NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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March 3, 2022

Richard Rienzo
Consolidated Edison Company of New York, Inc.
31-01 20th Avenue
Long Island City, NY 11105

Re: Remedial Design Work Plan
Former West 45th Street Gas Works
Site #231109

Dear Richard Rienzo:

The New York State Department of Environmental Conservation (Department) and the New York State Department of Health (NYSDOH) have reviewed the Remedial Design Work Plan (RDWP) for the Former West 45th Street Gas Works, Operable Unit 2 (the site) located at the intersection of West 45th Street and 12th Avenue in New York, New York, submitted by Parsons on behalf of Consolidated Edison Co. of New York, Inc., dated January 2022. The RDWP is hereby approved pending submission of a signed and stamped final version. Please provide a schedule for field work implementation including a 10-business day notification to the Department.

If you have any questions, please feel free to contact me at 518-402-2029 or email: greta.white@dec.ny.gov.

Sincerely,

Greta White, P.G.
Project Manager
Remedial Action Bureau C
Division of Environmental Remediation

EC: K. Kaiser, ConEd
D. MacNeal and J. Brown, NYSDEC
A. Perretta & S. McLaughlin, NYSDOH

REMEDIAL DESIGN WORK PLAN
FOR THE FORMER WEST 45TH STREET GAS WORKS SITE – OPERABLE UNIT 2

Site #231109

CONSOLIDATED EDISON CO. OF NEW YORK, INC.
31-01 20th Avenue
Long Island City, NY 11105

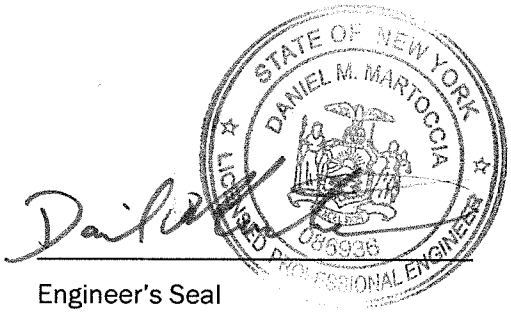
Prepared by:

301 Plainfield Road, Suite 350
Syracuse, NY 13212

JANUARY 2022

Certification

"I certify that this Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER10."



Engineer's Seal

3/7/22

Date

PARSONS

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LIST OF ACRONYMS

3D	Three dimensional
AAR	Alternatives Analysis Report
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, xylene
CAMP	Community Air Monitoring Plan
COC	Contaminate of concern
Con Edison	Consolidated Edison Company of New York, Inc.
CSCO	Commercial Use Soil Cleanup Objective
DER-10	NYSDEC Technical Guidance for Site Investigation and Remediation
DNAPL	Dense nonaqueous phase liquid
DOT	Department of Transportation
FER	Final Engineering Report
FSP	Field Sampling Plan
GSI	Geo-Solutions, Inc.
GWQS	Groundwater quality standards
HASP	Health and Safety Plan
ISS	*In situ* stabilization and solidification
LEAF	Leaching Environmental Assessment
MGP	Manufactured gas plant
MSL	Mean sea level
MW	Monitoring well
NAPL	Nonaqueous phase liquid
NYCRR	New York Codes Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSDOT	New York State Department of Transportation
OU	Operable Unit
PAH	Polycyclic aromatic hydrocarbon
PCE	Tetrachloroethylene
PDI	Predesign investigation
PID	Photoionization detector
ppm	Parts per million
PRR	Periodic Review Report
QAPP	Quality Assurance Project Plan
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS - CONTINUED

RDWP	Remedial Design Work Plan
SC	Site characterization
SCG	Standards, Criteria, and Guidance Values
SCO	Soil Cleanup Objectives
Site	OU-2 of the Former West 45th Street Gas Works in New York City, New York
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total dissolved solids
TMV	Toxicity, mobility, or volume
TOGS	Technical and Operational Guidance Series
TP	Test pit
UCS	Unconfined compressive strength
USCO	Unrestricted Use Soil Cleanup Objective
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound

1.0 INTRODUCTION

On behalf of Consolidated Edison Company of New York, Inc. (Con Edison), this Remedial Design Work Plan (RDWP) for Operable Unit 2 (OU-2) of the Former West 45th Street Gas Works Site has been prepared for the New York State Department of Environmental Conservation (NYSDEC). The Former West 45th Street Gas Works is located in the borough of Manhattan in New York City, New York, in an area loosely bounded by 46th Street to the north, 11th Avenue to the east, 44th Street to the south, and 12th Street (aka Route 9A and the Henry Hudson Highway) to the west, as shown in Figure 1. For characterization purposes, the Former West 45th Street Gas Works was divided into two distinct areas designated as Operable Unit 1 (OU-1) and OU-2, as shown in Figure 2. This RDWP focuses only on the OU-2 portion of the Former West 45th Street Gas Works Site, which is herein referred to as the Site. The Site is located mid-block between 11th Avenue and 12th Avenue and is bounded by 46th Street to the north and 45th Street to the south.

The purpose of this RDWP is to define the tasks to take place as components of the remedial design process; including identification of pre-design testing; modeling; and other tasks necessary for the preparation and development of final plans and specifications necessary to implement the remedial alternative set forth in the Decision Document.

The final Alternatives Analysis Report (AAR) for the Site was submitted to the NYSDEC in November 2020 (Parsons). The NYSDEC-approved AAR included an evaluation of three remedial alternatives to address non-aqueous phase liquid (NAPL) or manufactured gas plant (MGP)-related impacts at the Site, comparing them to the nine evaluation criteria outlined in NYSDEC Technical Guidance for Site Investigation and Remediation (DER-10) and in accordance with New York Codes Rules and Regulations (NYCRR) 6 NYCRR 375-1.8(f). The three remedial alternatives evaluated in the final AAR included the following:

- Alternatives 1 and 1A – Excavation and off-site disposal and treatment of soils that exceed Commercial Use Soil Cleanup Objectives (CSCOs) and/or NAPL-impacted soils to a depth of 15 feet and in situ stabilization and solidification (ISS) for deeper NAPL-impacted soils,
- Alternatives 2 and 2A –ISS of soils that exceed CSCOs and/or NAPL-impacted soils to 15 feet and ISS of deeper NAPL-impacted soils, and
- Alternative 3 – Implementation of a Site Management Plan (SMP).

The NYSDEC selected Remedial Alternative 2A – ISS of soils exceeding CSCOs and/or NAPL-impacted soils to a depth of greater than 30 feet below ground surface (bgs). This remedial alternative consists of the following major components:

- Excavation and disposal of overburden Site soils to a depth of up to 5-feet bgs,
- ISS of soils that exceed CSCOs and/or NAPL-impacted soils to depths greater than 30 feet bgs, and
- Institutional and engineering controls for remaining Site contamination.

This RDWP has been prepared to outline the scope of pre-design tasks required to develop the remedial design for the Site.

1.1 RDWP ORGANIZATION

The RDWP is organized as follows:

Table 1.1 RDWP Organization

Section	Description
Section 1 - Introduction	Presents the organization of the RDWP, pertinent Site background information, a summary of potentially applicable standards, criteria, and guidance (SCGs) criteria, a site characterization summary, RAOs, and a description of the NYSDEC-selected remedy.
Section 2 – Pre-Design Investigation	Presents the scope and rationale for supplemental pre-design investigation (PDI) activities to be completed in support of the remedial design.
Section 3 – Remedial Design	Describes the remedial design activities to be completed in support of implementing the NYSDEC selected remedy.
Section 4 – Permits, Access Agreements and Approvals	Identifies the permits, access agreements, and approvals necessary to conduct the supplemental pre-design investigation activities and to implement the NYSDEC selected remedy.
Section 5 – Remedial Design Documents and Schedule	Identifies the remedial design documents to be prepared in support of the remedial action and presents the anticipated project schedule for implementing the supplemental pre-design investigation activities and preparing the remedial design.
Section 6 – Post-Remedial Construction Activities	Describes the documents to be prepared following the remedial construction.
Section 7 - References	Presents a list of documents used to support the preparation of this RDWP.

The current Field Sampling Plan (FSP), Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) with a Community Air Monitoring Plan (CAMP), will be updated before field activities begin.

1.2 SITE BACKGROUND

1.2.1 Site History and Operation

The Site was part of the former West 45th Street Gas Works (MGP) which was present on portions of the city blocks from 44th to 46th Street, between 11th Avenue and the Hudson River. Former MGP structures located on OU-2 included two gasholders and associated structures and a purifying house.

The plant operated from 1877 to the mid–1890s using the coal gas process prior to switching to a carbureted gas process. Although most of the buildings and structures associated with the MGP facility were removed in 1913, the large tar-sealed gasholder located at OU-2 was used until 1965. The height of the large gasholder appears to have increased from 90 feet in 1911 to 276 feet in 1930, expanding the holder's capacity from 2,000,000 cubic feet to 7,000,000 cubic feet before being decommissioned and demolished in the mid-1960s. The subsurface remnants of the gasholders are still believed to be present on the Site. Following demolition of the aboveground structures, Con Edison used the Site for heavy equipment storage and as a parking lot. In 1995, Con Edison constructed a natural gas refueling station on the northeast corner of OU-2 which has since been removed. In 2000, the New York State Department of Transportation (NYSDOT) acquired the Site from Con Edison. The existing zone for the Site based on the New York City Planning Commission Zoning Map 8c (Appendix A) is a manufacturing district.

The current Site is covered with concrete and asphalt pavement, having been developed as a parking lot with a pedestrian bridge over 12th Avenue (State Route 9A) leading to the adjacent Intrepid Sea, Air and Space Museum.

1.3 SITE TOPOGRAPHY, SOILS, GEOLOGY AND HYDROGEOLOGY

1.3.1 Topography

Surface topography ranges from approximately 10 to 20 feet above mean sea level (MSL) at the Site and tends to decrease slightly downward from north to south and from east to west.

1.3.2 Soils

Subsurface soils observed during Site Characterization (SC) and PDI field activities consist of fill material, to include silts, sand, gravels, large cobbles, and other debris (e.g., brick, ash, etc.). Subsurface structures are present at the Site, and include gas holder walls and foundations encountered during PDI field activities.

1.3.3 Geology

The bedrock underlying the Site is the Manhattan Formation, composed of gray to black mica schist that has been intensely folded and deformed by two major geologic episodes of mountain building during the Paleozoic Era, more than 200 million years ago. The depth of the bedrock surface in the mid to lower west Manhattan area varies from more than 150 feet bgs in the Chelsea section to near the surface in the Clinton area (AKRF 1994).

Soil borings were advanced during SC and PDI field encountered gneissic schist bedrock at significantly varying depths. Figure 3 details bedrock elevations based on soil boring and test pit locations. Bedrock highs above 15 feet bgs. were observed in the northwestern, northeastern, and southwestern corners of the Site. A bedrock high is observed between 12.5 and 16 feet bgs in the center of the Site, directly below the interior portion of the former large gas holder. The bottom of the large gasholder appears to be a combination of concrete and bedrock. Bedrock depths encountered within the large gasholder appear to be deeper along the perimeter of the holder (between 35 and 45 feet bgs), forming a bedrock trough in a ring shape around the entire bedrock high. Cross sections that transverse the Site from east to west and from north to south are shown on Figures 4 through 7.

1.3.4 Hydrogeology

Groundwater levels were collected at the Site in 2003, 2006, 2007, and 2012 via gauging events and tidal studies. Data from the 2003, 2006, and 2007 events were similar and indicate groundwater flow beneath the Site is to the west toward the Hudson River. Overall, groundwater maintains a general flow toward the west. A mounding effect observed within the footprint of the large gasholder increased between 2003 and 2012, and artesian conditions were encountered during PDI field activities in select wells in 2012. Figure 8 is a groundwater elevation contour map based on the 2012 gauging event. A tidal study conducted during SC field activities in March 2006 determined Site monitoring wells are not subject to tidal influence.

1.3.5 Groundwater Usage

Groundwater at the Site is not used for potable purposes (nor is groundwater anywhere in New York City used for potable purposes).

1.3.6 Nature and Extent of Remaining Impacts

Manufactured gas-production byproducts, typically dense non-aqueous phase liquid (DNAPL) (i.e., coal tar), often account for the majority of the environmental impacts at former MGP sites. Principal components of coal tar are benzene, toluene, ethylbenzene, and xylene (BTEX) compounds, which are volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs), which are semivolatile organic compounds (SVOCs). Because coal tar typically contains elevated levels of these compounds, soil samples and groundwater monitoring wells that contain visual evidence of coal tar are typically assumed to contain BTEX and PAHs at concentrations greater than applicable SCGs.

1.3.6.1 Surface Soil

Surface soils were characterized during SC and PDI field activities via soi boring advancement and test pit excavation. Soil samples collected during SC field activities were submitted for laboratory analysis of Target Compound List (TCL) VOCs, TCL SVOCs, Target Analyte List (TAL) metals, cyanide and Toxicity Characteristic Leaching Procedure (TCLP) lead. Soil samples collected during PDI field activities were submitted for laboratory analysis of TCL VOCs, TCL SVOCs, and cyanide. Soil sample results were compared to 6 NYCRR 375 Unrestricted Use Soil Cleanup Objective (USCO) and CSCOs.

Impacts to soil in exceedance of applicable criteria for BTEX compounds were detected at depths ranging from 7 to 35 feet bgs. Impacts to soil in exceedance of applicable criteria for PAHs were detected at depths ranging from 7 to 36 feet bgs.

Impacts to soil were generally found in exceedance of applicable criteria in locations where NAPL was observed in the subsurface, primarily along the perimeters of the former gasholders and in the vicinity of the former tar tank/skimmer pump structures, as described in further sections.

During PDI activities, soil samples were collected for waste characterization analysis to evaluate potential disposal options. Of all collected samples, one sample exhibited a TCLP benzene concentration exceeding the U.S. Environmental Protection Agency (USEPA) regulatory limit of 0.5 ppm for a hazardous waste.

1.3.6.2 NAPL

During SC and PDI activities, soil samples were visually characterized, and the presence of potential impacts (NAPL, sheen, odor, staining) was noted. NAPL was detected at depths ranging from 1 to 41

feet bgs, generally along the perimeter of the gasholders in the vicinity of the former tar tanks/skimmer pumps. NAPL detected within the former gasholders was limited to the outside edge of the structures. NAPL was not observed at locations near the center of the large gasholder. NAPL was detected during SC and PDI activities at or near the bedrock surface in the southern portion of the Site. Accumulations of DNAPL have been detected in groundwater monitoring wells located near the southwestern corner of the Site during groundwater gauging activities.

Two representative samples of NAPL were collected from SC soil boring locations and submitted to an analytical laboratory for forensic hydrocarbon fingerprint analysis. In general, the analytical results of fingerprint analysis indicate that the samples contained probable residue from a former MGP using the carbureted water gas process.

