; moist (fill)		0.0	
10		Brown medium to coarse SAND, trace Silt, trace Gravel, trace Brick, trace Coal Fragments; wet (fill)		0.0	
		Brown medium to coarse SAND, trace Silt, trace Gravel, trace Brick, trace Coal Fragments; wet (fill)		15.2	
15		Brown to tan fine to coarse SAND, trace Gravel, trace Brick, trace Concrete; wet (fill)		3.7	
		Tan to black stained fine to coarse SAND, trace Gravel, trace Concrete, trace Brick; wet (fill)		43.1	Odor.

Bottom of soil boring 17.5 feet below land surface.

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SOIL BORING LOG

WELL NO. GH-3B	NORTHING	EASTING		
PROJECT NO./NAME 92401Y02 / FCRC 2nd Avenue MGP Site		LOCATION 124-136 2nd Avenue Brooklyn, New York		
APPROVED BY S. Glash	LOGGED BY D. Moss			
DRILLING CONTRACTOR/DRILLER Aquifer Drilling & Testing, Inc. / L. Adams		GEOGRAPHIC AREA Gas Holder 3		
DRILL BIT DIAMETER/TYPE 3 7/8 inch / Tri-Cone	BOREHOLE DIAMETER 4-inches	DRILLING EQUIPMENT/METHOD CME-75 / Drive and Wash	SAMPLING METHOD 2" Split Spoon	START-FINISH DATE 3/15/02-3/19/02
LAND SURFACE ELEVATION (FT.)	DEPTH TO WATER (Feet BLS)	BACKFILL Grout		

Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
1		Brown coarse to fine SAND, trace Silt, trace Gravel, trace Brick; dry to wet (fill)			Lithology from 0 to 5 feet interpreted from previous Site investigation.
2					
3					
4					
5		Black stained fine to coarse SAND, some Gravel, little Silt; wet (fill)	4		Odor and free product.
6		Concrete and 1.5 inches of steel	4		
7			50/1		
8		Wood and Concrete fragments; wet	80		Odor and trace free product.
9			38		
10		Peat	25		Free product in groundwater around sample in split spoon; no product observed within the sample.
11			21		Bottom of boring 11 feet below land surface.

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LOG OF BORING LB7

SHEET 1 OF 2

PROJECT: Loews @ Gowanus	PROJECT NO.: 1531601
LOCATION: Brooklyn, NY	ELEVATION AND DATUM: approx. el 11 [BBHDD]
DRILLING EQUIPMENT: Davey Kent DK50RA Track Rig	DATE STARTED: 11/19/98; DATE FINISHED: 11/24/98; COMPLETION DEPTH: 77 ft.
SIZE AND TYPE OF BIT: HW and NQ Rock Cores and Tri-Cone Roller Bit	NUMBER OF SAMPLES: DIST. 18; UNDIST. 1; CORE —
CASING DIAMETER (in): 4 1/2" OD 4" ID; CASING DEPTH(ft): 7	WATER LEVEL (ft.): FIRST ▽ ----- ; COMPL. ▼ ----- ; 24 HR. ▼ 6.5
SAMPLER: Standard Solit Spoon (SS) or Shelby Tube (ST)	DRILLING FOREMAN: Gus Suri/Mike Chizmar
SAMPLER HAMMER; WEIGHT(lbs): 140; DROP(in): 30	INSPECTING ENGINEER: Gary L. Gleason

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST BL/6in	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
approx. el 11	5" CONCRETE w/ wire mesh								*New York City BC Classification numbers in parenthesis
	5" CONCRETE								
	Inferred miscellaneous FILL (11-65)*								Started coring w/ water
	Gray/black f.-c. SAND, some silt (11-65)			S1	SS	7	28 47 54 20	101	Lost some water D = 1.5'
									PID = 400 ppm
									Petroleum like material odor
									On/off rig chatter D = 1.5' - 4.5'
	Black SILT/PETROLEUM LIKE MATERIAL, some c. sand, and white cement fragments, trace f.-m. sand and clay (11-65)		5	S2	SS	2	4 2 1 50/1"	3	Petroleum like material in wash D = 4.75'
0.0									Spoon refusal 50/1" w/ bouncing D = 6'
									PID = 480 ppm
	Piece of STEEL								A 16" x 4" x 1/4" piece of vertical steel on a 1/2" thick base plate D = 7' w/ 2" wide horizontal pieces of steel, which were cut, at the top inside and bottom outside D = 6' - 7'
	Inferred miscellaneous FILL (11-65)								
0.0	0.5" STEEL			S3					
0.0	CONCRETE								
	Petroleum like material treated WOOD (11-65)		10						Lost some water D = 8' - 9.25'
	Inferred WOOD (11-65)			-	SS	0	WOR WOR WOR WOR	WOR	Added mud D = 9.25'
	Inferred Brown PEAT, some silt (11-65)								Drilled through WOOD and lost circulation D = 9.75'
									WOR: Weight of rods
									WOR went from D = 10' - 15'
	Inferred Brown PEAT, some silt (11-65)		15	S4	SS	0	WOH WOH WOH WOH	WOH	WOH: Weight of hammer
									Sample S4 SS lip material
									PID = 590 ppm
									WOH went from D = 15' - 17.5'
	Brown PEAT, some silt (11-65)			T1	ST	24	PUSH PUSH PUSH PUSH	PUSH	
	Brown/gray f. SAND, some silt (8-65)								Visible petroleum like material w/ odor
	Brown f. SAND, some silt (8-65)		20	S5	SS	19	1 3 3 4	6	Pushing became more difficult D = 19.25'
									Added mud D = 20'
									PID = 920 ppm
	Brown f. SAND, trace silt and clay (8-65)		25	S6	SS	11	34 42 33 40	75	PID = 700 ppm
									Trace wood fibers in wash D = 27' - 30.5'
									Tight fit for bit D = 27' - 30.5'
			30						
	Brown f.-m. SAND, trace silt (7-65)			S8 S7	SS	7	18 19 11 12	30	1" of WOOD FIBERS, trace f.-m. sand w/ PID = 170 ppm in top of SS
									PID = 750 ppm
									Brown SILT, trace clay and f. sand in SS lip D = 32.5'
	Brown SILT, trace clay and f. sand (10-65)		35	S10 S9	SS	18	3 3 2 3	5	PP = 0.1 - 0.3 tsf
	Gray CLAY, some silt (9-65)								PID = 640 ppm
									PP = 0.6 - 0.9 tsf
									PID = 320 ppm
	Gray/brown CLAY, some silt, trace f. sand (9-65)		40	S11	SS	17	WOH 2 2 4	4	PP = 0.4 - 0.65 tsf
									PID > 2000 ppm

BORING 1531601.GPJ LANGANFL.GDT 22/12/98

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LOG OF BORING LB7

SHEET 2 OF 2

PROJECT	PROJECT NO.
Loews @ Gowanus	1531601
LOCATION	ELEVATION AND DATUM
Brooklyn, NY	approx. el 11 [88HDD]

ELEV. (ft)	SAMPLE DESCRIPTION	SYMBOL LOG	DEPTH SCALE	SAMPLE DATA: NUMBER	TYPE	RECOV. (in)	PENETR. RESIST. BLOWS	N-VALUE BLOWS PER FT	REMARKS (DRILLING FLUID, DEPTH OF CASING, FLUID LOSS, DRILLING RESISTANCE, ETC.)
	Brown CLAY, some silt, trace f. sand (9-65)		45	S12	SS	13	4 4 4 4	8	PP = 0.6 - 0.65 tsf PID = 170 ppm
	Brown f. SAND, trace silt (8-65)		50	S13	SS	14	13 31 23 19	56	PID = 550 ppm Rig chatter D = 52.25' - 53'
	Brown f.-c. SAND, trace silt and f.-m. gravel (6-65)		55	S14	SS	10.5	24 20 24 24	44	PID = 710 ppm Added mud D = 57' - 58' Rig chatter D = 57.5 - 58'
	Red brown f.-c. SAND, trace silt and f.-m. gravel (6-65)		60	S15	SS	8	10 36 31 22	67	PID = 40 ppm On/off rig chatter D = 60' - 65'
	Red brown f.-c. SAND, some f.-m. gravel, trace silt (6-65)		65	S16	SS	8	28 42 22 19	64	PID = 640 ppm On/off rig chatter D = 65' - 70'
	Red brown f.-c. SAND, some f.-m. gravel, trace silt (6-65)		70	S17	SS	7.5	43 26 22 25	46	PID = 20 ppm On/off rig chatter D = 70' - 75'
	Red brown f.-c. SAND, some f.-m. gravel, trace silt (6-65)		75	S18	SS	8	38 28 22 25	50	PID = 540 ppm Borehole grouted upon completion
	Boring terminated D = 77'		80						
			85						
			90						

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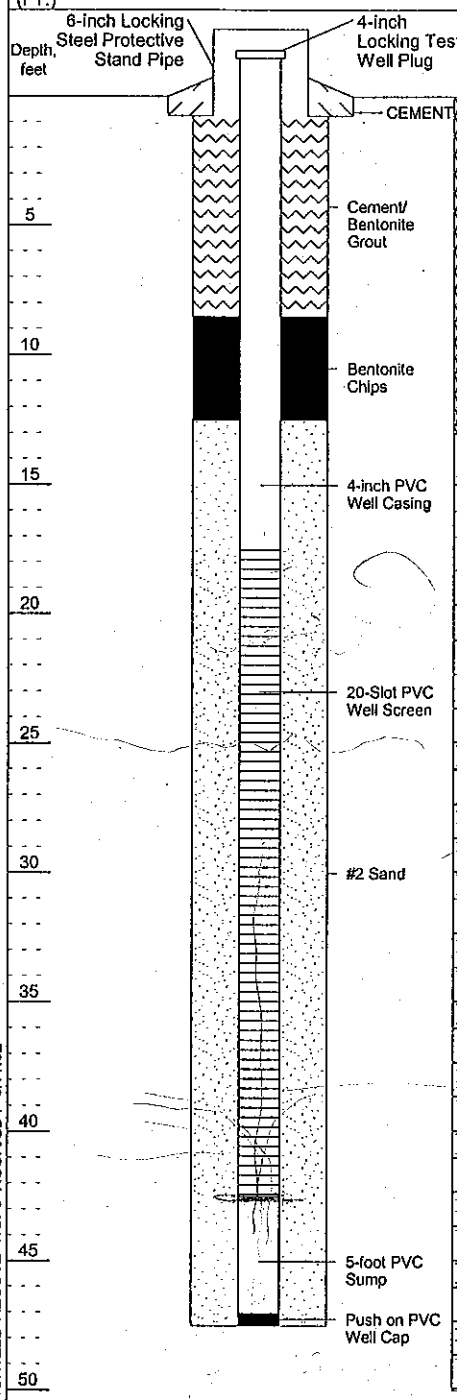
WELL CONSTRUCTION LOG

WELL NO. **RW-1**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / S. Miller**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **Mobile Drill B-61 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/18/02-4/1/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, some Gravel, trace Brick; dry to wet (fill)			
5				Strong odor
	Brown fine to coarse SAND, some Silt, little Gravel, trace Brick; dry to wet (fill)		21.8	Sheen and strong odor
	No recovery			
10				
	Brown to dark brown fine to coarse Sand, and Gravel, little Silt, little Wood; wet (fill)		29.3	Sheen and strong odor
	Brown to red fine to coarse SAND, some Silt, little Gravel, trace Brick, trace Concrete; wet (fill)		13.7	
15	Green to grey PEAT; moist			Thickness of peat interval interpreted from previous Site investigation
	Dark gray Silt and fine Sand; wet		4.5	Strong odor
20				
	Dark gray Silt and fine Sand; wet		5.8	
25				
	Dark gray Silt and fine Sand, trace Gravel; wet		10.4	
30				
	Brown Silt and fine Sand; wet			Sheen and strong odor
35				
	Brown Silt and fine Sand; wet		79.4	Sheen and strong odor
40				
	Brown Silt and fine Sand; wet			Trace free product
45				
	Brown Silt and fine Sand; wet		30.1	Bottom of well 47.5 feet below land surface
50				

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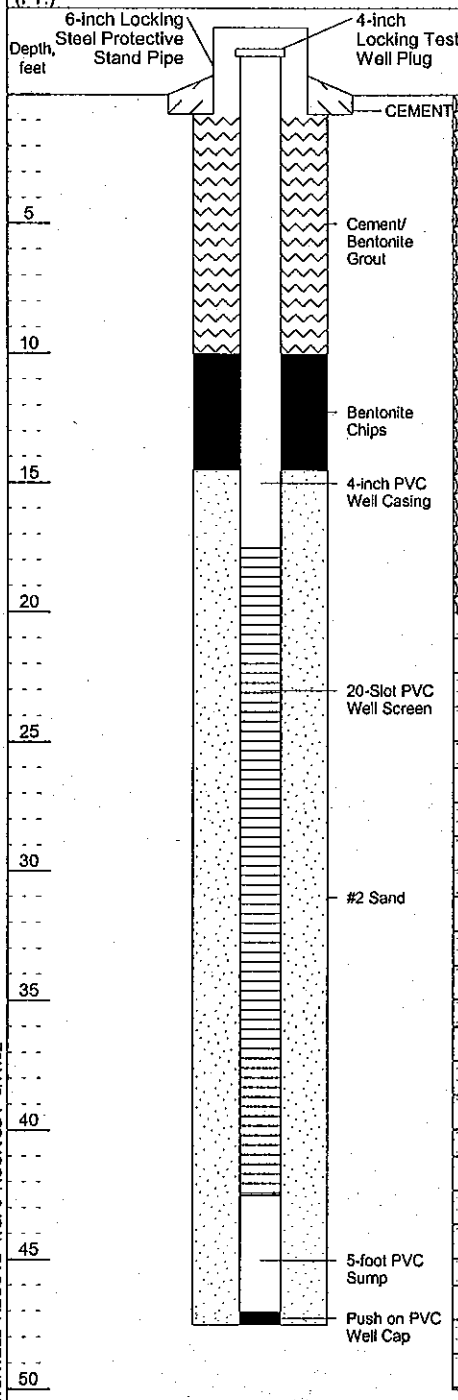
WELL CONSTRUCTION LOG

WELL NO. **RW-2**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / S. Miller**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **Mobile Drill B-61 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/21/02-3/29/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, little Gravel, trace Silt, trace Brick, trace Coal Fragments; dry to wet (fill)			
5				5
10				10
	Brown fine to coarse SAND, trace Silt, trace Gravel; wet (fill)		0.3	
	Brown fine to medium SAND, trace Silt, trace Gravel; wet (fill)		0.3	
15	Brown fine to medium SAND, trace Silt, trace Gravel; wet (fill)		0.6	15
	Brown fine to medium SAND, trace Silt, trace Gravel, trace Wood; wet (fill)		0.1	
	Brown fine to medium SAND, trace Silt, trace Gravel, trace Wood; wet (fill)		0.1	
20	Brown Silt and fine Sand, little coarse Gravel; wet			20 Strong odor
			126	
25	Brown Silt and fine Sand, little Gravel; wet			25 Strong odor
			303	
30	Brown Silt and fine Sand, little Gravel; wet			30 Trace free product
			493	
			274	
35	Brown Silt and fine Sand, little Gravel; wet			35 Free product
			311	
40	Brown Silt and fine Sand, little Gravel; wet			40 Free product
			893	
45	Dark gray to brown fine SAND, little Silt; wet			45 Free product
			>2000	
50				50 Bottom of well 47.5 feet below land surface

BORING/WELL RECOVE~1.GPJ ROUX.GDT 6/11/02

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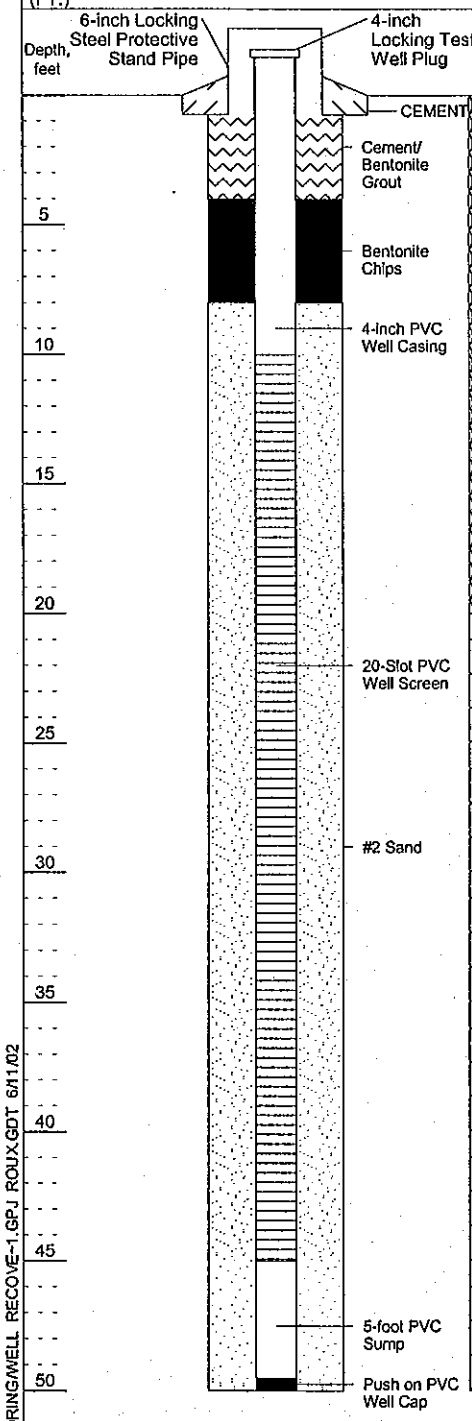
WELL CONSTRUCTION LOG

WELL NO. **RW-3**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/21/02-3/28/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **35.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Brick; wet at 5 (fill)			
5					
10					
		Brown fine to coarse SAND, little Gravel, little Brick, trace Silt; wet (fill)		0.0	
		Brown fine to coarse SAND, little Gravel, little Brick, trace Silt; wet (fill)		0.0	
15		Brown fine to coarse SAND, trace Gravel, trace Silt; wet (fill)		1.4	
		Brown fine to medium SAND, trace Silt, trace Gravel; wet (fill)		5.7	Strong odor and trace free product
		Brown fine to medium SAND, trace Silt, trace Gravel; wet (fill)		1.4	Trace free product
20		Brown fine to coarse SAND, little Silt; wet			Odor
				27.4	
25		Brown fine to coarse SAND, little Silt, trace Gravel; wet			Odor
				15.1	
30		Brown fine to coarse SAND, little Silt, trace Gravel; wet			Free product
				152	
35		Brown SILT, some fine Sand, trace coarse Sand; wet			Odor and free product
				98.1	
40		Brown fine SAND, little Silt, trace Gravel; wet			Odor and free product
				237	
45		Brown fine SAND, little Silt, trace Gravel; wet			Free product
				1681	
50					Bottom of well 50 feet below land surface

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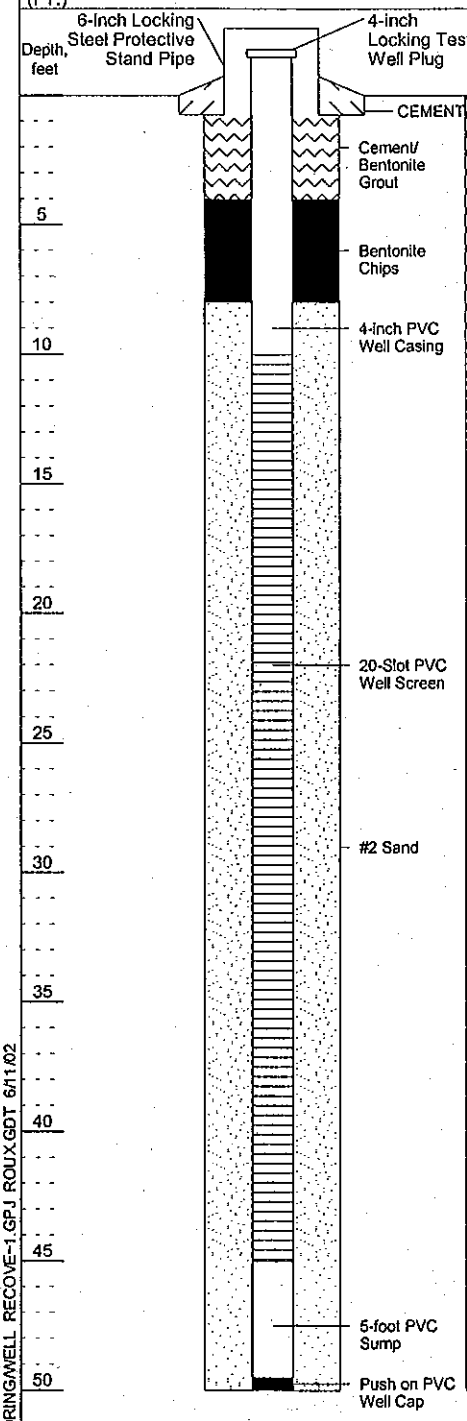
WELL CONSTRUCTION LOG

WELL NO. **RW-4**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/21/02-3/28/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **35.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, trace Brick, trace Silt, trace Gravel; wet at 5 (fill)			
5				
10				
	Brown fine to coarse SAND, trace Brick, trace Silt, trace Gravel; wet (fill)		0.1	
	Brown fine to coarse SAND, trace Brick, trace Silt, trace Gravel; wet (fill)		1.6	Odor
15	Brown fine to coarse SAND, trace Brick, trace Silt, trace Gravel; wet (fill)		1.6	Odor
	Brown fine to coarse SAND, trace Brick, trace Silt, trace Gravel; wet (fill)		0.9	Slight odor
	Brown fine to medium SAND, trace Gravel, trace Silt; wet		1.9	
20	Brown fine to medium SAND, trace Gravel; wet (fill)		4.7	
	Gray fine SAND, little Wood; wet (fill)			Black staining and strong Odor
	Brown fine to coarse SAND, little Silt, trace Gravel; wet		26.8	
25	Brown fine to coarse SAND, some Silt, trace Gravel; wet		7.2	Odor and trace free product
30	Brown fine to coarse SAND, some Silt, trace Gravel; wet		5.6	Odor and trace free product
35	Brown fine to coarse SAND, some Silt, trace Gravel; wet		14.9	Odor and trace free product
40	Brown fine to coarse SAND, some Silt, trace Gravel; wet		35.1	Free product
45	Brown fine to coarse SAND, some Silt, trace Gravel; wet		87.4	Free product
50				Bottom of well 50 feet below land surface

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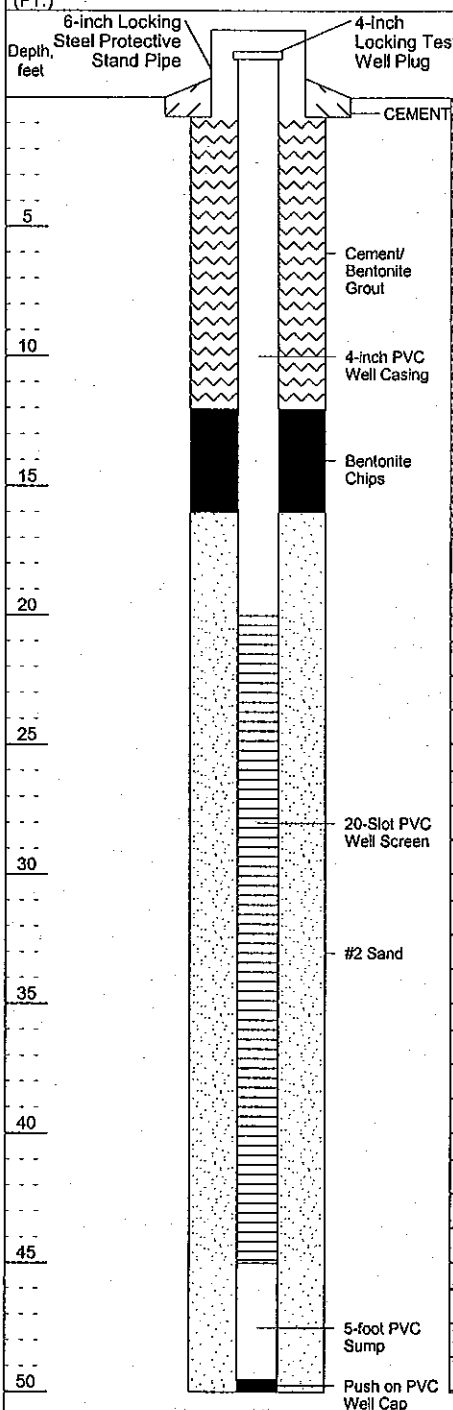
WELL CONSTRUCTION LOG

WELL NO. **RW-5**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / S. Miller**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **Mobile Drill B-61 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/21/02-3/27/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown coarse to fine SAND, trace Gravel, trace Brick, trace Silt; dry to wet (fill)			
5				5
10				10
	Brown fine SAND, trace Silt, trace Gravel; wet (fill)		0.0	
	Brown fine SAND, trace Silt, trace Gravel; wet (fill)		3.3	
15	Brown fine SAND, little Silt, trace Gravel; wet (fill)		9.5	Black staining 15
	No recovery			
	Green to gray Peat and Clay, trace Sand; wet		14.6	Thickness of peat interval interpreted from previous Site investigation
20				20
	Brown fine to coarse SAND, little Silt, little Gravel; wet		2.6	Strong odor
25	Brown fine to coarse SAND, some Silt; wet		1.7	Strong odor 25
30	Brown fine to coarse SAND, some Silt, trace Gravel; wet		106	Strong odor 30
35	Brown fine to coarse SAND, some Silt, trace Gravel; wet		134	Trace free product 35
40	Brown fine to coarse SAND, some Silt; wet		281	Free product 40
45	Brown Silt and fine Sand; wet		375	Odor and free product 45
50				50 Bottom of well 50 feet below land surface

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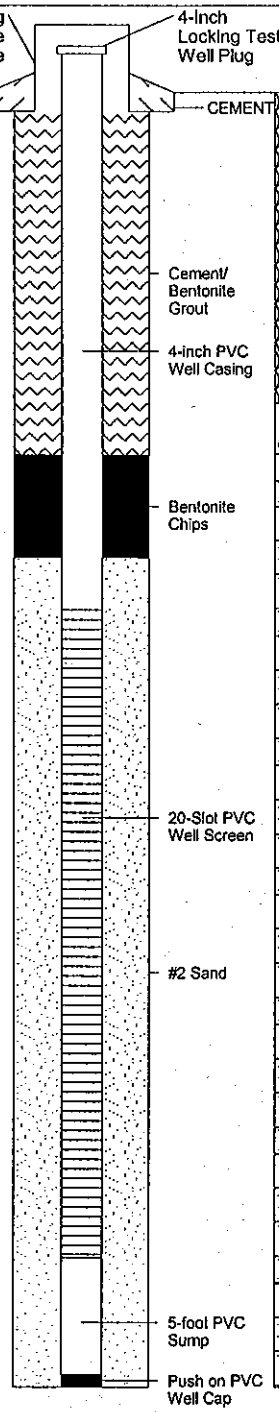
WELL CONSTRUCTION LOG

WELL NO. **RW-6**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/21/02-3/25/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, trace Gravel, trace Brick, trace Silt; dry to wet (fill)			
5				5
10	Brown fine SAND, little Silt, trace Brick; wet (fill)		1.6	Odor and Black Staining
	Green to gray Peat and Clay, trace brown Sand; moist		7.3	
15			5.9	Thickness of peat interval interpreted from previous Site investigation Black staining Odor
	Fine SAND, trace Gravel, trace Silt; wet			
20	Gray fine SAND, little Silt, trace Gravel; wet		1.9	Black staining Odor
25	Gray fine SAND, little Silt, trace Gravel; wet		4.7	Slight Odor
30	Grey SILT, Some fine Sand; wet		156	Odor
35	Brown to green fine SAND, some Silt; wet		350	Odor
40	Brown to green fine SAND, some Silt; wet		1254	Odor
45	Brown to green fine SAND, some Silt; wet		1824	Odor
50				Bottom of well 50 feet below land surface

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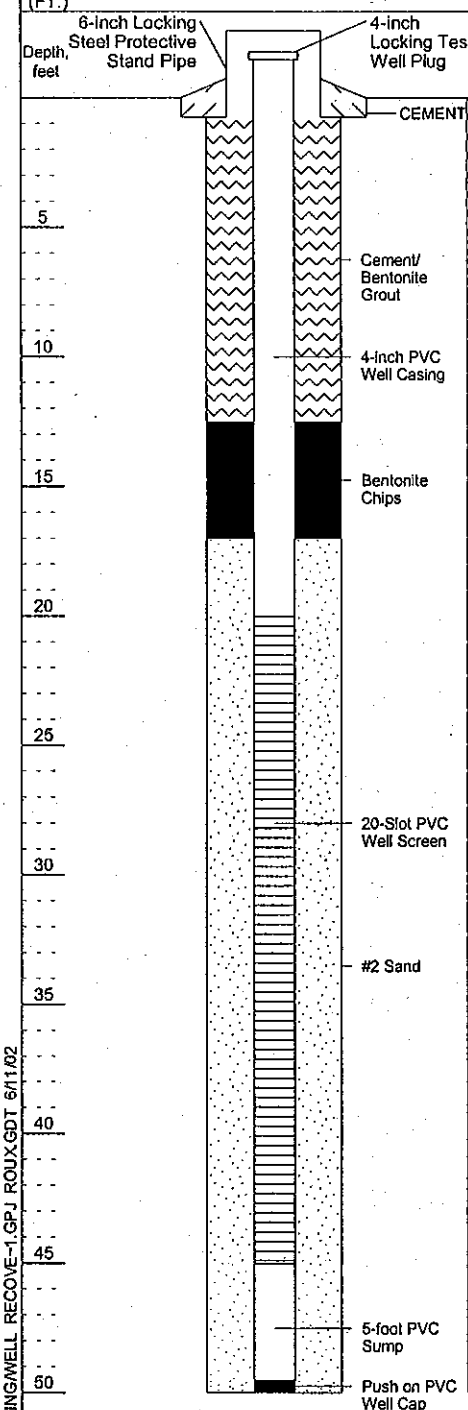
WELL CONSTRUCTION LOG

WELL NO. **RW-7**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / S. Miller**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **Mobile Drill B-61 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/21/02-3/25/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, trace Gravel, trace Brick, trace Silt; dry to wet (fill)			
5				5
	No recovery			
10	Fine SAND, some Gravel, trace Silt; wet (fill)		0.7	10 Black staining
	Brown fine SAND, little Silt; wet (fill)		1.4	Black staining
15	Brown fine SAND, little Silt; wet (fill)		1.9	15 Odor and black staining
	Green to gray Peat and Clay; wet		7.3	Odor Thickness of peat interval interpreted from previous Site Investigation
20	Brown fine to coarse SAND, some Silt, trace Gravel; wet		10.2	20 Odor
25	Brown fine to coarse SAND, some Silt, trace Gravel; wet		11.7	25 Odor
30	No recovery			30
35	Dark Gray fine to medium SAND, some Silt; wet		27.1	35
40	Dark Gray fine to medium SAND, some Silt, little Gravel; wet		21.0	40 Odor
45	Dark gray Silt and fine Sand; wet		30.6	45 Sheen and odor
50				50 Bottom of well 50 feet below land surface

BORING/WELL RECOVE~1.GPJ ROUX.GDT 6/11/02

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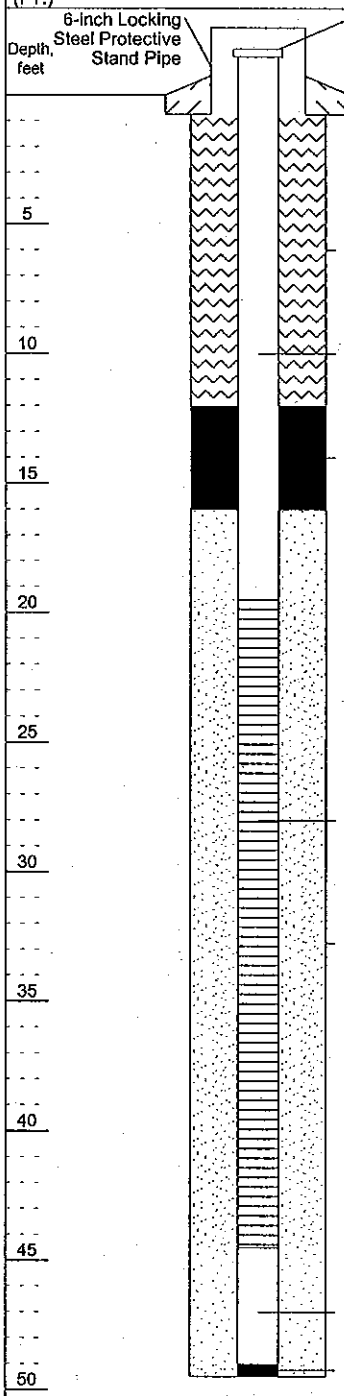
WELL CONSTRUCTION LOG

WELL NO. **RW-8**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / S. Miller**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **Mobile Drill B-61 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/22/02-4/2/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse fine SAND, trace Gravel, trace Brick, trace Silt; dry to wet (fill)			
5				5
10	Brown fine to coarse SAND, trace silt, trace concrete; wet (fill)			10
	Brown fine to medium SAND, trace Silt; wet (fill)			Black staining and trace free product
15	Brown PEAT; wet			Thickness of peat interval interpreted from previous Site investigation 15
	Brown fine to coarse SAND, little Silt, trace Gravel; wet		38.5	
20	Brown fine to coarse SAND, little Silt; wet		17.1	Strong odor and trace free product Slight odor and Sheen 20
25	Brown fine to coarse SAND, little Silt, trace Gravel; wet		0.0	Slight odor and Sheen 25
30	Brown to dark gray fine to medium SAND, some Silt, little Clay; wet		333	Odor 30
35	Brown to dark gray fine to medium SAND, some Silt, little Clay; wet		235	Odor 35
40	Dark gray to brown fine SAND, little Silt; wet		427	Odor 40
45	Dark gray to brown fine SAND, little Silt; wet		236	Odor 45
50				Bottom of well 49.5 feet below land surface 50

BORING/WELL RECOVE~1.GPJ ROUX.GDT 6/11/02

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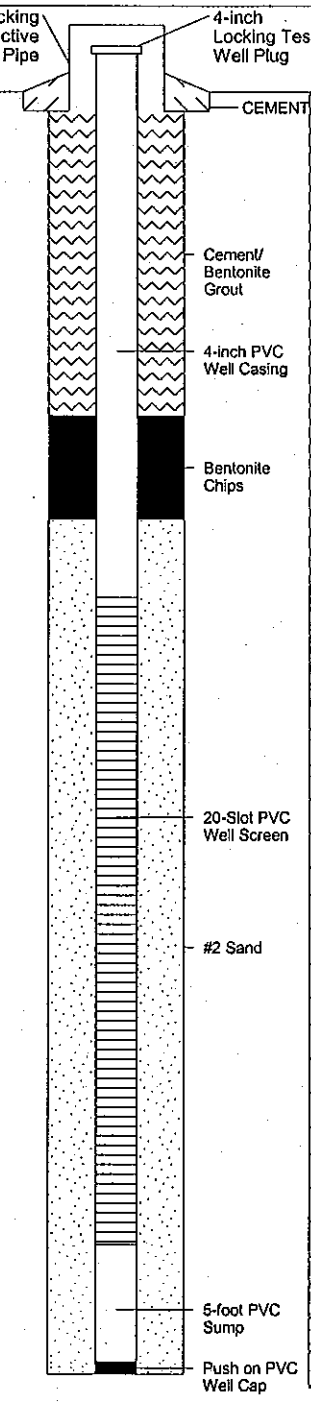
WELL CONSTRUCTION LOG

WELL NO. **RW-9**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/22/02-4/2/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, trace Gravel, trace Brick, trace Silt; dry to wet (fill)			
5				5
10	Brown WOOD; wet (fill)		120	Free product
	Brown fine SAND, little Silt, trace Gravel; wet (fill)		180	Black staining Odor and free product
15	Green to tan fine to medium SAND, little Silt; wet (fill)		109	Trace free product
	Green to brown fine SAND, some Silt, trace Peat; wet (fill)		57.6	
20	Brown PEAT; moist			Thickness of peat interval interpreted from previous Site Investigation
	Black fine to coarse SAND, little Gravel; wet		84.9	Odor and free product
25	Black fine to coarse SAND, some Silt, trace Gravel; wet		28.5	Black staining Trace free product
30	Black to gray SILT, little fine Sand; wet		66.8	Black staining Odor and trace free product
35	Brown Silt and fine Sand, trace coarse Sand; wet		28.2	Odor and sheen
40	Brown Silt and fine Sand, trace coarse Sand; wet		19.7	Odor and sheen
45	Brown Silt and fine Sand, trace coarse Sand; wet		27.1	Odor and sheen
50				Bottom of well 49.5 feet below land surface

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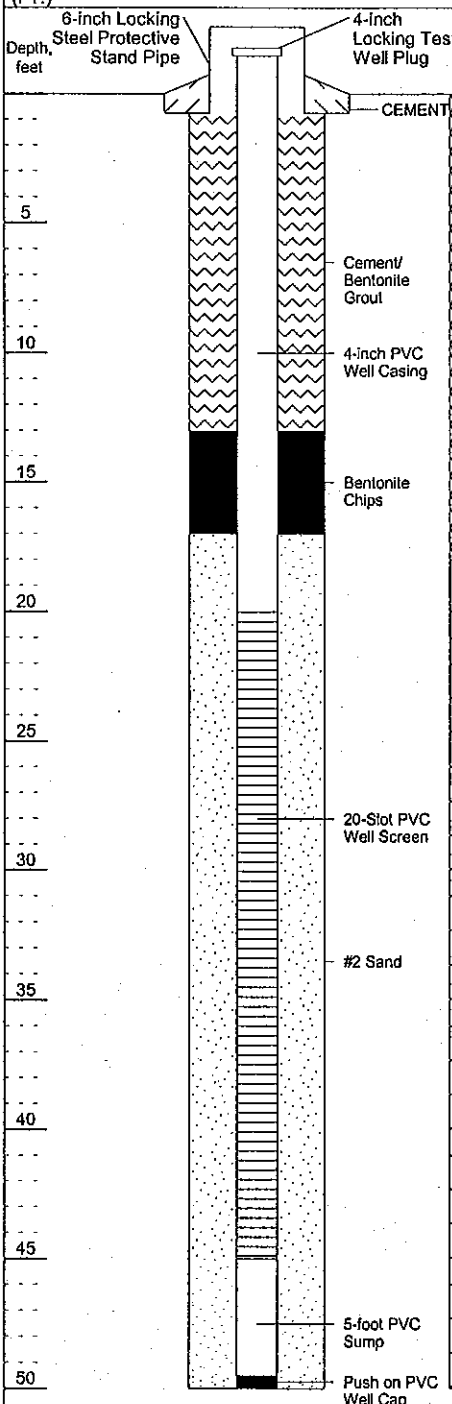
WELL CONSTRUCTION LOG

WELL NO. **RW-10**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **R. Kovacs**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/22/02-4/1/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; dry to wet (fill)			
5				5
10	Green to brown fine SAND, little Silt, trace Gravel; wet (fill)		8.2	Black staining
	Green to brown fine SAND, little Silt; wet (fill)		8.1	Black staining Slight Odor
15	Green to brown fine SAND, little Silt; wet (fill)		6.0	Black staining
	Green to brown fine to coarse SAND, little Silt, little Peat at 18; wet (fill)		8.7	Black staining
	Brown PEAT; moist		54.0	Thickness of peat interval interpreted from previous Site investigation
20				20
	Brown to light brown fine SAND, some Silt; wet		59.0	Odor and sheen
25	Brown to reddish brown fine to medium SAND, some Silt; wet		96.5	Free product
30	Brown to light brown fine to medium SAND, some Silt; wet		219	Odor and free product
35	Brown fine to medium SAND, some Silt; wet		110	Odor and free product
40	Brown SILT, some medium Sand; wet		172	Odor and free product
45	Brown SILT, some fine to medium Sand; wet		162	Odor and free product
50				Bottom of well 50 feet below land surface

BORING/WELL RECOVE-1.GPJ ROUX.GDT 6/11/02

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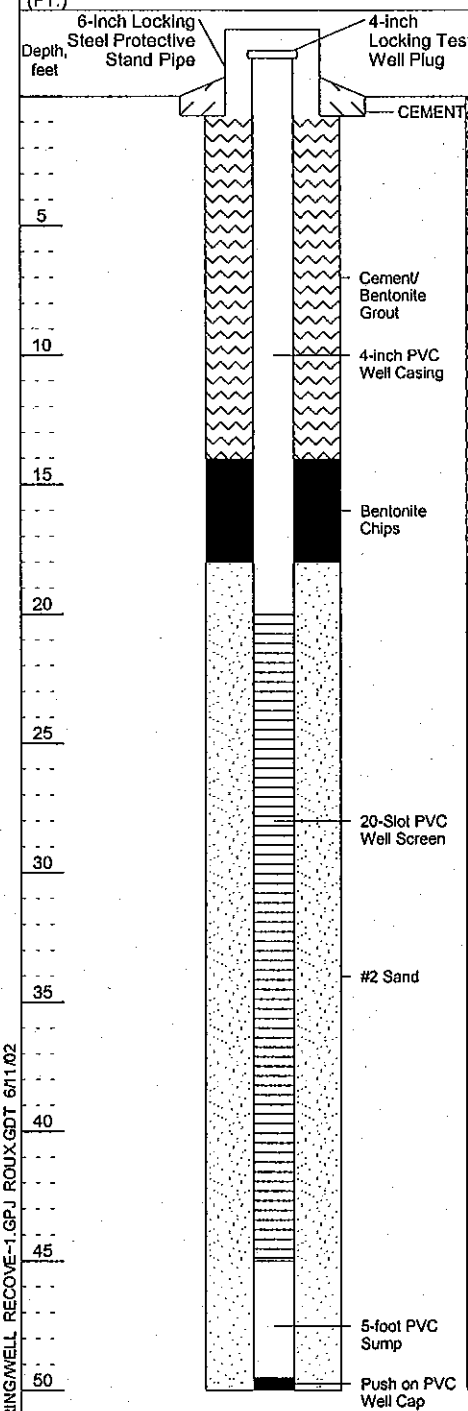
WELL CONSTRUCTION LOG

WELL NO. **RW-11**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/22/02-3/29/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, little Gravel, trace Brick, trace Silt; wet at 6 (fill)			
5				5
10				10
	Brown fine to coarse SAND, little Gravel, trace Brick, trace Silt; wet (fill)		50.0	Black staining
	Brown fine to coarse SAND, little Gravel, trace Brick, trace Silt; wet (fill)		71.9	Black staining
15	Brown fine to medium SAND, little Gravel, little Silt; wet (fill)		43.9	15
	Brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; wet (fill)		31.2	
	Brown PEAT; moist		138	
20				Thickness of peat interval interpreted from previous Site investigation 20
	Brown fine to coarse SAND, little Silt, trace Gravel; wet		7.2	
25				25
	Brown fine to coarse SAND, some Silt; wet		7.2	Odor and trace free product
30				30
	Brown fine to coarse SAND, some Silt; wet		23.2	Trace free product
35				35
	Brown fine to coarse SAND, some Silt; wet		17.6	Trace free product
40				40
	Brown Silt and fine Sand, trace coarse Sand, trace Gravel; wet		1124	Trace free product
45				45
	Brown Silt and fine Sand, trace coarse Sand, trace Gravel; wet		280	
50				50
				Bottom of well 50 feet below land surface

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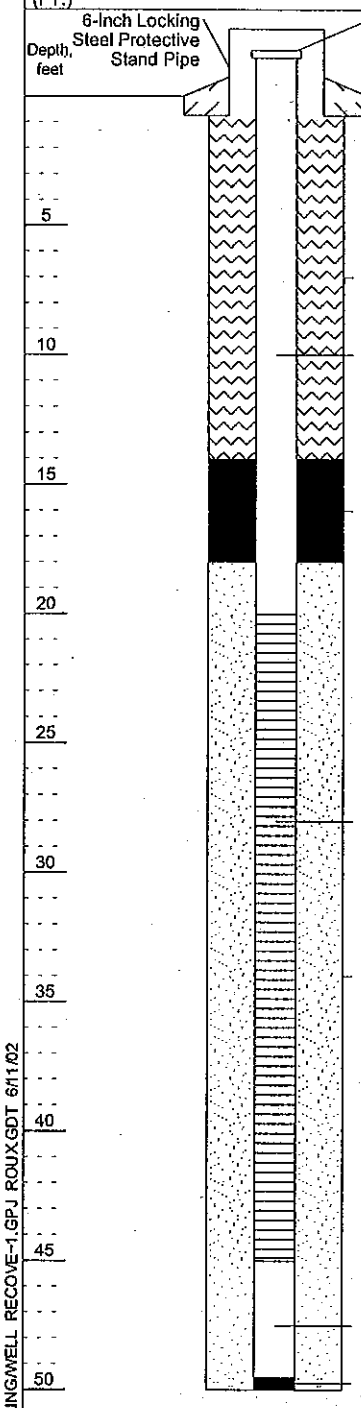
WELL CONSTRUCTION LOG

WELL NO. **RW-12**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/22/02-3/27/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC**	TOTAL LENGTH **25.0**	DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; dry to moist (fill)			
5	BRICK; dry (fill)			
	Brown fine to coarse SAND, some Gravel, trace Brick, trace Silt; wet at 7 (fill)			
10	Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)			Sheen and odor
	Brown fine to coarse SAND, little Silt, little Gravel; wet (fill)		55.3	Slight odor
15	Brown fine to coarse SAND, little Silt, little Gravel; wet (fill)		72.2	Slight odor
	Brown fine to coarse SAND, some Gravel, little Silt; wet (fill)		74.9	
	Brown PEAT; moist		1.7	Thickness of peat interval interpreted from previous Site Investigation
20	Brown fine to coarse SAND, some Silt, trace Gravel; wet		11.7	
25	Brown fine to coarse SAND, some Silt, trace Gravel; wet		19.3	
30	Brown fine to coarse SAND, some Silt, trace Gravel; wet		4.1	
35	Brown fine to coarse SAND, some Silt, trace Gravel; wet		35.1	Odor
40	Brown fine to coarse SAND, some Silt, trace Gravel; wet		174	Odor and trace free product
45	Brown fine to coarse SAND, some Silt, trace Gravel; wet		294	Odor and trace free product
50				Bottom of well 50 feet below land surface

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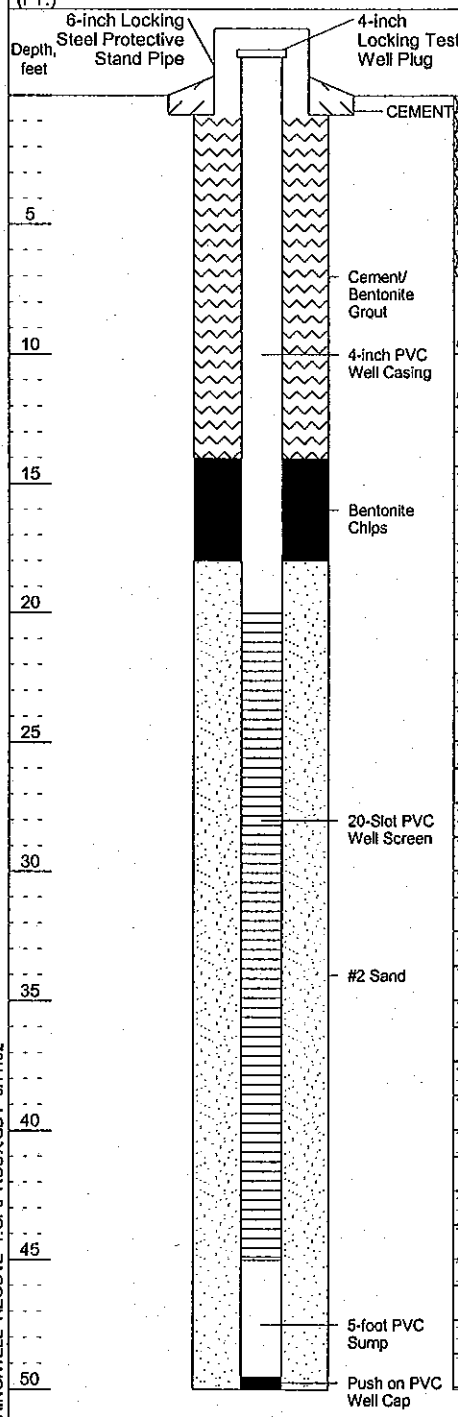
WELL CONSTRUCTION LOG

WELL NO. **RW-13**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/22/02-3/26/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; dry to moist (fill)			
5		Brick and Concrete; dry (fill)			
		Brown fine to coarse Sand and Brick; wet (fill)		80.8	Black staining
		Brown PEAT; moist			
		Brown PEAT; moist			
10		Brown PEAT; moist		73.9	
		Fine SAND, some Silt, trace Gravel; wet			Black staining
				21.7	Odor
15		Brown to green fine SAND, some Silt; wet			Odor
				17.1	
20		Brown fine SAND, little Silt; wet			Slight odor
				9.7	
25		Brown SILT, little fine Sand, trace Gravel; wet			Odor and trace free product
				118	
30		Brown SILT, little fine Sand, trace Gravel; wet			Odor and trace free product
				15.6	
35		Brown fine SAND, some Silt; wet			Odor
				5.3	
40		Brown to green SILT, little fine Sand; wet			Odor and trace free product
				459	
45		Brown SILT, some Sand; wet			Odor
				154	
50					Bottom of well 50 feet below land surface

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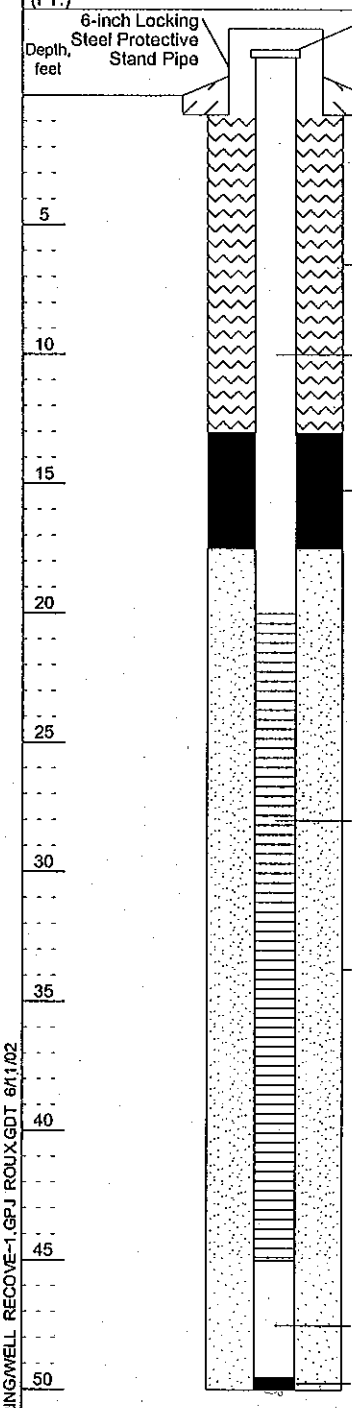
WELL CONSTRUCTION LOG

WELL NO. **RW-14**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / S. Miller**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **Mobile Drill B-61 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **3/22/02-3/26/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, little Gravel, trace Silt; dry (fill)			
5	Brown fine to coarse SAND, little Gravel, trace Silt; dry to moist (fill)		49.5	5
	Brown fine to coarse SAND, little Gravel, trace Silt; wet (fill)		45.9	
	Brown PEAT; moist			
10	Brown PEAT; moist to wet			10
			1.3	
15	Dark brown SAND, some Silt, trace Peat; wet			15
			2.7	
20	Dark brown PEAT; moist to wet			20
			125	
25	Dark brown fine SAND, little Silt; wet			25 Odor and trace free product
			147	
30	Dark brown fine SAND, little Silt; wet			30 Sheen
			413	
35	Dark brown fine SAND, little Silt; wet			35 Trace free product
			475	
40	Dark brown fine SAND, little Silt; wet		>2000	40 Sheen
45	Dark brown fine SAND, little Silt; wet		524	45
50				50 Bottom of well 50 feet below land surface

BORING/WELL RECOVE-1.GPJ ROUX.GDT 6/11/02

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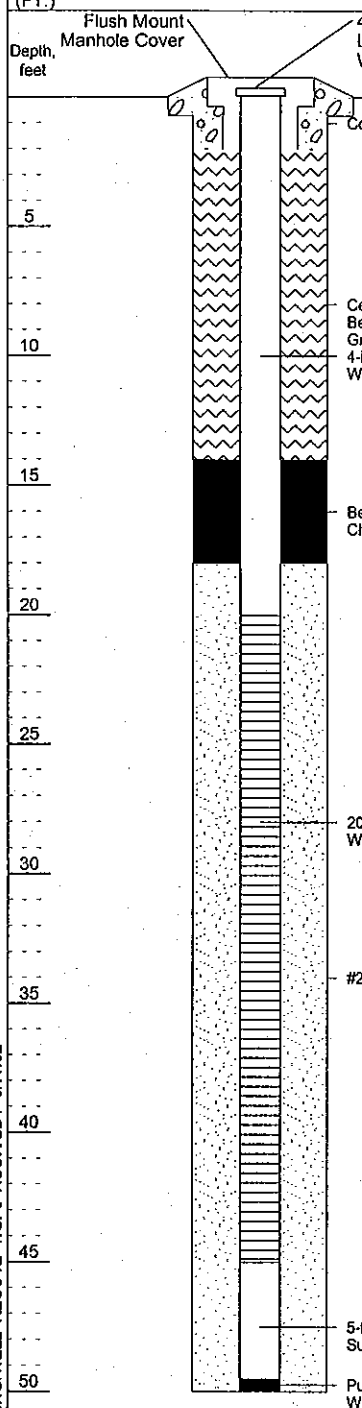
WELL CONSTRUCTION LOG

