ALTERNATIVE ANALYSIS REPORT

FORMER KENT AVENUE GENERATING STATION

500 KENT AVENUE
BROOKLYN, NEW YORK

Prepared for:

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TABLE OF CONTENTS

FIGURES

APPENDIX

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ACM	Asbestos-Containing Material
AST	Aboveground Storage Tank
bgs	Below Ground Surface
BMT	Brooklyn-Manhattan Transit Corporation
CAMP	Community Air Monitoring Plan
Con Edison	Consolidated Edison Company of New York, Inc.
cy	cubic yards
DER	Division of Environmental Remediation (New York State Department of Environmental Conservation)
ESA	Environmental Site Assessment
ft	Feet
IRM	Interim Remedial Measure
LBP	Lead Based Paint
LMS	Lawler, Matusky & Skelly Engineers
LNAPL	Light Non-Aqueous Phase Liquid
MDL	Method Detection Limit
MGP	Manufactured Gas Plant
MTA	Metropolitan Transit Authority
NYCDEP	New York City Department of Environmental Protection
NYCRR	New York State Codes of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAH	Polycyclic Aromatic Hydrocarbon
PBS	Petroleum Bulk Storage
PCB	Polychlorinated Biphenyl
PDI	Pre-Design Investigation
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RSCO	NYSDEC-Technical Administrative Guidance Memorandum # 4046: Recommended Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SCO	Soil Cleanup Objective
sf	Square Feet
Shaw	Shaw Environmental & Infrastructure Engineering of NY, P.C.
SPDES	State Pollution Discharge Elimination System
SVOC	Semi-volatile Organic Compound
TAGM	Technical Administrative Guidance Memorandum
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tank

VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

1.0 INTRODUCTION

The Consolidated Edison Company of New York, Inc. (Con Edison) entered into a Voluntary Cleanup Agreement (VCA) with the New York State Department of Environmental Conservation (NYSDEC) to investigate and remediate potential contamination at a number of properties owned by Con Edison in August 2002 (VCA Index No. D2-003-02-08). On July 16, 2010, the NYSDEC amended the VCA (Amendment #2) to include the property known as the Former Kent Avenue Generating Station (hereafter referred to as the "Site") located at 500 Kent Avenue, Brooklyn, New York (**Figure 1**). The Site number in the Voluntary Cleanup Program is V-00732-2. The Site was formerly owned by the Metropolitan Transportation Authority (MTA) and its predecessors. The Site is located in Kings County, New York and is identified as Block 2023, Lot 10 on the Tax Map of the Borough of Brooklyn/Kings County.

This report has been developed in accordance with the VCA, Title 6 of the New York State Code of Rules and Regulations (NYCRR) Part 375 for remedial action selection, and the May 2010 NYSDEC - Division of Environmental Remediation (DER) *DER-10, Technical Guidance for Site Investigation and Remediation*.

1.1 Site Description

The Site is located in the Borough of Brooklyn, Kings County on the southeastern shore of the Wallabout Channel of the East River. The Site is generally flat and lies at an elevation of approximately 10 feet (ft) above mean sea level. The total area of the Site is approximately 4 acres. It had been developed by a 7- and 9-story structure (demolished in 2009) with a footprint of approximately 2.6 acres which formerly housed the generating station (**Figure 2**). The remaining 1.4 acres consist of a vacant lot on the southern portion of the property (where a previously demolished portion of the generating station complex was located), a concrete walkway in the western portion, and a small concrete/unpaved side yard in the northern portion.

Adjacent to the Site on the north is Division Avenue; beyond this dead-end street is a commercial lumber yard. Adjacent to the south is the former Brooklyn Navy Yard property, of which the portion adjacent to Con Edison's Kent Avenue site was the Nassau Gas Works, a former manufactured gas plant (MGP) site that is being addressed by National Grid. This adjacent property is currently occupied by the New York City Sanitation Department and is used for salt storage. To the east is Kent Avenue; beyond this street is a public park. To the west is Wallabout Channel, a tidal tributary to the East River. The neighborhood is currently a mix of commercial, industrial, and residential uses; however, historical land use was primarily industrial.

The geology of the region consists of varying thicknesses of glacial till, outwash sediments, and marine deposits, overlying a sloping bedrock surface. Bedrock in the Site area is believed to lie at approximately 100 ft below ground surface (bgs).

According to maps found in technical literature[1], the Site location appears to be one that was landfilled sometime between 1844 and 1900. Landfills in New York City during this time period were typically composed of sediments consisting of coal ash, cinders, slag, brick, wood, and cement. This is consistent with the findings of previous investigations at the Site that encountered ash, concrete, and brick, as well as sand, silt, gravel, and clay in the upper 15 feet of the soil column. The water table is at an elevation approximately level with the surface water altitude in the adjacent Wallabout Channel, and thus is likely to be influenced by tidal variations. Depth to groundwater was found to be approximately 8 ft bgs.

1.2 Site History

As stated above, the Site appears to have been landfilled sometime between 1844 and 1900. By 1906 the Site owner, Brooklyn-Manhattan Transit Corporation (BMT), had constructed a boiler house building on the southern portion of the Site for a power plant. By 1938, the plant had expanded into the northern portion of the Site. Prior to Con Edison's purchase of the property, the 1906 boiler house building portion of the power plant had been demolished. Based on later site investigations, it appears that the building was demolished into the basement of the structure, approximately eight to ten ft bgs. Prior to 2009, Con Edison had ceased operations at the generating plant, and in 2009 demolished the remaining power plant structures. After the demolition of the buildings, the basement was backfilled with stone and the Site was left generally flat. During the period September 2011 – January 2012 the Ash Pit, located in the northwest corner of the Site, was remediated and backfilled with concrete.

[1] Landfills in New York City: 1844-1994, Walsh, D.C., and LaFleur, R.G., GROUND WATER, v. 33, No. 4, 1995.

2.0 SITE INVESTIGATION HISTORY

In September 1999, H2M, from Melville, New York, completed a Phase I Environmental Site Assessment (ESA) and identified the following potential concerns at the Site:

- underground storage tanks (USTs),
- aboveground storage tanks (ASTs),
- an ash pit,
- suspect materials within the buildings,
- placement of fill material, polychlorinated biphenyls (PCBs), oil-filled electrical components,
- lead-based paint (LBP), and
- asbestos-containing material (ACM).

Regarding subsurface environmental conditions at the Site, the Phase I ESA recommended the collection of shallow-horizon soil samples, and a determination of groundwater quality both upgradient and downgradient of the Site.

2.1 Phase II Site Investigation

In December 1999, Lawler, Matusky & Skelly Engineers (LMS), from Pearl River, New York, performed a Phase II Site Investigation which focused on the applicable areas of concern outlined in the Phase I ESA as a basis for a subsurface investigation. Surface soil samples were collected in 16 locations from depths of 0 to 2 ft bgs. Laboratory analysis of the samples reported concentrations of PCBs exceeding Technical and Administrative Guidance Memorandum #4046 (TAGM) Recommended Soil Cleanup Objectives (RSCOs) at six locations. The deeper soil horizon (2 to 8 ft bgs) was investigated at 13 locations, where soil borings were advanced to the depth of the water table (approximately 8 ft bgs), and soil samples were collected for on-site evaluation and for laboratory analysis. The laboratory analyses reported concentrations of metals exceeding the TAGM RSCOs at seven locations, concentrations of semi-volatile organic compounds (SVOCs) exceeding TAGM RSCOs at nine locations, and concentrations of volatile organic compounds (VOCs) exceeding TAGM RSCOs at one location.

During the Phase II Site Investigation field activities, four separate environmental incidents were reported by Con Edison and subsequently reported to the NYSDEC. These included a drum encountered at the southeast corner of the Site on December 9, 1999, and subsequently removed; a sheen formed on the water surface within the ash pit at the northwest corner of the Site during sludge sampling on December 16, 1999 (the ash pit was remediated and closed in late 2011/early2012); oil-stained soil (fuel oil) was encountered at the southwest corner of the Site at a depth of 9-12 ft bgs on December 16, 1999; and soil saturated with oil (weathered fuel oil) was encountered at a depth of 8-8.5 ft bgs at the Site on December 17, 1999.

2.2 Site Investigation

In April 2007 Shaw Environmental & Infrastructure Engineering of NY, P.C. (Shaw) completed a Site Investigation (field work completed between May and December 2006) focused on delineation of subsurface soil contamination and to formulate a Remedial Action Work Plan, if needed, to facilitate potential future Site redevelopment. A total of 12 test pits and nine GeoProbe® soil borings were advanced at the locations shown on **Figure 3**. Three test pits were terminated at 1.5 ft bgs when suspect ACM was encountered. Soil samples were collected and analyzed for VOCs, SVOCs, PCBs, total petroleum hydrocarbon (TPH), and metals. Subsurface soil samples were collected in six test pit locations from depths between 5-5.5 ft bgs to 14-14.5 ft bgs. The sample collected from 14-14.5 ft bgs was at location PBL-9, and from below the concrete basement slab of the former building (the boring log showed concrete from 10 to 14 ft bgs). All of the other samples collected were from above the concrete slab. Laboratory analysis of the samples reported no concentrations of VOCs or PCBs exceeding TAGM RSCOs at any of the six locations. The laboratory analyses reported concentrations of 11 metals exceeding TAGM RSCOs at the five locations above the basement slab and concentrations of 16 SVOCs exceeding TAGM RSCOs at four locations, also above the basement slab (**Figure 3**). The shallow soil horizon (2 to 5 ft bgs) was investigated at nine locations in the northern portion of the Site, where GeoProbe® borings were advanced to refusal. Laboratory analysis of the samples reported no concentrations of VOCs or PCBs exceeding TAGM RSCOs at any of the nine locations. The laboratory analyses reported concentrations of one metal (zinc) exceeding the TAGM RSCO at one location and concentrations of three SVOCs exceeding RSCOs at two locations (**Figure 3**).

During the 2006 Site Investigation field activities, visually contaminated soils were observed as well as a sheen on the groundwater observed at the bottom of Test Pit PBL-1. On July 14, 2006, Con Edison reported the discovery to the NYSDEC, and the incident was subsequently assigned Spill identification number 0604169. Remedial activities were performed to remove approximately 30 cy of petroleum-contaminated soil from the Site. The majority of the soil was removed from the area of PBL-1. All excavated soils were segregated and stockpiled on top of poly sheeting onsite, and then loaded into drums which were shipped to a Con Edison approved disposal facility. Spill number 0604169 was closed by the NYSDEC on January 9, 2008.

The Site Investigation Summary Report, completed in April 2007, provided the following conclusions regarding the Site investigation:

- Laboratory analyses performed on the soil samples collected from 12 test pits and nine GeoProbe® soil borings reported SVOCs at concentrations exceeding TAGM RSCOs in seven of the samples. No VOCs were detected above TAGM RSCOs in any of the soil samples.

- The PCB analyses reported one PCB (Aroclor-1260) at concentrations above method detection limits (MDLs) in most of the subsurface soil samples; however, the concentrations were well below the TAGM RSCO.
- TPH was detected in all but one of the soil samples. Fingerprint analysis of selected soil samples reported the identification of heavy lubricating oil and weathered #6 fuel oil in several samples.
- Metal concentrations were detected above the TAGM 4046 RSCOs in eight of the soil samples. Concentrations of metals such as calcium, iron, sodium, and potassium consisted of a significant portion of the total metals in many of the samples. Arsenic concentrations above the TAGM 4046 RSCOs were detected in two of the samples.
- Physical evidence, such as soil staining, as well as analytical data confirming elevated concentrations of petroleum-related chemical compounds, suggest that environmental impact to Site soils had resulted from facility operations, or possibly from the adjacent property to the south, which is a former MGP site. However, concentrations of most metals in Site soils, possibly with the exception of arsenic, may be due to deposition during landfilling operations over 100 years ago (urban fill). Concentrations of other metals, such as iron, calcium, and sodium, may be representative of typical soil concentrations in the northeastern United States.

2.3 Pre-Design Investigation

A Pre-Design Investigation (PDI) was performed by Shaw and completed in June 2010. The goals of the PDI were 1) to confirm the presence and location of a 1,500 gallon UST that was used to store fuel oil, and 2) to approximate the lateral and vertical extents of subsurface contamination in the vicinity of soil boring locations PBL-1 and PBL-2 at the southwestern corner of the property; PBL-5 at the northwestern corner of the property (near the ash pit); and PBL-7 and PBL-8 at the southeastern portion of the property. A total of 40 rotasonic soil borings were advanced at the locations shown on **Figure 4**. A total of 54 subsurface soil samples were collected and analyzed for SVOCs and metals. The 16 subsurface soil samples collected from the PBL-1 and PBL-2 series of soil borings were also analyzed for VOCs.

A total of 15 VOCs of the 48 analyzed were detected at very low concentrations within the sixteen soil samples collected from areas PBL-1 and PBL-2. A total of six VOCs were detected in eight of the PBL-1 series borings in exceedance of 6 NYCRR Part 375-6.8(a) Unrestricted Use Soil Cleanup Objectives (SCOs) as shown on **Figure 5**. No VOCs were detected in any of the 16 samples in exceedance of 6 NYCRR Part 375-6.8(b) Restricted Residential SCOs.

A total of 21 of the 55 SVOCs analyzed were detected at low to moderate concentrations within the 54 soil samples collected from all five areas. With the exception of bis(2-ethylhexyl)phthalate, all of the SVOCs are petroleum-related compounds. A total of 10 of the 21 detected SVOCs exceeded the corresponding Unrestricted Use SCOs in five samples as shown

on **Figure 6**. A total of six of the 21 detected SVOCs exceeded the corresponding Restricted Residential SCOs in the samples as shown on **Figure 6**. Four of the six compounds exceeding the Restricted Residential SCOs are located within the PBL-1 area.

All twenty three metals that were analyzed were detected at low to high concentrations within the fifty four soil samples collected from all five soil boring areas. A total of 10 of the detected metals exceeded the corresponding Unrestricted Use SCOs in 37 samples as shown on **Figure 7**. A total of six of the detected metals exceeded the corresponding Restricted Residential SCOs in 37 samples as shown on **Figure 7**. Arsenic was the most prevalent metal detected in exceedance of the Restricted Residential SCOs. Nearly every sample from the PBL-7 and PBL-8 area had arsenic concentrations in excess of the Restricted Residential SCO.

The PDI report concluded that:

- The presence of the reported buried 1,500 gallon fuel oil tank at the north end of the site was confirmed, but the specific outline of the UST was not;
- SVOC exceedances of the Part 375 Unrestricted Use and Restricted Residential SCOs are driving the delineation of the soil remediation in the PBL-1 area;
- A combination of SVOC and metal exceedances of the Part 375 Unrestricted Use and Restricted Residential SCOs are driving the delineation of the soil remediation in the PBL-5 area;
- Metals (in particular, arsenic) exceedances of the Part 375 Unrestricted Use and Restricted Residential SCOs are driving the delineation of the soil remediation in the PBL-2, PBL-7 and PBL-8 areas; and
- A review of the combined results of the PDI and historical investigations indicates that nearly every location sampled had either a SVOC or metal exceedance. The SCO exceedances are principally attributable to two (2) chemical constituents detected in the subsurface soils, benzo(a)pyrene and arsenic.

2.4 Pre-IRM Investigation

Shaw completed a Pre-IRM Investigation in August 2012 to identify any petroleum/chemical impacts and discover potential light non-aqueous phase liquid (LNAPL) impacts at or below the water-table to a minimum depth of 30 ft bgs, in the area between the former building foundation slab and Wallabout Channel. A total of five rotasonic soil borings were advanced at the locations shown on **Figure 8**. A total of 12 subsurface soil samples were collected and analyzed for VOCs, SVOCs and metals.

A total of 23 VOCs of the 59 analyzed were detected at very low concentrations within the 12 soil samples. VOCs were not detected above the Unrestricted Use SCOs in 11 of the 12

samples. A total of five VOCs were detected in DB-6 (29.5-30.0') in exceedance of the Unrestricted Use SCOs as shown on **Figure 8**. None of the VOCs exceeded the Restricted Residential SCO.