1.3.6.3 Groundwater

Three groundwater sampling events have been conducted at the Site. Groundwater samples collected during each event were submitted for laboratory analysis of TCL VOCs, TCL SVOCs, TAL metals, and cyanide.

During each groundwater sampling event, VOCs (primarily BTEX compounds) and PAHs were detected in select groundwater monitoring wells at concentrations exceeding their respective groundwater quality standards (GWQS). Concentrations of VOCs and PAHs in exceedance of applicable criteria were generally detected in the vicinity of the large gasholder. Additionally, minimum concentrations have consistently been detected in the most downgradient well. Metals have been detected in Site groundwater however are not attributed to MGP-related impacts.

1.3.6.4 Soil Vapor

During SC activities, soil gas samples were collected from three locations along the northern and eastern boundaries of the Site. Two soil gas samples (at 1 foot and 4 feet bgs) were collected from each location. All soil gas samples were submitted for laboratory analysis of VOCs using modified USEPA Method TO-15. Various VOCs, including BTEX, tetrachloroethylene (PCE) and trichloroethylene (TCE) were detected at concentrations greater than New York State Department of Health (NYSDOH) guidance.

1.3.7 Exposure Assessment

A qualitative exposure assessment was performed for the Site in accordance with Appendix 3B of NYSDEC DER 10 and was included in the AAR. The exposure assessment was based on the results of the investigation activities completed at the Site.

The Site is in a highly-urbanized area, which is zoned for manufacturing uses. The Site is currently developed as a parking lot that includes a pedestrian bridge over 12th Avenue (Route 9A/Henry Hudson Parkway) to the Intrepid Sea, Air and Space Museum. Currently, the Site is covered with concrete and asphalt pavement, and there is no exposed surface soil on the Site.

Under current conditions, a potential exposure to impacted materials at the Site is unlikely unless intrusive subsurface work is performed (e.g., repair of underground utilities) or if the Site were developed. The field investigations have revealed that surface soils consist of fill material and are covered with concrete or asphalt pavement. Therefore, current exposure to soils at the Site is limited. In addition, no free-phase product or DNAPL was observed in surface soil below that parking area during previous investigations. Proper engineering controls will be implemented during future intrusive remedial activities to minimize exposure at the Site.

Groundwater throughout the Site is impacted primarily with BTEX, PAHs, and NAPL. Potential exposure to impacted groundwater may occur if future construction activities are conducted at the Site. Groundwater at the Site currently is not used for potable purposes, and there reportedly are no plans for future use of potable or commercial/industrial groundwater at the Site or in the general vicinity of the Site. Site groundwater flows westward toward the Hudson River, approximately 0.1 mile from the Site boundary. Based on the analytical results for groundwater samples collected at the Site, groundwater concentrations did not exceed the Class GA standards in a monitoring well located upgradient of the Hudson River.

1.4 STANDARDS, CRITERIA, AND GUIDANCE

Title 6 of the NYCRR Part 375-6 Remedial Program Soil Cleanup Objectives (SCOs), effective December 14, 2006, was used in preparing remedial alternatives for the Site. Remedial actions conducted in New York State are required to attain chemical-, action-, and location-specific SCGs to the extent practicable as per DER-10 (NYSDEC 2010). The remedy evaluation portion of the AAR considered applicable SCGs.

1.4.1 Remedial Goal

The primary remedial goal for the areas of the Site affected by MGP-related impacts is to ensure that the MGP-related contamination does not present a threat to human health or the environment considering the manner in which the properties are used, and to develop and implement the necessary remedial actions to remediate the area to a level that is protective of human health and the environment for such uses.

1.4.2 Remedial Action Objectives

RAOs established for the Site represent media-specific goals that are protective of public health and the environment. They have been developed through consideration of the results of Site investigation activities and with reference to potential SCGs, as well as current and foreseeable future anticipated uses of the Site. The RAOs were presented in the Decision Document dated July 2021 and are outlined below.

Table 1.2 Remedial Action Objectives

Medium	Protection	RAO
Soil	Public Health	Prevent ingestion/direct contact with contaminated soil
		Prevent inhalation of or exposure from contaminants volatilizing from contaminates of concern (COCs) in soil
	Environmental	Prevent migration of COCs that would result in groundwater or surface water contamination
Groundwater	Public Health	Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards
		Prevent contact with, or inhalation of volatiles, from contaminated groundwater
	Environmental	Restore the groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable

Medium	Protection	RAO
		Remove the source of groundwater or surface water contamination
Soil Vapor	Public Health	Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the Site

1.5 DESCRIPTION OF SELECTED REMEDY

The NYSDEC-selected remedy identified in the Decision Document issued by NYSDEC in July 2021 for OU2 of Site #231109 consists of the following major components:

- Excavation and disposal of overburden Site soils to a depth of up to 5 feet bgs,
- ISS of soils that exceed CSCOs and/or NAPL-impacted soils to depths greater than 30 feet bgs, and
- Institutional and engineering controls for remaining Site contamination.

Excavation of overburden soil to a depth of up to 5 feet bgs will be required prior to the implementation of the ISS field program to allow for bulking of the subsurface material. This excavated material will be transported off site for disposal. Backfill material meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought to the Site to provide protection of the ISS soils, complete backfilling, and establish the designed grades at the Site following the remediation activities.

ISS will be implemented on remaining source materials below a depth of 5 feet bgs. The treatment zone will extend from approximately 5 feet bgs to approximately 15 feet bgs in select areas of the Site, to approximately 30 feet bgs in other areas, and to bedrock in the areas depicted on Figure 9.

The solidified ISS mass will be then covered with a cover system to prevent direct exposure to the solidified mass. In addition, the cover will allow for commercial use of the Site and to protect the ISS component of the Site remedy by providing sufficient thermal protection of the solidified mass from seasonal freeze/thaw cycles.

Following implementation of the Site remedy, a SMP consisting of a monitoring program, groundwater sampling, periodic inspections, and periodic review reports will be used to monitor the long-term effectiveness and performance of this remedy.

2.0 SUPPLEMENTAL PRE-DESIGN INVESTIGATION

The following supplemental PDI activities will be conducted to support the design of the NYSDEC selected remedy:

- Supplemental soil boring field program to collect soil samples to support a bench scale treatability study for the ISS component of the Site remedy,
- Bench scale treatability study,
- Subsurface hydraulics evaluation and modeling,
- A three-dimensional (3D) rendering of Site lithologies, and
- Structural evaluation of sensitive structures.

The results of the supplemental PDI activities will be included in the development of the remedial design for the Site remedy.

2.1 SUPPLEMENTAL SOIL BORING FIELD PROGRAM

Rotosonic drilling techniques will be implemented at the Site to advance soil borings to target depths and collect soil samples, NAPL, and groundwater that will be used for the bench scale treatability study. Additional borings may also be installed to provide additional information related to obstructions and the debris field present in the areas to remediated. The supplemental soil boring field program will include the advancement of soil borings for the delineation of subsurface obstructions in locations determined via 3D model analysis, and the advancement of soil borings for the purpose of soil sampling to support the bench scale treatability study.

Perimeter air monitoring will be completed in accordance with the NYSDOH CAMP and the Site-specific HASP during intrusive activities. The following tasks will be conducted as components of this activity.

2.1.1 NYSDOT Permitting and Site Access

Drilling activities to be completed in support of the bench scale treatability study will be conducted within the NYSDOT owned parking lot at the Site. As such, a NYSDOT permit application will be completed to gain access to the parking lot and will include the following information:

- A description of field activities,
- An anticipated field schedule,
- Contact information for the Con Edison and Parsons team members,
- A drawing depicting the proposed drilling locations and work areas,
- Work Zone Traffic Control drawings, and
- A Certificate of Insurance.

The NYSDOT permit application and drawings will be signed and sealed by a Professional Engineer licensed in the State of New York. Permit close out will be done at the completion of field activities.

2.1.2 Utility Clearance

Prior to the start of intrusive work, a utility clearance program will be completed in accordance with Con Edison requirements.

2.1.3 Soil Boring Installation

Six soil borings will be advanced in locations near previous boring locations PDI-10, PDI-20, PDI-22, PDI-27, PDI-29 and MW-24 shown as SPDI-1 through SPDI-6 on Figure 9. Soil boring locations were selected based on the results of previous geotechnical analysis generated during the PDI distinguishing six soil types based on the Unified Soil Classification System classification (SC-SM at PDI-10, SC at PDI-20, GP-GM at PDI-22, SM at PDI-27, GP at PDI-29, and CL at MW-24) and the presence of NAPL (PDI-20, PDI-22, PDI-27, PDI-29, and MW-24). Additional borings may also be installed to provide additional information related to obstructions and the debris field present in the areas to be remediated in locations based on analysis of the 3D model. All soil boring locations are subject to change based on accessibility, utility clearance, and conditions encountered during the Site inspection and field activities.

Soil borings will be advanced via rotosonic drilling to a depth of up to 37 feet bgs, depending on the boring location and depth to bedrock. Soil samples retrieved from each boring will be visually classified for soil type, grain size, texture, moisture content, and visible evidence of staining or impacts. Samples will be collected from each soil boring within the intervals where target soil types were distinguished during the previous geotechnical analysis, and submitted for analysis of the following:

- Moisture content,
- Sieve analysis and visual classification,
- Organic content,
- Soil pH,
- Soil density, and
- Water testing (pH, hardness, total dissolved solids [TDS])

Soil index testing results and remaining soil samples will be used for the bench scale treatability study, which is further discussed in Section 2.4.

Additionally, soil samples will also be submitted for analysis of TCL VOCs, TCL SVOCs, Target Analyte List (TAL) metals, cyanide, TCLP VOCs, TCLP SVOCs, TCLP metals, polychlorinated biphenyls, Resource Conservation and Recovery Act (RCRA) Characteristics, TCLP Pesticides, and TCLP Herbicides at a NYSDOH accredited laboratory.

2.1.4 Site Survey

The soil boring locations will be surveyed by a Professional Surveyor licensed in the State of New York. Vertical control of elevations will be established to the nearest 0.01-foot and will be based on a U.S. Geological Survey datum and benchmarks established on the Site. Horizontal control will be based on New York State plane coordinate system with established and referenced control points. All survey elevations will be referenced to the North American Vertical Datum of 1988, and all horizontal locations of each point will be surveyed in the New York State Plan Coordinate System – Long Island Zone North American Datum of 1983.

2.1.5 Management of Investigation Derived Waste

Investigation-derived wastes generated during the field investigation will be containerized. Soils will be placed in 55-gallon Department of Transportation (DOT) approved drums and labeled appropriately. Plastic sheeting and personal protective equipment will be consolidated in DOT-approved drum(s).

Fluids will be placed in DOT-approved fluid drums with closed tops. The drums will be staged in a secure area prior to proper characterization and off-site disposal.

2.2 BENCH SCALE TREATIBILITY STUDY

The goal of the bench-scale treatability study is to assess the treatability and effectiveness of mixing NAPL-impacted Site soils with various reagent design mixes to determine an effective reagent design mix(es) and dose requirements for achieving established performance criteria.

Based on previous geotechnical analysis completed at the Site, six discrete soil types have been identified in the subsurface. For the bench-scale testing, samples of each soil representing the six assumed lithologies at the Site will be collected within the anticipated ISS footprint during field activities and submitted for the treatability study as detailed below.

The treatability study will be performed in three steps:

- Step 1 – Soil Index Testing,
- Step 2 – Initial Mixture Development, and
- Step 3 – Final Mixture Development and Confirmation Testing.

During Step 1, prior to developing reagent mixtures, each of the six soil composite samples will be analyzed for:

- As received moisture content,
- Sieve analysis with visual classification,
- Loss on ignition (total organic content),
- Soil pH,
- Soil density (single point Proctor), and
- Water testing (pH, hardness, and TDS)

Based on the results of Step 1, reagent mixtures will be developed for testing during Step 2. Up to six selected soil reagent combinations will be applied to each of the six composite soil samples, for a total of 36 mixes. The following analysis will be performed on the mixes:

- Standard grout tests (e.g., pH and temperature; viscosity and density),
- Slump (visual or mini slump cone) and density,
- Early unconfined compressive strength (UCS) development monitoring using pocket penetrometer,
- UCS testing following 3- and 7-day curing periods, and
- Hydraulic conductivity testing following 7- and 14-day curing periods.

Additionally, Step 2 mixtures will be submitted for laboratory analysis of the following:

- Final leachate pH for Synthetic Precipitation Leaching Procedure (SPLP) analysis,
- TCL SPLP VOCs,
- TCL SPLP SVOCs, and
- TAL SPLP metals.

Based on the results of Step 2, 12 mixes, two from each composite soil type, will be selected for additional testing during Step 3. The following are components of Step 3 testing to finalize mixture development:

- USC testing following 14- and 28-day curing periods,
- Hydraulic conductivity testing after samples have cured for 28 days, and
- Slake immersion with no UCS.

Additionally, Step 3 mixtures will be submitted for laboratory analysis of the following:

- Final leachate pH for SPLP analysis,
- TCL VOCs via Leaching Environmental Assessment (LEAF) USEPA Method 1315,
- TCL SVOCs via LEAF USEPA Method 1315,
- TAL metals via LEAF USEPA Method 1315, and
- Conductivity, specific conductance, oxidation-reduction potential, and pH.

Laboratory analysis of materials and leachate will be performed in a step-wise process by utilizing SPLP analysis during Step 2 and LEAF analysis during Step 3. Analysis via LEAF Method 1315 involves submerging a complete sample of each final mixture in closed containers with zero headspace for a total period of 63 days, with the collection of leachate waters at nine specific intervals for laboratory analysis of VOCs, SVOCs, metals, conductivity, specific conductance, oxidation-reduction potential, and pH. This method allows for monitoring of leached concentrations and mass over time, as well as cumulative concentration and mass release over the duration of the analysis.

The scope of the ISS bench scale treatability study and the number of ISS design mixes may be modified during the soil sampling and treatability study preparation activities based on the characteristics of the composite soil samples and the early results of the hydraulic conductivity and/or unconfined compressive strength testing.

2.3 SUBSURFACE HYDRAULICS EVALUATION AND MODELING

The Site is hydraulically complicated in that spatial and temporal distribution of water levels are often at unexpected elevations. For example, several monitoring wells at the Site frequently became artesian during PDI activities. As shown on Figure 8, which is the 2012 Groundwater Elevation Contour, groundwater levels in MW-5, PW-1, and MW-24 were all determined to be above ground surface, meaning that the groundwater flowed out of the top of the casing after the J plugs were removed for gauging. To better understand the anomalous nature of the subsurface hydraulic system, a study will be executed using existing Site data to determine if and to what degree these hydraulic anomalies may impact and/or should be accounted for in the remedial design.