WELL NO. **RW-15**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/4/02-4/4/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	CONCRETE			
	Brown fine to coarse SAND, trace Gravel, trace Brick, trace Silt; dry to wet (fill)			
5				5
	Brown to green fine SAND, little Silt, trace Gravel, trace Brick, trace Concrete; wet (fill)		73.7	Odor and sheen
10	Brown fine SAND, little Silt, trace coarse SAND, trace Gravel; wet (fill)		147	10
	Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)		51.8	
	Brown fine SAND, some Silt, trace coarse SAND; wet (fill)		7.1	
15	Brown PEAT; moist			15
				Thickness of peat interval interpreted from previous Site investigation
	Brown fine SAND, little Silt, trace coarse Sand; wet		29.2	
20				20
	Brown fine Sand and Silt, trace coarse Sand; wet		89.7	Slight odor
25				25
	Brown fine SAND, little Silt, trace coarse Sand; wet		154	Slight odor
30				30
	Brown fine SAND, little Silt, trace Coarse Sand; wet		243	
35				35
	Brown fine SAND, little Silt, trace Coarse Sand; wet		172	Trace free product
40				40
	Brown fine SAND, little Silt, trace Coarse Sand; wet		612	Trace free product
45				45
	Brown fine Sand and Silt; wet		684	Odor and trace free product
50				50
				Bottom of well 50 feet below land surface

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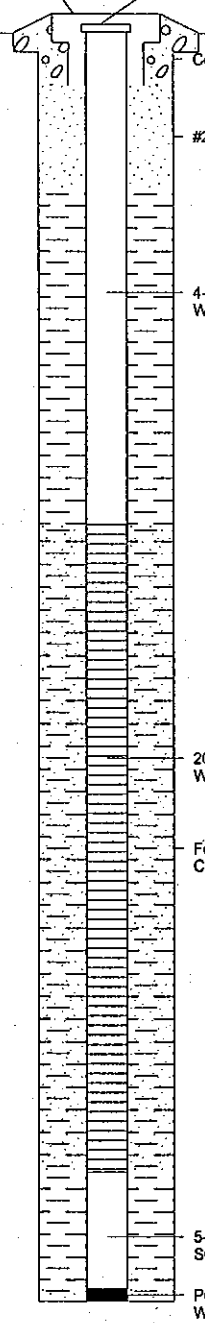
WELL CONSTRUCTION LOG

WELL NO. **RW-16**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/5/02-4/5/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	CONCRETE			
	Brown to dark brown fine to coarse SAND, some Gravel, trace Silt; wet at 4 (fill)			
5	Dark gray fine to coarse Sand and Gravel, little Silt; wet (fill)		7.9	Slight odor
10	Brown to dark gray GRAVEL, some fine to coarse Sand, trace Silt, trace Ash, trace Cinders; wet (fill)		5.8	
	Brown to dark gray fine to coarse SAND, trace Silt, trace Gravel; wet (fill)		4.1	
15	Brown fine to coarse SAND, trace Silt, trace Gravel; wet (fill)		26.4	
	Brown PEAT; moist			Thickness of peat interval interpreted from previous Site investigation
20	Brown Silt and fine Sand, little Gravel; wet			
25	Brown Silt and fine Sand, little Gravel; wet		11.5	odor
30	Brown Silt and fine Sand, little Gravel; wet		6.1	odor
35	Brown Silt and fine Sand, little Gravel; wet		10.0	odor
40	Dark gray fine SAND, some Silt, little Clay; wet		62.3	
45	Dark gray fine SAND, some Silt, little Clay, little Gravel; wet		4.4	Trace free product
50				Bottom of well 49 feet below land surface

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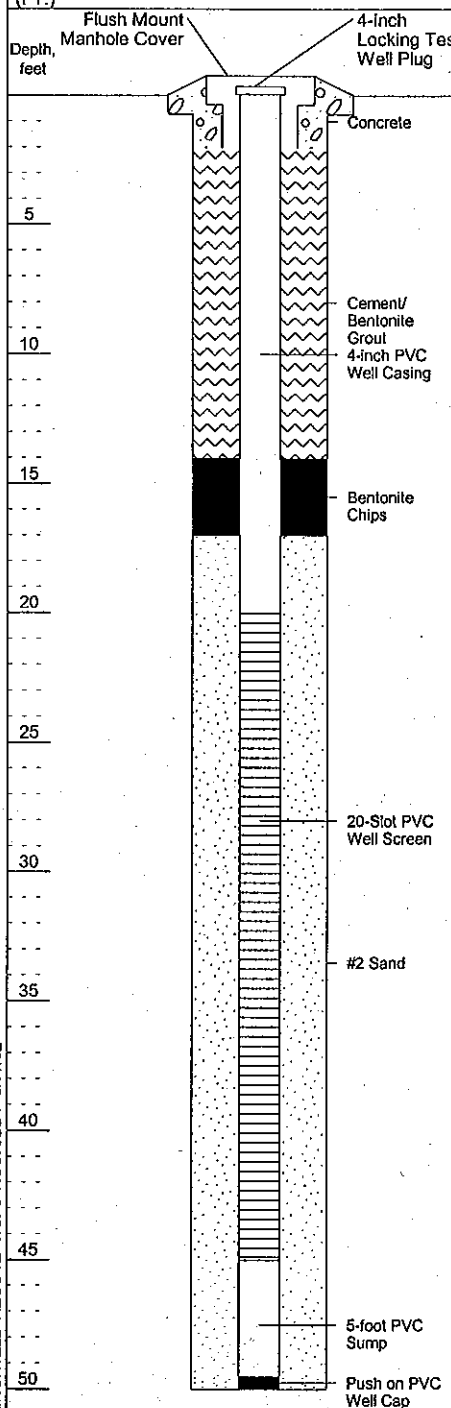
WELL CONSTRUCTION LOG

WELL NO. **RW-17**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **R. Kovacs**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/9/02-4/9/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	CONCRETE			
	Brown to dark brown fine to coarse SAND, some Silt; wet (fill)		13.0	Slight odor
5				
	Brown to dark brown fine to medium SAND, some Silt; wet (fill)		14.0	Slight odor
10				
	Brown to dark brown fine Sand and Silt; wet (fill)		22.3	Slight odor
	Brown fine to medium SAND; wet (fill)		12.7	
	Brown fine Sand and Silt; wet (fill)		12.3	Slight odor
15	Brown to reddish brown fine to medium SAND; wet (fill)		10.7	Slight odor
	Brown PEAT; moist		7.4	Thickness of peat interval interpreted from previous Site investigation
	Brown fine to medium SAND; wet			Slight odor
20	Brown to dark brown fine SAND; wet		10.7	Slight odor
25	Brown to dark brown fine SAND; wet		11.9	Slight odor
30	Brown to dark brown fine SAND; wet		14.9	Slight odor
35	Brown fine to medium SAND; wet		9.7	Slight odor
40	Brown fine to medium SAND; wet		47.3	Odor and trace free product
45	Brown fine to medium SAND; wet		59.9	Odor and trace free product
50				Bottom of well 50 feet below land surface

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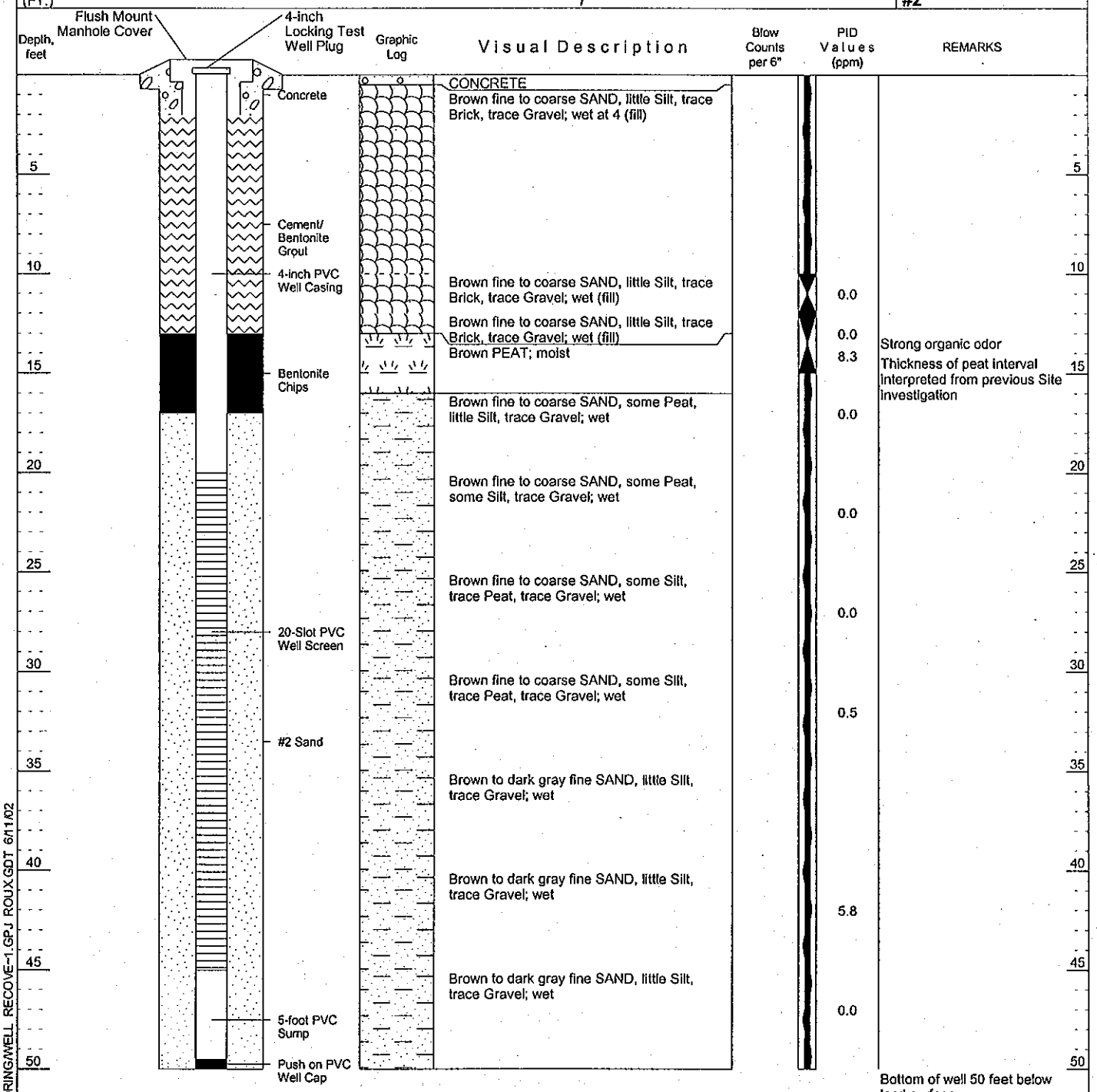
WELL CONSTRUCTION LOG

WELL NO. **RW-18**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/19/02-4/19/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



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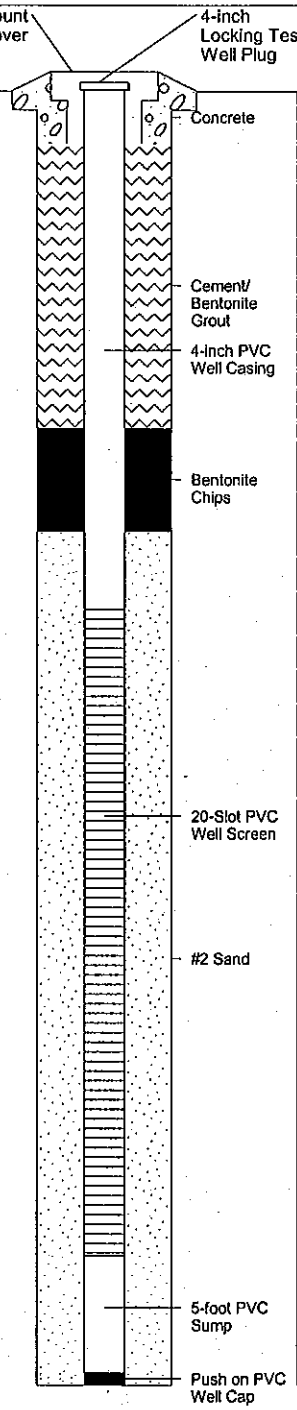
WELL CONSTRUCTION LOG

WELL NO. **RW-19**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D.Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/18/02-4/18/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Concrete			
	Brown fine to coarse SAND, little Silt, trace Brick, trace Gravel; wet at 4 (fill)			
5				5
10				10
	Brown fine SAND, trace Silt, trace coarse Sand, trace Gravel; moist (fill)		0.9	
	Brown fine SAND, trace Silt; wet (fill)		0.7	
15	Peat and green-grey CLAY; moist			Thickness of peat interval intrepreted from previous Site investigation 15
	Brown fine SAND, little Silt, trace Gravel; wet		1.8	
20				20
	Brown fine SAND, little Silt; wet		0.0	
25				25
	Brown fine SAND, little Silt; wet		0.0	Odor
30				30
	Brown fine SAND, little Silt, trace coarse Sand; wet		0.7	Odor
35				35
	Brown fine SAND, little Silt, trace coarse Sand; wet		0.0	Odor
40				40
	Brown fine SAND, little Silt; wet		0.0	Odor
45				45
	Brown fine SAND, little Silt; wet		0.0	Odor
50				50
				Bottom of well 50 feet below land surface

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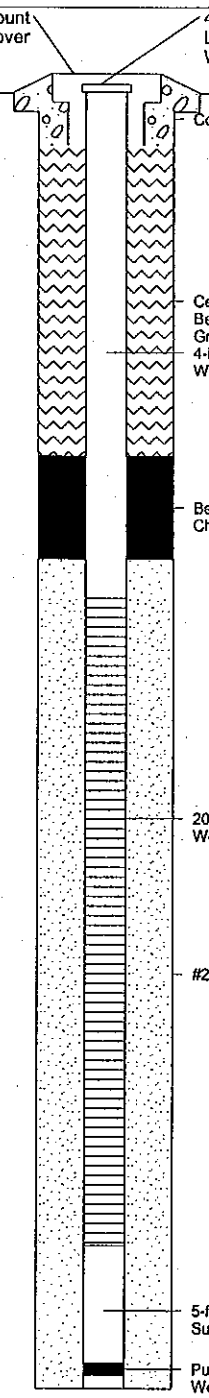
WELL CONSTRUCTION LOG

WELL NO. **RW-20**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **C. Battista**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/17/02-4/17/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	CONCRETE			
	Dark brown fine to coarse SAND, trace Gravel, trace Brick, trace Silt; dry to wet (fill)			
5				Odor
			13.3	
10	Brown to dark green fine to coarse SAND, little Gravel, trace Silt, trace Brick; wet (fill)		11.4	
	Brown fine to coarse SAND, little Gravel, trace Silt, trace Brick; wet (fill)		12.0	
15	Brown PEAT; moist			Thickness of peat interval interpreted from previous Site investigation
	Brown medium to coarse SAND, little Silt, trace Gravel, trace Peat; wet		10.5	Slight odor
20	Brown fine SAND, little Silt; wet			
			6.5	
25	Brown fine SAND, little Silt; wet			Odor
			21.9	
30	Brown fine SAND, little Silt; wet			
			3.8	
35	Brown fine SAND, little Silt, trace Gravel; wet			
			6.4	
40	Dark gray to light brown fine to medium SAND; wet			
			4.3	
45	Dark gray to light brown fine to medium SAND, trace Silt, trace Gravel; wet			
			5.2	
50				Bottom of well 49.5 feet below land surface.

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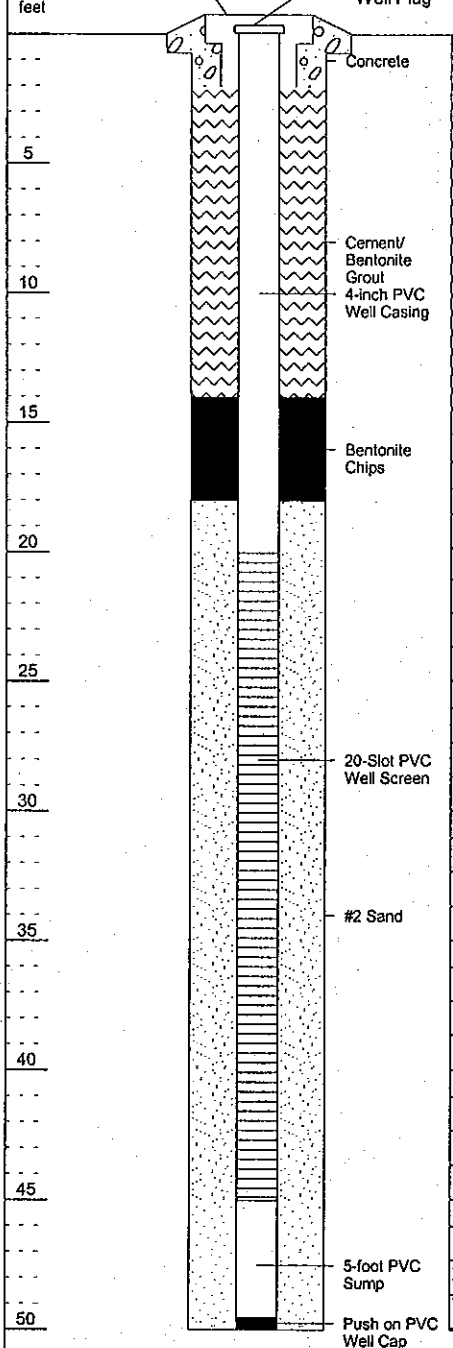
WELL CONSTRUCTION LOG

WELL NO. **RW-21**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/16/02-4/16/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		CONCRETE			
		Brown fine to coarse SAND, trace Gravel, trace Brick, trace Silt; dry to wet (fill)			
5					5
10		Brown fine SAND, little Silt, trace coarse Sand; wet (fill)		32.1	10
		Brown fine to coarse SAND, trace Silt, trace Gravel; wet (fill)		11.6	
15		Brown Peat and green to gray Silt and Clay; moist			15
		Brown fine SAND, little Silt; wet		5.0	Thickness of peat interval interpreted from previous Site investigation
20		Brown fine SAND, little Silt, trace coarse Sand; wet		10.8	20
25		Brown fine SAND, little Silt; wet		52.9	25 Strong odor
30		Brown fine SAND, little Silt; wet		87.4	30 Strong odor
35		Brown fine SAND, little Silt; wet		28.6	35 Slight odor
40		Brown fine SAND, little Silt; wet		18.8	40 Slight odor
45		Brown fine SAND, little Silt; wet		16.4	45 Slight odor
50					50 Bottom of well 50 feet below land surface

BORING/WELL RECOVE-1.GPJ ROUX.GDT 6/11/02

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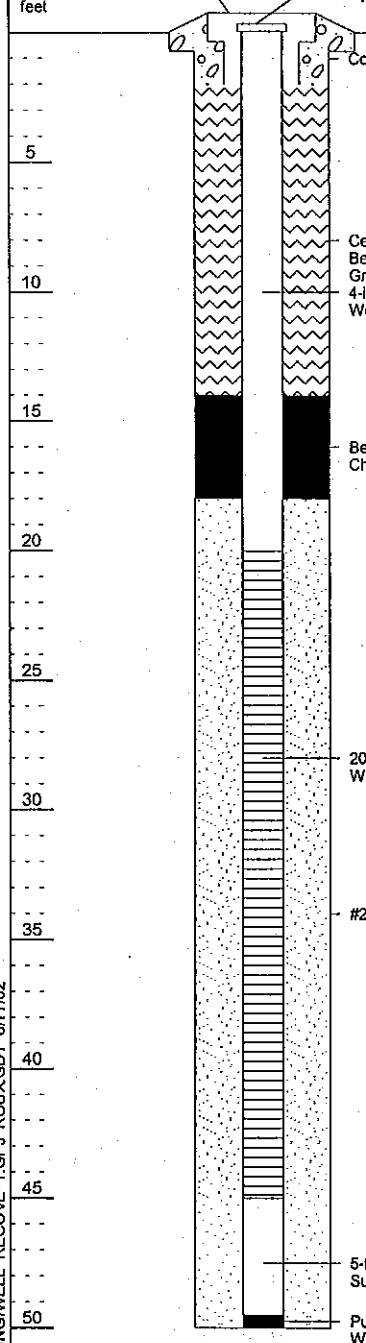
WELL CONSTRUCTION LOG

WELL NO. **RW-22**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/15/02-4/15/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Concrete			
	Brown fine to coarse SAND, trace silt, trace Brick, trace Concrete, trace Gravel; dry to wet (fill)			
5				5
10	Brown fine SAND, trace Silt; wet (fill)		699	10
	Brown fine to coarse SAND, trace Silt; wet (fill)		>2000	Odor and black staining
15	Brown fine to coarse SAND, little silt; wet (fill)		5.7	15
	Brown fine SAND, little Silt; wet (fill)		3.7	
	PEAT, Green-Gray Clay and fine Sand		27.8	Thickness of peat interval interpreted from previous Site investigation
20	Brown to gray fine SAND, little Silt, trace coarse Sand, trace Gravel; wet		0.0	20
25	Brown to gray fine SAND, little Silt, trace coarse Sand, trace Gravel; wet		11.9	25
30	Brown to gray fine SAND, little Silt, trace coarse Sand, trace Gravel; wet		0.0	30
35	Brown to gray fine SAND, little Silt, trace coarse Sand, trace Gravel; wet		0.0	35
40	Brown fine SAND, little silt; wet		2.1	40
45	Brown fine SAND, little silt; wet		0.0	45
50				50

Bottom of well 50 feet below land surface

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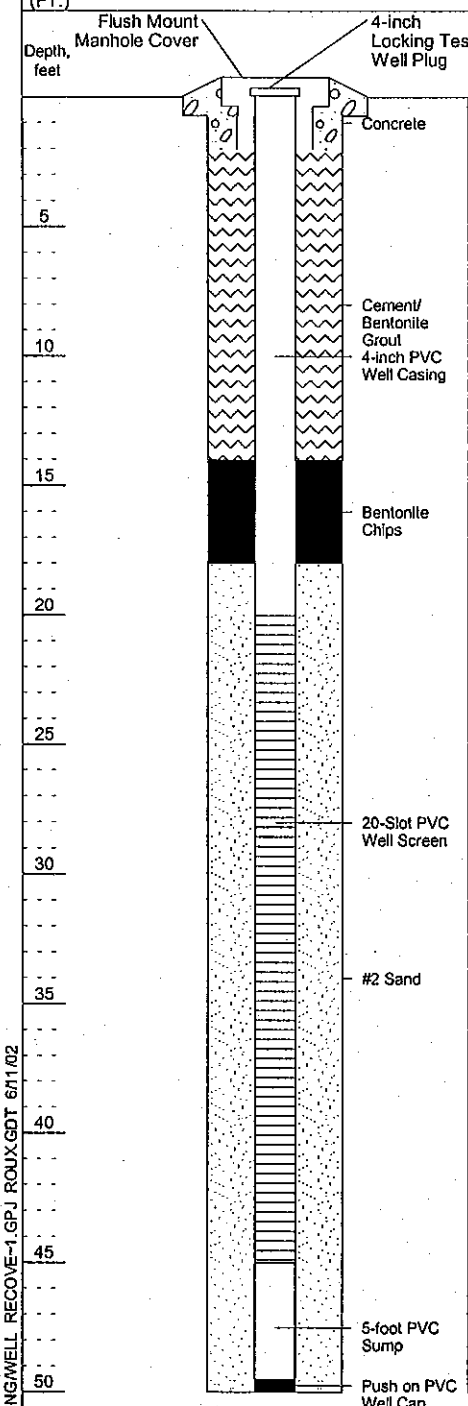
WELL CONSTRUCTION LOG

WELL NO. **RW-23**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/10/02-4/10/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Concrete			
	Brown fine to coarse SAND, trace Brick, trace Concrete, trace Gravel; dry to wet (fill)			
5				5
10	Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)		1354	Odor and trace free product
	Brown fine Sand and Silt, trace coarse Sand; wet (fill)		72.8	Odor
15	Brown fine SAND, little Silt, trace Gravel; wet (fill)		352	Odor
	PEAT and Green-Gray CLAY, trace Shells; moist			Thickness of peat interval interpreted from previous Site investigation
	Brown fine to coarse SAND, little Silt, trace Gravel; wet		92.5	Odor
20	Brown fine to coarse SAND, little Silt, trace Gravel; wet		50.7	Odor
25	Brown fine to coarse SAND, little Silt, trace Gravel; wet		25.2	Odor
30	Brown fine to coarse SAND, little Silt; wet		40.1	Odor
35	Brown fine to coarse SAND, little Silt; wet		13.7	Odor
40	Brown fine to coarse SAND, little Silt; wet		9.6	Odor
45	Brown fine to coarse SAND, some Silt; wet		12.7	Odor
50				Bottom of well 50 feet below land surface

BORING/WELL RECOVE~1.GPJ ROUX.GDT 6/11/02

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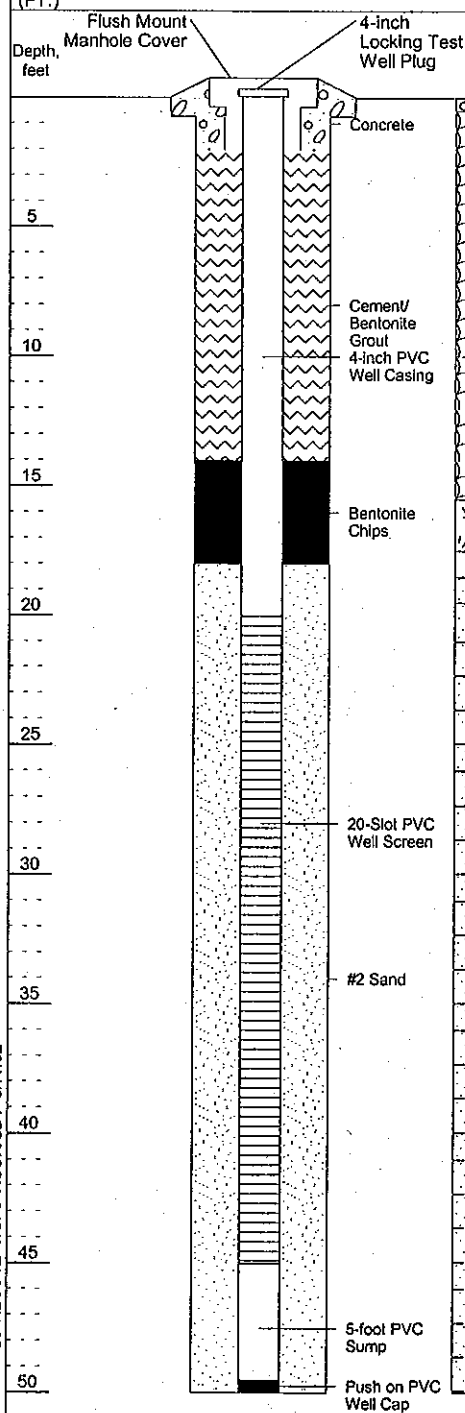
WELL CONSTRUCTION LOG

WELL NO. **RW-25**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/11/02-4/11/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete			
		Brown fine to coarse SAND, trace Brick, trace Concrete, trace Gravel; dry to wet (fill)			
5					5
10		Brown fine SAND, little Silt, trace Gravel; wet (fill)		8.1	10
		Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)		198	Odor
15		Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)		478	Odor 15
		PEAT and Green-Gray CLAY; moist			Odor
					Thickness of peat interval interpreted from previous Site investigation
20		Brown fine to coarse SAND, little Silt, trace Gravel; wet		518	20
		Brown fine to coarse SAND, little Silt, trace Gravel; wet			Odor
				610	
25		Brown fine to coarse SAND, little Silt; wet			25
				31.4	
30		Brown fine to coarse SAND, little Silt; wet			30 Odor
				231	
35		Brown fine SAND, little Silt, trace coarse Sand; wet			35 Odor
				315	
40		Brown fine SAND, some Silt, trace coarse Sand; wet			40 Odor
				136	
45		Brown fine Sand and Silt; wet			45 Odor
				246	
50					50 Bottom of well at 50 feet below land surface

BORING/WELL RECOVE~1.GPJ ROUX.GDT 6/11/02

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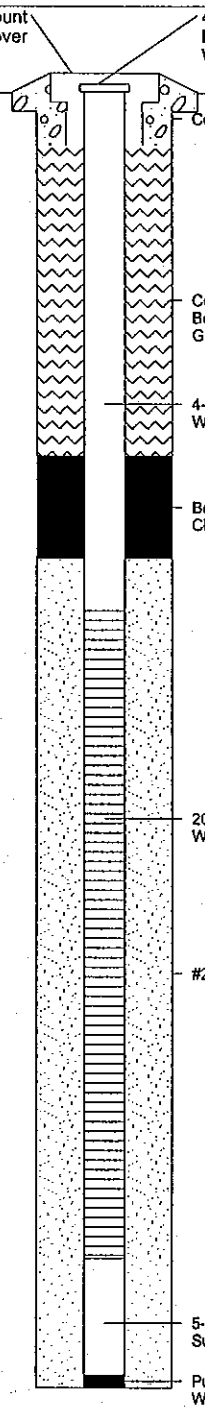
WELL CONSTRUCTION LOG

WELL NO. **RW-27**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/12/02-4/12/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Concrete			
	Brown fine to coarse SAND, trace Brick, trace Concrete, trace Gravel; dry to wet (fill)			
5				5
10				10
	Brown fine to coarse SAND, little Gravel; wet (fill)		1.7	
	Brown fine to coarse SAND, little Gravel; wet (fill)		6.9	
	Brown fine to coarse SAND, little Gravel, trace Silt; wet (fill)		3.1	
15				15
	PEAT and Green-Gray CLAY; moist		2.7	Thickness of peat interval interpreted from previous Site investigation
	Brown fine SAND, little Silt, trace Gravel, trace coarse Sand; wet			
20				20
	Brown fine to coarse SAND, little Silt, trace Gravel; wet		17.7	
25				25
	Brown fine SAND, little Silt; wet		32.4	
30				30
	Brown fine SAND, little Silt, trace coarse Sand; wet		3.8	
35				35
	Brown fine SAND, little Silt, trace coarse Sand; wet		5.2	
40				40
	Brown fine SAND, some Silt; wet		3.8	
45				45
	Brown fine SAND, some Silt; wet		7.1	
50				50
				Bottom of well 50 feet below land surface

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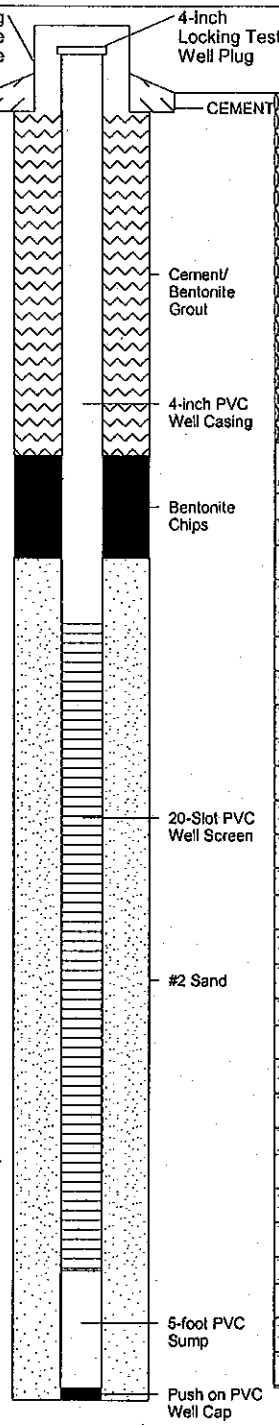
WELL CONSTRUCTION LOG

WELL NO. **RW-29**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/25/02-4/25/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown coarse to fine SAND, trace Silt, trace Brick, trace Gravel; dry to moist (fill)			
5	Black fine to coarse SAND, little Wood, trace Gravel; moist to wet (fill)		301	Odor and black staining
10	CONCRETE and WOOD; wet (fill)			Black staining
	Brown fine to medium SAND, little Silt, trace Gravel, wet (fill)		12.8	Black staining
15	Green to gray CLAY and PEAT; moist			Thickness of peat interval interpreted from previous Site investigation
	Gray fine SAND, little Silt, little Wood; wet		44.4	Black staining
20	Gray fine to coarse SAND, little Silt, trace Wood; wet		17.6	Odor and black staining
25	Gray fine SAND, some Silt, trace coarse SAND; wet		12.5	Odor and black staining
30	Gray to brown fine SAND, little Silt; wet		6.0	Odor
35	Gray to brown fine SAND, little Silt; wet		459	Odor
40	Brown fine to medium SAND, some Silt; wet		762	Odor and trace free product
45	Brown fine SAND, little Silt; wet		314	Odor
50				Bottom of well 50.5 feet below land surface

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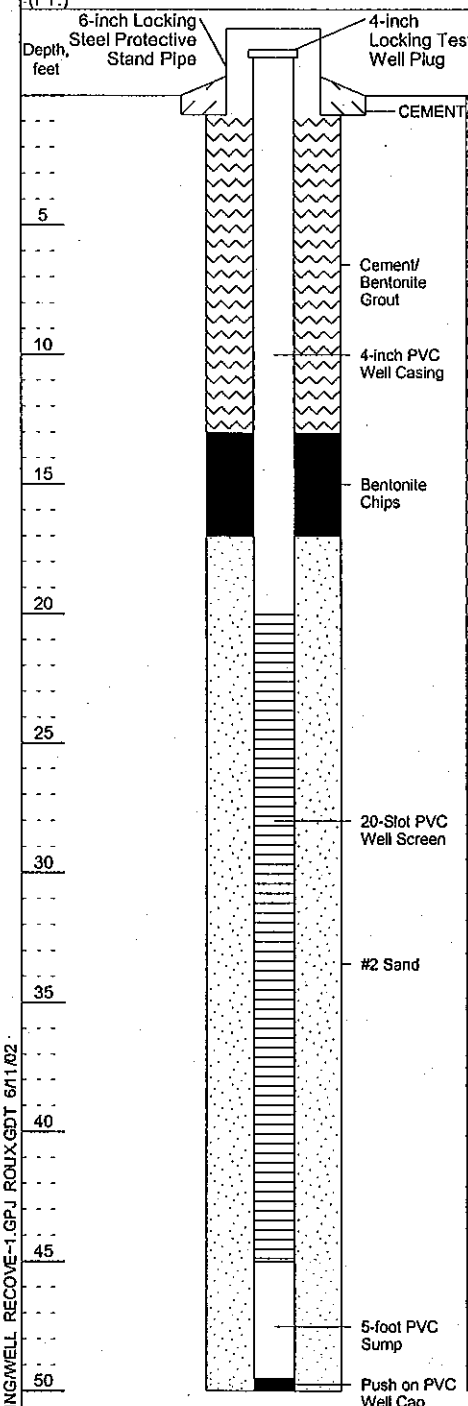
WELL CONSTRUCTION LOG

WELL NO. **RW-30**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/26/02-4/26/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown coarse to fine SAND, trace Silt, trace Brick, trace Gravel; dry to moist (fill)			
5	Brown coarse to fine SAND, little Gravel; moist (fill)		228	Odor and black staining
10	Brown fine to coarse SAND, little Gravel, trace Wood, trace Brick; wet (fill)		5.7	
	Brown fine to medium SAND, trace Gravel, trace Silt; wet (fill)		6.2	
15	Brown fine SAND, little Silt, trace Gravel; wet (fill)		8.9	Odor and black staining
	Brown fine SAND, little Silt, trace Gravel; wet (fill)		8.7	Odor and black staining
	Gray fine to medium SAND, trace Silt, trace Peat; wet		10.4	Odor and black staining
20	Fine SAND, trace Silt; wet		22.2	Black staining
	Brown PEAT; moist			
	Brown fine SAND, little Silt; wet		13.3	Odor and black staining
25	Gray fine SAND, trace Silt; wet		12.7	Odor and black staining
30	Brown fine SAND, little Silt; wet		17.1	Odor and trace free product
35	Fine SAND, little Silt; wet		728	Odor, black staining, and free product
40	Fine SAND, little Silt; wet		1067	Odor, black staining, and free product
45	Fine SAND, little Silt; wet		840	Odor, black staining, and free product
50				Bottom of well 50 feet below land surface

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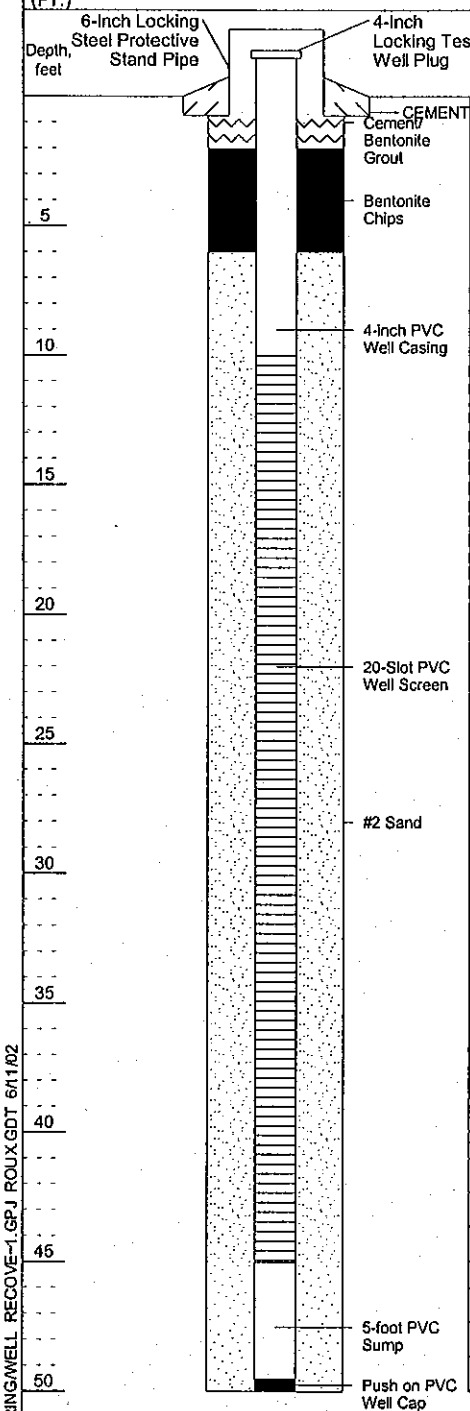
WELL CONSTRUCTION LOG

WELL NO. **RW-31**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/29/02-4/29/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted** MAT. **SCH 40 PVC** TOTAL LENGTH **35.0** DIA. **4-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: (FT.) GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GW SURFACE	GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown coarse to fine SAND, trace Silt, trace Brick, trace Gravel; dry to moist (fill)			
5		Fine SAND, trace Silt; wet (fill)		945	Odor, black staining, and sheen
10					
		Brown fine to medium SAND, trace Silt, trace Brick, trace Gravel, trace Wood, trace Coal Fragments; wet (fill)		35.9	
15		Brown fine to medium SAND, some Silt, trace Gravel; wet (fill)		26.3	
		Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)		>2000	Odor
		Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)		886	Odor, black staining, and trace free product
20		Brown PEAT; moist		>2000	Odor and free product
		Brown fine to coarse SAND, little Silt, trace Gravel; wet			
		Brown fine SAND, little Silt; wet		1349	
25		Gray to brown fine SAND, little Silt, trace coarse SAND; wet		257	Odor and trace free product
30		Gray to brown fine SAND, little Silt, trace coarse SAND; wet		192	Odor and trace free product
35		Gray to brown fine SAND, little Silt, trace coarse SAND; wet		254	Odor and trace free product
40		Gray to brown fine SAND, little Silt, trace coarse SAND; wet		415	Odor and trace free product
45		Gray to brown fine SAND, some Silt; wet		785	Odor and trace free product
50					Bottom of well 50 feet below land surface

BORING/WELL RECOVE~1.GPJ ROUX.GDT 6/11/02

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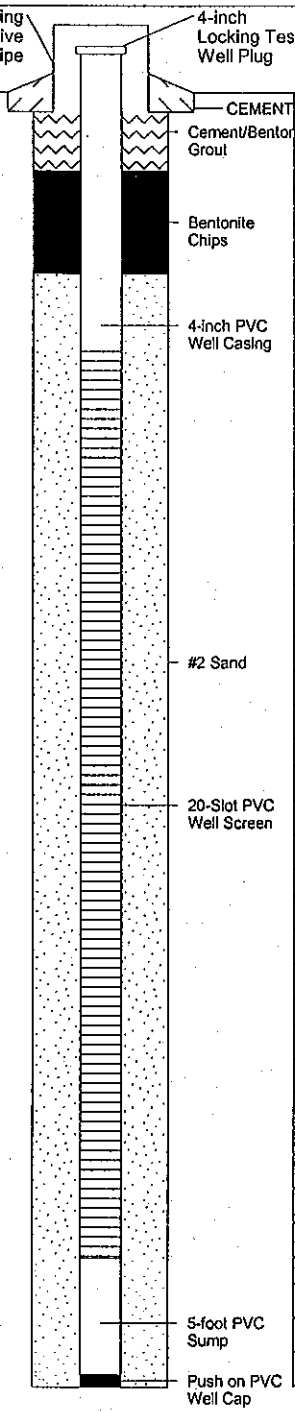
WELL CONSTRUCTION LOG

WELL NO. **RW-32**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/30/02-4/30/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **35.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown coarse to fine SAND, trace Silt, trace Brick, trace Gravel; dry to moist (fill)			
5		Gray-brown fine to coarse SAND, trace Silt, trace Gravel; moist (fill)		21.1	
10		Gray-brown medium SAND, trace Silt, trace Gravel, trace coarse Sand; moist (fill)		13.8	Odor, sheen
15		Brown coarse to fine Sand, little Silt, trace Gravel; moist (fill)		6.5	Odor, trace black staining
		Brown fine to medium SAND, little Silt, trace coarse Sand; wet (fill)		7.3	Odor
		Brown fine to coarse SAND, little Silt; wet		15.3	
20		Gray-brown fine SAND, little Silt, trace coarse Sand; wet		36.0	Odor, sheen
25		Gray-brown fine SAND, little Silt, trace coarse Sand; wet		87.4	Odor, sheen
30		Gray-brown fine SAND, little Silt, trace coarse Sand; wet		118	Odor, sheen
35		Brown fine SAND, some Silt; wet		67.4	Odor
40		Brown fine to medium SAND, little Silt; wet		107	Odor
45		Brown fine SAND, some Silt; wet		68.9	Odor
50					Bottom of well 50 feet below land surface

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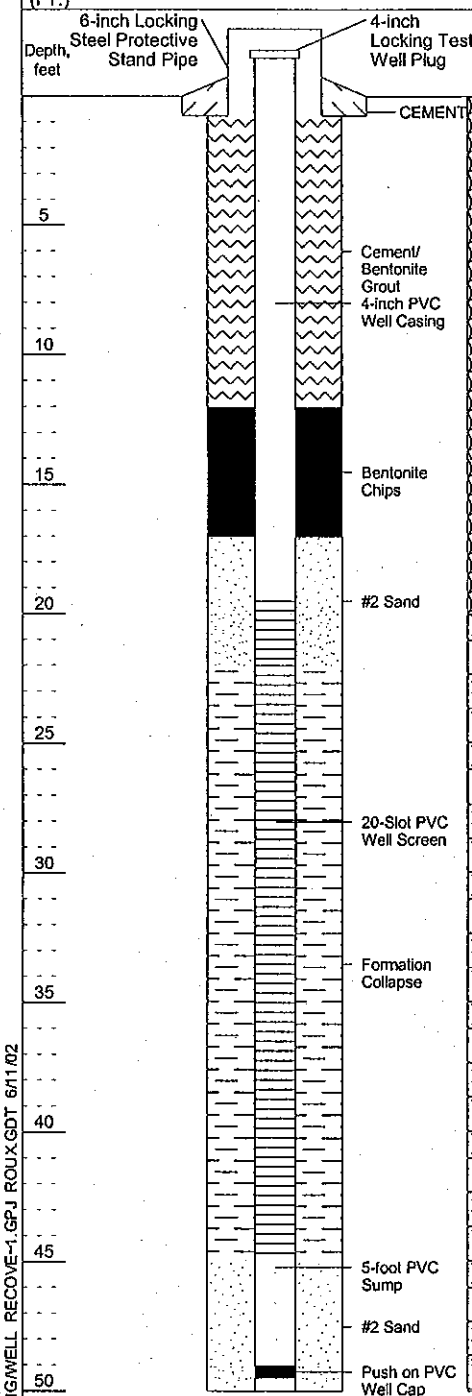
WELL CONSTRUCTION LOG

WELL NO. **RW-33**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along Pathmark Wall**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/1/02-5/1/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown coarse to fine SAND, trace Silt, trace Brick, trace Gravel; dry to moist (fill)			
5		Brown fine to coarse SAND, little Silt; wet (fill)		0.0	
10		Brown fine SAND, some Silt; wet (fill)		1.3	
15		Brown fine SAND, some Silt, trace coarse Sand, trace Gravel; wet (fill)		8.3	
		Brown to Black stained fine to coarse SAND, trace Gravel; wet (fill)		0.0	Trace free product
20		Gray-brown fine to medium SAND, little Silt, trace Gravel; Wet		0.0	
25		Brown fine SAND, little Silt, trace coarse Sand; wet		439	Odor
30		Brown fine SAND, little Silt, trace coarse Sand; wet		7.2	Odor
35		Brown fine SAND, some Silt; wet		18.4	
40		Brown fine SAND, some Silt; wet		79.5	Odor
45		Brown fine SAND, some Silt, trace coarse Sand; wet		194	Odor
50					Bottom of well 49.5 feet below land surface

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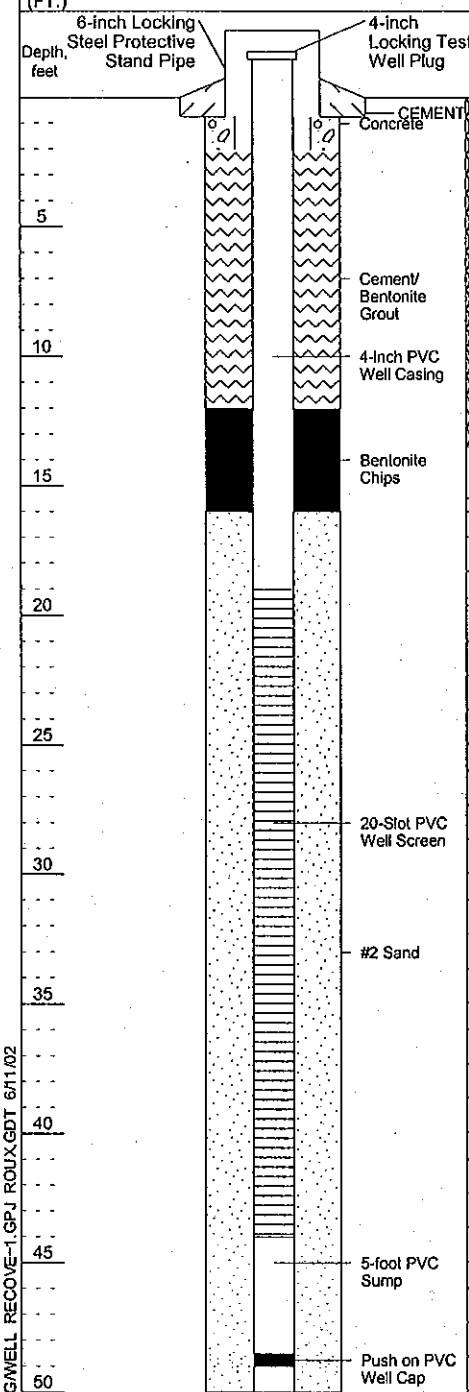
WELL CONSTRUCTION LOG

WELL NO. **RW-34**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/3/02-5/3/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, little Silt, trace Gravel; moist to wet at appoximately 7 ft bls (fill)			
5				31.2	
10		Brown fine to coarse SAND, trace Silt, trace Gravel; wet (fill)		10.3	
		Brown fine sand, little Silt, trace coarse Sand; wet (fill)		17.1	
15		Green-gray CLAY and PEAT; moist		47.4	Thickness of peat interval interpreted from previous Site investigation Odor
		Brown fine SAND, little Silt, trace coarse Sand; wet			
20		Gray-brown fine SAND, little Silt, trace Gravel; wet		26.9	Odor, sheen
25		Gray-brown fine SAND, some Silt; wet		16.6	Odor
30		Gray-brown fine SAND, some Silt; wet		24.3	Odor
35		Gray-brown fine SAND, some Silt, trace coarse Sand; wet		107	Odor, sheen
40		Brown fine SAND, little Silt; wet		126	Odor
45		Brown fine SAND, little Silt; wet		134	Odor
50					Bottom of well 49 feet below land surface

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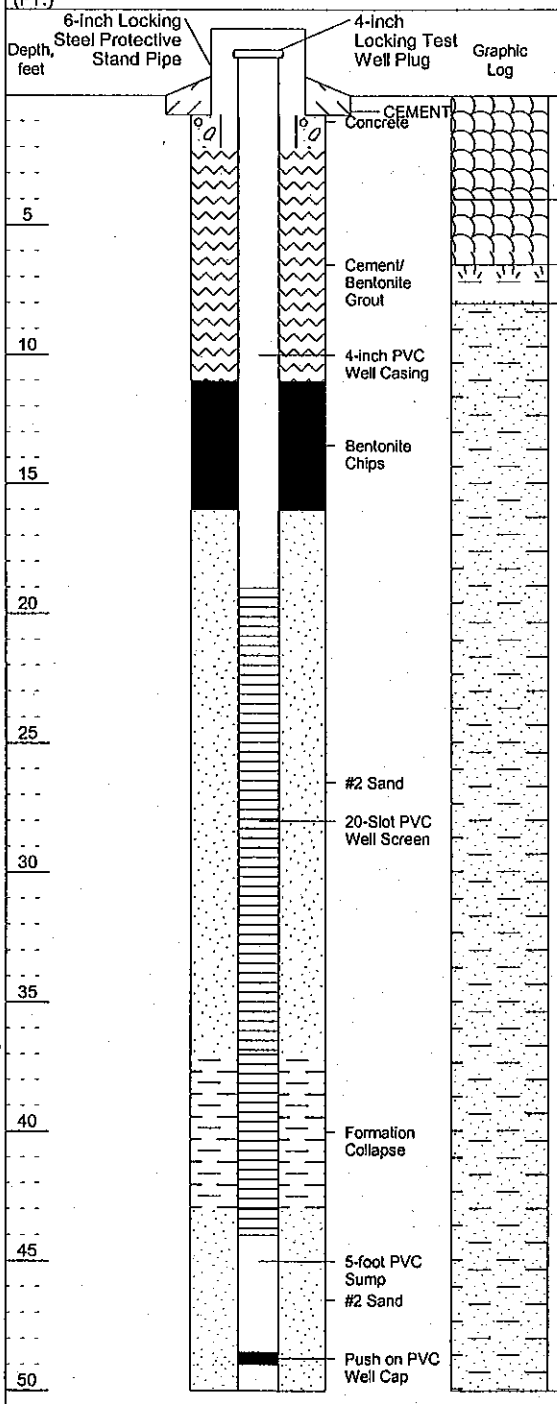
WELL CONSTRUCTION LOG

WELL NO. **RW-35**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/6/02-5/8/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC**	TOTAL LENGTH **25.0**	DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace silt, trace gravel, trace brick; moist (fill)			
5		Black fine SAND, trace Silt; moist to wet at approximately 5.5 ft bls (fill)		>2000	Odor, trace free product
		Black fine SAND, little Silt; wet (fill)		>2000	Odor, free product
		Green-gray CLAY and PEAT; moist			
		Black to brown fine SAND and SILT; wet		872	Odor, free product
10					
		Brown to black fine SAND, some Silt, trace coarse Sand; wet			
15				272	Odor
20		Gray-brown fine SAND, little Silt, trace Clay, trace Peat; wet		311	
25		Brown fine SAND, little Silt; wet		182	Odor
30		Brown fine SAND, little Silt; wet		158	Odor
35		Brown fine SAND, little Silt, trace coarse Sand; wet		552	Odor, trace free product
40		Gray-brown fine to medium SAND, little Silt; wet		918	Trace free product
45		Gray-brown fine to medium SAND, little Silt; wet		723	Trace free product
50					Bottom of well 49 feet below land surface

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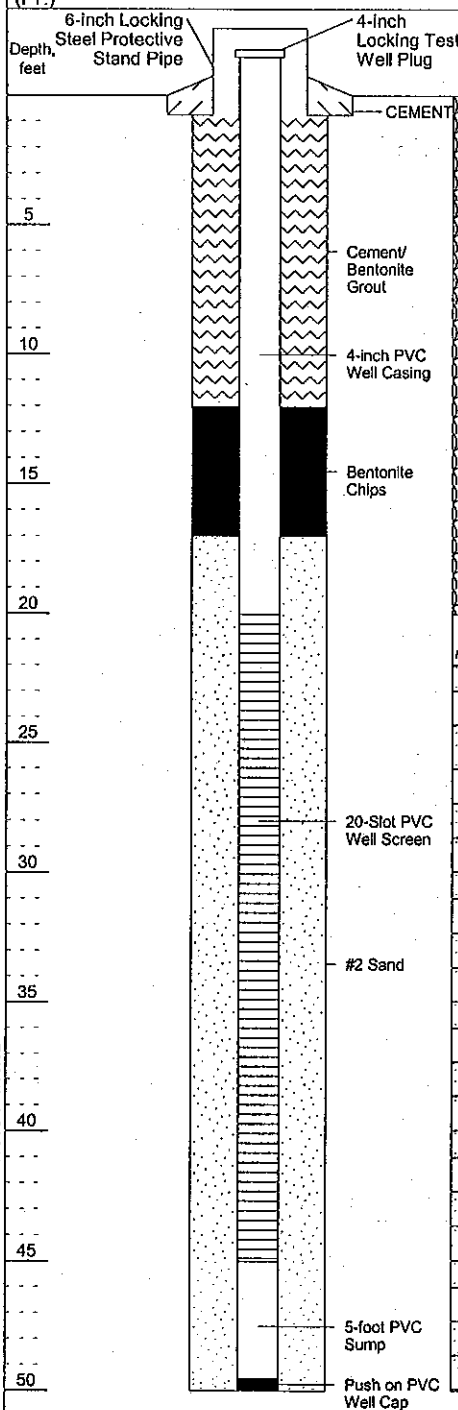
WELL CONSTRUCTION LOG