A total of 20 SVOCs of the 70 analyzed were detected at very low concentrations within the 12 soil samples. SVOCs were not detected above the Unrestricted Use SCOs in 10 of the 12 samples. A total of one SVOC was detected in DB-1 (34.5-35.0') in exceedance of the Restricted Residential SCO as shown on **Figure 9**. A total of five SVOCs were detected in DB-6 (29.5-30.0') in exceedance of the Unrestricted Use SCOs as shown on **Figure 9**. Four of the five SVOCs in DB-6 (29.5-30.0') also exceeded the Restricted Residential SCOs (**Figure 9**).

A total of 16 metals of the 18 analyzed were detected within the 12 soil samples. Hexavalent chromium and total cyanide were not detected in any of the samples. Metals that exceeded the Unrestricted Use SCOs were detected in six of the 12 soil samples as shown on **Figure 10**. Only one of the detected metal concentrations (arsenic) was detected in one sample (DB-1 (34.5-35.0')) above the Restricted Residential SCOs as shown on **Figure 10**.

The Pre-IRM Investigation Summary Report concluded that:

- No VOC concentrations in excess of the Restricted Residential SCOs were identified in any of the soil samples collected during soil boring activities;
- Two SVOC concentrations and one metal concentration in excess of the Restricted Residential SCOs were identified in soil sample DB-1 (34.5-35') collected at the northwestern portion of the Site;
- Four SVOC concentrations in excess of the Restricted Residential SCOs were identified in soil sample DB-6 (29.5-30') collected at the southwestern portion of the Site; and
- The SVOCs identified in excess of the Restricted Residential SCOs are polycyclic aromatic hydrocarbons (PAHs), which occur in oil, coal, and tar deposits, and are produced as byproducts of fuel burning.

2.5 Conceptual Model

For evaluative purposes, the Site consists of three areas, northern, central, and southern. The northern portion of the Site, immediately east of the Ash Pit (**Figure 2**), is shaped like a triangle and covers approximately 5,250 square feet (sf) (0.12 acres). Several samples previously collected from within the northern portion of the Site had exceedances of several metals and SVOCs. The central portion of the Site, approximately 2.6 acres in area, was covered by the former power plant which was demolished in 2009. The demolition included removing all of the building and contents, except the basement walls and floor. The basement floor, at elevation 8 feet above mean sea level (amsl), had numerous holes drilled to penetrate through the concrete slab. The entire basement was then backfilled with environmentally clean backfill. The central

portion of the Site does not require remediation and is not included as part of this planned remedy. The southern portion of the Site is somewhat rectangular and covers approximately 36,500 sf (0.84 acres); most of the southern area lies within the footprint of the original boiler house building. Numerous samples previously collected from within the southern portion of the Site had exceedances of several metals, SVOCs and VOCs. Based on field observations during the Site Investigation completed by Shaw in 2007, the on-site materials consist of considerable amounts of building debris down to a depth ranging between 8 to 10 ft bgs. The boring log for PBL-9/MW-1 identifies fill material that is significantly different (i.e., contains much more sand, silt and clay with much less building debris) below the basement slab of the original boiler house building. The material below the building slab is presumed to be historic urban fill that was placed between 1844 and 1900 to build up the Site for the construction of the first power plant. This historic urban fill does contain concentrations of metals that might exceed the Unrestricted Use SCOs, but little to no VOCs or SVOCs. The model presumes that the fill above the basement slab of the former buildings in the northern and southern portions of the Site is predominantly debris from the demolition of the former buildings, and the fill below the slab is historic urban fill.

The PDI delineated the area impacted by exceedances of Restricted Residential SCOs. The PDI also pointed out that metals and SVOCs persist throughout all of the fill material. This was exemplified by the fact that metal and SVOC concentrations did not typically decline in samples collected further away from the center of each of the five areas. The PDI recommended that rather than try to further define the limits for removal of material with exceedances of the Restricted Residential SCOs, to excavate the area within the former power plant footprint in the south down to the bottom of the basement slab or to the water table, and to excavate all of the northern area down to either a basement slab or the water table. To comply with DER-10, this model will consider two alternatives; 1) the excavation and removal of all impacts to Unrestricted Use SCOs, and 2) the excavation and removal of all impacts to Restricted Residential SCOs.

Alternative 1 (Unrestricted Land Use Excavation) will remove 100% of all contaminants exceeding the Unrestricted Use SCOs (approximately 24,050 cubic yards [cy] to an average depth of 15 feet bgs) within the entire limits of the southern and northern areas (see **Figure 11**). Alternative 2 (Removal to Restricted Residential SCOs), based on the recommendation in the PDI, will remove approximately 85% of contaminants to an average depth of 8 feet bgs (approximately 10,850 cy) with the limits of the southern and northern areas (see **Figure 12**).

The model highlights the following site conditions that will affect the consideration and selection of remedial alternatives:

- Nearly one half of the southern and northern areas do not have sufficient data to define the specific limits of impacts to Restricted Residential SCOs;

- SVOCs, particularly benzo(a)pyrene and metals, particularly arsenic, are persistent throughout the fill material in the top eight to ten feet (above the basement slab and water table);
- The buried 1,500-gallon fuel oil tank and any related soil contamination will be removed as part of both alternatives; and
- Asbestos has been identified in the building debris material (within the confines of the former building basement wall and floors in the northern and southern portions of the Site) that will be excavated and removed, and will define how those materials will be excavated, handled, and removed from the site.

The historic urban fill beneath the basement floors in the northern and southern portions of the Site is not expected to contain asbestos.

3.0 REMEDIAL ACTION OBJECTIVES

Remedial Action Objectives (RAOs) are medium-specific or operable-unit specific objectives for the protection of human health and the environment. RAOs are developed based on contaminant-specific Standards, Criteria and Guidance (SCGs) and the intended land use.

SCGs are defined in DER-10. Standards and criteria are New York State regulations or statutes which dictate the cleanup standards, standards of control and other substantive environmental protection requirements, criteria, or limitations which are generally applicable, consistently applied, officially promulgated and are directly applicable to a remedial action. Guidance are non-promulgated criteria and guidance that are not legal requirements; however, those responsible for investigation and/or remediation of the site should consider guidance that, based on professional judgment, are determined to be applicable to the site.

Based on the investigations completed at the Site, the remedial action objectives are to

- Prevent ingestion/direct contact with contaminated soil;
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil;
- Prevent migration of contaminants that would result in groundwater or surface water contamination; and
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Achieving the remedial action objectives will:

1) Permit the use of the Site without impediment caused by the suspected ACM, SVOC and metals contaminated soil/fill present to the north and south of the former generating station building; and
2) Protect human health and the environment.

The cleanup goals for the Site are to eliminate, or reduce to the extent feasible by the remedial action:

> Exposure of persons at or in the immediate vicinity of the Site to concentrations of ACM, SVOCs and metals in Site soil/fill material that exceed the clean up objectives established by the selected remedy.

The 6NYCRR Part 375-6.8(a) Unrestricted Use Soil Cleanup Objectives and 6NYCRR Part 375-6.8(b) Restricted Residential Soil Cleanup Objectives were applied to the Site as the contaminant-specific SCGs, based on the previously collected site characterization data in which SVOCs such as benzo(a)pyrene and metals such as arsenic, have been reported by

laboratory analyses after multiple sample characterization analyses. Also, exposure of persons at or in the immediate vicinity of the Site to ACM in Site soil/fill material that exceeds one percent (1%) asbestos as established in Title 15, Chapter 1 of the Rules of the City of New York (Title 15, Chapter 1). Achieving the SCGs can be enhanced through institutional controls such as an environmental easement and/or deed restrictions as well as the development of a Site Management Plan that indicates how the institutional controls are to be maintained and places controls on any future site disturbing activities.

4.0 DEVELOPMENT OF ALTERNATIVES

4.1 Interim Remedial Measures

An IRM was implemented for the remediation of the Ash Pit located in the northwest corner of the Site. The IRM included the removal and disposal of the PCB-impacted material from within the pit and backfilling the pit with lightweight concrete. The objectives of the IRM were to protect the public health by preventing contact with or ingestion of ash pit sludge and to protect the environment.

The IRM consisted of:

1. Excavation of all ash pit sludge and water by vacuum dredging;
2. Onsite dewatering of the ash pit sludge using Geotube® technology;
3. Disposal of filter cake at an off-site permitted facility;
4. Disposal of filtrate to Wallabout Channel; and
5. Backfilling the ash pit with lightweight concrete.

4.2 Remedial Alternatives

After screening potential remedial technologies, the following remedial alternatives are selected for further development and analysis for eliminating/mitigating impacts at the Site.

The alternatives are:

1. Removal of contaminants exceeding the Unrestricted Use SCOs from the northern and southern (i.e., defined) areas to a depth of approximately 15 feet bgs, based on 6 NYCRR Part 375-6.8(a) as well as removal of material exceeding one percent (1%) asbestos as established in Title 15, Chapter 1.
2. Removal of approximately 85% of contaminants from the defined areas via excavation and removal from the Site based on the Restricted Residential SCOs from 6 NYCRR Part 375-6.8(b) as well as removal of material exceeding one percent (1%) asbestos as established in Title 15, Chapter 1.

5.0 DESCRIPTION OF REMEDIAL ALTERNATIVES

The two alternatives being considered are described in more detail below.

5.1 Alternative 1 – Unrestricted Land Use Excavation

As shown on **Figure 11**, Alternative 1 would include the excavation of all impacted fill and possible UST-impacted soils down to 15 ft bgs in both the Northern and Southern Excavation Areas. As indicated on **Figures 3** through **10**, the building debris/fill within the former boiler house building footprint and above the water table in the northern and southern portions of the Site and the underlying historic urban fill that was used to make up the land on which much of the former power plants were constructed contains concentrations of VOCs, SVOCs and metals that exceed the Unrestricted Use SCOs. Potential UST-impacted soils are soils where Unrestricted Use exceedances of VOCs and SVOCs are attributable to contamination from the buried 1,500-gallon fuel oil tank reported to be located in the northern portion of the Site. In addition to the data shown on Figures 3 through 10, asbestos has been identified in the fill material within the footprint of the former building. This alternative would meet the requirements of unrestricted use, except that the historic urban fill that underlies the entire property would also have to be removed. Specifically, the following action would be taken for the Site:

This alternative includes 1.) The excavation of impacted building debris/fill material and historic urban fill down to the basement slab or the water table to remove all asbestos contaminated fill, and 2.) the removal of all remnant buried building walls and floors and excavation of historic urban fill to 15 ft bgs. These excavations would extend laterally to the established limits of Alternative 1. The final excavation depth would be 15 ft bgs throughout the identified areas on **Figure 11**. The alternative would include the removal of approximately 18,370 cy of impacted and historic urban fill materials and 5,680 cy of building walls and floor slabs. Excavated materials would be disposed at permitted, Con Edison-approved off-site facilities. The excavations would be backfilled with imported clean fill material which meets the requirements for backfill in 6 NYCRR Part 375-6.7(d). The existing ground surface would be returned to pre-excavation elevations.

Alternative 1 would not require the development and implementation of a Site Management Plan.

The excavation of the ACM would have different excavation, handling and disposal requirements than the removal of the buried building walls and floors and underlying historic urban fill. Therefore, Alternative 1 would consist of two phases.

Phase I – ACM Excavation

The excavation in the South Excavation Area would extend west of the basement walls of the former boiler house building. The excavation in the North Excavation Area would be contained by the basement wall of the former generating station building to the south, the ash pit wall to the west, and the basement wall of a former building located adjacent to Division Avenue. Both excavations would extend down to the basement slab floors which range between seven and ten ft bgs (average depth is 8 ft bgs) or to the water table.

The buried 1,500-gallon fuel oil tank within the North Excavation Area would also be removed during this work. There is no documentation to suggest that the fuel oil tank is registered in the NYSDEC Petroleum Bulk Storage (PBS) Program. After successful removal of the tank, a closure report would be prepared following the guidelines in DER-10, Section 5.8 and, along with a PBS application that would both register the UST and document that the tank had been removed and closed, would be submitted to the NYSDEC.

In the event that a portion of an excavation bottom has no floor slab, the excavation would extend down to the top of the water table, which is located at approximately 8 ft bgs. Where the excavations are outside of the main building footprint, it is anticipated that there would be no basement floor slab. If any concrete slab was encountered outside of the main building footprint while excavating down to the water table, the slab would be removed. If for reasons of structural stability a slab should not be removed, the NYSDEC would be notified and the soil quality beneath the slab would be investigated using safe, practical methods.

Phase II – Non-ACM Excavation

Upon completion of the ACM excavation, the exposed building walls and floors would be demolished and removed from the Site. Sheet piling would then be installed around the perimeter of both the northern and southern areas to allow the continued excavation of the historic urban fill. The historic urban fill would be excavated to 15 ft bgs and documentation samples would be collected and analyzed in accordance with Section 5.4(b)5 of DER-10. After the documentation sample results have verified that there are no contaminants in excess of the Unrestricted SCOs, the excavation would be backfilled with environmentally clean fill meeting the requirements of Section 5.4(e) of DER-10.

The remediation contractor would be required to obtain all necessary permits (and any sampling and analysis necessary for those permits) to treat and discharge collected groundwater to Wallabout Channel (using an existing SPDES permit equivalent obtained by Con Edison for the Ash Pit IRM). While the use of sheet piling would help reduce the volume of required

dewatering, the volume of groundwater to be managed over the course of the remediation may be on the order of 500,000 gallons.

It is anticipated that Alternative 1 would require an asbestos variance from the New York City Department of Environmental Protection (NYCDEP). An Asbestos Variance Application would be prepared by the remediation contractor in accordance with Section 1-03 of Title 15, Chapter 1 and submitted to the NYCDEP. The variance application would specify which specific rules would require a variance, why the variance is requested, and describe alternative procedures that would satisfy each requirement as modified. This would include an asbestos air monitoring program.

To address health and safety issues relevant to dust and organic vapors, a Community Air Monitoring Plan (CAMP) would be prepared based on the New York State Department of Health (NYSDOH) Generic CAMP in Appendix 1A of DER-10. In addition to the immediate notification requirements set forth in the CAMP, a weekly summary that highlights any exceedances along with the possible explanation of the exceedances and the corrective action that was taken would be submitted to the NYSDEC and the NYSDOH. Similarly, a schedule of asbestos air sampling, as well as site and personal air monitoring, would be conducted in accordance with Title 15, Chapter 1 (Sections 1-41 through 1-51). Details of the CAMP are included in the September 2012 Remedial Action Work Plan.

With respect to the preliminary screening guidance in DER-10, Section 4.3(a)(5)(ii), the alternative is described as follows:

- **Size and Configuration.** **Figure 11** shows the conceptual plans for this alternative. Approximately ¼ of the Site would be disturbed to some degree during excavation. Excavation of the entire impacted fill material would occur over approximately 41,750 sf on the Site. Sheet piling would be required in the Southern and Northern Excavation Areas. Dewatering would be necessary to enable excavation of material down to 15 ft bgs.

- **Time for Remediation.** The expected duration of the Alternative 1 remedy, including construction plans and permitting, would be approximately 1 year, 9 months.

  The rate of excavation would be affected by the need to segregate the building fill material (i.e., wood and timbers, large concrete blocks, residual equipment and old piping, etc.) and, most particularly, due to the management of all the material as ACM. The excavation would have to be continuously kept wet, and in addition to segregating the building material, the excavated material would also have to be inspected for any ACM that could be segregated and placed into smaller containers. Because of the reduced rate of ACM excavation, there should be a sufficient number of trucks to transport the material, and for the disposal facilities to accept the material. Both the installation of sheet piling around the perimeters as

well as demolition of the buried building walls and floors would add to the time required to complete this alternative.

- **Spatial Requirements.** This alternative would require substantial area for equipment and material storage, access, logistics and operation. The majority of the Site is open and useable for all construction related activities. The current site access is through a gate at the southeast corner of the Site, off of Kent Avenue. That gate would be used during the excavation and backfill of the Northern Excavation Area. A new gate would have to be constructed for the excavation and backfill of the Southern Excavation Area. There should be sufficient area onSite to stage empty trucks, or trucks filled with clean backfill material.

