

882 FULTON STREET

BROOKLYN, NEW YORK

Block: 2011; Lot: 30

Remedial Action Work Plan

NYC VCP Number: 14CVCP227K

OER Project Number: 14EH-N226K

Prepared for:

Andrew Bradfield

500 Waverly Property Owner LLC, 6 West 14th Street, 2nd Floor

New York, NY 10011

Prepared by:

CA Rich Consultants, Inc

17 Dupont Street, Plainview, New York 11803

516-576-8844

jcooper@carichinc.com

and

Nicholas A. Andrianas, P.E.

28 Henry Street

Kings Park, New York 11754

631-2692680

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REMEDIAL ACTION WORK PLAN

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LIST OF ACRONYMS

Acronym	Definition
AOC	Area of Concern
AS/SVE	Air Sparging/Soil Vapor Extraction
BOA	Brownfield Opportunity Area
CAMP	Community Air Monitoring Plan
C/D	Construction/Demolition
COC	Certificate of Completion
CQAP	Construction Quality Assurance Plan
CSOP	Contractors Site Operation Plan
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
BCA	Brownfield Cleanup Agreement
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC BCP	New York City Brownfield Cleanup Program
NYC DEP	New York City Department of Environmental Protection
NYC DOHMH	New York State Department of Health and Mental Hygiene
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation
NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
ORC	Oxygen-Release Compound
OSHA	United States Occupational Health and Safety Administration
PE	Professional Engineer
PID	Photo Ionization Detector

QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan or Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound

CERTIFICATION

I, Nicholas A Andrianas, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 882 Fulton Street, Brooklyn, New York Site, Site Number 14CVCP244K.

I, Jason Cooper am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 882 Fulton Street, Brooklyn, New York Site, Site Number 14CVCP244K.

I, Eric Weinstock am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 882 Fulton Street, Brooklyn, New York Site, Site Number 14CVCP244K.

I certify that this Remedial Action Work Plan (RAWP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAWP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Nicholas A. Andrianas, P.E.

Name

063661

NYS PE License Number

Signature

4/29/2014

Date

Jason T. Cooper

QEP Name

QEP Signature

4/30/2014

Date

Eric Weinstock

QEP Name

QEP Signature

4/30/2014

Date



EXECUTIVE SUMMARY

500 Waverly Avenue Owner LLC has applied to enroll in the New York City Voluntary Brownfield Cleanup Program (NYC VCP) to investigate and remediate an 11,927-square foot site (0.27 acres) located at 882 Fulton Street in Brooklyn, New York. A remedial investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). The remedial action described in this document provides for the protection of public health and the environment consistent with the intended property use, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

Site Location and Current Usage

The Site is located at 882 Fulton Street in the Clinton Hill section in Brooklyn, New York and is identified as Block 2011 and Lot 30 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 11,927-square feet and is bounded by Fulton Street to the north, an asphalt-paved parking lot to the south, Waverly Avenue to the east, and multi-story residential structures to the west along Clinton Avenue. A map of the site boundary is shown in Figure 2. Currently, the Site is not used for any purpose and contains an empty asphalt-paved parking lot with a chain-link fence along the perimeter. Figure 9 shows the geophysical survey results with the location of the suspect tanks.

Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of a new eight-story building, ground floor retail, and one level of cellar that will include vehicle parking. The apartments will consist of mixed affordable and market rate housing. The proposed building development is expected to cover the entire footprint of the Site, with the exception of a 16 foot subgrade setback at the northern side of the site. The proposed development includes excavation to a depth of approximately 10-feet below grade with the exception of the below grade parking area, which includes excavation to a depth of approximately 23-feet below grade. An elevator pit at the western side of the Site will require excavation to a depth of approximately 15 feet below grade, and a trench in the parking area will require excavation to approximately 26 feet below grade. The soil excavation includes removal of approximately 3,230 tons of soil from the below grade

parking area and 5,900 tons from the remainder of Site. A total of approximately 9,130 tons of soil will be excavated. Groundwater is expected to be encountered at approximately 65-feet below grade; therefore, excavation activities are not likely to encounter groundwater. Layout of the proposed site development is presented in Figure 3. According to OER's SPEED application, the current zoning designation is R7A for residential use. The proposed use is consistent with existing zoning for the property.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

Summary of the Remedy

The proposed remedial action achieves protection of public health and the environment for the intended use of the property. The proposed remedial action achieves all of the remedial action objectives established for the project and addresses applicable standards, criterion, and guidance; is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants; is cost effective and implementable; and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establish Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 SCOs. The excavation depth of the new building will be approximately 23-feet below grade for the below grade parking area and approximately 10-feet below grade for the remainder of the Site. An elevator pit at the western side of the Site will require excavation to a depth of approximately 15 feet below grade, and a trench in the parking area will require excavation to approximately

26 feet below grade. Approximately 9,130 tons of soil will be excavated and removed from this site.

6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of excavated media on-Site.
7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
10. Import of materials to be used for backfill and cover (if necessary) in compliance with this plan and in accordance with applicable laws and regulations.
11. As part of new development, installation of a vapor barrier system beneath the building slab and outside foundation sidewalls below grade.
12. As part of new development, construction and maintenance of an engineered composite cover consisting of a 12" thick concrete building slab in the cellar parking area, 6" thick concrete building slab in the remainder of the cellar, and an 8" thick at-grade concrete building slab in the setback area at the north side of the Site to prevent human exposure to residual soil/fill remaining under the Site. The proposed redevelopment of the Property calls for a ground-floor build-out that covers the entire Property.
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and

regulations.

15. If Track 1 cleanup is not achieved, submission of an approved Site Management Plan (SMP) in the Remedial Action Report (RAR) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and certification of Engineering and Institutional Controls and reporting at a specified frequency.
16. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.
17. If Track 1 cleanup is not achieved, the property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls; a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.
18. CA RICH, in conjunction with Nicholas A. Andrianas, P.E., will be responsible to assure direct oversight of the community air monitoring, site inspections, invasive activity, soil screening, imported soil screening, truck inspections, housekeeping, notifications, odor and dust control, and daily reporting under this remedial action work plan and will certify in the Remedial Action Report the conformance of remedial action oversight activities with the requirements of this work plan. CA Rich, in conjunction with Nicholas A. Andrianas, P.E., will assure appropriate training of field oversight personnel. Individuals assigned to perform these activities will be identified prior to the commencement of field activities, and any changes to these personnel during field activities will be noted in the daily reports.

COMMUNITY PROTECTION STATEMENT

The Office of Environmental Remediation created the New York City Voluntary Cleanup Program (NYC VCP) to provide governmental oversight for the cleanup of contaminated property in NYC. This Remedial Action Work Plan (“cleanup plan”) describes the findings of prior environmental studies that show the location of contamination at the site, and describes the plans to clean up the site to protect public health and the environment.

This cleanup plan provides a very high level of protection for neighboring communities and also includes many other elements that address common community concerns, such as community air monitoring, odor, dust and noise controls, hours of operation, good housekeeping and cleanliness, truck management and routing, and opportunities for community participation. The purpose of this Community Protection Statement is to explain these community protection measures in non-technical language to simplify community review.

Remedial Investigation and Cleanup Plan. Under the NYC VCP, a thorough cleanup study of this property (called a remedial investigation) has been performed to identify past property usage, to sample and test soils, groundwater and soil vapor, and identify contaminant sources present on the property. The cleanup plan has been designed to address all contaminant sources that have been identified during the study of this property.

Identification of Sensitive Land Uses. Prior to selecting a cleanup, the neighborhood was evaluated to identify sensitive land uses nearby, such as schools, day care facilities, hospitals and residential areas. The cleanup program was then tailored to address the special conditions of this community.

Qualitative Human Health Exposure Assessment. An important part of the cleanup planning for the Site is the performance of a study to find all of the ways that people might come in contact with contaminants at the Site now or in the future. This study is called a Qualitative Human Health Exposure Assessment (QHHEA). A QHHEA was performed for this project. This assessment has considered all known contamination at the Site and evaluated the potential for people to come in contact with this contamination. All identified public exposures will be addressed under this cleanup plan.

Health and Safety Plan. This cleanup plan includes a Construction Health and Safety Plan

(CHASP) that is designed to protect community residents and on-Site workers. The elements of this plan are in compliance with safety requirements of the United States Occupational Safety and Health Administration (OSHA). This plan includes many protective elements including those discussed below.

Site Safety Coordinator. This project has a designated Site safety coordinator to implement the Health and Safety Plan. The safety coordinator maintains an emergency contact sheet and protocol for management of emergencies. The Site safety coordinator is Jason Cooper and can be reached at 516-576-8844

Worker Training. Workers participating in cleanup of contaminated material on this project are required to be trained in a 40-hour hazardous waste operators training course and to take annual refresher training. This pertains to workers performing specific tasks including removing contaminated material and installing cleanup systems in contaminated areas.

Community Air Monitoring Plan. Community air monitoring will be performed during this cleanup project to ensure that the community is properly protected from contaminants, dust and odors. Air samples will be tested in accordance with a detailed plan called the Community Air Monitoring Plan or CAMP. Results will be regularly reported to the NYC Office of Environmental Remediation. This cleanup plan also has a plan to address any unforeseen problems that might occur during the cleanup (called a ‘Contingency Plan’).

Odor, Dust and Noise Control. This cleanup plan includes actions for odor and dust control. These actions are designed to prevent off-Site odor and dust nuisances and includes steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odors are controlled by limiting the area of open excavations, physical covers, spray foams and by a series of other actions (called operational measures). The project is also required to comply with NYC noise control standards. If you observe problems in these areas, please contact the onsite Project Manager Eric Weinstock of CA Rich Consultants at 516-576-8844 or NYC Office of Environmental Remediation Project Manager Shana Holberton at 212-788-3220

Quality Assurance. This cleanup plan requires that evidence be provided to illustrate that all cleanup work required under the plan has been completed properly. This evidence will be

summarized in the final report, called the Remedial Action Report. This report will be submitted to the NYC Office of Environmental Remediation and will be thoroughly reviewed.

Storm-Water Management. To limit the potential for soil erosion and discharge, this cleanup plan has provisions for storm-water management. The main elements of the storm water management include physical barriers such as tarp covers and erosion fencing, and a program for frequent inspection.

Hours of Operation. The hours for operation of cleanup will comply with the NYC Department of Buildings construction code requirements or according to specific variances issued by that agency. For this cleanup project, the hours of operation will be in accordance with the New York City Department of Buildings construction code requirements.

Signage. While the cleanup is in progress, a placard will be prominently posted at the main entrance of the property with a laminated project Fact Sheet that states that the project is in the NYC Voluntary Cleanup Program, provides project contact names and numbers, and locations of project documents can be viewed.