In addition, since the ISS will significantly alter the subsurface hydraulics, a groundwater model will be developed to evaluate potential alterations in the groundwater flow directions and rates following remedial construction. This model will simulate the changes in the groundwater systems with the goal of identifying the potential for an unexpected rise in the water table and/or redirection of groundwater flow.

2.4 3D RENDERING OF SITE LITHOLOGIES

This task includes the development of a 3D visualization model of the relevant subsurface. The Site is complicated because the elevation of the top of bedrock and/or other subsurface obstructions are variable, including potential backfilling with large bedrock boulders. To complete the ISS, detailed depth assignments are needed to estimate spatial characteristics in a dense, point-by-point manner to accommodate the complicated Site features and design requirements. As such, the 3D model will be generated to identify bedrock elevations in relation to observed obstructions to help improve spatial

distribution of the total depth of each ISS column/grid location and provide more informed conceptualization and an improved visualization tool for the remedial design.

Figure 10 is a conceptual rendering and has been included for illustrative purposes. The conceptual rendering identifies the three excavation areas, the excavation zones, the soil mixing zones, and the jet grouting zones with the extrapolated bedrock contour of the Site shown underneath.

2.5 STRUCTURAL EVALAUTION OF SENSITIVE STRUCTURES

A visual evaluation of existing above-grade structures (e.g., multi-story building, pedestrian bridge) at the Site that would need to be monitored during the remedial construction activities will be completed as part of the supplemental PDI. This will include a records search at the New York City Department of Buildings to obtain available engineering drawings that may exist for these above-grade structures. Real time monitoring and surveying technologies that would be implemented during the remedial construction at the Site will be considered at part of this evaluation.

3.0 REMEDIAL DESIGN

This section describes the remedial design tasks to be completed to prepare the design for the selected Site remedy. Preparation of the remedial design will include the following general tasks:

- Remedial Design Task 1 – Removal of Overburden Soil
- Remedial Design Task 2 – ISS Mix Design
- Remedial Design Task 3 – ISS Methodology
- Remedial Design Task 4 – Site Restoration and Cover

A description of each task associated with the preparation of the remedial design is presented below. Note that additional supporting remediation tasks (e.g., Site preparation, maintaining the Site cover, waste management) will be developed as part of the remedial design. The remedial design will also present proposed locations for temporary remediation support structures (e.g., staging areas), requirements for soil erosion control and monitoring and mitigation procedures for dust, odor, and vapors. Green remediation principles and techniques also will be evaluated during the remedial design and implementation processes.

3.1 REMEDIAL DESIGN TASK 1 – REMOVAL OF OVERBURDEN SOIL

Excavation of overburden soil to a depth of up to five feet in select areas of the Site will be required prior to the implementation of the ISS activities to allow for bulking of the subsurface material and to remove and/or expose debris and other obstructions. The bulking factor is typically 25 to 30 percent and would more accurately be estimated during the bench-scale treatability study. The perimeter of the excavation areas will be sloped or shored as required. The excavated material will be sampled for waste characterization and transported for off-site disposal. ISS bulking materials will be managed within the 5-foot excavations and disposed off-site. The removal of overburden soil will also allow for subsurface utilities to be exposed, identified, and rerouted as required. Lastly, the removal of overburden soils to a depth of 5 feet will ensure the constructed ISS formation is below frost depths.

3.2 REMEDIAL DESIGN TASK 2 – ISS MIX DESIGN

ISS technology generally involves the mixing of contaminated soils with a binder reagent to create stabilized material that discourages groundwater flow through it, thus greatly reducing the potential for contaminants in Site soils from migrating off site. The results of the bench scale treatability study will be used during the remedial design to determine the ISS mix designs to achieve the RAOs established for the Site. The remedial design will include the proposed hydraulic conductivity and unconfined compressive strength for the ISS formation based on the results of the treatability study and other Site considerations. The goal is to establish two or more ISS mix designs that can achieve the required hydraulic conductivity and unconfined compressive strength determined during the remedial design.

3.3 REMEDIAL DESIGN TASK 3 – ISS METHODOLOGY

ISS will be implemented on remaining source materials below a depth of 5 feet. The treatment zone will extend from approximately 5 feet bgs to approximately 15 feet bgs. It is anticipated that the ISS within this depth interval will be conducted using “bucket mixing” methods. The excavators will also be used to remove subsurface obstructions within these depths. The actual ISS methodology will be

determined during the remedial design and confirmed by the selected remediation contractor implementing the Site remedy.

The ISS methodology below 15 feet bgs is anticipated to consist of jet grouting technology. This is primarily due to the presence of existing obstructions that were encountered during previous Site investigations. During the implementation of the supplemental soil boring field program, additional soil borings may be installed to confirm the presence of subsurface obstructions that were documented during previous Site investigations.

The diameters and spacing of the ISS columns will also be determined during the remedial design. The diameters and spacing of ISS jet grout columns may be decreased based on the presence of subsurface obstructions and potential shadowing effects created by the jet grouting around obstructions. A conceptual layout of the ISS jet grout columns is presented in Figure 11 for designated Area 1 and Area 3 of the ISS formation and Figure 12 for the designated Area 2 of the ISS formation. The actual diameters and spacing of the ISS columns will be confirmed by the selected remediation contractor implementing the Site remedy.

3.4 REMEDIAL DESIGN TASK 4 – SITE RESTORATION AND COVER

Imported backfill meeting the requirements of 6 NYCRR Part 375-6.7(d) will be brought to the Site to backfill the excavations to the subgrade design grades for the Site cover.

A Site cover will be required to allow for commercial use of the Site and to protect the ISS component of the remedy. In the ISS areas, the function of this cover will be to provide sufficient thermal protection of the solidified mass from seasonal freeze/thaw cycles and prevent contact with the ISS material. A Site cover currently exists in the form of asphalt pavement and will be maintained in areas where excavation and ISS are not performed to allow for commercial use of the Site. Any Site redevelopment will maintain the existing Site cover. The Site cover may include paved surface parking areas, sidewalks, or soil where the upper one foot of exposed surface soil meets the applicable SCOs for commercial use.

Where the soil cover is required over the ISS treatment area, it will consist of a minimum of four feet of soil meeting the SCOs for commercial use. For areas where solidified material underlies the cover, the solidified material itself will serve as the demarcation layer due to the nature of the material. The design requirements mandated by the NYSDOT for the restored parking lot will also be incorporated into the remedial design for the Site.

4.0 PERMITS, ACCESS AGREEMENT, AND APPROVALS

The remedial design will be developed to meet applicable SCGs, permits and approvals. In addition to NYSDEC approval of the remedial design, local permits and approvals will be necessary to implement the NYSDEC-selected remedy.

4.1 SUPPLEMENTAL PDI PERMITS AND SITE ACCESS AGREEMENTS

Drilling activities to be completed in support of the bench scale treatability study will be conducted within the NYSDOT-owned parking lot at the Site. As such, a permit application will be completed to gain access to the parking lot and will include the following information:

- A description of field activities,
- An anticipated field schedule,
- Contact information for the Con Edison and Parsons team members,
- A drawing depicting the proposed drilling locations and work areas,
- Work Zone Traffic Control drawings, and
- A Certificate of Insurance.

The drawings will be signed and sealed by a Professional Engineer licensed in the State of New York.

4.2 REMEDIAL ACTION PERMITS AND APPROVALS

Permits and approvals anticipated to complete the remedial construction activities may include (but are not limited to):

- Remediation General Permit for Stormwater Discharges from Construction Activities,
- NYSDOT Access Permit,
- Traffic Control Permits, and
- New York City Building Permits.

A final list of permits necessary to implement the remedy will be identified in the remedial design.

5.0 REMEDIAL DESIGN DOCUMENTS AND SCHEDULE

The scope of work for this task includes preparation of remedial design documents consistent with the requirements of NYSDEC DER-10. The following remedial design submittals will be prepared:

- 75% Pre-Final Remedial Design
- 100% Remedial Design
- Final 100% (Issued-for-Bid) Remedial Design

Specific technical design elements to be developed during the design process include:

- Detailed engineering design to provide quantities, locations, and construction details for the stabilization of soils
- Site restoration details

The general contents of each remedial design document are presented below.

5.1 75% PRE-FINAL REMEDIAL DESIGN

The 75% Pre-Final Remedial Design Report will generally include the following information:

- Narrative descriptions of remedial activities and responsibility assignments including an introductory section that provides a brief overview of the remedial design, Site background information, the design report objectives, and results of the supplemental PDI),
- A summary of the remedy with a basis of design that describes the proposed remedial design and presents information used to develop the design approach and construction components of the project, including design calculations, where appropriate, to support the basis of design,
- A description of Site controls for protecting the public health, safety, welfare, and environment and to maintain the effectiveness of the remedial action,
- Draft technical specifications,
- Draft design drawings, and
- Draft project control plans, including:
    - CAMP that describes the monitoring activities that will be conducted during the remedial activities,
    - A Waste/Soil Management Plan that describes the characterization, handling, treatment, and disposal requirements for various waste materials that will be generated,
    - Water Management Plan for handling of waters generated/collected during remedial activities,
    - Sampling and Analysis Plan that outlines requirements for characterization of soil and water generated,
    - Noise Monitoring Plan that describes monitoring requirements and acceptable noise levels during remedial activities, and
    - Odor, Vapor, and Dust Control Plan that presents methods to minimize potential impacts to the surrounding community.
- Construction quality assurance language that describes the materials and procedures necessary for proper construction, evaluation, and documentation during remedial activities, along with required transportation routes showing truck routes to minimize disturbances to the community,

- Conceptual Remedial Action Schedule that presents the anticipated schedule for implementation of the remedial activities, and

Project plans will be presented in brief reports that describe the general approach to the design of the component and any required design calculations.

5.2 FINAL (100%) REMEDIAL DESIGN

The Final (100%) Remedial Design Report will address comments provided by the NYSDEC on the 95% Remedial Design Report and will finalize all the design documents for final distribution to the NYSDEC. The Final (100%) Remedial Design Report will include final technical specifications and drawings, final project plans, and the final construction schedule.

5.3 REMEDIAL DESIGN SCHEDULE

The anticipated schedule for completing the supplemental PDI activities identified in this RDWP and a preliminary schedule for completion of the remedial design and construction of the selected remedy for the Site are presented in Table 5.1 below.

Table 5.1 Preliminary Project Schedule

Task	Anticipated Time Frame
Obtain Access Agreements, Conduct Supplemental PDI Activities	2Q to 3Q 2022
Prepare 75% Pre-Final Design for NYSDEC	4Q 2022 to 2Q 2023
Submit 75% Pre-Final Design to NYSDEC	3Q 2023
Address NYSDEC comments on prefinal design; prepare final design	4Q 2023 to 1Q 2024
Submit Final (100%) Remedial Design Report to NYSDEC	2Q 2024

This anticipated schedule for conducting the supplemental PDI activities is dependent on Site access. Preparation of remedial design documents is dependent on receipt of NYSDEC comments on project submittals.

6.0 POST-CONSTRUCTION ACTIVITIES

Following remedial construction activities, the completed remedial programs for the Site will be documented in a certified Final Engineering Report (FER) using the guidance provided in Section 5.8 of DER-10. Future Site activities will be conducted in accordance with an SMP to be established for the Site coving the OU2 portion of the Former West 45th Street Gas Works Site discussed in this RDWP, and incorporating the information detailed in the Interim Site Management Plan submitted to the NYSDEC in May 2021 for the OU1 portion of the Former West 45th Street Gas Works Site. The anticipated components of the SMP and FER are presented below.

6.1 FINAL ENGINEERING REPORT

A FER will be prepared in accordance with DER-10 guidance to document implementation of the completed remedial program, and will consist of the following elements:

- A summary of relevant background information, including Site location/description and history,
- A summary of the final remedial activities, as constructed, including:
    - A description of any problems encountered during construction and their resolutions,
    - A description of changes to the design documents and why the changes were made,
    - Quantities and concentrations of constituents in media (e.g., soil and water) removed,
    - A listing of the waste streams, including quantity of materials treated/disposed and corresponding treatment/disposal locations,
    - The quantity of excavated material re-used as subsurface fill (if applicable),
    - Boundaries of the real property subject to the environmental easement or other institutional controls, and
    - A detailed description of site restoration activities.
- A list of the RAOs and remedial goals applied to the remedial activities,
- A description of source and quality of fill,
- A description of the community air monitoring and other remedial action compliance activities performed,
- Tables and figures containing laboratory analytical results,
- "As-built" drawings bearing the stamp and signature of a Professional Engineer licensed to practice in New York State and showing:
    - Surveyed excavation limits and ISS limits
    - Permanent survey markers for horizontal and vertical control for site management
- A description of the institutional controls employed at the site and a copy of the environmental easement, when available, and
- A certification statement with the signature and seal of a Professional Engineer licensed to practice in New York State.

The following supplemental information will also be provided with the FER:

- Fully executed manifests/certificates of disposal documenting the off-site transportation and treatment/disposal of waste materials generated as part of the remedial activities
- Copies of weekly field reports and air monitoring logs documenting results of air monitoring performed in accordance with the CAMP

- Results of all analyses, including laboratory analytical data reports and data validation reports
- Correspondence with the NYSDEC and others, as deemed relevant to the remedial activities

6.2 SITE MANAGEMENT PLAN

The SMP will be prepared consistent with the applicable requirements of DER-10 and in a format generally consistent with the NYSDEC's SMP template. As indicated in the Decision Document, the SMP will consist of the following:

- Institutional and Engineering Controls Plan – describes the use restrictions and engineering controls that will be established
- Monitoring Plan – used to assess the performance and effectiveness of the remedy. The SMP will include requirements for post-remedial action groundwater and NAPL monitoring, as well as Site inspection schedules and NYSDEC reporting requirements

6.2.1 Institutional and Engineering Controls

The Institutional and Engineering Controls Plan will identify use restrictions and engineering controls for the Site and detail the steps and media-specific requirements necessary to ensure that institutional and/or engineering controls remain in place and effective. This plan includes but is not limited to:

- An Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination,
- Descriptions of the provisions of the environmental easement including any land use and groundwater use restrictions,
- A provision for evaluating the potential for soil vapor intrusion for any buildings developed on the Site and off-Site locations, including those that previously did not respond or refused sampling offers, and include provisions for implementing actions recommended to address exposures related to soil vapor intrusion,
- Provisions for the management and inspection of the identified engineering controls,
- Maintaining Site access controls and NYSDEC notification, and
- The steps necessary for the for the periodic reviews and certification of the institutional and/or engineering controls.