- **Options for Disposal.** Options for disposal of impacted materials are readily available off site at a permitted, Con-Edison approved facility. Because of the relatively slow rate of excavation, the daily volume of excavated material is not expected to exceed the disposal facility capabilities during the excavation.

- **Permit Requirements.** It is anticipated that the implementation of Alternative 1 would require an asbestos variance from the NYCDEP. An Asbestos Variance Application would be prepared in accordance with Section 1-03 of Title 15, Chapter 1 and submitted to the NYCDEP. The variance application would include an asbestos air monitoring program. Local building permits would be required for the shoring along Division Avenue and to access the site through a new gate location. Con Edison already has a SPDES permit equivalent to address any construction water (from dewatering, decontamination, runoff water) requiring treatment and discharge to Wallabout Channel.

- **Limitations.** The ability to completely excavate material to satisfy the Unrestricted Use SCOs would be significantly limited due to the stringent target concentrations and the historic urban use of the property (i.e., vertical and lateral extent of fill underlying the Site).

- **Ecological Impacts.** Since the impacted media is located subsurface, this alternative is not expected to have either significant adverse impacts on fish and wildlife resources during implementation nor residual beneficial ecological effects.

5.2 Alternative 2 – Excavation to Restricted Residential SCOs

As shown on **Figure 12**, Alternative 2 would include the excavation of all impacted fill and possible UST-impacted soils down to the bottom of the basement slab or the water table in both the Northern and Southern Excavation Areas. As indicated on **Figures 3** through **10**, the building debris/fill within the former boiler house building footprint and above the water table in the northern and southern portions of the Site contains concentrations of SVOCs and metals that exceed the Restricted Residential SCOs. Potential UST-impacted soils are materials where Restricted Residential SCO exceedances of VOCs and SVOCs are attributable to contamination

from the buried 1,500-gallon fuel oil tank reported to be located in the northern portion of the Site. This alternative would meet the requirements of restricted residential use. Specifically, the following action would be taken for the Site:

This alternative includes the excavation of impacted building debris/fill material down to the basement slab or the water table based on individual compound exceedances of the Restricted Residential SCOs. This excavation would extend to the established limits of Alternative 2. The excavation depths would range from approximately seven to ten feet bgs throughout the identified areas on **Figure 12**. The alternative would include the removal of approximately 10,850 cubic yards of impacted fill material. Excavated materials would be disposed at permitted, Con Edison-approved off-site facilities. The excavations would be backfilled with imported clean fill material which meets the requirements for backfill in 6 NYCRR Part 375-6.7(d). The existing ground surface would be returned to pre-excavation elevations.

The excavation in the South Excavation Area would be within the basement walls of the former boiler house building. The excavation in the North Excavation Area would be contained by the basement wall of the former generating station building to the south, the ash pit wall to the west, and the basement wall of a former building located adjacent to Division Avenue. Both excavations would extend down to the basement slab floors which range between seven and ten ft bgs (average depth is 8 ft bgs) or to the water table.

The buried 1,500-gallon fuel oil tank within the North Excavation Area would also be removed during this work. There is no documentation to suggest that the fuel oil tank is registered in the NYSDEC PBS Program. After successful removal of the tank, a closure report would be prepared following the guidelines in DER-10, Section 5.8 and, along with a PBS application that would both register the UST and document that the tank had been removed and closed, would be submitted to the NYSDEC.

In the event that a portion of an excavation bottom has no floor slab, the excavation would extend down to the top of the water table, which is located at approximately 8 ft bgs. Where the excavations are outside of the main building footprint, it is anticipated that there would be no basement floor slab. If any concrete slab was encountered outside of the main building footprint while excavating down to the water table, the slab would be removed. If for reasons of structural stability, a slab should not be removed, soil quality beneath the slab would be investigated using safe, practical methods.

Dewatering within the South Excavation Area is anticipated to be minimal. Test pits completed as part of the 2006-2007 Site Investigation identified small pockets of water on top of the floor slab. If there is appreciable groundwater infiltration, a pump would be used to remove the water into a storage tank maintained on Site. The material removal in the North Excavation Area outside of any floor slabs would extend below grade to the top of the water table. These two areas would be dewatered concurrently with the excavation to reduce the volume of water in the

excavated material and to provide a solid bottom to place clean backfill material. Dewatering of each Area would maintain the saturation zone at least one foot below the bottom of the excavation.

The remediation contractor would be required to obtain all necessary permits (and any sampling and analysis necessary for those permits) to either transport and dispose of the collected groundwater at an offsite treatment facility or treat and discharge to Wallabout Channel (using an existing SPDES permit equivalent obtained by Con Edison for the Ash Pit IRM). Since the dewatering operation only needs to lower the water table in the immediate area by a minimum of one foot, the anticipated volume of water may be managed with a series of sumps pumping into a storage tank with periodic removal for off-site treatment/disposal by a vacuum truck.

It is anticipated that Alternative 2 would require an asbestos variance from the NYCDEP. An Asbestos Variance Application would be prepared by the remediation contractor in accordance with Section 1-03 of Title 15, Chapter 1 and submitted to the NYCDEP. The variance application would specify which specific rules would require a variance, why the variance is requested, and describe alternative procedures that would satisfy each requirement as modified. This would include an asbestos air monitoring program.

To address health and safety issues relevant to dust and organic vapors, a CAMP would be prepared based on the NYSDOH Generic CAMP in Appendix 1A of DER-10. In addition to the immediate notification requirements set forth in the CAMP, a weekly summary that highlights any exceedances along with the possible explanation of the exceedances and the corrective action that was taken would be submitted to the NYSDEC and the NYSDOH. Similarly, a schedule of asbestos air sampling, as well as site and personal air monitoring would be conducted in accordance with Title 15, Chapter 1 (Sections 1-41 through 1-51). Details of the CAMP are included in the September 2012 Remedial Action Work Plan.

Because this alternative would result in residual soil containing contaminant concentrations above Unrestricted Use SCOs, long-term monitoring of the Site and institutional controls, would also be required to control potential exposure to residual contamination remaining in the soil. The proposed long-term monitoring and institutional controls may include the following:

- An environmental easement or deed restriction on future use of the property and development limitations for the Site, including a prohibition on the development of water supply or irrigation wells on the Site;
- Notification to the NYSDEC prior to any intrusive activity;
- Annual groundwater monitoring for 30 years to include the collection of a groundwater sample and associated quality assurance/quality control (QA/QC) samples from the existing on-site monitoring well (MW-2, **Figure 3**) located in the southwest portion of the Site;

- Site inspection and certification (annual for the first five years, once every five years thereafter for a total of 30 years) to verify the appropriate use of the Site, and to ensure institutional controls are in place and remain effective to control the identified potential exposures; and
- Development and approval of a Site Management Plan providing requirements for post-remediation activities to take place at the Site (including provisions for groundwater monitoring, soil management and worker health and safety during intrusive activities, soil cover and land use limits remain in place to control potential exposure to any residual contamination);

The institutional controls would be memorialized to remain in place via an agreement between future property owner(s) and Con Edison, with the approval of the NYSDEC. An environmental land use restriction or deed restriction would be required to address impacted materials not removed under this remedial alternative.

With respect to the preliminary screening guidance in DER-10, Section 4.3(a)(5)(ii), the alternative is described as follows:

- **Size and Configuration.** **Figure 12** shows the conceptual plans for this alternative. Approximately ¼ of the Site would be disturbed to some degree during excavation. Excavation of the entire impacted fill material would occur over approximately 35,250 sf on the Site. Shoring would be required in the Northern Excavation Area along Division Avenue. Dewatering would be necessary to enable excavation of material down to the water table, particularly to the west of the former boiler house building.

- **Time for Remediation.** The expected duration of the Alternative 2 remedy, including preconstruction plans, designs and permitting, would be approximately 1 year.

  The rate of excavation would be affected by the need to segregate the building fill material (i.e., wood and timbers, large concrete blocks, residual equipment and old piping, etc.) and, most particularly, due to the management of all the material as ACM. The excavation would have to be continuously kept wet, and in addition to segregating the building material, the excavated material would also have to be inspected for any ACM that could be segregated and placed into smaller containers. Because of the reduced rate of excavation, there should be a sufficient number of trucks to transport the material, and for the disposal facilities to accept the material.

- **Spatial Requirements.** This alternative would require substantial area for equipment and material storage, access, logistics and operation. The majority of the Site is open and useable for all construction related activities. The current site access is through a gate at the southeast corner of the Site, off of Kent Avenue. That gate would be used during the

excavation and backfill of the Northern Excavation Area. A new gate would have to be constructed for the excavation and backfill of the Southern Excavation Area. There should be sufficient area on Site to stage empty trucks, or trucks filled with clean backfill material.

- **Options for Disposal.** Options for disposal of impacted materials are readily available off site at a permitted, Con-Edison approved facility. Because of the relatively slow rate of excavation, the daily volume of excavated material is not expected to exceed the disposal facility capabilities during the excavation.

- **Permit Requirements.** It is anticipated that the implementation of Alternative 2 would require an asbestos variance from the NYCDEP. An Asbestos Variance Application would be prepared in accordance with Section 1-03 of Title 15, Chapter 1 and submitted to the NYCDEP. The variance application would include an asbestos air monitoring program. Local building permits would be required for the shoring along Division Avenue and to access the site through a new gate location. Con Edison already has a SPDES permit equivalent to address any construction water (from dewatering, decontamination, runoff water) requiring treatment and discharge to Wallabout Channel.

- **Limitations.** The ability to completely excavate material to satisfy the Restricted Residential SCOs would not have any limitations. The previous investigations (see **Figures 3** through **10**) clearly show that the Restricted Residential SCO exceedances were identified within the Alternative 2 limits.

- **Ecological Impacts.** Since the impacted media is located subsurface this alternative is not expected to have either significant adverse impacts on fish and wildlife resources during implementation nor residual beneficial ecological effects.

6.0 REMEDIAL ALTERNATIVES ANALYSIS

6.1 Evaluation Criteria

6 NYCRR Part 375-1.8(f) requires a detailed analysis of remedial alternatives against nine criteria and specifies specific factors to consider for each criterion. The nine criteria are:

Overall Protection of Public Health and the Environment: The criterion in an evaluation of the remedy's ability to protect public health and the environment, assessing how risks posed through each existing potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, engineering controls or institutional controls. The remedy's ability to achieve each of the RAOs is evaluated.

Compliance with SCGs: Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance. All SCGs for the site will be listed along with a discussion of whether or the remedy will achieve compliance. For those SCGs that will not be met, provide a discussion and evaluation of the impacts of each, and whether waivers are necessary.

Long-term Effectiveness and Permanence: This criterion evaluates the long-term effectiveness of the remedy after implementation. If wastes or treated residuals remain on site after the selected remedy has been implemented, the following items are evaluated:

- The magnitude of the remaining risks (i.e., will there be any significant threats, exposure pathways, or risks to the community and environment from the remaining wastes or treated residual?).
- The adequacy of the engineering and institutional controls intended to limit the risk.
- The reliability of these controls.
- The ability of the remedy to continue to meet RAOs in the future.

Reduction of Toxicity, Mobility or Volume through Treatment: The remedy's ability to reduce the toxicity, mobility or volume of site contamination is evaluated. Preference should be given to remedies that permanently and significantly reduce the toxicity, mobility, or volume of the wastes at the site.

Short-term Impacts and Effectiveness: The potential short-term adverse impacts and risks of the remedy upon the community, the workers, and the environment during the construction and/or implementation are evaluated. A discussion of how the identified adverse impacts and health risks to the community or workers at the site will be controlled, and the effectiveness of the controls, should be presented. Provide a discussion of engineering controls that will be

used to mitigate short-term impacts (i.e., dust control measures). The length of time needed to achieve the remedial objectives is also estimated.

Implementability: The technical and administrative feasibility of implementing the remedy is evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operation approvals, access for construction, etc.

Cost: Capital, operation, maintenance and monitoring costs are estimated for the remedy and presented on a present worth basis.

Community Acceptance: This criterion gauges the acceptance of the selected remedial alternative by the community at large. Community Acceptance is not within the scope of this AAR, but will be evaluated and addressed in NYSDEC's Decision Document.

Land Use: The NYSDEC may consider the current, intended, and reasonably anticipated future land uses of the Site and its surroundings in the selection of the remedy.

6.2 Evaluation of Alternatives

6.2.1 Alternative 1: Unrestricted Land Use Excavation

Overall Protection of Public Health and the Environment: This alternative effectively controls the potential exposure to contaminants in surface pathways by removing all contaminants exceeding the Unrestricted Use SCOs to a depth of 15 ft bgs.

This alternative achieves the Site-specific RAO as described below:

Improve the environmental quality of the Site to support potential future restricted residential use. All impacted soil exceeding the Unrestricted Use SCOs will be removed from the Site.

Compliance with SCGs: The remedy will comply with established standards, criteria and guidance by removing soils which do not meet the Unrestricted Use SCOs and by providing a clean soil cover over the Site.

Long-term Effectiveness and Permanence: Since all impacted material exceeding the Unrestricted Use SCOs will be removed, the remedy will provide long-term effectiveness and reduce the risks from the Site.

Reduction of Toxicity, Mobility or Volume through Treatment: The remedy will remove all impacted material at the Site via direct excavation and removal.

Short-term Impacts and Effectiveness: The potential short-term impacts during the projected 1 year and 9 month long construction period to implement the remedy include potential odors from petroleum releases during soil excavation, and traffic in the local community with the removal of impacted materials from the Site and the delivery of clean backfill. It is estimated there would be approximately 2,400 truckloads of materials removed and delivered to the Site. These potential impacts will be addressed by planned routing of truck traffic on and off the Site and the use of suppressants to control odors.

In addition, a Community Air Monitoring Program (CAMP) will be implemented to detect organic vapors and dust at the Site perimeter during the implementation of the remedy. Potential short-term exposures could occur to on-site construction workers and local residents from dust during abatement and construction activities. The soils will be wetted down and inactive stockpiles will be covered to mitigate materials becoming airborne. The CAMP will detect levels of airborne contaminants exceeding CAMP limits and controls will be implemented, including, but not limited to, adjusting work methods and applying additional dust and/or odor suppressants, or suspending work, to address the conditions. Details of the CAMP are included in the Remedial Action Work Plan (RAWP). CAMP monitoring data will be made available to NYSDEC, NYSDOH, and the public.

Potential short-term exposures could occur to on-site construction workers and local residents from airborne asbestos fibers during abatement and construction activities. Therefore, in addition to the CAMP, air sampling, as well as Site and personal air monitoring, will be conducted for asbestos in accordance with Title 15, Chapter 1 (Sections 1-41 through 1-51). The air monitoring program will also be included in the Asbestos Variance Application. The NYCDEP asbestos abatement permit/variance will also include stipulations for controlling airborne emissions, which may include, but not be limited to, adjusting work methods and applying additional dust suppressants, or suspending work, to address the conditions. Asbestos air monitoring data will be made available to NYSDEC, NYSDOH, NYCDEP and the public.

Implementability: The remedy is technically feasible. While all of the aspects of the remedy are commercially available and have been implemented on other sites, the extensive dewatering operations (approximately 500,000 gallons) will require a significant number of pumps, piping and a substantial treatment system. Additionally, excavation of the material beneath the former boiler house building would be impacted by the structural piles supporting the former facility.

Cost: The estimated construction cost for the remedy is $13.5 million. The remedy does not include any long-term monitoring, nor any long-term operation or maintenance. The costs are summarized in Table A-1, Appendix A.

Land Use: The Site is currently vacant and no longer used for utility operations. Based on recent property developments in the surrounding Williamsburg area, it is anticipated that the Site, if rezoned from industrial use, could be redeveloped for residential and/or commercial use.

6.2.2 Alternative 2: Removal to Restricted Residential SCOs

Overall Protection of Public Health and the Environment: This alternative effectively controls the potential exposure to contaminants in surface pathways by removing impacted material to Restricted Residential SCOs to the top of basement floor slabs within the basement walls of the former boiler house building or the water table. Since some impacted material west of the former boiler house building exceeding the Unrestricted Use SCOs will remain on the Site, controls to manage future soil exposures will be implemented.

This alternative achieves the Site-specific RAO as described below:

Improve the environmental quality of the Site to support potential future restricted residential use. All impacted soil exceeding the Restricted Residential SCOs will be removed from the Site to the basement floor slab or to the water table.