WELL NO. **RW-36**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/6/02-5/7/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace silt, trace gravel, trace brick; moist (fill)			
5		Black fine SAND, some Silt; wet (fill)		94.3	Odor
		Brown to black fine SAND, some Silt, trace Clay, trace Coal, trace Shells, trace Gravel; wet (fill)		199	Odor
10		Black fine SAND, little silt; wet(fill)		8.7	Odor, trace free product
		Brown to black fine to coarse SAND, little Silt, trace Gravel; wet (fill)		35.0	Odor, trace free product, sheen
15		Brown to black fine SAND, little Silt, trace Wood; wet (fill)		51.2	
		Brown to black fine to medium SAND, little Silt; wet (fill)		109	Odor
		Grey-brown fine SAND, some Silt; wet (fill)		22.9	Odor
20		Brown fine to coarse SAND; wet (fill)		5.0	
		Green-grey CLAY and PEAT; moist			Thickness of peat interval interpreted from previous Site investigation
		Grey to black fine to coarse SAND, little Silt, trace Gravel; wet		>2000	Odor, trace free product
25		Grey to black fine to coarse SAND, little Silt, trace Gravel; wet		111	Odor, trace free product
30		Grey-brown fine to coarse SAND, little Silt, trace Gravel; wet		>2000	Odor, trace free product
35		Grey-brown fine to coarse SAND, little Silt, trace Gravel; wet		>2000	Odor, trace free product
40		Brown fine SAND, little Silt, trace coarse Sand; wet		1785	Odor, trace free product
45		Brown to light brown fine SAND, some Silt; wet		708	Odor, free Product
50					Bottom of well 50 feet below land surface

BORING/WELL RECOVE-1.GPJ ROUX.GDT 6/11/02

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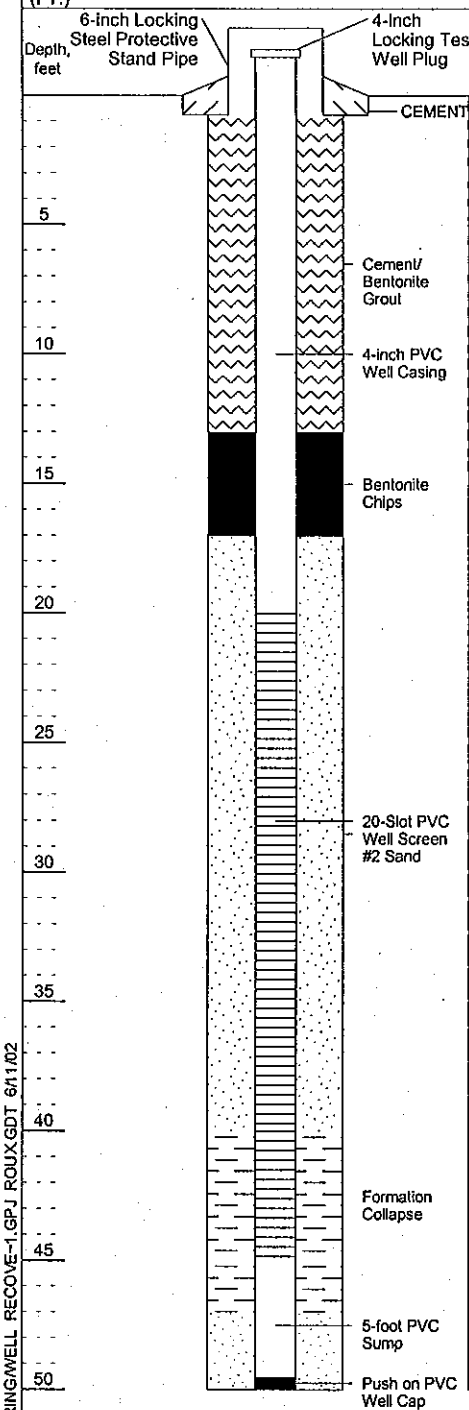
WELL CONSTRUCTION LOG

WELL NO. **RW-37**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/9/02-5/9/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; moist to wet (fill)			
5				5
	Brown to black fine to medium SAND, little Silt, trace Gravel, trace Coal; wet (fill)		1271	Odor
10	Brown-green to black fine SAND, little Silt, trace Gravel, trace Wood; wet (fill)		1197	Odor 10
	Brown fine to medium SAND, trace Gravel, trace Silt; wet (fill)		380	
15	Brown-green fine SAND, some Silt; wet (fill)		158	15
	Green-grey CLAY and PEAT; moist		252	Thickness of peat interval interpreted from previous Site investigation
20	Brown fine SAND, little Silt, trace coarse SAND, trace Gravel; wet			20
	Brown fine SAND, little Silt, trace coarse SAND; wet		207	Odor
25	Brown fine SAND, little Silt, trace coarse SAND; wet		664	Odor 25
30	Brown fine SAND, little Silt; wet		775	Odor 30
35	Brown fine SAND, little Silt; wet		1345	Odor 35
40	Brown fine SAND, little Silt; wet		1489	Odor, trace free product 40
45	Brown fine SAND, little Silt; wet		1183	Odor, trace free product 45
50				Bottom of well at 50 ft bls 50

BORING/WELL RECOVE-1.GPJ ROUX.GDT 6/11/02

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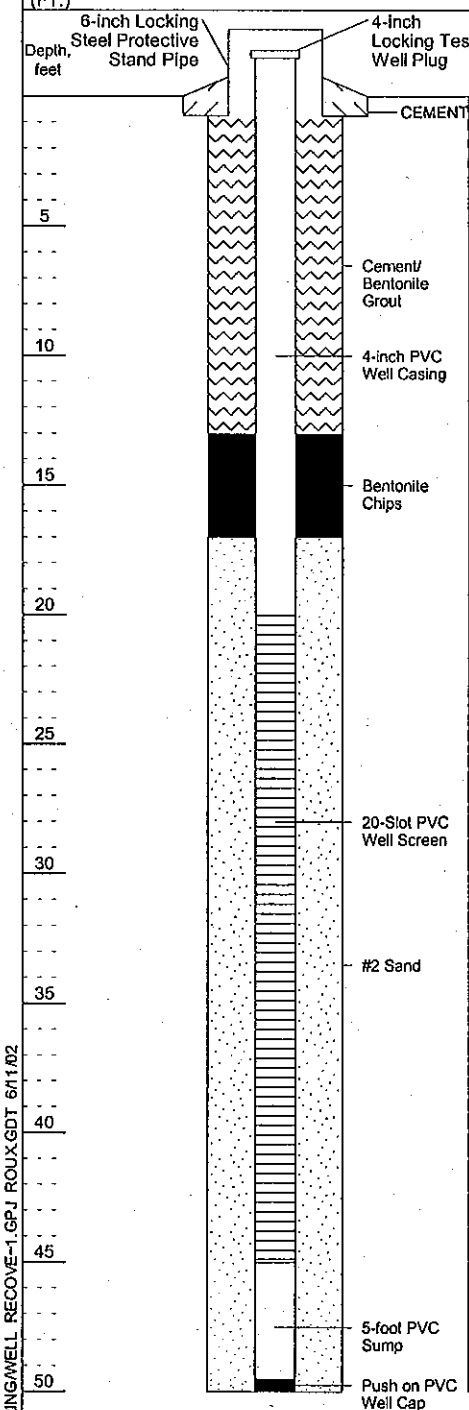
WELL CONSTRUCTION LOG

WELL NO. **RW-38**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/10/02-5/10/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Gravel, trace Silt, trace Brick; moist (fill)			
5					5
10		Brown fine to coarse SAND, little Silt, trace Gravel; moist (fill)		35.4	Odor
		Brown fine to coarse SAND, little Silt, trace Gravel; moist (fill)		867	Odor
15		Brown fine SAND, little Silt, trace coarse Sand; wet (fill)		>2000	Odor
		Brown fine SAND, little Silt, trace coarse Sand; wet (fill)		6.9	
		Green-gray CLAY and PEAT; moist			Thickness of peat interval interpreted from previous Site investigation
20		Gray-brown fine to coarse SAND, little Silt, trace Gravel; wet		96.6	Odor
25		Gray-brown fine to coarse SAND, little Silt, trace Gravel; wet		381	Odor
30		Gray-brown fine to coarse SAND, little Silt, trace Gravel; wet		874	Odor
35		Gray-brown fine to medium SAND, little Silt; wet		1341	Odor
40		Brown fine SAND, some Silt; wet		1033	Odor, trace free product
45		Gray-brown fine to medium SAND, little Silt; wet		1271	Odor, trace free product
50					Bottom of well 50 feet below land surface

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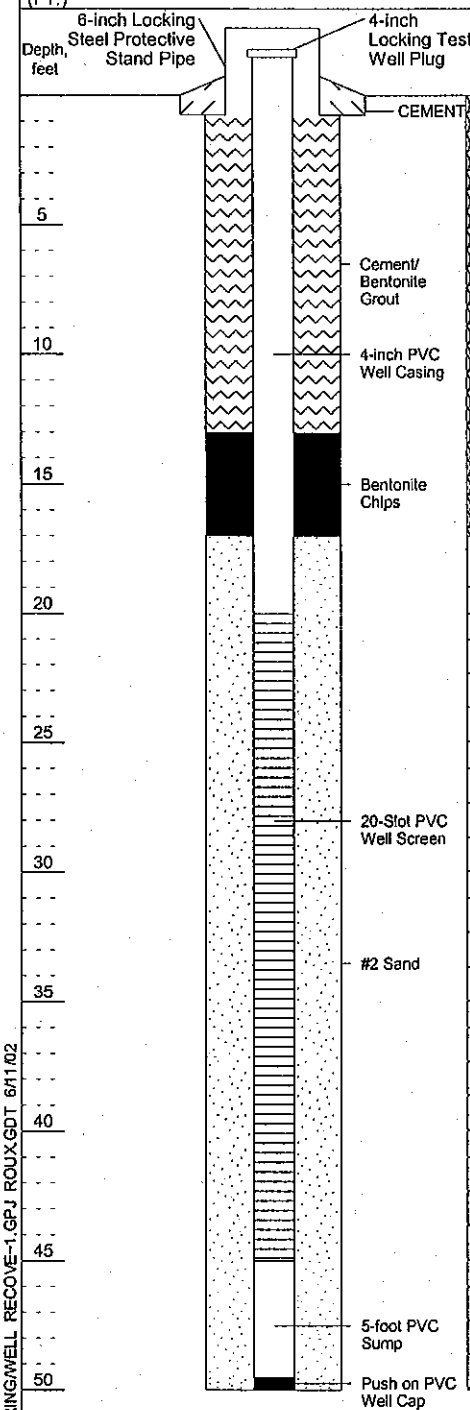
WELL CONSTRUCTION LOG

WELL NO. **RW-39**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **R. Kovacks**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/13/02-5/13/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown coarse to fine SAND, trace Gravel, trace Silt, trace Brick, trace Cobbles; moist (fill)			
5					
10		Brown medium to fine SAND, trace Silt, trace Gravel; moist (fill)		19.9	Slight odor
		Brown to reddish brown fine SAND, some Silt; moist (fill)		762	Slight odor
15		Brown to reddish brown fine SAND, some Silt; wet (fill)		659	Odor
		Brown to reddish brown fine SAND, some Silt, trace coarse SAND; wet (fill)			Odor
		Peat			Thickness of peat interval interpreted from previous Site investigation
20		Gray to brown medium SAND, some Silt; wet			Odor
25		Gray-brown fine SAND, some Silt; wet		129	Odor
30		Gray-brown fine SAND, some Silt; wet		421	Odor
35		Gray-brown fine SAND, some Silt; wet		>2000	Odor
40		Gray-brown fine SAND, some Silt; wet		1200	Odor, trace free product
45		Gray-brown fine SAND, trace Silt, trace Gravel; wet		1421	Trace free product
50					Bottom of well 50 feet below land surface

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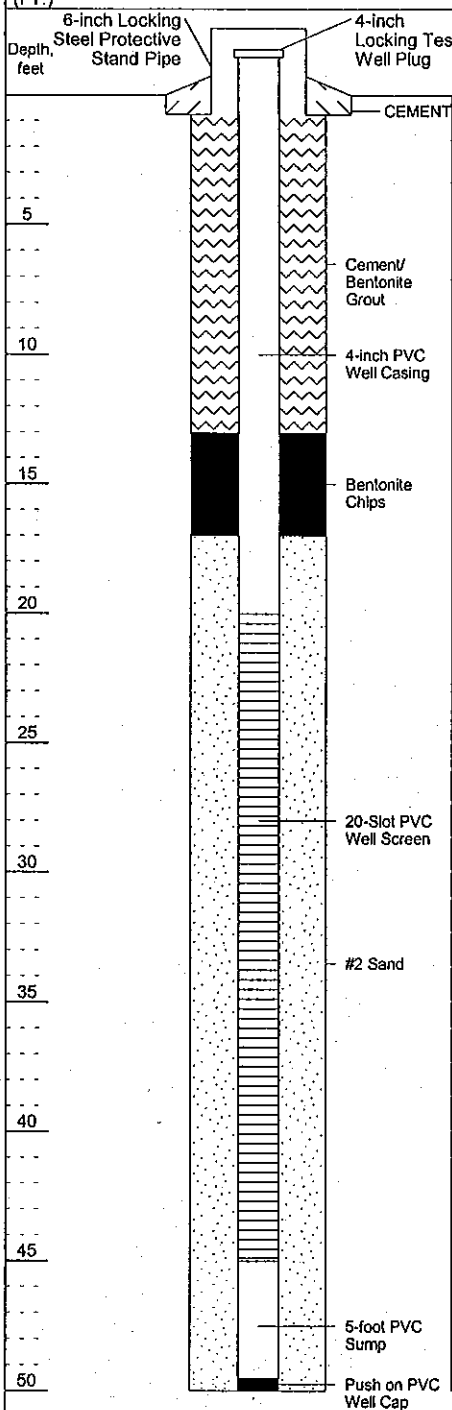
WELL CONSTRUCTION LOG

WELL NO. **RW-40**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **On Site Along 12th Street**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/14/02-5/14/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown to black stained fine to medium SAND, little Silt, trace coarse SAND, trace Gravel; wet (fill)		17.1	
5				Odor
10	Gray-brown fine SAND, some Silt; wet (fill)		10.1	Odor
15	Brown fine to medium SAND, little Silt; wet (fill)		22.8	Odor
	Brown fine to coarse SAND, little Silt; wet (fill)		21.3	Odor
	Green-gray CLAY and PEAT; moist			Thickness of peat interval interpreted from previous Site investigation
20	Gray-brown fine to medium SAND, little Silt; wet		29.2	Odor
25	Gray-brown fine SAND, some Silt; wet		35.1	
30	Grey-brown fine SAND, some Silt; wet		65.2	Odor
35	Grey-brown fine SAND, some Silt; wet		149	Odor
40	Grey-brown fine SAND, some Silt; wet		78.1	Odor, trace free product
45	Brown fine SAND, little Silt; wet		522	Odor, trace free product
50				Bottom of well 50 feet below land surface

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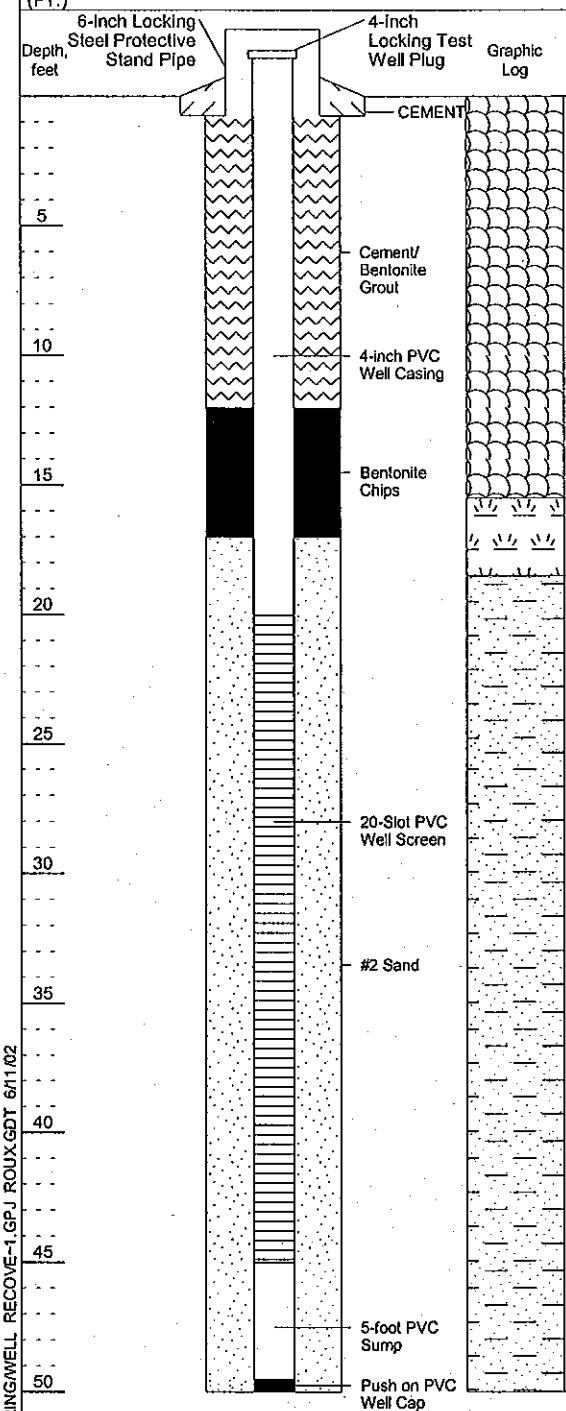
WELL CONSTRUCTION LOG

WELL NO. **RW-41**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/16/02-5/16/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Brown to black stained fine to medium SAND, little Silt, trace coarse SAND, trace Gravel; wet (fill)			
5				5
10	Brown fine to coarse SAND, trace Silt, trace Gravel; wet (fill)		166	Odor
	Brown fine to coarse SAND, trace Silt, trace Gravel; wet (fill)		1526	Odor
15	Brown fine to coarse SAND, trace Silt; wet (fill)		713	Odor
	Green-gray CLAY and PEAT; moist			Thickness of peat interval interpreted from previous Site Investigation
20	Brown fine SAND, little Silt, trace coarse Sand; wet		23.5	Odor
25	Brown to black fine SAND, little Silt, trace coarse Sand; wet		1029	Odor
30	Brown fine SAND, little Silt, trace coarse Sand; wet		1785	Odor, trace free product
35	Brown fine SAND, little Silt, trace coarse Sand; wet		>2000	Odor, trace free product
40	Brown fine to medium SAND, little Silt; wet		1527	Odor, trace free product
45	Brown fine to medium SAND, little Silt; wet		>2000	Odor, trace free product
50				Bottom of well 50 feet below land surface

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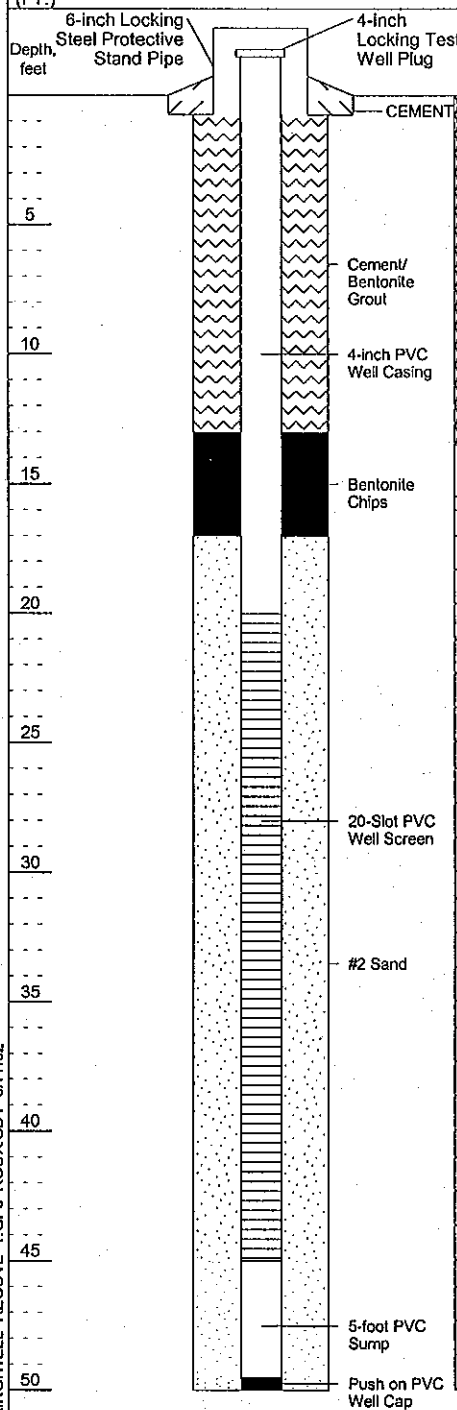
WELL CONSTRUCTION LOG

WELL NO. **RW-42**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/17/02-5/17/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC**	TOTAL LENGTH **25.0**	DIA. **4-inch** SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN **/**	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown to black stained fine to medium SAND, little Silt, trace coarse SAND, trace Gravel; wet (fill)			
5					5
10					10
		Brown to black fine to medium SAND, trace Gravel, trace Silt, trace Coarse Sand; wet (fill)		>2000	Odor
15		PEAT; moist			Thickness of peat interval interpreted from previous Site investigation 15
		Brown fine to coarse SAND, trace Silt, trace Gravel; wet		>2000	
20		Gray-brown fine to medium SAND, little Silt, trace coarse Sand; wet		>2000	Odor 20
25		Gray-brown fine to medium SAND, little Silt, trace coarse Sand; wet		520	Odor 25
30		Gray-brown fine to medium SAND, little Silt, trace coarse Sand; wet		54.9	Odor, free product 30
35		Gray-brown fine SAND, little Silt, trace coarse Sand; wet		280	Odor, free product 35
40		Gray-brown fine to coarse SAND, little Silt; wet		>2000	Odor, free product 40
45		Gray-brown fine to coarse SAND, little Silt; wet		>2000	Odor, free product 45
50					Bottom of well 50 feet below land surface 50

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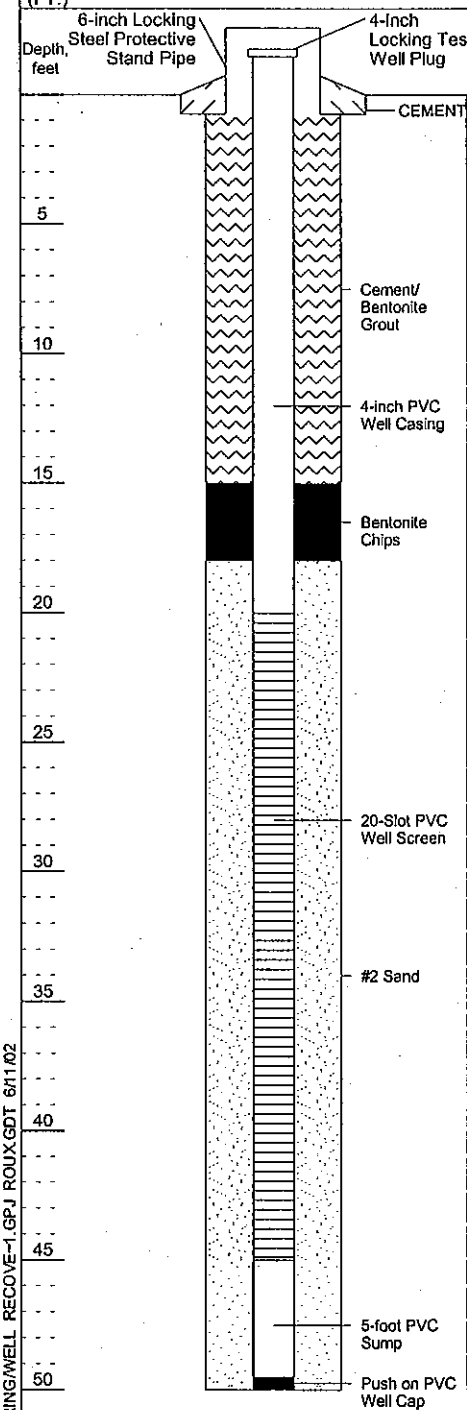
WELL CONSTRUCTION LOG

WELL NO. **RW-43**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **M. Kroll**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/20/02-5/20/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
5		Brown to black stained fine to medium SAND, little Silt, trace coarse SAND, trace Gravel; wet (fill)			
10					
		Grey to light brown fine to medium SAND, some Silt, little Clay; wet		268	Slight odor, some staining
15		PEAT		>2000	Slight odor, some staining
		Brown fine to coarse SAND, some Silt; wet		>2000	
20		Brown fine to medium Sand and Silt, some Clay, trace Gravel; wet		907	Odor
25		Brown fine to medium Sand and Silt, some Clay, trace Gravel; moist		1235	Odor
30		Brown fine to coarse SAND, some Silt and Clay; wet		>2000	Odor
35		Brown fine to coarse SAND, some Silt and Clay; wet		1226	Odor
40		Brown fine to coarse SAND, some Silt and Clay; wet		>2000	Odor
45		Brown fine to coarse SAND, some Silt and Clay; wet		>2000	Odor
50					Bottom of well 50 feet below land surface

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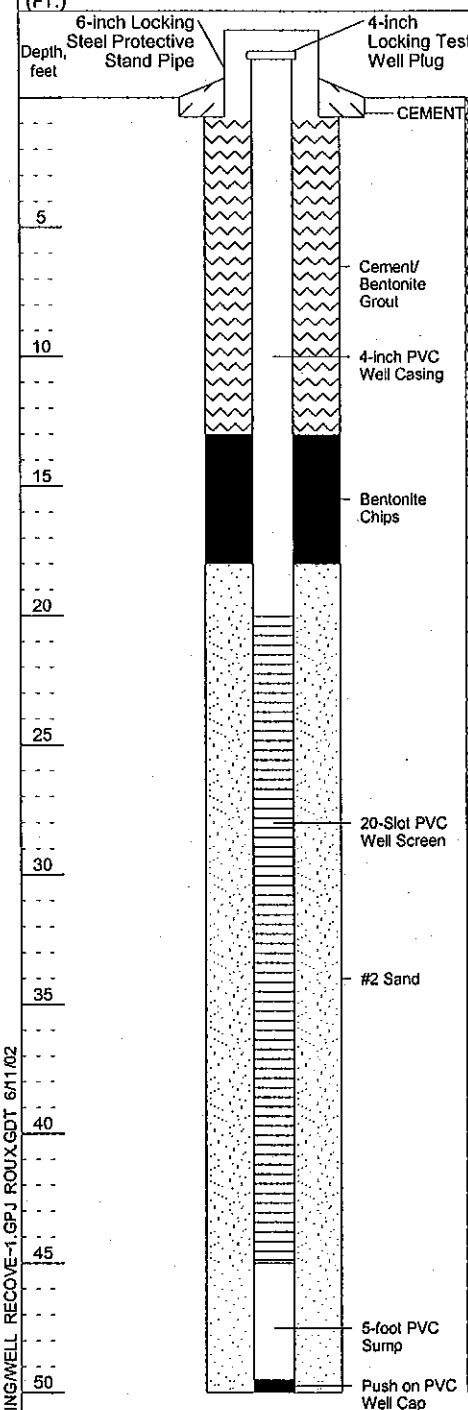
WELL CONSTRUCTION LOG

WELL NO. **RW-44**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **5/21/02-5/21/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **25.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE	GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Brown fine to coarse SAND, trace Silt and Gravel; wet (fill)		32.7	
5					
10					
		Brown gray fine to medium SAND, little Silt; wet		0.0	
15					
		Brown PEAT and green-gray Clay			
		Brown fine SAND, some Silt, trace coarse Sand and Gravel; wet		3.7	
20					
25		Brown fine SAND, some Silt, trace coarse Sand and Gravel; wet		41.7	
30		Brown fine SAND, some Silt; wet		45.3	Organic odor
35		Brown fine SAND, little silt, trace coarse Sand; wet		77.2	Odor
40		Brown fine SAND, some Silt; wet		137	Odor
45		Brown fine SAND, some Silt; wet		87.6	Odor, free product
50					Bottom of well 50 feet below land surface

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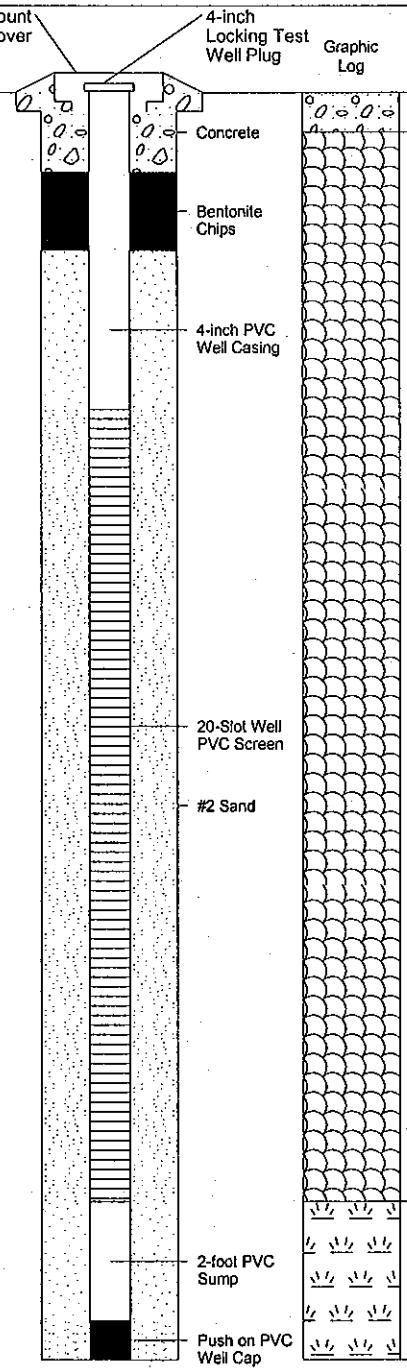
WELL CONSTRUCTION LOG

WELL NO. **RW-1S**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/22/02-4/22/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted** MAT. **SCH 40 PVC** TOTAL LENGTH **10.0** DIA. **4-inch** SLOT SIZE **20-Slot**			
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Graphic Log	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
		Concrete			
		Brown fine to coarse SAND, little Silt, trace Gravel, trace Concrete; dry to wet at 3 feet (fill)			
5		Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)		12.1	Odor
10		Brown fine to coarse SAND, little Silt, trace Gravel; wet (fill)		23.8	Odor
15		PEAT and green-grey CLAY; moist			

Bottom of well at 16 feet below land surface

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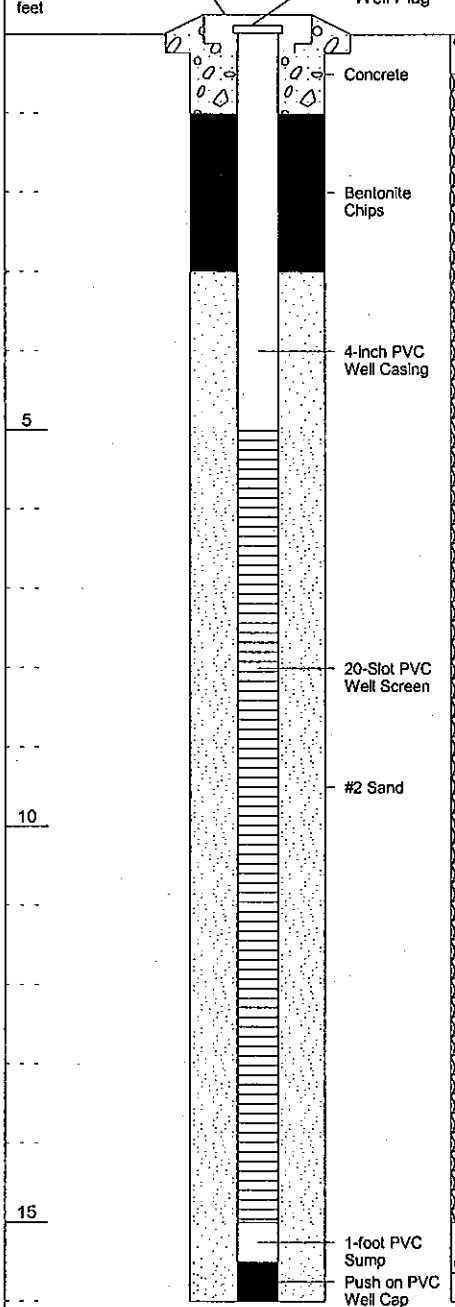
WELL CONSTRUCTION LOG

WELL NO. **RW-2S**	NORTHING	EASTING		
PROJECT NO./NAME **92401Y03 / FC Gowanus former MGP Site**		LOCATION **124-136 2nd Avenue**		
APPROVED BY **G. Tyers**	LOGGED BY **D. Moss**	**Brooklyn, New York**		
DRILLING CONTRACTOR/DRILLER **Aquifer Drilling & Testing, Inc. / L. Adams**		GEOGRAPHIC AREA **Off Site 12th Street Sidewalk**		
DRILL BIT DIAMETER/TYPE **6.25-in. / Auger**	BOREHOLE DIAMETER **10-inches**	DRILLING EQUIPMENT/METHOD **CME-75 / HSA**	SAMPLING METHOD **2" Split Spoon**	START-FINISH DATE **4/22/02-4/22/02**
CASING MAT./DIA. **SCH 40 PVC / 4-inch**	SCREEN: TYPE **Slotted**	MAT. **SCH 40 PVC** TOTAL LENGTH **10.0**	DIA. **4-inch**	SLOT SIZE **20-Slot**
ELEVATION OF: (FT.)	GROUND SURFACE	TOP OF WELL CASING	TOP & BOTTOM SCREEN /	GW SURFACE / GRAVEL PACK **#2**



Depth, feet	Visual Description	Blow Counts per 6"	PID Values (ppm)	REMARKS
	Concrete			
	Brown fine to coarse SAND, little Silt, little Gravel, trace Concrete; dry to wet at 3 feet (fill)			
5	Brown fine to coarse SAND, little Silt, little Gravel; wet (fill)		28.6	
10	Brown fine to coarse SAND, little Silt, little Gravel; wet (fill)		27.2	Odor and sheen
15	PEAT and green-grey CLAY; moist			

Bottom of well at 16 feet below land surface

AKRF Engineering Logs – 2001

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Environmental Consultants

FIELD BOREHOLE LOG

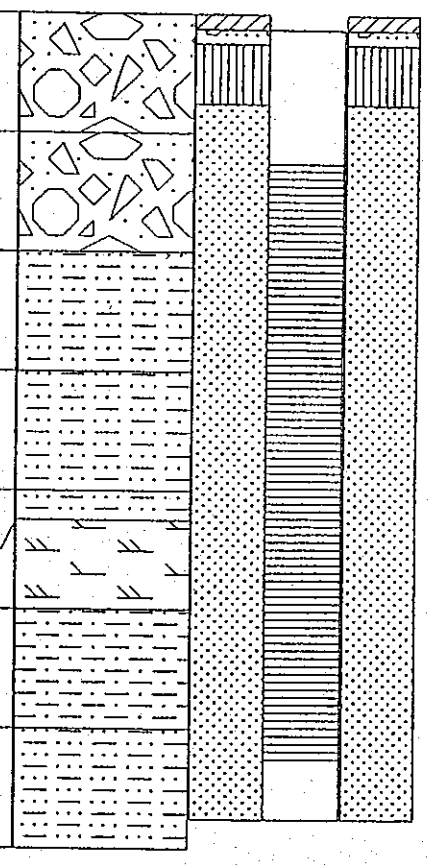
BOREHOLE NUMBER: MW-2/DP-1

PROJECT NUMBER: 80030-0002
PROJECT NAME: 124-136 SECOND AVENUE
LOCATION: BROOKLYN, NEW YORK
DRILLING CO: FENLEY & NICOL
DRILLING METHOD: HOLLOW STEM AUGER/GEOPROB
FIELD PARTY: CHRIS BOSS
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 12/14/2000 DATE COMPLETED: 12/14/2000

FIELD BOOK NO: 301
TOTAL DEPTH: 28 Feet
GROUND SURFACE ELEVATION: 0.0

STATIC WATER LEVEL (BLS)		
Depth (ft)	5.3	
Time	12:35	
Date	12/22/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0	1		ND		FILL: concrete and red brick fragments, ash, gray silty sand.		
	2		ND		FILL: concrete and red brick fragments, ash, gray silty sand.		
10.0	3		ND		SILTY SAND		
	4		ND		SILTY SAND		
	5		ND		SILTY SAND		
20.0					PEAT: clay		
	6		ND		SILT		
	7		ND		SILTY SAND		



AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER DP-2

PROJECT NUMBER:	80030-0002	FIELD BOOK NO:	301
PROJECT NAME:	124-136 SECOND AVENUE	TOTAL DEPTH:	28 Feet
LOCATION:	BROOKLYN, NEW YORK	GROUND SURFACE ELEVATION:	0.0
DRILLING CO:	FENLEY & NICOL		
DRILLING METHOD:	GEOPROBE		
FIELD PARTY:	CHRIS BOSS/JAY SEALE		
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	12/14/2000 DATE COMPLETED: 12/14/2000		

STATIC WATER LEVEL (BLS)		
Depth (ft)	5.0	
Time	10:10	
Date	12/14/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0	1		ND		FILL: concrete and red brick fragments, ash, black silty sand.		
	2		83	Strong odor			
10.0	3		4				
	4		ND				
					PEAT: With Clay		
	5		36				
20.0	6		40		SILT: Brownish gray to gray SILT		
	7		ND				
					SAND: Fine to medium SAND		

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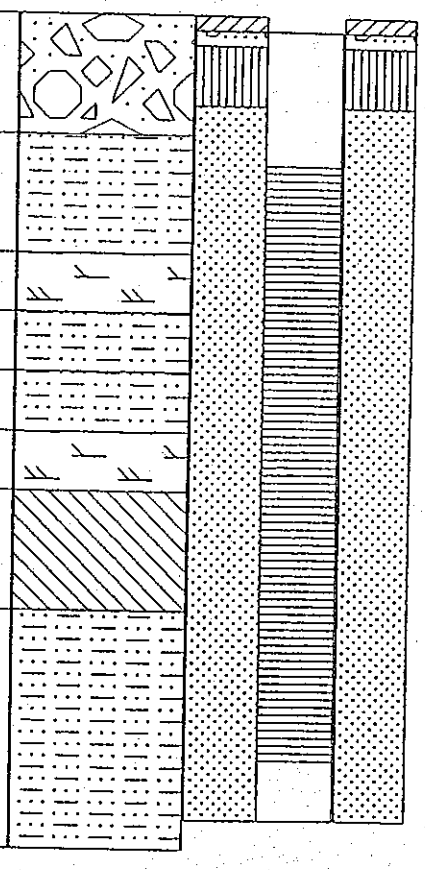
FIELD BOREHOLE LOG

BOREHOLE NUMBER: MW-4/DP-3

PROJECT NUMBER:	80030-0002	FIELD BOOK NO:	301
PROJECT NAME:	124-136 SECOND AVENUE	TOTAL DEPTH:	28 Feet
LOCATION:	BROOKLYN, NEW YORK	GROUND SURFACE ELEVATION:	0.0
DRILLING CO:	FENLEY & NICOL		
DRILLING METHOD:	HOLLOW STEM AUGER/ GEOPROBE		
FIELD PARTY:	CHRIS MIGLIORE/JAY SEAL		
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	12/13/2000 DATE COMPLETED: 12/13/2000		

STATIC WATER LEVEL (BLS)		
Depth (ft)	3.0	
Time	12:15	
Date	12/23/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0	1		ND		FILL: Coal and red brick fragments, ash, gray silty sand.		
	2		14	Strong odor	SILTY SAND: Black		
10.0	3				PEAT: CLAY		
			17	Free Product	SILTY SAND: Black		
	4		2	Strong odor	SILTY SAND: Brown		
					PEAT: CLAY		
	5		20		CLAY: Very dense		
20.0	6		45		SILTY SAND: Dark gray		
			452	Free product			
	7						



AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER DP- 4

PROJECT NUMBER: 80030-0002
PROJECT NAME: 124-136 SECOND AVENUE
LOCATION: BROOKLYN, NEW YORK
DRILLING CO: FENLEY & NICOL
DRILLING METHOD: HOLLOW STEM AUGER
FIELD PARTY: CHARLIE GUZZARDO
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 12/1/2000 DATE COMPLETED: 12/1/2000

FIELD BOOK NO: 301
TOTAL DEPTH: 18 Feet
GROUND SURFACE ELEVATION: 0.0

STATIC WATER LEVEL (BLS)		
Depth (ft)	6.0	
Time	1:30	
Date	12/1/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0	1				FILL: Red brick fragments, ash, woo black silty sand.		
	2		250	Strong odor			
	3		200	Strong odor			
	4		50		CLAY: Little ash		
10.0	5		10		No Recovery		
	6		ND				
	7		ND		CLAY: With little Silt		
	8		20		PEAT		

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FIELD BOREHOLE LOG

BOREHOLE NUMBER: DP-6

PROJECT NUMBER: 80030-0002
PROJECT NAME: 124-136 SECOND AVENUE
LOCATION: BROOKLYN, NEW YORK
DRILLING CO: FENLEY & NICOL
DRILLING METHOD: HOLLOW STEM AUGER
FIELD PARTY: CHARLIE GUZZARDO
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 11/30/2000 DATE COMPLETED: 11/30/2000

FIELD BOOK NO: 301
TOTAL DEPTH: 18 Feet
GROUND SURFACE ELEVATION: 0.0

STATIC WATER LEVEL (BLS)		
Depth (ft)	6.0	
Time	10:40	
Date	11/30/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0							
	1		ND		FILL: Red brick and concrete fragments, ash, wood, black silty sand.		
▼	2		25	Strong odor			
	3		389	Strong odor			
	4		243		SILTY SAND		
10.0	5		97				
	6		20				
	7		24				
	8		24	Bottom of the gas holder (Refusal) @18 Feet			

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FIELD BOREHOLE LOG

BOREHOLE NUMBER: DP-7

PROJECT NUMBER: 80030-0002
PROJECT NAME: 124-136 SECOND AVENUE
LOCATION: BROOKLYN, NEW YORK
DRILLING CO: FENLEY & NICOL
DRILLING METHOD: HOLLOW STEM AUGER
FIELD PARTY: CHARLIE GUZZARDO
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 11/30/2000 DATE COMPLETED: 11/30/2000

FIELD BOOK NO: 301
TOTAL DEPTH: 18 Feet
GROUND SURFACE ELEVATION: 0.0

STATIC WATER LEVEL (BLS)		
Depth (ft)	6.0	
Time	10:40	
Date	11/30/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0							
	1		ND		FILL: Red brick and concrete fragments, ash, wood, black silty sand.		
	2		ND		SILTY SAND: With some Gravel an Wood		
	3		ND				
	4		75	Strong odor			
10.0	5		161	Strong odor			
	6		82	Strong odor			
	7		166	Free product			
	8		84	Free product			

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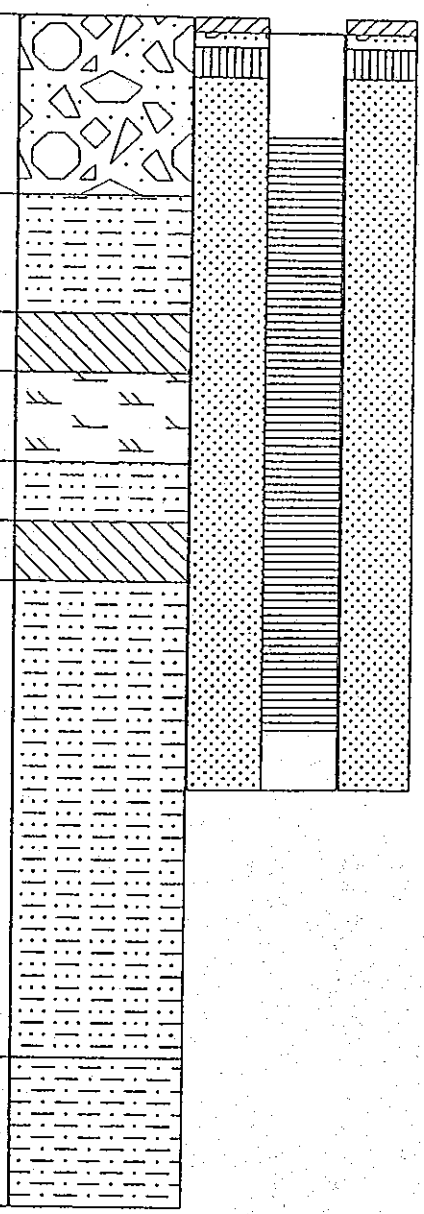
FIELD BOREHOLE LOG

BOREHOLE NUMBER
MW-3/DP-9

PROJECT NUMBER:	80030-0002	FIELD BOOK NO:	301
PROJECT NAME:	124-136 SECOND AVENUE	TOTAL DEPTH:	40 FEET
LOCATION:	BROOKLYN, NEW YORK	GROUND SURFACE ELEVATION:	0.0
DRILLING CO:	FENLEY & NICOL		
DRILLING METHOD:	HOLLOW STEM AUGER/GEOPROBE		
FIELD PARTY:	JAY SALE		
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	12/12/2000 DATE COMPLETED: 12/12/2000		

STATIC WATER LEVEL (BLS)		
Depth (ft)	5.15	
Time	11:20	
Date	12/23/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0	1		9		FILL: red brick and coal fragments, ash, black silty sand.		
	2		7		SILTY SAND: dark black		
10.0	3		ND		CLAY		
	4		ND		PEAT: Clay		
	5		ND		SILTY SAND		
20.0	6		ND		CLAY		
	7		43	Strong odor, free product	SILTY SAND		
30.0	8		94				
	9		10	slight petroleum odor			
	10		13	slight petroleum odor	SILT: Dense reddish brown silt		
40.0							



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FIELD BOREHOLE LOG

BOREHOLE NUMBER: DP- 10

PROJECT NUMBER:	80030-0002	FIELD BOOK NO:	301
PROJECT NAME:	124-136 SECOND AVENUE	TOTAL DEPTH:	28 Feet
LOCATION:	BROOKLYN, NEW YORK	GROUND SURFACE ELEVATION:	0.0
DRILLING CO:	FENLEY & NICOL		
DRILLING METHOD:	GEOPROBE		
FIELD PARTY:	JAY SEALE		
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	12/13/2000 DATE COMPLETED: 12/13/2000		

STATIC WATER LEVEL (BLS)		
Depth (ft)	5.0	
Time	10:10	
Date	12/13/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0	1		ND		FILL: concrete and red brick fragments, ash, black silty sand.		
	2		89	Strong odor	SILTY SAND: Gray Silty Sand changed to reddish brown Silty SAnd		
	3		26	Strong odor	SILY SAND: Reddish brown Silty Sand with some pebbles		
10.0	4				SILTY SAND: Black		
			40	Free product	CLAY: Dense		
	5				CLAY: With little SAND		
			27	Free product	CLAY: Dense		
20.0	6		45	Free product	Refusal: Location moved 15 feet north		
	7				CLAY: Dense		
			189	Free Product	SILT: Reddish Brown SILT		
					SAND: Fine to medium SAND		

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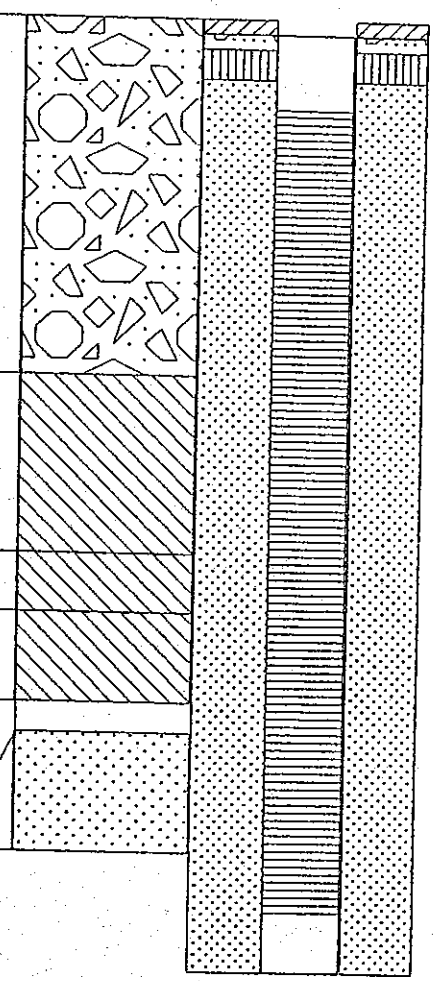
FIELD BOREHOLE LOG

BOREHOLE NUMBER: MW-5/DP-11

PROJECT NUMBER:	80030-0002	FIELD BOOK NO:	301
PROJECT NAME:	124-136 SECOND AVENUE	TOTAL DEPTH:	32 Feet
LOCATION:	BROOKLYN, NEW YORK	GROUND SURFACE ELEVATION:	0.0
DRILLING CO:	FENLEY & NICOL		
DRILLING METHOD:	HOLLOW STEM AUGER/GEOPROBE		
FIELD PARTY:	CHRIS MIGLIORE/JAY SEAL		
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	12/08/200	DATE COMPLETED:	12/08/2000

STATIC WATER LEVEL (BLS)		
Depth (ft)	5.3	
Time	2:45	
Date	12/22/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0	1		202	strong odor	FILL: Coal and red brick fragments, ash, black silty sand.		
	2		ND				
10.0	3		ND				
	4		ND		CLAY: With little Silt		
	5		ND				
20.0					CLAY: With little Peat		
	6		ND		CLAY		
			ND		SANDY CLAY		
	7				SAND		
30.0							



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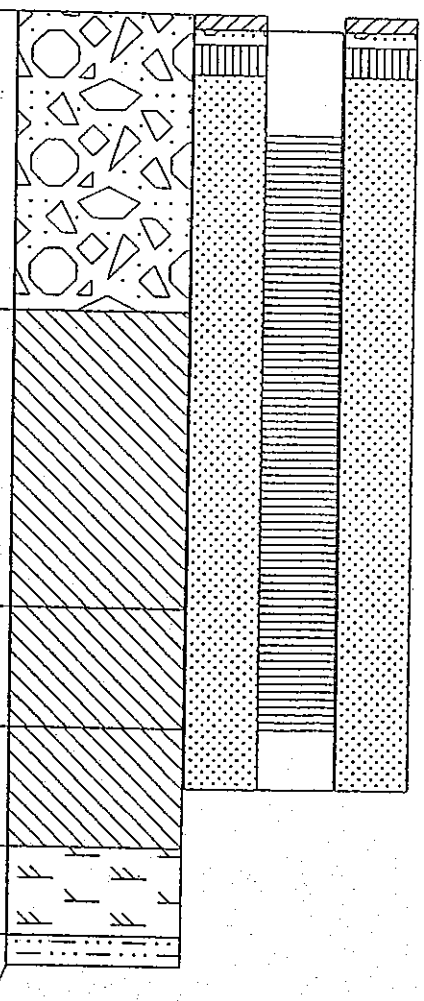
FIELD BOREHOLE LOG

BOREHOLE NUMBER: MW-6/DP-12

PROJECT NUMBER:	80030-0002	FIELD BOOK NO:	301
PROJECT NAME:	124-136 SECOND AVENUE	TOTAL DEPTH:	32 Feet
LOCATION:	BROOKLYN, NEW YORK	GROUND SURFACE ELEVATION:	0.0
DRILLING CO:	FENLEY & NICOL		
DRILLING METHOD:	HOLLOW STEM AUGER/GEOPROBE		
FIELD PARTY:	CHRIS MIGLIORE/JAY SEAL		
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	12/6/2000	DATE COMPLETED:	12/6/2000

STATIC WATER LEVEL (BLS)		
Depth (ft)	4.95	
Time	10:30	
Date	12/23/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0	1		ND		FILL: Coal and red brick fragments, ash, black silty sand.		
	2		ND				
10.0	3		ND		CLAY: With little Silt		
	4		ND				
	5		ND				
20.0	6		ND		GLAY: Shell fragments		
			ND				
	7				CLAY: With little Silt		
30.0			ND		PEAT: With Clay		
			200	Free product	SILTY SAND		



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FIELD BOREHOLE LOG

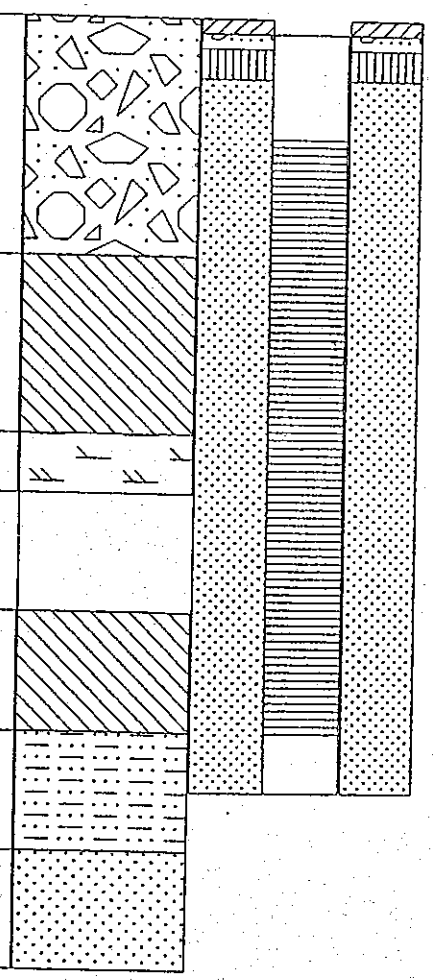
BOREHOLE NUMBER: MW-7/DP-13

PROJECT NUMBER: 80030-0002
PROJECT NAME: 124-136 SECOND AVENUE
LOCATION: BROOKLYN, NEW YORK
DRILLING CO: FENLEY & NICOL
DRILLING METHOD: HOLLOW STEM AUGER/GEOPROBE
FIELD PARTY: CHRIS MIGLIORE/JAY SEAL
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 12/06/2000 DATE COMPLETED: 12/06/2000