Complaint Management. The contractor performing this cleanup is required to address all complaints. If you have any complaints, you can call the facility Project Manager Andrew Bradfield at 212-431-5900, the NYC Office of Environmental Remediation Project Manager Shana Holberton at 212-788-3220, or call 311 and mention the Site is in the NYC Voluntary Cleanup Program.

Utility Mark-outs. To promote safety during excavation in this cleanup, the contractor is required to first identify all utilities and must perform all excavation and construction work in compliance with NYC Department of Buildings regulations.

Soil and Liquid Disposal. All soil and liquid material removed from the Site as part of the cleanup will be transported and disposed of in accordance with all applicable City, State and Federal regulations and required permits will be obtained.

Soil Chemical Testing and Screening. All excavations will be supervised by a trained and properly qualified environmental professional or Health and Safety Coordinator (HSC) or his/her properly trained assignee. In addition to extensive sampling and chemical testing of soils on the

Site, excavated soil will be screened continuously using hand-held instruments, by sight, and by smell to ensure proper material handling and management, and community protection.

Stockpile Management. Soil stockpiles will be kept covered with tarps to prevent dust, odors and erosion. Stockpiles will be frequently inspected. Damaged tarp covers will be promptly replaced. Stockpiles will be protected with silt fences. Hay bales will be used, as needed to protect storm water catch basins and other discharge points.

Trucks and Covers. Loaded trucks leaving the Site will be covered in compliance with applicable laws and regulations to prevent dust and odor. Trucks will be properly recorded in logs and records and placarded in compliance with applicable City, State and Federal laws, including those of the New York State Department of Transportation. If loads contain wet material that can leak, truck liners will be used. All transport of materials will be performed by licensed truckers and in compliance with all laws and regulations.

Imported Material. All fill materials proposed to be brought onto the Site will comply with rules outlined in this cleanup plan and will be inspected and approved by a qualified worker located on-Site. Waste materials will not be brought onto the Site. Trucks entering the Site with imported clean materials will be covered in compliance with applicable laws and regulations.

Equipment Decontamination. All equipment used for cleanup work will be inspected and washed, if needed, before it leaves the Site. Trucks will be cleaned at a truck inspection station on the property before leaving the Site.

Housekeeping. Locations where trucks enter or leave the Site will be inspected every day and cleaned regularly to ensure that they are free of dirt and other materials from the Site.

Truck Routing. Truck routes have been selected to: (a) limit transport through residential areas and past sensitive nearby properties; (b) maximize use of city-mapped truck routes; (c) limit total distance to major highways; (d) promote safety in entry to highways; (e) promote overall safety in trucking; and (f) minimize off-Site line-ups (queuing) of trucks entering the property. Operators of loaded trucks leaving the Site will be instructed not to stop or idle in the local neighborhood.

Final Report. The results of all cleanup work will be fully documented in a final report

(called a Remedial Action Report) that will be available for public review online. The closest public library to the Site with Internet access is the Bushwick Library located at 340 Bushwick Avenue, Brooklyn, New York.

Long-Term Site Management. If long-term protection after the cleanup is needed, the property owner will be required to comply with an ongoing Site Management Plan that calls for continued inspection of protective controls, such as Site covers. The Site Management Plan is evaluated and approved by the NYC Office of Environmental Remediation. Requirements that the property owner must comply with are established through a city environmental designation. A certification of continued protectiveness of the cleanup will be required from time to time to show that the approved cleanup is still effective.

REMEDIAL ACTION WORK PLAN

1.0 SITE BACKGROUND

500 Waverly Property Owner LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 882 Fulton Street in the Clinton Hill section of Brooklyn, New York (the “Site”). A Remedial Investigation (RI) was performed to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP) in a manner that will render the Site protective of public health and the environment consistent with the contemplated end use. This RAWP establishes remedial action objectives, provides a remedial alternatives analysis that includes consideration of a permanent cleanup, and provides a description of the selected remedial action. The remedial action described in this document provides for the protection of public health and the environment, complies with applicable environmental standards, criteria and guidance and applicable laws and regulations.

1.1 SITE LOCATION AND CURRENT USAGE

The Site is located at 882 Fulton Street in the Clintonville section in Brooklyn, New York and is identified as Block 2011 and Lot 30 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 11,927-square feet and is bounded by Fulton Street to the north, an asphalt-paved parking lot to the south, Waverly Avenue to the east, and multi-story residential structures to the west along Clinton Avenue. A map of the site boundary is shown in Figure 2. Currently, the Site is not used for any purpose and contains an empty asphalt-paved parking lot with a chain-link fence along the perimeter.

1.2 PROPOSED REDEVELOPMENT PLAN

The proposed future use of the Site will consist of a new eight-story building, ground floor retail, and one level of cellar that will include vehicle parking. The apartments will consist of mixed affordable and market rate housing. The proposed building development is expected to cover the entire footprint of the Site, with the exception of a 16 foot subgrade setback at the northern side of the site. The proposed development includes excavation to a depth of approximately 10-feet below grade with the exception of the below grade parking area, which

includes excavation to a depth of approximately 23-feet below grade. An elevator pit at the western side of the Site will require excavation to a depth of approximately 15 feet below grade, and a trench in the parking area will require excavation to approximately 26 feet below grade. The soil excavation includes removal of approximately 3,230 tons of soil from the below grade parking area and 5,900 tons from the remainder of Site. A total of approximately 9,130 tons of soil will be excavated. Groundwater is expected to be encountered at approximately 65-feet below grade; therefore, excavation activities are not likely to encounter groundwater. Layout of the proposed site development is presented in Figure 3. According to OER's SPEED application, the current zoning designation is R7A for residential use. The proposed use is consistent with existing zoning for the property.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan.

1.3 DESCRIPTION OF SURROUNDING PROPERTY

The Site is located in a historically well-developed area of Brooklyn consisting of a mix of residential and commercial structures. No hospitals or day care centers were identified with a 500-foot radius. One sensitive receptor, identified as Achievement First Endeavor Middle School, is located approximately 250-feet south of the Site.

The Site is surrounded by residential structures to the west and south. The site is bordered on the north by Fulton Street, beyond which are residential structures with commercial store fronts. The Site is bordered on the east by Waverly Avenue, beyond which are residential structures with commercial store fronts.

Figure 4 shows the surrounding land usage.

1.4 REMEDIAL INVESTIGATION

A remedial investigation was performed and the results are documented in a companion document called "*Remedial Investigation Report, 882 Fulton Street, Brooklyn, New York*", dated March 2014 (RIR).

Summary of Past Uses of Site and Areas of Concern

According to the Phase I Report, the area has been developed prior to 1887. The following summarizes the previous usage of the Site using available Sanborn Maps.

- In the 1887 Sanborn Map the Property is identified as containing stores along the northern boundary, dwellings along the eastern boundary and Ackerman's Coal Yard near the center.
- In 1904, the Site contains stores along the northern boundary, a coal yard in the west and center of the Site and a stable near the eastern boundary.
- In 1915 the Site contains stores along the northern boundary, an area denoted as wagon sheds near the west and center portion of the Site.
- In 1938, 1950 and 1969 the Site contains a row of stores along the northern boundary and the remaining portion is denoted as garage with skylights.
- In 1977, 1979, 1980, 1981, and 1982 the Site is vacant and no use is denoted.
- In 1986, 1987, 1988, 1989, 1991, 1992, 1993, 1995, 1996, 2001, 2002, 2003, 2004, 2005, 2006, and 2007 the Site is vacant; however, it is denoted as parking.

Previous ownership/usage of the Property was researched using the NYC Department of Building webpage. No Certificate of Occupancy was listed for the Site in the database.

A review of the NYC Department of Finance ACRIS system database identifies ownership for the Site from 1969 to present. Previous ownership includes White Memorial Chapels, Inc. from 1984 to 2013, La Juan Development Corp. from 1978 to 1984, City of New York from 1978 to 1984, Ivan E. Irizarry from 1976 to 1978, Prudential Savings Bank from 1973 to 1976, Henry Krissoff from 1971 to 1973 and Richlou Associates from 1969 to 1971.

The AOCs identified for this site include:

1. Four suspect underground storage tanks (USTs) located along the eastern portion of the Site. Soil boring and soil vapor points were installed in close proximity to the suspected USTs. No elevated photoionization detector (PID) readings were detected and the laboratory data did not identify elevated levels of compounds

typically associated with petroleum.

Summary of the Work Performed under the Remedial Investigation

500 Waverly Property Owner LLC (previously reported under the entity Orange Management LLC) performed the following scope of work:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed eight soil borings across the entire project Site, and collected 16 soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Attempted to install one groundwater monitoring well along the downgradient portion of the Site. Sub-surface conditions provided for difficult drilling, which only reached a depth of approximately 15-feet below grade. The difficult drilling conditions were conveyed to OER, who then waived the groundwater monitoring well requirement. Two soil samples were collected from this boring from 2-4 and 4-6 feet below grade.
4. Installed four soil vapor probes around Site perimeter and one soil vapor probe in the center of the Site. A total of five samples were collected for chemical analysis.
5. A geophysical survey was conducted by NAEVA Geophysics, Inc. on October 9, 2013. The equipment utilized during the investigation included a Fisher TW-6 Pipe and Cable Locator, a Sensors and Software ground penetrating radar (GPR) system with a 250-Megahertz antenna, a Subsite 950 utility locator, and a Dynatel 2250 Cable Locator. The survey identified 21 metal anomalies throughout the area of investigation. Four suspect USTs were identified along the eastern property boundary and appear to be 550-gallon in size. Figure 9 shows the geophysical survey results with the location of the suspect tanks.

Summary of Environmental Findings

1. Elevation of the property ranges from 78 to 79 feet.
2. Depth to groundwater is unknown at the Site. However, it is expected to be encountered at approximately 65-feet below grade.