Compliance with SCGs: The remedy will comply with established standards, criteria and guidance by removing soils which do not meet the Restricted Residential SCOs and by providing a clean soil cover over the Site.

Long-term Effectiveness and Permanence: Since all impacted material exceeding the Restricted Residential SCOs will be removed down to the basement floor slab or the water table, the remedy will provide long-term effectiveness and reduce the risks from the Site.

Reduction of Toxicity, Mobility or Volume through Treatment: The remedy will permanently reduce the volume of impacted material at the Site via direct excavation and removal.

Short-term Impacts and Effectiveness: The potential short-term impacts during the projected 12 month long construction period to implement the remedy include potential odors from petroleum releases, and traffic in the local community associated with the transport of impacted materials from the Site and the transport of clean backfill. It is estimated there would be approximately 1,100 truckloads of materials removed and delivered to the Site. These potential impacts will be addressed by planned routing of truck traffic on and off the site and the use of suppressants to control odors.

In addition, a Community Air Monitoring Program (CAMP) will be implemented to detect organic vapors and dust at the Site perimeter during the implementation of the remedy. Potential short-term exposures could occur to on-site construction workers and local residents from dust during abatement and construction activities. The soils will be wetted down and inactive stockpiles will be covered to mitigate materials becoming airborne. The CAMP will detect levels of airborne

contaminants exceeding CAMP limits and controls will be implemented, including, but not limited to, adjusting work methods and applying additional dust and/or odor suppressants, or suspending work, to address the conditions. Details of the CAMP are included in the Remedial Action Work Plan (RAWP). CAMP monitoring data will be made available to NYSDEC, NYSDOH, and the public.

Potential short-term exposures could occur to on-site construction workers and local residents from airborne asbestos fibers during abatement and construction activities. Therefore, in addition to the CAMP, air sampling, as well as Site and personal air monitoring, will be conducted for asbestos in accordance with Title 15, Chapter 1 (Sections 1-41 through 1-51). The air monitoring program will also be included in the Asbestos Variance Application. The NYCDEP asbestos abatement permit/variance will also include stipulations for controlling airborne emissions, which may include, but not be limited to, adjusting work methods and applying additional dust suppressants, or suspending work, to address the conditions. Asbestos air monitoring data will be made available to NYSDEC, NYSDOH, NYCDEP and the public.

Implementability: The remedy is technically feasible. All of the aspects of the remedy are commercially available and have been implemented on other sites.

Cost: The estimated construction cost for the remedy is $5.1 million. The remedy includes long-term monitoring and reporting. The costs are summarized in Table A-2, Appendix A.

Land Use: The Site is currently vacant and no longer used for utility operations. Based on recent property developments in the surrounding Williamsburg area, it is anticipated that the Site, if rezoned from industrial use, could be redeveloped for residential and/or commercial use.

7.0 Comparative Analysis of Remedial Alternatives and Proposed Site Remedy

This section compares the alternatives developed in Sections 5.1 and 5.2 and concludes with the recommended site remedy.

7.1 Comparison of Alternatives

The unrestricted use remedy provides no additional protection for public health or the environment over the restricted residential remedy as the contaminants that would remain in the restricted residential remedy would be at a depth that would not be encountered under most circumstances. A soil management plan, as part of a Site Management Plan would provide the necessary protection for public health in the event that those deeper soils would be exposed. Groundwater contamination at the site is minimal and there is a city-wide prohibition on groundwater use for potable water.

Both remedies would fully meet the standards, criteria, and guidance. The restricted residential remedy would meet the standards for a property which would have a future use of multiple-family residences, commercial, or industrial uses. The only additional use that the unrestricted remedy would meet the objectives would be for single-family homes. Given the reasonably anticipated future use of the property, the restricted residential property meets all the appropriate standards, criteria, and guidance.

While the unrestricted use remedy could be considered to provide more long-term effectiveness and more reduction in volume given that more contaminated material would be removed, the difference is not enough to provide significant additional protections to public health and the environment. Furthermore, the site management plan and institutional controls that would be put in place for the restricted residential remedy would provide similar long-term effectiveness.

The restricted residential remedy would provide significantly less short-term impacts and would be far more easily implemented. The unrestricted use remedy would require almost twice as much time and would result in more than double the truck traffic leaving and returning to the site. There is also more potential for odor issues as material below the water table would likely need to be de-watered prior to loading. While the excavation required for the unrestricted remedy is technically implementable, there are significant challenges with the proposed work. Working around structural piles and significant dewatering, both in-situ and, potentially, at the surface prior to loading, are major obstacles which could delay or prevent achieving the unrestricted use cleanup objectives.

As noted above, the restricted residential remedy would allow for any of the reasonably anticipated future uses of the property.

7.2 Recommended Site Remedy

The Restricted Residential alternative is the preferred remedy. This remedy removes most of the contaminants associated with historic power generation facilities at the Site and can be implemented in a cost-effective manner to be protective of public health and the environment during both the short and long terms. This remedy will require the implementation of institutional controls including an environmental easement or deed restriction as well as annual monitoring, and reporting to the NYSDEC, of conditions at the Site for a 30-year period.

8.0 Signatures of Environmental Professionals

Curtis A. Kraemer, P.G.
Senior Geologist

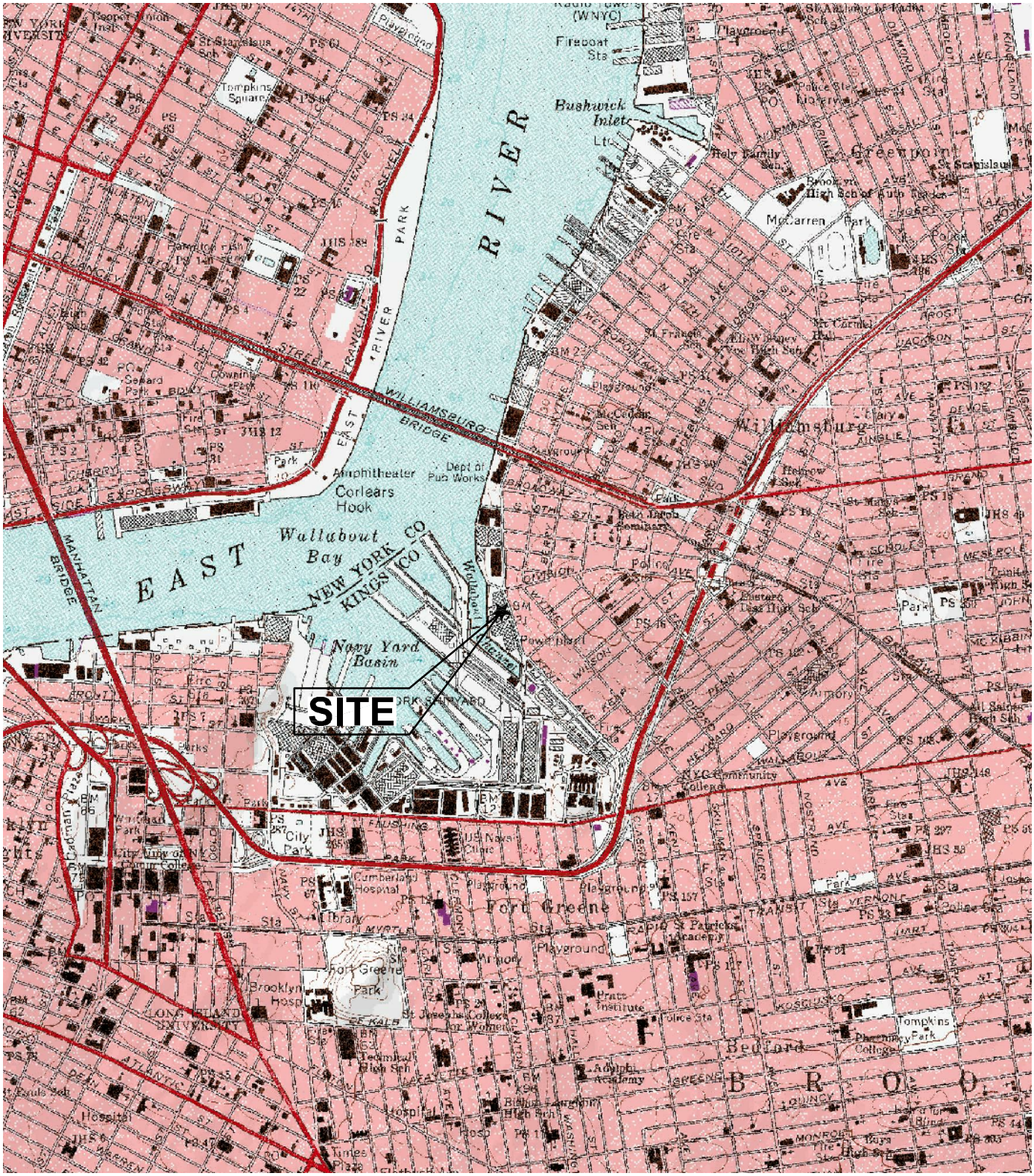
Daniel Chen, P.E.
Engineering Manager

FIGURES

FIGURE 1

DRAWING NUMBER

OFFICE
NEW YORK, NY



VERIFY SCALE
0 1"

APPROXIMATE SCALE

0 2000 4000 6000 FEET

REFERENCE:
7.5 MINUTE SERIES TOPOGRAPHIC MAP OF BROOKLYN, NY
USGS GEOLOGICAL SURVEY, 1966, 1927 NORTH AMERICAN DATUM

Shaw Environmental & Infrastructure
Engineering of NY, PC

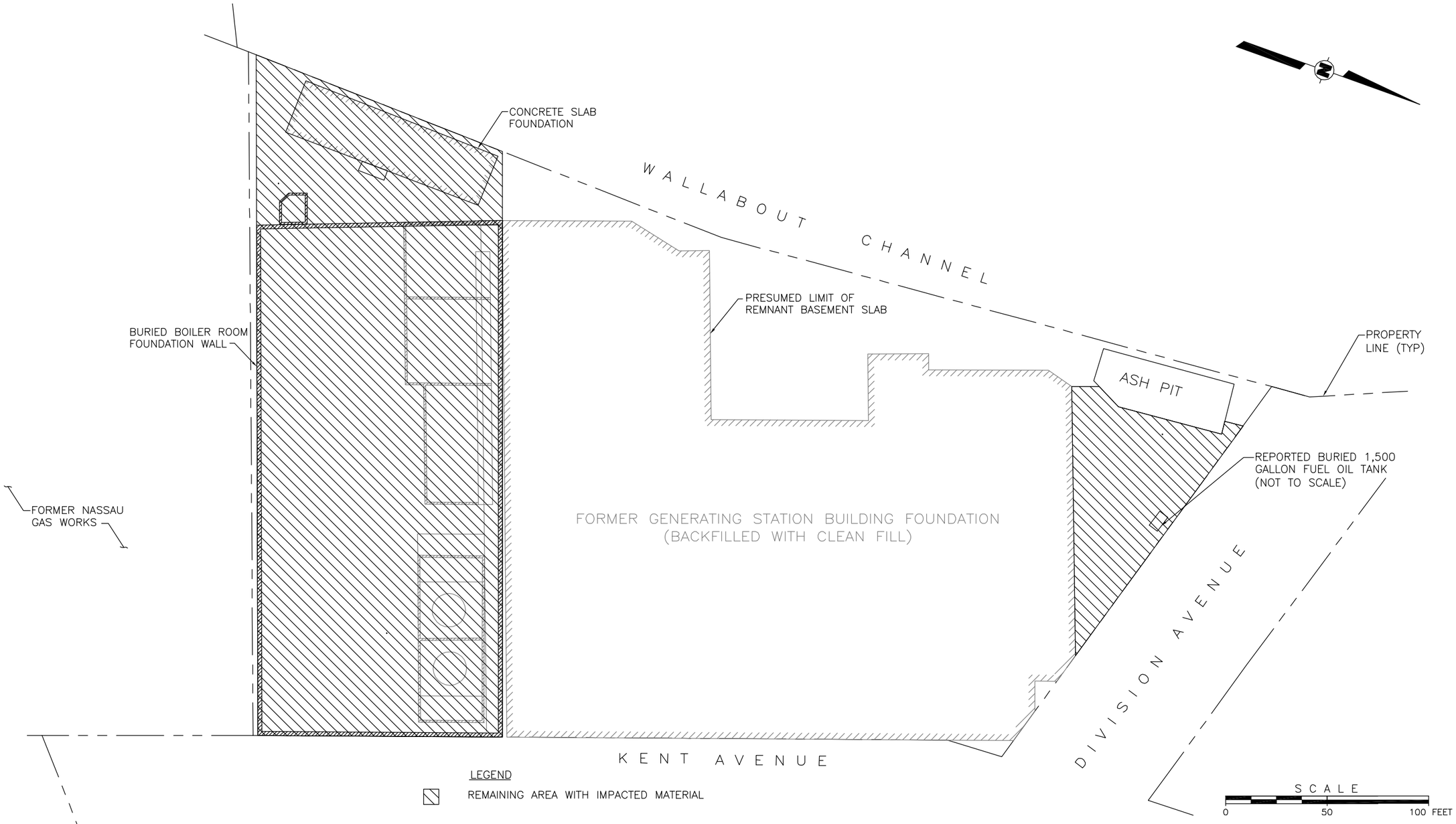
DESIGNED BY: S. SHATZ	CON EDISON LONG ISLAND CITY, NEW YORK			
DRAWN BY: S. SHATZ	SITE LOCATION MAP			
CHECKED BY: C. KRAEMER	FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK			
APPROVED BY: J. FRANCESCON	DATE: 02/08/13	SCALE: AS SHOWN	DRAWING NO. FIGURE 1	REV NO. -

File: V:\— CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figure 1.dwg
Plot Date/Time: Apr 23, 2013 — 3:00pm
Plotted By: sara.shatz

FIGURE 2

DRAWING NUMBER

OFFICE NEW YORK, NY



SOURCE: "PHASE II INVESTIGATION REPORT:KENT AVENUE SITE", LAWLER, MATUSKY, AND SKELLY ENGINEERS, LLP, DATE: FEBRUARY 2000

Shaw Environmental & Infrastructure Engineering of NY, PC

DESIGNED BY: C. KRAEMER	CON EDISON LONG ISLAND CITY, NEW YORK			
DRAWN BY: S. SHATZ	SITE PLAN FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK			
CHECKED BY: C. KRAEMER				
APPROVED BY: J. FRANCESCON	DATE: 02/08/13	SCALE: AS SHOWN	DRAWING NO. FIGURE 2	REV NO. -

File: V:\-- CLIENT\Con Edison\146740 Kent Ave\Working\RIM\CADD\RIM\alternatives\Figure 2.dwg
Plot Date/Time: Apr 23, 2013 - 3:00pm
Plotted By: sara.shatz