6.2.2 Monitoring Plan

The SMP also will require that Con Edison institute a long-term monitoring program to assess the performance and effectiveness of the remedy. The Monitoring Plan will, at a minimum, include details and requirements for the following:

- Periodic monitoring of groundwater,
- Periodic monitoring for vapor intrusion for any buildings developed in the area of Site management,
- Annual inspections of the institutional and engineering controls,
- A schedule for performance and effectiveness monitoring, and
- A schedule for submittal of Periodic Review Reports (PRRs) to the NYSDEC.

Consistent with DER-10 (Section 6.3), the PRRs will include certification of institutional and engineering controls until the NYSDEC notifies the property owner in writing that this certification is no longer needed. The PRR will contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are

compliant with NYSDEC approved modifications and indicate that nothing has occurred that would impair the ability of the control to protect public health or the environment or constitute a violation or failure to comply with the SMP unless otherwise approved by the NYSDEC.

7.0 REFERENCES

AKRF, Inc. 1994. Route 9A Reconstruction Project – Environmental Impact Statement. May.

NYSDEC, 2010. *DER-10 Technical Guidance for Site Investigation and Remediation*. New York State Department of Environmental Conservation. May.

NYSDEC, 2016. *NYSDEC ISS QA/QC Guidance Document*. New York State Department of Environmental Conservation Letter. February 22.

Parsons, 2020. Revised Alternative Analysis Report for the former West 45th Street Gas Works Site Operable Unit No. 2. November.

FIGURES

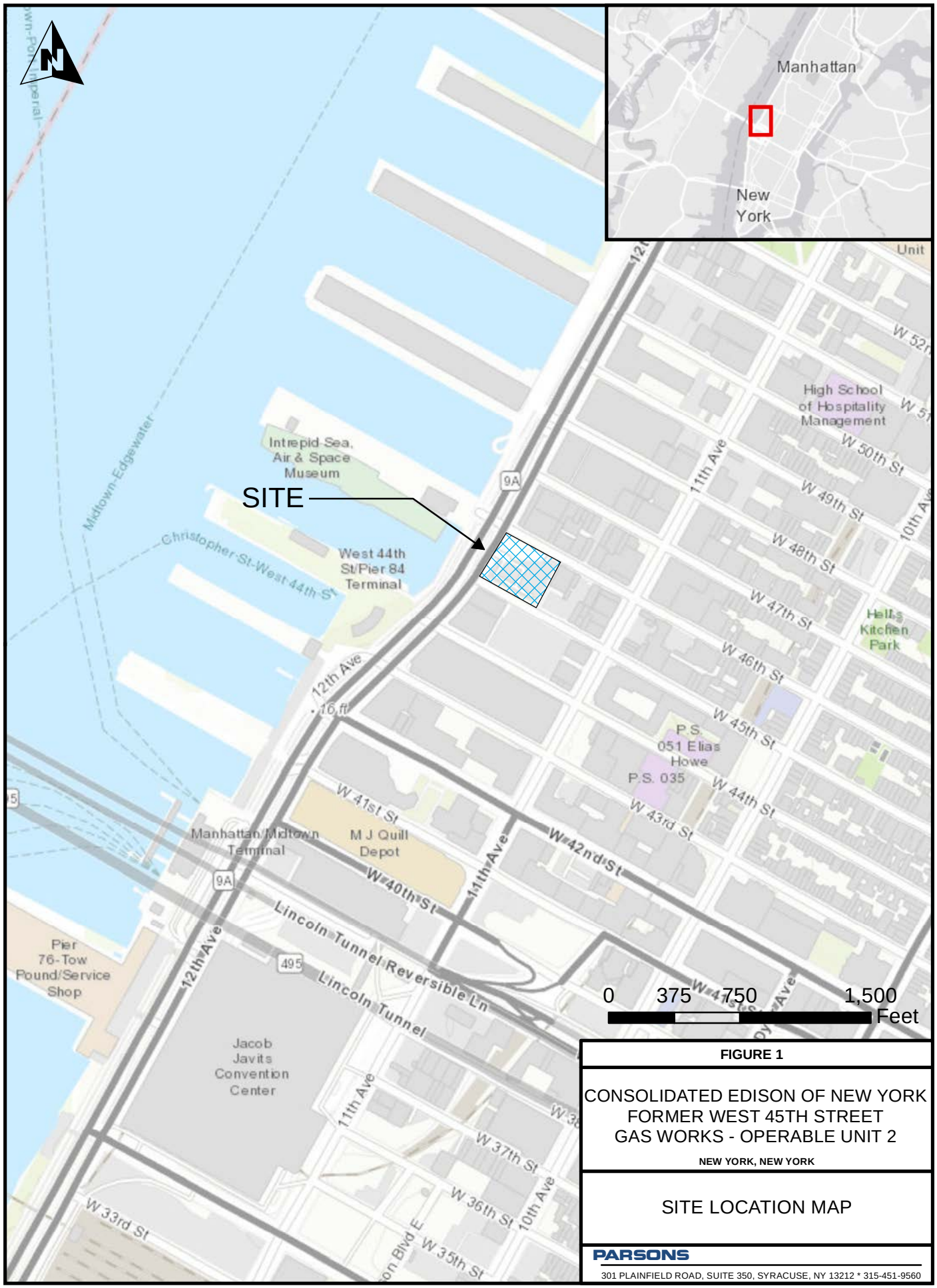


FIGURE 1

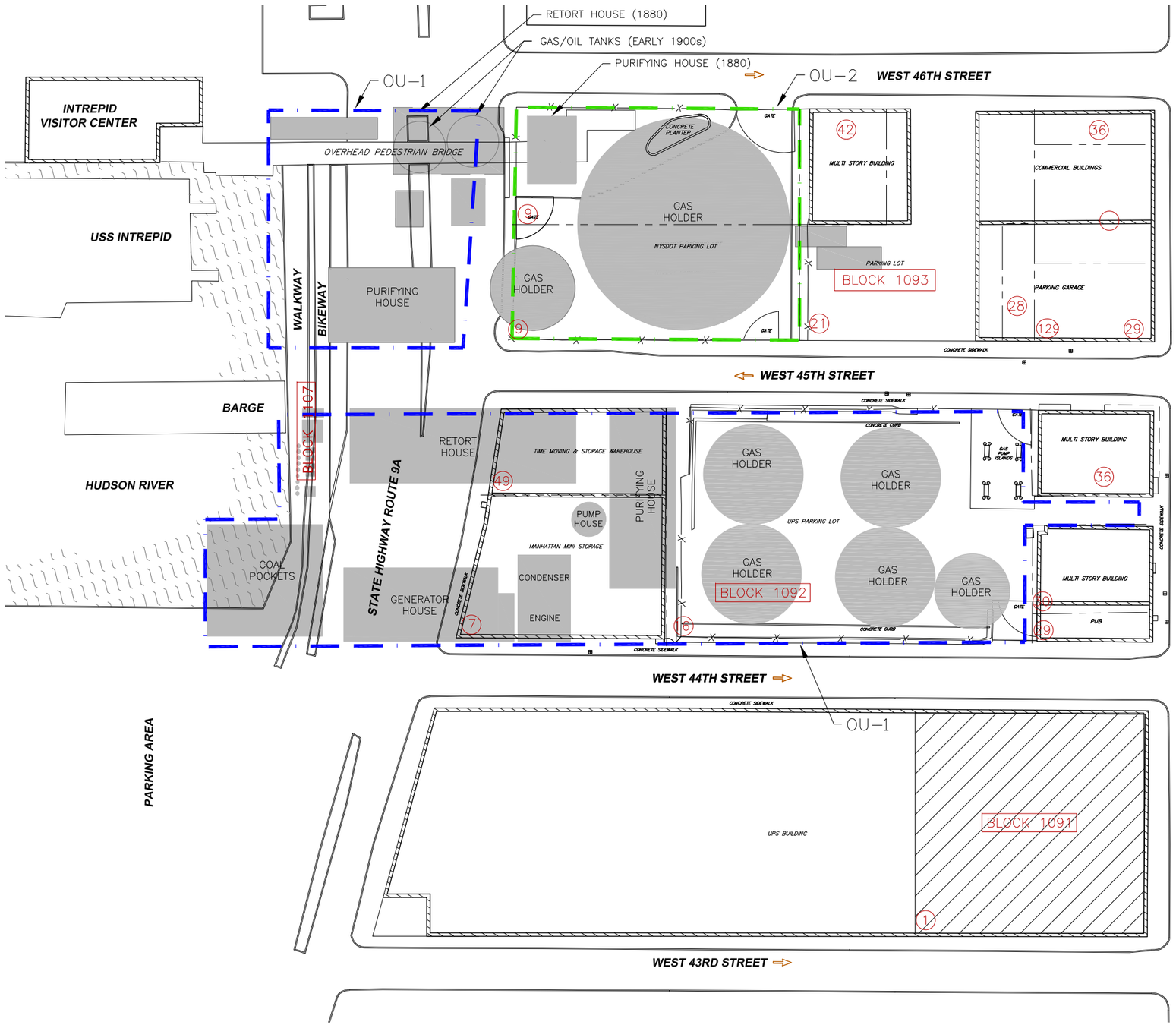
CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45TH STREET
GAS WORKS - OPERABLE UNIT 2

NEW YORK, NEW YORK

SITE LOCATION MAP

PARSONS
301 PLAINFIELD ROAD, SUITE 350, SYRACUSE, NY 13212 * 315-451-9560

FILE NAME: P:\ConEd\450089 - W45th OU-2 AAR 2016\ENGR\OU2\Figure 1 Site Location.mxd
DATE: 12/7/2021 CREATED BY: S. Liberatore



LEGEND:

- CURRENT FEATURES
- HISTORICAL FEATURES (LOCATIONS ARE APPROXIMATE)
- EXISTING BUILDING
- CHAIN LINK FENCE
- LIMITS OF OU–1
- LIMITS OF OU–2
- BLOCK 1093 — TAX BLOCK NUMBER
- 21 — TAX LOT NUMBER FOR PARCELS WITHIN FORMER MGP
- TAX LOT BOUNDARIES
- APPROXIMATE EXTENT OF UPS PARKING GARAGE

100 50 0 100 200

SCALE: 1"=100'

FIGURE 2

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS – OU2
NEW YORK, NEW YORK

OPERABLE UNIT MAP AND FORMER MGP STRUCTURES

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732–537–3500

FILE NAME: P:\CONED\452727 – WEST 45TH OU–2 RDWP\CAD\RDWP\452727–RDWP–SK002.DWG
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WEST 46th STREET
(TRAFFIC FLOW)

HIGHWAY 9A
(TRAFFIC FLOW)
12th AVENUE - STATE

(TRAFFIC FLOW) WEST 45th STREET

A
A'
B
B'
C
C'
D
D'

PDI-32 (-1.4')/-15'
MW-19
MW-1
PW-2
(-30.4')/-45'*
PDI-1
MW-22
(-24.1')/-37.5'*
PDI-5
(-33.6')/-47.5'*
PDI-2
PDI-3
(-28.8')/-43'
(-2.7')/-17'
PDI-4
(-25.5')/-39.5'*
PDI-6
(1.2')/-13'
PDI-7
(-27.3')/-41.5'*
MW-3
(-17.4')/-30'
PDI-33
CONT-1
(-16.2')/-30'
PDI-34
(5')/-7'
MW-2
CONT-7
(-3.1')/-15'*
CONT-2
(-16.7')/-30'
PDI-9 (-21.6')/-36'
PDI-28
(1.9')/-9'
PDI-27
(-26')/-37'
PDI-10
(-19.3')/-32'
PDI-11
(-27.8')/-41'
(-16.2')/-27'
PDI-30
PDI-26
(-11')/-22'*
CONT-5
(-4.8')/-16'*
MW-24
(-1.8')/-13'*
PW-1
(-1.3')/-12.5'*
PDI-29
(-24.3')/-35'
PDI-22
(-19.8')/-30.5'*
PDI-21
(-29')/-40'*
(-12.3')/-24.5'
CONT-8
(-22.5')/-35'
CONT-3
PDI-13
(-27.5')/-40'
PDI-12
(0.9')/-12.5'
MW-5
MW-4
PDI-18/
MW-23
(-13.4')/-25'
PDI-19
(-21.7')/-33'
PDI-16
(-18.2')/-30'
MW-6
PDI-25
(-14.7')/-25'
(-9.5')/-20'*
PDI-23
PDI-24/
MW-21
(-16.6')/-27'
PDI-20
(-12.5')/-23.5'
PDI-17
(-27.2')/-39'
PDI-15
(1.2')/-11'
(4.6')/-8'
CONT-4
PDI-31
(-5')/-15'

GAS HOLDER
TANK
WAGON SHED (PUMPING HOUSE)
OVERHEAD DECK
OVERHEAD CANOPY
OVERHEAD PEDESTRIAN BRIDGE
CONCRETE SIDEWALK
CONCRETE RAMP
STAIRS
GATE
CHAIN LINK FENCE
SLIDING GATE
GRANITE CURB
CONCRETE
ASPHALT PARKING LOT
APPROXIMATE LOCATION OF BURIED BRICK WALL
TRENCH DRAIN
SHED
PST
SLIDING GATE

LEGEND:

- PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF FORMER MGP STRUCTURES
- SOIL BORING LOCATION
- MONITORING WELL LOCATION
- ABANDONED MONITORING WELL
- ABANDONED PUMPING WELL
- EXISTING PUMPING WELL
- (-27.3')/-41.5' (BEDROCK ELEVATION)/DEPTH RELATIVE TO GROUND SURFACE (NAVD88)
- * NX CORE WAS NOT COLLECTED AT THIS LOCATION BECAUSE OF DRILLING ISSUES (e.g., ARTESIAN CONDITIONS, PRESENCE OF DEBRIS) OR PROXIMITY TO A LOCATION WHERE A NX CORE WAS TAKEN
- BEDROCK ELEVATION CONTOURS (DASHED WHERE INFERRED)
- CROSS SECTION LOCATION

NOTES:

1. GROUND SURFACE ELEVATIONS RANGE FROM 10 FT TO 14.6 FT (NAVD88) ACROSS THE SITE.

30 15 0 30 60

SCALE: 1"=30'