3. Groundwater flow is generally from east to west beneath the Site based upon topographic gradient.
4. Bedrock was not encountered at the Site.
5. The stratigraphy of the site, from the surface down, consists of approximately 10-feet of urban fill underlain by native fine sand and silt.
6. Soil/fill samples collected during the RI showed no VOCs or PCBs were detected above NYSDEC Part 375 Table 375-6.8 Soil Cleanup Objectives (SCOs) for Unrestricted Use in any of the samples. No SVOCs or pesticides were detected in the deep samples above Unrestricted Use SCOs. Several SVOCs including benzo(a)anthracene (maximum [max.] of 11,000 micrograms per kilogram [$\mu\text{g}/\text{kg}$]), benzo(a)pyrene (max. of 9,400 $\mu\text{g}/\text{kg}$), benzo(b)fluoranthene (max. of 9,100 $\mu\text{g}/\text{kg}$), benzo(k)fluoranthene (max. of 7,800 $\mu\text{g}/\text{kg}$), chrysene (max. of 11,000 $\mu\text{g}/\text{kg}$), dibenzo(a,h)anthracene (max. of 1,600 $\mu\text{g}/\text{kg}$), and ideno(1,2,3-c,d)pyrene (max. of 6,800 $\mu\text{g}/\text{kg}$) exceeded Unrestricted Use and Restricted Use SCOs in five of the shallow samples as well as in one deep sample. The pesticides 4,4'-DDE (max. of 24 $\mu\text{g}/\text{kg}$) and 4,4'-DDT (max. of 22 $\mu\text{g}/\text{kg}$), were detected above Unrestricted Use SCOs in four shallow samples. Metals including lead (max. of 128 milligrams per kilogram [mg/kg]), mercury (max. of 0.747 mg/kg), and zinc (120 mg/kg) were detected at concentrations above Unrestricted Use SCOs in four shallow samples. The metals chromium (36.3 mg/kg) and nickel (32.4 mg/kg) were each detected slightly above Unrestricted Use SCOs in two deep soil samples (SB-6 and SB-3).
7. No groundwater samples were collected during the RI.
8. Soil vapor samples collected during the RI showed that the chlorinated solvents 1,1,1-trichloroethane (TCE), carbon tetrachloride, tetrachloroethylene (PCE), and trichloroethylene were detected below their respective guidance values in all five soil vapor samples. TCE was detected at a maximum concentration of 4.1 $\mu\text{g}/\text{m}^3$ and PCE was detected at a maximum concentration of 14 $\mu\text{g}/\text{m}^3$. Several other gasoline-related compounds benzene, toluene, ethyl benzene, and xylenes, were detected at relatively low concentrations (below 100 $\mu\text{g}/\text{m}^3$). Other compounds detected at relatively high concentrations included acetone (max. of 226 $\mu\text{g}/\text{m}^3$), carbon disulfide (max. of 604 $\mu\text{g}/\text{m}^3$), cyclohexane (max. of 226 $\mu\text{g}/\text{m}^3$), heptane (max. of 139 $\mu\text{g}/\text{m}^3$), hexane (max. of

272 $\mu\text{g}/\text{m}^3$), and propylene (max. of 2,030 $\mu\text{g}/\text{m}^3$).

For more detailed results, consult the RIR. The soil data and soil vapor data are summarized and included in Tables 1-7. Based on an evaluation of the data and information from the RIR and this RAWP, disposal of significant amounts of hazardous waste is not suspected at this site.

2.0 REMEDIAL ACTION OBJECTIVES

Based on the results of the RI, the following Remedial Action Objectives (RAOs) have been identified for this Site:

Soil

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.

3.0 REMEDIAL ALTERNATIVES ANALYSIS

The goal of the remedy selection process is to select a remedy that is protective of human health and the environment taking into consideration the current, intended and reasonably anticipated future use of the Property. The remedy selection process begins by establishing RAOs for media in which chemical constituents were found in exceedence of applicable standards, criteria and guidance values (SCGs). A remedy is then developed based on the following ten criteria:

1. Protection of human health and the environment;
2. Compliance with SCGs;
3. Short-term effectiveness and impacts;
4. Long-term effectiveness and permanence;
5. Reduction of toxicity, mobility, or volume of contaminated material;
6. Implementability;
7. Cost effectiveness;
8. Community Acceptance;
9. Land use; and,
10. Sustainability.

Alternative 1

- Establishment of NYSDEC Part 375 Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
- Removal of all soil/ fill exceeding Unrestricted Use (Track 1) SCOs throughout the Site and confirmation that Track 1 SCOs have been achieved with post-excavation endpoint sampling. The anticipated excavation depth of the building will be approximately 23-feet below grade for the below grade parking area and approximately 10-feet below grade for the remainder of the Site. If soil/fill containing analytes at concentrations above Track 1 SCOs is still present after removal of soil required for construction, additional excavation will be performed to ensure complete removal of soil that does not meet Track 1 Unrestricted Use SCOs.
- No Engineering or Institutional Controls are required for a Track 1 cleanup, but a vapor

and waterproof barrier would be installed beneath the basement foundation and behind foundation sidewalls of the new building as a part of development to prevent any potential future exposures from off-Site soil vapor.

- As part of new development, placement of final cover (concrete building slab) over the entire site.

Alternative 2

- Establishment of Site Specific (Track 4) SCOs.
- Removal of all soil/ fill exceeding Track 4 Site-specific SCOs. The anticipated excavation depth of the building will be approximately 23-feet below grade for the below grade parking area and approximately 10-feet below grade for the remainder of the Site. If soil/fill containing analytes at concentrations above Track 4 SCOs is still present after removal of soil required for construction, additional excavation will be performed to ensure complete removal of soil that does not meet Track 4 Site Specific SCOs.
- Installation of a waterproofing/ vapor barrier membrane.
- Placement of a final cover system (concrete building slab) over the entire site to prevent exposure to remaining soil/fill;
- Establishment of use restrictions including prohibitions on the use of groundwater from the site and prohibitions on sensitive site uses, such as farming or vegetable gardening, to eliminate future exposure pathways.
- Establishment of an approved Site Management Plan (SMP) to ensure long-term management of engineering and institutional controls (EC/ICs) including the performance of periodic inspections and certification that the controls are performing as they were intended. SMP will note that the property owner and property owner's successors and assigns must comply with the approved SMP; and
- The property will continue to be registered with an E-Designation at the NYC Buildings Department.

3.1 THRESHOLD CRITERIA

Protection of Public Health and the Environment

This criterion is an evaluation of the remedy's ability to protect public health and the environment, and an assessment of how risks posed through each existing or potential pathway of exposure are eliminated, reduced or controlled through removal, treatment, and implementation of Engineering Controls or Institutional Controls. Protection of public health and the environment must be achieved for all approved remedial actions.

Alternative 1 would be protective of human health and the environment by removing historic fill/soil exceeding Unrestricted Use Track 1 SCOs and groundwater protection standards, thus eliminating potential for direct contact with contaminated soil/fill once construction is complete and eliminating the risk of contamination leaching into groundwater.

Alternative 2 would achieve comparable protections of human health and the environment by removing most contaminated soil/fill and by ensuring that remaining soil/fill on-Site meets Track 4 SCOs as well as by placement of Engineering and Institutional Controls (EC/ICs) including a composite cover system. The composite cover system would prevent direct contact with any remaining soil/fill. Implementing ICs including a Site Management Plan and continued registration with E- Designation of property would ensure that the composite cover system remains intact and protective. Establishment of Track 4 Site Specific SCOs would minimize the risk of contamination leaching into groundwater.

For both Alternatives, potential exposure to contaminated soils and groundwater during construction would be minimized by implementing a Construction Health and Safety Plan, an approved Soil and Materials Management Plan and Community Air Monitoring Plan (CAMP). Potential future migration of off-Site vapors into the new building would be prevented by installing a vapor barrier/waterproofing system beneath the new building's basement slab and continuing the vapor barrier around foundation walls.

3.2. BALANCING CRITERIA

Compliance with Standards, Criteria and Guidance (SCGs)

This evaluation criterion assesses the ability of the alternative to achieve applicable standards, criteria and guidance.

Alternative 1 would achieve compliance with the remedial goals, chemical specific SCGs and RAOs for soil through removal of soil to achieve Track 1 Unrestricted Use SCOs and groundwater protection standards. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier/waterproofing system beneath the new building's basement slab and continuing the vapor barrier around foundation walls as part of new development.

Alternative 2 would achieve compliance with the remedial goals, chemical specific SCGs and RAOs for soil through removal of soil to achieve Track 4 SCOs. Compliance with SCGs for soil vapor would also be achieved by installing a vapor barrier/waterproofing system beneath the new building's basement slab and continuing the vapor barrier around foundation walls. A Site Management Plan would ensure that these controls remained protective for the long term. Compliance with groundwater SCGs would be achieved over the long term by excavation and removal of soil exceeding Track 4 Site-specific SCOs.

Health and Safety measures contained in the CHASP and Community Air Monitoring Plan (CAMP) that comply with the applicable SCGs shall be implemented during Site redevelopment in this RAWP. For both Alternatives, focused attention on means and methods employed during the remedial action would ensure that handling and management of contaminated material would be in compliance with applicable SCGs. United States Occupational Health and Safety Administration (OSHA) requirements for on-site construction safety will also be followed by the site Contractors. These measures would protect on-Site workers and the surrounding community from exposures to Site related to historic fill contaminants.

Short-term effectiveness and impacts

This evaluation criterion assesses the effects of the alternative during the construction and implementation phase until remedial action objectives are met. Under this criterion, alternatives are evaluated with respect to their effects on public health and the environment during implementation of the remedial action, including protection of the community, environmental impacts, time until remedial response objectives are achieved, and protection of workers during

remedial actions.

Both alternatives have similar short term impacts during their respective implementation, as each requires excavation of historic fill material. Short term impacts could potentially be higher for Alternative 1 if excavation of greater amounts of historical fill material is encountered below the excavation depth of the proposed building. The most significant short-term adverse impacts and risks to the community would be the potential complications involved with designing support of excavation. Both Track 1 and Track 4 remedial alternatives would result in similar dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Truck traffic will be routed on the most direct course using major thoroughfares where possible and flaggers will be used to protect pedestrians at Site entrances and exits. Focused attention to means and methods during the remedial action, including community air monitoring and appropriate truck routing will minimize or negate the overall impact of these activities.

Both alternatives would employ appropriate measures to prevent short term impacts, including a CAMP, during all on-Site soil disturbance activities and would minimize the release of contaminants into the environment. Both alternatives provide short term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site contaminants. Construction workers operating under appropriate management procedures and a CHASP would be protected from on-Site contaminants (personal protective equipment would be worn consistent with the document risk within the respective work zones).

Long-term effectiveness and permanence

This evaluation criterion addresses the results of a remedial action in terms of its permanence and quantity/nature of waste or residual contamination remaining at the Site after response objectives have been met, such as permanence of the remedial alternative, magnitude of remaining contamination, adequacy of controls including the adequacy and suitability of ECs/ICs that may be used to manage contaminant residuals that remain at the Site and assessment of containment systems and ICs that are designed to eliminate exposures to contaminants, and long-term reliability of Engineering Controls.

Alternative 1 – The Track 1 remedy would achieve long-term effectiveness and permanence related to on-site contamination by permanently removing all impacted soil/fill. Removal of on-

Site contaminant sources will also prevent continued and future groundwater contamination. Installation of a waterproofing/ vapor barrier membrane would prevent potential future migration of soil vapors into the new building.

Alternative 2 – The Track 4 remedy would provide long-term effectiveness by removing the majority of on-Site contamination and attaining Track 4 Site-specific SCOs; by establishing Engineering Controls including a composite cover system, and establishing Institutional Controls, including use restrictions, a SMP, and continuation of the restrictive declaration to memorialize these controls for the long term. The SMP will ensure long-term effectiveness of all ECs and ICs by requiring periodic inspection and certification that these controls and use restrictions continue to be in place and are functioning as they were intended assuring that protections designed into the remedy would provide continued high level of protection in perpetuity.