FIELD BOOK NO: 301
TOTAL DEPTH: 32 Feet
GROUND SURFACE ELEVATION: 0.0

STATIC WATER LEVEL (BLS)		
Depth (ft)	2.8	
Time	1:15	
Date	12/22/2000	

DEPTH (ft)	SAMPLE NUMBER	BLOWS COUNT	PID/ppm	REMARKS	DESCRIPTION	LITHOLOGY	WELL INSTALLATION
0.0							
	1		ND		FILL: Coal and red brick fragments, ash, black silty sand.		
	2		ND				
10.0	3		ND		CLAY		
	4		ND				
					PEAT		
	5		ND		No Recovery		
20.0	6		ND		CLAY: With Peat		
	7		ND		SILTY SAND		
30.0	8		ND		SAND: Medium to coarse brown SAND with some Gravel		



AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-1

PROJECT NUMBER:	80030-0003	START TIME	0930
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1045
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN: 02/16/01	DATE COMPLETED: 02/16/01		

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

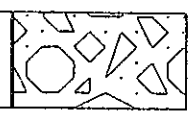
DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/42	ND		fill: red bricks and concrete fragments; brownish red silty sand	
8.0	GP1	48/48	17		silt: dark gray to reddish brown silt; wet at -8ft.	
12.0		48/36	ND		clay: dark gray clay	
					peat	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-2

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/16/01 DATE COMPLETED: 02/16/01

START TIME 1115
END TIME 1125
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0				refusal at -8 ft.; location moved two times; third attempt was 20 ft towards 11th St.	fill, not sampled	
4.0	GP2	48/24	197	FREE PRODUCT	fill: free product, fill, brick fragments, black silty sand	
8.0						
12.0						
16.0						

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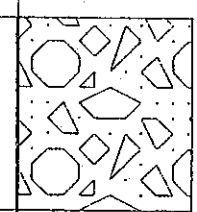
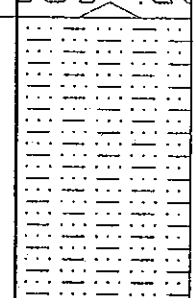
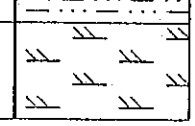
FIELD BOREHOLE LOG

BOREHOLE NUMBER: GP-3

PROJECT NUMBER:	80030-0003	START TIME	1130
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1220
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/16/01	DATE COMPLETED:	02/16/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0				refusal at -12 ft.; location moved 12 ft. towards 11th St.	fill, not sampled	
4.0		48/24	15.3		fill: black sandy silt, odor	
8.0	GP3	48/15	218	FREE PRODUCT	silty sand: dark black silty sand, free product	
12.0		48/30	36	FREE PRODUCT		
					peat	
16.0						

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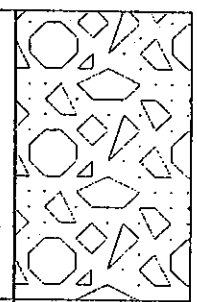
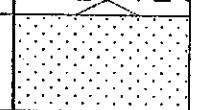
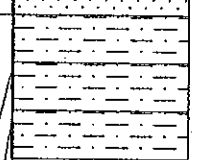
FIELD BOREHOLE LOG

BOREHOLE NUMBER: GP-6

PROJECT NUMBER:	80030-0003	START TIME	0850
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	0925
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/21/01	DATE COMPLETED:	02/21/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0	GP6		0.5	refusal at -11 ft.; three attempts made; refusal at 7 ft. and 4 ft.; sampling location 5 ft. SE of flag	fill: light brown medium coarse sand and gravel	
4.0					sand: black/dark brown medium sand and silt; wet at -6 ft.	
8.0					silt: black/dark brown silt and medium coarse sand with small cobbles	
					silt: brown/tan silt and medium coarse sand with small cobbles	
12.0			1.9		silt: black silt and medium coarse sand with small cobbles	
16.0						

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FIELD BOREHOLE LOG

BOREHOLE NUMBER: GP-15

PROJECT NUMBER:	80030-0003	START TIME	0900
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	0930
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/22/01	DATE COMPLETED:	02/22/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/36	8.0	FREE PRODUCT	fill: coal fragments, loose, stained with free product	
8.0	GP15	48/12	21.0	FREE PRODUCT	fill: coal fragments, loose, stained with free product	
12.0		48/24	9.0	FREE PRODUCT	silty sand: fill, black silty sand, loose, free product	
					peat: dark brown peat	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-16

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/22/01 DATE COMPLETED: 02/22/01

START TIME 0945
END TIME 1030
GROUND SURFACE ELEVATION: 0

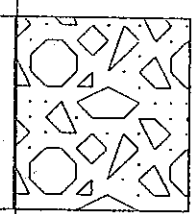
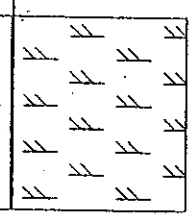
STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/32	3.5	stained with FREE PRODUCT	fill: dark black silty sand, stained with free product	
8.0	GP16	48/48	12.5	FREE PRODUCT	silty sand: black silty sand, dense free product	
12.0		48/24	63.0	FREE PRODUCT	silty sand: black silty sand, free product	
16.0					peat	

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-17

PROJECT NUMBER:	80030-0003	START TIME	1045
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1130
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/22/01	DATE COMPLETED:	

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/4	8		fill: ash, brick fragments	
8.0		48/0		no recovery	(no recovery)	
12.0	GP17	48/36			peat: dark brown peat	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-18

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/22/01 DATE COMPLETED: 02/22/01

START TIME 1135
END TIME 1215
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/42	16.0		fill: red bricks, coal fragments, ash, black silty sand	
8.0	GP18	48/20	2.5	FREE PRODUCT	silty sand: black silty sand, free product	
12.0		48/24	7.0	FREE PRODUCT	silty sand: brownish gray silty sand	
16.0					peat	

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FIELD BOREHOLE LOG

BOREHOLE NUMBER
GP-19

PROJECT NUMBER:	80030-0003	START TIME	1330
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1415
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/22/01	DATE COMPLETED:	02/22/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/40	3.0		fill: ash, coal fragments, red bricks, black to brownish gray silty sand	
8.0		48/36	2.5			
12.0	GP19	48/36	3.0			
16.0					peat	

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-20

PROJECT NUMBER:	80030-0003	START TIME	1420
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1515
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/22/01	DATE COMPLETED:	02/22/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY (in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0						
4.0		48/48			fill: coal fragments, ash, red bricks, black silty sand	
8.0		48/36			silty sand: brownish gray silty sand, dense, peat at tip of sampler	
12.0	GP20	48/48			clay and peat: dense peat and clay	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-21

PROJECT NUMBER:	80030-0003	START TIME	0815
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	0830
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/27/01	DATE COMPLETED:	02/27/01

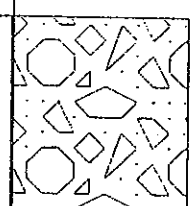
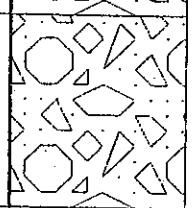
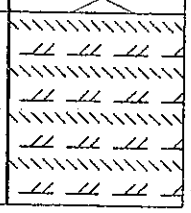
STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/46	2		fill: red brick fragments, ash, coal fragments	
8.0		48/24	12		fill: red brick fragments, ash, coal fragments, free product in lower 6 in.	
	GP21			FREE PRODUCT		
12.0		48/42	9		clay: very dense gray clay	
					silt: dense brownish grey silt, peat at tip of liner	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-22

PROJECT NUMBER:	80030-0003	START TIME	0835
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	0850
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN: 02/27/01	DATE COMPLETED: 02/27/01		

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0	GP22	48/42	65	FREE PRODUCT	fill: ash, coal fragments, black silty sand, loose, free product	
8.0		48/36	11	FREE PRODUCT	fill: ash, coal fragments, black silty sand, loose, free product	
12.0		48/48	ND		clay and peat: very dense clay and peat	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-23

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/27/01 DATE COMPLETED: 02/27/01

START TIME 0852
END TIME 0905
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0	GP23	48/44	173		fill: brick and concrete fragments	
				FREE PRODUCT		
8.0		48/46	118	FREE PRODUCT	silt: brownish gray dense silty sand with free product	
					silt: light gray dense silt with free product	
12.0		48/48	60		clay and peat: dense clay and peat	
16.0					clay: dense clay	

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-24

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/27/01 DATE COMPLETED: 02/27/01

START TIME 0915
END TIME 0950
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill; not sampled	
4.0		48/46	36	FREE PRODUCT	fill: red bricks, wood, silty sand, free product	
8.0	GP24	48/10	57	FREE PRODUCT	fill: red bricks, wood, silty sand, free product	
12.0		48/0		no recovery		
16.0				refusal		

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-25

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/27/01 DATE COMPLETED: 02/27/01

START TIME 1000
END TIME 1045
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/46	55	FREE PRODUCT	fill: ash, coal fragments, wood, black silty sand stained with free product	
8.0		48/36	22	FREE PRODUCT	fill: ash, coal fragments, wood, black silty sand stained with free product	
12.0	GP25	48/48	76		silt: brownish gray dense silt	
				FREE PRODUCT	clay and peat: dense clay and peat	
16.0					silty sand: black silty sand with free product	

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-26

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/27/01 DATE COMPLETED: 02/27/01

START TIME 1050
END TIME 1120
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

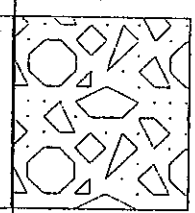
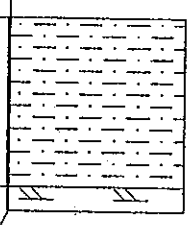
DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/40	61	FREE PRODUCT	fill: ash, wood, black silty sand with free product	
8.0		48/47	14	FREE PRODUCT	silt: dense dark black silt with free product	
12.0		48/48	109		clay and peat: dense clay and peat	
	GP26			FREE PRODUCT	silty sand: black silty sand with free product	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-27

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/27/01 DATE COMPLETED: 02/2701

START TIME 1130
END TIME 1215
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/24	ND		fill: red bricks, concrete [and] coal fragments, ash	
8.0		48/0		no recovery	(no recovery, void)	
12.0		48/48	ND		silt: light gray dense silt; peat at tip of sampler	
16.0					peat	

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-28

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/27/01 DATE COMPLETED: 02/27/01

START TIME 1230
END TIME 1255
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/46	ND		fill: red brick, concrete, ash, wood;	
8.0		48/48	ND		silt: brownish gray to light gray dense silt	
12.0		48/48	14			
	GP28				clay and peat: dense clay and peat	
16.0						

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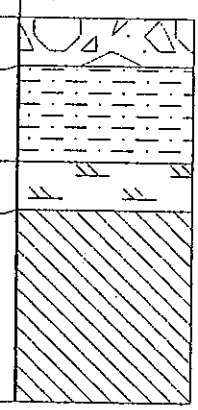
FIELD BOREHOLE LOG

BOREHOLE NUMBER: GP-29

PROJECT NUMBER:	80030-0003	START TIME	1330
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1345
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/27/01	DATE COMPLETED:	02/27/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0	GP29	48/48	25		fill: ash, concrete fragments, wood	
					silt: dark black to gray silt	
8.0		48/48	ND		peat: dense layer of peat	
					clay: dense clay	
12.0				end of boring		
16.0						



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FIELD BOREHOLE LOG

BOREHOLE NUMBER: GP-30

PROJECT NUMBER:	80030-0003	START TIME	1305
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1320
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/27/01	DATE COMPLETED:	02/27/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/48	ND		fill: brick, concrete, wood	
					clay and peat: dense clay and peat	
8.0		48/46	ND		clay and peat	
12.0				end of boring		
16.0						

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FIELD BOREHOLE LOG

BOREHOLE NUMBER: GP-31

PROJECT NUMBER:	80030-0003	START TIME	1345
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1425
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/21/01	DATE COMPLETED:	02/21/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/30	1.8		sand: medium coarse brown sand	
					sand and silt: fine to medium sand [with] some silt; lt. red/tan/brown	
8.0	GP31	48/24	74.1	odor, staining	sand: black fine to medium sand some silt; odor staining	
					sand and silt: dark brown fine to medium sand some silt	
12.0		48/42	0.3		sand and silt: dark brown sand and silt	
16.0					peat: dark brown tan peat	

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FIELD BOREHOLE LOG

BOREHOLE NUMBER: GP-32

PROJECT NUMBER:	80030-0003	START TIME	1255
PROJECT NAME:	124-136 Second Ave. (Gowanus)	END TIME	1345
LOCATION:	Brooklyn, NY	GROUND SURFACE ELEVATION:	0
DRILLING CO:			
DRILLING METHOD:	GeoProbe		
FIELD PARTY:			
GEOLOGIST:	MOHAMED AHMED		
DATE BEGUN:	02/21/01	DATE COMPLETED:	02/21/01

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0				2 ft. NW of flag--refusal at -4 ft.; [sampling location] 3 ft. SW of flag	fill, not sampled	
4.0	GP32	48/42	382	odor; sheen on liner	sand: black sand--strong odor, some dark brown sand and silt at -4 ft., fine gravel at -8 ft.; sheen on liner	
8.0		48/12	63.8	odor	sand: black sand--odor	
12.0		48/48	0		sand and silt: silt and fine to medium sand, black	
16.0					peat: tan peat	

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-33

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 02/21/01 DATE COMPLETED: 02/21/01

START TIME 1215
END TIME 1250
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0				[sampling location] 3 ft. SE of flag	fill, not sampled	
4.0	GP33	48/48	14	staining	sand: dark brown sand; some staining at 6 ft.; 2 in of wet peat or other organic at -6 ft.	
					sand: medium coarse sand and fine gravel	
8.0		48/12	4.4		gravel: gray/black fine gravel and sand	
12.0		48/30	1.9			
					peat: brown/tan peat	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-41

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/01/01 DATE COMPLETED: 03/01/01

START TIME 1300
END TIME 1345
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/36	ND		fill: red brick, gray silty sand	
					fill: cinders, ash, coal fragments, black silty sand	
8.0		48/48	ND			
					silt: reddish briown dense silt	
12.0		48/24	ND			
16.0		48/40	ND			
					clay and peat: dense clay and peat	
					peat	
20.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-42

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/01/01 DATE COMPLETED: 03/01/01

START TIME 1400
END TIME 1405
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/24	ND		fill: cinders, ash, coal fragments	
8.0		48/24	ND		fill: black silty sand, red bricks	
12.0		48/10	ND		silt: reddish brown loose silt	
16.0		48/40	ND		clay and peat	
20.0					peat	

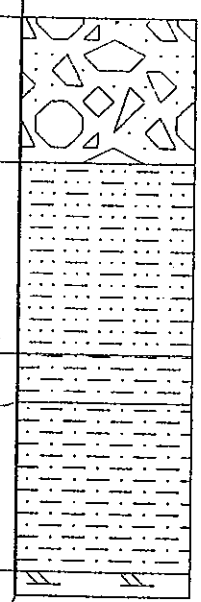
AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-44

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/01/01 DATE COMPLETED: 03/01/01

START TIME 1440
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/20	9.0		fill: red brick, glass, ash, gray silty sand	
				FREE PRODUCT	silty sand: black silty sand, free product	
8.0	GP44	48/46		FREE PRODUCT		
			30		silt: gray loose silt	
12.0		48/46	1.6	FREE PRODUCT	silt: reddish brown silt, free product; peat at tip of liner	
16.0					peat	



AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-45

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/02/01 DATE COMPLETED: 03/02/01

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/44	ND		fill: ash, red bricks, gray silty sand	
8.0		48/42	ND		silt: reddish brown loose silt	
12.0		48/48	ND			
16.0		48/48	ND			
					clay and peat	
20.0						

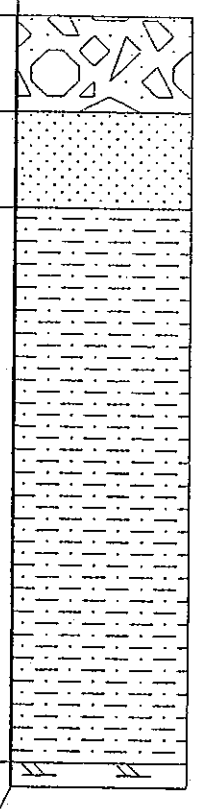
AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-46

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/01/01 DATE COMPLETED: 03/01/01

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0	GP46	48/46	46		fill: concrete, ash , red bricks	
					sand: black to reddish gray silty sand	
8.0		48/42	ND		silt: reddish brown loose silt; peat at lower 3 in.	
12.0		48/24	ND			
16.0		48/24	ND			
20.0					peat	



AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-47

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/02/01 DATE COMPLETED: 03/02/01

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/42	ND		fill: concrete, ash, red brick, yellow silt	
8.0		48/30	ND		silt: gray loose silt	
12.0		48/15	ND		silt: reddish brown loose silt	
16.0		48/48	ND		clay and peat	
20.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-48

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/02/01 DATE COMPLETED: 03/02/01

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/46	ND		fill: cinders, ash, wood, red bricks, concrete chips	
8.0		48/46	ND		silt: reddish brown loose silt	
12.0		48/44	ND		clay and peat	
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-49

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/02/01 DATE COMPLETED: 03/02/01

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/48	ND		fill: concrete chips, ash, gray silty sand	
					clay: dense clay; peat at tip of sampler	
8.0		48/48	ND		clay and peat	
12.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-50

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: DATE COMPLETED:

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/30	ND		fill: concrete, red brick, black silty sand	
8.0		48/36	ND			
12.0		48/36	ND		silt: reddish/brown loose silt	
16.0		48/40	ND		clay and peat	
20.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-51

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/02/01 DATE COMPLETED: 03/02/01

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

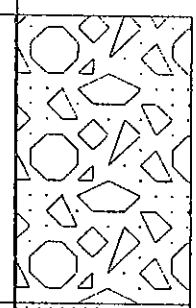
DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/36	ND		fill: concrete, red brick, ash, gray silty sand	
8.0		48/48	ND		silt: reddish brown loose silt	
12.0		48/24	ND			
16.0		48/48	ND		clay: dense clay	
					clay and peat	
20.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-53

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: DATE COMPLETED:

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0		48/48	ND		fill: concrete chips, cinder, ash, gray silty sand	
8.0		48/48	ND			
					clay and peat	
12.0						
16.0						

AKRF, INC. Environmental Consultants	FIELD BOREHOLE LOG	BOREHOLE NUMBER GP-54

PROJECT NUMBER: 80030-0003
PROJECT NAME: 124-136 Second Ave. (Gowanus)
LOCATION: Brooklyn, NY
DRILLING CO:
DRILLING METHOD: GeoProbe
FIELD PARTY:
GEOLOGIST: MOHAMED AHMED
DATE BEGUN: 03/02/01 DATE COMPLETED: 03/02/01

START TIME
END TIME
GROUND SURFACE ELEVATION: 0

STATIC WATER LEVEL (BLS)		
Depth (ft)	NA	
Time	NA	
Date	NA	

DEPTH (ft)	SAMPLE NUMBER	RECOVERY(in) [driven/recovered]	PID(ppm)	REMARKS	DESCRIPTION	LITHOLOGY
0.0					fill, not sampled	
4.0	GP54	48/46	324	FREE PRODUCT	silty sand: dark black silty sand, fill, red brick, free product	
8.0		48/24	159	FREE PRODUCT	silty sand: dark black silty sand, fill, red brick, free product	
12.0		48/24	227	FREE PRODUCT	silty sand: dark black silty sand, fill, red brick, free product	
16.0						

Nelson, Pope and Voorhis Logs – 1999

TEST BORING / PROBE LOG

CODE: SP-1

Site Location:	Brooklyn Commons	**Installer:**	Impact Environmental
Job Number:	99.001	**Installation Method:**	Geoprobe
Client:	Nelson, Pope & Voorhis	**Date Begin/End:**	06/10/1999
Client Contact:	C. Voorhis	**Surface Elevation:**	
Boring Code:		**Depth to Water:**	~10 feet BEG
Location Description:	DMU-	**Total Depth:**	
Geologist:	R. Parrish, P.G./Franzen	**Page #:**	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	PID Reading [ppm]	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0							CONCRETE	
3	Very dark grayish-brown 10YR3/2		1.0		SM		Poorly sorted fine sand & silt with some gravel Some solid waste debris noted	
6			12.4					
9	Gley Greenish-black 2.5/10Y		9.1		OH		Organic clay; high plasticity Presence of coal fragments mixed with clam/oyster shell	99-240-SP-1 @ 8-10
10	End Probe							
12								
15								

TEST BORING / PROBE LOG

CODE: SP-2

Site Location:	Brooklyn Commons	**Installer:**	Impact Environmental
Job Number:	99.001	**Installation Method:**	Geoprobe
Client:	Nelson, Pope & Voorhis	**Date Begin/End:**	06/10/1999
Client Contact:	C. Voorhis	**Surface Elevation:**	
Boring Code:		**Depth to Water:**	~10 feet BEG
Location Description:	DMU-	**Total Depth:**	
Geologist:	R. Parrish, P.G./Franzen	**Page #:**	2

Depth Below Grade [feet]	Color [Munsell]	Recovery	PID Reading [ppm]	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0								
3	Very dark grayish-brown 10 YR 3/2		1.1		SM		Poorly sorted fine sand + silt with some gravel Some solid waste debris noted	
6			3.9					
9	Gley Greenish-black 2.5/10Y		2.1		SC		Sand- clay mixture Clayey Soil some debris	99-240-SP-1 @ 8-10
10	End Probe							
12								
15								

TEST BORING / PROBE LOG

CODE: SP-3

Site Location:	Brooklyn Commons	**Installer:**	Impact Environmental
Job Number:	99.001	**Installation Method:**	Geoprobe
Client:	Nelson, Pope & Voorhis	**Date Begin/End:**	06/10/1999
Client Contact:	C. Voorhis	**Surface Elevation:**	
Boring Code:		**Depth to Water:**	~10 feet BEG
Location Description:	DMU-	**Total Depth:**	
Geologist:	R. Parrish, P.G./Franzen	**Page #:**	3

Depth Below Grade [feet]	Color [Munsell]	Recovery	PID Reading [ppm]	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0							CONCRETE	
3	Very dark grayish-brown 10 YR 3/2		1.0		SM		Poorly sorted fine sand + silt with some gravel Some solid waste debris noted	
			13.2					
6								
9	Gley Greenish-black 2.5/10Y		5.4		SC		Sand- clay mixture Clayey Soil some debris	99-240-SP-1 @ 8-10
10	End Probe							
12								
15								

TEST BORING / PROBE LOG

CODE: SP-4

Site Location:	Brooklyn Commons	**Installer:**	Impact Environmental
Job Number:	99.001	**Installation Method:**	Geoprobe
Client:	Nelson, Pope & Voorhis	**Date Begin/End:**	06/10/1999
Client Contact:	C. Voorhis	**Surface Elevation:**	
Boring Code:		**Depth to Water:**	~10 feet BEG
Location Description:	DMU-	**Total Depth:**	
Geologist:	R. Parrish, P.G./Franzen	**Page #:**	

Depth Below Grade [feet]	Color [Munsell]	Recovery	PID Reading [ppm]	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0							CONCRETE	
3	Very dark grayish-brown 10YR 3/2		2.1		SM		Poorly sorted fine sand & silt with some gravel Some solid waste debris noted	
6								
9	Gley Greenish-black 2.5/10Y				SC		Clayey sand Large chips of coal, High volume of clam/oyster shells	99-240-SP-1 @ 8-10
10	End Probe							
12								
15								

TEST BORING / PROBE LOG

CODE: SP-5

Site Location:	Brooklyn Commons	**Installer:**	Impact Environmental
Job Number:	99.001	**Installation Method:**	Geoprobe
Client:	Nelson, Pope & Voorhis	**Date Begin/End:**	06/10/1999
Client Contact:	C. Voorhis	**Surface Elevation:**	
Boring Code:		**Depth to Water:**	~10 feet BEG
Location Description:	DMU-	**Total Depth:**	
Geologist:	R. Parrish, P.G./Franzen	**Page #:**	5

Depth Below Grade [feet]	Color [Munsell]	Recovery	PID Reading [ppm]	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0							CONCRETE	
3	Very dark grayish-brown 10 YR 3/2		1.1		SM		Poorly sorted fine sand & silt with some gravel Some solid waste debris noted	
6								
9	Gley Greenish-black 2.5/10Y		0.0		OH		Organic clay Coalchips	99-240-SP-1 @ 8-10
10	End Probe							
12								
15								

TEST BORING / PROBE LOG

CODE: SP-6

Site Location:	Brooklyn Commons	**Installer:**	Impact Environmental
Job Number:	99.001	**Installation Method:**	Geoprobe
Client:	Nelson, Pope & Voorhis	**Date Begin/End:**	06/10/1999
Client Contact:	C. Voorhis	**Surface Elevation:**	
Boring Code:		**Depth to Water:**	~10 feet BEG
Location Description:	DMU-	**Total Depth:**	
Geologist:	R. Parrish, P.G./Franzen	**Page #:**	6

Depth Below Grade [feet]	Color [Munsell]	Recovery	PID Reading [ppm]	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0							CONCRETE	
3	Very dark grayish-brown 10YR 3/2		1.1		SM		Poorly sorted fine sand & silt with some gravel Some solid waste debris noted	
6								
9	2.5Y Olive brown 4/3		6.0		SP		Petroleum scent Poorly graded sand with some gravel	99-240-SP-1 @ 8-10
10	End Probe							
12								
15								

Nelson, Pope and Voorhis Logs – 1997

TEST BORING / PROBE LOG

CODE: SP-7

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	4/24/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-7	Depth to Water:	
Location Description:		Total Depth:	7 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 2/2 Very Dark Brown					Fine to Medium	
3	10YR 3/3 Dark Brown					Fine to Medium	
4	10YR 2/1 Black					Fine to Medium Strong Odor	
5	10YR 2/1 Black					Fine to Medium Strong Odor	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-8

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	4/24/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-8	Depth to Water:	
Location Description:		Total Depth:	7 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 2/2 Very Dark Brown					Fine to Medium	
3	10YR 3/3 Dark Brown					Fine to Medium	
4	10YR 2/1 Black					Fine to Medium Strong Odor	
5	10YR 2/1 Black					Fine to Medium Strong Odor	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-9

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	4/24/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-9	Depth to Water:	
Location Description:		Total Depth:	7 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 2/2 Very Dark Brown					Fine to Medium	
3	10YR 3/3 Dark Brown					Fine to Medium	
4	10YR 2/1 Black					Fine to Medium Strong Odor	
5	10YR 2/1 Black					Fine to Medium Strong Odor	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-10

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	NPV	Date Begin/End:	5/7/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-10	Depth to Water:	
Location Description:		Total Depth:	7.5 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 2/2 Very Dark Brown					Fine to Medium Brick Fines	
3	10YR 2/2 Very Dark Brown					Fine to Medium Brick Fines	
4	10YR 2/2 Very Dark Brown					Fine to Medium Brick Fines	
5	10YR 2/1 Black					Fine to Medium	
6	10YR 2/1 Black					Fine to Medium	
7	10YR 2/1 Black					Fine to Medium	
8	10YR 2/1 Black					Fine to Medium	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-11

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	NPV	Date Begin/End:	5/7/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-11	Depth to Water:	
Location Description:		Total Depth:	10 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 2/2 Very Dark Brown					Fine to Medium Brick Fines	
3	10YR 2/2 Very Dark Brown					Fine to Medium Brick Fines	
4	10YR 2/2 Very Dark Brown					Fine to Medium Brick Fines	
5	10YR 2/1 Black					Fine to Medium	
6	10YR 2/1 Black					Fine to Medium	
7	10YR 2/1 Black					Fine to Medium	
8	10YR 2/1 Black					Fine to Medium	
9	10YR 2/2 Very Dark Brown					Fine to Medium	
10	10YR 2/2 Very Dark Brown					Fine to Medium	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-12

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	NPV	Date Begin/End:	5/7/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-12	Depth to Water:	
Location Description:		Total Depth:	10 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 5/6 Yellowish Brown					Brick Fines	
3	10YR 5/6 Yellowish Brown					Brick Fines	
4	10YR 5/6 Yellowish Brown					Brick Fines	
5	10YR 5/6 Yellowish Brown					Brick Fines	
6	10YR 4/8 Red					Hard Red Clay	
7	10YR 2/2 Very Dark Brown					Fine to Medium Strong Odor	
8	10YR 2/1 Black					Fine to Medium Strong Odor	
9	10YR 2/1 Black					Fine to Medium Strong Odor	
10	10YR 2/2 Very Dark Brown					Fine to Medium Strong Odor	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-13

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	NPV	Date Begin/End:	5/7/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-13	Depth to Water:	
Location Description:		Total Depth:	10 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 5/6 Yellowish Brown					Brick Fines	
3	10YR 5/6 Yellowish Brown					Brick Fines	
4	10YR 5/6 Yellowish Brown					Brick Fines	
5	10YR 5/6 Yellowish Brown					Brick Fines	
6	10YR 4/8 Red					Hard Red Clay	
7	10YR 2/2 Very Dark Brown					Fine to Medium Strong Odor	
8	10YR 2/1 Black					Fine to Medium Strong Odor	
9	10YR 2/1 Black					Fine to Medium Strong Odor	
10	10YR 2/2 Very Dark Brown					Fine to Medium Strong Odor	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-16

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	5/5/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-16	Depth to Water:	
Location Description:		Total Depth:	8 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 2/2 Very Dark Brown					Fine to Medium	
3	10YR 2/2 Very Dark Brown					Fine to Medium	
4	10YR 2/1 Black					Fine to Medium Strong Odor	
5	10YR 2/1 Black					Fine to Medium Strong Odor	
6	10YR 2/1 Black					Fine to Medium Strong Odor	
7	10YR 2/1 Black					Fine to Medium Strong Odor	
8	10YR 2/1 Black					Fine to Medium Strong Odor	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-17

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	5/5/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-17	Depth to Water:	
Location Description:		Total Depth:	7 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 2/2 Very Dark Brown					Fine to Medium	
3	10YR 3/3 Dark Brown					Brick Fines	
4	10YR 2/1 Black					Anthrocite pieces	
5	10YR 2/1 Black					Anthrocite pieces	
6	2 Clay 3/1 Dark Blueish Gray					Fine to Medium	
7	10R 4/6 Red					Fine to Medium	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-18

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	5/5/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-18	Depth to Water:	
Location Description:		Total Depth:	7 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 2/2 Very Dark Brown					Brick Fines	
3	10YR 2/1 Black					Brick Fines	
4	10YR 2/2 Very Dark Brown					Brick Fines	
5	10YR 2/2 Very Dark Brown					Brick Fines	
6	2 Clay 5/1 Blueish Gray					Clay	
7	10R 4/6 Red					Medium to course Gravel	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-19

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	5/5/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-19	Depth to Water:	
Location Description:		Total Depth:	7 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
2	10YR 6/2 Gray to Light Brown					Brick Fines	
3	10YR 6/2 Gray to Light Brown					1/4" Blue Gravel Stone	
4	10YR 3/3 Dark Brown					Medium to fine	
5	10YR 4/6 Dark Yellowish Brown					Fine to Medium	
6	10YR 5/8 Yellowish Brown					Fine to Medium Sandy Material	
7	10YR 5/8 Yellowish Brown					Fine to Medium Sandy Material	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-20

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	5/5/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-20	Depth to Water:	
Location Description:		Total Depth:	4 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0	10YR 1/1 Black					Asphalt 1/4 " Blue Gravel Stone	
3							
4	10YR 1/1 Black					Pieces of Anthrocite	
	REFUSAL						

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-21

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	Brooklyn	Date Begin/End:	5/5/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-21	Depth to Water:	
Location Description:		Total Depth:	7 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
3	10YR 2/2 Very Dark Brown					Medium to Fine Wood Chips/Brick Fines	
4	10YR 2/1 Black					Strong odor/ Wet Black Staining on Gloves	
5	10YR 2/1 Black					Strong odor/ Wet Black Staining on Gloves	
6	10YR 2/1 Black					Strong odor/ Wet Black Staining on Gloves	
7	10YR 2/2 Very Dark Brown					Medium to Fine	

Note: USCS (Unified Soil Classification System)

TEST BORING / PROBE LOG

CODE: SP-22

Site Location:	Brooklyn	Installer:	Impact Environmental
Job Number:	97-070	Installation Method:	Geoprobe
Client:	NPV	Date Begin/End:	5/5/97
Client Contact:	Charles Voorhis	Surface Elevation:	
Boring Code:	SP-22	Depth to Water:	
Location Description:		Total Depth:	7 feet
Geologist:	James Mulvey	Page #:	1

Depth Below Grade [feet]	Color [Munsell]	Recovery	FID Reading [ppm]	Description [USCS]	Lithology	Description	Sample
0						Asphalt	
3	10YR 2/2 Very Dark Brown					Very Coarse to Coarse Soil	
4	10YR 2/2 Very Dark Brown					Fine to Medium Pieces of Anthrocite	
5	10YR 2/1 Black					Fine to Medium Pieces of Anthrocite	
6	10Y 6/3 Pale Brown					Very Fine to Fine Sandy Material	
7	10YR 2/1 Black					Medium to fine 1/2" Coke	

Note: USCS-(Unified Soil Classification System)

Appendix C

Field Sampling and Analytical Plan (FSAP)

Prepared for:
National Grid
Brooklyn, New York

Field Sampling and Analytical Plan

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-0606

AECOM, Inc.
February 2009
Project No.: 01787-075

AECOM

Prepared for:
National Grid
Brooklyn, New York

Field Sampling and Analytical Plan

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-0606

_____ **for**
Prepared By: Caryn DeJesus, Project Scientist

_____
Reviewed By: Peter S. Cox, PG, Senior Geologist

AECOM, Inc.
February 2009
Project No.: 01787-075

AECOM

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1.0 Introduction

This Field Sampling and Analytical Plan (FSAP) presents the methods and procedures to be used for performing the Remedial Investigation (RI) at the Metropolitan former manufactured gas plant (MGP) site located at 124-136 2nd Avenue in Brooklyn, New York.

1.1 Overview of field activities

The following field activities will be performed as part of the RI:

- Test Pit Excavation – Two test pits will be excavated at the site.
- Soil Boring Installation – There will be approximately 17 soil borings (including 9 borings converted for monitoring well installation) with approximately 51 soil samples collected.
- Monitoring Well Installation and Groundwater Sampling – Approximately 20 monitoring wells will be installed at varying depths (shallow, intermediate, and deep). Groundwater samples will be collected from the new wells in addition to select existing wells.
- Aquifer Testing – Slug tests will be performed at select well locations.
- Soil Vapor Intrusion/Indoor Air Evaluation – Four co-located sub-slab soil vapor and indoor air samples will be collected in two buildings overlying the footprint of the former MGP (2 sample locations in each building).
- Surveying – The locations and elevations of the RI data points and important site features will be surveyed.

2.0 General field guidelines

2.1 Site hazards

Potential on-site surface hazards, such as sharp objects, overhead power lines, energized areas, vehicular traffic, and building hazards will be identified prior to initiation of the fieldwork. Generally, potential hazards at the site will be identified during a site reconnaissance by the project team on the first day of the investigation field activities. Additional safety measures to be undertaken for the work performed during the investigation are addressed in the Site-Specific Health and Safety Plan (HASP).

2.2 Underground utilities

Underground utilities, including electric lines, gas lines, storm and sanitary sewers, and communication lines will be identified prior to initiation of drilling and other subsurface work. Underground utility location will be accomplished as follows:

- All RI data points will be flagged or marked out with white paint.
- Dig Safely of New York (800) 272-4480 will be contacted to initiate the locating activities. New York State law requires that Dig Safely of New York be notified at least two working days, and not more than 10 working days, before subsurface work is conducted.
- Companies with subsurface utilities present will locate and mark out all subsurface utility lines.
- Geophysical methods will be used to further evaluate the potential presence of underground utilities in the area of each proposed investigation location.
- Subsurface investigation locations will be hand cleared to five feet below ground surface (bgs) prior to advancing borings with mechanized equipment.

2.3 Field log books

All field activities will be carefully documented in field log books. Entries will be of sufficient detail that a complete daily record of significant events, observations, and measurements is developed. The field log book will provide a legal record of the activities conducted at the site. Accordingly:

- Field books will be assigned a unique identification number.
- Field books will be bound with consecutively numbered pages.
- Field books will be controlled by the Site Manager while fieldwork is in progress.
- Entries will be written with waterproof ink.
- Entries will be signed and dated at the conclusion of each day of fieldwork.
- Erroneous entries made while fieldwork is in progress will be corrected by the field person that made the entries. Corrections will be made by drawing a line through the error, entering the correct information, and initialing the correction.
- Corrections necessary after departing the field will be made by the person who entered the original information. Corrections will be made by drawing a line through the error, entering the correct information, and initialing and dating the time of the correction.

At a minimum, daily field book entries will include the following information:

- Location of field activity;
- Date and time of entry;
- Names and titles of field team members on site and site contacts;
- Names, titles of any site visitors, as well as the date and time entering and leaving the site;
- Weather information, for example: temperature, cloud coverage, wind speed, and direction;
- Purpose of field activity;
- A detailed description of the fieldwork conducted;
- Sample media (soil, sediment, groundwater, etc.);
- Sample collection method;
- Number and volume of sample(s) taken;
- Description of sampling point(s);
- Volume of groundwater removed before sampling;
- Preservatives used;
- Analytical parameters;
- Date and time of collection;
- Sample identification number(s);
- Sample distribution (e.g., laboratory);
- Field observations;
- All field measurements made, such as volatile organic compounds (VOCs) using a PID, pH, temperature, conductivity, water level, etc.;
- References for all maps and photographs of the sampling site(s); and
- Information pertaining to sample documentation such as:
  - Bottle lot numbers;
  - Dates and method of sample shipments;
  - Chain-of-custody (COC) record numbers; and
  - Federal Express air bill number.

3.0 Field equipment decontamination and management of investigation-derived residuals

3.1 Decontamination area

A temporary decontamination area lined with polyethylene sheeting will be constructed on site for use during decontamination of the drilling and test pitting equipment. Water collected from the decontamination of activities will be collected in 55-gallon drums or a bulk tank and managed as described in Section 3.3.

3.2 Equipment decontamination

The following procedures will be used to decontaminate equipment used during the RI activities.

- All drilling equipment including the backhoe, bucket, and drilling rig; augers; bits; rods; tools; split-spoon samplers; and tremie pipes will be cleaned with a high-pressure, hot water pressure washing unit between investigation locations.
- Tools, drill rods, and augers will be placed on polyethylene plastic sheets following pressure washing. Direct contact with the ground will be avoided.
- The back of the drill rig and all tools, augers, and rods will be decontaminated at the completion of the work and prior to leaving the site.

3.2.1 Sampling equipment decontamination

Suggested Materials:

- Potable water;
- Phosphate-free detergent (such as Alconox™ or Simple Green™);
- Distilled water;
- Aluminum foil;
- Plastic/polyethylene sheeting;
- Plastic buckets and brushes; and
- Personal protective equipment (PPE) in accordance with the HASP.

Procedures:

- Prior to sampling, all non-dedicated sampling equipment (bowls, spoons, interface probes, etc.) will be washed with potable water and a phosphate-free detergent (such as Alconox™). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, etc.
- The sampling equipment will then be rinsed with potable water followed by a de-ionized water rinse.
- Between rinses, equipment will be placed on polyethylene sheets or aluminum foil, if necessary. At no time will washed equipment be placed directly on the ground.
- Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

3.3 Management of investigation-derived residuals

3.3.1 Decontamination fluids

Hot water pressure wash and decontamination fluids will be collected in 55-gallon drums or a bulk tank. The storage drums or tank will be labeled as “pending analysis – investigation-derived residual decon water” and temporarily stored in a plastic-lined containment area pending characterization and proper disposal.

3.3.2 Drill cuttings

Drill cuttings will be contained in 55-gallon drums. The drums will be labeled as “pending analysis – investigation-derived residual – soil from drill cuttings” and temporarily stored in a plastic-lined containment area pending characterization and proper disposal.

3.3.3 Development and purge water

All development and purge water will be contained in 55-gallon drums or a bulk tank. The drums or tank will be labeled as “pending analysis - investigation derived residual development and purge water” and temporarily stored in a plastic-lined containment area pending characterization and proper disposal.

3.3.4 Personal protective equipment

All PPE will be placed in 55-gallon drums or a lined cardboard yard box for proper disposal.

3.3.5 Dedicated sampling equipment

All dedicated groundwater sampling equipment will be placed in 55-gallon drums for disposal.

4.0 Soil sampling procedures

4.1 Introduction

Surface and subsurface investigation activities to be conducted at the Metropolitan former MGP site will consist of exploratory test pit excavation; the advancement of soil borings; and the installation of monitoring wells. These activities will require the use of the following equipment and material:

- Field book;
- Project plans;
- PPE in accordance with the HASP;
- Stakes, flagging and marking paint;
- Plastic bags for soil screening samples;
- Tape measure;
- Steel shovel and stainless steel spoons or disposable polyethylene trowels (surface soil);
- Decontamination supplies;
- Water level indicator;
- Electronic oil/water interface probe
- Clear polyethylene disposable bailers (NAPL confirmation in wells);
- Polyethylene disposable bailers (well development);
- Polypropylene rope (well development);
- Waterra™ pump or other purge pump (well development);
- Submersible electric pump (well development);
- Stainless steel or glass beakers (well development);
- Turbidity meter (well development);
- Temperature, conductivity, pH meter (well development).
- PID with a 10.2 or 10.6 eV lamp;
- Camera;
- Clear tape, duct tape;
- Laboratory sample bottles;
- Coolers and ice; and
- Shipping supplies.

Procedures for these activities are described in the following sections.

4.2 Soil Sampling

4.2.1 Test pit excavation

Test pits will be excavated using a rubber-tired or track backhoe. In the event deep excavations are anticipated, a track hoe will be utilized. Locations of test pits are specified in the RI Work Plan, and will be finalized in the field, based on the location of existing underground utilities. If the prospective test pit location is covered by concrete, the area will be saw-cut prior to excavation.

During test pit investigation activities, personnel will stand upwind of the excavation area to the extent possible. Air monitoring and odor mitigation (if necessary) will be conducted in accordance with the Community Air Monitoring Project (CAMP) and HASP. Test pit materials will be photographed and logged for future reference. Material removed from the test pit will be placed on polyethylene sheeting. The location and size of the test pit will be measured and described in the field logbook.

Visually clean soils, such as surface soils, will be segregated from soils that may be impacted. The visually clean soils will be used to cover the impacted soils/source materials when placed back in the excavation. At a minimum, the top 2 feet of backfilled soil will be visually clean. The test pit will be backfilled as soon as possible after completion and in general prior to the cessation of activities at the end of the day. Following restoration of the excavation, the test pit will be staked/marked to facilitate subsequent location by surveying crews.

4.2.2 Surface soil

Approximately three surface soil samples will be collected from identified areas of the Site containing exposed surface soil. One sample (SS-1) will be collected from proposed SB-9/MW-9 location in the vegetated parcel between Hamilton Plaza and the Gowanus Canal. The locations of the remaining two samples (SS-2 and SS-3) will be determined pending identification of additional areas of surface soil within the defined Site boundary. In the event that the parcel between Hamilton Plaza and the Gowanus Canal is the only area of identified surface soil, it is proposed that the remaining two samples (SS-2 and SS-3) be collected in this parcel. At each surface soil sampling location, vegetation will be cleared from the location, and the surface soil samples will be collected from 0 to 2 inches bgs using a steel shovel and a stainless steel spoon or disposal polyethylene trowel. A portion of the sample from each location will be collected directly into the sample container designated for volatile organic compound (VOC) analysis. The remaining soils will be homogenized in a stainless steel or disposable mixing bowl prior to transfer to the sample container for the remaining analyses (semi-volatile organic compounds [SVOCs]) using USEPA Method 8270C, RCRA 8 metals using USEPA Methods 6010 and 7000-series, and free cyanide (extraction by EPA method 9013A and analysis by Microdiffusion, ASTM International method D4282-02). Visual descriptions of the surface soil and field screening of the soils using a PID will be performed prior to homogenization. One sample (SS-1) will be analyzed for the full Target Compound List (TCL) VOCs, SVOCs, pesticides (USEPA Method 8081A), herbicides (USEPA Method 8151A), PCBs (as Aroclors; USEPA Method 8082), Target Analyte List (TAL) metals, and free cyanide ASTM International method D4282-02.

4.2.3 Subsurface soil

Soil borings will be advanced and sampled with a combination of either rotosonic drilling methods equipped with 4-inch diameter sampling cores or hollow-stem augers (HSAs) equipped with 2-inch or 3-inch diameter split-spoon samplers. In some instances, a direct-push (Geoprobe™) drilling rig equipped with 4-foot long, 2-inch diameter Macro-Core™ samplers may be used if there are access limitations. All drilling equipment will be decontaminated between each boring in accordance with methods specified in Section 3.2.

All locations will be properly abandoned following the collection of samples. Boreholes for the direct-push borings will be filled with bentonite chips. All rotosonic or auger soil borings not used for the construction of monitoring wells will be tremie grouted to the ground surface following the completion of the soil sampling to

prevent cross-contamination of permeable zones. The borings will be filled using a cement/bentonite grout mixture with the following specifications:

- Bentonite will be powdered sodium montmorillonite furnished in moisture resistant sacks without additives.
- Cement shall be a low-alkaline Portland cement, Type I in conformance with ASTM C-150 and without additives.
- The cement/bentonite grout mixture shall be to the following proportion:
  - Three sacks (94 pounds) of Type I Portland cement;
  - 14 pounds of granular bentonite (5% mix); and
  - 25 gallons of water.

The cement will be mechanically mixed, above ground, with water from a potable water source. Bentonite will be added to ensure a lump-free consistency. The mixture will be pumped through a tremie pipe as the drill is being withdrawn.

4.2.4 Geologic logging methods

The field geologist will log borehole geology and headspace measurements, and any other observations (e.g., odors, NAPL, soil staining, etc.), in the field book and the Drilling Record shown in Figure 4-1, or similar form.. Soil samples retrieved from the borehole/test pit will be visually described for: 1) percent recovery, 2) soil type, 3) color, 4) moisture content, 5) texture, 6) grain size and shape, 7) consistency, 8) visible evidence of staining or other hydrocarbon-related impacts, and 9) any other relevant observations. The descriptions will be in accordance with the Unified Soil Classification System (USCS) and the American Society for Testing and Materials (ASTM) guidelines. Descriptions will also follow National Grid's internal field description guidance (KeySpan, 2005) included in Appendix A.

Immediately after describing the core/test pit wall, a representative soil sample will be placed in a re-sealable plastic (e.g., "ziplock") bag filled approximately half full. The bag will be labeled with the boring number and interval sampled. After allowing the bagged soil to warm the tip of the sample probe attached to the PID will be inserted into the bag to measure the headspace for organic vapors. Soil remaining after completion of sample description, collection, and field screening will be disposed of properly.

4.2.5 Collection of samples

The number and frequency of samples to be collected from each boring and the associated analytical parameters are summarized on Table 3-1 in the RI Work Plan. The sample locations, descriptions, and depths will be recorded on the boring logs in the field book.

Samples for laboratory analyses will be collected directly from the sampling spoon (test pits), acetate liners, split-spoons, or core barrel and placed into appropriate containers (for VOC analyses); homogenized (for non-VOC analyses); and compacted to minimize headspace and pore space. Samples for VOC analysis will be collected directly from the acetate liners, split-spoons, or core barrel and placed into appropriate containers. Soil used for headspace analysis will not be used for laboratory VOC analysis. The sampling equipment will be decontaminated between samples in accordance with procedures described in Section 3. Soil remaining after completion of sample description, collection, and field screening will be disposed of properly.

The sample containers will be labeled, placed in a laboratory-supplied cooler, and packed with ice. The coolers will then be shipped to the laboratory for analysis. COC procedures will be followed as outlined in the QAPP. If there is a delay of sample shipment due to insufficient samples to warrant overnight delivery, the samples will be stored in a cool, secure place with sufficient ice to maintain a temperature of 4˚ C.

4.3 Monitoring well installation and development

The following methods will be used for drilling, installing, and developing the monitoring wells;

4.3.1 Overburden monitoring well installation

Figure 4-2 illustrates the construction details for a typical overburden monitoring well. Specific details regarding the depth and anticipated screened interval of proposed monitoring wells is provided in Table 3-1 of the RI Work Plan. In general, monitoring wells will be installed according to the following specifications:

- The monitoring well borings will be advanced with either 4.25-inch inner diameter (ID) hollow-stem augers or 4-inch ID flush casing.
- Wells will be constructed with 2-inch ID, threaded, flush-joint, PVC casings and screens.
- Screens will be 10-feet long with 0.01-inch or 0.02-inch slot openings (in NAPL present) with a 2-foot DNAPL sump at the base. Alternative screen lengths up to 20' long may be used at the discretion of the field geologist and with the approval of NYSDEC, based on site conditions.
- The annulus around the screens will be backfilled with clean silica sand having appropriate size (e.g., Morie No. 1) to a minimum height of 2 feet above the top of the screen. Auger flights or casing will be withdrawn as sand is poured in a manner that will minimize hole collapse and bridging.
- A bentonite chip seal with a minimum thickness of 2 feet will be placed above the sand pack. The bentonite seal will be hydrated with clean, potable water before placement of grout above the seal layer.
- The remainder of the annular space will be filled with cement-bentonite grout to ground surface. The grout will be allowed to set for a minimum of 24 hours before wells are developed.
- Each monitoring well will be a flush-mounted installation with a locking cap.
- The concrete seal or pad will be sloped to channel water away from the well, and be deep enough to remain stable during freezing and thawing of the ground.
- The top of the PVC well casing and ground surface will be marked and surveyed to 0.01 foot, and the elevation will be determined relative to a fixed benchmark or datum.
- The measuring point on all wells will be on the innermost PVC casing.
- Monitoring well construction details will be recorded in the field book and on the Construction Log shown in Figure 4-3, or similar form.
- If commercially available nested wells are considered to sample multiple aquifer depth zones in the same borehole, they will be discussed with NYSDEC prior to installation.

4.3.2 Monitoring well development

- After a minimum of 24 hours after installation, the monitoring wells will be developed by surging and pumping. Surging will be performed periodically, across the lengths of screen in 2-foot increments prior to, at interim periods of pumping, and immediately before the final pumping. Pumping methods may include using a centrifugal, submersible, or peristaltic pump and dedicated polyethylene tubing, using a Waterra™ positive displacement pump and dedicated polyethylene tubing, or other methods at the discretion of the field geologist.
- Water levels will be measured in each well to the nearest 0.01 foot prior to development.
- The wells will be developed until the water in the well is reasonably free of visible sediment (50 NTU if possible or until pH, temperature, and specific conductivity stabilize). A portable nephelometer will be used to make the turbidity measurement.

- Development water will be contained in and properly disposed of.
- Following development, wells will be allowed to recover for at least 14 days before groundwater is purged and sampled. All monitoring well development will be performed or overseen by a field geologist and recorded in the field book.

5.0 Groundwater sampling procedures

5.1 Introduction

Procedures for obtaining samples of groundwater are described in this section. Groundwater samples will be collected using low-flow, low-stress purge and sampling methods.

5.2 Groundwater sampling

The number and frequency of the samples that will be collected for laboratory analysis from each well and the analytical parameters are listed in Table 3-1 in Section 3 of the RI Work Plan.

The following method will be used to collect groundwater samples from monitoring wells:

5.2.1 Required Equipment and Supplies

- Field book
- Project plans
- PPE in accordance with the HASP
- Electronic oil/water interface probe
- Disposable polyethylene bailers and low-flow sampling pump
- Polypropylene rope
- Temperature, conductivity, and pH meter
- Turbidity meter
- Flow-through cell
- Decontamination supplies
- Peristaltic or submersible pump capable of achieving low-flow rates (i.e., 0.5 liters per minute or less)
- Plastic tubing
- Plastic sheeting
- PID
- Clear tape, duct tape
- Coolers and ice
- Laboratory sample bottles
- Federal Express labels

5.2.2 Groundwater sampling method

5.2.2.1 Purging

- Prior to sampling, the static water level and thickness of any light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) will be measured to the nearest 0.01 foot from the surveyed well elevation mark on the top of the PVC casing with a decontaminated oil/water interface probe. NAPL thickness will be confirmed using a clear bailer or a weighted string. The measurement will be recorded in the field book.

- The probe will be decontaminated between uses.
- Groundwater from the well will be purged until field parameters stabilize, up to three well volumes are removed, or 1 hour of continuous purging is performed. Field parameters are considered to be stable when three consecutive readings are within the stabilization criteria for that parameter. The stabilization criteria are as follows: 10% or below 10 NTUs for turbidity, 3% for conductivity and temperature, 0.1 standard unit for pH, and 10 mV for ORP. Purging will be conducted using the low-flow sampling technique specified by the USEPA Region 1 in its guidance document entitled “Low-Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells”.
- The flow rate measurement will be approximately 0.5 liter per minute or less.
- If a well goes dry before the required volumes are removed, it will be allowed to recover, purged a second time until dry or the required parameters are met, and sampled when it recovers sufficiently, in accordance with low-flow sampling protocol.
- Purge water will be managed and disposed of properly.

5.2.2.2 Sampling

- Samples will be collected using dedicated 1/4- or 3/8-inch polyethylene tubing and/or bailers.
- Prior to filling the sample bottles, the temperature, pH, conductivity, and oxidation reduction potential (ORP) will be measured within a flow-through cell. Turbidity will be measured with a hand-held turbidity meter. All measurements will be recorded in the field book.
- Three 40-ml VOA vials with Teflon™ lined septa and hydrochloric acid as a preservative will be filled for analysis of VOCs. The VOA vials will be filled to ensure that no bubbles are in the sample. Two 1-liter amber glass sample bottles for SVOC analysis and two 1-liter amber glass bottles for PCB analysis will then be filled followed by a 500 milliliter (mL) plastic bottle preserved with nitric acid for the total metals analysis. An opaque, 500 mL plastic bottle, with sodium hydroxide added for preservative to achieve a pH of >12 will then be filled for the analysis of free cyanide.
- The sample containers will be labeled, placed in a laboratory-supplied cooler, and packed on ice (to maintain a temperature of 4˚ C). The cooler will be shipped overnight or delivered to the laboratory for analysis.
- COC procedures will be followed as outlined in the QAPP.
- Well sampling data will be recorded on the Groundwater Sampling Record shown in Figure 5-1, or similar form.