FIGURE 3

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS – OU2
NEW YORK, NEW YORK

BEDROCK ELEVATIONS

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500

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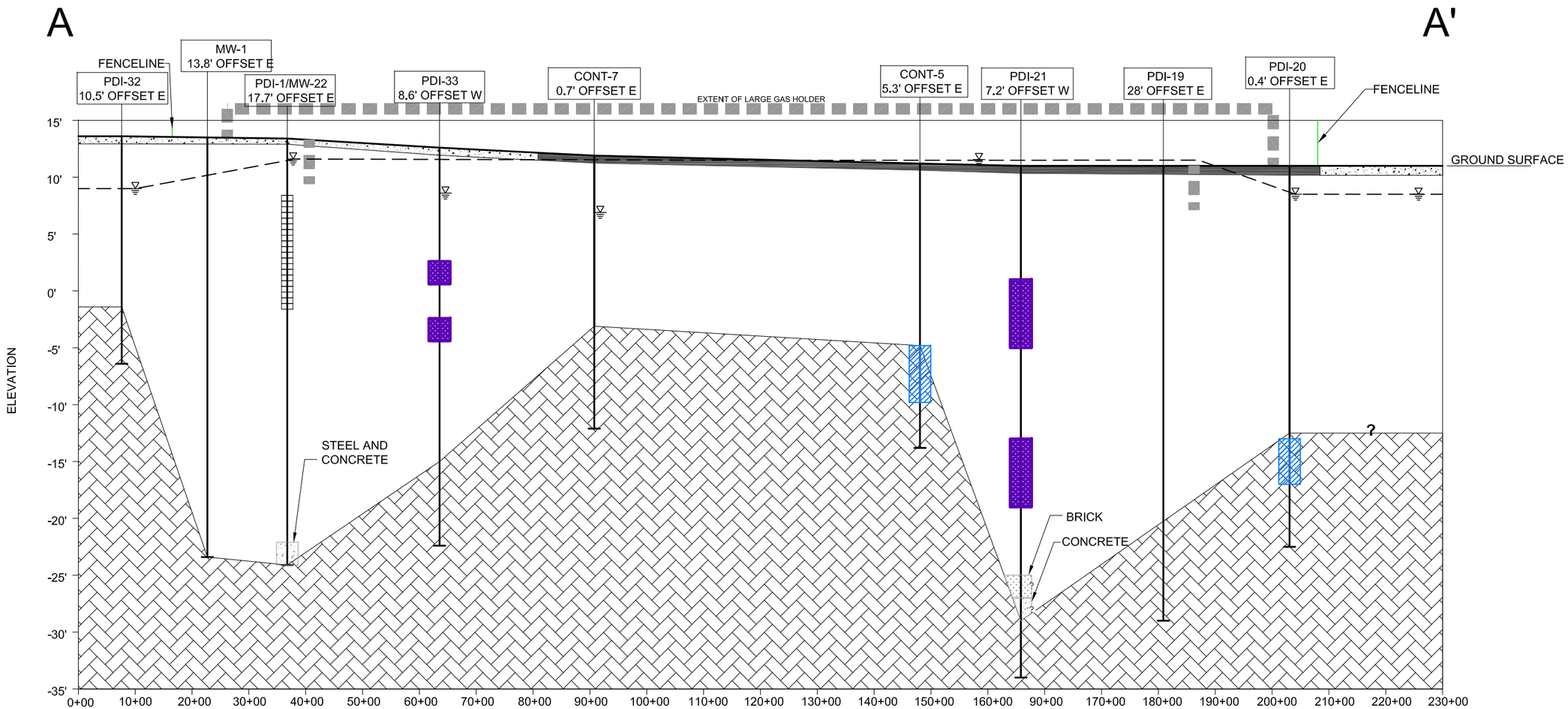

CONCRETE

ASPHALT

BEDROCK

VISIBLE NAPL IN SOIL SAMPLE

VISIBLE NAPL IN WASH WATER

BRICK

? BEDROCK DEPTH ESTIMATED FROM FIELD OBSERVATIONS WITHOUT BEDROCK CORE

ESTIMATED POTENTIOMETRIC SURFACE ELEVATION

MONITORING WELL SCREEN INTERVAL

SOIL BORING

FORMER HOLDER WALL LOCATION (APPROX)

20 10 0 20 40

SCALE: 1"=20'

HORIZONTAL SCALE

10 5 0 10 20

SCALE: 1"=10'

VERTICAL SCALE

NOTES:

1. ELEVATIONS ARE BASED ON NAVD88.
2. NO HATCHING BELOW GROUND SURFACE INDICATES FILL MATERIALS, WHICH INCLUDE SAND, GRAVEL, COBBLES, WEATHERED GNEISSIC SCHIST, AND DEBRIS (BRICK, CONCRETE, WOOD, METAL).
3. BEDROCK ELEVATIONS BASED ON BORING LOGS AND CONTOURS SHOWN ON FIGURE 3.
4. GROUNDWATER ELEVATIONS BASED ON CONTOURS SHOWN ON FIGURE 8.

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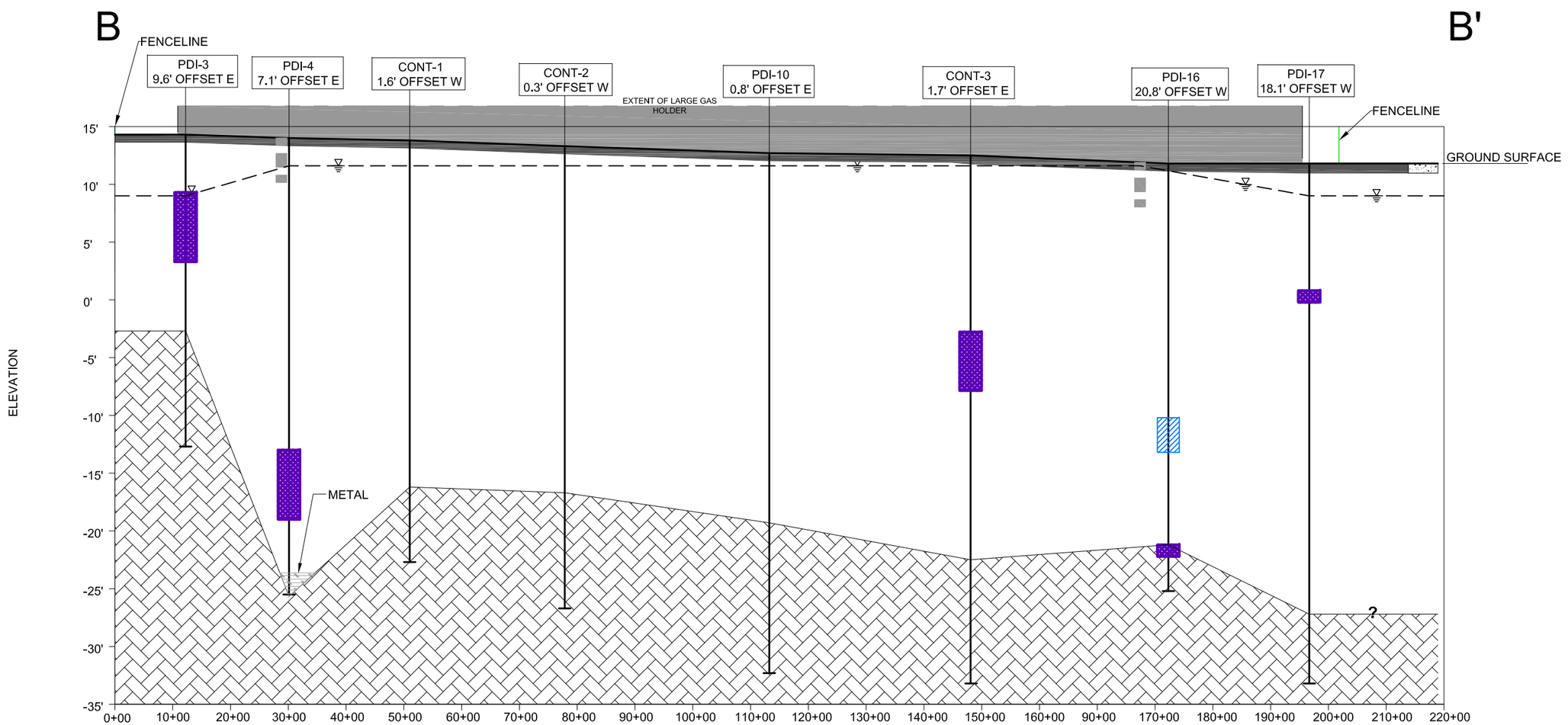
FIGURE 4

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS - OU2
NEW YORK, NEW YORK

OU-2 PRE-DESIGN INVESTIGATION
CROSS SECTION A-A'

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500



CONCRETE

ASPHALT

BEDROCK

VISIBLE NAPL IN SOIL SAMPLE

VISIBLE NAPL IN WASH WATER

METAL

? BEDROCK DEPTH ESTIMATED FROM FIELD OBSERVATIONS WITHOUT BEDROCK CORE

ESTIMATED POTENTIOMETRIC SURFACE ELEVATION

MONITORING WELL SCREEN INTERVAL

SOIL BORING

FORMER HOLDER WALL LOCATION (APPROX)

20 10 0 20 40

SCALE: 1"=20'

HORIZONTAL SCALE

10 5 0 10 20

SCALE: 1"=10'

VERTICAL SCALE

NOTES:

1. ELEVATIONS ARE BASED ON NAVD88.
2. NO HATCHING BELOW GROUND SURFACE INDICATES FILL MATERIALS, WHICH INCLUDE SAND, GRAVEL, COBBLES, WEATHERED GNEISSIC SCHIST, AND DEBRIS (BRICK, CONCRETE, WOOD, METAL).
3. BEDROCK ELEVATIONS BASED ON BORING LOGS AND CONTOURS SHOWN ON FIGURE 3.
4. GROUNDWATER ELEVATIONS BASED ON CONTOURS SHOWN ON FIGURE 8.

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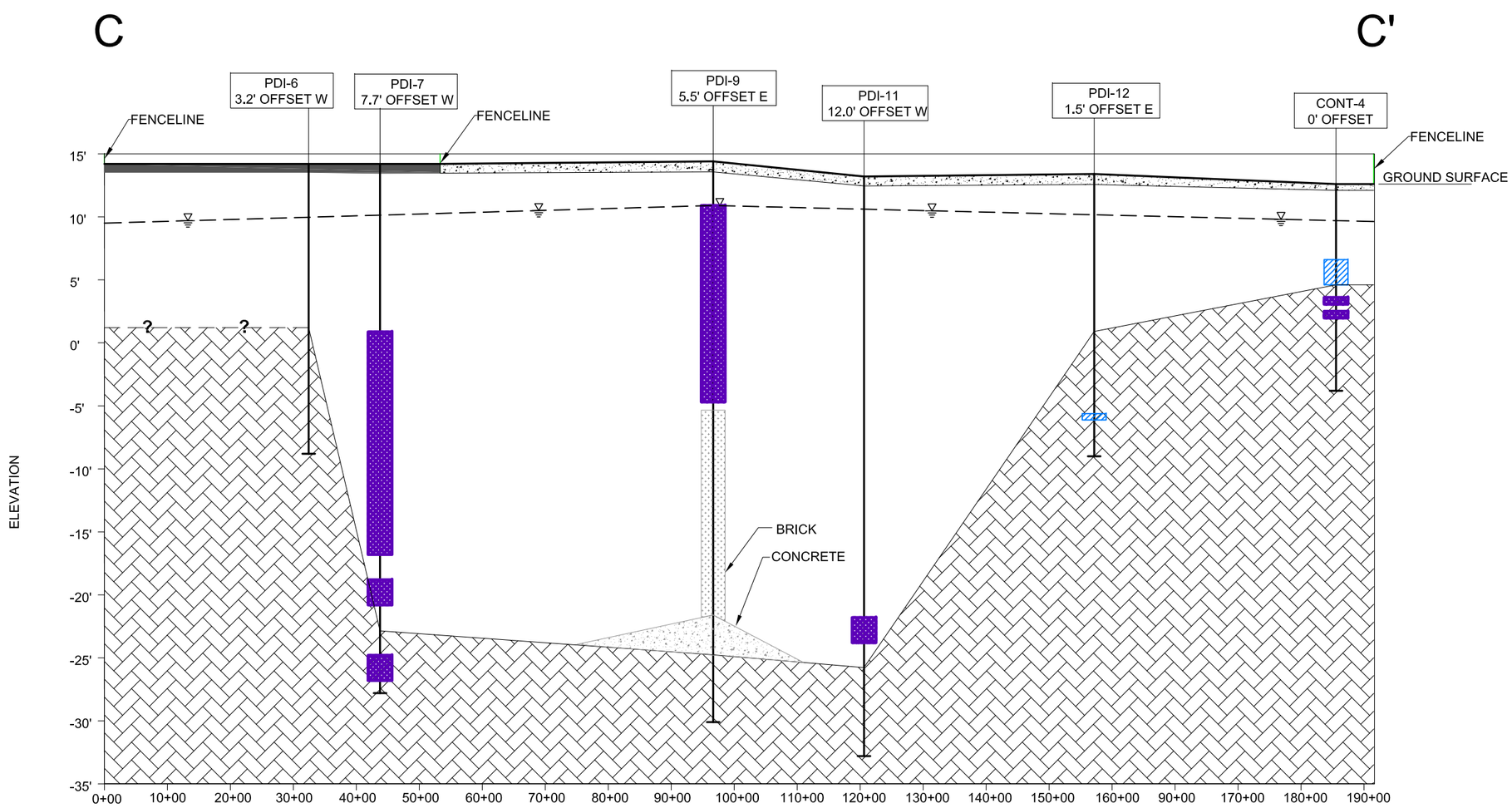
FIGURE 5

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS – OU2
NEW YORK, NEW YORK

OU-2 PRE-DESIGN INVESTIGATION
CROSS SECTION B-B'

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500



CONCRETE

ASPHALT

BEDROCK

VISIBLE NAPL IN SOIL SAMPLE

VISIBLE NAPL IN WASH WATER

BRICK

? BEDROCK DEPTH ESTIMATED FROM FIELD OBSERVATIONS WITHOUT BEDROCK CORE

ESTIMATED POTENTIOMETRIC SURFACE ELEVATION

MONITORING WELL SCREEN INTERVAL

SOIL BORING

FORMER HOLDER WALL LOCATION (APPROX)

20 10 0 20 40

SCALE: 1"=20'

HORIZONTAL SCALE

10 5 0 10 20

SCALE: 1"=10'

VERTICAL SCALE

NOTES:

1. ELEVATIONS ARE BASED ON NAVD88.
2. NO HATCHING BELOW GROUND SURFACE INDICATES FILL MATERIALS, WHICH INCLUDE SAND, GRAVEL, COBBLES, WEATHERED GNEISSIC SCHIST, AND DEBRIS (BRICK, CONCRETE, WOOD, METAL).
3. BEDROCK ELEVATIONS BASED ON BORING LOGS AND CONTOURS SHOWN ON FIGURE 3.
4. GROUNDWATER ELEVATIONS BASED ON CONTOURS SHOWN ON FIGURE 8.