Both alternatives would result in removal of soil contamination exceeding the SCOs providing a high level, effective and permanent remedy over the long-term with respect to a remedy for contaminated soil, which will prevent any migration to groundwater. The potential exists for residual VOC concentrations in groundwater and soil vapor due to an off-site source. Potential exposure by soil vapor VOC intrusion would be prevented by the installation of a vapor barrier. Therefore, the long-term effectiveness of this remedy will eliminate risks and satisfy the objectives of this criterion.

Reduction of toxicity, mobility, or volume of contaminated material

This evaluation criterion assesses the remedial alternative's use of remedial technologies that permanently and significantly reduce toxicity, mobility, or volume of contaminants as their principal element. The following is the hierarchy of source removal and control measures that are to be used to remediate a Site, ranked from most preferable to least preferable: removal and/or treatment, containment, elimination of exposure and treatment of source at the point of exposure. It is preferred to use treatment or removal to eliminate contaminants at a Site, reduce the total mass of toxic contaminants, cause irreversible reduction in contaminants mobility, or reduce of total volume of contaminated media.

Alternative 1 – The Track 1 remedy provides the maximum reduction of toxicity, mobility, and volume of contaminated material through the removal of historic fill and soil exceeding Track 1 SCOs.

Alternative 2 – would remove most of the impacted soil present on the Site and remaining soil beneath the composite cover would meet Track 4 Site-specific SCOs. Alternative 1 would eliminate a greater total mass of contaminants on Site.

Implementability

This evaluation criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation, including technical feasibility of construction and operation, reliability of the selected technology, ease of undertaking remedial action, monitoring considerations, administrative feasibility (e.g. obtaining permits for remedial activities), and availability of services and materials.

Both alternatives will utilize standard methods that are commonly available and routinely applied by the industry. Alternatives 1 and 2 use standard materials and services that are well established technology. The reliability of the remedies is also high. There are no special difficulties associated with any of the activities proposed.

Cost effectiveness

This evaluation criterion addresses the cost of alternatives, including capital costs (such as construction costs, equipment costs, and disposal costs, engineering expenses) and site management costs (costs incurred after remedial construction is complete) necessary to ensure the continued effectiveness of a remedial action.

Alternative 1 –Excavation and off-site disposal of historic fill and soil is necessary to accommodate the proposed development. As the Site will be remediated to an unrestricted-use level, there are no operations, maintenance, or monitoring costs associated with the proposed remedy.

Alternative 2 – The cost of the Track 4 is similar to the cost of the Track 1 remedy. The short-term costs of Alternative 1 are potentially higher based on greater excavation quantities of

historic fill material. Long-term costs associated with Alternative 2 are likely higher than Alternative 1 based on the implementation of an SMP and placement of a deed restriction.

Community Acceptance

This evaluation criterion addresses community opinion and support for the remedial action. Observations here will be supplemented by public comment received on the RAWP.

Based on the overall goals of the remedial program, no adverse community opinion is anticipated for either alternative. However, this RAWP will be subject to and undergo public review under the NYC VCP and will provide the opportunity for public input on the selected remedial actions. Any public comments related to environmental remediation will be considered by New York City Office of Environmental Remediation (NYCOER) prior to approval of this plan.

Land use

This evaluation criterion addresses the proposed use of the property. This evaluation has considered reasonably anticipated future uses of the Site and takes into account: current use and historical and/or recent development patterns; applicable zoning laws and maps; NYS Department of State's Brownfield Opportunity Areas (BOA) pursuant to section 970-r of the general municipal law; applicable land use plans; proximity to real property currently used for residential use, and to commercial, industrial, agricultural, and/or recreational areas; environmental justice impacts, Federal or State land use designations; population growth patterns and projections; accessibility to existing infrastructure; proximity of the site to important cultural resources and natural resources, potential vulnerability of groundwater to contamination that might emanate from the site, proximity to flood plains, geography and geology; and current Institutional Controls applicable to the site.

The current, intended, and reasonably anticipated future land use of the Site and its surroundings are compatible with the selected remedy of soil remediation. The proposed future use of the Site includes an eight-story residential building. The reasonably anticipated future use of the Site and its surroundings will be documented by the applicant in the NYC VCP application, which will include the following conclusions:

The proposed redevelopment of the Site is compatible with its current zoning and is consistent

with recent development patterns. The areas surrounding the site are urban and consist of predominantly, mixed residential and commercial buildings in zoning districts designated for commercial and residential uses. The development would replace an underutilized site with a modern residential building. The proposed development would create new employment opportunities, living space, and economic and fiscal benefits to the City and State in the form of economic revitalization and tax revenue.

The proposed use will not cause or increase a disproportionate burden on the community in which the Site is located. In addition, temporary short-term project impacts are being mitigated through site management controls and truck traffic controls during remediation activities. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs or Track 4 SCOs, which are appropriate for its planned residential use.

The Site is not in close proximity to important cultural resources, including federal or state historic or heritage sites or Native American religious sites, natural resources, waterways, wildlife refuges, wetlands, or critical habitats of endangered or threatened species. The Site is located in an urban area with limited proximity to fish or wildlife. Both alternatives would prevent any potential exposure pathways of contaminant migration affecting fish or wildlife. Municipal water supply wells are not present in Brooklyn; therefore, groundwater from the Site cannot affect municipal water supply wells or recharge areas. The Site does not lie in a Federal Emergency Management Agency (FEMA)-designated flood plain. Both alternatives are equally protective of natural resources and cultural resources.

Sustainability of the Remedial Action

This criterion evaluates the overall sustainability of the remedial action alternatives and the degree to which sustainable means are employed to implement the remedial action including those that take into consideration NYC's sustainability goals defined in *PlaNYC: A Greener, Greater New York*. Sustainability goals may include: maximizing the recycling and reuse of non-virgin materials; reducing the consumption of virgin and non-renewable resources; minimizing energy consumption and greenhouse gas emissions; improving energy efficiency; and promotion of the use of native vegetation and enhancing biodiversity during landscaping associated with Site development.

Both alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The overall sustainability of both alternatives is low. Most of the excavated material would likely be landfilled (no recycling and reuse of non-virgin materials). It is possible that some of the deeper soil may be reused using the City's Clean Soil Bank.

4.0 REMEDIAL ACTION

4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

The preferred remedial action alternative is Alternative 1, the Track 1 Alternative. The preferred remedial action alternative achieves protection of public health and the environment for the intended use of the property. The preferred remedial action alternative will achieve all of the remedial action objectives established for the project and addresses applicable SCGs. The preferred remedial action alternative is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants. The preferred remedial action alternative is cost effective and implementable and uses standards methods that are well established in the industry.

The proposed remedial action will consist of:

1. Preparation of a Community Protection Statement and performance of all required NYC VCP Citizen Participation activities according to an approved Citizen Participation Plan.
2. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
3. Establish Unrestricted Use (Track 1) Soil Cleanup Objectives (SCOs).
4. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
5. Excavation and removal of soil/fill exceeding Track 1 SCOs. The excavation depth of the new building will be approximately 10-feet below grade for the below grade parking area and approximately 18-feet below grade for the remainder of the Site. An elevator pit at the western side of the Site will require excavation to a depth of approximately 15 feet below grade, and a trench in the parking area will require excavation to approximately 26 feet below grade. Approximately 9,130 tons of soil will be excavated and removed from this site.
6. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID. Appropriate segregation of

excavated media on-Site.

7. Removal of underground storage tanks (if encountered) and closure of petroleum spills (if evidence of a spill/leak is encountered during Site excavation) in compliance with applicable local, State and Federal laws and regulations.
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on-Site.
9. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
10. Import of materials to be used for backfill and cover (if necessary) in compliance with this plan and in accordance with applicable laws and regulations.
11. As part of new development, installation of a vapor barrier system beneath the building slab and outside foundation sidewalls below grade.
12. As part of new development, construction and maintenance of an engineered composite cover consisting of a 12” thick concrete building slab in the cellar parking area, 6” thick concrete building slab in the remainder of the cellar, and an 8” thick at-grade concrete building slab in the setback area at the north side of the Site to prevent human exposure to residual soil/fill remaining under the Site. The proposed redevelopment of the Property calls for a ground-floor build-out that covers the entire Property.
13. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
14. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
15. If Track 1 cleanup is not achieved, submission of an approved Site Management Plan (SMP) in the Remedial Action Report (RAR) for long-term management of residual contamination, including plans for operation, maintenance, monitoring, inspection and

certification of Engineering and Institutional Controls and reporting at a specified frequency.

16. Submission of a RAR that describes the remedial activities, certifies that the remedial requirements have been achieved, defines the Site boundaries, lists any changes from this RAWP, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAWP.
17. If Track 1 cleanup is not achieved, the property will continue to be registered with an E-Designation at the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls; a requirement that management of these controls must be in compliance with an approved SMP. Institutional Controls will include prohibition of the following: (1) vegetable gardening and farming; (2) use of groundwater without treatment rendering it safe for the intended use; (3) disturbance of residual contaminated material unless it is conducted in accordance with the SMP; and (4) higher level of land usage without OER-approval.
18. CA RICH, in conjunction with Nicholas A. Andrianas, P.E., will be responsible to assure direct oversight of the community air monitoring, site inspections, invasive activity, soil screening, imported soil screening, truck inspections, housekeeping, notifications, odor and dust control, and daily reporting under this remedial action work plan and will certify in the Remedial Action Report the conformance of remedial action oversight activities with the requirements of this work plan. CA Rich, in conjunction with Nicholas A. Andrianas, P.E., will assure appropriate training of field oversight personnel. Individuals assigned to perform these activities will be identified prior to the commencement of field activities, and any changes to these personnel during field activities will be noted in the daily reports.

4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

6 NYCRR Part 375, Table 6.8(a) Unrestricted Use SCOs are proposed for this project. If Track 1 Unrestricted Use is not achieved, the 6 NYCRR Part 375, Table 6.8(b) Track 2 (Restricted Residential) SCOs will be used as amended by the following Site-Specific Track 4 SCOs:

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	150 ppm
Lead	650 ppm
Mercury	2.5 ppm

Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix 3. The entire Site is planned to undergo excavation activities. The Site redevelopment plan is shown in Figure 3 and Appendix 5.

Discrete contaminant sources (such as hotspots) identified during the remedial action will be identified by GPS or surveyed. This information will be provided in the Remedial Action Report.

Estimated Soil/Fill Removal Quantities

The total quantity of soil/fill expected to be excavated from the below grade parking area is approximately 3,230 tons and 5,900 tons from the remainder of the Site. With the exception of a 16 foot subgrade setback at the northern portion of the Site, the entire site will be excavated for a cellar. A below grade parking area within the cellar is expected to be excavated to approximately 23-feet below grade and the remainder of the basement will require excavation to approximately 10-feet below grade. The total amount of soils to be excavated and disposed off-site is approximately 9,130 tons. However, an unknown amount of soil from the below grade parking area may be reused on-site; therefore, the actual amount of soils to be excavated and disposed off-site may be less than 9,130 tons.