FIGURE 3

DRAWING NUMBER

OFFICE
NEW YORK, NY

PBL-1	
DATE	7/26/06
DEPTH	5-5.5
TVOCs	0.18
TSVOCs	394.87
TMETALs	28,727
TPHs	3,420
TPCBs	ND

PBL-2	
DATE	7/26/06
DEPTH	6-6.5
TVOCs	0.120
TSVOCs	1.59
TMETALs	28,065
TPHs	17.90
TPCBs	ND

PBL-5	
DATE	7/25/06
DEPTH	8-8.5
TVOCs	0
TSVOCs	24.79
TMETALs	45,155
TPHs	113.0
TPCBs	0.095

S-7	
DATE	12/5/06
DEPTH	-
TVOCs	NA
TSVOCs	NA
TMETALs	NA
TPHs	51.1
TPCBs	0.05

S-9	
DATE	12/5/06
DEPTH	-
TVOCs	NA
TSVOCs	NA
TMETALs	NA
TPHs	315
TPCBs	0.59E

S-8	
DATE	12/5/06
DEPTH	-
TVOCs	NA
TSVOCs	NA
TMETALs	NA
TPHs	64.4
TPCBs	0.6

S-6	
DATE	12/5/06
DEPTH	
TVOCs	NA
TSVOCs	NA
TMETALs	NA
TPHs	183
TPCBs	0.089

S-5	
DATE	12/5/06
DEPTH	-
TVOCs	NA
TSVOCs	NA
TMETALs	NA
TPHs	96.4
TPCBs	0.23

S-4	
DATE	12/5/06
DEPTH	-
TVOCs	NA
TSVOCs	NA
TMETALs	NA
TPHs	89
TPCBs	0.16

S-3	
DATE	12/5/06
DEPTH	-
TVOCs	0.0125
TSVOCs	9.96
TMETALs	NA
TPHs	53.6
TPCBs	0.13

S-2	
DATE	12/5/06
DEPTH	-
TVOCs	0.0202
TSVOCs	6.53
TMETALs	NA
TPHs	127
TPCBs	0.26

S-1	
DATE	12/5/06
DEPTH	-
TVOCs	NA
TSVOCs	NA
TMETALs	19,565
TPHs	25.7
TPCBs	0.1

PBL-7	
DATE	7/17/06
DEPTH	7-7.5
TVOCs	0.175
TSVOCs	1.998
TMETALs	69,114
TPHs	NA
TPCBs	3.500

PBL-8	
DATE	7/14/06
DEPTH	8-8.5
TVOCs	0.169
TSVOCs	20.85
TMETALs	139,534
TPHs	1,560
TPCBs	0.370

PBL-8A	
DATE	7/14/06
DEPTH	9-9.5
TVOCs	0.093
TSVOCs	5.81
TMETALs	106,975
TPHs	808
TPCBs	0.450

PBL-9	
DATE	7/20/06
DEPTH	14-14.5
TVOCs	0.076
TSVOCs	0.11
TMETALs	28,311
TPHs	ND
TPCBs	ND

WALLABOUT CHANNEL

KENT AVENUE

S-07/ PBL-1 · MW-2 PBL-2 · S-06 · PBL-3 · BM 3 · S-08/ W-08 · S-04/ W-04 · PBL-4 · BM2 · BM1 · PBL-11 · S-10 · S-09 · PBL-6 · PBL-7 · PBL-10 · S-13 · S-11 · S-03 · MW-1 PBL-9 · S-12 · S-02 PBL-8 · S-7 · PBL-5 GW-1 · S-9 · S-01/ W-01 · S-8 · S-5 · S-6 · S-4 · S-3 · S-2 · UST · S-1

FEMA FLOOD HAZARD ZONE AS(EL 10) · PRELIMINARY · PARCEL SURVEYED · 378.77' · 103.52' · TAX LOT 10 IN BLOCK 7073 · BULKHEAD LINE AS APPROVED BY THE SECRETARY OF WAR DECEMBER 29, 1931 · JEVEMWIME STORY AND BASEMENT BRICK · CONC. PLAZ. · BANK · NOISIVIO AVENUE

SCALE
0 50 100 FEET

LEGEND

- + SOIL BORING/TEST PIT LOCATION (JULY 2006)
- MW-2 ⊕ SOIL BORING LOCATION COMPLETED AS MONITORING WELL
- GW-1 ⊕ SOIL BORING LOCATION COMPLETED AS TEMPORARY WELL
- × SOIL BORING LOCATION (DECEMBER 2006)
- BM1 ⊕ BENCH MARK (ARBITRARY DATUM)

S-1	
DATE	12/5/06
DEPTH	-
TVOCs	NA
TSVOCs	NA
TMETALs	19,565
TPHs	25.7
TPCBs	0.1

- -BORING I.D.
- -DATE
- -DEPTH (FEET)
- -TOTAL VOLATILE ORGANIC COMPOUNDS (mg/kg)
- -TOTAL SEMI-VOLATILE ORGANIC COMPOUNDS (mg/kg)
- -TOTAL METALS (mg/kg)
- -TOTAL PETROLEUM HYDROCARBONS (mg/kg)
- -TOTAL POLYCHLORINATED BIPHENYLS (mg/kg)

ANALYTICAL RESULTS IN **BOLD** INDICATE AN EXCEEDANCE OF ONE OR MORE COMPOUNDS TO NYSDEC TAGMS

ND = NOT DETECTED
NA = NOT ANALYZED
mg/kg = MILLIGRAMS PER KILOGRAM

SITE PLAN SOURCE: "PHASE II INVESTIGATION REPORT:KENT AVENUE SITE", LAWLER, MATUSKY, AND SKELLY ENGINEERS, LLP, DATE: FEBRUARY 2000

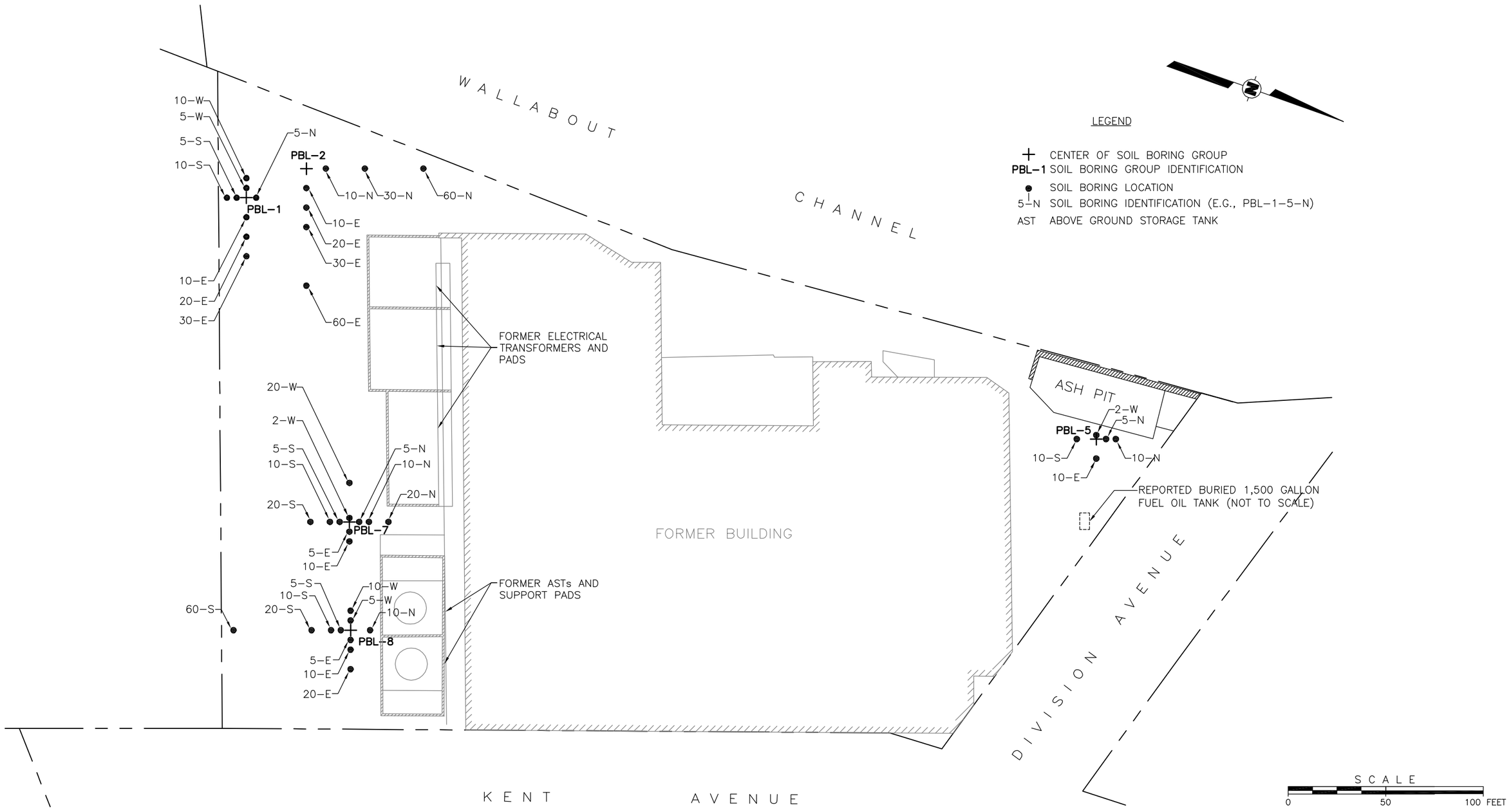
Shaw Environmental & Infrastructure Engineering of NY, PC

DESIGNED BY:	CON EDISON
C. KRAEMER	LONG ISLAND CITY, NEW YORK
DRAWN BY: S. SHATZ	2006-2007 SITE INVESTIGATION SOIL ANALYTICAL DATA
CHECKED BY: C. KRAEMER	FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK

APPROVED BY:	DATE:	SCALE:	DRAWING NO.	REV NO.
J. FRANCESCON	02/08/13	AS SHOWN	FIGURE 3	-

File: V:\- CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figure 3.dwg
Plot Date/Time: Apr 23, 2013 - 3:01pm
Plotted By: sara.shatz

OFFICE NEW YORK, NY | DRAWING NUMBER FIGURE 4



SOURCE: "PHASE II INVESTIGATION REPORT:KENT AVENUE SITE", LAWLER, MATUSKY, AND SKELLY ENGINEERS, LLP, DATE: FEBRUARY 2000

Shaw Environmental & Infrastructure Engineering of NY, PC

DESIGNED BY: C. KRAEMER	CON EDISON LONG ISLAND CITY, NEW YORK			
DRAWN BY: S. SHATZ	PRE-DESIGN INVESTIGATION BORING LOCATION PLAN FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK			
CHECKED BY: C. KRAEMER				
APPROVED BY: J. FRANCESCON	DATE: 02/08/13	SCALE: AS SHOWN	DRAWING NO. FIGURE 4	REV NO. -

File: V:\ – CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figure 4.dwg
Plot Date/Time: Apr 23, 2013 – 3:04pm
Plotted By: sara.shatz

FIGURE 5

DRAWING NUMBER

OFFICE NEW YORK, NY

PBL–1–5–W	
9	
BENZENE	0.097J
ETHYLBENZENE	2.8
XYLENES, TOTAL	0.67

PBL–1–5–S	
12	
METHYL ETHYL KETONE	0.40J
BENZENE	0.38J
TOLUENE	5.8
ETHYLBENZENE	20
XYLENES, TOTAL	21

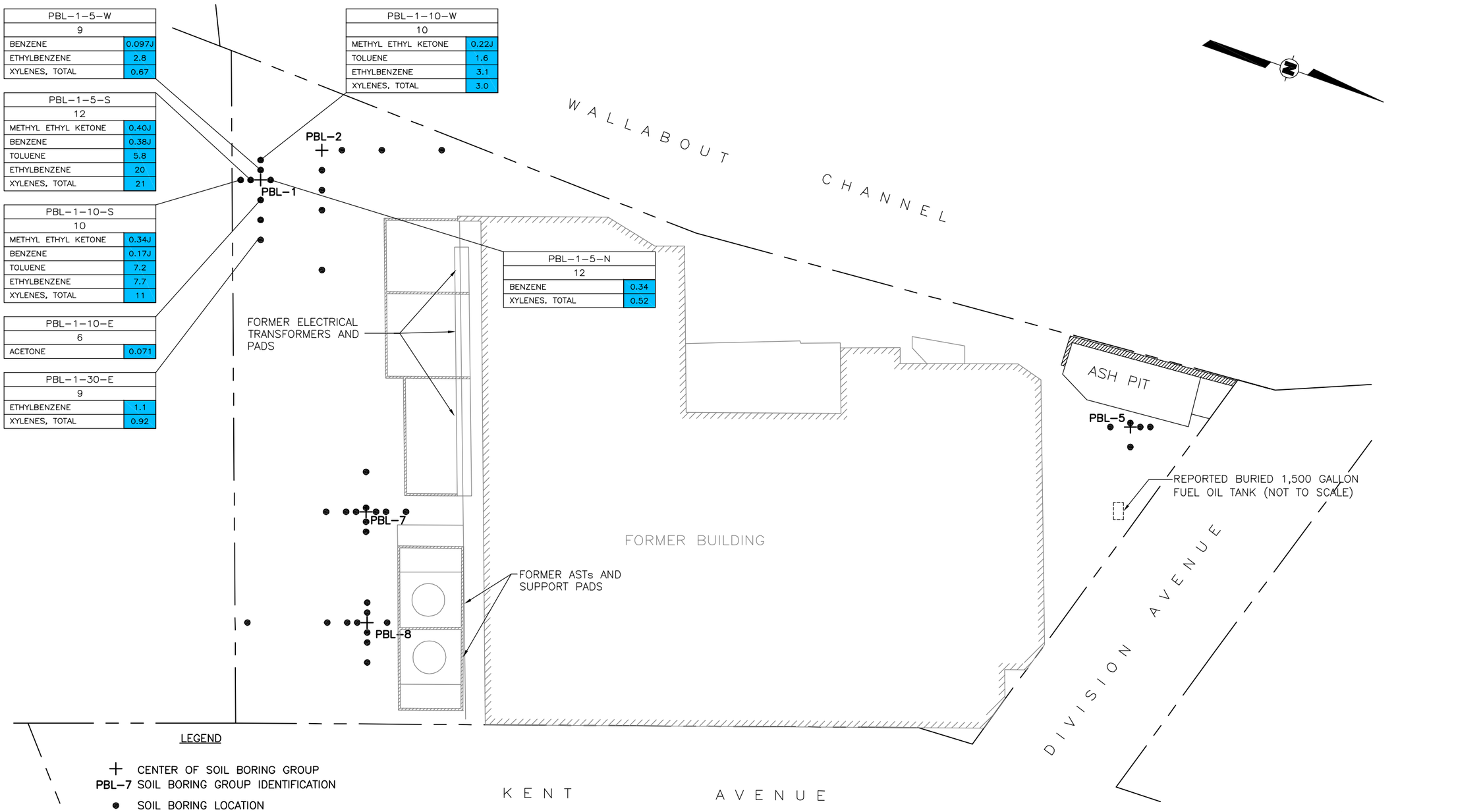
PBL–1–10–S	
10	
METHYL ETHYL KETONE	0.34J
BENZENE	0.17J
TOLUENE	7.2
ETHYLBENZENE	7.7
XYLENES, TOTAL	11

PBL–1–10–E	
6	
ACETONE	0.071

PBL–1–30–E	
9	
ETHYLBENZENE	1.1
XYLENES, TOTAL	0.92

PBL–1–10–W	
10	
METHYL ETHYL KETONE	0.22J
TOLUENE	1.6
ETHYLBENZENE	3.1
XYLENES, TOTAL	3.0

PBL–1–5–N	
12	
BENZENE	0.34
XYLENES, TOTAL	0.52



LEGEND

- + CENTER OF SOIL BORING GROUP
- PBL–7 SOIL BORING GROUP IDENTIFICATION
- ● SOIL BORING LOCATION
- AST ABOVE GROUND STORAGE TANK
- VOC VOLATILE ORGANIC COMPOUND
- UUSCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVE
- RRSCO RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVE

PBL–1–5–W		
9		SOIL BORING SAMPLE DEPTH (FEET)
BENZENE	0.097J	BLUE SHADED VALUES EXCEED UNRESTRICTED USE SCO

COMPOUND — ANALYTICAL RESULT (mg/Kg) — J – RESULT IS LESS THAN THE REPORTING LIMIT BUT GREATER THAN OR EQUAL TO THE METHOD DETECTION LIMIT AND THE CONCENTRATION IS AN APPROXIMATE VALUE

SOURCE: "PHASE II INVESTIGATION REPORT:KENT AVENUE SITE", LAWLER, MATUSKY, AND SKELLY ENGINEERS, LLP, DATE: FEBRUARY 2000