6.0 Sub-slab soil vapor/indoor air/ambient air sampling

A soil vapor intrusion survey will be performed at the Site since MGP-related compounds have been detected in soil vapor, soil, and groundwater samples collected from the Site. The work will be performed in accordance with *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* (NYSDOH, 2006) and the USEPA document entitled *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils, Office of Solid Waste and Emergency Response* (US EPA, 2002). The sampling event will be conducted in a one-time event during the heating season between November 1 and March 31 and will require two days to complete. The proposed sampling plan consists of the collection of a total of 10 samples, with two sub-slab soil vapor samples and matching indoor air samples collected in each of two buildings (eight total) plus one ambient outdoor air sample and one sample duplicate.

The indoor/ambient air and sub-slab vapor sampling will require two days to complete. On the first day, a chemical inventory check will be performed within each of the two site buildings to document current conditions with the regard to the storage of chemicals at each facility. On the second day, the ambient air sample, indoor air samples and sub-slab vapor samples will be collected concurrently.

The methods to be used for the collection of the sub-slab soil vapor samples, indoor air samples, and the ambient air sample are summarized as follows:

- All sub-slab soil vapor samples will be collected from immediately below the concrete floor slabs of each building, in accordance with NYSDEC Guidance.
- The sub-slab sampling implants will be installed by drilling a ¾-inch diameter hole through the concrete slab and placing Teflon tubing in the hole. An air-tight seal will be created by filling the space between the tubing and the concrete with hydrated bentonite clay or modeling clay.
- The integrity of the seals around the implants will be confirmed by placing a helium-filled “shroud” around the insertion points. One to three volumes of air will be purged at a rate not to exceed 0.2 liters per minute, and helium concentrations will be monitored using a portable helium meter (MARK Model 9822 Helium Detector, or equivalent), which will be pre-calibrated by the supplier according to the manufacturer’s instructions. If helium is detected in the purged air from the sampling assembly at concentrations greater than 5% of the concentration in the shroud, the probe will either be resealed, or replaced, as appropriate. Figure 6-1 illustrates the equipment to be used during the helium gas testing.
- Indoor air samples will be collected at locations co-located with the sub-slab soil vapor samples, and they will be collected from a minimum of two-feet above the floor surface.
- The ambient air sample will be collected at a location determined to be upwind of the buildings at time of sampling.
- Each sub-slab soil vapor, indoor air, and ambient air sample will be collected as an integrated (not grab) sample. A laboratory-provided flow controller fixed to a negative pressure vessel (a batch certified clean 6-liter Summa™ canister) will be used to collect the integrated sample. The controller will be a fixed-rate flow controller and the approximate length of the sample time will be set by the laboratory. The flow controllers are fitted with an internal filter to prevent particulates from entering the Summa™ Canister.
- The sample time for the canisters will be set to 8 hours. The collection of the samples in 6-liter canisters over an approximate 8-hour interval will ensure that the samples are collected at the rate specified by the NYSDOH (less than 0.2 liters per minute).
- The sample tubing will be attached to the sampling canister with Swagelok™ fittings.

- Prior to sampling, the initial vacuum in each canister will be checked prior to use to ensure mechanical integrity of the canister. The initial vacuum should be approximately 30 inches mercury (in. Hg).
- To start sampling, the canister ball valve is opened and the initial time and vacuum is recorded.
- The final vacuum should be between 10 and 4 in. Hg, with a target of 5 in. of Hg. The initial and final vacuum in each canister will be recorded on the laboratory chain-of-custody form to be returned to the laboratory with the samples. The gauges provided with the canisters are accurate only for “indication of change”, and are not sufficiently accurate to provide gauge-to-gauge comparisons. The final vacuum will also be measured in the laboratory.
- Following collection of the sample, the canister will be sealed by closing the ball valve and fitting on the canister inlet. The inlet will then be capped with a laboratory-provided threaded end cap.
- Following collection of the sample, the PID will be used to obtain a final reading from the probe assembly or tubing for the concentration of total organic vapors.
- The site name, sample identification, canister number, canister certification number, samplers name, sample times and date will be recorded on a tag that is attached to each canister.
- The air and soil vapor samples will be shipped overnight to a NY ELAP-certified laboratory for analysis.
- After the laboratory sample is collected, the sub-slab soil vapor sampling assembly will be removed and the concrete coring holes will be sealed and patched to match the existing grade.

All sampling equipment will be decontaminated between uses with rinses of Alconox™ (detergent) and water with a final rinse of laboratory-provided analyte-free water. The equipment will be stored in plastic sleeves when ever they are not being used.

The field sampling team will record all information regarding the sampling on field forms. Copies of the field forms that will be used are included as Figures 6-2 and 6-3. Information that will be recorded will include the following: sample identification, date and times of sample collection, sampling depth, identity of the field personnel, sampling methods and equipment, purge volumes and rates, tracer test results, and any other relevant observations made during the sampling. A NYSDOH indoor air quality questionnaire and building inventory form will also be filled out prior to indoor air sampling (Figure 6-4).

7.0 Air monitoring

7.1 Introduction

Two types of air monitoring will be performed during the site investigation: 1) work zone monitoring for protection of the workers performing the site investigation, and 2) community air monitoring at the perimeter of the work site for protection of the local community.

7.2 Breathing zone air monitoring during drilling and sampling

Monitoring of air in the breathing zone within the work site will be conducted periodically during all drilling and sampling activities.

- An organic vapor meter (OVM) equipped with a PID will be used to monitor for VOCs or other organic vapors in the breathing zone and borehole, and to screen the samples.
- Additional air monitoring may be required as specified in the site-specific HASP.

The PID readings will be recorded in the field book and on the boring log during drilling activities. The procedure for the PID operation and calibration is included in the HASP. Note that equipment calibration will be performed as often as needed to account for changing conditions or instrument readings. The minimum frequency of calibration is specified in the HASP; more frequent calibration will be performed if spurious readings are observed or there are other problems with the instruments.

7.3 Community air monitoring

Community air monitoring requires real-time monitoring for VOCs, particulates (i.e., dust), and MGP-related odors at the downwind perimeter of each designated work area when certain activities are in progress at impacted sites. The community air monitoring is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels for community air monitoring require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, community air monitoring helps to confirm that work activities do not spread contamination off site through the air.

The procedures and action levels for community air monitoring are presented in the CAMP that has been prepared for the RI at the Metropolitan MGP Site.

8.0 Field instruments and calibration

All field analytical equipment will be calibrated immediately prior to each day's use and more frequently if required. The calibration procedures will conform to manufacturer's standard instructions. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. All instrument calibrations will be documented in the project field book and in an instrument calibration log. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all of the instrument manuals will be maintained on site by the Field Team Leader. All changes to instrumentation will be noted in the field log book.

The following field instruments will be used during the investigation:

- PID
- Particulate monitors
- Multi-parameter meter (pH, specific conductivity, dissolved oxygen, oxidation reduction, and temperature meter)
- Turbidity meter

8.1 Portable photo-ionization detector (PID)

- The photo-ionization detector will be equipped with either a 10.2 or 10.6 eV lamp. In this configuration, the PID is capable of ionizing and detecting compounds that account for over 70% of the VOCs on the USEPA Target Compound List.
- Calibration must be performed at the beginning of each day of use with a standard calibration gas having a concentration of 100 parts per million of isobutylene. If the unit experiences abnormal perturbation or erratic readings, more frequent or additional calibration will be required.
- All calibration data must be recorded in the project field notebooks.
- A battery check must be completed at the beginning and end of each working day.
- All changes to the PID will be noted in the field notes (such as lamp or filter cleaning or replacement or change of instrument).

8.2 Multi-parameter meter

- Calibration of the meter (YSI or equivalent) must be performed at the start of each day of use, and after very high or low readings as required by this Plan, according to manufacturer's instructions.
- National Institute of Standards and Technology - traceable standard calibration solutions will be used (where applicable). At least one backup meter will also be present on-site in the event of a malfunction.
- The calibration data must be recorded in the project field book each time it is performed.

8.3 Turbidity meter

- The turbidity meter must be checked at the start of each day of use according to manufacturer's instructions.

9.0 Analytical program

9.1 Environmental sample analyses

The laboratory samples for each media and the chemical analyses to be performed are summarized in Table 3-1 of the RI Work Plan.

9.1.1 Soil analyses

The majority of the soil samples will be analyzed for the following parameters:

- VOC compounds by USEPA Method 8260B;
- Semi-volatile organic compounds (SVOCs) by USEPA Method 8270C;
- RCRA 8 metals by USEPA Method 6000-7000 Series; and
- Free Cyanide with extraction by USEPA Method 9013A and analysis by ASTM Method D4282-02 (microdiffusion).

A subset (approximately 20%) of the total number of soil samples will be analyzed for an expanded list of the following parameters:

- Full TCL VOCs by USEPA Method 8260B;
- Full TCL SVOCs by USEPA Method 8270C;
- TAL Metals by USEPA Method 6000-7000 Series;
- Free Cyanide with extraction by USEPA Method 9013A and analysis by ASTM Method D4282-02 (microdiffusion);
- TCL Pesticides by USEPA Method 8081A;
- TCL Herbicides by USEPA Method 8151A; and
- PCBs (as Aroclors) by USEPA Method 8082.

9.1.2 Groundwater analyses

Similar to soils, the majority of groundwater samples will be analyzed for the following parameters:

- VOC compounds by USEPA Method 8260B;
- SVOC compounds by USEPA Method 8270C;
- TAL Metals by USEPA Method 6000-7000 Series; and
- Free Cyanide with extraction by USEPA Method 9013A and analysis by ASTM Method D4282-02 (microdiffusion).

A subset (approximately 20%) of the total number of groundwater samples will be analyzed for an expanded list of the following parameters:

- Full TCL VOCs by USEPA Method 8260B;
- Full TCL SVOCs by USEPA Method 8270C;
- TAL Metals by USEPA Method 6000-7000 Series;

- Free Cyanide with extraction by USEPA Method 9013A and analysis by ASTM Method D4282-02 (microdiffusion);
- TCL Pesticides by USEPA Method 8081A;
- TCL Herbicides by USEPA Method 8151A; and
- PCBs (as Aroclors) by USEPA Method 8082.

9.1.3 Sub-slab soil vapor/indoor air/ambient air analyses

The sub-slab soil vapor, indoor air, and ambient air samples will be analyzed for VOCs by USEPA Method TO-15 (including naphthalene). The sub-slab soil vapor samples will also be analyzed for helium by ASTM Method ASTM D-1945. In addition to the standard TO-15 list of compounds, several additional compounds will be analyzed for, including: indane, indene, thiophene, styrene, 2-methyl pentane, isopentane, 2,3-dimethyl pentane, isooctane, and methyl tert-butyl ether (MTBE).

9.1.4 Waste characterization/profiling

Sufficient samples (a minimum of two) will be collected during the investigation and analyzed for full RCRA Hazardous Characteristics testing to determine if materials exhibiting hazardous characteristics may be present at the site and to support waste disposal profiling purposes. The analyses to be performed may include, but not be limited to, the following, depending on the medium and the selected disposal facility:

- Total Metals by USEPA Method 6010B (Mercury 7470A);
- Total Petroleum Hydrocarbons (DRO and GRO) by USEPA Method 8015 modified;
- PCBs by USEPA Method 8082;
- TCLP ZHE Extraction by USEPA Method 1311;
- TCLP VOC by USEPA Method 8260B;
- TCLP SVOC by USEPA Method 8270C;
- TCLP RCRA Metals by USEPA Method 6010B (Mercury 7470A);
- Corrosivity by USEPA Method 9045C;
- Ignitability/Flashpoint by USEPA Method 1010A;
- Reactive Cyanide and Reactive Sulfide by USEPA SW-846 Chapter 7, Sections 7.3.3.2 and 7.3.4.2; and
- Total Organic Halogens – USEPA Method 9020B.

9.2 Field quality control samples

Field quality control samples will be collected and analyzed to document the accuracy and precision of the samples. The quality control samples are described as follows:

- Trip Blank: One trip blank will accompany each shipment of samples for VOC analysis sent to the laboratory. The trip blank will be analyzed to test for any contaminants introduced while samples are being stored or transported to the laboratory. The trip blanks will be analyzed for volatiles only.
- Field Equipment Blanks: The purpose of the equipment blank is to detect any contamination from sampling equipment, cross-contamination from previously sampled locations, and contamination caused by conditions at sampling locations (e.g., airborne contaminants). One equipment blank will be

collected for every 20 samples collected during sampling. The samples will be collected by pouring analyte-free water, prepared in the laboratory, over decontaminated sampling equipment and collecting it in sample jars. The blanks will be collected in the vicinity of a sample location. This field blank will be analyzed for VOCs, SVOCs, PCBs, free cyanide, and TAL metals. An equipment blank will not be collected if sampling is conducted with dedicated sampling equipment.

- Field Duplicates: Field duplicates are collected to determine the precision of the soil samples collected. This is achieved by homogenizing soil (for non-VOC analyses) and splitting it evenly between separate sample jars. Duplicate samples will be collected and analyzed for VOC, SVOCs, PCBs, free cyanide, and TAL metals. The minimum required number of field duplicates is one for every 20 samples.
- Matrix Spikes, and Matrix Spike Duplicates: These samples are laboratory quality control samples and will be completed as part of the laboratory analytical batch quality control. These samples will be collected in the same manner as the field duplicates. Both the matrix spike and matrix spike duplicate will be collected at the same sample location.

9.3 Sample location numbering system

- Surface soil samples will be numbered consecutively beginning with SS1 (if applicable).
- Subsurface soil borings will be numbered consecutively beginning with SB1 (soil borings) or MW1 (monitoring well borings). Individual samples will also be designated with a depth code (see below).
- Monitoring wells will be numbered consecutively beginning with MW1. An “S” suffix will designate water table wells, an “I” suffix will designate intermediate zone wells, and a “D” suffix will designate deeper zone wells, as defined in the RI Work Plan.

9.4 Sample identification

Each sample will be given a unique alphanumeric identifier in accordance with the following classification system:

Table 9-1 Sample Identification

LL* Sample Type	NN* Sample Number	N-N Depth Code	LL QC Identifier

Sample Type:	MW – Monitoring Well Boring SB – Soil Boring SS – Surface Soil	MW – Monitoring Well SV – Soil Vapor IA – Indoor Air, AMB – Ambient Air
Sample Number:	Number referenced to a sample location map.	
Depth Code:	Depth in feet of sample interval (0-0.5, 2-4, 10-12, etc.)	
QC Identifier:	TB – Trip Blank EB – Equipment Blank	MS – Matrix Spike MSD–Matrix Spike Duplicate MB – Matrix Blank

* L = Letter
* N = Number

Field duplicate samples will be assigned identifiers that do not allow the laboratory to distinguish them as field duplicates. Each sample container will be labeled prior to packing for shipment. The sample identifier, site name, date and time of sampling, and analytical parameters will be written on the label in waterproof ink and recorded in the field book.

9.5 Chain-of-custody

- A Chain-of-Custody (COC) record (Figure 9-1 or similar) will accompany the sample containers during selection and preparation at the laboratory, during shipment to the field, and during return shipment to the laboratory.
- The COC will include the sample identities of each sample container and the analytical parameters for each, and will list the field personnel that collected the samples, preservation method, the project name and number, the name of the analytical laboratory that will receive the samples, and the method of sample shipment.
- If samples are split and sent to different laboratories, such as to a specialty laboratory for fingerprint analysis, a copy of the COC record will be sent with each sample shipment.
- The COC will be completed by field personnel as samples are collected and packed for shipment.
- Erroneous markings will be crossed-out with a single line and initialed by the author.
- The REMARKS space will be used to indicate if the sample is a matrix spike, matrix spike duplicate, or matrix duplicate.
- Trip and field blanks will be listed on separate rows.
- After the samples have been collected and sample information has been listed on the COC form, the method of shipment, the shipping cooler identification number(s), and the shipper airbill number will be entered on the COC.
- Finally, a member of the sampling team will write his/her signature, the date, and time on the first RELINQUISHED BY space.
- One copy of the COC will be retained by sampling personnel. The other copy and the original will be sealed in a plastic bag and taped inside the lid of the shipping cooler.
- Sample shipments will be refrigerated at 4˚C, typically by packing with bagged ice, to preserve the samples during shipment.
- After the shipping cooler is closed, custody seals provided by the laboratory will be affixed to the latch and across the front and back of the cooler lid, and signed by the person relinquishing the samples to the shipper.
- The seal will be covered with clear tape, and the cooler lid will be secured by wrapping with packing tape.
- The cooler will be relinquished to the shipper, typically an overnight carrier.
- The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the samples will not be analyzed until directed to do so.
- The samples must be delivered to the laboratory within 48 hours of collection.

9.6 Sample documentation

The field team leader will retain a copy of the COC, and, in addition, the field team leader will ensure that the following information about each sample is recorded in the field book:

- Sample identifier;
- Identification of sampled media (e.g., soil, sediment, groundwater);
- Sample location with respect to known reference point;
- Physical description of sample location;
- Field measurements, (e.g., pH, temperature, conductivity, and water levels);
- Date and time of collection;
- Sample collection method;
- Volume of groundwater purged before sampling;
- Number of sample containers;
- Analytical parameters;
- Preservatives used; and
- Shipping information:
  - Dates and method of sample shipments;
  - COC Record numbers;
  - Federal Express Air Bill numbers; and
  - Sample recipient (e.g., laboratory name).

Figures

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Figure 4-1

Boring/Well ID:_____

Page _____ of _____

Project Name:	Drilling Company:	Surface Comp:
Project Number:	Drilling Method:	Grout (bgs):
Date Pre-Cleared:	Rig Type:	Filter Pack (bgs):
Date Started Drilling:	Casing ID:	Riser (bgs):
Date Finished Drilling:	Water Level While Drilling (bgs):	Well Screen (bgs):
Logged By:	Total Depth of Boring (bgs):	Sump (bgs):

(Note: bgs = below ground surface)

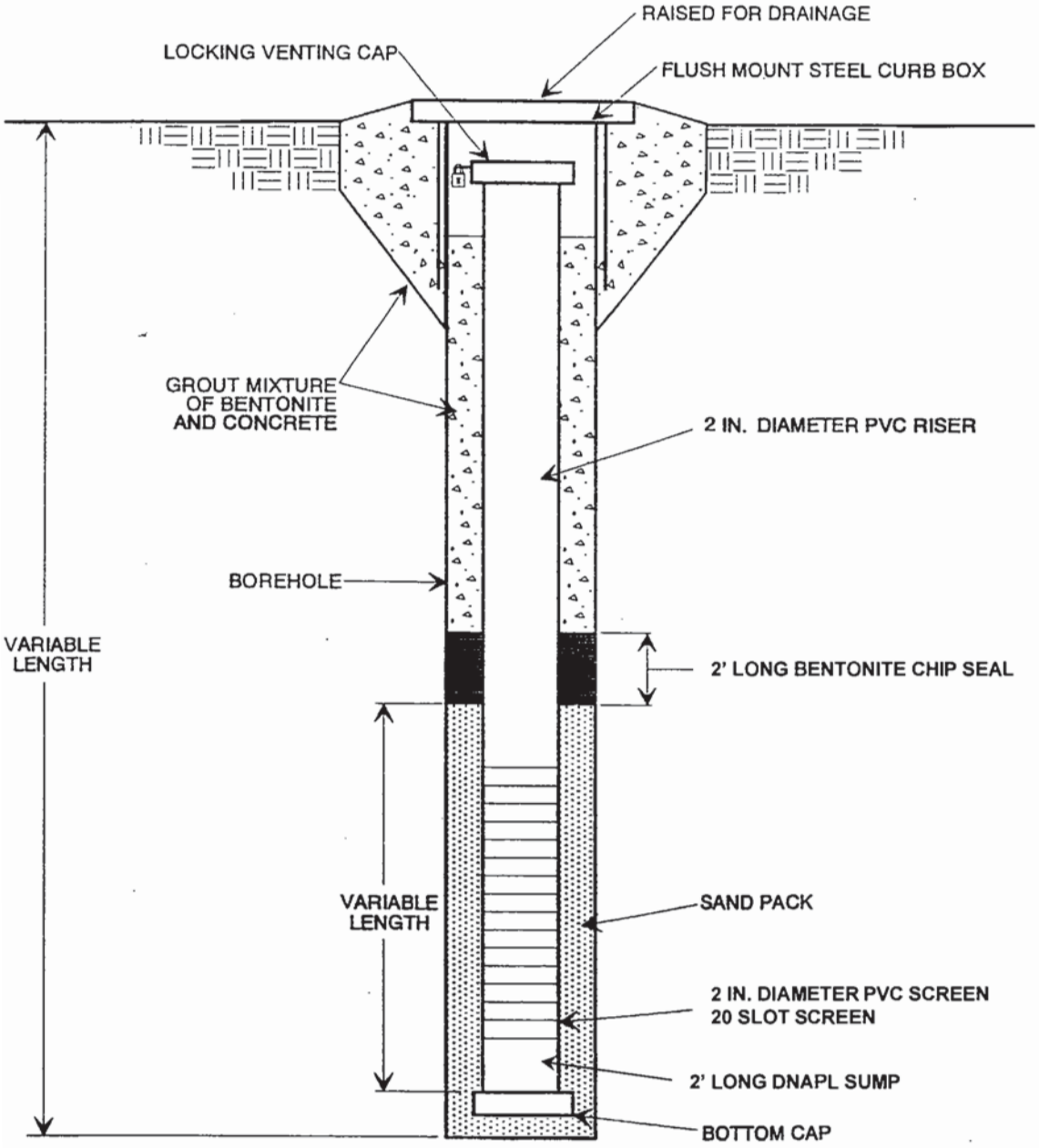
Depth Range	Blow per 6 Inch	Re-covery ft/ft	PID	Lab Sample ID	USCS	Geologic Description Method:_____

Lithology:	
1.)	5.)
2.)	6.)
3.)	7.)
4.)	8.)

Comments:

Figure 4-2

TYPICAL MONITORING WELL CROSS SECTION



NOT TO SCALE

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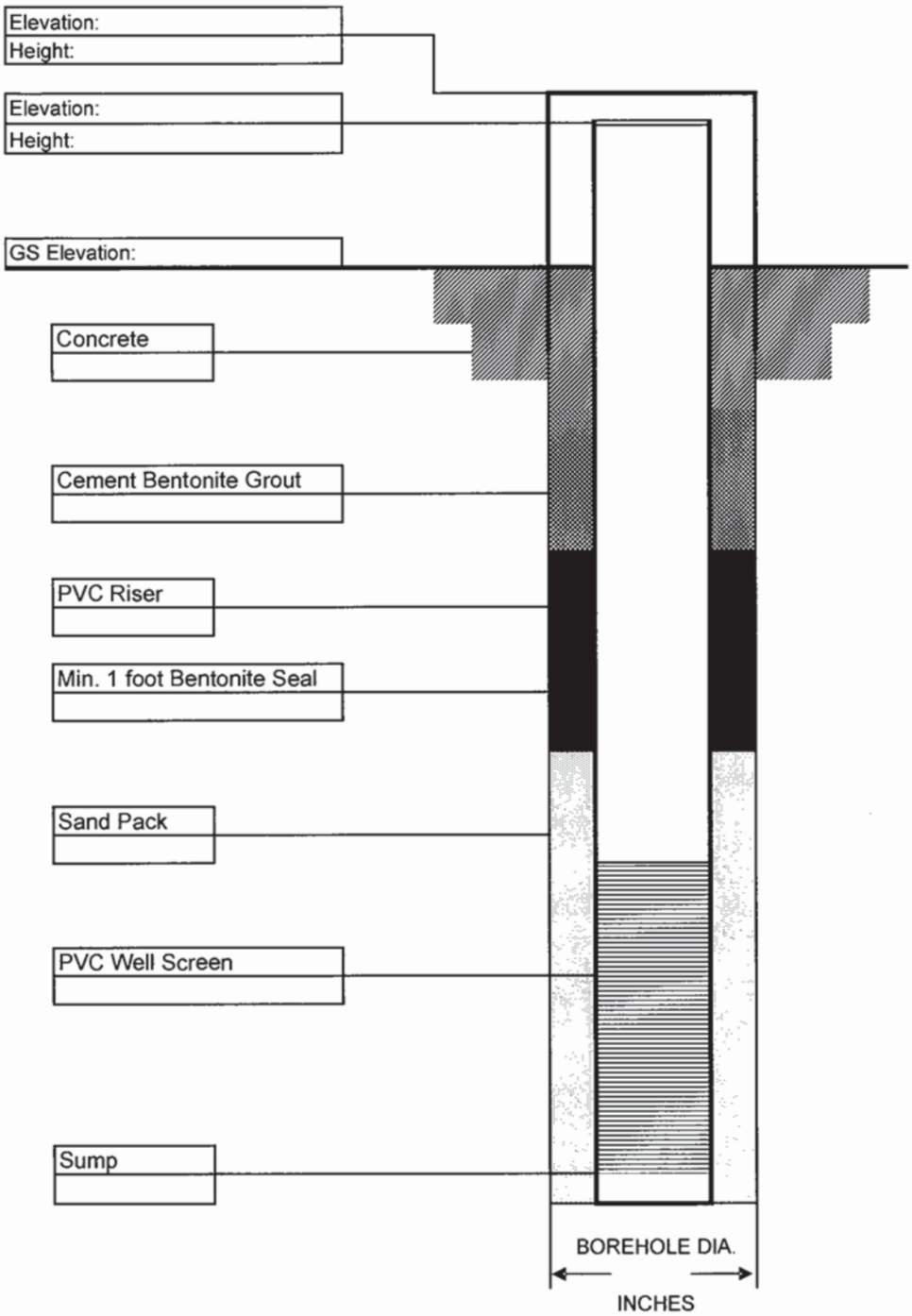
Figure 4-3

WELL CONSTRUCTION LOG

WELL NO.:	FACILITY/SITE NAME:
PROJ. NO.:	CLIENT:
INSPECTOR:	DRILLING CONTACTOR:
DATE START:	DATE END:
LOCATION:	DRILLING METHOD:



PROTECTIVE CASING
Material:
Diameter:
Depth BGS:
Water Tight Seal:
Flushmount:
Weep hole:

GUARD POSTS
Material:
No. & Size:

SURFACE PAD
Composition:
Size:

RISER PIPE
Material:
Schedule:
Joint Type:
O-ring:
Diameter:

GROUT
Amt cement:
Amt bentonite:
Amt water:
Tremied:
Interval:

SEAL
Material:
Type:
Amount Used:
Interval:

FILTER PACK
Material:
Brand Name:
Amount Used:
Grain Size Dist.:
Interval:
Tremied:

SCREEN
Material:
Diameter:
Slot Size & Type:
Interval BGS:

SUMP
Interval BGS:
Bottom Cap:

BACKFILL PLUG
Material:
Setup/Hydration Time:

Figure 5-1

LOW-STRESS GROUND WATER SAMPLING FORM

Project Number: _____
Project Name: _____
Date: _____
Weather: _____

Well ID: _____
Sample ID: _____
Permit Number: _____
Well Condition: _____

PRE-PURGE INFORMATION

Protective Casing Diameter (inch): _____
Inner Casing Diameter (inch): _____
Inner Casing Material: _____
Purge/Sample Method: _____
Pump Intake Setting* (feet): _____
PID/FID Reading of Well Headspace (ppm)
Before Cap Removal: _____
After Cap Removal: _____

Depth to Product* (feet): _____
Initial Depth to Water* (feet): _____
Product Thickness (feet): _____
Depth to Top of Screen* (feet): _____
Total Depth* (feet): _____
Water Column (feet): _____
Casing Volume (gal): _____
DTW After Pump Installed: _____

PURGING/SAMPLING INFORMATION

Time	Rate (gpm)	Gallons Purged	pH (SI Units)	Conductivity (µohms/cm)	Temp (°C)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	ORP (mv)	Depth to Water (ft)	Comments

Start Purge Date/Time: _____
End Purge Date/Time: _____
Total Volume Purged (gal): _____
Depth to Water After Purge* (feet): _____

Pre-Sample Depth to Water* (feet): _____
Start Sample Date/Time: _____
End Sample Date/Time: _____
Sampler Names: _____

Observations During Sampling (e.g. slow recharge, turbidity, odor, sheen, PID/FID readings):

_____
_____
_____

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Figure 5-1

LOW-STRESS GROUND WATER SAMPLING FORM

Sampling Sequence:

Analysis	Method	Container	Number of Bottles	Preservative	Comments
Volatile Organics					
Base/neutrals					
TPH					
Total Metals					
Dissolved Metals					
Cyanide					
Sulfate and Chloride					
Nitrate and Ammonia					
Preserved Inorganics					
Non-Preserved Inorg					
Bacteria					

Complete those analyses that apply.

Stabilization Ranges
Dissolved Oxygen: +/- 10%
Turbidity: +/- 10%
Specific Conductance: +/- 3%
Temperature: +/-3 %
pH: +/- 0.1 unit
Redox Potential: +/- 10mv

* = Measured from top of inner casing
DTW - Depth to Water
Thermo Environmental Instruments Model 580s OVM w/ 10.2 ev bulb
Water Levels Measured with an Electronic Water Level Meter
Field parameter meter calibration results are recorded in the field book.

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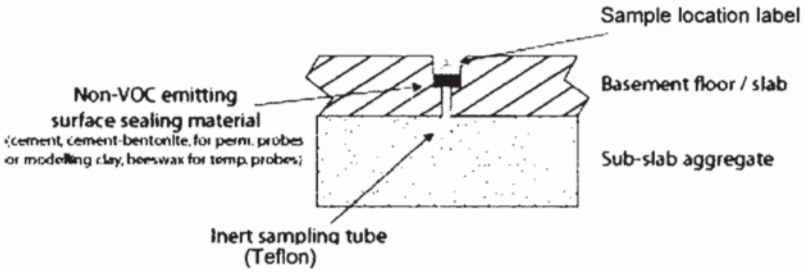
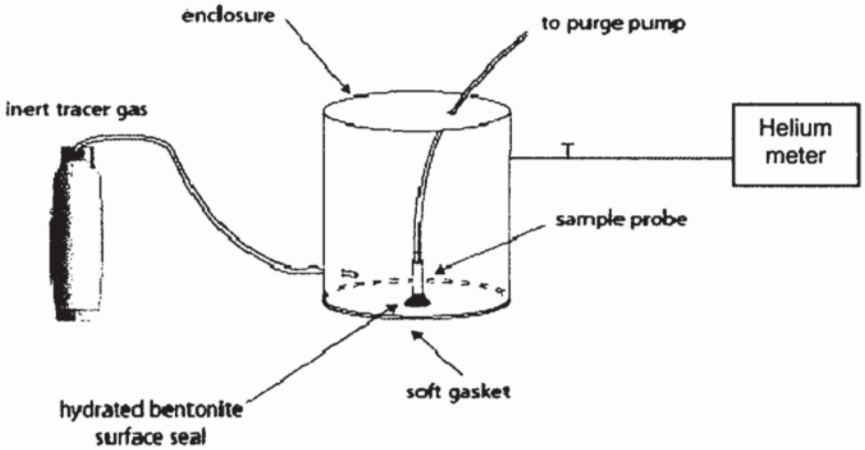


TYPICAL SUB-SLAB SAMPLING PROBE SET UP



TYPICAL HELIUM TRACER TEST SET UP

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			TYPICAL HELIUM TRACER AND SUB-SLAB
DATE. 9/5/06	DRWN. MLR		FIGURE 6-1

File: H:\186001\186005057.dwg Layout: FIGURE 2-2 User: ustenberg Plotted: Sep 19, 2005 4:00pm Xref's: 186000001

FIGURE 6-2

Soil Gas Sampling Log Sheet
Sample ID_____

Client:_____
Project Name:_____
Project Number:_____
Date:_____
Sampler:_____

Location:_____
Canister Number:_____
Core Diameter:_____ Core Material:_____
Core Length:_____
Magnehelic Measurement: (Positive number indicates higher pressure in Core)_____
Depth of Hand Auguring:_____
Soil Type:_____
Method of Probe Advancement:_____
Depth of Probe Advancement:_____ Length Probe is Retracted:_____

Time of Purging	PID Reading	Time of Purging	PID Reading
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Starting Time:_____ Starting Pressure:_____
Finish Time:_____ Final Pressure:_____

Room Dimensions: Length:_____ Width:_____ Height:_____

Comments:

Indoor Air/Ambient Air Sample
Sample ID_____

Location:_____
Sample ID:_____
Canister Number:_____
Starting Time:_____ Starting Pressure:_____
Finish Time:_____ Final Pressure:_____

Comments:

General Weather Conditions:_____
Chemical Inventory:

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FIGURE 6-3

FIELD SAMPLING DATA SHEET
(One Sample Per Data Sheet)

GENERAL:

PROJECT: _____ DATE(S) SAMPLED: _____

SITE: _____

LOCATION: _____ OPERATOR: _____

PID INSTRUMENT MODEL NO.: _____ CALIBRATED BY: _____
CGI INSTRUMENT MODEL NO.: _____ CALIBRATED BY: _____

TIME	CGI READING (%)	PID READING (ppm)	DRAGER TUBE (ppm)	LOCATION
1)				
2)				
3)				
4)				
5)				
6)				
7)				
8)				
9)				
10)				

CANISTER #	LOCATION	TIME

DATE/TIME	AMBIENT TEMPERATURE°	BAROMETRIC PRESSURE mm Hg	RELATIVE HUMIDITY %	COMMENTS

Data from meteorological station*

FIGURE 6-4

OSR-3

NEW YORK STATE DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH ASSESSMENT
BUREAU OF TOXIC SUBSTANCE ASSESSMENT

INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date Prepared _____

Preparer's Affiliation _____ Phone No. _____

1. **OCCUPANT**

Name: _____

Address: _____

County: _____

Home Phone No._____ Office Phone No _____

2. **OWNER OR LANDLORD:**
(If different than occupant)

Name: _____

Address: _____

_____

Phone No. _____

A. <u>Building Construction Characteristics</u>

Type (circle appropriate responses): Single Family Multiple Dwelling Commercial Public School

Ranch	2-Family
Raised Ranch	Duplex
Split Level	Apartment House _____ Units
Colonial	Number of floors _____
Mobile Home	Other specify _____

Residence Age _____ General Description of Building Construction Materials _____

Is the building insulated? Yes / No How air tight is the building?_____

_____

_____

OSR-3 (continued)

B. <u>Basement construction characteristics (circle all that apply):</u>

1. Full basement, crawlspace, slab on grade, other _____
2. Basement floor: concrete, dirt, other _____
3. Concrete floor: unsealed, painted, covered, with _____
4. Foundation walls: poured concrete, block, laid up stone, other _____
5. The basement is: wet, damp, dry___ Sump present? y / n _____ Water in sump? y / n_____
6. The basement is: finished, unfinished _____
7. Identify potential soil vapor entry points (e.g., cracks, utility ports, etc.)

   _____

8. Describe how air tight the basement is _____

   _____

C. <u>HVAC (circle all that apply):</u>

1. The type of heating system(s) used in this residence is/are:

Hot Air Circulation	Heat Pump
Hot Water Radiation	Unvented Kerosene Heater
Steam Radiation	Wood stove
Electric Baseboard	Other (specify)_____

2. The type(s) of fuel(s) used is/are: Natural Gas, Fuel Oil, Electric, Wood, Coal Solar

   Other (specify)_____

3. Is the heating system's power plant located in the basement or another area? _____
4. Is there air-conditioning? Yes / No Central Air or Window Units?

   Specify the location _____

5. Are there air distribution ducts present? Yes / No
6. Describe the supply and cold air return duct work in the basement including whether there is a cold air return, the tightness of duct joints

   _____

   _____

OSR-3 (continued)

D. <u>Potential Indoor Sources of Pollution</u>

1. Has the house ever had a fire? Yes / No
2. Is there an attached garage? Yes / No
3. Is a vehicle normally parked in the garage? Yes / No
4. Is there a kerosene heater present? Yes / No
5. Is there a workshop, hobby or craft area in the residence? Yes / No
6. An inventory of all products used or stored in the home should be performed. Any products that contain volatile organic compounds or chemicals similar to the target compounds should be listed. The attached product inventory form should be used for this purpose.
7. Is there a kitchen exhaust fan? Yes / No Where is it vented? _____
8. Has the house ever been fumigated? If yes describe date, type and location of treatment.

_____

E. <u>Water and Sewage (Circle the appropriate response)</u>

Source of Water

Public Water Drilled Well Driven Well Dug Well Other (Specify)_____

Water Well Specifications:

Well Diameter _____ Grouted or Ungrouted _____

Well Depth _____ Type of Storage Tank _____

Depth to Bedrock _____ Size of Storage Tank _____

Feet of Casing _____ Describe type(s) of Treatment _____

_____

Water Quality:

Taste and/or odor problems? y / n If so, describe _____

How long has the taste and/or odor been present? _____

Sewage Disposal: Public Sewer Septic Tank Leach Field Other (Specify) _____

Distance from well to septic system_____Type of septic tank additive _____

OSR-3 (continued)

F. <u>Plan View</u>

Draw a plan view sketch for each floor of the residence and if applicable, indicate air sampling locations, possible indoor air pollution sources and PID meter readings.

OSR-3 (continued)

G. <u>Potential Outdoor Sources of Pollution</u>

Draw a sketch of the area surrounding the residence being sampled. If applicable, provide information on the spill location (if known), potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system if applicable, and a qualifying statement to help locate the site on a topographical map.

Household Products Inventory

Occupant / residence _____

Investigator: _____ Date: _____

Product description (dispenser, size, manufacturer …)	**VOC Ingredients**

Chain of Custody Record № 0476

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FIGURE 9-1

Project Name:	Project Number:
Send Report To:	Sampler (Print Name):
Address:	Sampler (Print Name):
	Shipment Method:
	Airbill Number:
Phone:	Laboratory Receiving:
Fax:	

Analysis Requested

Page ____ of ____

Purchase Order #: _____

Field Sample ID	Sample Date	Sample Time	Sample Matrix	Number of Containers												Comments, Special Instructions, etc.	Lab Sample ID (to be completed by lab)

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:

Sample Custodian Remarks (Completed By Laboratory):

QA/QC Level		Turnaround		Sample Receipt	
				Total # Containers Received?	
Level I	☐	Routine	☐	COC Seals Present?	
Level II	☐	24 Hour	☐	COC Seals Intact?	
Level III	☐	1 Week	☐	Received Containers Intact?	
Other	☐	Other _____		Temperature?	

White: Lab Copy Yellow: PM Copy Pink: Field Copy Gold: PM/QA/QC Copy

Appendix A

Field Descriptions of Samples for Former Manufactured Gas Plant (MGP) Sites

Field Descriptions of Samples for Former Manufactured Gas Plant (MGP) Sites

Soil Sample Descriptions

It is important that descriptive qualifiers are consistently used to characterize degree and nature of contaminant impacts and visual-manual soil classification. The following presents some examples of descriptive qualifiers.

Soil Logging

- All soils are to be logged using the **Unified Soil Classification** (ASTM D 2488 field descriptions)
- **PID or FID** used to screen all soil samples (Jar Headspace method) – maximum readings should be recorded and included on the logs. PID/FID to be calibrated daily at a minimum
- **Moisture terms** are: Dry, Moist, and Wet
- **Color terms** - use geotechnical color charts - colors may be combined: e.g. red-brown. Color terms should be used to describe the "natural color" of the sample as opposed to staining caused by contamination (see below)
- **Log of each sample interval** should be prepared as follows:
  - **[Coarse Grained Example]** NARROWLY GRADED SAND (SP); mostly fine sand; <5% fines; red-brown, moist, environmental/depositional/geologic descriptions.
  - **[Fine Grained Example]** SANDY SILT (ML); heterogeneous till structure, nonplastic, ~30% fine to coarse, subangular sand; ~10% subangular fine gravel, max. size ~ 10 mm; brown; environmental/depositional/geologic descriptions.
- **Representativeness** – Soil logs should include particular notes if the field representative believes that there is a possibility the soil sample being described is not representative of the interval sampled.
- **Intervals for Description** – if using a 2' (split spoon) or 4' (Macro-core) long sampler – the field description should not necessarily be for the entire sample interval. It is important to look for, identify, and describe small-scale units and changes within each sample interval.

Description Of Contaminants

<u>Visible Contamination Descriptors</u>

- **Sheen** - iridescent petroleum-like sheen. Not to be used to describe a "bacterial sheen" which can be distinguished by its tendency to break up on the water surface at angles whereas petroleum sheen will be continuous and will not break up. A field test for sheen is to put a soil sample in a jar of water and shake the sample (jar shake test) , then observe the presence/absence of sheen on the surface of the water in the jar.
- **Stained** - used w/ color (i.e. black or brown stained) to indicate that the soil matrix is stained a color other than the natural (unimpacted) color of the soil.
- **Coated** - soil grains are coated with tar/free product – there is not sufficient free-phase material present to saturate the pore spaces.

- **Blebs** - observed discrete sphericals of tar/free product - but for the most part the soil matrix was not visibly contaminated or saturated. Typically this is residual product.
- **Saturated** - the entirety of the pore space for a sample is saturated with the tar/free product. Care should be taken to ensure that you're not observing water saturating the pore spaces if you use this term. Depending on viscosity, tar/free-phase saturated materials may freely drain from a soil sample.
- **Oil**. Used to characterize free and/or residual product that exhibits a distinct fuel oil or diesel fuel like odor; distinctly different from MGP-related odors/impacts.
- **Tar**. Used to describe free and/or residual product that exhibits a distinct "coal tar" type odor (e.g. naphthalene-like odor). Colors of product can be brown, black, reddish-brown, or gold.
- **Solid Tar**. Used to describe product that is solid or semi-solid phase. The magnitude of the observed solid tar should be described (e.g. discrete granules or a solid layer).
- **Purifier Material**. Purifier material is commonly brown/rust or blue/green wood chips or granular material. It is typically associated with a distinctive sulfur-like odor. Other colors may be present.

Olfactory Descriptors

Use terms such as " tar-like odor" or "naphthalene-like odor" or "fuel oil-like odor" that provide a qualitative description (opinion) as to the possible source of the odor.

Use modifiers such as strong, moderate, faint to indicate intensity of the observed odor.

DNAPL/LNAPL

A jar shake test should be performed to identify and determine whether observed tar/free-phase product is either denser or lighter than water. In addition, MGP residues can include both light and dense phases - this test can help determine if both light and dense phase materials are present at a particular location.

Viscosity of Free-Phase Product

If free-phase product/tar is present a qualitative description of viscosity should be made. Descriptors such as:

- Highly viscous (e.g. taffy-like)
- Viscous (e.g. No. 6 fuel oil or bunker crude like)
- Low viscosity (e.g. No. 2 fuel oil like)

Groundwater Sampling Observations

Any observations of sheen, blebs, free-phase product/tar, staining or coating of the sampling equipment, odor, etc. that made during sampling of groundwater are to be included in the groundwater sample collection log.

Appendix D

Quality Assurance Project Plan (QAPP)

Prepared for:
National Grid
Brooklyn, New York

Quality Assurance Project Plan

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-0606

AECOM, Inc.
February 2009
Document No.: 01765-075

AECOM

AECOM

Prepared for:
National Grid
Brooklyn, New York

Quality Assurance Project Plan

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-0606

Prepared By Jen Atkins

Reviewed By Greg Malzone

AECOM, Inc.
February 2009
Document No.: 01765-075

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List of Acronyms

%R	Percent recovery
ASP	Analytical services program
ASTM	American Society for Testing Materials
CAMP	Community Air Monitoring Plan
CAR	Corrective Action Request
CLP	Contract laboratory program
COC	Chain of custody
CRDLs	Contract Required Detection Limits
CRQLs	Contract Required Quantitation Limits
DQOs	Data quality objectives
DUSR	Data Usability Summary Report
EDD	Electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
GC/MS	Gas Chromatography/Mass Spectroscopy
HASP	Health and safety plan
LIMS	Laboratory information management system
MDLs	Method detection limits
MGP	Manufactured gas plant
MS	Matrix spike
MSD	Matrix spike duplicate
NIST	National Institute of Standards and Technology
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PA	Preliminary assessment
PID	Photoionization detector
PQL	Practical quantitative limit
QA	Quality assurance
QAO	Quality assurance officer
QAPP	Quality Assurance Project Plan
QC	Quality control
RI	Remediation Investigation
RPD	Relative percent difference
SOPs	Standard operating procedures
TCLP	Toxicity characteristics leaching procedure
USEPA	United States Environmental Protection Agency
VOA	Volatile organic analysis
VOCs	Volatile organic compounds

1.0 Introduction

This Quality Assurance Project Plan (QAPP) details the protocols and procedures that will be followed during the proposed Remedial Investigation (RI) that will occur at the National Grid Metropolitan former manufactured gas plant (MGP) site. The purpose of these protocols and procedures is to ensure that all project activities will be performed in a manner consistent with the data quality objectives (DQOs) established for the project and all data collected during the RI are precise, accurate, representative, comparable, and complete.

1.1 Project description

The Metropolitan former MGP site is located at 124 – 136 2nd Avenue, Brooklyn, Kings County, New York 11215, east of the Gowanus Canal, between the Gowanus Expressway (Highway 278) and the New York City Transit train bridge and associated subway rail line. A portion of the site was the subject of previous extensive remedial/redevelopment activities undertaken by independent third parties with NYSDEC oversight. The investigation associated with this QAPP is intended to address those portions of the site that were not associated with the previous remedial/redevelopment activities, i.e. the “current” site. These areas are generally bounded to the north and west by the Gowanus Canal, to the east by a parcel of land occupied by the Lowe’s Supply store (part of the previous remediation) and 2nd Avenue, and to the south by 13th Street.

The current site is being investigated in accordance with Administrative Consent Order Index # A2-0552-0606 between KeySpan and the NYSDEC. The RI is designed to delineate the extent of MGP impacts observed during the preliminary assessment (PA) performed in September 1986 and the various environmental investigations conducted at the Site between 1997 and 2003.

1.2 Scope of work

The scope of work at the Site is described in the Remedial Investigation Work Plan dated December 2008. The following tasks will be performed as a part of the RI:

- Pre-investigation coordination (i.e., access agreements)
- Utility clearance
- Mobilization
- Surface soil sampling and analysis (if applicable)
- Soil boring advancement, subsurface soil sampling and analysis
- Monitoring well installation and development
- Groundwater sampling and analysis
- Aquifer slug testing at selected locations
- Sub-slab soil vapor and indoor air sampling and analysis
- Investigation-derived waste management
- Community air monitoring
- Site survey
- Data validation evaluation, and reporting

1.3 Data quality objectives

DQOs are qualitative and quantitative statements to ensure that data of known and appropriate quality are obtained during sampling and analysis activities. Data developed during the RI will be used to fulfill the overall objectives of the project. These objectives are to:

- Fill data gaps to determine the nature and extent of MGP impacts at the Site and offsite. Specifically, to delineate the areal extent of MGP impacts, determine the surface and subsurface characteristics of the Site, identify sources of contamination, migration pathways, and potential human or ecological receptors at the Site and offsite. The DQOs for delineation data include:
  - data will identify MGP-related constituents in soil and groundwater
  - data will be collected using a systematic method to delineate the perimeter of MGP-related impacts
  - analytical methods will be of sufficient sensitivity that method detection limits (MDLs) and practical quantitation limits (PQLs) measure constituent concentrations at or below constituent NYSDEC guidance values.
- Perform a soil vapor and indoor air survey in accordance with New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York. The DQOs for vapor intrusion data include:
  - data will identify MGP-related constituents in soil vapor and indoor air (if present)
  - data will be collected using a systematic method to determine whether vapor intrusion of MGP-related impacts is occurring
  - analytical methods will be of sufficient sensitivity to meet a minimum PQL of at most one part per billion.

1.3.1 Data quality levels

There are five analytical levels of data quality which may be used to accomplish these Site objectives. They are typically designated as follows:

- Level I – Field screening or analysis using portable instruments, calibrated to non-compound specific standards
- Level II – Field analysis using portable instruments, calibrated to specific compounds
- Level III – Non-Contract Laboratory Program (CLP/ASP) laboratory methods
- Level IV – ASP-CLP Routine Analytical Services methods
- Level V – Non-standard analytical methods.

To meet the specific objectives of this project, Levels I and III data quality levels will be utilized.

1.3.1.1 Level I – field screening methods

These tests, which are quantitative and/or semi-quantitative, are classified as field screening evaluations, even though they typically are not used for site characterization purposes.

Soil and soil headspace screening will be conducted using a photoionization detector (PID) to determine the soil boring interval(s) that will be submitted for analytical laboratory analysis.

In addition, as part of the Health and Safety Plan (HASP) and the Community Air Monitoring Plan (CAMP), worker safety and ambient air quality may be monitored using one or more of a variety of field screening tests. Applicable equipment may include but not be limited to: a PID, Draeger tubes, and personal monitors to test for volatile organic vapors, or a combustible gas indicator to test for explosive potential. Worker health and safety requirements are specified in the HASP.

1.3.1.2 Level III – Non-Contract Laboratory Program (CLP/ASP) laboratory methods

Samples will be analyzed according to the required United States Environmental Protection Agency (USEPA) SW-846, ASTM, and USEPA Compendium air methods described in the most recent editions of the USEPA reference methods (see section 7.0). Data will be analyzed using Level III Non-Contract Laboratory Program (CLP/ASP) laboratory methods; however, the laboratory will provide Level IV data packages for all data including hazardous waste classification data. Laboratory data will be reported in the New York State Analytical Services Program (ASP) Category B deliverables format. This level of data quality will ensure the generation of legally and technically defensible data for project use. The laboratory performing the analysis of samples will be certified for the specific parameters pursuant to NYSDOH ELAP Certification program.

2.0 Project organization

This RI will be completed for National Grid by AECOM Environment, an environmental contractor (the Contractor), who will arrange for the drilling and analytical services and provide an onsite field representative to perform the soil logging, soil sampling, surveying, and groundwater sampling. The Contractor will also perform the data interpretation and reporting tasks.

Key contacts for this project are as follows:

National Grid Project Manager:
Donald Campbell, P.G.
Telephone: (718) 963-5453
Fax: (718) 963-5611

Contractor Project Manager (AECOM Environment):
Peter Cox, PG
Telephone: (978) 589-3000
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Laboratory Representative:
CHEMTECH
Joe Dockery
Telephone: (908) 789-8900

Laboratory Quality Assurance Officer (QAO)
CHEMTECH
Krupa Dubey
Telephone: (908) 789-8900

3.0 Quality assurance/quality control objectives for measurement of data

3.1 Introduction

The quality assurance and quality control (QA/QC) objectives for all measurement data include precision, accuracy, representativeness, completeness, and comparability. These objectives are defined in following subsections. They are formulated to meet the requirements of the USEPA SW-846. The analytical methods and their Contract Required Quantitation Limits (CRQLs) and Contract Required Detection Limits (CRDLs) are provided in Section 7.

3.2 Precision

Precision is an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Specifically, it is a quantitative measurement of the variability of a group of measurements compared to their average value (USEPA, 1987). Precision is usually stated in terms of standard deviation, but other estimates such as the coefficient of variation (relative standard deviation), range (maximum value minus minimum value), relative range, and relative percent difference (RPD) are common.

For this project, field sampling precision will be determined by analyzing coded duplicate samples (labeled so that the laboratory does not recognize them as duplicates) for the same parameters, and then, during data validation (Section 8), calculating the RPD for field duplicate sample results.

Analytical precision will be determined by the laboratory by calculating the RPD for the results of the analysis of internal QC duplicates and matrix spike duplicates. The formula for calculating RPD is as follows:

$$RPD = \frac{|V1 - V2|}{(V1 + V2)/2} \times 100$$

where:

RPD= Relative Percent Difference

V1, V2 = The two values to be compared

|V1 - V2| = The absolute value of the difference between the two values

(V1 + V2)/2 = The average of the two values

For soil samples, the data quality objectives for analytical precision, calculated as the RPD between duplicate analyses, is presented in Table 3-1.

The same is presented for groundwater in Table 3-2 and air samples in Table 3-3.