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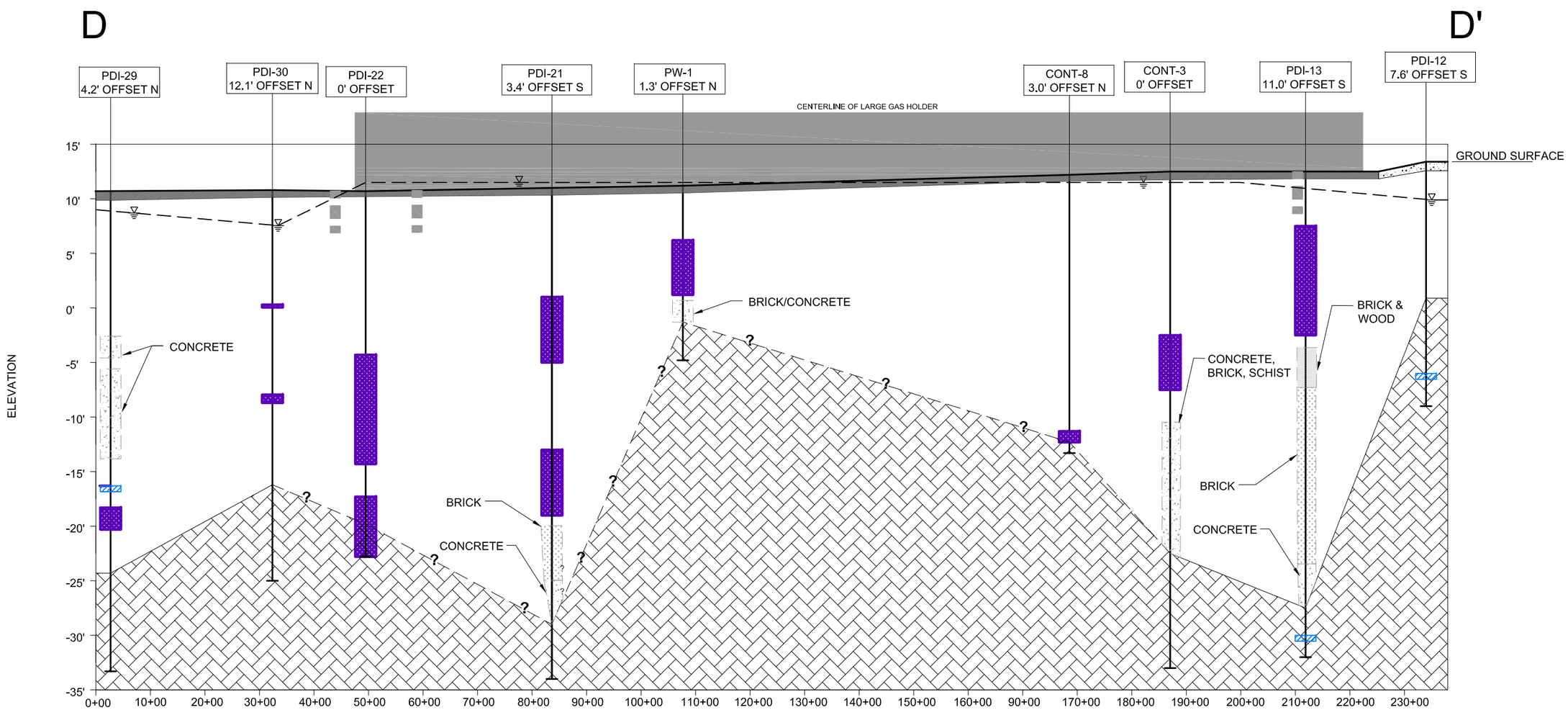
FIGURE 6

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS – OU2
NEW YORK, NEW YORK

OU-2 PRE-DESIGN INVESTIGATION
CROSS SECTION C-C'

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500



CONCRETE

ASPHALT

BEDROCK

VISIBLE NAPL IN SOIL SAMPLE

VISIBLE NAPL IN WASH WATER

BRICK

? BEDROCK DEPTH ESTIMATED FROM FIELD OBSERVATIONS WITHOUT BEDROCK CORE

ESTIMATED POTENTIOMETRIC SURFACE ELEVATION

MONITORING WELL SCREEN INTERVAL

SOIL BORING

FORMER HOLDER WALL LOCATION (APPROX)

20 10 0 20 40

SCALE: 1"=20'

HORIZONTAL SCALE

10 5 0 10 20

SCALE: 1"=10'

VERTICAL SCALE

NOTES:

1. ELEVATIONS ARE BASED ON NAVD88.
2. NO HATCHING BELOW GROUND SURFACE INDICATES FILL MATERIALS, WHICH INCLUDE SAND, GRAVEL, COBBLES, WEATHERED GNEISSIC SCHIST, AND DEBRIS (BRICK, CONCRETE, WOOD, METAL).
3. BEDROCK ELEVATIONS BASED ON BORING LOGS AND CONTOURS SHOWN ON FIGURE 3.
4. GROUNDWATER ELEVATIONS BASED ON CONTOURS SHOWN ON FIGURE 8.

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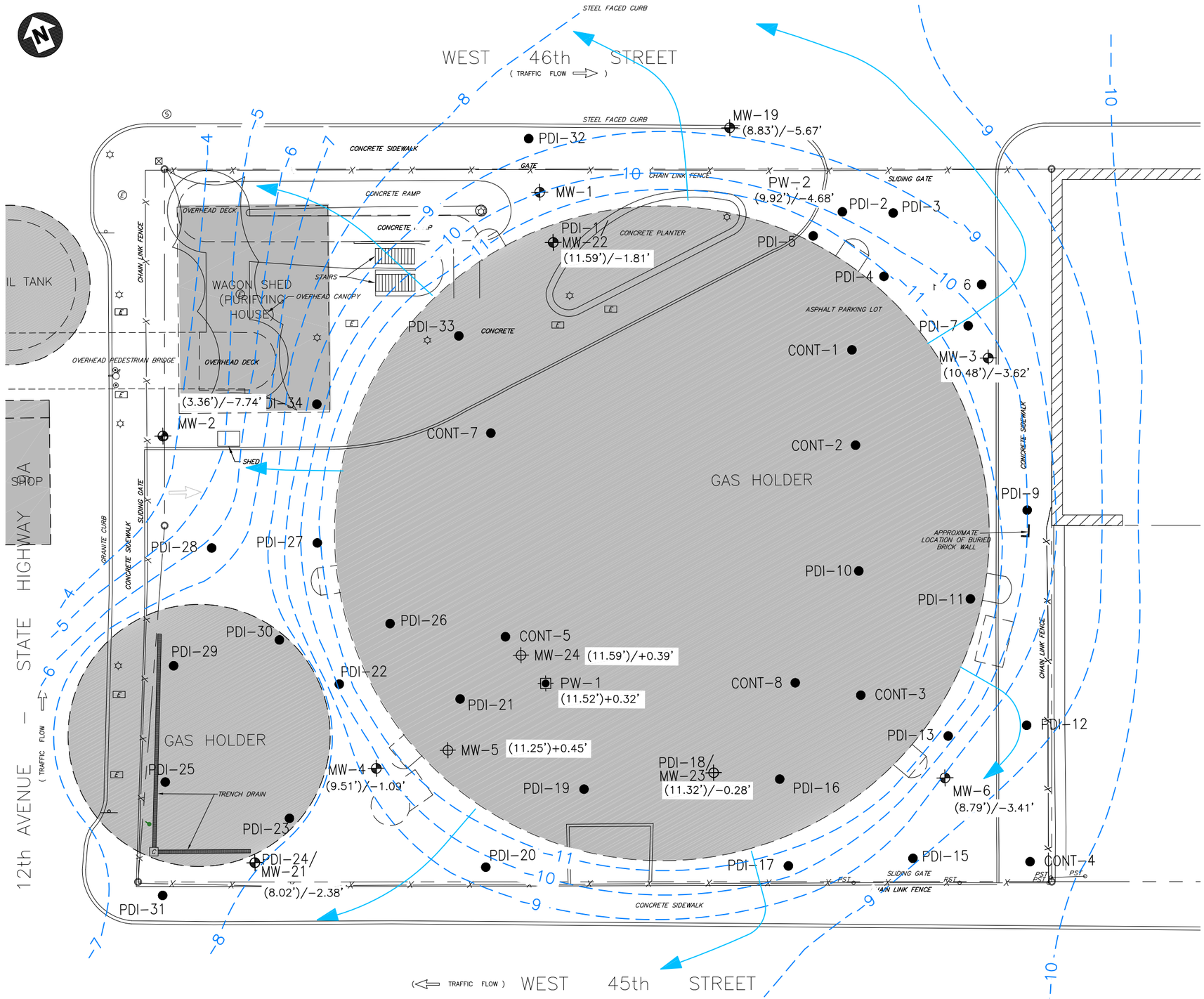
FIGURE 7

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS - OU2
NEW YORK, NEW YORK

OU-2 PRE-DESIGN INVESTIGATION
CROSS SECTION D-D'

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500



LEGEND:

- PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF FORMER MGP STRUCTURES
- SOIL BORING LOCATION
- MONITORING WELL LOCATION
- ABANDONED MONITORING WELL
- ABANDONED PUMPING WELL
- EXISTING PUMPING WELL
- (11.32')/-0.28' (GROUNDWATER ELEVATION)/DEPTH RELATIVE TO GROUND SURFACE
- INFERRED GROUNDWATER ELEVATION CONTOUR
- INFERRED GROUNDWATER FLOW DIRECTION

NOTES:

1. GROUND SURFACE ELEVATIONS RANGE FROM 10 FT TO 14.6 FT (NAVD88) ACROSS THE SITE.
2. GROUNDWATER ELEVATIONS REPRESENT AVERAGE VALUES OBSERVED DURING THE PRE-DESIGN INVESTIGATION FROM MARCH TO JULY IN 2012.

30 15 0 30 60

SCALE: 1"=30'

FIGURE 8

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS - OU2
NEW YORK, NEW YORK

OU-2 PRE-DESIGN INVESTIGATION 2012 GROUNDWATER ELEVATIONS

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500

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WEST 46th STREET
(TRAFFIC FLOW ⇒)

CONCRETE SIDEWALK
STEEL FACED CURB
CONCRETE SIDEWALK
CONCRETE RAMP
OVERHEAD DECK
CHAIN LINK FENCE
GATE
SLIDING GATE
STAIRS
OVERHEAD CANOPY
WAGON SHED (PURIFYING HOUSE)
GAS OIL TANK
OVERHEAD PEDESTRIAN BRIDGE
ASPHALT PARKING LOT
CONCRETE
SHED
TRENCH DRAIN
GAS HOLDER
TP-10
TP-11
TP-8
APPROXIMATE LOCATION OF BURIED BRICK WALL
GRANITE CURB
CONCRETE LEDGE AT 7'
REFUSAL 36'
REFUSAL 10'
REFUSAL 7'

A1
A2
A3

MW-19
PDI-32
MW-1
PDI-1
MW-22
PDI-33
SB-5
PDI-34
MW-2
PDI-28
PDI-27
SB-1
SPDI-4
PDI-30
PDI-29
SPDI-5
SB-13
SB-16
PDI-25
PDI-24
MW-21
SB-22
SB-23
SPDI-2
SB-24
PDI-31
PDI-26
CONT-5
MW-24
SPDI-3
PDI-22
SB-8
SPDI-6
PW-1
PDI-21
MW-5
MW-4
PDI-19
SB-19
PDI-20
SB-20
SB-9
CONT-1
CONT-7
CONT-2
SB-12
PDI-10
SPDI-1
PW-2
PDI-2
PDI-3
SB-3
PDI-5
SB-6
PDI-4
SB-7
PDI-6
PDI-7
MW-3
SB-10
PDI-9
PDI-11
CONT-8
SB-15
CONT-3
PDI-12
PDI-13
SB-17
PDI-18/
MW-23
PDI-16
MW-6
SB-21
PDI-15
CONT-4
RDI-17

-5 -10 -15 -20 -25 -30 0 +5

LEGEND:

- PROPERTY BOUNDARY
- APPROXIMATE LOCATION OF FORMER MGP STRUCTURES
- SOIL BORING LOCATION
- MONITORING WELL LOCATION
- ABANDONED MONITORING WELL
- ABANDONED PUMPING WELL
- EXISTING PUMPING WELL
- TEST PIT LOCATION
- BEDROCK CONTOURS (DASHED IF INFERRED)
- ISS TO 15'
- ISS TO 30'
- ISS TO BEDROCK
- PROPOSED SUPPLEMENTAL PRE-DESIGN INVESTIGATION SOIL BORING

AREA	Area (sf)	ISS TO 15 FT BGS VOLUME (cy)	ISS 15-30 FT BGS VOLUME (cy)	ISS >30 FT BGS VOLUME (cy)	TOTAL REMEDIATION VOLUME (cy)
AREA 1	820	900	600	0	1,500
AREA 2	9,910	5,500	5,100	600	11,200
AREA 3	10,520	5,800	4,300	40	10,140
TOTAL	21,250	12,200	10,000	640	22,840

30 15 0 30 60

SCALE: 1"=30'

12th AVENUE - STATE HIGHWAY 9A (TRAFFIC FLOW ⇒)