Shaw Environmental & Infrastructure Engineering of NY, PC

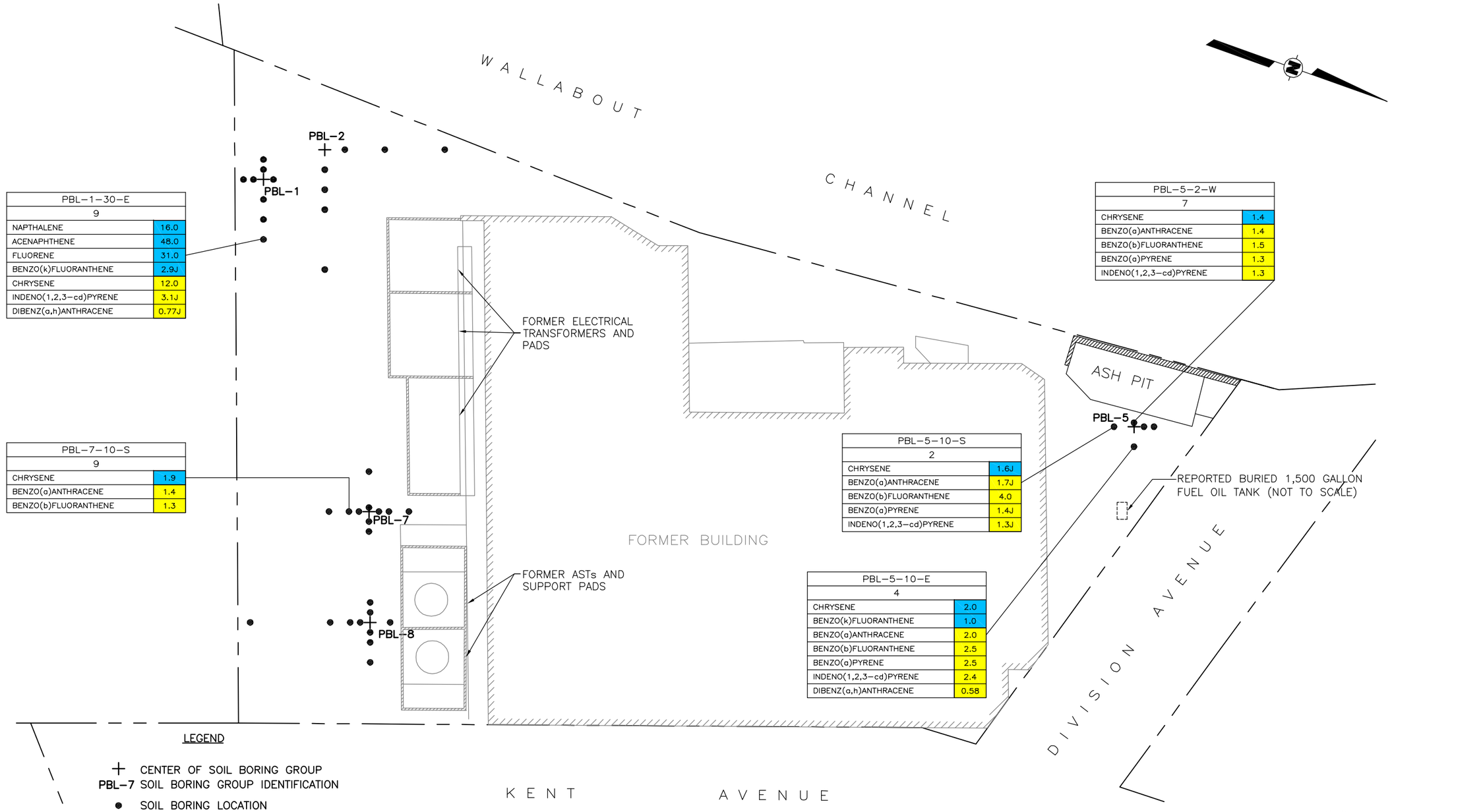
DESIGNED BY: C. KRAEMER	CON EDISON LONG ISLAND CITY, NEW YORK			
DRAWN BY: S. SHATZ	PRE-DESIGN INVESTIGATION VOC EXCEEDANCES OF UUSCO AND RRSCO FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK			
CHECKED BY: C. KRAEMER				
APPROVED BY: J. FRANCESCON	DATE: 02/08/13	SCALE: AS SHOWN	DRAWING NO. FIGURE 5	REV NO. -

File: V:\– CLIENT\Con Edison\146740 Kent Ave\Working\RIM\CADD\RIM\alternatives\Figure 5.dwg
Plot Date/Time: Apr 23, 2013 – 3:05pm
Plotted By: sara.shatz

FIGURE 6

OFFICE: NEW YORK, NY

DRAWING NUMBER



LEGEND

+ CENTER OF SOIL BORING GROUP

PBL-7 SOIL BORING GROUP IDENTIFICATION

● SOIL BORING LOCATION

AST ABOVE GROUND STORAGE TANK

SVOC SEMIVOLATILE ORGANIC COMPOUND

UUSCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVE

RRSCO RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVE

PBL-5-10-E	
4	
CHRYSENE	1.6J
BENZO(a)ANTHRACENE	1.7J

SOIL BORING

SAMPLE DEPTH (FEET)

BLUE SHADED VALUES EXCEED UNRESTRICTED USE SCO

YELLOW SHADED VALUES EXCEED RESTRICTED RESIDENTIAL SCO

COMPOUND

ANALYTICAL RESULT (mg/Kg)

J – RESULT IS LESS THAN THE REPORTING LIMIT BUT GREATER THAN OR EQUAL TO THE METHOD DETECTION LIMIT AND THE CONCENTRATION IS AN APPROXIMATE VALUE

SOURCE: "PHASE II INVESTIGATION REPORT:KENT AVENUE SITE", LAWLER, MATUSKY, AND SKELLY ENGINEERS, LLP, DATE: FEBRUARY 2000

Shaw Environmental & Infrastructure Engineering of NY, PC

DESIGNED BY: C. KRAEMER	CON EDISON
DRAWN BY: S. SHATZ	LONG ISLAND CITY, NEW YORK
CHECKED BY: C. KRAEMER	PRE-DESIGN INVESTIGATION SVOC EXCEEDANCES OF UUSCO AND RRSCO FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK

APPROVED BY:	DATE:	SCALE:	DRAWING NO.	REV NO.
J. FRANCESCON	02/08/13	AS SHOWN	FIGURE 6	-

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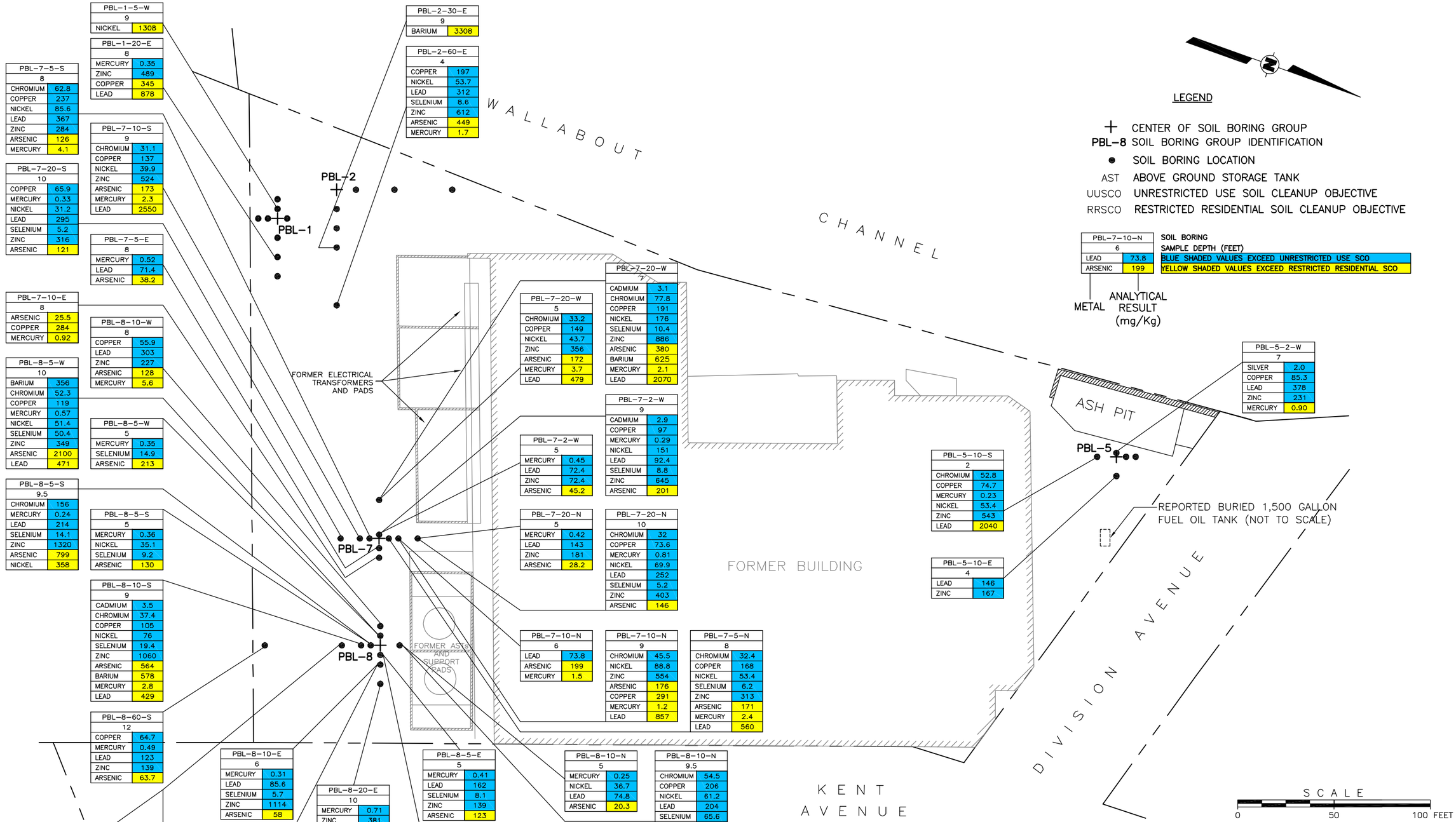
Plot Date/Time: Apr 23, 2013 - 3:06pm
Plotted By: sara.shatz

FIGURE 7

DRAWING NUMBER

OFFICE
NEW YORK, NY



SOURCE: "PHASE II INVESTIGATION REPORT:KENT AVENUE SITE", LAWLER, MATUSKY, AND SKELLY ENGINEERS, LLP, DATE: FEBRUARY 2000

Shaw Environmental & Infrastructure Engineering of NY, PC

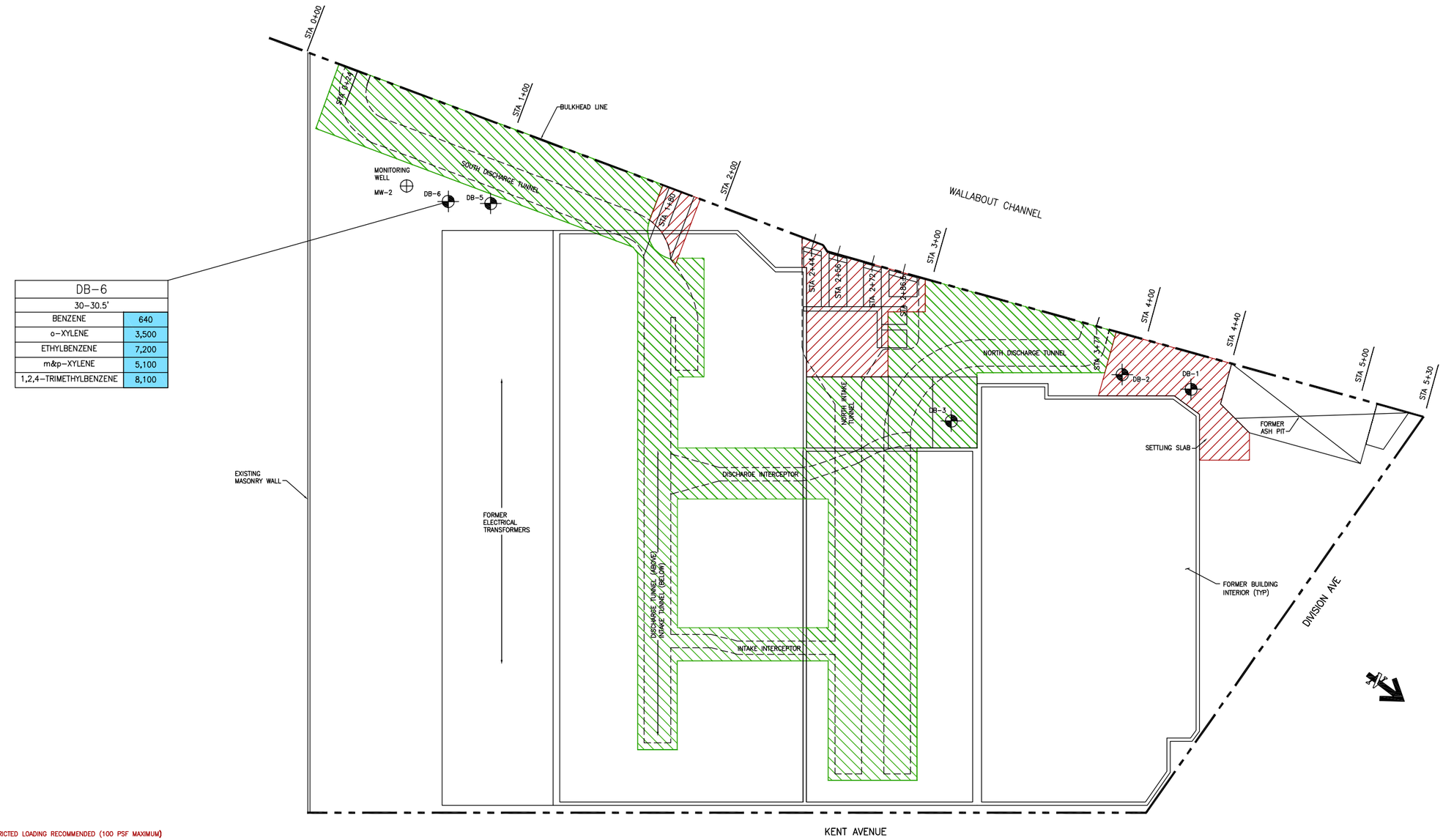
DESIGNED BY: C. KRAEMER	CON EDISON LONG ISLAND CITY, NEW YORK			
DRAWN BY: S. SHATZ	PRE-DESIGN INVESTIGATION METAL EXCEEDANCES OF UUSCO AND RRSCO FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK			
CHECKED BY: C. KRAEMER				
APPROVED BY: J. FRANCESCON	DATE: 02/08/13	SCALE: AS SHOWN	DRAWING NO. FIGURE 7	REV NO. -

File: V:\- CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figure 7.dwg
Plot Date/Time: Apr 23, 2013 - 3:06pm
Plotted By: sara.shatz

FIGURE 8

OFFICE NEW YORK, NY

DRAWING NUMBER



DB-6	
30-30.5'	
BENZENE	640
o-XYLENE	3,500
ETHYLBENZENE	7,200
m&p-XYLENE	5,100
1,2,4-TRIMETHYLBENZENE	8,100

LEGEND

- RESTRICTED LOADING RECOMMENDED (100 PSF MAXIMUM)
- LIMITED LOADING RECOMMENDED
- LOCATION OF SOIL BORING (DB-1)
- UUSCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVE
- RRSCO RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVE
- VOC VOLATILE ORGANIC COMPOUND

DB-6		SAMPLE IDENTIFIER
30-30.5'		DEPTH OF COLLECTION
BENZENE	640	BLUE SHADED VALUES EXCEED UUSCO
COMPOUND	ANALYTICAL RESULT in micrograms per kilogram (ug/Kg) = parts per billion (ppb)	

NOTE:
SITE MAP BASED ON MCLAREN DRAWING B-3, IN APPENDIX B OF THE REPORT UNDERWATER INSPECTION AND CONDITION SURVEY DATED DECEMBER 2006

PRE-IRM SOIL ANALYTICAL RESULTS MAP

SCALE: 1"=50'

Shaw Environmental & Infrastructure Engineering of NY, PC

DESIGNED BY: C. KRAEMER	CON EDISON LONG ISLAND CITY, NEW YORK
DRAWN BY: S. SHATZ	PRE-IRM SITE INVESTIGATION VOC EXCEEDANCES OF UUSCO AND RRSCO FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK
CHECKED BY: C. KRAEMER	