Table 3-1 Quality Control Limits For Soil Samples

Analytical	Analytical Method [a]	Matrix Spike (MS) Compounds	Laboratory Accuracy and Precision			Surrogate Compounds	Surrogate Recovery (%)
			MS/MSD [b] Recovery (%)	MS/MSD RPD [c] (%)	LCS [d] Recovery (%)		
VOCs [e]	8260B	1,1-Dichloroethane	77-139	20	50-150	Toluene-d8	63-124
		Trichloroethene	81-129	20	82-113	Bromofluorobenzene	50-133
		Benzene	83-135	20	81-118	1,2-Dichloroethane-d4	54-142
		Toluene	79-140	20	81-115		
		Chlorobenzene	80-141	20	83-114		
SVOCs [f]	8270C	Phenol	42-105	20	48-96	Nitrobenzene-d5	28-110
		2-Chlorophenol	52-107	20	54-92	2-Fluorobiphenyl	32-109
		1,4-Dichlorobenzene	40-101	20	57-86	Terphenyl-d14	30-150
		N-Nitroso-di-n-propylamine	63-97	20	49-99	Phenol-d5	29-104
		1,2,4-Trichlorobenzene	42-98	20	57-93	2-Fluorophenol	23-104
		4-Chloro-3-methylphenol	60-100	20	57-92	2,4,6-Tribromophenol	24-112
		Acenaphthene	65-100	20	52-97		
		4-Nitrophenol	45-95	20	24-120		
		2,4-Dinitrotoluene	56-104	20	61-101		
		Pentachlorophenol	33-111	20	32-102		
		Pyrene	49-120	20	53-103		
PCBs (as Aroclors)	8082	Aroclor-1016	55-128	20	67-121	TCMX	44-141
		Aroclor-1260	58-140	20	78-128	DCB	34-145
Pesticides	8081A	4,4'-DDD	35-165	20	86-133	TCMX	30-158
		4,4'-DDE	50-144	20	80-130	DCB	30-161
		4,4'-DDT	23-170	20	72-141		
		Aldrin	57-145	20	84-133		
		alpha-BHC	37-154	20	81-136		
		beta-BHC	51-161	20	83-132		
		delta-BHC	43-159	20	77-131		
		gamma-BHC (Lindane)	48-159	20	83-135		
		alpha-Chlordane	44-156	20	88-132		
		gamma-Chlordane	61-147	20	87-135		

Analytical	Analytical Method [a]	Matrix Spike (MS) Compounds	Laboratory Accuracy and Precision			Surrogate Compounds	Surrogate Recovery (%)
			MS/MSD [b] Recovery (%)	MS/MSD RPD [c] (%)	LCS [d] Recovery (%)		
Pesticides (cont.)	8081A	Dieldrin	41-154	20	81-129		
		Endosulfan II	52-151	20	85-132		
		Endosulfan sulfate	32-162	20	76-135		
		Endrin	31-165	20	82-134		
		Endrin aldehyde	48-152	20	85-134		
		Endrin ketone	70-141	20	87-132		
		Heptachlor	41-155	20	85-132		
		Heptachlor epoxide	44-160	20	86-132		
		Methoxychlor	44-163	20	82-137		
		Toxaphene	50-150	20	50-150		
Herbicides	8151A	2,4,5-TP (Silvex)	47-128	20	47-128	2,4-DCAA	50-130
		2,4,5-T	72-130	20	72-130		
		2,4-D	55-122	20	55-122		
Inorganics [h]	6010B	Inorganic Analyte	75-125 [i]	20 [j]	80-120	NA	NA
	6020		75-125 [i]	20 [j]	80-120	NA	NA
	7471A		75-125 [i]	20 [j]	80-120	NA	NA
	ASTM D4282-02 (free cyanide)		75-125 [i]	20 [j]	90-110	NA	NA

Notes

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990, any subsequent revisions shall supersede this information
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds
(f) Target Compound List Semivolatile Organic Compounds
(g) Limits are advisory only
(h) Target Analyte List Inorganics (metals and cyanide)
(i) Matrix spike only
(j) Laboratory duplicate RPD
NA - Not Applicable

Table 3-2 Quality Control Limits for Water Samples

Analytical	Analytical Method [a]	Matrix Spike Compounds	Laboratory Accuracy and Precision			Surrogate Compounds	Surrogate Recovery (%)
			MS/MSD [b] Recovery (%)	MS/MSD RPD [c] (%)	LCS [d] Recovery (%)		
VOCs [e]	8260B	1,1-Dichloroethane	55-139	20	55-139	Toluene-d8	83-117
		Trichloroethene	55-138	20	61-138	Bromofluorobenzene	74-123
		Benzene	85-121	20	66-125	1,2-Dichloroethane-d4	75-124
		Toluene	83-123	20	68-121		
		Chlorobenzene	85-119	20	70-122		
SVOCs [f]	8270C	Phenol	11-48	20	10-100	Nitrobenzene-d5	30-120
		2-Chlorophenol	35-99	20	41-91	2-Fluorobiphenyl	35-111
		1,4-Dichlorobenzene	49-88	20	53-91	Terphenyl-d14	26-135
		N-Nitroso-di-n-propylamine	55-127	20	54-116	Phenol-d5	30-77
		1,2,4-Trichlorobenzene	62-105	20	59-104	2-Fluorophenol	30-78
		4-Chloro-3-methylphenol	12-125	20	46-97	2,4,6-Tribromophenol	27-118
		Acenaphthene	68-99	20	63-101		
		4-Nitrophenol	10-89	20	10-78		
		2,4-Dinitrotoluene	61-99	20	67-106		
		Pentachlorophenol	39-107	20	33-100		
		Pyrene	72-112	20	64-108		
PCBs (as Aroclors)	8082	Aroclor-1016	30-150	20	65-126	TCMX	42-133
		Aroclor-1260	36-147	20	76-131	DCB	30-141
Pesticides	8081A	4,4'-DDD	55-177	20	86-134	TCMX	30-150
		4,4'-DDE	54-126	20	89-126	DCB	45-131
		4,4'-DDT	55-160	20	74-138		
		Aldrin	57-167	20	83-131		
		alpha-BHC	63-178	20	87-136		
		beta-BHC	50-150	20	88-131		
		delta-BHC	98-131	20	78-128		
		gamma-BHC (Lindane)	89-138	20	86-133		
		alpha-Chlordane	69-144	20	88-131		
		gamma-Chlordane	76-126	20	92-133		

Analytical	Analytical Method [a]	Matrix Spike Compounds	Laboratory Accuracy and Precision			Surrogate Compounds	Surrogate Recovery (%)
			MS/MSD [b] Recovery (%)	MS/MSD RPD [c] (%)	LCS [d] Recovery (%)		
Pesticides (cont.)	8081A	Dieldrin	72-136	20	81-132		
		Endosulfan I	84-127	20	91-132		
		Endosulfan II	79-138	20	90-129		
		Endosulfan sulfate	84-134	20	99-130		
		Endrin	75-143	20	87-130		
		Endrin aldehyde	62-160	20	95-133		
		Endrin ketone	87-135	20	90-130		
		Heptachlor	63-131	20	85-131		
		Heptachlor epoxide	82-125	20	89-132		
		Methoxychlor	76-161	20	88-139		
		Toxaphene	50-150	20	50-150		
Herbicides	8151A	2,4,5-TP (Silvex)	48-140	20	48-140	2,4-DCAA	45-140
		2,4,5-T	60-145	20	60-145		
		2,4-D	60-138	20	60-138		
Inorganics [h]	6010B	Inorganic Analyte	75-125 [i]	20 [j]	80-120	NA	NA
	6020		75-125 [i]	20 [j]	80-120	NA	NA
	7470A		75-125 [i]	20 [j]	80-120	NA	NA
	ASTM D4282-02 (free cyanide)		75-125 [i]	20 [j]	90-110	NA	NA

Notes

(a) Analytical Methods: USEPA SW-846, 3rd edition, Revision 1, November 1990, any subsequent revisions shall supersede this information
(b) MS/MSD = Matrix Spike/Matrix Spike Duplicate
(c) RPD = Relative Percent Difference
(d) LCS = Laboratory Control Sample
(e) Target Compound List Volatile Organic Compounds
(f) Target Compound List Semivolatile Organic Compounds
(g) Limits are advisory only
(h) Target Analyte List Inorganics (metals and cyanide)
(i) Matrix spike only
(j) Laboratory duplicate RPD
NA - Not Applicable

Table 3-3 Quality Control Limits For Air Samples

Analytical Parameter	Analytical Method [a]	Analyte Compounds	LCS [d] Recovery (%)	Duplicate RPD [c], [e] (%)	Laboratory Accuracy and Precision			
					MS/MSD [b] Recovery (%)	MS/MSD RPD [c] (%)	Surrogate Compounds	Surrogate Recovery (%)
VOCs	TO-15 Mod.	Acetone	60-140	25	NA	NA	Toluene-d8 Bromofluorobenzene 1,2-Dichloroethane-d4	70-130 70-130 70-130
		Bromodichloromethane	60-140	25				
		Butadiene, 1,3-	60-140	25				
		Carbon Disulfide	60-140	25				
		Chloro-1-Propene, -3 (Allyl Chloride)	60-140	25				
		Chlorodibromomethane	60-140	25				
		Cumene	60-140	25				
		Dichloroethylene, Trans-1,2-	60-140	25				
		Dioxane, 1,4-	60-140	25				
		Hexane	60-140	25				
		Methyl Ethyl Ketone	60-140	25				
		Methyl Isobutyl Ketone	60-140	25				
		Methyl Tert-Butyl Ether (MTBE)	60-140	25				
		Naphthalene	60-140	25				
		Propylbenzene, N-	60-140	25				
		Tribromomethane (Bromoform)	60-140	25				
		Cyclohexane	60-140	25				
		2-Hexanone	60-140	25				
		4-Ethyltoluene	60-140	25				
		Ethanol	60-140	25				
		Heptane	60-140	25				
		2-Methylpentane	60-140	25				
		Isopentane	60-140	25				
		2,3-Dimethylpentane	60-140	25				
		2,2,4-Trimethylpentane	60-140	25				
		Indene	60-140	25				
		Indan	60-140	25				
		Thiopene	60-140	25				
		2-Propanol	60-140	25				
		Tetrahydrofuran	60-140	25				

Analytical Parameter	Analytical Method [a]	Analyte Compounds	LCS [d] Recovery (%)	Duplicate RPD [c], [e] (%)	Laboratory Accuracy and Precision			
					MS/MSD [b] Recovery (%)	MS/MSD RPD [c] (%)	Surrogate Compounds	Surrogate Recovery (%)
VOCs	TO-15 Mod.	Benzene	70-130	25	NA	NA	Toluene-d8 Bromofluorobenzene 1,2-Dichloroethane-d4	70-130 70-130 70-130
		Bromomethane	70-130	25				
		Carbon Tetrachloride	70-130	25				
		Chlorobenzene	70-130	25				
		Chloroethane	70-130	25				
		Chloroform	70-130	25				
		Dibromoethane, 1,2- (Ethylene Dibromide)	70-130	25				
		Dichlorobenzene, 1,2-	70-130	25				
		Dichlorobenzene, 1,3-	70-130	25				
		Dichlorobenzene, 1,4-	70-130	25				
		Dichlorodifluoromethane (Freon 12)	70-130	25				
		Dichloroethane, 1,1-	70-130	25				
		Dichloroethane, 1,2-	70-130	25				
		Dichloroethylene, 1,1-	70-130	25				
		Dichloroethylene, Cis-1,2-	70-130	25				
		Dichloromethane (Methylene Chloride)	70-130	25				
		Dichloropropane, 1,2-	70-130	25				
		Dichloropropene, Cis-1,3-	70-130	25				
		Dichloropropene, Trans-1,3-	70-130	25				
		1,2-Dichloro-1,1,2,2,-tetrafluoroethane	70-130	25				
		Ethyl Benzene	70-130	25				
		Fluorotrichloromethane (Freon 11)	70-130	25				
		Methyl Chloride	70-130	25				
		Styrene	70-130	25				
		Tetrachloroethane, 1,1,2,2-	70-130	25				
		Tetrachloroethylene (PCE)	70-130	25				
		Toluene	70-130	25				
		Trichloro-1,2,2-Trifluoroethane, 1,1,2-	70-130	25				
		Trichlorobenzene, 1,2,4-	70-130	25				

Analytical Parameter	Analytical Method [a]	Analyte Compounds	LCS [d] Recovery (%)	Duplicate RPD [c], [e] (%)	Laboratory Accuracy and Precision			
					MS/MSD [b] Recovery (%)	MS/MSD RPD [c] (%)	Surrogate Compounds	Surrogate Recovery (%)
VOCs	TO-15 Mod.	Trichloroethane, 1,1,1- Trichloroethane, 1,1,2- Trimethylbenzene, 1,3,5- Vinyl Chloride m,p-xylene o-xylene Hexachlorobutadiene alpha-chlorotoluene	70-130 70-130 70-130 70-130 70-130 70-130 70-130 70-130	25 25 25 25 25 25 25 25	NA	NA	Toluene-d8 Bromofluorobenzene 1,2-Dichloroethane-d4	70-130 70-130 70-130
Fixed Gas	ASTM D1945 Mod.	Helium	75-125	30	NA	NA	NA	NA

Notes

(a) USEPA, 1999. Compendium Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared-Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS). January 1999.
American Society of Testing Materials, 2003. D1945-03. Standard Test Method for Analysis of Natural Gas by Gas Chromatograph, 2003.
(b) Matrix Spike/Matrix Spike Duplicate
(c) Relative Percent Difference
(d) Laboratory Control Sample
(e) Laboratory duplicate RPD
NA - Not Applicable

3.3 Accuracy

Accuracy is a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern (Taylor, 1987), or the difference between a measured value and the true or accepted reference value. The accuracy of an analytical procedure is best determined by the analysis of a sample containing a known quantity of material, and is expressed as the percent of the known quantity which is recovered or measured. The recovery of a given analyte is dependent upon the sample matrix, method of analysis, and the specific compound or element being determined. The concentration of the analyte relative to the detection limit of the analytical method is also a major factor in determining the accuracy of the measurement. Concentrations of analytes which are close to the detection limits are less accurate because they are more affected by such factors as instrument "noise". Higher concentrations will not be as affected by instrument noise or other variables and thus will be more accurate.

Sampling accuracy may be determined through the assessment of the analytical results of field blanks and trip blanks for each sample set. Analytical accuracy is typically assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks. Additionally, initial and continuing calibrations must be established and be within method control limits. Instrument and method analytical accuracy can then be determined for any sample set.

Accuracy is normally measured as the percent recovery (%R) of a known amount of analyte, called a spike, added to a sample (matrix spike) or to a blank (blank spike). The %R is calculated as follows:

$$\%R = \frac{SSR - SR}{SA} \times 100$$

where:

%R = Percent recovery
SSR = Spike sample result: concentration of analyte obtained by analyzing the sample with the spike added
SR = Sample result: the background value, i.e., the concentration of the analyte obtained by analyzing the sample
SA = Spiked analyte: concentration of the analyte spike added to the sample

The acceptance limits for accuracy for each parameter are presented in Tables 3-1, 3-2, and 3-3.

3.4 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter which is most concerned with the proper design of the sampling program (USEPA, 1987). Samples must be representative of the environmental media being sampled. Selection of sample locations and sampling procedures will incorporate consideration of obtaining the most representative sample possible.

Field and laboratory procedures will be performed in such a manner as to ensure, to the degree that is technically possible, that the data derived represents the in-place quality of the material sampled. Every effort will be made to ensure that chemical compounds will not be introduced into the sample via sample containers, handling, and analysis. Decontamination of sampling devices and digging equipment will be performed between samples as outlined in Appendix C of the RI Work Plan. Analysis of field blanks, trip

blanks, and method blanks will also be performed to monitor for potential sample contamination from field and laboratory procedures.

The assessment of representativeness also must consider the degree of heterogeneity in the material from which the samples are collected. Sampling heterogeneity will be evaluated during data validation through the analysis of coded field duplicate samples. The analytical laboratory will also follow acceptable procedures to assure the samples are adequately homogenized prior to taking aliquots for analysis, so the reported results are representative of the sample received.

Chain-of-custody procedures will be followed to document that contamination of samples has not occurred during container preparation, shipment, and sampling. Details of blank, duplicate and chain-of-custody procedures are presented in Sections 4 and 5.

3.5 Completeness

Completeness is defined as the percentage of measurements made which are judged to be valid (USEPA, 1987). The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested. Completeness is defined as follows for all sample measurements:

$$\%C = \frac{V}{T} \times 100$$

where:

%C = Percent completeness
V = Number of measurements judged valid
T = Total number of measurements

3.6 Comparability

Comparability expresses the degree of confidence with which one data set can be compared to another (USEPA, 1987). The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project
- Requiring traceability of all analytical standards and/or source materials to the USEPA or National Institute of Standards and Technology (NIST)
- Requiring that all calibrations be verified with an independently traceable standard from a source other than that used for calibration (if applicable)
- Using standard reporting units and reporting formats including the reporting of QC data
- Performing a complete data validation on all of the analytical results, including the use of data qualifiers in all cases where appropriate
- Requiring that all validation qualifiers be considered any time an analytical result is used for any purpose

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

4.0 Sampling program

4.1 Introduction

The sampling program will provide data concerning the presence and the nature and extent of contamination of groundwater, soil, soil vapor and air. This section presents sample collection procedures, sample container preparation procedures, sample preservation procedures, sample holding times, and field QC sample requirements. Sample matrices and the anticipated number of environmental and QC samples to be collected are given in Table 4-1. Actual numbers of sampling may change based on field conditions.

4.2 Sample collection

Soil, groundwater, and air samples will be collected at the Site. The location and frequency of sampling and the methods selected for field procedures and laboratory analysis are described in detail in the RI Work Plan.

4.3 Sample container preparation and sample preservation

All sample containers will be new and will meet the specifications required by the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used for sample collection. The containers will be labeled and the appropriate preservatives will be added. The container requirements are shown in Tables 4-2, 4-3, and 4-4.

Samples shall be preserved according to the preservation techniques given in Tables 4-2 through 4-4. Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in the shipping cooler, cooled to 4 ± 2 ºC with ice and delivered to the laboratory within 48 hours of collection. Chain-of-custody (COC) procedures are described in Section 5.

4.4 Sample holding times

The sample holding times for organic and inorganic parameters are given in Tables 4-2 through 4-4 and must be in accordance with the NYSDEC ASP requirements. Holding times for Toxicity Characteristic Leaching Procedure (TCLP) samples are given in Table 4-5. The NYSDEC ASP holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to National Grid.

4.5 Field quality control samples

To assess field sampling and decontamination performance, two types of "blanks" will be collected and submitted to the laboratory for analyses. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and matrix spike/matrix spike duplicates (MS/MSDs). The blanks will include the following.

- Trip Blanks – A trip blank will be prepared before the sample containers are sent by the laboratory. The trip blank will consist of a 40-ml VOA vial containing distilled, deionized water, which accompanies the other water sample bottles into the field and back to the laboratory. A trip blank will be included with each shipment of water samples for volatiles analysis. The trip blank will be analyzed for volatile organic compounds to assess any contamination from sampling, transport, storage, and internal laboratory procedures.

- Rinseate Blanks – Rinseate blanks will be taken at a minimum frequency of one per 20 field samples per sample matrix. Rinseate blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. It is a sample of reagent water provided by the laboratory that has passed through a decontaminated bailer or other sampling apparatus. It is usually collected as a last step in the decontamination procedure, prior to taking an environmental sample. The rinseate blank may be analyzed for all or some of the parameters of interest.

The duplicates collected to assess field/laboratory precision will consist of the following.

- Coded Field Duplicate – To determine the representativeness of the sampling methods, coded field duplicates will be collected. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are field duplicate samples. This will eliminate any possible bias that could arise. Field duplicates will be taken at a minimum frequency of one per 20 field samples per sample matrix.

- Matrix Spike/Matrix Spike Duplicate (MS/MSD) – MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be collected at a frequency of one pair per 20 field samples. MS/MSD samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes. The advisory acceptance limits for MS/MSD %R and RPDs are given in Tables 3-1 and 3-2.

Table 4-1 Summary of Samples and Analyses

Matrix [a]	Parameter	Analytical Method	Field Samples				QC Blanks		Total
			Field Samples	Field Duplicate	MS/MSD[b] (Total)	Sub-Total	Trip Blank	Rinse Blank	
Surface Soil Samples	VOCs	EPA SW 8260B (NY ASP OLM04.2)	18	-	-	18	-	-	18
	TCL VOCs + 10	EPA SW 8260B (NY ASP OLM04.2)	4	1	1	6	1	1	8
	SVOCs	EPA SW 8270C (NY ASP OLM04.2)	18	-	-	18	-	-	18
	TCL SVOCs + 20	EPA SW 8270C (NY ASP OLM04.2)	4	1	1	6	-	1	7
	Free Cyanide	ASTM Method D4282-02 (Microdiffusion) (extraction by EPA Method 9013A)	22	1	1	24	-	1	25
	RCRA 8 Metals	EPA SW 6010B/6020/7471A Series (NY ASP ILM04.1)	18	-	-	18	-	-	18
	TAL Metals	EPA SW 6010B/6020/7471A Series (NY ASP ILM04.1)	4	1	1	6	-	1	7
	PCBs (as Aroclors)	EPA SW 8082 (NY ASP Category B)	4	1	1	6	-	1	7
	Pesticides	EPA SW 8081A (NY ASP Category B)	4	1	1	6	-	1	7
	Herbicides	EPA SW 8151A (NY ASP Category B)	4	1	1	6	-	1	7
Subsurface Soil Samples	VOCs	EPA SW 8260B (NY ASP OLM04.2)	33	1	1	35	2	1	38
	TCL VOCs + 10	EPA SW 8260B (NY ASP OLM04.2)	8	1	1	10	1	1	12
	SVOCs	EPA SW 8270C (NY ASP OLM04.2)	33	1	1	35	-	1	36
	TCL SVOCs + 20	EPA SW 8270C (NY ASP OLM04.2)	8	1	1	10	-	1	11
	Free Cyanide	ASTM Method D4282-02 (Microdiffusion) (extraction by EPA Method 9013A)	41	2	2	45	-	2	47
	RCRA 8 Metals	EPA SW 6010B/6020/7471A Series (NY ASP ILM04.1)	33	1	1	35	-	1	36
	TAL Metals	EPA SW 6010B/6020/7471A Series (NY ASP ILM04.1)	8	1	1	10	-	1	11
	PCBs (as Aroclors)	EPA SW 8082 (NY ASP Category B)	8	1	1	10	-	1	11
	Pesticides	EPA SW 8081A (NY ASP Category B)	8	1	1	10	-	1	11
	Herbicides	EPA SW 8151A (NY ASP Category B)	8	1	1	10	-	1	11
Groundwater Samples	VOCs	EPA SW 8260B (NY ASP OLM04.2)	13	-	-	13	-	-	13
	TCL VOCs + 10	EPA SW 8260B (NY ASP OLM04.2)	7	1	1	9	1	1	11
	SVOCs	EPA SW 8270C (NY ASP OLM04.2)	13	-	-	13	-	-	13
	TCL SVOCs + 20	EPA SW 8270C (NY ASP OLM04.2)	7	1	1	9	-	1	10

Matrix [a]	Parameter	Analytical Method	Field Samples				QC Blanks		Total
			Field Samples	Field Duplicate	MS/MSD[b] (Total)	Sub-Total	Trip Blank	Rinse Blank	
Groundwater Samples (cont.)	Free Cyanide	ASTM Method D4282-02 (Microdiffusion) (extraction by EPA Method 9013A)	20	1	1	22	-	1	23
	RCRA 8 Metals	EPA SW 6010B/6020/7470A Series (NY ASP ILM04.1)	13	-	-	13	-	-	13
	TAL Metals	EPA SW 6010B/6020/7470A Series (NY ASP ILM04.1)	7	1	1	9	-	1	10
	PCBs (as Aroclors)	EPA SW 8082 (NY ASP Category B)	7	1	1	9	-	1	10
	Pesticides	EPA SW 8081A (NY ASP Category B)	7	1	1	9	-	1	10
	Herbicides	EPA SW 8151A (NY ASP Category B)	7	1	1	9	-	1	10
Soil Gas Samples	VOCs + Naphthalene	EPA TO-15	4	1	-	5	-	1	6
Indoor Air Samples	VOCs + Naphthalene	EPA TO-15	4	-	-	4	-	-	4
Ambient Air Samples	VOCs + Naphthalene	EPA TO-15	1	-	-	1	-	-	1
Waste Characterization (solids)	TCLP VOCs	EPA SW 1311/8260B (NY ASP OLM04.2)	5	-	-	5	-	-	5
	TCLP SVOCs	EPA SW 1311/8270C (NY ASP OLM04.2)	5	-	-	5	-	-	5
	TCLP Metals	EPA SW 1311/6010B/7470A (NY ASP ILM04.1)	5	-	-	5	-	-	5
	Total PCBs	EPA SW 8082 (NY ASP Category B)	5	-	-	5	-	-	5
	Total Petroleum Hydrocarbons	DRO: EPA SW 8015 modified GRO: EPA SW 8015 modified	5	-	-	5	-	-	5
	Corrosivity	EPA SW Method 9045C	5	-	-	5	-	-	5
	Ignitability	EPA SW Method 1010A	5	-	-	5	-	-	5
	Reactive Cyanide and Sulfide	EPA SW Chapter 7, Sections 7.3.3.2 and 7.3.4.2	5	-	-	5	-	-	5
	Total Organic Halogens	EPA SW Method 9020B	5	-	-	5	-	-	5

Notes

TCL - Target Compound List

TAL - Target Analyte List

TCLP – Toxicity Characteristic Leaching Procedure

(a) Number of samples is approximate and for information purposes only.

(b) Matrix spike / matrix spike duplicate for organic analyses; matrix spike and laboratory duplicate for inorganic analysis.

Table 4-2 Soil and Waste Sample Containerization and Holding Times

Analysis	Bottle Type	Preservation [(a)]	Holding Time [(b)]
Volatile Organic Compounds (VOCs)	Wide-mouth glass w/ Teflon lined cap	Cool to 4ºC	10 days
Extractable Organic Compounds [(c)]	Wide-mouth glass w/ Teflon lined cap	Cool to 4ºC	10 days*
Metals	Wide-mouth plastic or glass	Cool to 4ºC	6 months, except mercury (26 days)
Cyanide	Wide-mouth plastic	Cool to 4ºC	10 days
TCLP Organic Compounds	Wide-mouth glass w/ Teflon lined cap	Cool to 4ºC	See Table 4-5
TCLP Metals	Wide-mouth plastic or glass	Cool to 4ºC	See Table 4-5
Total Petroleum Hydrocarbons (TPH)	DRO: Clear glass GRO: Clear glass	DRO: Cool to 4°C GRO: Cool to 4°C	DRO: 7 days to extraction/40 days to analysis GRO: 14 days
Corrosivity	Clear glass	None	Analyze ASAP
Ignitability	Clear glass	None	Analyze ASAP
Reactive Cyanide and Sulfide	Clear glass	None	Analyze ASAP
Total Organic Halogens	Amber glass	pH < 2 with H_2SO_4, Cool to 4°C, Dark	28 days

Notes
(a) All samples to be preserved with ice during collection and transport
(b) Days from verified time of sample receipt (VTSR).
(c) Semivolatile organic compounds, PCBs, pesticides, herbicides.

* Sohxlet or sonication procedures for extraction and concentration of soil/waste samples for SVOCs must be completed within 5 days of VTSR. Sohxlet or sonication procedures for extraction and concentration of soil/sediment/waste samples for PCBs must be completed within 5 days of VTSR. Extracts of soil samples must be analyzed within 40 days of extraction.

Table 4-3 Water Sample Containerization and Holding Times

Analysis	Bottle Type	Preservation [(a)]	Holding Time [(b)]
Volatile Organic Compounds (VOCs)	(2) 40 mL glass vial with Teflon septum	Cool to 4ºC	10 days
Extractable Organic Compounds [(c)]	1000 mL glass w/ Teflon-lined cap	Cool to 4ºC	5 days*
Metals	1000 mL plastic bottle	Nitric Acid to pH < 2 Cool to 4ºC	6 months, except mercury (26 days)
Cyanide	500 mL plastic bottle	NaOH to pH > 12 Cool to 4ºC	10 days

Notes

(a) All samples to be preserved in ice during collection and transport.

(b) Days from validated time of sample receipt (VTSR)

(c) Semivolatile organic compounds, PCBs, pesticides, herbicides

* Continuous liquid-liquid extraction is the required extraction for water samples for SVOCs. Continuous liquid-liquid extraction and concentration of water samples for SVOC analysis must begin within 5 days and be completed within 7 days of VTSR. Extracts of water samples must be analyzed within 40 days of extraction.

Table 4-4 Soil Gas, Indoor, and Ambient Air Sample Containerization and Holding Times

Analysis	Bottle Type	Preservation	Holding Time [(b)]
Volatile Organic Compounds (VOCs)	6 L Summa® canister [(a)]	NA	30 days
Fixed Gases (Helium)	6 L Summa® canister [(a)]	NA	30 days

Notes

(a) Stainless steel SUMMA® canisters must be certified clean by the laboratory using TO-15 § 8.4.1. The canisters will be delivered to the field with a pressure of 28-30" Hg. Canisters received with a vacuum pressure less than 25" Hg will not be used.

(b) Days from date of sample collection. The holding time for the TO-15 analysis is 30 days. The holding time for an evacuated canister is 30 days. After 30 days, unused canisters must be exchanged for recently cleaned canisters.

Table 4-5 TCLP[(a)] Sample Holding Times

Analytical Parameter	From: Sample Collection To: TCLP Extraction*	From: TCLP Extraction To: Preparative Extraction	From: Preparative Extraction To: Determinative Analysis
Volatiles	7 days	NA	7 days
Semivolatiles	5 days	7 days	40 days
PCBs (as Aroclors)	5 days	7 days	40 days
Mercury	5 days	NA	28 days
Metals (except Mercury)	180 days	NA	180 days

Notes:

NA - Not Applicable.

(a) Toxicity Characteristic Leaching Procedure.

*Times shown are from verified time of sample receipt (VSTR).

5.0 Sample tracking and custody

5.1 Introduction

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples collected in the field is the responsibility of field personnel. Both laboratory and field personnel involved in collection and transfer of samples will be trained as to the purpose and procedures for sample custody prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 5-1. A sample is considered to be in a person's custody if the sample is:

- In a person's possession
- Maintained in view after possession is accepted and documented
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody
- In a secured area which is restricted to authorized personnel

5.2 Field sample custody

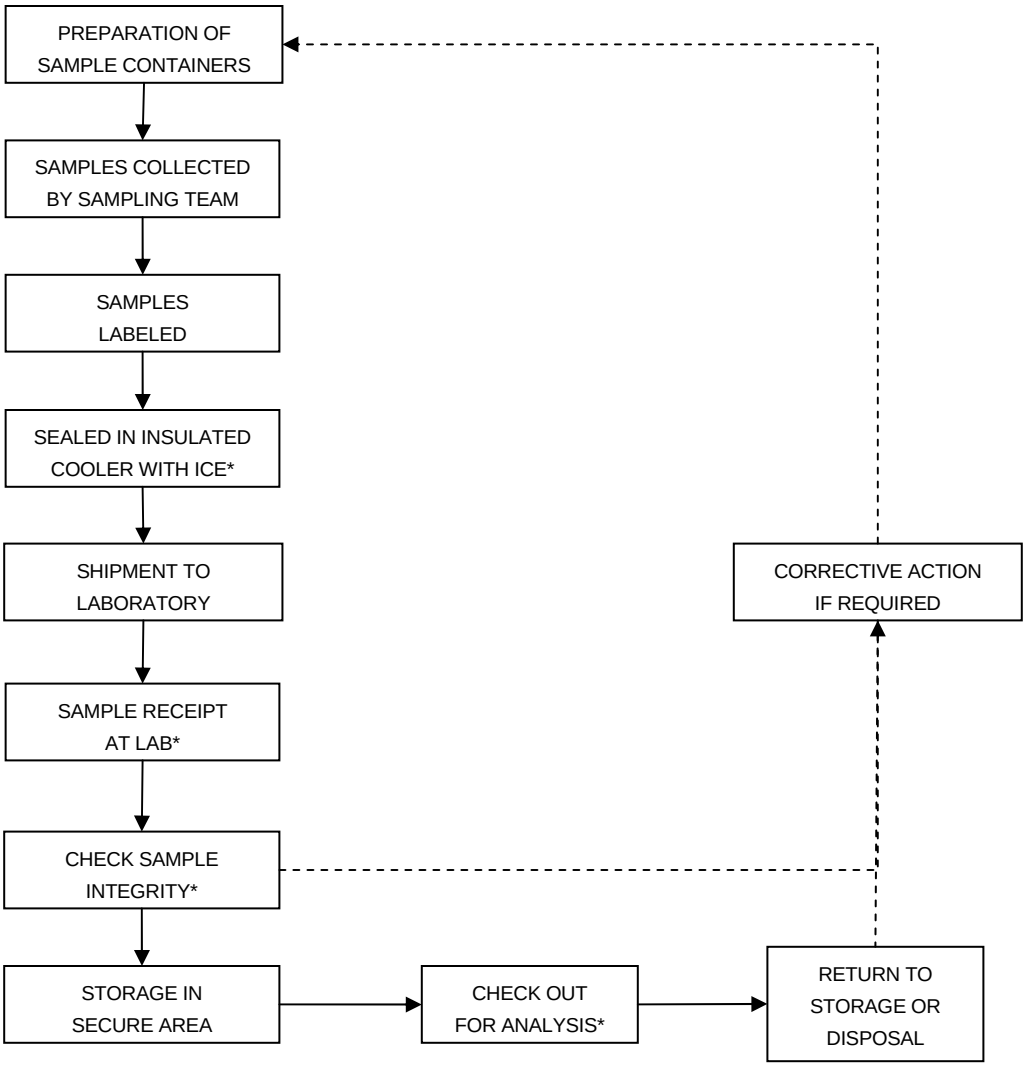
A COC record (Figure 5-2 or similar) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample collection and preservation, and during the return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

The COC lists the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent, and the method of sample shipment. The COC also lists a unique description of every sample bottle in the set. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample.

The REMARKS space on the COC is used to indicate if the sample is a matrix spike, matrix spike duplicate, or any other sample information for the laboratory. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first **RELINQUISHED BY** space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper airbill number on the top of the COC. Errors in field records will be crossed out with a single line in ink and initialed by the author.

One copy of the COC is retained by sampling personnel and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier. The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the sample will not be analyzed.

Figure 5-1 Sample Custody Flowdown



*Requires Sign-Off On Chain-Of-Custody.

Figure 5-2 Chain-Of-Custody Record

CHAIN OF CUSTODY RECORD

Client Name | Purchase Order | Analyses Requested | Turnaround Time | Compliance Monitoring

Address | Phone/Fax #

City | State | Zip | Report Attention:

Sampled by: | Signature:

Standard: Other: ____ ____

Rush: 24 Hr ____ 48 Hr ____

Yes: ____

No: ____

Lab Use Only Sub-Sample pH <2 >12

Date Sampled	Time Sampled	Sample Type *	Sample Identification	Preservative* See Key Below	Number of Containers									Remarks

	Signature	Print Name	Company	Date	Time
Relinquished By:					
Received By:					
Relinquished By:					
Received By:					
Relinquished By:					
Received By Laboratory:					

Custody Seal Intact
Yes ____ No ____ None ____

Sample Temperature

Degrees C _____

Samples are discarded 30 days after results are reported unless other arrangements are made. Hazarcous samples will be returned to client or disposed of at client expense. The analytical results associated with this COC apply only to the samples as they are received by the laboratory. The liability of the laboratory is limited to the amount paid for the report.

Terms: Net thirty days on approved credit.

** KEY:* Sample Type: 1=Drinking Water, 2=Surface Water, 3=Ground Water, 4=Waste Water, 5=Soil, 6=RCRA, 7=Other
Preservative: 1=NaOH, 2=NaOH + ZnOAC, 3=HNO3, 4=H2SO4, 5=Na2S2O3, 6=None, 7=Other

SEM COC Form Revised 02/01

5.3 Laboratory sample custody

The Project Manager or Field Team Leader will notify the laboratory of upcoming field sampling activities and the subsequent shipment of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples and for maintaining all associated records documenting that custody.
- Upon receipt of the samples, the custodian will check cooler temperature, and check the original COC documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.
- Care will be exercised to annotate any labeling or descriptive errors. In the event of documentation or sample integrity issues, the laboratory will immediately contact the Project Manager or Field Team Leader as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming COC procedure.
- The soil, water, and air samples will be stored in a secured area until analyses commence, at a temperature of approximately 4 ± 2 ˚C if required.
- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.

A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

6.0 Calibration procedures

6.1 Field instruments

All field analytical equipment will be calibrated immediately prior to each day's use. The calibration procedures will conform to manufacturer's standard instructions and are described in the Appendix C of RI Work Plan. This calibration will ensure that the equipment is functioning within the allowable tolerances established by the manufacturer and required by the project. Records of all instrument calibration will be maintained by the Field Team Leader. Copies of all the instrument manuals will be maintained onsite by the Field Team Leader.

Calibration procedures for instruments used for monitoring health and safety hazards (e.g., photoionization detector [PID] and explosimeter) are provided in the HASP. More frequent calibration may be needed depending on conditions encountered in the field.

6.2 Laboratory instruments

The laboratory will follow all calibration procedures and schedules as specified in the sections of the USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods given in Section 7.

7.0 Analytical procedures

7.1 Introduction

Soil, water, and waste samples will be analyzed according to the USEPA SW-846 "*Test Methods for Evaluating Solid Waste*," November 1986, 3rd edition and subsequent updates. Air and soil gas samples will be analyzed according to the USEPA Compendium Method TO-15, *Determination of VOCs in Air Collected in Specially Prepared-Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS)*, January 1999 and helium (fixed gas) analyses will be performed using American Society for Testing Materials (ASTM), Method 1945 modified. The methods to be used for the laboratory analysis of water and soil samples are presented in Tables 7-1 and 7-2. The soil gas and ambient air samples will be analyzed by USEPA Method TO-15 as presented in Table 7-3. These methods were selected because they attain the quantitation limits and DQOs required by the project, which are compiled on Tables 7-1 through 7-3.

Table 7-1 Project Quantitation Limits for Soil and Water

CAS No.	Analysis/Compound	Method	Quantitation Limits		State of New York Standards	
			Water (µg/L)	Soil (µg/kg)	Water [(a)] (µg/L)	Soil [(b)] (µg/kg)
Volatile Organics						
71-55-6	1,1,1-Trichloroethane	SW8260B	5	5	5	800
79-34-5	1,1,2,2-Tetrachloroethane	SW8260B	5	5	5	600
79-00-5	1,1,2-Trichloroethane	SW8260B	5	5	1	
76-13-1	1,1,2-Trichlorotrifluoroethane	SW8260B	5	5	5	
75-34-3	1,1-Dichloroethane	SW8260B	5	5	5	200
75-35-4	1,1-Dichloroethene	SW8260B	5	5	5	400
120-82-1	1,2,4-Trichlorobenzene	SW8260B	5	5	5	3400
96-12-8	1,2-Dibromo-3-Chloropropane	SW8260B	5	5	0.04	
106-93-4	1,2-Dibromoethane	SW8260B	5	5	0.0006	
95-50-1	1,2-Dichlorobenzene	SW8260B	5	5	3	7900
107-06-2	1,2-Dichloroethane	SW8260B	5	5	0.6	100
78-87-5	1,2-Dichloropropane	SW8260B	5	5	1	
541-73-1	1,3-Dichlorobenzene	SW8260B	5	5	3	1600
106-46-7	1,4-Dichlorobenzene	SW8260B	5	5	3	8500
78-93-3	2-Butanone	SW8260B	25	25	50	300
591-78-6	2-Hexanone	SW8260B	25	25	50	
108-10-1	4-Methyl-2-Pentanone	SW8260B	25	25		1000
67-64-1	Acetone	SW8260B	25	25	50	200
71-43-2	Benzene	SW8260B	5	5	1	60
75-27-4	Bromodichloromethane	SW8260B	5	5	50	
75-25-2	Bromoform	SW8260B	5	5	50	
74-83-9	Bromomethane	SW8260B	5	5	5	
75-15-0	Carbon Disulfide	SW8260B	5	5		2700
56-23-5	Carbon Tetrachloride	SW8260B	5	5	5	600
108-90-7	Chlorobenzene	SW8260B	5	5	5	1700
75-00-3	Chloroethane	SW8260B	5	5	5	1900
67-66-3	Chloroform	SW8260B	5	5	7	300
74-87-3	Chloromethane	SW8260B	5	5	5	
156-59-2	cis-1,2-Dichloroethene	SW8260B	5	5	5	
10061-01-5	cis-1,3-Dichloropropene	SW8260B	5	5	0.4	
110-82-7	Cyclohexane	SW8260B	5	5		
124-48-1	Dibromochloromethane	SW8260B	5	5	50	
75-71-8	Dichlorodifluoromethane	SW8260B	5	5	5	
100-41-4	Ethyl Benzene	SW8260B	5	5	5	5500
98-82-8	Isopropylbenzene	SW8260B	5	5	5	
79-20-9	Methyl Acetate	SW8260B	5	5		
1634-04-4	Methyl tert-butyl Ether	SW8260B	5	5		
108-87-2	Methylcyclohexane	SW8260B	5	5		
75-09-2	Methylene Chloride	SW8260B	5	5	5	100
100-42-5	Styrene	SW8260B	5	5	930	
10061-02-6	t-1,3-Dichloropropene	SW8260B	5	5	0.4	
127-18-4	Tetrachloroethene	SW8260B	5	5	5	1400
108-88-3	Toluene	SW8260B	5	5	5	1500
156-60-5	trans-1,2-Dichloroethene	SW8260B	5	5	5	300
79-01-6	Trichloroethene	SW8260B	5	5	5	700
75-69-4	Trichlorofluoromethane	SW8260B	5	5	5	

CAS No.	Analysis/Compound	Method	Quantitation Limits		State of New York Standards	
			Water (µg/L)	Soil (µg/kg)	Water [(a)] (µg/L)	Soil [(b)] (µg/kg)
Volatile Organics (continued)						
75-01-4	Vinyl Chloride	SW8260B	5	5	2	200
136777-61-2	m/p-Xylenes	SW8260B	10	10	5	1200
95-47-6	o-Xylene	SW8260B	5	5	5	
Semivolatile Organics						
92-52-4	1',1-Biphenyl	SW8270C	10	330	5	
108-60-1	2,2'-oxybis(1-Chloropropane)	SW8270C	10	330	5	
95-95-4	2,4,5-Trichlorophenol	SW8270C	10	330		100
88-06-2	2,4,6-Trichlorophenol	SW8270C	10	330		
120-83-2	2,4-Dichlorophenol	SW8270C	10	330		400
105-67-9	2,4-Dimethylphenol	SW8270C	10	330		
51-28-5	2,4-Dinitrophenol	SW8270C	10	330		200
121-14-2	2,4-Dinitrotoluene	SW8270C	10	330	5	
606-20-2	2,6-Dinitrotoluene	SW8270C	10	330	5	1000
91-58-7	2-Chloronaphthalene	SW8270C	10	330	10	
95-57-8	2-Chlorophenol	SW8270C	10	330		800
91-57-6	2-Methylnaphthalene	SW8270C	10	330		36400
95-48-7	2-Methylphenol	SW8270C	10	330		100
88-74-4	2-Nitroaniline	SW8270C	10	330	5	430
88-75-5	2-Nitrophenol	SW8270C	10	330		330
91-94-1	3,3'-Dichlorobenzidine	SW8270C	10	330	5	n/a
65794-96-9	3+4-Methylphenols	SW8270C	10	330		900
99-09-2	3-Nitroaniline	SW8270C	10	330	5	500
534-52-1	4,6-Dinitro-2-methylphenol	SW8270C	10	330		
101-55-3	4-Bromophenyl-phenyl ether	SW8270C	10	330		
59-50-7	4-Chloro-3-methylphenol	SW8270C	10	330		240
106-47-8	4-Chloroaniline	SW8270C	10	330	5	220
7005-72-3	4-Chlorophenyl-phenyl ether	SW8270C	10	330		
100-01-6	4-Nitroaniline	SW8270C	10	330	5	
100-02-7	4-Nitrophenol	SW8270C	10	330		100
83-32-9	Acenaphthene	SW8270C	10	330	20	50000
208-96-8	Acenaphthylene	SW8270C	10	330		41000
98-86-2	Acetophenone	SW8270C	10	330		
120-12-7	Anthracene	SW8270C	10	330	50	50000
1912-24-9	Atrazine	SW8270C	10	330	7.5	
56-55-3	Benzo(a)anthracene	SW8270C	10	330	0.002	224
50-32-8	Benzo(a)pyrene	SW8270C	10	330	ND	61
205-99-2	Benzo(b)fluoranthene	SW8270C	10	330	0.002	1100
191-24-2	Benzo(g,h,i)perylene	SW8270C	10	330		50000
207-08-9	Benzo(k)fluoranthene	SW8270C	10	330	0.002	1100
100-52-7	Benzaldehyde	SW8270C	10	330		
111-91-1	bis(2-Chloroethoxy)methane	SW8270C	10	330	5	
111-44-4	bis(2-Chloroethyl)ether	SW8270C	10	330	1	
117-81-7	bis(2-Ethylhexyl)phthalate	SW8270C	10	330	5	50000
85-68-7	Butylbenzylphthalate	SW8270C	10	330	50	50000
105-60-2	Caprolactam	SW8270C	10	330		
86-74-8	Carbazole	SW8270C	10	330		
218-01-9	Chrysene	SW8270C	10	330	0.002	400
53-70-3	Dibenzo(a,h)anthracene	SW8270C	10	330		14

CAS No.	Analysis/Compound	Method	Quantitation Limits		State of New York Standards	
			Water (µg/L)	Soil (µg/kg)	Water [a] (µg/L)	Soil [b] (µg/kg)
Semivolatile Organics (continued)						
132-64-9	Dibenzofuran	SW8270C	10	330		6200
84-66-2	Diethylphthalate	SW8270C	10	330	50	7100
131-11-3	Dimethylphthalate	SW8270C	10	330	50	2000
84-74-2	Di-n-butylphthalate	SW8270C	10	330	50	8100
117-84-0	Di-n-octyl phthalate	SW8270C	10	330	50	50000
206-44-0	Fluoranthene	SW8270C	10	330	50	50000
86-73-7	Fluorene	SW8270C	10	330	50	50000
118-74-1	Hexachlorobenzene	SW8270C	10	330	0.04	410
87-68-3	Hexachlorobutadiene	SW8270C	10	330	0.5	
77-47-4	Hexachlorocyclopentadiene	SW8270C	10	330	5	
67-72-1	Hexachloroethane	SW8270C	10	330	5	
193-39-5	Indeno(1,2,3-cd)pyrene	SW8270C	10	330	0.002	3200
78-59-1	Isophorone	SW8270C	10	330	50	4400
91-20-3	Naphthalene	SW8270C	10	330	10	13000
98-95-3	Nitrobenzene	SW8270C	10	330	0.4	200
621-64-7	N-Nitroso-di-n-propylamine	SW8270C	10	330		
86-30-6	N-Nitrosodiphenylamine	SW8270C	10	330	50	
87-86-5	Pentachlorophenol	SW8270C	10	330		1000
85-01-8	Phenanthrene	SW8270C	10	330	50	50000
108-95-2	Phenol	SW8270C	10	330		30
129-00-0	Pyrene	SW8270C	10	330	50	50000
Metals						
7429-90-5	Aluminum	6010B / 6020	50	5000	2000	SB
7440-36-0	Antimony	6010B / 6020	25	2500	6	SB
7440-38-2	Arsenic	6010B / 6020	10	1000	50	7500
7440-39-3	Barium	6010B / 6020	50	5000	2000	300000
7440-41-7	Beryllium	6010B / 6020	3	300	3	160
7440-43-9	Cadmium	6010B / 6020	3	300	5	1000
7440-70-2	Calcium	6010B / 6020	1000	100000		SB
7440-47-3	Chromium	6010B / 6020	5	500	100	10000
7440-48-4	Cobalt	6010B / 6020	15	1500	5	30000
7440-50-8	Copper	6010B / 6020	10	1000	1000	25000
7439-89-6	Iron	6010B / 6020	50	5000	600	2000000
7439-92-1	Lead	6010B / 6020	6	600	50	400 [c]
7439-95-4	Magnesium	6010B / 6020	1000	100000	35000	SB
7439-96-5	Manganese	6010B / 6020	10	1000	600	SB
7440-02-0	Nickel	6010B / 6020	20	2000	200	13000
7440-09-7	Potassium	6010B / 6020	1000	100000		SB
7782-49-2	Selenium	6010B / 6020	10	1000	20	2000
7440-22-4	Silver	6010B / 6020	5	500	100	SB
7440-23-5	Sodium	6010B / 6020	1000	100000		SB
7440-28-0	Thallium	6010B / 6020	20	2000	0.5	SB
7440-62-2	Vanadium	6010B / 6020	20	2000		150000
7440-66-6	Zinc	6010B / 6020	20	2000	5000	20000
7439-97-6	Mercury	7471A	0.2	10	1.4	100
Inorganics						
n/a	Cyanide, Free	ASTM D4282-02 / 9013A	10	60		

CAS No.	Analysis/Compound	Method	Quantitation Limits		State of New York Standards	
			Water (µg/L)	Soil (µg/kg)	Water [(a)] (µg/L)	Soil [(b)] (µg/kg)
Pesticides						
72-54-8	4,4'-DDD	8081	0.05	1.7	0.3	2900
72-55-9	4,4'-DDE	8081	0.05	1.7	0.2	2100
50-29-3	4,4'-DDT	8081	0.2	1.7	0.2	2100
309-00-2	Aldrin	8081	0.05	1.7	ND	41
319-84-6	alpha-BHC	8081	0.05	1.7	0.01	110
319-85-7	beta-BHC	8081	0.2	1.7	0.04	200
319-86-8	delta-BHC	8081	0.05	1.7	0.04	300
58-89-9	gamma-BHC (Lindane)	8081	0.05	1.7	0.05	60
5103-71-9	alpha-Chlordane	8081	0.05	1.7		540
5566-34-7	gamma-Chlordane	8081	0.05	1.7		540
57-74-9	Chlordane	8081	0.5	17	0.05	540
60-57-1	Dieldrin	8081	0.05	1.7	0.004	44
959-98-8	Endosulfan I	8081	0.05	1.7		900
33213-65-9	Endosulfan II	8081	0.05	1.7		900
1031-07-8	Endosulfan sulfate	8081	0.05	1.7		1000
72-20-8	Endrin	8081	0.05	1.7	ND	100
7421-93-4	Endrin aldehyde	8081	0.05	1.7	5	
53494-70-5	Endrin ketone	8081	0.05	1.7	5	
76-44-8	Heptachlor	8081	0.05	1.7	0.04	100
1024-57-3	Heptachlor epoxide	8081	0.05	1.7	0.03	20
72-43-5	Methoxychlor	8081	0.05	1.7	35	
8001-35-2	Toxaphene	8081	0.5	17	0.06	
PCB's						
12674-11-2	Aroclor-1016	8082	0.5	17	0.09* Applies to the sum of the PCBs	1000 (total surface soil) 10000 (total subsurface soil)
11104-28-2	Aroclor-1221	8082	0.5	17		
11141-16-5	Aroclor-1232	8082	0.5	17		
53469-21-9	Aroclor-1242	8082	0.5	17		
12672-29-6	Aroclor-1248	8082	0.5	17		
11097-69-1	Aroclor-1254	8082	0.5	17		
11096-82-5	Aroclor-1260	8082	0.5	17		
37324-23-5	Aroclor-1262	8082	0.5	17		
11100-14-4	Aroclor-1268	8082	0.5	17		
Herbicides						
93-72-1	2,4,5-TP (Silvex)	8151	2	67	0.26	700
n/a	2,4,5-T	8151	2	67		1900
n/a	2,4-D	8151	2	67		500
94-80-4	2,4-DB	8151	2	67		

Notes:

N/A - Not Applicable

SB - soil background

ND - not detected

(a) - Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations, NYSDEC, October 1993, reissued June 1998

(b) - Determination of Soil Cleanup Objectives and Cleanup Levels, NYSDEC, January 24, 1994

(c) - EPA Guidance on Residential Lead-Based Paint, Lead Contaminated Dust, and Lead Contaminated Soil, July 14, 1994

Table 7-2 Practical Quantitation Limits (PQLs) for TCLP

Compound	SW-846 Analysis	Water (µg/L)
TCLP Volatile Organic Compounds		
Benzene	1311 / 8260B	25
Carbon Tetrachloride	1311 / 8260B	25
Chloroform	1311 / 8260B	25
1,2-Dichloroethane	1311 / 8260B	25
1,1-Dichloroethene	1311 / 8260B	25
2-Butanone	1311 / 8260B	125
Tetrachloroethene	1311 / 8260B	25
Trichloroethene	1311 / 8260B	25
Vinyl Chloride	1311 / 8260B	25
TCLP Semivolatile Organic Compounds		
2-Methylphenol	1311 / 3510 / 8270B	10
3 & 4-Methylphenol	1311 / 3510 / 8270B	10
1,4-Dichlorobenzene	1311 / 3510 / 8270B	10
2,4-Dinitrotoluene	1311 / 3510 / 8270B	10
Hexachlorobutadiene	1311 / 3510 / 8270B	10
Hexachloroethane	1311 / 3510 / 8270B	10
Hexachlorobenzene	1311 / 3510 / 8270B	10
Nitrobenzene	1311 / 3510 / 8270B	10
Pentachlorophenol	1311 / 3510 / 8270B	10
Pyridine	1311 / 3510 / 8270B	10
2,4,5-Trichlorophenol	1311 / 3510 / 8270B	10
2,4,6-Trichlorophenol	1311 / 3510 / 8270B	10
TCLP Metals		
Arsenic	1311 / 3010 / 6010B	10
Barium	1311 / 3010 / 6010B	50
Cadmium	1311 / 3010 / 6010B	3
Chromium	1311 / 3010 / 6010B	5
Lead	1311 / 3010 / 6010B	6
Selenium	1311 / 3010 / 6010B	10
Silver	1311 / 3010 / 6010B	5
Mercury	7470A	0.2
TCLP Pesticides		
Chlordane	1311 / 8081A	0.5
Endrin	1311 / 8081A	0.05
Heptachlor (and its hydroxide)	1311 / 8081A	0.05
Lindane	1311 / 8081A	0.05
Methoxychlor	1311 / 8081A	0.05
Toxaphene	1311 / 8081A	0.5
TCLP Pesticides		
2,4-D	1311 / 8151A	2
2,4,5-TP Silvex	1311 / 8151A	2

Notes:
ND - Not Determined

Table 7-3 Project Quantitation Limits for Air

Analysis / Compound	Method	Quantitation Limits Soil Gas/Air ($\mu g/M^3$)
Fixed Gases		
Helium	ASTM D1945 mod.	16360 (0.01%)
Volatile Organics [1]		
Freon 12	TO-15 Mod.	0.81
Freon 114	TO-15 Mod.	1.14
Chloromethane	TO-15 Mod.	0.34
Vinyl Chloride	TO-15 Mod.	0.42
Bromomethane	TO-15 Mod.	0.63
Chloroethane	TO-15 Mod.	0.43
Freon 11	TO-15 Mod.	0.92
1,1-Dichloroethene	TO-15 Mod.	0.64
Freon 113	TO-15 Mod.	1.26
Methylene Chloride	TO-15 Mod.	0.56
1,1-Dichloroethane	TO-15 Mod.	0.66
cis-1,2-Dichloroethene	TO-15 Mod.	0.64
Chloroform	TO-15 Mod.	0.81
1,1,1-Trichloroethane	TO-15 Mod.	0.89
Carbon Tetrachloride	TO-15 Mod.	1.03
Benzene	TO-15 Mod.	0.52
1,2-Dichloroethane	TO-15 Mod.	0.66
Trichloroethene	TO-15 Mod.	0.89
1,2-Dichloropropane	TO-15 Mod.	0.76
cis-1,3-Dichloropropene	TO-15 Mod.	0.74
Toluene	TO-15 Mod.	0.61
trans-1,3-Dichloropropene	TO-15 Mod.	0.74
1,1,2-Trichloroethane	TO-15 Mod.	0.89
Tetrachloroethene	TO-15 Mod.	1.11
1,2-Dibromoethane (EDB)	TO-15 Mod.	1.26
Chlorobenzene	TO-15 Mod.	0.76
Ethyl Benzene	TO-15 Mod.	0.71
m,p-Xylene	TO-15 Mod.	0.71
o-Xylene	TO-15 Mod.	0.71
Styrene	TO-15 Mod.	0.69
1,1,2,2-Tetrachloroethane	TO-15 Mod.	1.13
1,3,5-Trimethylbenzene	TO-15 Mod.	0.81
1,2,4-Trimethylbenzene	TO-15 Mod.	0.81
1,3-Dichlorobenzene	TO-15 Mod.	0.98
1,4-Dichlorobenzene	TO-15 Mod.	0.98
alpha-Chlorotoluene	TO-15 Mod.	0.85
1,2-Dichlorobenzene	TO-15 Mod.	0.98
1,2,4-Trichlorobenzene	TO-15 Mod.	6.12
Hexachlorobutadiene	TO-15 Mod.	8.69
Propylene	TO-15 Mod.	1.4
1,3-Butadiene	TO-15 Mod.	1.77

Analysis / Compound	Method	Quantitation Limits Soil Gas/Air ($\mu g/M^3$)
Acetone	TO-15 Mod.	1.93
Carbon Disulfide	TO-15 Mod.	2.58
trans-1,2-Dichloroethene	TO-15 Mod.	3.22
2-Butanone (MEK)	TO-15 Mod.	2.42
Hexane	TO-15 Mod.	2.9
Tetrahydrofuran	TO-15 Mod.	2.42
Cyclohexane	TO-15 Mod.	2.74
1,4-Dioxane	TO-15 Mod.	2.9
Bromodichloromethane	TO-15 Mod.	5.47
4-Methyl-2-pentanone	TO-15 Mod.	3.38
2-Hexanone	TO-15 Mod.	3.38
Dibromochloromethane	TO-15 Mod.	6.92
Bromoform	TO-15 Mod.	8.37
4-Ethyltoluene	TO-15 Mod.	4.03
Ethanol	TO-15 Mod.	1.55
Methyl tert-butyl ether	TO-15 Mod.	2.9
Heptane	TO-15 Mod.	3.38
Naphthalene	TO-15 Mod.	4.35
2-Methylpentane	TO-15 Mod.	2.9
Isopentane	TO-15 Mod.	2.42
2,3-Dimethylpentane	TO-15 Mod.	3.38
2,2,4-Trimethylpentane	TO-15 Mod.	3.86
Indene	TO-15 Mod.	3.86
Indan	TO-15 Mod.	3.86
Thiopene	TO-15 Mod.	2.74
2-Propanol	TO-15 Mod.	1.93

Notes

(1) The final quantitation limit (QL) is adjusted to reflect the initial pressurization step, dilution required to bring target analyte levels into the calibration range, and/or minimize matrix interferences

Final QL = QL * DF, DF was assumed to be 1.61 for a 6-L Canister, with 5 in. Hg Final Canister Pressure.