(⇐ TRAFFIC FLOW) WEST 45th STREET

FIGURE 9

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS - OU2
NEW YORK, NEW YORK

ALTERNATIVE 2A - ESTIMATED REMEDIATION AREA ISS TO BEDROCK

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500

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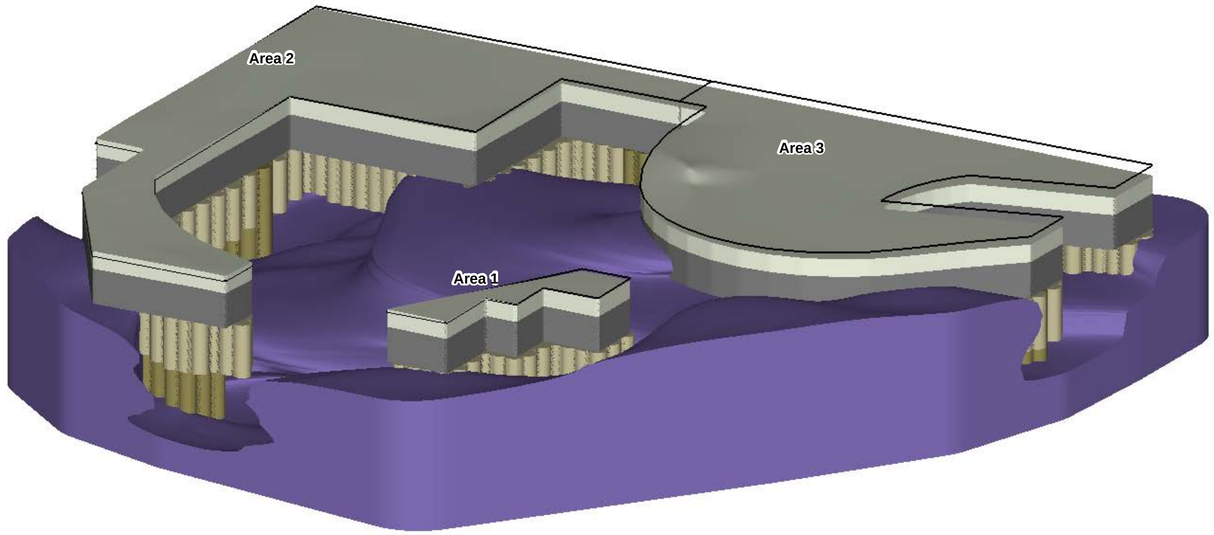
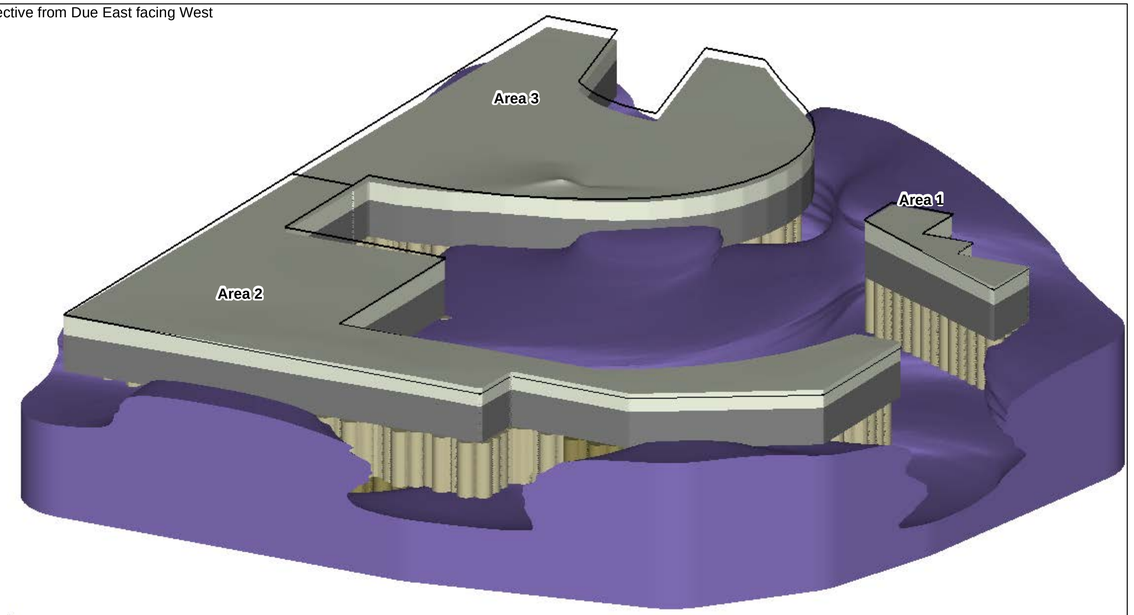
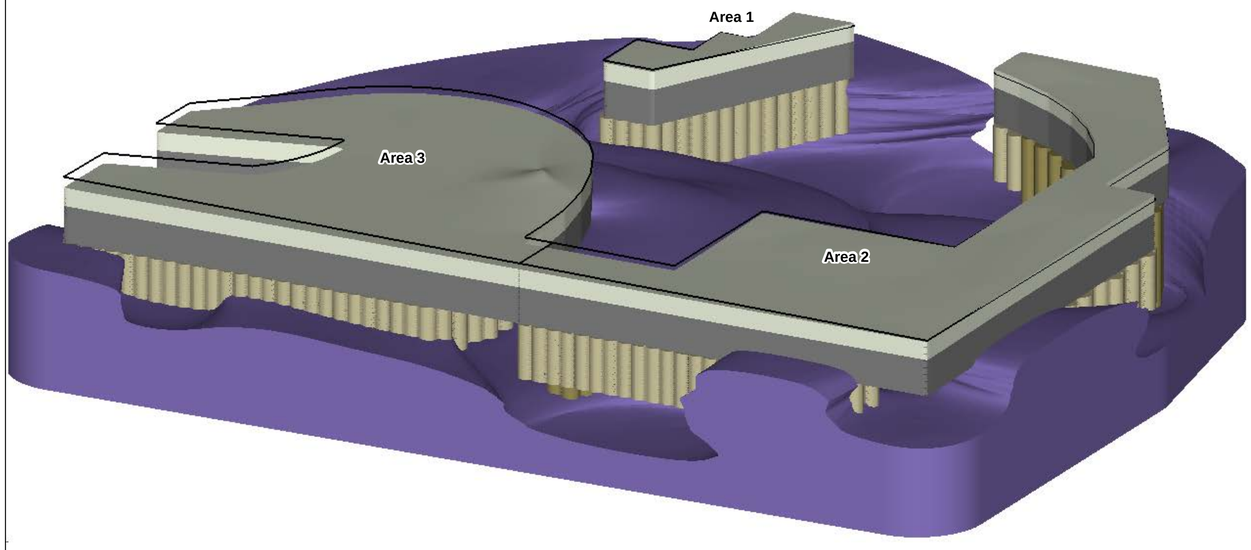
Perspective from Due North facing South



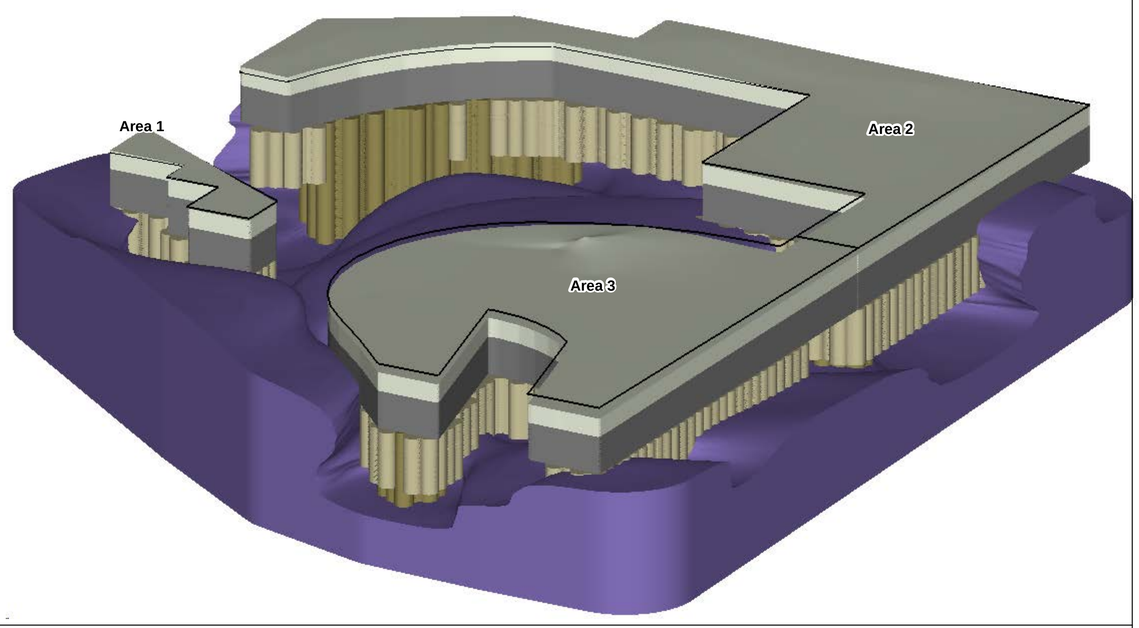
Perspective from Due East facing West



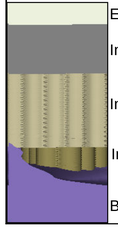
Perspective from Due South facing North



Perspective from Due West facing East



3D Perspective Key



Excavation 0-5 ft. bgs.

In-Situ soil mixing 5-15 ft. bgs.

In-Situ jet grout columns 15-30 ft. bgs.

In-Situ jet grout columns 15 ft. bgs. to bedrock.

Bedrock

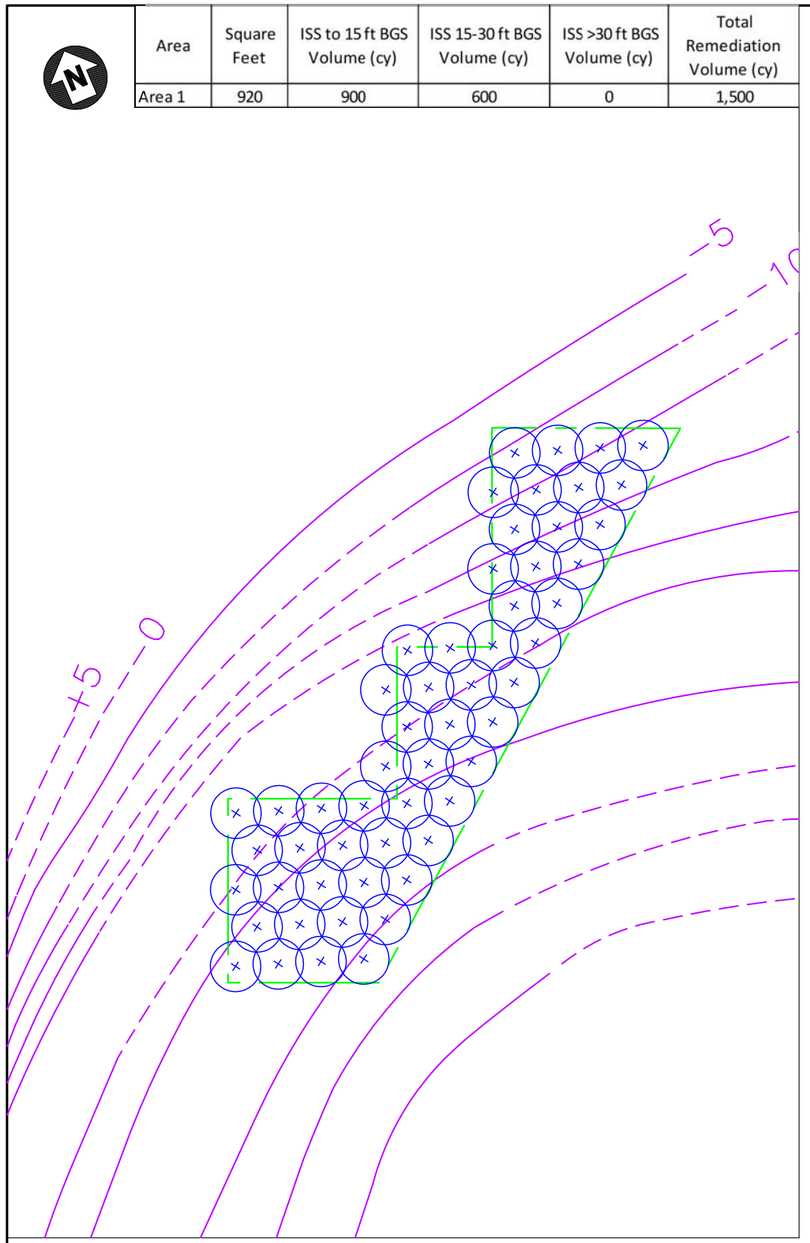
FIGURE 10

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS -OU2
NEW YORK, NEW YORK

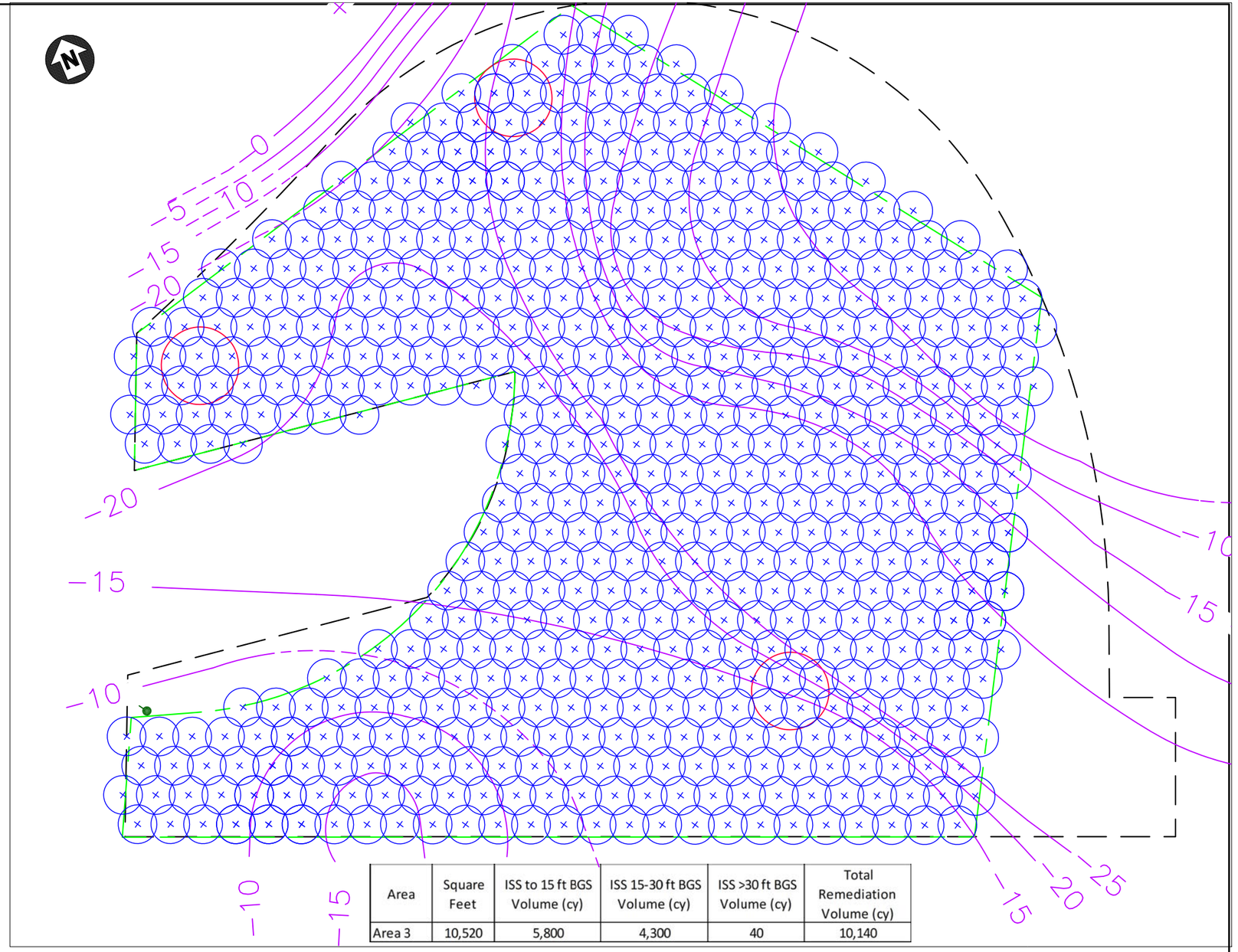
West 45th St. ISS 3D Rendering

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500

Area	Square Feet	ISS to 15 ft BGS Volume (cy)	ISS 15-30 ft BGS Volume (cy)	ISS >30 ft BGS Volume (cy)	Total Remediation Volume (cy)
Area 1	920	900	600	0	1,500