The proposed disposal locations for Site-derived impacted materials are listed below. However, disposal facility approvals have not been granted yet. The disposal locations, which will be established at a later date, will be reported promptly to the OER Project Manager and prior to the start of remedial action.

<u>Disposal Facility</u>	<u>Waste Type</u>	<u>Estimated Quantities</u>
Clean Earth of Carteret, Carteret, New Jersey	Historic fill	To be determined

Clean Soil Bank	Native soils below the historic fill	To be determined
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End-Point Sampling

Removal actions for development purposes under this plan will be performed in conjunction with confirmation soil sampling. Four confirmation samples will be collected from the base of the excavation at locations to be determined by OER. Figure 4 shows the proposed endpoint sample locations. For comparison to Track 1 SCOs, analytes will include VOCs, SVOC, pesticides, PCBs and metals according to analytical methods described below. For comparison to Track 4 SCOs, analytes will only include trigger compounds and elements established on the Track 4 SCO list.

Hot-spot removal actions, whether established under this RAWP or identified during the remedial program, will be performed in conjunction with post remedial end-point samples to ensure that hot-spots are fully removed. Analytes for end-point sampling will be those parameters that are driving the hot-spot removal action and will be approved by OER. Frequency for hot-spot end-point sample collection is as follows:

1. For excavations less than 20 feet in total perimeter, at least one bottom sample and one sidewall sample biased in the direction of surface runoff.
2. For excavations 20 to 300 feet in perimeter:
 - For surface removals, one sample from the top of each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
 - For subsurface removals, one sample from each sidewall for every 30 linear feet of sidewall and one sample from the excavation bottom for every 900 square feet of bottom area.
3. For sampling of volatile organics, bottom samples should be taken within 24 hours of excavation, and should be taken from the zero to six-inch interval at the excavation floor. Samples taken after 24 hours should be taken at six to twelve inches.

4. For contaminated soil removal, post remediation soil samples for laboratory analysis should be taken immediately after contaminated soil removal. If the excavation is enlarged horizontally, additional soil samples will be taken pursuant to bullets 1-3 above.

Post-remediation end-point sample locations and depth will be biased towards the areas and depths of highest contamination identified during previous sampling episodes unless field indicators such as field instrument measurements or visual contamination identified during the remedial action indicate that other locations and depths may be more heavily contaminated. In all cases, post-remediation samples should be biased toward locations and depths of the highest expected contamination.

New York State ELAP certified labs will be used for all confirmation and end-point sample analyses. Labs performing confirmation and end-point sample analyses will be reported in the RAR. The RAR will provide a tabular and map summary of all confirmation and end-point sample results and will include all data including non-detects and applicable standards and/or guidance values. End-point samples will be Confirmation samples will be analyzed for compounds and elements as described above utilizing the following methodology:

Soil analytical methods will include:

- Volatile organic compounds by EPA Method 8260;
- Semi-volatile organic compounds by EPA Method 8270;
- Target Analyte List metals; and
- Pesticides/PCBs by EPA Method 8081/8082.

If either LNAPL and/or DNAPL are detected, appropriate samples will be collected for characterization and “finger print analysis” and required regulatory reporting (i.e. spills hotline) will be performed.

Quality Assurance/Quality Control

The fundamental QA objective with respect to accuracy, precision, and sensitivity of analysis for laboratory analytical data is to achieve the QC acceptance of the analytical protocol. The accuracy, precision and completeness requirements will be addressed by the laboratory for all

data generated.

Collected samples will be appropriately packaged, placed in coolers, and shipped via overnight courier or delivered directly to the analytical laboratory by field personnel. Samples will be containerized in appropriate laboratory provided glassware and shipped in plastic coolers. Samples will be preserved through the use of ice or “cold-paks” to maintain a temperature of 4°C.

Dedicated disposable sampling materials will be used for the collection of endpoint samples, eliminating the need to prepare field equipment (rinsate) blanks. However, if non-disposable equipment is used, (stainless steel scoop, etc.) field rinsate blanks will be prepared at the rate of one (1) for every eight (8) samples collected.

Decontamination of non-dedicated sampling equipment will consist of the following:

- Gently tap or scrape to remove adhered soil
- Rinse with tap water
- Wash with Alconox® detergent solution and scrub
- Rinse with tap water
- Rinse with distilled or deionized water

Field blanks will be prepared by pouring distilled or deionized water over decontaminated equipment and collecting the water in laboratory provided containers. Trip blanks will be used whenever samples are transported to the laboratory for analysis of VOCs. Trip blanks will not be used for samples to be analyzed for metals, SVOCs, or pesticides. One blind duplicate sample will be prepared and submitted for analysis every 20 samples.

One duplicate and one matrix spike/matrix spike duplicate will be collected for every 20 samples.

Import and Reuse of Soils

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix 3. Soils are not expected to be imported into the Site for backfill. The estimated quantity of onsite soil/fill expected to be reused/relocated on Site is unknown at this time.

4.3 ENGINEERING CONTROLS

The excavation required for the proposed Site development will achieve Track 1 Unrestricted Use SCOs. No Engineering Controls are required to address residual contamination at the Site. However, the following elements will be incorporated into the foundation design as part of the development: composite cover system and soil vapor barrier. If Track 1 is not achieved, these two elements will constitute Engineering Controls that will be employed in the remedial action to address residual contamination remaining at the Site.

Composite Cover System

If Track 1 SCO's are not achieved at the Site, the composite cover system will be a permanent engineering control. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the RAR.

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of:

- Concrete building slab that will be approximately 12-inches thick below the cellar parking area, six-inches thick for the remainder of the cellar, and eight-inches thick in the at-grade setback area at the north side of the Site.

Figure 6 and drawing FO-100 in Appendix 5 show the location of each cover type built at the Site.

The composite cover system is a permanent engineering control for the Site. The system will be inspected and reported at specified intervals as required by this RAWP and the SMP. A Soil Management Plan will be included in the Site Management Plan and will outline the procedures to be followed in the event that the composite cover system and underlying residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite cover system will be described in the Site Management Plan in the RAR.

Vapor Barrier

- As part of development, mitigation of potential soil vapor from offsite in the future will be achieved with a combination of building slab and vapor barrier. The vapor barrier will consist of Stego® 20-mil. vapor barrier, or equivalent. The vapor barrier will be installed prior to pouring the building's concrete slab. The vapor barrier will extend below the slab throughout the area occupied by the footprint of the new building (both in the cellar and at grade) and up the foundation sidewalls in accordance with manufacturer specifications. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner. The specifications state that all vapor barrier seams, penetrations, and repairs will be sealed either by the tape method or weld method, according to the manufacturer's recommendations and instructions.
- The project's Professional Engineer licensed by the State of New York will have primary direct responsibility for overseeing the implementation of the vapor barrier. The extent of the proposed vapor barrier membrane is provided in Drawing A-100.0 in Appendix 5. Installation details (penetrations, joints, etc.) with respect to the proposed building foundation, footings, slab, and sidewalls are provided in Appendix 5 in Drawing A-722 and in Appendix 6. Product specification sheets are provided in Attachment 6. The Remedial Action Report will include photographs (maximum of two photos per page) of the installation process, PE/RA certified letter (on company letterhead) from primary contractor responsible for installation oversight and field inspections, and a copy of the manufacturer's certificate of warranty.

4.4 Institutional Controls

Institutional Controls are not required on sites that achieve Track 1 Remedial Action. If Track 1 SCOs are not achieved, Institutional Controls (IC) will be utilized in this remedial action to manage residual soil/fill and other media and render the Site protective of public health and the environment. Institutional Controls are listed below. Long-term employment of EC/ICs will be implemented under a site-specific Site Management Plan (SMP) that will be included in the RAR. The property will continue to be registered with an E-Designation at the NYC Buildings

Department.

Institutional Controls for this remedial action are:

- Continued registration of the E-Designation for the property. This RAWP includes a description of all EC's and IC's and summarizes the requirements of the Site Management Plan which will note that the property owner and property owner's successors and assigns must comply with the approved SMP;
- Site Management Plan approved by OER that provides procedures for appropriate operation, maintenance, inspection and certification of EC's and IC's. SMP will require that the property owner and property owner's successors and assigns will submit to OER a periodic written statement that certifies that: (1) controls employed at the Site are unchanged from the previous certification or that any changes to the controls were approved by OER; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. OER retains the right to enter the Site in order to evaluate the continued maintenance of any controls. This certification shall be submitted at a frequency to be determine by OER in the SMP and will comply with RCNY §43-1407(1)(3).
- Vegetable gardens and farming on the Site are prohibited;
- Use of groundwater underlying the Site is prohibited without treatment rendering it safe for its intended use;
- All future activities on the Site that will disturb residual material must be conducted pursuant to the soil management provisions in an approved SMP; and
- The Site will be used for residential use and will not be used for a higher level of use without prior approval by OER.

4.5 SITE MANAGEMENT PLAN

Site Management is not required for Track 1 remedial actions. However, if Track 1 SCOs are not achieved, Site Management will be the last phase of remediation and begins with the approval of the Remedial Action Report and issuance of the Notice of Completion (NOC) for the Remedial Action. The Site Management Plan (SMP) describes appropriate methods and procedures to ensure implementation of all ECs and ICs that are required by this RAWP. The Site Management Plan is submitted as part of the RAR but will be written in a manner that

allows its use as an independent document. Site Management continues until terminated in writing by OER. The property owner is responsible to ensure that all Site Management responsibilities defined in the Site Management Plan are implemented.

The SMP will provide a detailed description of the procedures required to manage residual soil/fill left in place following completion of the remedial action in accordance with the Brownfield Cleanup Agreement with OER. This includes a plan for: (1) implementation of EC's and ICs; (2) implementation of monitoring programs; (3) operation and maintenance of EC's; (4) inspection and certification of EC's; and (5) reporting.

Site management activities, reporting, and EC/IC certification will be scheduled by OER on a periodic basis to be established in the SMP and will be subject to review and modification by OER. The Site Management Plan will be based on a calendar year and certification reports will be due for submission to OER by July 31 of the year following the reporting period.

4.6 QUALITATIVE HUMAN HEALTH EXPOSURE ASSESSMENT

The objective of the qualitative exposure assessment is to identify potential receptors and pathways for human exposure to the contaminants of concern (COC) that are present at, or migrating from, the Site. The identification of exposure pathways describes the route that the COC takes to travel from the source to the receptor. An identified pathway indicates that the potential for exposure exists; it does not imply that exposures actually occur.