8.0 Data reduction, assessment, and reporting

8.1 Data reduction

Data collected during the field investigation will be reduced in accordance with SW-846 protocols and reviewed by the laboratory QA personnel. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates.

8.2 Data quality assessment

NYSDEC recommends two levels of data review. The basic review is a Data Usability Summary Report (DUSR). Current NYSDEC policy is to require this level of review for analytical data from investigations on most sites. Full data validation is called for at sites where the data will be used in litigation, or where problems are expected with data quality (such as where matrix interference is expected to be significant). The laboratory deliverables (i.e., NYSDEC ASP Category B) are the same in both cases, and a DUSR can be upgraded to full validation at a later time if necessary. For this investigation a DUSR will be performed.

Based on the results of data assessment, the validated analytical results reported by the laboratory will be assigned one of the following USEPA-defined data usability qualifiers:

- U – Not detected at given value
- UJ – Estimated not detected at given value
- J – Estimated value
- N – Presumptive evidence at the value given
- R – Result not useable
- No Flag – Result accepted without qualification

Trained and experienced data assessors, who meet NYSDEC approval criteria, will perform the data review. Résumés of people who will perform the data validation and prepare the DUSR will be provided to NYSDEC for review and approval, upon request.

8.2.1 Data usability summary report

Data for this investigation will be evaluated and qualification applied in accordance with the *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*, USEPA-540-R-07-003, July 2007 and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA-540-R-04-004, October 2004, as they applied to the analytical methods employed. A DUSR will be generated in accordance with USEPA Region II guidelines.

The DUSR will include a review and an evaluation of all the analytical results. To ensure compliance with the analytical method protocols the following parameters will be reviewed:

- Chain-of-custody forms
- Holding times
- Initial and continuing calibrations
- Blanks
- Laboratory control standards and matrix spikes

- Surrogate recoveries
- Matrix interference checks
- Field and laboratory duplicates
- Sample data

The DUSR will contain a description of the samples and parameters reviewed. Any deficiencies identified during the review will be noted and the effect on the generated data will be discussed. Any re-sampling or reanalysis recommendations will be then be made to the investigation's Project Manager. The results of the evaluation will be incorporated into the final investigative report.

8.2.2 Data validation

The determination to validate data will be made based on the presence of data anomalies, suspect data, or laboratory issues. Data will be validated and qualifications applied in accordance with *USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review*, USEPA-540-R-07-003, July 2007 and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA-540-R-04-004, October 2004, as they applied to the analytical methods employed. If applicable, a data validation report will be prepared and reviewed by the Quality Assurance Office (QAO) before issuance. The data validation report will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each sample delivery group will follow. For each of the organic analytical methods, the following parameters will be assessed:

- Holding times
- Instrument tuning
- Instrument calibrations
- Blank results
- System monitoring compounds or surrogate recovery compounds (as applicable)
- Internal standard recovery results
- MS and MSD results
- Field duplicate results
- Target compound identification
- Result calculations
- Pesticide cleanup (if applicable)
- Compound quantitation and reported detection limits
- System performance
- Results verification

For each of the inorganic compounds, the following will be assessed:

- Holding times
- Calibrations
- Blank results

- Interference check sample
- Laboratory check samples
- Duplicates
- Matrix Spike(s)
- Furnace atomic absorption analysis QC
- ICP serial dilutions
- Results verification and reported detection limits
- Result calculations

8.3 Data reporting

The data package provided by the laboratory will contain all items discussed above in a “CLP-equivalent” format. Data quality issues will be discussed in a case narrative included with the data report. The completed copies of the COC records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

Two copies of the analytical data packages and an electronic data deliverable (EDD) will be provided by the laboratory approximately 30 days after receipt of a complete sample delivery group. The Project Manager will immediately arrange for filing one package. A second copy and the EDD will be used to generate summary tables. These tables will form the database for assessment of the site contamination condition.

The EDD format required is current format Earthsoft EQuIS® Environmental Data Management Software.

Each EDD must be formatted and copied using an MS-DOS operating system. To avoid transcription errors, data will be loaded directly into the ASCII format from the laboratory information management system (LIMS). If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all nonconformance issues are resolved prior to use of the data.

9.0 Internal quality control checks

QC procedures and checks are used to evaluate the precision and accuracy of analytical data. Field QC checks are used to identify potential problems associated with sample collection procedures. Laboratory QC checks are used to identify problems associated with sample preparation and analysis.

9.1 Field quality control checks

To check the quality of data from field sampling efforts, blanks and duplicate samples will be collected for analysis. Field duplicate and rinseate blank samples will be collected at a frequency of one in 20 samples. Trip blank samples will be analyzed at a frequency of one per each shipment of VOC samples. Field MS/MSD samples will be collected at a frequency of one in 20 samples. These samples will be treated as separate samples for identification, logging, and shipping purposes. Analytical results on blanks and duplicates will be reported with the data.

9.2 Laboratory quality control checks

The analytical laboratory must have an implemented QC program documented in a QA manual to ensure the reliability and validity of the analysis performed at the laboratory. All analytical procedures are documented in writing as standard operating procedures (SOPs) and each SOP must include a QC section that addresses the minimum QC requirements for the procedure. The internal QC checks differ slightly for each individual procedure, but in general the QC requirements include the following:

- Method blanks
- Reagent/preparation blanks (applicable to inorganic analysis)
- Instrument blanks
- MS/MSDs
- Surrogate spikes (organic methods only)
- Analytical spike (applicable to graphite furnace analysis)
- Laboratory control samples
- Internal standard areas for GC/MS analysis
- Mass tuning for GC/MS analysis
- Endrin/4,4'-DDT degradation checks for pesticide analysis
- Second, dissimilar column confirmation for pesticide and polychlorinated biphenyl (PCB) analysis

All data obtained will be properly recorded. The data package will include a full deliverable package capable of allowing the recipient to reconstruct QC information and compare it to QC acceptance criteria. The laboratory will reanalyze any samples associated with nonconforming quality control checks, if sufficient volume is available. It is expected that sufficient volumes/weights of samples will be collected to allow for reanalysis when necessary.

10.0 Performance and system audits and frequency

Two types of audit procedures are conducted during any environmental investigation: performance and system audits. These audits are performed on the laboratory as well as field activities. The laboratory and field auditors will be independent of the function they will be auditing. Audits will be documented and maintained by the Contractor Project Manager.

10.1 Performance audits

10.1.1 Laboratory performance audits

Laboratory performance audits are administered by the laboratory QA department on a periodic basis (e.g., semi-annually). The audit samples are used to monitor accuracy and identify and resolve problems in sample preparation and analysis techniques, which lead to the generation of nonconforming data.

The laboratory performance audits include verification of each analyst's record keeping, proper use and understanding of procedures, and accuracy evaluation. Corrective action will be taken for any performance failure noted.

10.1.2 Field performance audits

The QAO or designee will perform field performance audits of the field sample team on an annual basis at a minimum. The field team leader will review all field data. The analytical results of the field blanks and replicate samples are indirect audits of the level of performance of field activities. If a nonconformance is found in the evaluation of field QC data, corrective action will be taken to resolve the issue. The corrective action will be documented.

10.2 System audits

10.2.1 Laboratory system audits

Laboratory system audits will be conducted against the QA Manual and the administrative and method SOPs, by the laboratory QA department, on an annual basis. System audits are used to ensure that all aspects of the laboratory's QC program are effective. This involves a thorough review of all laboratory practices and documentation to confirm that work is performed according to project specifications.

Outside agency performance and system audits may be used to verify contract compliance or the laboratory's ability to meet requirements for analytical methods and documentation. Copies of current certifications and accreditations may be used in lieu of an audit by the Project Manager.

10.2.2 Field system audits

The QAO or designee shall perform field system audits of the field sampling team on an annual basis at a minimum. All field activities will be audited to ensure that the field work is being performed according to the approved work plans, QAPP, and method procedures. Accuracy, precision, and documentation clarity will be evaluated. Any time a deficiency is noted during an ongoing systems audit, the project manger or designee will inform the field staff immediately so that corrective actions may be implemented.

11.0 Preventive maintenance

11.1 Field instrument preventive maintenance

Written procedures will establish the schedule for servicing critical items in order to minimize the downtime of the measurement system(s). Field instruments will be checked and calibrated daily before use. Calibration checks will be documented on the field calibration log sheets. Critical spare parts such as tape and batteries will be kept on-site to reduce potential downtime. Backup instruments and equipment will be available on-site or within 1-day shipment to avoid delays in the field schedule.

11.2 Laboratory instrument preventive maintenance

Designated laboratory employees regularly perform routine scheduled maintenance and repair of all instruments. All maintenance that is performed is documented in the laboratory's operating records. All laboratory instruments are maintained in accordance with manufacturer's specifications. The laboratory's QA Manual specifies the typical frequency with which components of key analytical instruments or equipment will be serviced.

11.3 Records

Logs shall be established to record maintenance and service. All maintenance records will be controlled and traceable to the designated equipment, instruments, tools, or gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories. The QAO may audit the field maintenance records to verify complete adherence to these procedures.

12.0 Corrective action

12.1 Introduction

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, and corrected.

12.2 Procedure description

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude recurrence. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Contractor Project Manager, Field Team Leader, and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, report, and investigate conditions adverse to quality. Corrective actions will be initiated as follows.

- When predetermined acceptance standards are not attained
- When procedure or data compiled are determined to be deficient
- When equipment or instrumentation is found to be faulty
- When samples and analytical test results are not clearly traceable
- When quality assurance requirements have been violated
- When designated approvals have been circumvented
- As a result of system and performance audit findings
- As a result of a management assessment
- As a result of laboratory/field comparison studies
- As required by USEPA SW-846 and subsequent updates, or by the NYSDEC ASP

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, will monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities or documents ascertained to be nonconforming with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 12-1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Contractor Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file.

Any project personnel may identify issues requiring corrective action; however, the QAO is responsible for documenting, numbering, logging, and verifying the closeout action. The Contractor Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

Figure 12-1 Corrective Action Form

CORRECTIVE ACTION REQUEST Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOW-UP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

13.0 References

American Society of Testing Materials, 2003. D1945-03. *Standard Test Method for Analysis of Natural Gas by Gas Chromatograph,* 2003.

Taylor, J. K., 1987. *Quality Assurance of Chemical Measurements*. Lewis Publishers, Inc., Chelsea, Michigan

United States Environmental Protection Agency (USEPA), 1986. SW-846 Test Method for Evaluating Solid Waste, Washington, D.C., November 1986,

USEPA, 1987. *Data Quality Objectives for Remedial Response Actions Activities: Development Process*, EPA/540/G-87/003, OSWER Directive 9355.0-7, Washington, D.C.

USEPA, 1999a. Compendium Method TO-15, Determination of Volatile Organic Compounds (VOCs) in Air Collected in Specially-Prepared Canisters and Analyzed by Gas Chromatography/Mass Spectrometry (GC/MS). January 1999.

USEPA, 1999b. USEPA Contract Laboratory Program, National Functional Guidelines for Superfund Organic Methods Data Review, July 2007.

USEPA, 2004. USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Data Review, October 2004.

Appendix E

Community Air Monitoring Plan (CAMP)

Prepared for:
National Grid
Brooklyn, New York

Community Air Monitoring Plan

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-0606

AECOM, Inc.
December 2008
Document No.: 01765-075

AECOM

AECOM

Prepared for:
National Grid USA
Brooklyn, New York

Community Air Monitoring Plan

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-0606

Prepared By Peter S. Cox, Project Manager

Reviewed By Mark McCabe, Principal in Charge

AECOM, Inc.
December 2008
Document No.: 01765-075

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1.0 Introduction

This document provides the Community Air Monitoring Plan (CAMP) that will be implemented during the Remedial Investigation (RI) of the Metropolitan former manufactured gas plant (MGP) site located at 124 - 136 2nd Avenue in Brooklyn, New York. This site, known as the Metropolitan former MGP Site, was the former location of a manufactured gas plant (MGP) that was operated by Brooklyn Union Gas Company (BUG), a predecessor company to National Grid USA (Grid) from the late 1880s until approximately 1938. This CAMP has been prepared by AECOM Environment (AECOM) on behalf of Grid to present the methods and procedures that will be used to evaluate air quality in the immediate vicinity of investigation activities and provide protection to potential off-site receptors.

The Metropolitan former MGP site is located at 124 – 136 2nd Avenue, Brooklyn, Kings County, New York 11215, east of the Gowanus Canal, between the Gowanus Expressway (Highway 278) and the New York City Transit train bridge and associated subway rail line. A portion of the site was the subject of previous extensive remedial/redevelopment activities undertaken by independent third parties with NYSDEC oversight. The investigation associated with this CAMP is intended to address those portions of the site that were not addressed by the previous remedial/redevelopment activities, i.e. the “current” site. These areas are generally bounded to the north and west by the Gowanus Canal, to the east by a parcel of land occupied by the Lowe’s Supply store (part of the previous remediation) and 2nd Avenue, and to the south by 13th Street.

The RI fieldwork proposed for the current site is described in *Remedial Investigation Work Plan, Metropolitan Former MGP Site, Brooklyn, New York, NYSDEC Site No.: 224046* dated December 2008. The field investigation involves subsurface soil borings, the installation of monitoring wells, the collection of soil and groundwater samples, and collection of indoor air and soil gas samples.

The objectives of this CAMP are to:

- Ensure that the airborne concentrations of constituents of concern (COC) are minimized to protect human health and the environment
- Provide an early warning system so that potential emissions can be controlled on site at the source
- Measure and document the concentrations of airborne COC to confirm compliance with regulatory limits

The community air monitoring will be performed around the site perimeter, and will measure the concentrations of organic vapors and dust during all ground-intrusive activities (soil boring, well installations, test pitting, and ex-situ soil dewatering study).

This CAMP is a companion document to AECOM’s site-specific Health and Safety Plan (HASP). The HASP is a separate document and is directed primarily toward protection of on-site workers within the designated work zones.

2.0 Constituents of concern and action levels

The former MGP site is known to have subsurface impacts dating from the site's historical use as a MGP. As such, the constituents of concern are volatile and semi-volatile organic compounds (VOCs and SVOCs). The primary VOCs of concern are benzene, ethylbenzene, toluene, and xylene (BTEX compounds). VOCs are more volatile than SVOCs and are generally of greater concern when monitoring the air quality during MGP site investigations.

Airborne dust is also a concern and must be monitored and controlled due to its ability to co-transport adsorbed constituents and because of its nuisance properties.

Odors, though not necessarily indicative of high constituent concentrations, could create a nuisance (especially when working within or in close proximity to existing buildings and building entrances) and will be monitored and controlled to the extent practicable.

State and federal regulatory agencies have provided action levels for many of these constituents. The action levels are the allowable airborne concentrations above which respiratory protection or other health and safety controls are required. For work at the former MGP site, the following levels should not be exceeded for more than 15 consecutive minutes at the downwind perimeter of the site:

- Benzene 1 part per million (ppm).
- Total VOCs 5 ppm.
- Dust 100 micrograms per cubic meter (µg/m3).

The action levels cited here are above (in addition to) the background ambient (upwind) concentration.

3.0 Air monitoring equipment and methods

Air quality monitoring will be performed for total VOCs, benzene, and dust as outlined below.

Two perimeter locations will be established each day and an air monitoring technician will check the instrumentation at each of these locations frequently during the work. Typically there will be monitoring locations at one upwind site perimeter location and one downwind perimeter locations. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. Field personnel will be prepared to monitor multiple locations in the event that there is little wind or if the wind direction changes frequently.

The monitoring instruments will be calibrated at the start of each workday, and again during the day if the performance of an instrument is in question.

3.1 Volatile organic compounds and benzene monitoring

3.1.1 Ambient air monitoring

VOC monitoring will be performed using three field photoionization detectors (PIDs) (RAE Systems MiniRAE or equivalent). The monitoring instruments will be checked by a technician every 15 minutes, and the real-time measurements recorded. The PIDs will be equipped with an audible alarm to indicate exceedance of the action level.

If requested by the New York State Department of Environmental Conservation (NYSDEC), 15-minute running average concentrations may be calculated, which can then be compared to the action levels. If real-time measurements of total VOCs indicate that the action level is exceeded, the benzene concentration will also be determined at that location using constituent-specific colorimetric tubes.

PID measurements will be made at one upwind and one downwind location around the work area. The locations of the instruments may be changed during the day to adapt to changing wind directions.

3.2 Particulate (dust) monitoring

Particulate (dust) monitoring will be performed during drilling activity at the Site. Two particulate monitors (TSI DustTrak or equivalent) will be used for continuous real-time dust monitoring. The monitoring instruments will be checked by a technician every 15 minutes, and the real-time measurements recorded. If requested by the on-site NYSDEC representative, a 15-minute average concentration may be determined.

In addition, fugitive dust migration will be visually assessed during all work activities, and the observations recorded.

Measurements will be made at one upwind and one downwind location around the work area. The locations of the instruments may be changed during the day to adapt to changing wind directions.

4.0 Emission control plan

4.1 Ambient air

Odor, vapor, and dust control will be required for this project due to the close proximity commercial buildings and public roadways and sidewalks. Table 1 provides a response chart for the monitoring and control of vapor emissions. Table 2 provides a list of emergency contacts.

- If the ambient air concentration of total VOC levels at the downwind perimeter of the work area or exclusion zone exceeds 5 ppm (or the benzene level exceeds 1 ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor levels readily decreases (per instantaneous readings) below 5 ppm (and the benzene level drops below 1 ppm) over background, work activities can resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm (or the benzene level persists over 1 ppm) over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions until the concentrations drop below the action levels, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

Site perimeter particulate concentrations will also be monitored continuously. In addition, dust migration will be visually assessed during all work activities.

- If the downwind particulate level is 100 $\mu g/m^3$ greater than the background (upwind perimeter) level for a 15-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work may continue with dust suppression techniques provided that downwind particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

Typical emission control measures may include:

- Apply water for dust suppression;
- Relocate operations, if applicable; and
- Reassess the existing control measures.

Table 1 Vapor Emission Response Chart

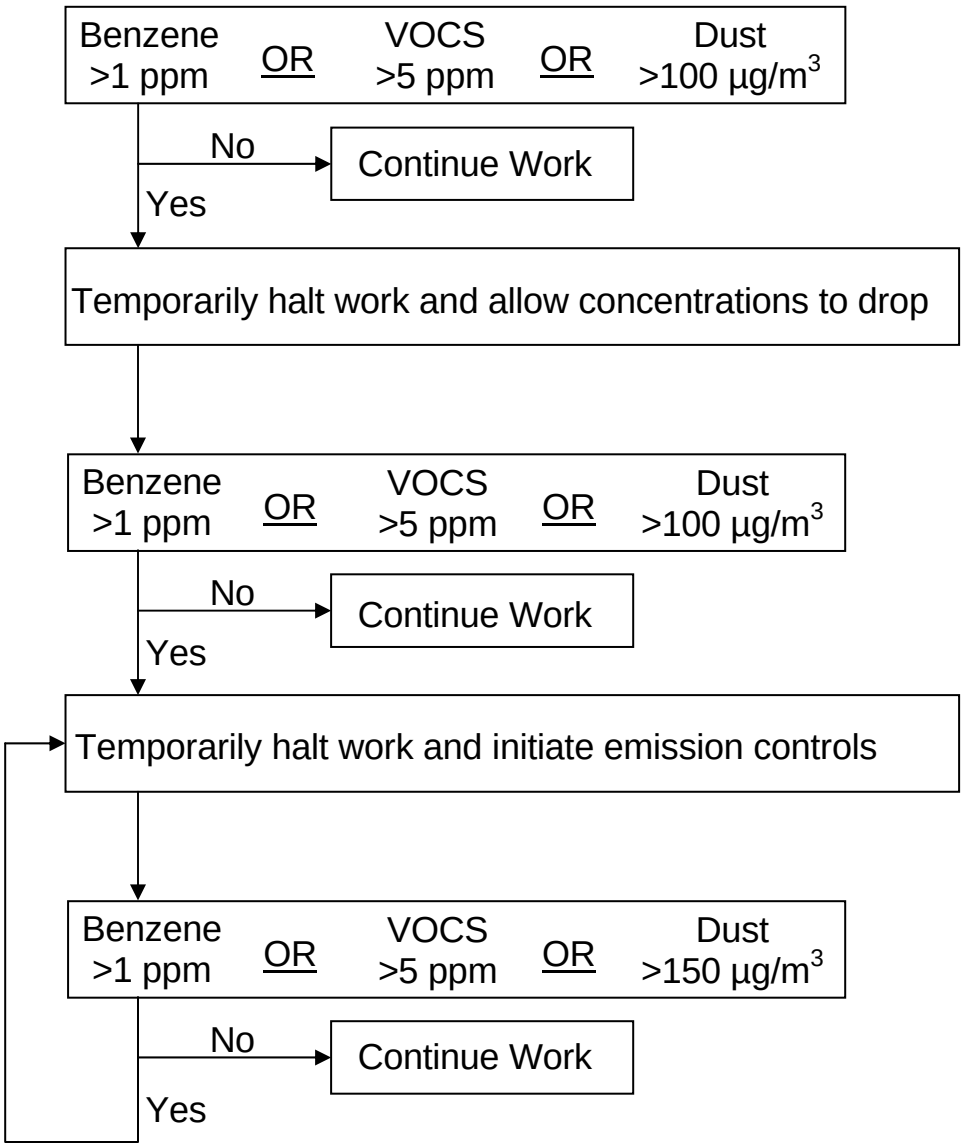

Table 2 Emergency Contacts and Telephone Numbers

Fire:	911	
Police:	911	
Ambulance:	911	
AECOM Environment Contacts	Pete Cox Kevin Katchel	(978) 764-4257 cell (610) 639-8860 cell
National Grid Contacts	Donald Campbell Andrew Prophete	(973) 715-8447 cell (516) 790-1654 cell

5.0 Odor control procedures

This section outlines the procedures to be used to control odors that may be generated during the RI field activities. The investigation program will be conducted using two principal remedial investigation techniques that may generate odors: test pit excavations and subsurface soil borings/monitoring well installations. The remainder of this section is intended to provide site managers, representatives of NYSDEC and New York State Department of Health (NYSDOH), and the public with information summarizing typical odor control options, and to provide some guidance for their implementation. A description of potential sources of odors and methods to be used for odor control is presented in the following sections.

5.1 Potential sources of odors

Generally, the residuals encountered at former MGP sites are well defined. They are related to residual coal tar-like materials and petroleum, and principally contain VOCs, polynuclear aromatic hydrocarbons (PAHs), and a number of inorganic constituents, including metal-complexed cyanide compounds, and metals. Constituents of MGP tar or petroleum products can produce odor emissions during investigation activities when they are unearthed during in backhoe test pits and soil borings/well installations. When this occurs, VOCs and light-end SVOCs can volatilize into the ambient air. Some MGP residuals can cause distinctive odors that are similar to mothballs, roofing tar, or asphalt driveway sealer. However, the constituent concentrations generally associated with these odors are typically significantly less than levels that might pose a potential health risk. It is important to note that the CAMP will provide for continual monitoring of VOCs and dust during the fieldwork to monitor for any potential release of constituents which may pose a threat to health.

5.2 Odor monitoring

The field investigation personnel will record observations of odors generated during the implementation of the RI. When odors attributable to the uncovering of impacted media are generated in the work area during intrusive activities such as soil borings or excavation of test pits, observations will also be made at the down-wind limit of the former MGP site, in order to assess the potential for off-site odors. The down-wind odor monitoring will be performed in conjunction with the RI and dust monitoring program described in this CAMP.

Upon detection of odors at the site perimeter, site controls, starting in the work area, will be implemented. The site controls described in the following sections will be used to assist with odor mitigation to minimize, and to prevent where practicable, the off-site migration of odors. Due to the short distances between any work area at the site and the property line or nearby potential receptors, site controls will be implemented proactively when odors are detected in the breathing zone at any work area.

5.3 General site controls

Several general excavation or drilling procedure site controls that will be implemented include:

- Every effort will be made to minimize the amount of time that impacted material is exposed to ambient air at the site.
- For the test pit excavations, it may be possible to move some amount of soil around within the footprint of the test pit excavation in order to minimize the amount of soil removal and subsequent stockpiling of impacted soil at the ground surface. The use of in-excavation stockpiling of test pit soil will be evaluated on a case-by-case basis, and will only be performed with the approval of the NYSDEC field representative, and will be completed only if it does not impede the collection of subsurface soils or the full delineation of the subsurface features being investigated.

- Drill cuttings from the soil borings will be containerized as soon as possible during completion of each soil boring.
- Loading of excavated debris or soil that has been found by the site manager to be unsuitable material to return to test pits may generate odors. Every effort will be made to complete this work as quickly as possible and to keep these materials covered at all times.
- Meteorological conditions are also a factor in the generation and migration of odors. Some site activities may be limited to times when specific meteorological conditions prevail, such as when winds are blowing away from a specific receptor.

5.4 Secondary site controls

If substantial odors still present an issue following implementation of the above procedures, secondary controls will be enacted. The AECOM field representative will work through the applicable list of secondary controls until the perimeter odor issues are resolved. The AECOM field representative will work closely with Grid and NYSDEC during this task if present. Final selection of controls will be dependent on field conditions encountered. Secondary controls include the following:

- For stockpiled impacted soil, temporary tarps or polyethylene covers will be used to control odors.
- The placement of portable barriers close to small active source areas (test pits) can elevate the discharge point of emissions to facilitate dispersion and minimize the effect on downwind receptors. The barriers can be constructed using materials such as plastic “Jersey barriers”, or fence poles and visual barrier fabric/plastic. The barriers are placed as temporary two or three-sided structures around active test pit or other intrusive investigation areas, oriented such that the barriers are placed on the upwind and downwind sides of the source. If only one side of the source can be accessed, then the barrier should be placed on the downwind side.
- Two agents that can be sprayed over impacted soil have been determined to be effective in controlling emissions. They include odor suppressant solution (BioSolve™), and hydro-mulch. These agents may be used where tarps cannot be effectively deployed over the source material, or where tarps are ineffective in controlling odors:
  - BioSolve™ can provide immediate, localized control of odor emissions. Information regarding the preparation and use of BioSolve™ is provided in Appendix A.
  - Hydromulch - Although it is unlikely that it will be necessary, a modified hydromulch slurry may be used to cover inactive sources for extended periods of time (up to several days). The hydromulch, typically cellulose fibers (HydroSealR) is modified by mixing a tackifier (glue) with the mulch and water to form a slurry. It is applied using a standard hydroseed applicator to a thickness of ¼ inch. The material forms a sticky, cohesive, and somewhat flexible cover. Reapplication may be necessary if the applied layer becomes desiccated or begins to crack.

5.5 Record keeping and communication

Similar to readings recorded during the monitoring specified in the CAMP, all odor monitoring results will be recorded in the field log book or other air monitoring forms, and be available for review by the agencies.

The AECOM field representative, in consultation with Grid, will also provide information on odor monitoring and odor management to residents of the neighborhood should they inquire. In the event that odors persist after these efforts, work will be temporarily discontinued until a mutually agreeable solution with Grid, NYSDEC, and NYSDOH staff can be worked out which allows the work to be completed while minimizing the off-site transport of nuisance odors.

6.0 Documentation and reporting

Data generated during perimeter air monitoring will be recorded in field logs and summarized daily in spreadsheets. The electronic measurements from the PIDs and dust meters will be downloaded each day, reviewed, and archived. Exceedances of the action levels, if any, and the actions to be taken to mitigate the situations, will be discussed immediately with the on-site representatives. Summaries of all air monitoring data will be provided to NYSDEC as requested.

Appendix A

Vapor Suppression Information

BioSolve®
Hydrocarbon Mitigation Technology

...Is Making A Difference!

VAPOR SUPPRESSION / ODOR CONTROL

BioSolve® offers a relatively simple and cost effective method of suppressing Odors and VOC release from soils, during excavation, loading, stockpiling, etc. The following guidelines will apply to the most common situations encountered on site.

In most cases a 3% BSW solution (1 part **BioSolve®** concentrate to 33 parts water) will be adequate to keep vapor emissions within acceptable limits and control fugitive odor problems on contact. Although, some sites may only require a 2% solution, up to a 6% solution may be recommended on sites with elevated levels or particularly difficult/ mixed stream contaminants are present.

The **BioSolve®** solution should be applied evenly to the soil surface in sufficient quantity to saturate the surface area. As a general rule, use 1-3 litres of **BioSolve®** solution to 1 square metre of surface area. (1 gallon of **BioSolve®** per solution will cover approximately 4-sq. yd. of soil surface area) **BioSolve®** is a water-based surfactant that will apply like water.

BioSolve®, in its concentrated form, is a viscous liquid material that must be diluted with water. A fluorescent red tracing dye is present in the formula allowing **BioSolve®** to be detected during application. Once diluted, **BioSolve®** can be applied with virtually any equipment that can spray water. **BioSolve®** will not harm equipment or clog pipes. For large sites, applicators such as water truck, portable agricultural sprayers, foam inductors & pressure sprayers can be used. For smaller jobs, garden sprayers, water extinguishers or a garden hose with a fertiliser attachment on the nozzle can be used effectively. This characteristic makes **BioSolve®** very adaptable and much most convenient to use in almost any situation. **BioSolve®** is equally effective when used with all types of water (soft, hard, salt or potable).

On stockpiled soil or other soil that will be left undisturbed, a single application of **BioSolve®** to the exposed surfaces may last up to 10 to 14 days or more (depending on environmental conditions). **BioSolve®,** when applied, will form a "cap" of clean soil. If the soil is not disturbed, via weather, movement, etc. this "cap" will remain functional. During excavation, loading or other movement of the soil, it may be required to spray an additional amount of **BioSolve®** to the freshly exposed surface area to keep emissions at an acceptable level.

In case of an extremely high level of emissions, or if the soil is heavily contaminated, it may be necessary to increase the strength of the **BioSolve®** solution or apply more solution per square metre to reduce emissions adequately. It is important that the site be monitored regularly and that the **BioSolve®** solution be reapplied if and when necessary to insure that VOC emissions and odors remain under control.

BioSolve® is packaged and readily available in 55 gallon (208 liter) drums, 5 gallon (19 liter) pails and in 4X1 gallon (3.8 liter X 4) cases. Contact The Westford Chemical Corporation® Toll Free @ 1-800-225-3909, via e-mail at info@biosolve.com or your Local BioSolve distributor for pricing.

BioSolve® ***should only be used in accordance with all regulatory rules and regulations.***

This material is made available or use by professionals or persons having technical skill to be used at the own discretion and risk. These protocols are guidelines only and may need to be modified to site specific conditions. Nothing included herein is a warrantee or to be taken as a license to use **BioSolve** without the proper permits, approvals, etc. of the appropriate regulatory agencies, nor are the protocols provided as instructions for any specific application of **BioSolve**.

SOIL VAPOR SUPPRESSION UTILIZING BIOSOLVE

BioSolve is being utilized by numerous environmental consultants, response contractors, and fire departments to suppress VOC's & LEL's as well as problem odors. BioSolve encapsulates the source of the vapor rather than temporarily blanketing it like a foam or other physical barrier. Vapor reduction is so fast and effective that BioSolve is used to comply with the tough emission standards regulated by each State.

BioSolve offers a relatively simple and cost effective method of suppressing VOC vapor release from soils during excavation, loading, stockpiling… The following guidelines will apply to the most common situations encountered on site.

In most cases a 3% solution of BioSolve will be adequate to keep vapor emissions within acceptable limits. Dilute BioSolve concentrate with water at a ratio of 1 part BioSolve to 33 parts water to make a 3% solution.

The BioSolve solution should be applied evenly to the soil surface in sufficient quantity to dampen the surface well, (as a general rule, 1 gallon of BioSolve solution will cover approximately 4 sq. yd. of soil surface area). BioSolve is not a foam, it is a surfactant based product that will apply like water. The solution may be applied with a hand sprayer, high pressure power sprayer, water truck, etc., whichever method best suits the site and/or conditions.

NOTE: In the case of extremely high emission levels and/or very porous soil it may be necessary to increase the strength of the BioSolve solution (6%) or apply more per sq. yd. to reduce emissions adequately. On stockpiled soil or other soil that will be undisturbed, a single application of BioSolve to the exposed surfaces may last 10-14 days or more. During excavation, loading, or other movement of soil it may be necessary or required to spray each freshly exposed surface to keep emissions below acceptable

levels.It is important that the site be monitored regularly and the BioSolve solution be reapplied if/when necessary to insure that vapor emissions remain at or below acceptable standards.

MATERIAL SAFETY DATA SHEET

THE WESTFORD CHEMICAL CORPORATION®
P.O. Box 798
Westford, Massachusetts 01886 USA

Ref. No.: 2001
Date: 1/1/2002

Phone: (978) 392-0689
Phone: (508) 878-5895
Emergency Phone-24 Hours: 1-800-225-3909
Fax: (978) 692-3487
Web Site: http://www.BioSolve.com
E-Mail: info@BioSolve.com

SECTION I - IDENTITY

Name:	**BioSolve®**
CAS #:	138757-63-8
Formula:	Proprietary
Chemical Family:	Water Based, Biodegradable, Wetting Agents & Surfactants
HMIS Code:	Health 1, Fire 0, Reactivity 0
HMIS Key:	4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Insignificant

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SECTION II - HAZARDOUS INGREDIENTS

Massachusetts Right to Know Law or 29 C.F.R. (Code of Federal Regulations) 1910.1000 require listing of hazardous ingredients.

This product does not contain any hazardous ingredients as defined by CERCLA, Massachusetts Right to Know Law and California's Prop. 65.

SECTION III - PHYSICAL - CHEMICAL CHARACTERISTICS

Boiling Point	: 265°F	Specific Gravity	: 1.00 +/-.01
Melting Point	: 32°F	Vapor Pressure mm/Hg	: Not Applicable
Surface Tension- 6% Solution	: 29.1 Dyne/cm at 25°C	Vapor Density Air = 1	: Not Applicable
Reactivity with Water	: No	Viscosity - Concentrate	: 490 Centipoise
Evaporation Rate	: >1 as compared to Water	Viscosity - 6% Solution	: 15 Centipoise
Appearance	: Clear Liquid unless Dyed	Solubility in Water	: Complete
Odor	: Pleasant Fragrance	pH	: 9.1+/-.3
Pounds per Gallon	: 8.38		

SECTION IV - FIRE AND EXPLOSION DATA

Special Fire Fighting Procedures	: None	Flammable Limit	: None
Unusual Fire and Explosion Hazards	: None	Auto Ignite Temperature	: None
Solvent for Clean-Up	: Water	Fire Extinguisher Media	: Not Applicable
Flash Point	: None		

SECTION V - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be taken in Handling and Storage: Use good normal hygiene.
Precautions to be taken in case of Spill or Leak -

Small spills, in an undiluted form, contain. Soak up with absorbent materials.
Large spills, in an undiluted form, dike and contain. Remove with vacuum truck or pump to storage/salvage vessel. Soak up residue with absorbent materials.

Waste Disposal Procedures -

Dispose in an approved disposal area or in a manner which complies with all local, state, and federal regulations.

SECTION VI - HEALTH HAZARDS

Threshold Limit Values: Not applicable
Signs and Symptoms of Over Exposure-

Acute : Moderate eye irritation. Skin: Causes redness, edema, drying of skin.
Chronic: Pre-existing skin and eye disorders may be aggravated by contact with this product.

Medical Conditions Generally Aggravated by Exposure: Unknown
Carcinogen: No

Emergency First Aid Procedures -

Eyes: Flush thoroughly with water for 15 minutes. Get medical attention.
Skin: Remove contaminated clothing. Wash exposed areas with soap and water. Wash clothing before reuse. Get medical attention if irritation develops.
Ingestion: Get medical attention.
Inhalation: None considered necessary.

SECTION VII - SPECIAL PROTECTION INFORMATION

Respiratory Protection	: Not necessary	Local Exhaust Required	: No
Ventilation Required	: Normal	Protective Clothing	: Gloves, safety glasses Wash clothing before reuse.

SECTION VIII - PHYSICAL HAZARDS

Stability	: Stable	Incompatible Substances	: None Known
Polymerization	: No	Hazardous Decomposition Products	: None Known

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SECTION IX - TRANSPORT & STORAGE

DOT Class	: Not Regulated/Non Hazardous		
Freeze Temperature	: 28°F	Storage	: 35°F-120°F
Freeze Harm	: None (thaw & stir)	Shelf Life	: Unlimited Unopened

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SECTION X - REGULATORY INFORMATION

The Information on this Material Safety Data Sheet reflects the latest information and data that we have on hazards, properties, and handling of this product under the recommended conditions of use. Any use of this product or method of application, which is not described on the Product label or in this Material Safety Data Sheet, is the sole responsibility of the user. This Material Safety Data Sheet was prepared to comply with the OSHA Hazardous Communication Regulation and Massachusetts Right to Know Law.

Appendix F

Health and Safety Plan (HASP)

Prepared for:
National Grid
Brooklyn, New York

HEALTH AND SAFETY PLAN

Remedial Investigation

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-060

AECOM Inc.
December 2008

AECOM

Prepared for:
National Grid.

HEALTH AND SAFETY PLAN

Remedial Investigation

Metropolitan Former MGP Site
Brooklyn, New York
NYSDEC Site No.: 224046
Order on Consent Index #: A2-0552-060

Prepared By – Kathleen Harvey, Regional Health and Safety Manager

Reviewed By – Peter Cox, Project Manager

AECOM Inc.
December 2008

AECOM

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Attachment B– Job Safety Analysis Form

Attachment C – Pre-Entry Briefing Attendance Sheet

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1.0 Introduction

1.1 HASP applicability

This Health and Safety Plan (HASP) has been developed by AECOM Environment (AECOM). It establishes the health and safety procedures to minimize potential risk to AECOM and contractor personnel involved with implementing the Remedial Investigation (RI) at the Metropolitan Former Manufactured Gas Plant (MGP) Site located at 124 -136 2nd Avenue in Brooklyn, New York. AECOM is conducting this investigation on behalf of National Grid USA (Grid).

The provisions of this plan apply to AECOM personnel and AECOM subcontractor personnel who may potentially be exposed to safety and/or health hazards related to activities described in Section 3.0 of this document.

This HASP has been written to comply with the requirements of OSHA's Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). All activities covered by this HASP must be conducted in complete compliance with this HASP and with all applicable federal, state, and local health and safety regulations. All contractors and their subcontractors must conform to applicable guidance and regulations, as established by the regulatory agencies in the following documents:

- U.S. Department of Labor, Occupational Safety and Health Administration (OSHA), Code of Federal Regulations, Title 29 (29 CFR), Part 1910.120.
- U.S. Department of Labor, OSHA, 29 CFR, Part 1910.1200.
- U.S. Department of Labor, OSHA, 29 CFR, Part 1910 and Part 1926.
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, Publication No. 85-115, 1985.

Personnel covered by this HASP who cannot or will not comply will be excluded from site activities.

This plan will be distributed to each employee, including all contractor employees, involved with the proposed investigation activities. Each employee must sign a copy of the attached health and safety plan sign-off sheet (see Attachment A).

This HASP only pertains to the tasks that are listed in Section 3.0. A task -specific HASP or addendum to this HASP will be developed at a later date for any other subsequent investigative/remedial activities at this Site.

1.2 Health and safety expectations

1.2.1 AECOM Safety Policy

As a leading global provider of environmental, health, and safety (EHS) engineering and consulting services, AECOM is committed in the conduct of our operations to protecting the environment as well as the health and safety of our employees, clients, subcontractors, suppliers, and the communities which we serve. To demonstrate and support this steadfast commitment, AECOM has adopted nine EHS Guiding Principles. It is the expectation and responsibility of each AECOM employee to understand and fully support these Principles in the performance of all work activities. These principles are presented on the next page.

H&S SOP No. 1.1

Environmental Health and Safety Policy	Issue Date: July 2007 Approval: Robert C. Weber Robert C. Weber President & CEO

As a leading global provider of environmental, health, and safety (EHS) engineering and consulting services, ENSR is committed in the conduct of our operations to protecting the environment as well as the health and safety of our employees, clients, subcontractors, suppliers, and the communities which we serve. To demonstrate and support this steadfast commitment, ENSR has adopted the following EHS Guiding Principles:

- We will conduct our day-to-day business in a manner consistent with our philosophy that protecting people and the environment is our highest priority and that no aspect of the Company's activities, including expediency and cost, shall ever take precedence;
- We will take every reasonable measure to assure a workplace that is free from occupational injuries and illnesses;
- We will comply with all relevant EHS legal and other voluntary requirements to which we subscribe;
- We will promote environmental sustainability through the efficient use of energy, conservation of natural resources, and prevention of pollution through reuse, recycling, and reduction wherever practical at every stage of our business;
- We will rigorously pursue the development and use of environmentally sound and intrinsically safe processes, technology, and management methods in the planning and execution of our services;
- We will identify and effectively manage the environmental impacts and health and safety risks caused by our operations;
- We will educate our employees and inform our subcontractors, as appropriate, on this Policy and the importance of fulfilling their EHS responsibilities, and will encourage our clients, suppliers, and service partners to commit to similar EHS standards;
- We will strive to continually improve our EHS performance by setting and reviewing periodic goals and by regularly conducting assessments to ensure that our EHS programs, procedures, and practices are effectively and consistently implemented; and
- We will provide the necessary human, financial, and material resources to adequately implement this Policy.

It is the expectation and responsibility of each ENSR employee and subcontractor to understand and fully support this Policy in the performance of all work activities.

1.2.2 Zero accident goal

The safety goal for this project is zero incidents and zero accidents, with work tasks designed to minimize or eliminate hazards to personnel, equipment, the environment and the general public. No individuals working at this site shall perform tasks that may endanger their own safety and health or that of others.

1.2.3 Stop work authority

Commitment to safety, health, and environmental excellence requires that all work proceed only after it is safe and environmentally sound to do so. The responsibility for ensuring that this takes place rests with every AECOM and contractor employee working at this project location. Effectively meeting these responsibilities depends upon open communication between individuals and their supervisors prior to work beginning, and – in certain cases – after safety, health and/or environmental issues are identified.

The safety and health of on-site personnel will take precedence over cost and schedule considerations for all project work. All AECOM personnel and AECOM contractors have the authority to STOP WORK if they see a potential or actual hazard that may threaten the safety of people or the environment. Upon stopping work, the AECOM Site Safety Officer (SSO) must be immediately notified and provided with information regarding the nature of the safety, health or environmental concern. The SSO will meet with the worker with the intent of resolving the worker's concerns. Once the concerns are resolved to the satisfaction of the worker, work can proceed.

If the concerns are not resolved to the satisfaction of the worker and/or the SSO, work does not proceed. The AECOM Regional Health and Safety Manager (RHSM) will be contacted to obtain assistance in resolving the concerns. Using his/her expertise of safety, health, and environmental rules, regulations, and procedures, the AECOM RHSM will attempt to resolve the matter with all parties involved. Work will not resume until this criterion is met.

1.3 Organization/responsibility

The implementation of health and safety at this project location will be the shared responsibility of the AECOM Project Manager (PM), the Regional Health and Safety Manager (RHSM), Site Safety Officer (SSO), other field staff, and contractor personnel implementing the proposed scope of work.

1.3.1 AECOM project manager

The AECOM PM (Peter Cox) is responsible for ensuring that the overall objectives of the safety program established for this project are met. Some of the PM's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies, including subcontractor personnel, have received a copy of it;
- Providing the RHSM with updated information regarding conditions at the Site and the scope of site work;
- Assigning a Site Safety Officer for the project and/or for each major field effort that occurs throughout the project;
- Providing adequate authority and resources to the SSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the SSO and RHSM;

- Conducting regular project reviews and on-site visits to verify that the components of this safety program are being implemented and to identify any improvements that could be made to increase the project's safety success;
- Ensuring that JSA's have been prepared for the AECOM tasks being implemented and for any additional tasks that AECOM might perform that have not been addressed in this HASP;
- Maintaining regular communications with the SSO and, if necessary, the RHSM;
- Participating as a member of the accident/incident investigation team and ensuring that all identified corrective actions are implemented in a timely fashion;
- Verifying that all contractors selected by AECOM to work on this program have completed AECOM's environmental, health and safety questionnaire (EHSQ) form within the past year and have been deemed acceptable for the proposed scope of work; and,
- Coordinating the activities of all AECOM subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project.

1.3.2 AECOM regional health and safety manager

The AECOM RHSM (Peter Sullivan) is the individual responsible for the preparation, interpretation and modification of this HASP. Modifications to this HASP which may result in less stringent precautions cannot be undertaken by the PM or the SSO without the approval of the RHSM. Specific duties of the RHSM include:

- Writing, approving and amending the HASP for this project;
- Reviewing JSAs that are prepared prior to mobilizing for the various field events covered by this HASP as well as JSAs that are developed to manage change in the field;
- Advising the SSO on matters relating to health and safety;
- Recommending appropriate personal protective equipment (PPE) and safety equipment to protect personnel from potential site hazards;
- Conducting site visits to verify that the components of this HASP and the task-specific JSAs provide the necessary hazard control measures to ensure work is conducted safely and that the project's zero accident goal is achieved;
- Forming accident/incident teams and leading the accident/incident investigations and root cause analysis process; and,
- Maintaining regular contact with the SSO to evaluate site conditions and new information which might require modifications to the HASP.

1.3.3 AECOM site safety officer

AECOM field staff are responsible for implementing the safety requirements specified in this HASP. However, one AECOM employee will serve as the SSO. The PM will appoint a SSO for this program. The SSO will be on-site during all activities covered by this HASP. The SSO is responsible for enforcing the requirements of this HASP once work begins. The SSO has the authority to immediately correct all situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies, including all subcontractors, have submitted a completed copy of the HASP receipt and acceptance form;
- Assuring that all personnel to whom this HASP applies attend and actively participate in a pre-entry briefing and daily safety meetings that are conducted during the implementation of site activities;

- Maintaining a high level of health and safety consciousness among employees implementing the proposed activities;
- Working directly with contractor's SSOs to develop job safety analysis (JSA) to effectively manage change associated with the performance of new work tasks not addressed in this HASP;
- Procuring and distributing the PPE and safety equipment needed for AECOM employees;
- Verifying that all PPE and health and safety equipment used by AECOM is in good working order;
- Verifying that AECOM contractors are prepared with the PPE and safety equipment required for this project;
- Performing the required environmental air monitoring during the proposed activities;
- Notifying the PM of all noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of all personnel, in coordination with the contractor's SSO, to ensure that required safety and health procedures are being followed;
- Conducting accident/incident investigations and preparing accident/incident investigation reports in conjunction with AECOM's SSO and contractor representatives (if applicable);
- Conducting the pre-entry briefing and daily safety meetings in conjunction with the contractor's SSO; and,
- Initiating emergency response procedures, in coordination with the contractor's SSO, and in accordance with Section 11.0 of this HASP.

1.3.4 AECOM field personal

All AECOM field personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading the HASP in its entirety prior to the start of on-site work and bringing forth any questions or concerns regarding the content of the HASP to the AECOM PM or RHSM;
- Submitting a completed HASP Acceptance Form to the AECOM SSO prior to the start of work;
- Complying with the requirements of this HASP and the requests of the SSO;
- Attending and actively participating in the required pre-entry briefing and daily safety meetings that are conducted during the implementation of the program;
- Preparing JSAs that address the hazards associated with any new tasks that are performed on site;
- Stopping work in the event that an immediate danger situation is perceived; and,
- Reporting all accidents, injuries and illnesses, and near misses, regardless of their severity, to the SSO.

1.3.5 Contractors

Contractors working with AECOM to implement the proposed activities are responsible for:

- Reading the HASP in its entirety prior to the start of on-site work;
- Appointing an on-site safety coordinator to interface with the AECOM SSO;

- Attending and actively participating in the required pre-entry briefing prior to beginning on-site work and daily safety meetings that are conducted during the implementation of the program;
- Ensuring, via daily inspections, that their equipment is in good working order;
- Operating their equipment in a safe manner;
- Reporting all accidents, injuries and illnesses, and near misses, regardless of their severity, to the AECOM SSO;
- Stopping work in the event that an immediate danger situation is perceived;
- Providing AECOM with copies of material safety data sheets (MSDS) for all hazardous materials brought on-site; and,
- Providing all the required PPE and safety supplies to their employees.

1.4 Management of change/modification of the HASP

1.4.1 Management of change

The procedures in this HASP have been developed based on site history, previous site investigations and the proposed scope of work. Every effort has been made to address the chemical and physical hazards that may be encountered during the implementation of the proposed investigative activities. However, unanticipated site-specific conditions or situations may occur during the implementation of this project. Also, AECOM and their selected contractors may elect to perform certain tasks in a manner that is different from what was originally intended due to a change in field conditions. As such, this HASP must be considered ***a working document*** that is subject to change to meet the needs of this dynamic project.

AECOM and their selected contractors will complete a JSA when new tasks or different investigative techniques not addressed in the HASP are proposed. The use of new techniques will be reviewed and if new hazards are associated with the proposed changes, they will be documented on the JSA form. An effective control measure must also be identified for each new hazard. JSA forms will be reviewed by the SSO prior to being implemented. Once approved, the completed forms will be reviewed with all field staff during the daily safety meeting. A blank JSA form is presented as Attachment B.

1.4.2 HASP modification

Should significant information become available regarding potential on-site hazards, it may be necessary to modify this HASP. All proposed modifications to this HASP must be reviewed and approved by the RHSM before such modifications are implemented. Any significant modifications must be incorporated into the written document as addenda and the HASP must be reissued. The PM will ensure that all personnel covered by this HASP receive copies of all issued addenda. Sign-off forms will accompany each addendum and must be signed by all personnel covered by the addendum. Sign-off forms will be submitted to the PM. The HASP addenda should be distributed during the daily safety meeting so that they can be reviewed and discussed. Attendance forms will be collected during the meeting.

2.0 Site description and history

2.1 Site location

The Metropolitan Former MGP site is located at 124 -136 2nd Avenue in Brooklyn, Kings County, New York. The site is located east of the Gowanus Canal, between the Gowanus Expressway (Highway 278) and the New York City Transit train bridge and associated subway rail line. The site is bounded by 10th Street and 11th Street to the north, 2nd Avenue to the east, 13th Street to the south and the Gowanus Canal to the west.