AREA 1



Area	Square Feet	ISS to 15 ft BGS Volume (cy)	ISS 15-30 ft BGS Volume (cy)	ISS >30 ft BGS Volume (cy)	Total Remediation Volume (cy)
Area 3	10,520	5,800	4,300	40	10,140

AREA 3

LEGEND:

BEDROCK CONTOURS (DASHED IF INFERRED)

JET GROUT COLUMNS

ISS TO 15'

ISS TO 30'

ISS >30'

15 7.5 0 15 30

SCALE: 1"=15'

FIGURE 11

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS – OU2
NEW YORK, NEW YORK

JET GROUT COLUMNS
AREA 1 & AREA 3

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500

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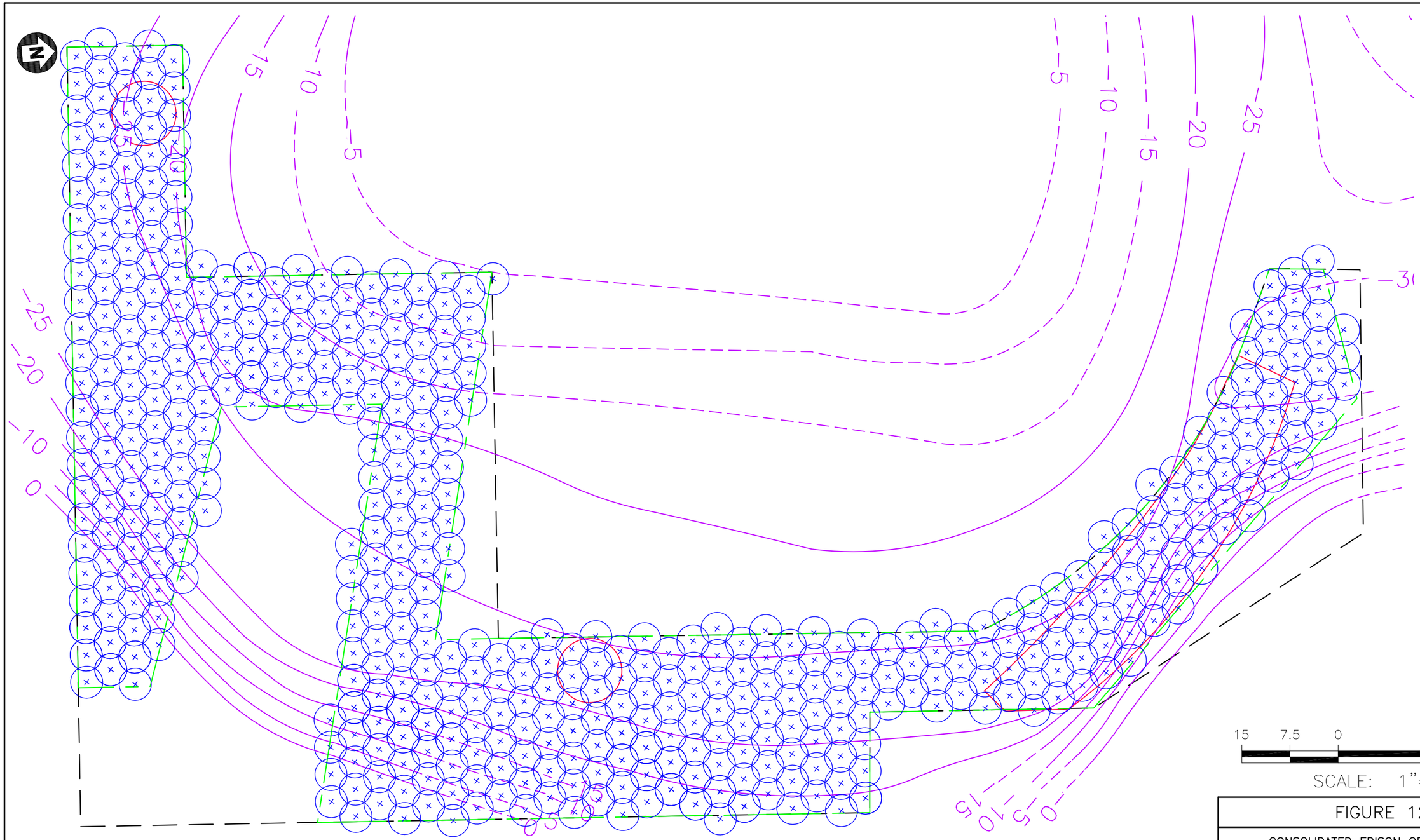

AREA 2

LEGEND:

BEDROCK CONTOURS (DASHED IF INFERRED)

JET GROUT COLUMNS

ISS TO 15'

ISS TO 30'

ISS >30'

Area	Square Feet	ISS to 15 ft BGS Volume (cy)	ISS 15-30 ft BGS Volume (cy)	ISS >30 ft BGS Volume (cy)	Total Remediation Volume (cy)
Area 2	9,910	5,500	5,100	600	11,200

FIGURE 12

CONSOLIDATED EDISON OF NEW YORK
FORMER WEST 45th STREET GAS WORKS – OU2
NEW YORK, NEW YORK

JET GROUT COLUMNS
AREA 2

PARSONS
200 COTTONTAIL LANE, SOMERSET, N.J. 08873, PHONE: 732-537-3500

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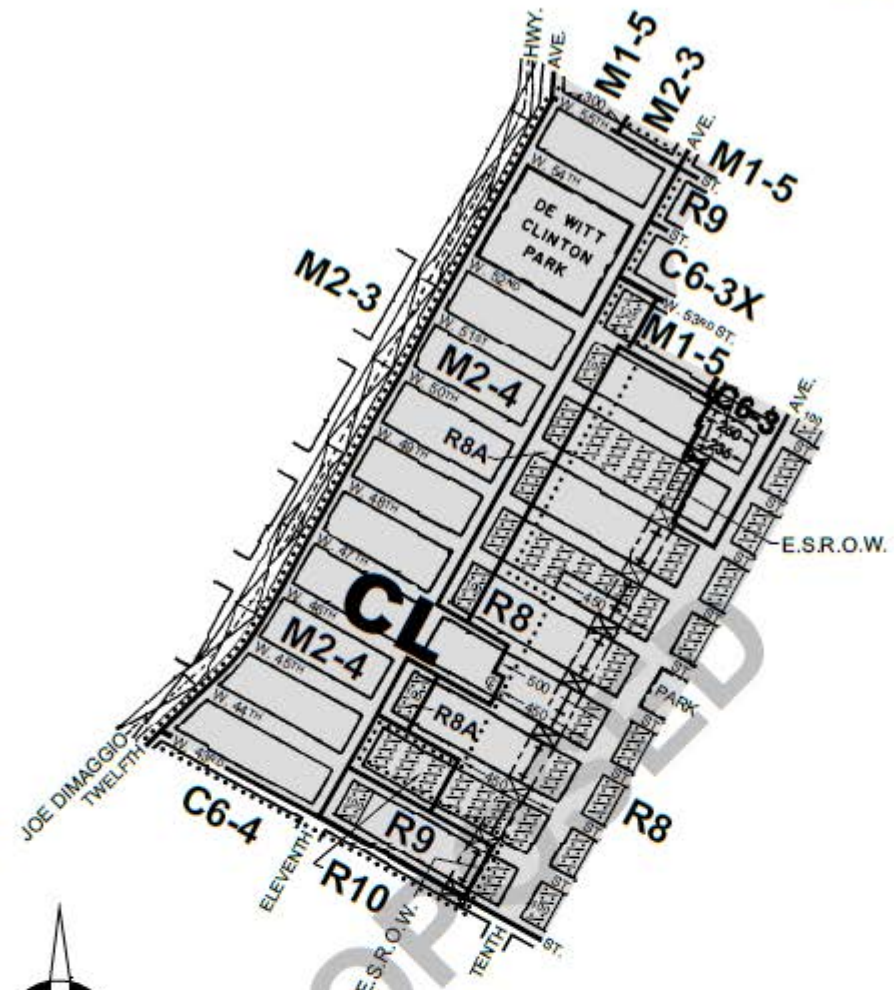
APPENDIX A
NEW YORK CITY PLANING COMMISSION ZONING MAP 8C

C.D.4

C 110177 ZMM



PROPOSED

CITY PLANNING COMMISSION

CITY OF NEW YORK

DIAGRAM SHOWING PROPOSED

ZONING CHANGE

ON SECTIONAL MAP

8c

BOROUGH OF

MANHATTAN

New York, Certification Date
JANUARY 03, 2011

S. Voyages, R.A. Director
Technical Review Division

SCALE IN FEET

600 0 600

NOTE:

Indicates Zoning District Boundary.

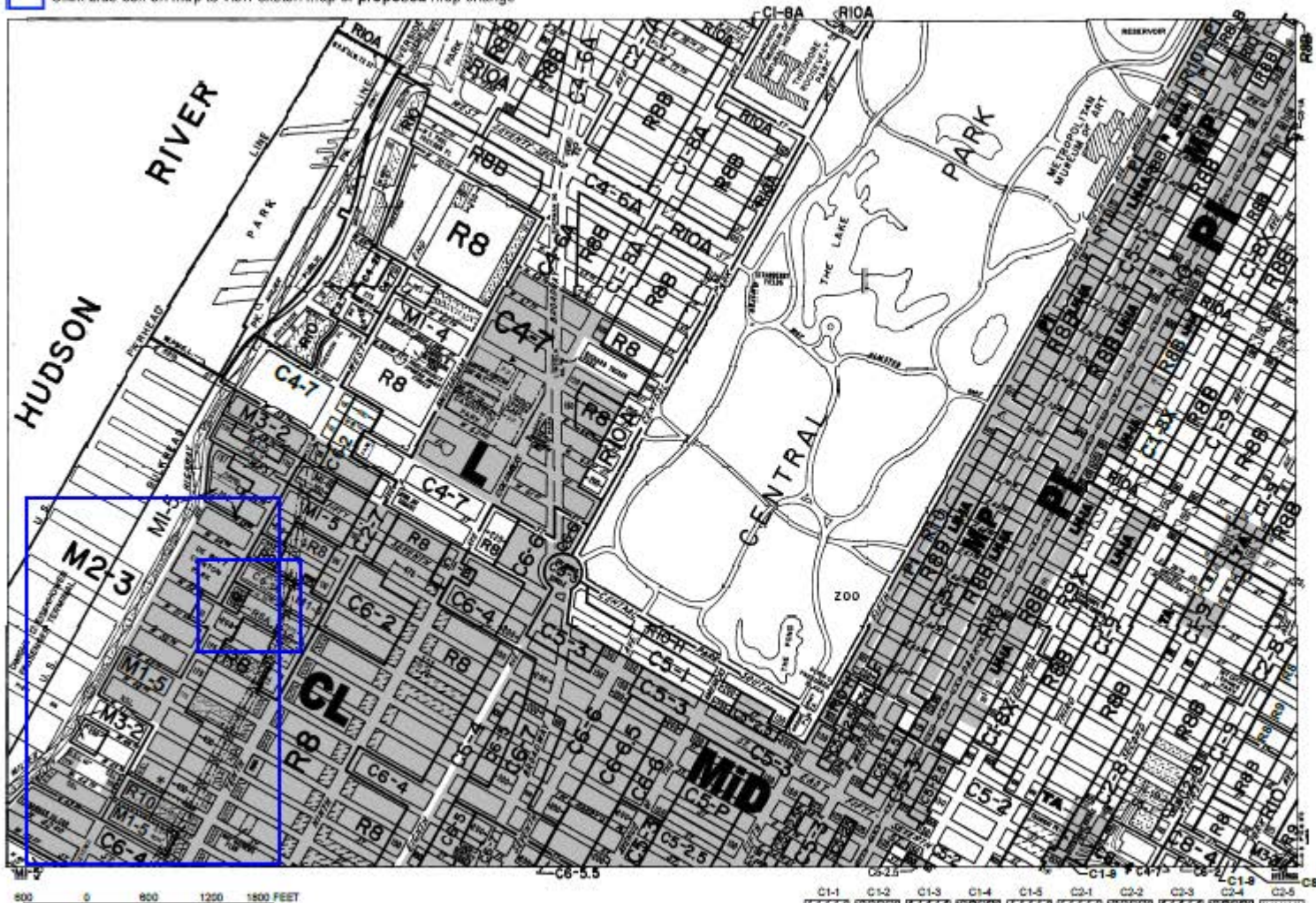
The area enclosed by the dotted line is proposed to be rezoned by changing from M1-5, M2-3 and M3-2 Districts to R8, R8A, R9 and M2-4 Districts, establishing within proposed R8A and R9 Districts a C2-5 District, and establishing a Special Clinton District.

Indicates a C2-5 District.

CL Indicates a Special Clinton District.

THIS DIAGRAM IS FOR ILLUSTRATIVE PURPOSES ONLY.

Click blue box on map to view sketch map of **proposed** map change



C1-1 C1-2 C1-3 C1-4 C1-5 C2-1 C2-2 C2-3 C2-4 C2-5

NOTE: Where no dimensions for zoning district boundaries appear on the zoning maps, such dimensions are determined in Article VII, Chapter 6 (Location of District Boundaries) of the Zoning Resolution.

ZONING MAP

THE NEW YORK CITY PLANNING COMMISSION

Major Zoning Classifications:

The number(s) and/or letter(s) that follows an R, C or M District designation indicates use, bulk and other controls as described in the text of the Zoning Resolution.

R – RESIDENTIAL DISTRICT

C – COMMERCIAL DISTRICT

M – MANUFACTURING DISTRICT

SPECIAL PURPOSE DISTRICT
The letter(s) within the shaded area designates the special purpose district as described in the text of the Zoning Resolution.

AREA(S) REZONED

Effective Date(s) of Rezoning:

*03-03-2010 C 100051 ZMM
12-21-2009 C 090430 ZMM

Special Requirements:

For a list of lots subject to CEQR environmental requirements, see APPENDIX C.

For a list of lots subject to "D" restrictive declarations, see APPENDIX D.

For Inclusionary Housing designated areas on this map, see APPENDIX F.

CITY MAP CHANGE(S):
▲ 12-08-2009 C 060098(A) MMM

MAP KEY

	5d	6b
8a	8c	9a
8b	8d	9b

ZONING MAP 8c

NOTE: Zoning information as shown on this map is subject to change. For the most up-to-date zoning information for this map, visit the Zoning section of the Department of City Planning website: www.nyc.gov/planning, or contact the Zoning Information Desk at (212) 720-3291.