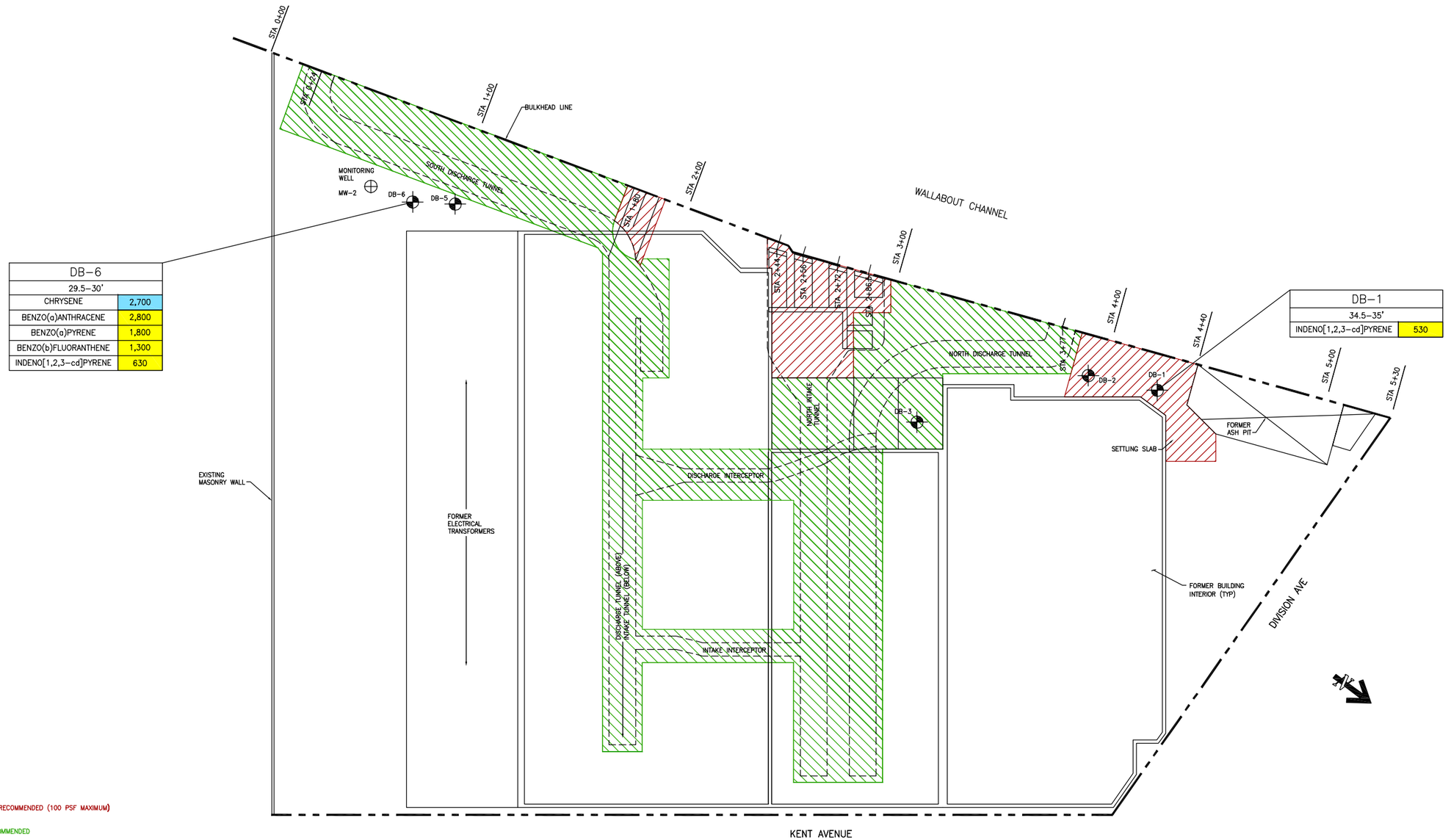
APPROVED BY:	DATE:	SCALE:	DRAWING NO.	REV NO.
T. LARISON	04/09/13	AS SHOWN	FIGURE 8	-

File: V:\-CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figures 8-10 rotated.dwg
Plot Date/Time: Apr 23, 2013 - 3:08pm
Plotted By: sara.shatz

FIGURE 9

DRAWING NUMBER

OFFICE NEW YORK, NY



DB-6	
29.5–30'	
CHRYSENE	2,700
BENZO(a)ANTHRACENE	2,800
BENZO(a)PYRENE	1,800
BENZO(b)FLUORANTHENE	1,300
INDENO[1,2,3–cd]PYRENE	630

DB-1	
34.5–35'	
INDENO[1,2,3–cd]PYRENE	530

LEGEND

RESTRICTED LOADING RECOMMENDED (100 PSF MAXIMUM)

LIMITED LOADING RECOMMENDED

LOCATION OF SOIL BORING (DB–1)

UUSCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVE

RRSCO RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVE

SVOC SEMIVOLATILE ORGANIC COMPOUND

DB-6		SAMPLE IDENTIFIER
30–30.5'		DEPTH OF COLLECTION
CHRYSENE	2,700	BLUE SHADED VALUES EXCEED UUSCO
BENZO(a)ANTHRACENE	2,800	YELLOW SHADED VALUES EXCEED RRSCO
COMPOUND	ANALYTICAL RESULT in micrograms per kilogram (ug/Kg) = parts per billion (ppb)	

NOTE:
SITE MAP BASED ON MCLAREN DRAWING B-3, IN APPENDIX B OF THE REPORT UNDERWATER INSPECTION AND CONDITION SURVEY DATED DECEMBER 2006

PRE–IRM SOIL ANALYTICAL RESULTS MAP

SCALE: 1"=50'

Shaw Environmental & Infrastructure Engineering of NY, PC

DESIGNED BY: C. KRAEMER	CON EDISON
DRAWN BY: S. SHATZ	LONG ISLAND CITY, NEW YORK
CHECKED BY: C. KRAEMER	PRE-IRM SITE INVESTIGATION SVOC EXCEEDANCES OF UUSCO AND RRSCO FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK

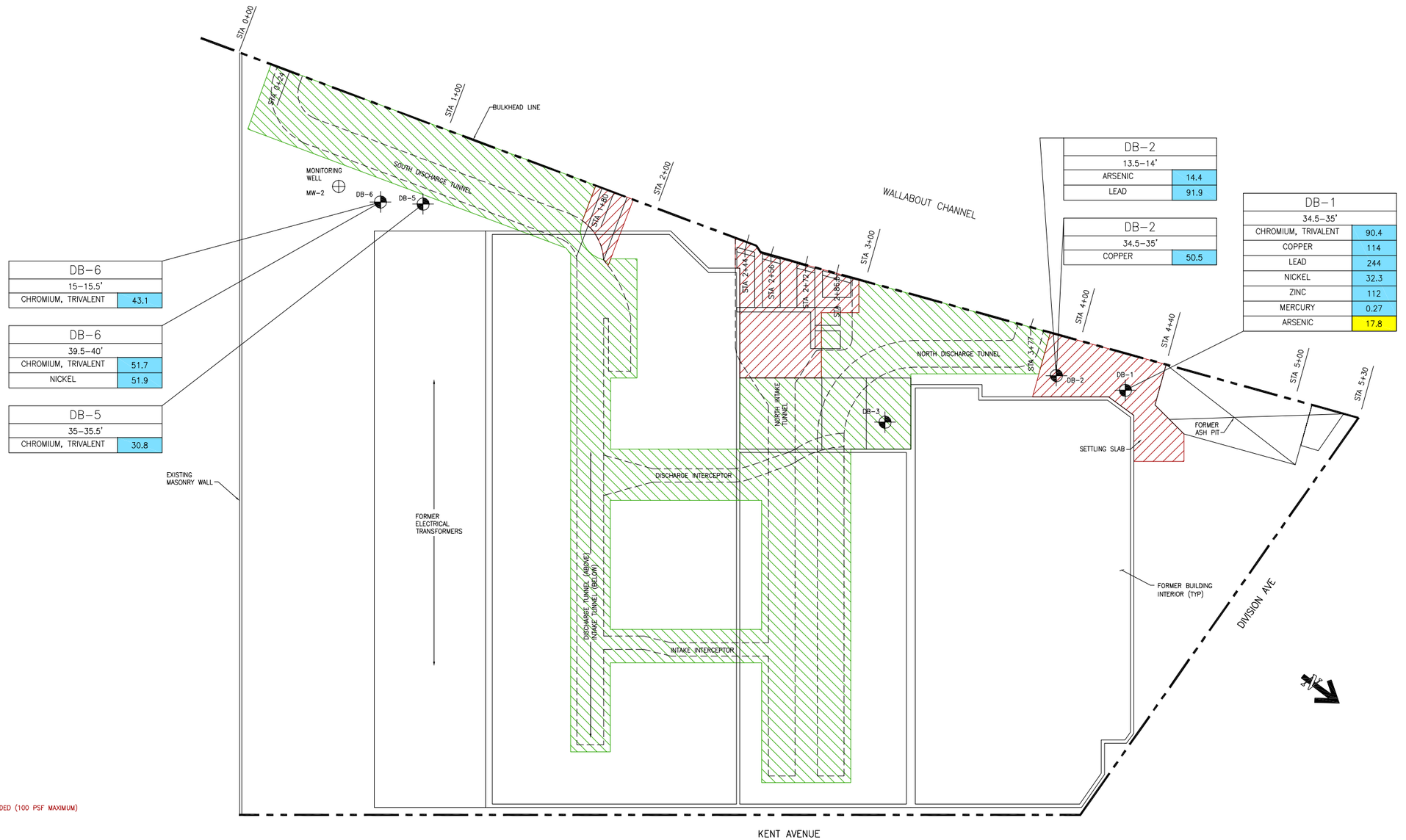
APPROVED BY:	DATE:	SCALE:	DRAWING NO.	REV NO.
T. LARISON	04/09/13	AS SHOWN	FIGURE 9	-

File: V:\ - CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figures 8-10 rotated.dwg
Plot Date/Time: Apr 23, 2013 - 3:08pm
Plotted By: sara.shatz

FIGURE 10

DRAWING NUMBER

OFFICE
NEW YORK, NY



DB-6	
15-15.5'	
CHROMIUM, TRIVALENT	43.1

DB-6	
39.5-40'	
CHROMIUM, TRIVALENT	51.7
NICKEL	51.9

DB-5	
35-35.5'	
CHROMIUM, TRIVALENT	30.8

DB-2	
13.5-14'	
ARSENIC	14.4
LEAD	91.9

DB-2	
34.5-35'	
COPPER	50.5

DB-1	
34.5-35'	
CHROMIUM, TRIVALENT	90.4
COPPER	114
LEAD	244
NICKEL	32.3
ZINC	112
MERCURY	0.27
ARSENIC	17.8

LEGEND

- RESTRICTED LOADING RECOMMENDED (100 PSF MAXIMUM)
- LIMITED LOADING RECOMMENDED
- LOCATION OF SOIL BORING (DB-1)
- UUSCO UNRESTRICTED USE SOIL CLEANUP OBJECTIVE
- RRSCO RESTRICTED RESIDENTIAL SOIL CLEANUP OBJECTIVE

DB-1		
34.5-35'		DEPTH OF COLLECTION
CHROMIUM, TRIVALENT	90.4	BLUE SHADED VALUES EXCEED UUSCO
ARSENIC	17.8	YELLOW SHADED VALUES EXCEED RRSCO
COMPOUND	ANALYTICAL RESULT in micrograms per kilogram (ug/Kg) = parts per billion (ppb)	

NOTE:
SITE MAP BASED ON MCLAREN DRAWING B-3, IN APPENDIX B OF THE REPORT UNDERWATER INSPECTION AND CONDITION SURVEY DATED DECEMBER 2006

PRE-IRM SOIL ANALYTICAL RESULTS MAP

SCALE: 1"=50'

Shaw Environmental & Infrastructure Engineering of NY, PC

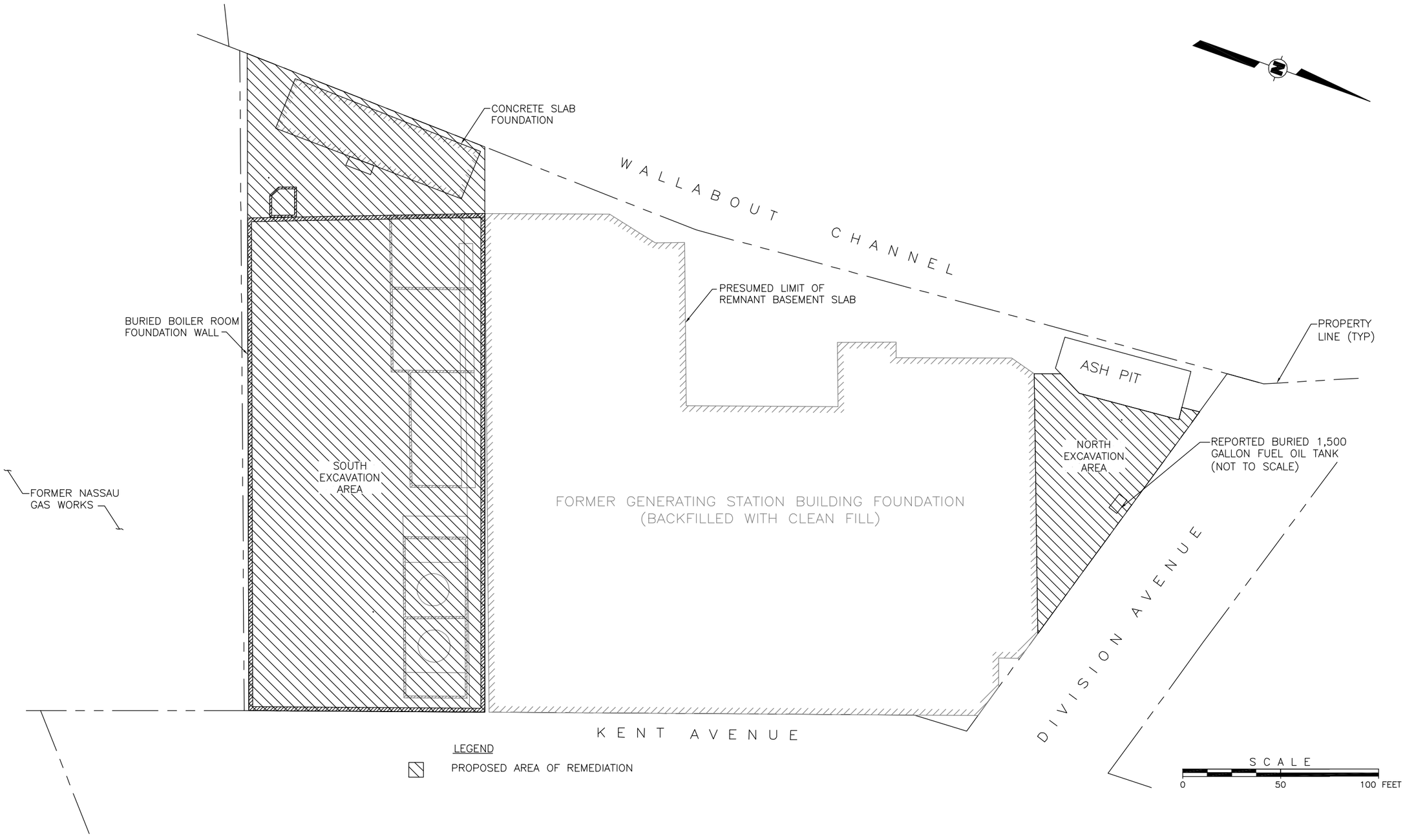
DESIGNED BY: C. KRAEMER	CON EDISON LONG ISLAND CITY, NEW YORK
DRAWN BY: S. SHATZ	PRE-IRM SITE INVESTIGATION METAL EXCEEDANCES OF UUSCO AND RRSCO FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK
CHECKED BY: C. KRAEMER	

APPROVED BY:	DATE:	SCALE:	DRAWING NO.	REV NO.
T. LARISON	04/09/13	AS SHOWN	FIGURE 10	-

File: V:\- CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figures 8-10 rotated.dwg
Plot Date/Time: Apr 23, 2013 - 3:09pm
Plotted By: sara.shatz

FIGURE 11

OFFICE NEW YORK, NY | DRAWING NUMBER



SOURCE: "PHASE II INVESTIGATION REPORT:KENT AVENUE SITE", LAWLER, MATUSKY, AND SKELLY ENGINEERS, LLP, DATE: FEBRUARY 2000