A portion of the site was the subject of previous extensive remedial/redevelopment activities undertaken by independent third parties with NYSDEC oversight. This plan covers activities for those portions of the site that were not addressed by the previous remedial/redevelopment activities. Currently, the site is comprised of six parcels including:

- Block 1007 Lot 172 – Hamilton Plaza including a large grocery store (Pathmark) and small retail shops
- Block 1007 Lot 269 – Part of retail plaza
- Block 1025 Lot 16 – Parking lot of retail plaza
- Block 1025 Lot 20 – Parking lot of retail plaza
- Block 1025 Lot 100 – Retail parking lot selling used automobiles
- Block 1025 Lot 26 – Two-story maintenance garage/retail offices

2.2 Site history

The Metropolitan former MGP was operated by Brooklyn Union Gas Company (BUG), a predecessor company to Grid, from the late 1880s until approximately 1938. This section discusses site usage based on a review of Sanborn Maps covering the 110 year period of 1886 through 1996.

In 1886 the site was occupied by Metropolitan Gas Light Company (listed as storage only on the 1886 Sanborn map) and included a coal shed, gasometer (No. 1 holder), and retorts. By 1904, the MGP was listed as the Metropolitan Works Branch and owned by BUG. By this time, the plant expanded to include two additional holders (Holders 2 and 3) and showed and expansion of gas manufacture structures and tanks (mostly in the northern portion of the site).

Historical records indicate the gas plant operated as a coal gas plant prior to 1915, by which time the plant appears to have converted to a carbonated water gas process. By this time , the plant had added an additional hydrogen holder (Holder 4) as well as oil storage tanks east of Holder 2. The facility expanded onto Block 1025 and added a large distribution holder (Holder 5). An asphalt plant (Brooklyn Alcatraz Asphalt Company) is shown to be located adjacent to the former MGP on two separate parcels

By 1938, most of the operating structures and Holders 1 through 3 were removed and the site was listed as the BUG “12th Street Holder Department”, suggesting that gas manufacturing had ceased and the site was used for gas storage only. At this time, the Ernst Zobel Pitch Paint Manufacturing Plant was reportedly in operation adjacent to and northeast of the site. However, the adjacent asphalt plant was no longer in operation by this time.

In 1950, the southern portion of the eastern parcel of the former MGP was listed as housing the US Post Office Garage and Repair shop, with some former MGP structures (a coal bunker where relief Holder 4 was previously shown and a boiler house) closer to the Gowanus Canal on the northern portion of this parcel. The

western parcel of the former MGP still housed Holder 5 and the exhaust house, with the parcel listed as a storage area for old electric cables.

By 1969, all former MGP structures were removed from the eastern parcel of the former MGP, however BUG was still listed as the owner of the western parcel and Holder 5 was still present. In addition, a food products warehouse was shown as being present in the northern portion of the eastern parcel of the former MGP, adjacent to the Gowanus Canal. By 1972, all structures from the former MGP were removed. Sanborns from 1982 through 1996 show no major changes in site usage, with the US Postal Service, the food packaging warehouse, and parking covering the footprint of the former MGP.

The southern half of the MGP parcel (Block 1007, Lots 1, 219 and 220) was investigated and remediated through extensive soil excavation of the former oil tanks and Holders 1 through 3. In addition, approximately 44 recovery wells were installed along the southern and western edges of this parcel to allow recovery of free phase non-aqueous phase liquid (NAPL). This work, completed in 2003 by FC Gowanus, LLC, allowed this portion of the former MGP footprint to be closed under NYSDEC oversight in September 2003. The remediation /closure of these areas, with subsequent redevelopment as a Lowe's Supply Store, provides the basis for the definition of the current site. Recent information on the current site is limited to a 2007 petroleum release for a maintenance and garage facility (Block 1025, Lot 26).

3.0 Scope of work

3.1 Purpose of investigation

The overall objective for the proposed remedial investigation is to complete the investigation of the remaining site areas and lay the groundwork for the selection of site remedy.

As indicated previously, the southern half of the main MGP parcel was investigated and remediated. The remaining portions of the MGP will be investigated during this RI. The key features of the former MGP to be investigated include:

- The former MGP structures on the western portion of the main MGP parcel where the Hamilton Plaza is currently located.
- The southern portion of the former MGP, which housed Holder 5 and additional gas storage (valve house) facilities.
- The areas west of Holder 5 that previously housed the Brooklyn Alcatraz Asphalt Company.
- Along 12th Street between the Gowanus Canal and 2nd Avenue, adjacent to several former MGP structures.
- One upgradient area with suspected impacts near the intersection of 12th Street and 2nd Avenue, and,
- The downgradient property boundary areas along 13th Street and the Gowanus Canal.

3.2 Field investigation

The field activities being conducted during the proposed remedial investigation include:

- Excavation of test pits in and around former Gas Holder No 5 using a backhoe or excavator;
- Collection of soil samples from each test pit for field screening using a photoionization detector (PID) and subsequent laboratory analyses;
- Advancement of subsurface soil borings to varying depths {maximum 70 feet below ground surface (bgs)} across the site using either rotosonic or hollow-stem auger drilling methods and possibly direct push drilling methods in areas with access limitations;
- Collection of surface soil and subsurface soil samples for field screening and laboratory analyses;
- Conversion of nine borings into overburden groundwater monitoring wells;
- Development of each newly installed groundwater monitoring well;
- Gauging of each newly installed and select existing groundwater monitoring wells for non-aqueous phase liquids (NAPL) prior to sampling;
- Collection of groundwater samples from all newly installed monitoring wells using low-flow techniques with a peristaltic or submersible pump;
- Conducting hydraulic conductivity test (i.e. slug test) on at least three monitoring wells; and,
- Collection of sub-slab soil vapor samples from immediately below the concrete floor slabs inside two on-site buildings, as well as three corresponding indoor air and one outside ambient air sample.

4.0 Chemical hazard assessment and control

4.1 Chemical hazards

Typical wastes associated with former MGP operations could include volatile organic compounds (VOCs) such as benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), tar-like materials, purifier box wastes (potentially containing cyanide complexes and compounds) and certain trace metals associated with ash and clinkers.

4.1.1 Volatile organic compounds

The VOCs associated with MGP wastes include BTEX. Exposure to the vapors of BTEX above their respective OSHA permissible exposure limits (PELs) may produce irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in the depression of the central nervous system (CNS). Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behaviors.

Prolonged overexposure to benzene vapors has detrimental effects on the blood-forming system ranging from anemia to leukemia. The PEL for benzene is 1 part per million (ppm), as an 8 hour time-weighted average (TWA). The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a threshold limit value (TLV) of 0.5 ppm. The OSHA PEL for ethylbenzene is 100 ppm, as an 8-hr TWA. The PEL for toluene is 200 ppm, as an 8-hr TWA; however, the ACGIH recommends a TLV of 10 ppm for toluene. Xylene is a flammable, colorless liquid with an OSHA PEL of 100 ppm, as an 8-hour TWA.

4.1.2 Polycyclic aromatic hydrocarbons

Typical coal gasification byproducts (coal tar) contain PAH compounds. PAH compounds are a family of multiple ring aromatic compounds commonly found in fossil fuels and formed from the incomplete combustion of organic materials. Repeated contact with PAH compounds may cause photosensitization of the skin, producing skin burns after subsequent exposure to ultra-violet light. Certain PAHs as a group are considered potential human carcinogens (CaPAH). OSHA regulates PAHs as coal tar pitch volatiles (CTPV) and has established a PEL for CTPV of 0.2 mg/m3, as an 8-hr TWA.

Of the PAH compounds typically present at MGP sites, naphthalene is typically present at higher concentrations than the other compounds. Naphthalene is easily detected due to its characteristic moth-ball like odor. The inhalation of high concentrations of naphthalene vapor may result in nausea, vomiting, abdominal pain and irritation of the bladder. Prolonged overexposure may result in renal shut down. The OSHA PEL for naphthalene, as an 8-hr TWA, is 10 ppm.

4.1.3 Oxide box wastes

Blue staining is the characteristic associated with the presence of oxide box wastes (ferrocyanide). Therefore, the presence of this material is very easily identified during field investigations. The cyanides associated with oxide box wastes are present in a form that is generally unavailable or complexed with metals such as iron, which makes the cyanide more stable. Thus, the reported effects of free cyanide are not applicable. OSHA has not established a PEL for ferro/ferri cyanide compounds. Similarly, the ACGIH has not recommended a TLV for these compounds.

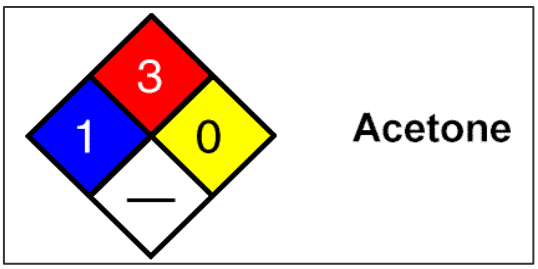
4.1.4 Metals

Lead is a common component of urban fill and soils present at industrial sites, such as former MGP and electrical generating sites. In general, the inhalation of metal dusts is irritating to the upper respiratory tract and nasal mucous membranes. Most metal dusts may cause dermatitis and/or eye irritation. The early symptoms of lead poisoning, as a result of overexposure (either through ingestion or inhalation) include fatigue, sleep disturbance, headache, aching bones and muscles, digestive irregularities, abdominal pains, and decreased appetite. Chronic overexposures to lead affect the CNS and male and female reproductive systems. Lead has also been identified as a fetotoxin. The OSHA PEL for inorganic lead is 50 micrograms per cubic meter ($\mu g/m^3$), as an 8-hr TWA.

4.2 Hazardous substances brought on-site by AECOM and/or contractors

A material safety data sheet (MSDS) must be available for each hazardous substance that AECOM or AECOM contractors bring on the property. This includes solutions/chemicals that will be used to decontaminate sampling equipment, fuels, and calibration gases for air monitoring equipment.

In addition, all containers of hazardous materials must be labeled in accordance with OSHA's Hazard Communication Standard. Either the original manufacturer's label or an NFPA 704M label specific for the material (as shown at the right) is considered to be an acceptable label.



4.3 Chemical exposure and control

4.3.1 Chemical exposure potential

The proposed investigation locations were selected to target areas most likely to contain MGP residuals or delineate the extent of previously identified soil and groundwater impacts. As such, the field team should be prepared to encounter contamination during the proposed investigation of the property. The most likely routes of potential chemical exposure during the implementation of this field program include the following:

- Inhalation of VOC vapors and impacted dusts during soil boring advancement and well installation, as well as during the excavation of test pits and/or the installation of soil gas vapor probes.
- Direct dermal contact with potentially contaminated soils and groundwater during sampling.
- Direct dermal contact with NAPL (if encountered) during well gauging, the collection of NAPL samples and/or oil-saturated soil samples

4.3.2 Chemical Exposure Control

The potential chemical hazards associated with the proposed activities can be controlled in several ways, including:

- Direct-reading air monitoring instrumentation will be used, as described in Section 6.0 of this HASP, to determine the concentration of VOC vapors that may be present in the work area and in the employee's breathing zone during intrusive site activities as described above. If necessary, respiratory protection, as defined in Section 7.2 of this HASP, may be donned to control employee exposure to the vapors of VOCs.
- Dusts from contaminated soils may be generated during intrusive site activities. If necessary, a light mist of water can be applied to the borehole or excavation to suppress dust generation. A MIE Data-

Ram total dust monitor, or its equivalent, will be used to monitor the effectiveness of these engineering controls and to determine if respiratory protection is required.

- Polyethylene sheeting will be placed over any soil stockpiles to prevent vapor release as well as dust generation.
- All work conducted inside buildings will be performed using electric drilling devices so that exhaust gases from internal combustion engines will not accumulate within any occupied tenant space or public access area.
- To avoid direct dermal contact with contaminated media, protective clothing, as described in Section 7.1, will be required when handling and collecting samples .
- Although highly unlikely, exposure to all of the contaminants of concern may occur via ingestion (hand-to-mouth transfer). The decontamination procedures described in Section 9.0 address personal hygiene issues that will limit the potential for contaminant ingestion.

5.0 Physical hazards and controls

The general safety procedures in this HASP have been developed to address the potential physical hazards associated with the implementation of this investigative program. Prior to site mobilization, JSAs will be developed by AECOM and/or AECOM's selected contractors for each field task to be executed during the overall proposed program. JSAs will be reviewed by the RHSM and Project Managers and appended to this HASP for all field staff to review and use as necessary.

While every effort has been made to address the potential chemical and physical hazards that may be encountered during the implementation of the proposed project activities, unanticipated site-specific conditions or situations may occur. As such, JSAs also will be used to manage change in the field. Site workers may elect to perform certain tasks in a manner different than what was originally intended due to a change in field conditions. Therefore, a JSA will be completed by AECOM or contractor staff when new tasks or different techniques not addressed in the HASP are proposed. The use of new techniques will be reviewed by the proposed field teams and any new hazards associated with the proposed changes will be documented on the JSA along with the proposed control measure for each of the identified hazards.

5.1 Utility hazards

5.1.1 Underground utilities

New York law requires that a utility clearance be performed at the site at least 48 hours prior to initiation of any subsurface work. The drilling and excavation contractors will contact NYC/LI One Call Dig Safely (1.800.272.4480) to request a mark-out of natural gas, electric, telephone, and cable television, in the proposed test pit and soil boring areas. Indoor sub-slab vapor sampling locations must also be included in this request. The contractor will also contact the local water and sewer authorities to request a mark out of any lines in the proposed work areas.

Public utility clearance organizations typically do not mark-out underground utility lines that are located on private property. As such, the contractor must exercise due diligence and try to identify the location of any private utilities at the work areas. Due diligence can be fulfilled in several ways, including:

- obtaining as-built drawings for the areas where subsurface work is being conducted from the property owner(s);
- visually reviewing each proposed subsurface work area with the property owner(s) or knowledgeable site representative(s);
- performing a geophysical survey to locate utilities or hiring a private line locating firm to determine the location of utility lines that are present at the property;
- identifying a no-drill/no-dig zone; or
- hand digging in the proposed subsurface locations if insufficient data is available to accurately determine the location of the utility lines.

For this program, following the NYC/LI One Call Dig Safely mark-out request and a review of all available site plans, AECOM will contact a private company to conduct a geophysical investigation to locate subsurface utility lines in the proposed investigative areas. As a final measure of due diligence to safely advance the proposed soil borings, the first five feet of each boring will be advanced using hand method or vacuum extraction methods.

5.1.2 Overhead utility hazards

Contractors must perform a site reconnaissance at each work location to identify all overhead lines located in and around the work areas and to determine if the minimum clearance requirements can be met. Any vehicle or mechanical equipment capable of having parts of its structure elevated (drill rig, crane etc.) near energized overhead lines shall be operated so that a clearance of at least 10 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.

If the required clearance cannot be maintained at any work area at the site, additional precautions must be taken to ensure contact with the overhead lines does not occur. Options include, but may not be limited to, de-energizing the line or placing an insulating barrier over the line. Both of these options will require coordination with the owner of the lines in question.

5.2 Working inside buildings to conduct sub-slab vapor sampling

Following utility clearance, sub-slab soil vapor samples will be collected immediately below the concrete floor slabs of two on-site buildings. The soil vapor sampling points will be installed by drilling a ¾-inch diameter hole through the concrete slab. Indoor air samples will also be collected at the same location as the sub-slab samples.

AECOM representatives will work with the building owners to ensure that the sampling being conducted inside their properties will not interfere with ongoing operations but that will also ensure that sample integrity is maintained. If necessary, AECOM will set up a small exclusion zone around each indoor sampling area so employees of the facility as well as patrons and visitors do not trip, slip or fall over the sampling equipment or otherwise potentially interfere with the sampling process.

5.3 Slips, trips and fall hazards

5.3.1 Site conditions

On any work area, it is expected that the ground may be uneven. The ground surface may be unreliable due to settling. Surface debris may be present and wet or swampy areas may exist.

To avoid the potential for slip, trips and falls, employees must wear sturdy footwear. Additionally, employees should walk around, not over or on top of, debris or trash piles. When carrying equipment, identify a path that is clear of any obstructions. It may be necessary to remove obstacles to create a smooth, unobstructed access point to the work areas on site.

5.3.2 Good housekeeping

Maintaining a work environment that is free from accumulated debris is the key to preventing slip, trip and fall hazards at construction sites. Essential elements of good housekeeping include

- orderly placement of materials, tools and equipment;
- placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish;
- prompt removal and secure storage of items that are not needed to perform the immediate task at hand; and,
- awareness on the part of all employees to walk around, not over or on, equipment that may have be stored in the work area

The SSO will conduct regular inspections of each work area with the Contractor's SSO to verify that each drilling area is being maintained in an orderly fashion and that materials are being stored in the dedicated areas so that tripping hazards are minimized.

5.4 Traffic hazards

The proposed investigative areas include paved areas used for parking and/or sidewalk right-of-ways along 12th Street. Each presents unique safety hazards that are addressed below.

5.4.1 Pedestrian Walkways on 12th Street

AECOM will ensure that temporary pedestrian walkways are established when work is conducted on 12th Street. The walkway will, to the extent possible, re-route pedestrians away from the drilling areas while still allowing access to the plaza and other businesses in the area.

5.4.2 Parking lots

Much of the proposed work is taking place in the parking areas of the retail plaza. As such, motor vehicle traffic will be a significant hazard for the field teams. When working in high traffic areas, AECOM should:

- Notify the property owner of the proposed work location, dates of work and the anticipated work times. AECOM should suggest the possibility of a detour around the work area.
- All employees working in high traffic areas will wear an ANSI-approved Class II safety vest.
- Create an exclusion zone around the work area by setting up traffic barriers and/or cones at least 50 feet in front of the work area. "Men at Work" signs should also be placed in a conspicuous area to warn others of your presence.

5.5 Drilling hazards

A variety of drilling techniques may be used to install soil borings and groundwater monitoring wells including direct-push techniques using a Geoprobe™ rig, hollow-stem auger drilling and/or rotosonic drilling.

5.5.1 Geoprobe™ hazards

Use of the Geoprobe™ System to collect soil samples will require all personnel in the vicinity of the operating unit to wear steel-toed boots, hardhats, hearing protection, and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. Additionally, the following safety requirements must be adhered to:

- A remote vehicle ignition is located on the control panel of the Geoprobe™ unit. This allows the operator to start and stop the vehicle engine from the rear. This device must be tested prior to job initiation and periodically thereafter. All employees should be aware of how to access and operate the rear ignition.
- The driller must never leave the controls while the probe is being driven.
- Drillers, helpers, and geologists must secure all loose clothing when in the vicinity of drilling operations.
- The Geoprobe™ vehicle shall not be moved any distance with the probe in the extended position. Check for clearance at roof or the vehicle before folding the Geoprobe™ out of the carrier vehicle.
- Be sure the parking brake is set before probing.

- Never allow the derrick foot to be lifted more than 6" off of the ground surface.
- Deactivate hydraulics when adding or removing probe rods, anvils, or any tool in the hammer.
- Verify that all threaded parts are completely threaded together before probing.

5.5.2 Auger Drilling

Use of a drill rig to advance soil borings and install monitoring wells will require all personnel in the vicinity of the operating rig to wear steel-toed boots, hardhats, hearing protection and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. Additionally, the following safety requirements must be adhered to:

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller and helper shall not simultaneously handle augers unless there is a standby person to activate the emergency stop.
- The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of rotating equipment.
- A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools which could rotate, the driller must shut down the rig prior to initiating such work.
- Drillers, helpers and geologists must secure all loose clothing when in the vicinity of drilling operations.
- Only equipment which has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed
- No person shall climb the drill mast while tools are rotating.
- No person shall climb the drill mast without the use of ANSI-approved fall protection (approved belts, lanyards and a fall protection slide rail) or portable ladder which meets the requirements of OSHA standards.

5.5.3 Sonic Drilling

The hazards of sonic drilling are unique. The lead driller will review the JSAs the drilling firm has prepared for this type of drilling with the AECOM environmental technician overseeing the drilling during the morning safety meetings to ensure that the technician is aware of the hazards associated with sonic drilling oversight.

5.6 Excavation hazards

5.6.1 Working around machinery

Heavy equipment, including bobcats or excavators, will be used to excavate test pits. The use of such equipment poses a potential hazard to the support crew working around the equipment. Use of heavy equipment at the site requires AECOM employees working in the exclusion zone to wear ANSI-approved hard hats, steel-toed safety shoes/boots, safety glasses, hearing protection and ANSI-approved traffic vests.

AECOM employees will be conducting monitoring and sampling during test-pitting activities and may be located in close proximity to the operating machinery. When working around heavy equipment, employees should:

- make sure that the operator is aware of your presence/activities;
- stay in the operator's line of sight, don't work in his/her blind spot;
- develop a series of hand signals to facilitate communication with the operator;
- approach areas where equipment is operating from a direction visible to the operator;
- be aware of the swing radius of the excavator;
- do not walk or work underneath loads handled by digging equipment;
- do not ride in buckets of loaders; and,
- stand away from soil stockpile areas to avoid being struck by any spillage or falling materials

5.6.2 Trench/excavation cave-in or collapse

The expected depth of the test pits will exceed five feet ground surface (bgs). Due to the potential for cave-in and collapse, all samples collected from the test pits will be done so with a remote sampling device or collected directly from the bucket of the backhoe. This eliminates the need for employees to enter the excavation or trench. NO AECOM EMPLOYEE WILL ENTER A TEST PIT TO COLLECT ANY SAMPLES.

5.6.3 Open excavations

To the extent possible, all excavations should be backfilled as soon as possible after work is completed. If excavations are to be left open, the perimeter of the excavation will be marked with high-visibility snow fencing. Additional protection, such as the use of metal plates, may be required by the facility, depending on where the open excavation is located.

5.7 Noise exposure

The use of drill rig or excavation equipment may expose the field team to noise levels that exceed the OSHA PEL of 90 dB for an 8-hour day. Exposure to noise can result in the following:

- Temporary hearing losses where normal hearing returns after a rest period;
- Interference with speech communication and the perception of auditory signals;
- Interference with the performance of complicated tasks; and,
- Permanent hearing loss due to repeated exposure resulting in nerve destruction in the hearing organ.

Since personal noise monitoring will not be conducted during the proposed activities, employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone 5 feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating (NRR) of 27 dB.

5.8 Hand and power tools

A variety of hand and power tools may be used during the proposed activities. The use of each can pose serious safety hazards to the user.

5.8.1 Hand tools

The greatest hazards posed by hand tools result from misuse and improper maintenance.

- When using hand tools be sure you have selected the right tool for the job. If a screwdriver is used as a chisel, the tip of the screwdriver may break or fly off, hitting the user or others.
- Inspect tools for damage such as mushroomed chisel heads or broken hammer handles. If jaws of a wrench are sprung, the wrench may slip. If a wooden handle is loose, splintered or cracked, the head of the tool may fly off.
- Do not use damaged tools.
- Be sure you know how to use the tool you are working with.

5.8.2 Using knives or blades

Geoprobe™ soil samples are contained within an acetate liner that must be cut open in order to retrieve the sample. As such, employees are at an increased risk of cutting themselves since a knife or blade is typically used to open the liner and the liner is often placed on an irregular or unstable work surface (i.e., the back of the Geoprobe™ van or the ground). However, a hooked knife is typically used to cut the liners open which will reduce the potential for being cut.

Additionally, a knife must be used to open boxes of materials or equipment and to cut groundwater sampling tubing. The only acceptable type of utility knife will be those with automatically retracting blades.

When using knives or blades, follow the safety precautions listed below:

- Keep your free hand out of the way when cutting.
- Secure whatever it is you are cutting, especially if it is located on an uneven surface.
- Use only sharp blades; dull blades require more force which results in less knife control.
- Pull the knife toward you; pulling motions are easier to manage.
- Don't put your knife in your pocket.
- Wear leather or Kevlar™ gloves when using knives or blades.

5.8.3 Power tools

To prevent hazards associated with the use of power tools, workers should observe the following general precautions:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords away from heat, oil and sharp edges.
- Disconnect tools when not using them, before servicing or cleaning them and when changing accessories such as blades, bits and cutters.
- If a tool is only temporarily being removed from the power source and the cord is not in the immediate control of the user, it is strongly suggested that a cord plug lockout be used to prevent the tool from accidentally being re-plugged in.
- Secure work with clamps or vise, freeing up both hands to operate the tool.

- Avoid accidental starting. Do not hold fingers on the switch button when carrying a plugged-in tool.
- Keep tools sharp and clean for best performance.
- Wear appropriate clothing. Loose clothing or jewelry can become caught in moving parts.
- Keep all guards in place.

5.8.4 Electric tools

A variety of power tools may also be used during the proposed activities. When using portable tools that are electrically powered, follow the safety precautions listed below:

- Check to see that electrical outlets used to supply power during field operations is of the three wire grounding type.
- Extension cords used for field operations should be of the three wire grounding type and designed for hard or extra-hard usage. This type of cord uses insulated wires within an inner insulated sleeve and will be marked S, ST, STO, SJ, SJO or SJTO.
- NEVER remove the ground plug blade to accommodate ungrounded outlets.
- Do not use extension cords as a substitute for fixed or permanent wiring. Do not run extension cords through openings in walls, ceilings or floors.
- Protect the cord from becoming damaged if the cord is run through doorways, windows or across pinch points.
- Examine extension and equipment cords and plugs prior to each use. Damaged cords with frayed insulation or exposed wiring and damaged plugs with missing ground blades MUST BE REMOVED from service immediately.
- All portable or temporary wiring which is used outdoors or in other potentially wet or damp locations must be connected to a circuit that is protected by a ground fault circuit interrupter (GFCI). GFCI's are available as permanently installed outlets, as plug-in adapters and as extension cord outlet boxes. DO NOT CONTINUE TO USE A PIECE OF EQUIPMENT OR EXTENSION CORD THAT CAUSES A GFCI TO TRIP.
- When working in flammable atmospheres, be sure that the electrical equipment being used is approved for use in Class I, Division I atmospheres.
- Do not touch a victim who is still in contact with current. Separate the victim from the source using a dry, nonmetallic item such as a broomstick or cardboard box. Be sure your hands are dry and you are standing on a dry surface. Turn off the main electrical power switch and then begin rescue efforts.

5.9 Generator safety

Generators may be needed to provide power to equipment being used on site. When using a generator, follow these safety guidelines:

- Make sure the wattage of the generator is sufficient for your project needs;
- Make sure the voltage rating of the generator matches the rating of the equipment you need to operate;
- Gasoline and its vapors may ignite if they come in contact with hot components or an electrical spark. Turn the generator off and make sure it has cooled down (i.e. 10-minutes) before re-fueling. Do not refuel when the generator is running or hot. Smoking is not permitted during refueling operations or in the vicinity of any diesel-fueled equipment

- Properly ground the generator
- Keep water away from the generator. Protect it from rain.
- Use a heavy-duty, three-prong, grounded extension cord.

5.10 Materials handling

5.10.1 Mechanical devices for safe lifting

All drums and containers of investigation-derived waste should be lifted and transported using drum dollies, hand carts, or other devices that remove the potential for employee back injury. This will also help reduce the potential for the containers to become ruptured or damaged during transport.

5.10.2 Back safety during manual lifting

The following precautions should be implemented when mechanical devices are not available to move materials:

- If mechanical devices are not available, ask another person to assist you.
- Bend at the knees, not the waist. Let your legs do the lifting.
- Do not twist while lifting.
- Bring the load as close to you as possible before lifting.
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip and fall hazards.

5.11 Thermal stress

The proposed activities are scheduled for Spring 2009. However, since the exact dates of field work are not known, the hazards of both heat and cold stress are addressed in this HASP.

5.11.1 Heat stress

<u>Types of heat stress</u>

Heat related problems include **heat rash, fainting, heat cramps, heat exhaustion and heat stroke**. **Heat rash** can occur when sweat isn't allowed to evaporate, leaving the skin wet most of the time and making it subject to irritation. **Fainting** may occur when blood pools to lower parts of the body and as a result, does not return to the heart to be pumped to the brain. Heat related fainting often occurs during activities that require standing erect and immobile in the heat for long periods of time. **Heat cramps** are painful spasms of the muscles due to excessive salt loss associated with profuse sweating. **Heat exhaustion** results from the loss of large amounts of fluid and excessive loss of salt from profuse sweating. The skin will be clammy and moist and the affected individual may exhibit giddiness, nausea and headache.

Heat stroke occurs when the body's temperature regulatory system has failed. The skin is hot, dry, red and spotted. The affected person may be mentally confused and delirious. Convulsions could occur. EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH. A person exhibiting signs of heat stroke should be removed from the work area to a shaded area. The person should be soaked with water to promote evaporation. Fan the person's body to increase cooling.

Early Symptoms of Heat-Related Health Problems:

- decline in task performance
- un-coordination
- decline in alertness
- unsteady walk
- excessive fatigue
- reduced vigilance
- muscle cramps
- dizziness

Susceptibility to Heat Stress Increases due to:

- lack of physical fitness
- lack of acclimation
- increased age
- dehydration
- obesity
- drug or alcohol use
- sunburn
- infection

People unaccustomed to heat are particularly susceptible to heat fatigue. First timers in PPE need to gradually adjust to the heat.

The effect of personal protective equipment

Sweating normally cools the body as moisture is removed from the skin by evaporation. However, the wearing of certain personal protective equipment (PPE), particularly chemical protective coveralls (e.g., Tyvek), reduces the body's ability to evaporate sweat and thereby regulate heat buildup. The body's efforts to maintain an acceptable temperature can therefore become significantly impaired by the wearing of PPE.

Measures to avoid heat stress:

The following guidelines should be adhered to when working in hot environments:

- Establish work-rest cycles (short and frequent are more beneficial than long and seldom).
- Identify a shaded, cool rest area.
- Rotate personnel, alternative job functions.
- Water intake should be equal to the sweat produced. Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst. DO NOT DEPEND ON THIRST TO SIGNAL WHEN AND HOW MUCH TO DRINK. For an 8-hour workday, 50 ounces of fluids should be drunk.
- Eat lightly salted foods or drink salted drinks such as Gatorade to replace lost salt.
- Save most strenuous tasks for non-peak heat hours such as the early morning or at night.
- Avoid alcohol during prolonged periods of heat. Alcohol will cause additional dehydration.
- Avoid double shifts and/or overtime.

The implementation and enforcement of the above mentioned measures will be the joint responsibility of the project manager, on-site field coordinator, and health and safety officer. Potable water and fruit juices should be made available each day for the field team.

Heat stress monitoring techniques

Site personnel should regularly monitor their heart rate as an indicator of heat strain by the following method: Check radial pulse rates by using fore-and middle fingers and applying light pressure to the pulse in the wrist for one minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beat/minute, shorten the next work cycle by one-third and keep the rest period the same. If, after the next rest period, the pulse rate still exceeds 110 beats/minute, shorten the work cycle by one-third.

5.11.2 Cold stress

Types of cold stress

Cold injury is classified as either localized, as in frostbite, frostnip or chilblain; or generalized, as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness and inadequate clothing.

The likelihood of developing frostbite occurs when the face or extremities are exposed to a cold wind in addition to cold temperatures. The freezing point of the skin is about 30° F. When fluids around the cells of the body tissue freeze, skin turns white. This freezing is due to exposure to extremely low temperatures. As wind velocity increases, heat loss is greater and frostbite will occur more rapidly.

Symptoms of cold stress

The first symptom of frostbite is usually an uncomfortable sensation of coldness, followed by numbness. There may be a tingling, stinging or aching feeling in the effected area. The most vulnerable parts of the body are the nose, cheeks, ears, fingers and toes.

Symptoms of hypothermia, a condition of abnormally low body temperature, include uncontrollable shivering and sensations of cold. The heartbeat slows and may become irregular, the pulse weakens and the blood pressure changes. Pain in the extremities and severe shivering can be the first warning of dangerous exposure to cold.

Maximum severe shivering develops when the body temperature has fallen to 95° F. Productive physical and mental work is limited when severe shivering occurs. Shivering is a serious sign of danger. Immediately remove any person who is shivering from the cold.

Methods to prevent cold stress

When the ambient temperature, or a wind chill equivalent, falls to below 40° F (American Conference of Governmental Industrial Hygienists recommendation), site personnel who must remain outdoors should wear insulated coveralls, insulated boot liners, hard hat helmet liners and insulated hand protection. Wool mittens are more efficient insulators than gloves. Keeping the head covered is very important, since 40% of body heat can be lost when the head is exposed. If it is not necessary to wear a hard hat, a wool knit cap provides the best head protection. A facemask may also be worn.

Persons should dress in several layers rather than one single heavy outer garment. The outer piece of clothing should ideally be wind and waterproof. Clothing made of thin cotton fabric or synthetic fabrics such as polypropylene is ideal since it helps to evaporate sweat. Polypropylene is best at wicking away moisture while still retaining its insulating properties. Loosely fitting clothing also aids in sweat evaporation. Denim is not a good protective fabric. It is loosely woven which allows moisture to penetrate. Socks with a high wool content are best. If two pairs of socks are worn, the inner sock should be smaller and made of cotton, polypropylene or similar types of synthetic material that wick away moisture. If clothing becomes wet, it should be taken off immediately and a dry set of clothing put on.

If wind conditions become severe, it may become necessary to shield the work area temporarily. The SSO and the PM will determine if this type of action is necessary. Heated break trailers or a designated area that is heated should be available if work is performed continuously in the cold at temperatures, or equivalent wind chill temperatures, of 20° F.

Dehydration occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to significant change in blood flow to the extremities. Drink plenty of fluids, but limit the intake of caffeine.

6.0 Air monitoring

6.1 Work zone monitoring

There are two main potential routes of exposure to the compounds of concern. The vapor pressure of PAHs, and metals is negligible. Therefore, the inhalation of PAH or metal vapors is not a concern. However, the inhalation of PAH and/or metal-impacted dusts is a concern as the potential for dust generation may occur during rotary drilling and test pitting, especially if site soils are dry. The VOCs associated with MGP wastes are volatile enough to pose a potential vapor hazard to those working in the immediate drilling and excavation areas. Therefore, monitoring in the worker's breathing zone will be conducted to ensure that the concentrations of total VOC vapors and airborne dusts, if any, are maintained at safe levels during all subsurface field investigations.

6.1.1 VOC monitoring/benzene

A photoionization detector (PID), such as a RaeSystems MiniRae 2000 PID equipped with a 10.6 ev lamp or equivalent, will be used to screen the breathing zone of employees during all subsurface investigations as site conditions warrant but no less than at least once every hour. If breathing zone concentrations of total VOCs are sustained (15 minutes) at 1 unit above background, a measurement will be made for the presence of benzene using a colorimetric detector tube. In the absence of benzene, respiratory protection will be donned if total VOC concentration is sustained at 10 units as indicated by the PID. If benzene is present at concentrations of 1 ppm or more as indicated by the detector tube, respiratory protection will be donned. Requirements for respiratory protection are outlined in Section 7.2 of this HASP.

6.1.2 Dust monitoring

Dust control measures, as described in this HASP, will be implemented to prevent and/or control the concentration of airborne dust levels during the subsurface activities. A MIE Data-Ram total dust monitor, or its equivalent, will be used to monitor the effectiveness of these engineering controls and to determine if measures to mitigate the dust are effective and/or if respiratory protection is required.

An action level of 150 ug/m^3 has been established for total dust (sustained downwind at breathing zone for 15-minutes). The total dust monitor will be used to determine that total dust levels upwind and downwind of the work area.

6.2 Personal exposure monitoring

Personal exposure monitoring will not be conducted during the proposed remedial investigations.

6.3 Calibration and recordkeeping

Equipment used by AECOM will be calibrated in accordance with the quality assurance plan and AECOM's standard operating procedures. The PID will be calibrated to an isobutylene-in-air mixture. The dust monitor will be zeroed daily. All calibrations will be recorded in a field notebook or separate equipment calibration sheets.

6.4 Community air monitoring program

The Community Air Monitoring Plan (CAMP) is provided as Appendix E in the Remedial Investigation Work Plan. The CAMP includes provisions for monitoring for VOCs and particulates (as total dust) at the downwind

perimeter of each designated work area when subsurface investigative activities are taking place. The CAMP specifies action levels which require increased monitoring, corrective actions to abate emissions, and/or work shutdown during the proposed intrusive activities.

7.0 Personal protective equipment

Personal protective equipment (PPE) will be worn during these activities to prevent on-site personnel from being injured by the safety hazards posed by the site and/or the activities being performed. Given the congested and high traffic nature of the site, all workers will wear an ANSI-approved Class II safety vest at all times. In addition, chemical protective clothing will be worn to prevent direct dermal contact with the site's chemical contaminants.

7.1 Protective Clothing

PPE Item	Advance Soil Borings/Install Monitoring Wells	Excavation of Test Pits	Soil Sampling	Well Development and Water Level Gauging	Groundwater Sample Collection and Slug Testing	Sub-Slab Soil Vapor and Indoor Air Sampling
Hard Hat	✓	✓	✓	If the facility requires such	If the facility requires such	If the facility requires such
Steel Toed Safety Shoes	✓	✓	✓	✓	✓	Waterproof if necessary
Safety Glasses with Sideshields	✓	✓	✓	✓	✓	✓
ANSI-approved Class II safety vest	✓	✓	✓	✓	✓	✓
Disposable nitrile gloves			✓	✓	✓	
Kevlar gloves	When handling drill rods		When cutting open acetate liners		When cutting tubing	When installing probes and cutting tubing
Hearing Protection	✓	✓	If working near operating rig or excavator			✓

7.2 Respiratory protection

As described in Section 6.1 of this HASP, direct reading instrumentation will be used to screen the breathing zone of employees during subsurface investigations and sampling activities. Exceedance of the following action limits will require that work be temporarily stopped and cause of the exceedance assessed. If the cause of the condition can be isolated such that the condition no longer persists or the activity that produced the exceedance can be modified to prevent future exceedance, then the work can continue in Level D PPE. If these alternatives cannot be realized then wearing of Level C respiratory protection will be required, as described below.

Contaminant	Action Limit (Sustained for 15 minutes)	Respirator Selection
Total VOCs (in the absence of benzene as determined by colorimetric indicator tube)	10 units on PID	Half-mask air-purifying respirator (APR) with organic vapor cartridges.
Benzene (as indicated by colorimetric indicator tube)	1 ppm to 10 ppm > 10 ppm	Half-mask air-purifying respirator (APR) with organic vapor cartridges. Suspend work and contact PM and RHSM.
Dust	150 µg/m^3	Apply light mist of water to borehole. If engineering controls are not sufficient, don half-mask APR with P-100 filters.

Level C Specification – Half-mask air-purifying respirator equipped with organic vapor cartridges and P-100 filters

All employees who are expected to wear respirators must have successfully passed a qualitative fit-test within the past year for the brand, model and size respirator they plan to wear for this program. Proof of medical clearance to wear respirator and current fit test documentation must be provided to the SSO upon arrival to the site.

7.3 Other safety equipment

The following additional safety items will be available at the site:

- Portable, hand-held eyewash bottles
- First aid kit
- Type A-B:C fire extinguisher (on drill rig)
- Portable phones/radios

If a trailer is provided onsite for employee occupation, it will be equipped with fire extinguishers an appropriate signage (e.g. “EXIT” and “No Smoking”).

8.0 Site control

8.1 Designation of zones

AECOM designates work areas or zones as suggested in the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November 1985. They recommend that the areas surrounding each of the work areas to be divided into three zones:

- Exclusion or "Hot" Zone,
- Contamination Reduction Zone (CRZ), and
- Support Zone.

8.1.1 Exclusion zone

An exclusion zone will be established around each exterior and interior subsurface activity location as well as each sampling location. The perimeter of the exclusion zone will be marked with traffic barriers, traffic cones and/or caution tape. All personnel entering these areas must wear the prescribed level of protective equipment.

8.1.2 Contamination reduction zone

A mini-contamination reduction zone (CRZ) will be established immediately adjacent to each exclusion zone to facilitate prompt removal of contaminated PPE. This is where personnel will begin the sequential decontamination process when exiting the exclusion zone. To prevent cross contamination and for accountability purposes, all personnel will enter and leave the exclusion zone through the contamination reduction zone. Personnel will remove contaminated gloves and other disposable items in this area and place them in a plastic bag until they can be properly disposed of.

8.1.3 Support zone

At this site, the support zone will include the area outside of the exclusion zone.

8.2 General site safety practices

The following measures are designed to augment the specific health and safety guidelines provided in this plan.

- AECOM personnel should avoid working alone on remote sites. On most sites, client, subcontractor, or public personnel are generally nearby in case of an emergency or accident. AECOM personnel, through coordination, can rely upon these personnel for assistance in an emergency. If no one else is nearby, scheduled calls on a cell phone may be used to assure personal safety.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in the immediate work area and the decontamination zone.
- Smoking is prohibited in all work areas. Matches and lighters are not allowed in work areas.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking or any other activities.

- The use of alcohol or illicit drugs is prohibited during the conduct of field operations.
- All equipment must be decontaminated or properly discarded before leaving the site in accordance with the project work plan.

8.3 Project communications plan

A call-in protocol has been established for this program. This call-in procedure is MANDATORY as it is the primary mechanism being used to verify that all AECOM employees have safely arrived at, and safely exited, their work areas.

Similar to a float plan that is created each time a boat leaves dock, a communication plan will detail when the individual or remote field team will call into the PM as a way to verify that the individual/team has made it to their destination, is continuing to work in safe conditions, has left the job site and has arrived back home safely.

The PM will create a communication protocol, similar to that described above, that identifies when the individual or team will call-in to the Project Manager. The plan will also outline what the PM will do in the event that the individual/team does not call-in within 1/2 hr of the designated call-in time (PM calls individual/team) and what the response will be if the individual/team does not respond to the PMs call to the individual/team (contact client, property owner, local police or emergency responders).

9.0 Decontamination

9.1 Personal decontamination

Proper decontamination is required of all personnel before leaving the exclusion zone. Decontamination will occur within the contamination reduction zone. Disposable PPE, such as gloves, will be removed in the decontamination reduction zone and placed in garbage bags for disposal as general refuse.

Regardless of the type of decontamination system required, as a minimum, a container of potable water and liquid soap should be made available so employees can wash their hands and face before leaving the site for lunch or for the day. Employees should always wash their face and hands with soap and water before eating, smoking or drinking.

9.2 Sampling equipment

Prior to sampling, all non-dedicated sampling equipment (bowls, spoons, interface probes, *etc*.) will be either steam cleaned or washed with potable water and a phosphate-free detergent (such as Alconox™). Decontamination may take place at the sampling location as long as all liquids are contained in pails, buckets, *etc*. The sampling equipment will then be rinsed with potable water followed by a deionized water rinse. Between rinses, equipment will be placed on polyethylene sheets or aluminum foil if necessary. At no time will washed equipment be placed directly on the ground. Equipment will be wrapped in polyethylene plastic or aluminum foil for storage or transportation from the designated decontamination area to the sampling location.

9.3 Investigation derived waste

All investigative waste generated during the RI will be collected in properly labeled USDOT approved storage containers (55-gallon drums) or a small bulk roll-off container and grouped by environmental matrix (soil, water, plastic/PPE, construction debris) drill cuttings that are generated during this program will be drummed and labeled as investigation derived waste. Final disposal of this material will be determined after receipt of analytical data.

10.0 Medical monitoring and training requirements

10.1 Medical monitoring

All personnel performing activities covered by this HASP must be active participants in a medical monitoring program that complies with 29 CFR 1910.120(f). Each individual must have completed an annual surveillance examination and/or an initial baseline examination within the last year prior to performing any work on the site covered by this HASP.

10.2 Health and safety training

10.2.1 HAZWOPER

All personnel performing activities covered by this HASP must have completed the appropriate training requirements specified in 29 CFR 1910.120 (e). Each individual must have completed an annual 8-hour refresher training course and/or initial 40-hour training course within the last year prior to performing any work on the sites covered by this HASP.

On-site managers and supervisors directly responsible for supervising individuals engaged in hazardous waste operations must have completed the specified 8-hour managers training course. (Note that AECOM corporate policy requires that whenever three or more AECOM employees are performing work on the same site, at least one of these individuals must have completed the manager's training course.)

10.2.2 First aid/CPR

At least one member of the AECOM field team must be currently certified in First Aid and CPR. All AECOM staff currently certified to provide First Aid and CPR are trained in the provisions of AECOM's Exposure Control Plan for Bloodborne Pathogens and will be prepared to implement those provisions in the event of an on-site emergency.

10.2.3 Hazard communication

All employees working on site will be advised of the associated hazards and the methodology to be utilized to mitigate those hazards and prevent exposures. This information will be presented to personnel prior to initiation of any field activities. The following information regarding hazardous materials will be presented to site workers per OSHA's Hazard Communication Program:

- Chemical/physical hazards of site contaminants and decontamination solvents and other hazardous materials brought on site;
- Appropriate PPE for protection from exposure to site contaminants and decontamination solvents;
- Review of MSDS and discussion about where MSDSs will be maintained on site; and
- Container labeling requirements and review of the NFPA labeling system.

10.3 On-site safety meetings

10.3.1 Pre-entry briefing

A pre-entry briefing will be conducted by the SSO to review the specific requirements of this HASP prior to the commencement of on-site activities. Attendance of the pre-entry meeting is mandatory for all personnel covered by this HASP and must be documented on the attendance form provided in Attachment C. HASP sign-off sheets should also be collected at the time of the pre-entry briefing. All documentation should be maintained in the project file.

The pre-entry briefing must be completed for each new employee before they begin work at the site. Short safety refresher meetings will be conducted, as needed, throughout the duration of the project. Specific topics that will be discussed during the pre-entry briefing include:

- Discussion of site responsibilities and project expectations
- Review of site history and contaminants of concern
- Discussion of work scope
- Review of the potential chemical hazards associated with contaminants of concern and how these potential hazards will be controlled
- Review of air monitoring requirements and action limits
- Review of PPE and engineering control requirements
- Review of respiratory protection requirements during various phases of site work
- Discussion of the potential physical hazards associated with implementing scope of work
- Review of decontamination procedures
- Review of emergency egress and hospital location/directions

10.3.2 Daily Safety Meetings

Daily meetings will also be held by the AECOM and Contractor SSO to ensure that all workers are prepared for and knowledgeable of that day's scope of work. Safety concerns will also be discussed at these meetings. Newly prepared JSAs will also be reviewed with the entire team. All AECOM and contractor field employees must be present and sign the attendance sheet.

11.0 Emergency response

11.1 General information

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." According to AECOM policy, AECOM personnel shall not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). AECOM response actions will be limited to evacuation and medical/first aid as described within this section below. As such this section is written to comply with the requirements of 29 CFR 1910.38 (a).

The basic elements of an emergency evacuation plan include:

- employee training
- alarm systems
- escape routes
- escape procedures
- critical operations or equipment
- rescue and medical duty assignments
- designation of responsible parties
- emergency reporting procedure
- methods to account for all employees after evacuation

11.2 Employee training

Employees must be instructed in the site-specific aspects of emergency evacuation. This information will be discussed during the pre-entry briefing. On-site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed.

11.3 Alarm system/emergency signals

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices can not be clearly perceived above ambient noise levels *(i.e.,* noise from heavy equipment, drilling rigs, backhoes, *etc*.) and anytime a clear line-of-sight can not be easily maintained amongst all AECOM personnel because of distance, terrain or other obstructions.

Verbal communications will be adequate to warn employees of hazards associated with the immediate work area. The facility is occupied; however, AECOM will bring a portable phone to the site to ensure that communications with facility representatives and local emergency responders is maintained, when necessary.

11.4 Escape routes and procedures

All personnel on site are responsible for knowing the escape route from the site and where to assemble after evacuation. The escape route from each site work area will be via established access roads that lead to the entrance/exit to the site.

These routes will be developed as part of the initial site reconnaissance that will take place immediately after the pre-entry briefing. All personnel working on the project should participate in the site reconnaissance so they are aware of how to evacuate each work area.

11.5 Rescue and medical duty assignments

The phone numbers of the police and fire departments, ambulance service, local hospital, and AECOM representatives are provided in the emergency reference sheet. This sheet will be posted in the AECOM site vehicle.

In the event an injury or illness requires more than first aid treatment, the SSO will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the on-site project manager and the RHSM.

If the injured employee can be moved from the accident area, he or she will be brought to the CRZ where their PPE will be removed. If the person is suffering from a back or neck injury the person will not be moved and the requirements for decontamination do not apply. The SSO must familiarize the responding emergency personnel about the nature of the site and the injury. If the responder feels that the PPE can be cut away from the injured person's body, this will be done on-site. If this not feasible, decontamination will be performed after the injured person has been stabilized.

11.6 Designation of responsible parties

The SSO is responsible for initiating emergency response. In the event the SSO can not fulfill this duty, the alternate SSO will take charge. The SSO will coordinate all emergency response efforts with the contractor and the store manager, as necessary, and based on the level of the emergency.

11.7 Employee accounting method

The SSO is responsible for identifying all AECOM personnel on-site at all times. On small, short duration jobs this can be done informally as long as accurate accounting is possible.

11.8 Near miss/HSE observation reporting

A *Near Miss Incident* is defined as any undesired event that, under slightly different circumstances (e.g., timing, distance, chance, etc.) could have resulted in personal harm, property damage, an environmental release or any undesired loss of resources. In other words, a *Near Miss Incident* is a situation in which an accident almost occurred. The purpose of reporting, and following up on, *Near Miss Incidents* is the same as that for incidents that result in injuries, illnesses, property damage or environmental releases. TO PREVENT REOCCURRENCE.

By definition, a *Near Miss Incident* must result in an actual incident or event. Situations in which a hazard is identified and corrected before an incident occurs do not necessarily meet the definition of a *Near Miss Incident* and will be referred to in this program as *HSE Observations.* Reporting and following up on *HSE Observations* can also provide opportunities for learning and improvement in the same manner as reporting and following up on *Near Miss Incidents*.

All near misses and safety observations should be reported. Near Miss/HSE Observation Report forms will be available on each site for staff to use. These forms should be completed in the field and forwarded to your RHSM for review and corporate filing.

11.9 Accident reporting and investigation

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an accident investigation and report. The investigation should be conducted as soon as emergency conditions are under control. The purpose of the investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. An AECOM accident investigation form is presented in Attachment D of this HASP. The injured AECOM employee's supervisor and the RHSM should be notified immediately of the injury.

If a subcontractor employee is injured, they are required to notify the AECOM SSO. Once the incident is under control, the subcontractor will submit a copy of their company's accident investigation report to the AECOM SSO.

Emergency References

Ambulance: 911

Fire: 911

Police: 911

Medical Services: 718.780.5500

New York Methodist Hospital

506 Sixth St - Brooklyn

START	1: Start out going NORTHEAST on 2ND AVE toward 10TH ST.	0.1 mi
	2: Turn RIGHT onto 9TH ST.	0.9 mi
	3: Turn LEFT onto 8TH AVE.	0.1 mi
	4: Turn LEFT onto 6TH ST.	0.1 mi
END	5: End at 506 6th St Brooklyn, NY 11215-3609	

Total Time: 4 minutes

Total Distance: 1.19 miles

AECOM Project Representatives:

AECOM/Westford, MA	**978.589.3000**
- Peter Cox (PM)	x 3012
- Peter Sullivan (Interim RHSM)	x 3444

Hospital Route from Site to New York Methodist Hospital

506 6th Street – Brooklyn

Attachment A

Health and Safety Plan Receipt and Acceptance Form

Health and Safety Plan Receipt and Acceptance Form

Site Investigation

Metropolitan Former MGP Site

Brooklyn, New York

I have received a copy of the Health and Safety Plan prepared for the above referenced site, I have read and understand its content and I agree that I will abide by its requirements.

Name	Signature	Company	Date

Attachment B

Job Safety Analysis Form

Job Safety Analysis

JSA Type: ☐ Investigation ☐ O&M ☐Office ☐ Construction ☐ Other	☐ New ☐ Revised	**Date**:
Work Activity:		
Personal Protective Equipment (PPE):		

Development Team	Position/Title	Reviewed By	Position/Title	Date

❶ Job Steps[1]	❷ Potential Hazards[2]	❸ Critical Actions[3]	STOP Stop Work Criteria
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•
		•	•

1 – Target number of job steps: six to ten

2 – Codes for Potential Hazards:

Caught Between (CBT)	Contacted By (CB)	Caught On (CO)	Fall To Below (FB)	Overexertion (O)	Struck Against (SA)
Caught In (CI)	Contact With (CW)	Exposure (E)	Fall - Same Level (FS)	Release To (R)	Struck By (SB)

3 – Types of Critical Actions: Elimination, Engineering Controls, Safe Work Practice / SOP, Administrative Controls, and/or PPE.

4 – Stop Work Trigger: Condition or situation that would require work to be stopped and hazards re-assessed

Attachment C

Health and Safety Plan Pre-Entry Briefing and Daily Safety Meeting Attendance Form

Health and Safety Plan Pre-Entry Briefing and Daily Safety Meeting Attendance Form

Site Investigation

Metropolitan Former MGP Site

Brooklyn, New York

Conducted by:		**Date Performed:**	
Topics Discussed:	1. Review of the content of the HASP (Required)		
	2.		
	3.		
	4.		

Printed Name	Signature	Representing

Attachment D

Supervisor's Accident Investigation Report Form

ATTACHMENT 8.1
Supervisor's Accident Investigation Report

Injured Employee _____ Job Title _____

Home Office _____ Division/Department_____

Date/Time of Accident _____

Location of Accident _____

Witnesses to the Accident _____

Injury Incurred? _____ Nature of Injury _____

_____

Engaged in What Task When Injured? _____

_____

Will Lost Time Occur? _____ How Long? _____ Date Lost Time Began _____

Were Other Persons Involved/Injured? _____

How Did the Accident Occur? _____

_____

_____

Why Did it Occur?_____

_____

_____

What Could Be Done to Prevent Recurrence of the Accident? _____

_____

_____

What Actions Have You Taken Thus Far to Prevent Recurrence? _____

_____

_____

Supervisor's Name _____ Signature: _____ Date: _____

Note: if the space provided on this form is insufficient, provide additional information on separate paper and attach. The completed accident investigation report must be submitted to the ENSR Regional Health and Safety Manager within three days of the occurrence of the accident.

Appendix G

Previous Investigation Reports (CD-ROM)