Investigations reported in the Remedial Investigation Report (RIR) are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). As part of the VCP process, a QHHEA was performed to determine whether the Site poses an existing or future health hazard to the Site's exposed or potentially exposed population. The sampling data from the RI were evaluated to determine whether there is any health risk by characterizing the exposure setting, identifying exposure pathways, and evaluating contaminant fate and transport. This QHHEA was prepared in accordance with Appendix 3B and Section 3.3 (b) 8 of the NYSDEC Draft DER-10 Technical Guidance for Site Investigation and Remediation.

Known and Potential Sources

Based upon the Remedial Investigation, the following contaminants of concern (COC) for

the Site are summarized below:

Soil COC

- SVOCs including Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, chrysene, Dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene exceeded Restricted Residential Use SCOs.
- Two pesticides 4,4, DDE and 4,4,DDT were identified but did not exceed Restricted Residential Use SCOs.
- Metals including lead and mercury were detected above Unrestricted Use SCOs but were all below Restricted Residential Use SCOs.

Soil Vapor

- Chlorinated VOCs were well below NYS DOH monitoring thresholds; and
- Petroleum VOCs detected at low concentrations including benzene, toluene, ethylbenzene and xylenes.

Nature, Extent, Fate and Transport of Contaminants

SVOCs and metals are present in the historic fill materials throughout the Site and is attributed to historic fill material beneath the Site. Based upon the boring logs and laboratory results from soil samples collected during the Remedial Investigation it appears that contaminants are from historic fill material. The migration of the contamination is not expected. The chlorinated VOCs in soil vapor were not detected or were well below guidance issued by New York State DOH and were not found in any of the on-Site soil samples collected. Groundwater is 60 plus feet deep and was not sampled.

Potential Routes of Exposure

The five elements of an exposure pathway are: (1) a contaminant source; (2) contaminant release and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and, (5) a receptor population. An exposure pathway is considered complete when all five elements of an exposure pathway are documented. A potential exposure pathway exists when any one or more

of the five elements comprising an exposure pathway cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future. Three potential primary routes exist by which chemicals can enter the body:

- Ingestion of water, fill, or soil;
- Inhalation of vapors and particulates; and,
- Dermal contact with water, fill, soil, or building materials.

Potential Points of Exposure

Current Conditions

The Site is currently a paved parking lot. The potential for exposure to surficial historic fill is prevented under current conditions. Groundwater is not exposed at the Site, and because the Site is served by the public water supply and groundwater use for potable supply is prohibited, groundwater is not used at the Site and there is no potential for exposure. There are no structures on Site where soil vapor could accumulate.

Construction/ Remediation Activities

Once redevelopment activities begin, construction workers will come into direct contact with surface and subsurface soils, as a result of on-Site construction and excavation activities. On-Site construction workers potentially could ingest, inhale or have dermal contact with any exposed impacted soil, and fill. Similarly, off-Site receptors could be exposed to dust and vapors from on-Site activities. During construction, on-Site and off-Site exposures to contaminated dust from on-Site will be addressed through the Soil/Materials Management Plan, dust controls, and through the implementation of the Community Air-Monitoring Program and a Construction Health and Safety Plan.

Proposed Future Conditions:

Under future remediated conditions, all soils in excess of Track 1 SCOs will be removed and soils will be excavated to a depth of at least 10-feet below grade. The Site will be fully capped, limiting potential direct exposure to soil and groundwater remaining in place, and a vapor barrier system will prevent any exposure to potential off site soil vapors in the future. The Site is served

by a public water supply, and groundwater is not used at the Site for potable supply. There are no plausible off-Site pathways for ingestion, inhalation, or dermal exposure to contaminants derived from the Site under future conditions.

Receptor Populations

On-Site Receptors

The Site is currently vacant and not used for any purposes. There are currently no on-site receptors as the Property is capped with an asphalt parking lot and contact with contaminated soils is unlikely. Vapor issues are not expected as there are no structures that would allow for the build-up of vapors. During redevelopment of the Site, the on-Site potential receptors will include construction workers, site representatives, and visitors. The plans for the redevelopment of the Site include the removal of soils and meeting Part 375 Track 1 Unrestricted Residential Use SCOs and the installation of a vapor barrier. Once the Site is redeveloped, the on-Site potential sensitive receptors will include adult and child building residents, workers and visitors.

Off-Site Receptors

Potential off-Site receptors within a 0.25-mile radius of the Site include adult and child residents, commercial and construction workers, pedestrians, trespassers, and cyclists, based on the following:

1. Commercial Businesses (up to 0.25 mile) – existing and future
2. Residential Buildings (up to 0.25 mile) – existing and future
3. Parks (up to 0.25 mile) – existing and future
4. Pedestrians, Trespassers, Cyclists (up to .25 mile) – existing and future
5. Schools (up to .25 mile) – existing and future
6. Child Health Center (up to 0.25 mile) – future

Overall Human Health Exposure Assessment

There is a potential complete exposure pathway that requires mitigation during implementation of the remedy. There is no complete exposure pathway under future conditions after the site is developed. This assessment takes into consideration the reasonably anticipated use of the site, which includes a residential structure and a subsurface vapor barrier system for

the building. Potential post-construction use of groundwater is not considered an option because groundwater in this area of New York City is not used as a potable water source. There are no surface waters in close proximity to the Site that could be impacted or threatened.

During the remedial action, on-Site exposure pathways will be eliminated by preventing access to the Site; through implementation of soil/materials management, stormwater pollution prevention, and dust controls; employment of a community air monitoring plan; and, implementation of a CHASP. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill, as all soil above Site-Specific SCOs will have been removed, the composite cover system will prevent contact with residual soil (if any), and a vapor barrier system will have been installed.

5.0 REMEDIAL ACTION MANAGEMENT

5.1 PROJECT ORGANIZATION AND OVERSIGHT

Principal personnel who will participate in the remedial action include Site Safety Coordinator, Jason Cooper and Project Manager Eric Weinstock. The Professional Engineer (PE) for this project is Nicholas A. Andrianas and the Qualified Environmental Professionals (QEP) for this project are Eric Weinstock and Jason Cooper.

5.2 SITE SECURITY

Site access will be controlled by a locked gate and the perimeter of the Property will be entirely fenced-in.

5.3 WORK HOURS

The hours for operation of remedial construction will be from in accordance with the New York City Department of Building construction code requirements.

5.4 CONSTRUCTION HEALTH AND SAFETY PLAN

The Health and Safety Plan is included in Appendix 4. The Site Safety Coordinator will be Jason Cooper. Remedial work performed under this RAWP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. The HASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice of Completion.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the HASP and be

required to sign an HASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the HASP. That document will define the specific project contacts for use in case of emergency.

5.5 COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. Periodic monitoring during sample collection, for instance, will consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence. Exceedances of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate

monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment will be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques will be employed. Work will continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \text{ mcg}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ above the upwind level, work will be stopped and a re-evaluation of activities initiated. Work will resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.

All readings will be recorded and be available for OER personnel to review.

5.6 AGENCY APPROVALS

All permits or government approvals required for remedial construction have been or will be obtained prior to the start of remedial construction. Approval of this RAWP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

5.7 SITE PREPARATION

Pre-Construction Meeting

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

Mobilization

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

Utility Marker Layouts, Easement Layouts

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Markout Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAWP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAWP.

Equipment and Material Staging

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

Stabilized Construction Entrance

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris

off-Site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

Truck Inspection Station

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the NYC VCP Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary.

Extreme Storm Preparedness and Response Contingency Plan

Damage from flooding or storm surge can include dislocation of soil and stockpiled materials, dislocation of site structures and construction materials and equipment, and dislocation of support of excavation structures. Damage from wind during an extreme storm event can create unsafe or unstable structures, damage safety structures and cause downed power lines creating dangerous site conditions and loss of power. In the event of emergency conditions caused by an extreme storm event, the enrollee will undertake the following steps for site preparedness prior to the event and response after the event.

Storm Preparedness

Preparations in advance of an extreme storm event will include the following: containerized hazardous materials and fuels will be removed from the property; loose materials will be secured to prevent dislocation and blowing by wind or water; heavy equipment such as excavators and generators will be removed from holes, trenches and depressions on the property to high ground or removed from the property; an inventory of the property with photographs will be performed to establish conditions for the site and equipment prior to the event; stockpile covers for soil and fill will be secured by adding weights such as sandbags for added security and worn or ripped stockpile covers will be replaced with competent covers; stockpiled hazardous wastes will be removed from the property; stormwater management systems will be inspected and fortified,

including, as necessary: clean and reposition silt fences, haybales; clean storm sewer filters and traps; and secure and protect pumps and hosing.

Storm Response

At the conclusion of an extreme storm event, as soon as it is safe to access the property, a complete inspection of the property will be performed. A site inspection report will be submitted to OER at the completion of site inspection and after the site security is assessed. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. Damage from storm conditions that result in acute public safety threats, such as downed power lines or imminent collapse of buildings, structures or equipment will be reported to public safety authorities via appropriate means such as calling 911. Petroleum spills will be reported to NYS DEC within 2 hours of identification and consistent with State regulations. Emergency and spill conditions will also be reported to OER. Public safety structures, such as construction security fences will be repaired promptly to eliminate public safety threats. Debris will be collected and removed. Dewatering will be performed in compliance with existing laws and regulations and consistent with emergency notifications, if any, from proper authorities. Eroded areas of soil including unsafe slopes will be stabilized and fortified. Dislocated materials will be collected and appropriately managed. Support of excavation structure will be inspected and fortified as necessary. Impacted stockpiles will be contained and damaged stockpile covers will be replaced. Storm-water control systems and structures will be inspected and maintained as necessary. If soil or fill materials are discharged off site to adjacent properties, property owners and OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to OER and implemented following approval by OER and granting of site access by the property owner. Impacted offsite areas may require characterization based on site conditions, at the discretion of OER. If onsite petroleum spills are identified, a qualified environmental professional will determine the nature and extent of the spill and report to NYS DEC's spill hotline at DEC 800-457-7362. If the source of the spill is ongoing and can be identified, it should be stopped if this can be done safely. Potential hazards will be addressed immediately, consistent with guidance issued by NYS DEC.

Storm Response Reporting

A site inspection report will be submitted to OER at the completion of site inspection. An inspection report established by OER is available on OER's website (www.nyc.gov/oer) and will be used for this purpose. Site conditions will be compared to the inventory of site conditions and material performed prior to the storm event and significant differences will be noted. The site inspection report will be sent to the OER project manager and will include the site name, address, tax block and lot, site primary and alternate contact name and phone number. Damage and soil release assessment will include: whether the project had stockpiles; whether stockpiles were damaged; photographs of damage and notice of plan for repair; report of whether soil from the site was dislocated and whether any of the soil left the site; estimates of the volume of soil that left the site, nature of impact, and photographs; description of erosion damage; description of equipment damage; description of damage to the remedial program or the construction program, such as damage to the support of excavation; presence of onsite or offsite exposure pathways caused by the storm; presence of petroleum or other spills and status of spill reporting to NYS DEC; description of corrective actions; schedule for corrective actions. This report should be completed and submitted to OER project manager with photographs within 24 hours of the time of safe entry to the property after the storm event.