Shaw Environmental & Infrastructure Engineering of NY, PC

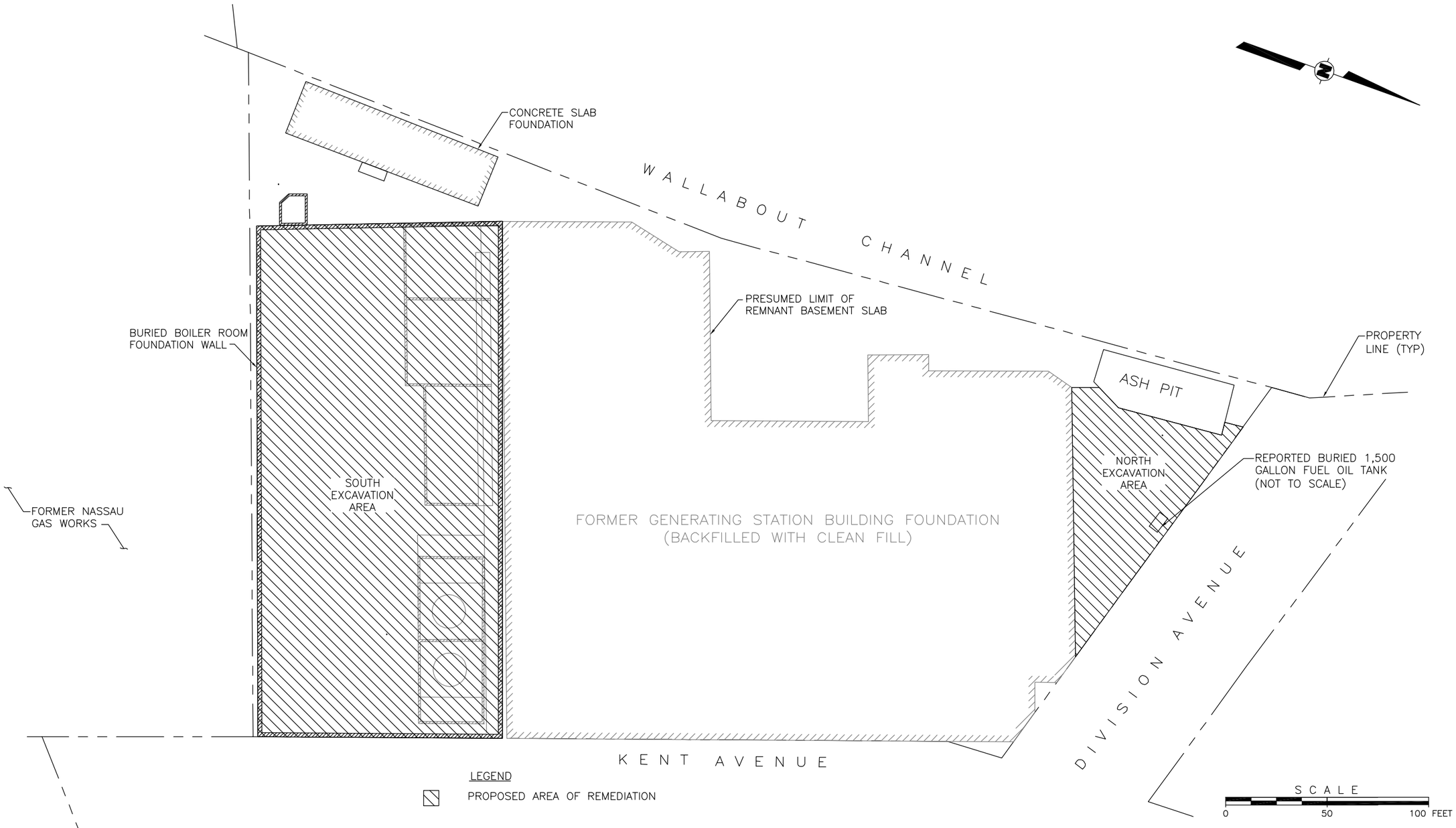
DESIGNED BY: C. KRAEMER	CON EDISON LONG ISLAND CITY, NEW YORK			
DRAWN BY: S. SHATZ	ALTERNATIVE 1			
CHECKED BY: C. KRAEMER	FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK			
APPROVED BY: J. FRANCESCON	DATE: 02/08/13	SCALE: AS SHOWN	DRAWING NO. FIGURE 11	REV NO. -

File: V:\~ CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figure 11.dwg
Plot Date/Time: Apr 23, 2013 - 3:10pm
Plotted By: sara.shatz

FIGURE 12

DRAWING NUMBER

OFFICE NEW YORK, NY



SOURCE: "PHASE II INVESTIGATION REPORT:KENT AVENUE SITE", LAWLER, MATUSKY, AND SKELLY ENGINEERS, LLP, DATE: FEBRUARY 2000

Shaw Environmental & Infrastructure Engineering of NY, PC

DESIGNED BY: C. KRAEMER	CON EDISON LONG ISLAND CITY, NEW YORK			
DRAWN BY: S. SHATZ	ALTERNATIVE 2			
CHECKED BY: C. KRAEMER	FORMER KENT AVENUE GENERATING STATION 500 KENT AVENUE, BROOKLYN, NEW YORK			
APPROVED BY: J. FRANCESCON	DATE: 02/08/13	SCALE: AS SHOWN	DRAWING NO. FIGURE 12	REV NO. -

File: V:\~ CLIENT\Con Edison\146740 Kent Ave\Working\IRM\CADD\IRM\alternatives\Figure 12.dwg
Plot Date/Time: Apr 23, 2013 - 3:10pm
Plotted By: sara.shatz

ATTACHMENT 1

REMEDIAL COST ESTIMATES

ALTERNATIVE 1

TABLE A-1

Shaw Environmental & Infrastructure
Engineering of NY, P.C.

TABLE A-1

ENGINEERING AND CONSTRUCTION COST ESTIMATE

UNRESTRICTED LAND USE EXCAVATION

(ASSUMED PERCENTAGE OF SOIL CONTAINING ACM IS 100%)

ITEM DESCRIPTION	QTY	UM	UNIT TOTAL	TOTAL COST
ENGINEERING AND CM FOR REMEDIATION				
PREPARE RAWP	1	LS	14,000	14,000
PREPARE BID SPECIFICATIONS/DRAWINGS & MEETINGS	1	LS	121,000	121,000
PRE-CONSTRUCTION SURVEY	1	LS	5,300	5,300
PERFORM REVIEW OF CONTRACTOR DELIVERABLES	1	LS	26,500	26,500
FIELD OVERSIGHT (INCLUDING CAMP)	340	DAY	2,000	680,000
3rd PARTY ASBESTOS MONITORING	220	DAY	1,125	247,500
CAMP EQUIPMENT & CONFIRMATION SAMPLE ANALYSIS	1	LS	125,000	125,000
PROJECT CLOSEOUT - FER REPORT	1	LS	55,000	55,000
SUBTOTAL				**$ 1,274,300**
TOTAL ENGINEERING AND CM (ROUNDED)				**$ 1,274,300**
CONSTRUCTION				
ACM EXCAVATION AND DEWATERING				
EXCAVATE, SORT, AND LOAD NON-HAZARDOUS SOLID WASTE	10,450	CY	15	156,750
DEMOLITION AND DISPOSAL OF INTERIOR WALLS	400	CY	200	80,000
DISPOSAL OF NON-ACM DEBRIS	600	CY	50	30,000
DEWATERING - TREATMENT SYSTEM SETUP AND OPERATION	1	LS	200,000	200,000
DEWATERING - BAKER TANK FOR STORAGE	2	LS	10,000	20,000
SUBTOTAL				**$ 486,750**
ACM HAULING AND DISPOSAL TO WASTE MGT				
SUPPLY BLADDER BAGS IN DUMPERS	828	EA	150	124,200
HAUL VIA 22 TON DUMP TRUCK	16,250	TON	58	942,500
ENVIRONMENTAL SAMPLING AND TESTING FEE	14	EA	828	11,592
MATERIAL/ACM DISPOSAL	16,250	TON	65	1,056,250
SUBTOTAL				**$ 2,134,542**
NON-ACM EXCAVATION AND BACKFILL				
TEMPORARY SHEETPILING INSTALLATION	1,244	LF	330	410,520
TEMPORARY SHEETPILING - MATERIAL	742	TON	3,100	2,298,650
TEMPORARY SHEETPILING REMOVAL	1,244	LF	270	335,880
EXCAVATE AND LOAD NON-HAZARDOUS SOLID WASTE	7,920	CY	15	118,800
DEMOLITION AND DISPOSAL OF BUILDING WALLS AND SLAB FLOOR	5,280	CY	200	1,056,000
CONFIRMATION SAMPLE COLLECTION AND ANALYSIS	47	EA	560	26,320
ENVIRONMENTAL CLEAN BACKFILL, COMPACTED	24,050	CY	35	841,750
SUBTOTAL				**$ 5,087,920**
NON-ACM HAULING AND DISPPOSAL TO APEX LANDFILL				
ENVIRONMENTAL SAMPLING FEE	7	EA	828	5,796
NON-ACM MATERIAL DISPOSAL	12,350	TON	67	827,450
SUBTOTAL				**$ 833,246**
TOTAL DIRECTS				**$ 8,542,458**

Shaw Environmental & Infrastructure
Engineering of NY, P.C.

TABLE A-1

ENGINEERING AND CONSTRUCTION COST ESTIMATE

UNRESTRICTED LAND USE EXCAVATION

(ASSUMED PERCENTAGE OF SOIL CONTAINING ACM IS 100%)

ITEM DESCRIPTION	QTY	UM	UNIT TOTAL	TOTAL COST
CONSTRUCTION INDIRECTS				
GENERAL CONDITIONS	1		683,397	683,397
INSURANCES AND BONDS @ 5%	1		427,123	427,123
OVERHEAD AND PROFIT @ 15%	1		1,447,947	1,447,947
SUBTOTAL				**$ 2,558,466**
				$ 11,100,924
CONTINGENCY @ 10%	1		1,110,092	1,110,092
TOTAL CONSTRUCTION (ROUNDED)				**$ 12,210,000**
GRAND TOTAL (ROUNDED)				**$ 13,500,000**

EXCLUSIONS:
OWNER PROJECT MANAGEMENT

ASSUMPTIONS
RATIO OF ACM TO TOTAL SOIL IN ACM EXCAVATION IS 100%
RATIO OF DEBRIS IN ACM EXCAVATION TO TOTAL EXC 5%
BASED ON 340 WORKING DAY DURATION FOR IRM CONSTRUCTION CONTRACT
ACM DISPOSAL IS BASED ON QUOTES FROM WASTE MANAGEMENT
NON-ACM DISPOSAL IS BASED ON QUOTES FROM APEX LANDFILL
NORTH WALL OF SOUTHERN EXCAVATION AREA IS COMMON TO FORMER GENERATING STATION AND WILL REMAIN IN PLACE

ALTERNATIVE 2

TABLE A-2

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Engineering of NY, P.C.

TABLE A-2

ENGINEERING AND CONSTRUCTION COST ESTIMATE

EXCAVATION TO RESTRICTED RESIDENTIAL SCOs

(ASSUMED PERCENTAGE OF SOIL CONTAINING ACM IS 100%)

ITEM DESCRIPTION	QTY	UM	UNIT TOTAL	TOTAL COST
ENGINEERING AND CM FOR REMEDIATION				
PREPARE RAWP	1	LS	14,000	14,000
PREPARE BID SPECIFICATIONS/DRAWINGS & MEETINGS	1	LS	121,000	121,000
PRE-CONSTRUCTION SURVEY	1	LS	5,300	5,300
PERFORM REVIEW OF CONTRACTOR DELIVERABLES	1	LS	26,500	26,500
FIELD OVERSIGHT (INCLUDING CAMP)	220	DAY	2,000	440,000
3rd PARTY ASBESTOS MONITORING	220	DAY	1,125	247,500
CAMP EQUIPMENT & CONFIRMATION SAMPLE ANALYSIS	1	LS	76,000	76,000
PROJECT CLOSEOUT - FER REPORT	1	LS	31,000	31,000
SUBTOTAL				**$ 961,300**
TOTAL ENGINEERING AND CM (ROUNDED)				**$ 961,300**
POST REMEDIATION MONITORING & REPORTING				
ANNUAL GROUNDWATER SAMPLE ANALYSIS (INCLUDING QA/QC)	30	EA	2,350	70,500
ANNUAL GROUNDWATER SAMPLE COLLECTION	30	EA	1,200	36,000
ANNUAL SITE INSPECION	5	EA	1,800	9,000
SITE INSPECION EVERY 5 YEARS	5	EA	1,800	9,000
ANNUAL MONITORING REPORT	30	EA	2,800	84,000
SUBTOTAL				**$ 208,500**
DISCOUNTED PRESENT DAY VALUE (4% INFLATION) (ROUNDED)				**$ 64,300**
CONSTRUCTION				
EXCAVATION AND BACKFILL				
EXCAVATE, SORT, AND LOAD NON-HAZARDOUS SOLID WASTE	10,450	CY	15	156,750
DEMOLITION AND DISPOSAL OF INTERIOR WALLS	400	CY	200	80,000
DISPOSAL OF NON-ACM DEBRIS	600	CY	50	30,000
DEWATERING - SYSTEM SETUP AND OPERATION	1	LS	25,000	25,000
DEWATERING - BAKER TANK FOR STORAGE	1	LS	10,000	10,000
DEWATERING - TRANSPORT, TREAT AND DISPOSE BI-WEEKLY	6	TRK	7,500	45,000
ENVIRONMENTAL CLEAN BACKFILL, COMPACTED	11,450	CY	35	400,750
SUBTOTAL				**$ 747,500**
ACM HAULING AND DISPOSAL TO WASTE MGT				
SUPPLY BLADDER BAGS IN DUMPERS	828	EA	150	124,200
HAUL VIA 22 TON DUMP TRUCK	16,250	TON	58	942,500
ENVIRONMENTAL SAMPLING AND TESTING FEE	828	EA	14	11,592
MATERIAL/ACM DISPOSAL	16,250	TON	65	1,056,250
SUBTOTAL	**16,250**		**131**	**$ 2,134,542**
NON-ACM HAULING AND DISPOSAL TO APEX LANDFILL				
ENVIRONMENTAL SAMPLING FEE	-	EA	14	-
INTERMODAL TRANS AND DISPOSAL VIA 62 CY RAILCARS	-	TON	67	-
SUBTOTAL	**-**		**-**	**$ -**
TOTAL DIRECTS				**$ 2,882,042**

Shaw Environmental & Infrastructure
Engineering of NY, P.C.

TABLE A-2

ENGINEERING AND CONSTRUCTION COST ESTIMATE

EXCAVATION TO RESTRICTED RESIDENTIAL SCOs

(ASSUMED PERCENTAGE OF SOIL CONTAINING ACM IS 100%)

ITEM DESCRIPTION	QTY	UM	UNIT TOTAL	TOTAL COST
CONSTRUCTION INDIRECTS				
GENERAL CONDITIONS	1		230,563	230,563
INSURANCES AND BONDS @ 5%	1		144,102	144,102
OVERHEAD AND PROFIT @ 15%	1		488,506	488,506
SUBTOTAL				**$ 863,172**
				$ 3,745,214
CONTINGENCY @ 10%	1		374,521	374,521
TOTAL CONSTRUCTION (ROUNDED)				**$ 4,120,000**
GRAND TOTAL (ROUNDED)				**$ 5,100,000**

EXCLUSIONS:
OWNER PROJECT MANAGEMENT

ASSUMPTIONS
RATIO OF ACM TO TOTAL SOIL IS 100%
RATIO OF DEBRIS TO TOTAL EXC 5%
BASED ON 220 WORKING DAY DURATION FOR IRM CONSTRUCTION CONTRACT
ACM DISPOSAL IS BASED ON QUOTES FROM WASTE MANAGEMENT
NON-ACM DISPOSAL IS BASED ON QUOTES FROM APEX LANDFILL
AVERAGE RATE OF INFLATION FOR NEXT 30 YEARS IS 4%