5.8 TRAFFIC CONTROL

Drivers of trucks leaving the NYC VCP Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is shown on Figure 7.

5.9 DEMOBILIZATION

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;

- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (*e.g.*, soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

5.10 REPORTING AND RECORD KEEPING

Daily Reports

Daily reports providing a general summary of activities for each day of *active remedial work* will be emailed to the OER Project Manager by the end of the following day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAWP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAWP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

An alpha-numeric site map will be used to identify locations described in reports submitted to OER and is shown in Figure 8.

Record Keeping and Photo-Documentation

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RAR in digital format (i.e. jpeg files).

5.11 COMPLAINT MANAGEMENT

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

5.12 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

All changes to the RAWP will be reported to the OER Project Manager and will be documented in daily reports and reported in the Remedial Action Report. The process to be followed if there are any deviations from the RAWP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAWP;
- Effect of the deviations on overall remedy; and
- Determination that the remedial action with the deviation(s) is protective of public health and the environment.

6.0 REMEDIAL ACTION REPORT

A Remedial Action Report (RAR) will be submitted to OER following implementation of the remedial action defined in this RAWP. The RAR will document that the remedial work required under this RAWP has been completed and has been performed in compliance with this plan. The RAR will include:

- Information required by this RAWP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan (if Track 1 is not achieved);
- Description of any changes in the remedial action from the elements provided in this RAWP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action and DUSR;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Continue registration of the property with an E-Designation by the NYC Department of Buildings.
- Reports and supporting material will be submitted in digital form.

Remedial Action Report Certification

The following certification will appear in front of the Executive Summary of the Remedial Action Report. The certification will include the following statements:

I, Nicholas A. Andrianas am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 882 Fulton Street, Brooklyn, New York Site, Site number.

I, Jason T. Cooper am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 882 Fulton Street, Brooklyn, New York Site, Site number .

I, Eric Weinstock am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 882 Fulton Street, Brooklyn, New York Site, Site number.

*I certify that the OER-approved Remedial Action Work Plan dated July 14, 2014 and Stipulations in a letter dated **month day, year; if any** were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.*

7.0 SCHEDULE

The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a ten month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAWP	0	-
Fact Sheet 2 announcing start of remedy	0	-
Mobilization	2	2
Remedial Excavation	26	24
Demobilization	28	2
Submit Remedial Action Report	40	12

APPENDIX 1

CITIZEN PARTICIPATION PLAN

The NYC Office of Environmental Remediation and 500 Waverly Property Owner LLC have established this Citizen Participation Plan because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This Citizen Participation Plan describes how information about the project will be disseminated to the Community during the remedial process. As part of its obligations under the NYC VCP, 500 Waverly Property Owner LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This Plan also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this Citizen Participation Plan, project documents and work plans are made available to the public in a timely manner. Public comment on work plans is strongly encouraged during public comment periods. Work plans are not approved by the NYC Office of Environmental Remediation (OER) until public comment periods have expired and all comments are formally reviewed. An explanation of cleanup plans in the form of a public meeting or informational session is available upon request to OER's project manager assigned to this Site, Eric Weinstock, who can be contacted about these issues or any others questions, comments or concerns that arise during the remedial process at (212) 788-8841

Project Contact List. OER has established a Site Contact List for this project to provide public notices in the form of fact sheets to interested members of the Community. Communications will include updates on important information relating to the progress of the cleanup program at the Site as well as to request public comments on the cleanup plan. The Project Contact List includes owners and occupants of adjacent buildings and homes, principal administrators of nearby schools, hospitals and day care centers, the public water supplier that serves the area, established document repositories, the representative Community Board, City Council members, other elected representatives and any local Brownfield Opportunity Area (BOA) grantee organizations. Any member of the public or organization will be added to the Site Contact List on request. A copy of the Site Contact List is maintained by OER's project manager. If you would like to be added to the Project Contact List, contact NYC OER at (212) 788-8841 or by email at brownfields@cityhall.nyc.gov.

Repositories. A document repository is maintained online. Internet access to view OER's document repositories is available at public libraries. This document repository is intended to house, for community review, all principal documents generated during the cleanup program including Remedial Investigation plans and reports, Remedial Action work plans and reports, and all public notices and fact sheets produced during the lifetime of the remedial project. The library nearest the Site is:

Bushwick Library

340 Bushwick Avenue

Brooklyn, NY 11206

718-602-1348

Monday-Wednesday 10am-6pm

Thursday 1pm-8pm

Friday 10am-6pm

Saturday and Sunday Closed

Digital Documentation. NYC OER strongly encourages the use of digital documents in repositories as a means of minimizing paper use while also increasing convenience in access and ease of use.

Public Notice and Public Comment. Public notice to all members of the Project Contact List is required at three major steps during the performance of the cleanup program (listed below) and at other points that may be required by OER. Notices will include Fact Sheets with descriptive project summaries, updates on recent and upcoming project activities, repository information, and important phone and email contact information. All notices will be prepared by 500 Waverly Property Owner LLC, reviewed and approved by OER prior to distribution and mailed by 500 Waverly Property Owner LLC. Public comment is solicited in public notices for all work plans developed under the NYC Voluntary Cleanup Program. Final review of all work plans by OER will consider all public comments. Approval will not be granted until the public comment period has been completed.

Citizen Participation Milestones. Public notice and public comment activities occur at several steps during a typical NYC VCP project. See flow chart on the following page, which identifies when during the NYC VCP public notices are issued: These steps include:

- **Public Notice of the availability of the Remedial Investigation Report and Remedial Action Work Plan and a 30-day public comment period on the Remedial Action Work Plan.**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the availability of the Remedial Investigation Report and Remedial Action Work Plan and the initiation of a 30-day public comment period on the Remedial Action Work Plan. The Fact Sheet summarizes the findings of the RIR and provides details of the RAWP. The public comment period will be extended an additional 15 days upon public request. A public meeting or informational session will be conducted by OER upon request.

- **Public Notice announcing the approval of the RAWP and the start of remediation**

Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the approval of the RAWP and the start of remediation.

- **Public Notice announcing the completion of remediation, designation of Institutional and Engineering Controls and issuance of the Notice of Completion**

- Public notice in the form of a Fact Sheet is sent to all parties listed on the Site Contact List announcing the completion of remediation, providing a list of all Institutional and Engineering Controls implemented for to the Site and announcing the issuance of the Notice of Completion.

Appendix 2

Sustainability statement

This Sustainability Statement documents sustainable activities and green remediation efforts planned under this remedial action.

Reuse of Clean, Recyclable Materials. Reuse of clean, locally-derived recyclable materials reduces consumption of non-renewable virgin resources and can provide energy savings and greenhouse gas reduction.

An estimate of the quantity (in tons) of clean, non-virgin materials (reported by type of material) reused under this plan will be quantified and reported in the RAR.

Reduce Consumption of Virgin and Non-Renewable Resources. Reduced consumption of virgin and non-renewable resources lowers the overall environmental impact of the project on the region by conserving these resources.

An estimate of the quantity (in tons) of virgin and non-renewable resources, the use of which will be avoided under this plan, will be quantified and reported in the RAR.

Reduced Energy Consumption and Promotion of Greater Energy Efficiency. Reduced energy consumption lowers greenhouse gas emissions, improves local air quality, lessens in-city power generation requirements, can lower traffic congestion, and provides substantial cost savings.

Best efforts will be made to quantify energy efficiencies achieved during the remediation and will be reported in the Remedial Action Report (RAR). Where energy savings cannot be easily quantified, a gross indicator of the amount of energy saved or the means by which energy savings was achieved will be reported.

Conversion to Clean Fuels. Use of clean fuel improves NYC's air quality by reducing harmful emissions.

An estimate of the volume of clean fuels used during remedial activities will be quantified and reported in the RAR.

Recontamination Control. Recontamination after cleanup and redevelopment is completed

undermines the value of work performed, may result in a property that is less protective of public health or the environment, and may necessitate additional cleanup work later or impede future redevelopment. Recontamination can arise from future releases that occur within the property or by influx of contamination from off-Site.

A Stego® 20-mil. vapor barrier is planned for installation below the concrete slab of the building.

An estimate of the area of the Site that utilizes recontamination controls under this plan will be reported in the RAR in square feet.

Storm-water Retention. Storm-water retention improves water quality by lowering the rate of combined storm-water and sewer discharges to NYC's sewage treatment plants during periods of precipitation, and reduces the volume of untreated influent to local surface waters.

An estimate of the enhanced storm-water retention capability of the redevelopment project will be included in the RAR.

Linkage with Green Building. Green buildings provide a multitude of benefits to the city across a broad range of areas, such as reduction of energy consumption, conservation of resources, and reduction in toxic materials use.

The number of Green Buildings that are associated with this brownfield redevelopment property will be reported in the RAR. The total square footage of green building space created as a function of this brownfield redevelopment will be quantified for residential, commercial and industrial/manufacturing uses.

Paperless Brownfield Cleanup Program. 500 Waverly Property Owner LLC is participating in OER's Paperless Brownfield Cleanup Program. Under this program, submission of electronic documents will replace submission of hard copies for the review of project documents, communications and milestone reports.

Low-Energy Project Management Program. 500 Waverly Property Owner LLC is participating in OER's low-energy project management program. Under this program, whenever possible, meetings are held using remote communication technologies, such as videoconferencing and teleconferencing to reduce energy consumption and traffic congestion

associated with personal transportation.

Trees and Plantings. Trees and other plantings provide habitat and add to NYC's environmental quality in a wide variety of ways. Native plant species and native habitat provide optimal support to local fauna, promote local biodiversity, and require less maintenance.

An estimate of the land area that will be vegetated, including the number of trees planted or preserved, will be reported in square feet in the RAR.

APPENDIX 3

SOIL/MATERIALS MANAGEMENT PLAN

1.1 SOIL SCREENING METHODS

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the RAR. Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Completion.

1.2 STOCKPILE METHODS

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

1.3 CHARACTERIZATION OF EXCAVATED MATERIALS

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

1.4 MATERIALS EXCAVATION, LOAD-OUT AND DEPARTURE

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAWP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

1.5 OFF-SITE MATERIALS TRANSPORT

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are shown on Figure 7. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

1.6 MATERIALS DISPOSAL OFF-SITE

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Enrollee to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in Brooklyn, New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Enrollee. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RAR.

The Remedial Action Report will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RAR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization

sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RAR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RAR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

1.7 MATERIALS REUSE ON-SITE

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are the Part 375 Unrestricted Residential Use SCOs. 'Reuse on-Site' means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to the NYC VCP agreement subject to Engineering and Institutional Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAWP are followed. The expected location for placement of reused material is shown is unknown at this time. Since the entire Site with the exception of a 16 foot subgrade setback at the northern side of the Site is expected to be excavated and size of the Site is relatively small, the placement of reused material, if any, will be determined in the field. Locations of material reuse will be reported to OER prior to implementation.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

1.8 DEMARCATION

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the SMP; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover

soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all associated documentation will be presented in the RAR.

This demarcation will constitute the top of the site management horizon. Materials within this horizon require adherence to special conditions during future invasive activities as defined in the Site Management Plan.

1.9 IMPORT OF BACKFILL SOIL FROM OFF-SITE SOURCES

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives shall meet Part 375 Track 1 Unrestricted Soil Use SCOs.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAWP. The RAR will report the source of the fill, evidence

that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

Source Screening and Testing

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RAR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

1.10 FLUIDS MANAGEMENT

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department

of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

1.11 STORM-WATER POLLUTION PREVENTION

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAWP (silt fences and barriers, and hay bale checks) will be installed around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. All necessary repairs shall be made immediately. Accumulated sediments will be removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence toe anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

1.12 CONTINGENCY PLAN

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings

will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for TAL metals, TCL volatiles and semi-volatiles, TCL pesticides and PCBs, as appropriate.

1.13 ODOR, DUST AND NUISANCE CONTROL

Odor Control

All necessary means will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying the Remedial Action Report.

Dust Control

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Action Report.

Other Nuisances

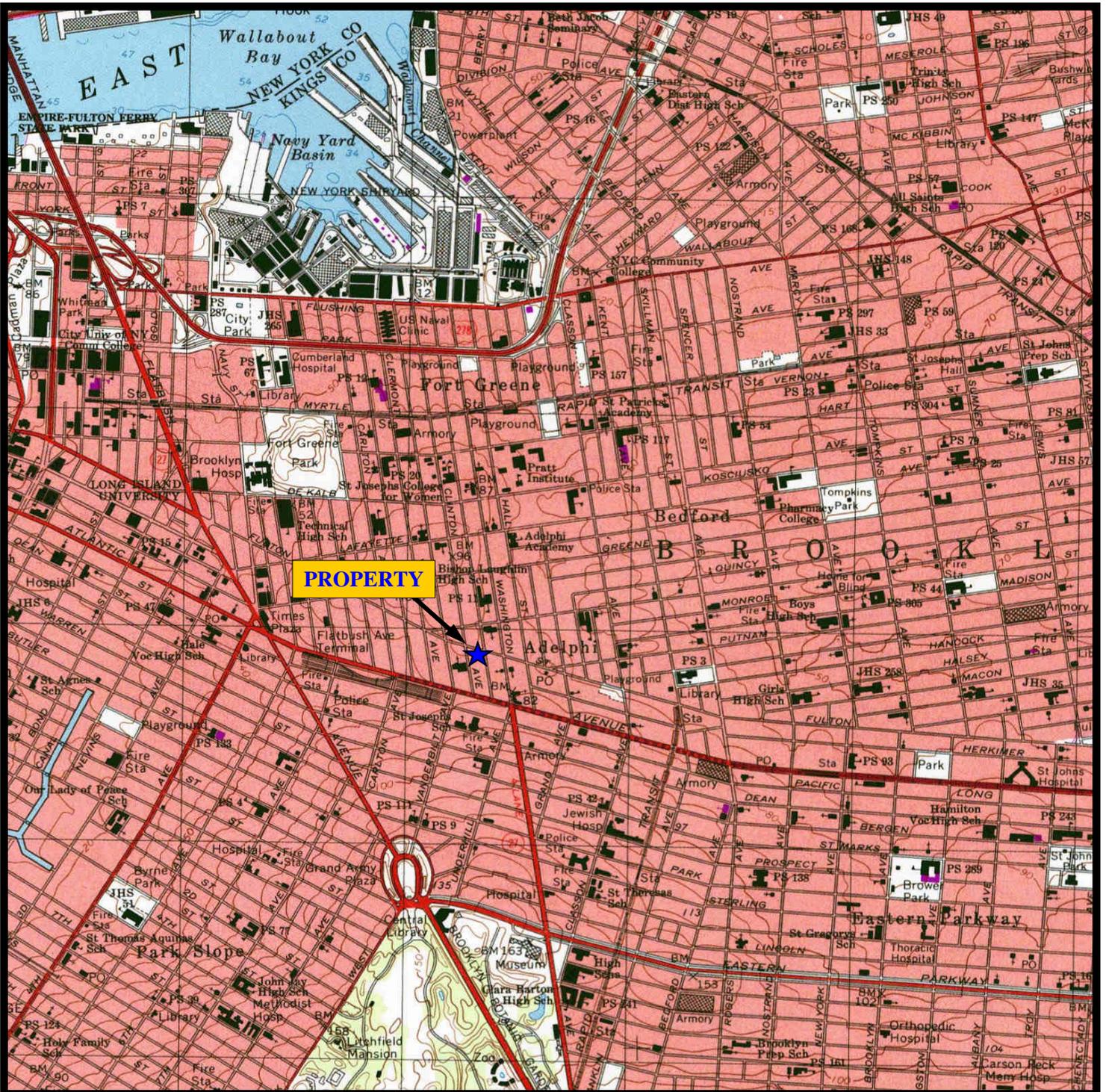
Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

APPENDIX 4

HEALTH AND SAFETY PLAN

FIGURES



PROPERTY



N

Adapted from USGS Brooklyn 1995



CA RICH CONSULTANTS, INC.
 17 Dupont Street,
 Plainview, NY 11803

TITLE:		DATE:
PROPERTY LOCATION MAP		11/24/13
		SCALE:
		1:24,000
FIGURE:	882 Fulton Street Brooklyn, New York	DRAWN BY:
1		JTC
DRAWING:		APPR. BY:
		EAW

THE OFFSETS OR DIMENSIONS SHOWN FROM THE STRUCTURES TO THE PROPERTY LINES ARE FOR A SPECIFIC PURPOSE AND USE AND THEREFORE ARE NOT INTENDED TO GUIDE THE ERECTION OF FENCES, RETAINING WALLS, POOLS, PLANTING AREAS, ADDITIONS TO STRUCTURES AND ANY OTHER CONSTRUCTION.

Job No. RLS131659

THE EXISTENCE OF RIGHT OF WAYS AND/OR EASEMENTS OF RECORD, IF ANY, NOT SHOWN ARE NOT CERTIFIED.

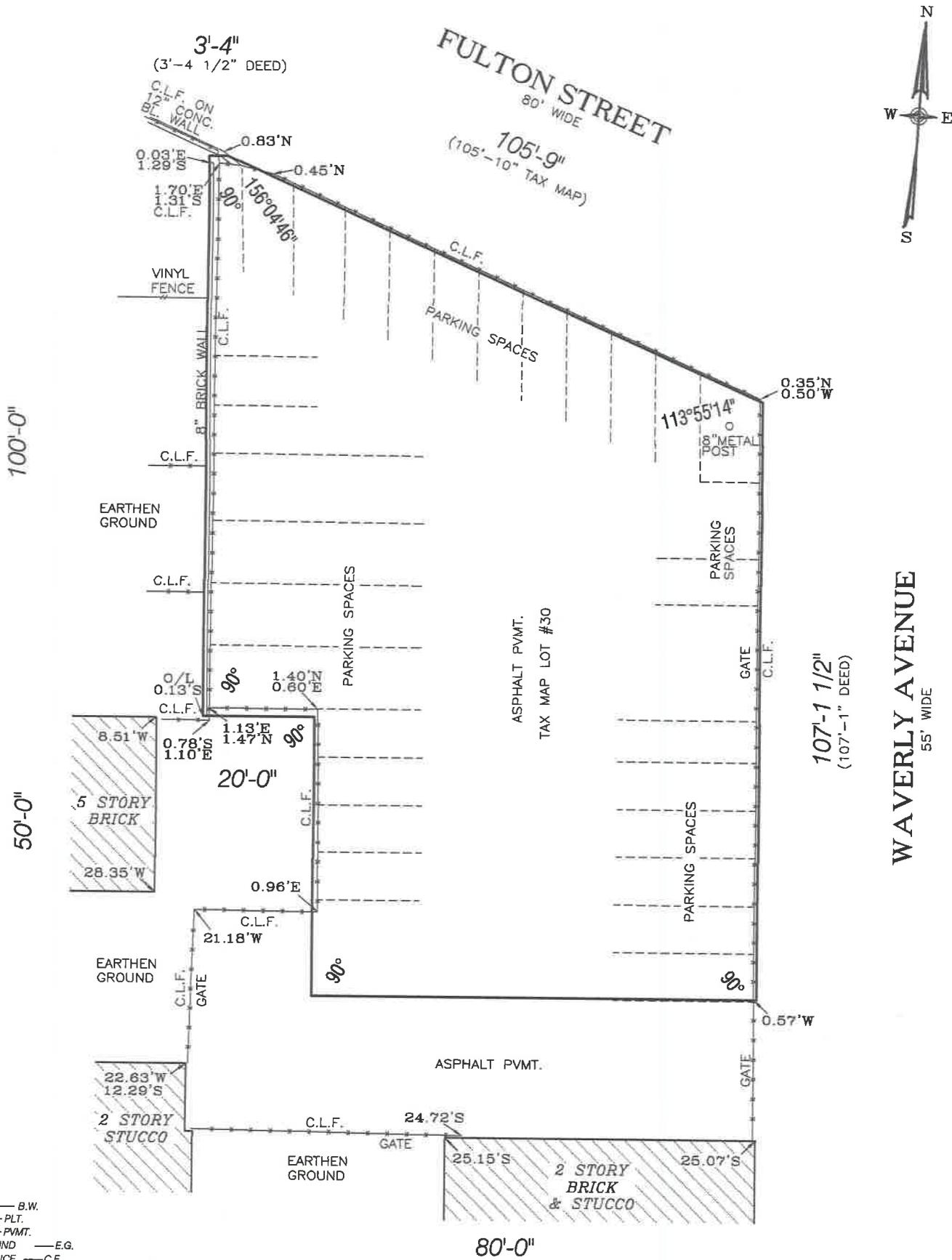


Figure 2

LOT # 30 AREA IS 11927.4 sq.ft.

FOR BUILDING DEPARTMENT USE ONLY

SURVEY OF: *Described Property*
 LOCATED AT:
 882 Fulton Street, Brooklyn
 County of Kings
 City and State of New York
 TAX DESIG: Block 2011 Lot 30
 CERTIFIED TO:

Nathaniel G White

ROGUSKI
 LAND SURVEYING, P.C.
 TITLE • ARCHITECTURAL • BOUNDARY • CONSTRUCTION

87-20 WOODHAVEN BLVD, WOODHAVEN, N.Y. 11421
 Tel. • (718)480-3761 • Cell • (917)561-0579 •
 Fax. • (718) 480-3762 •

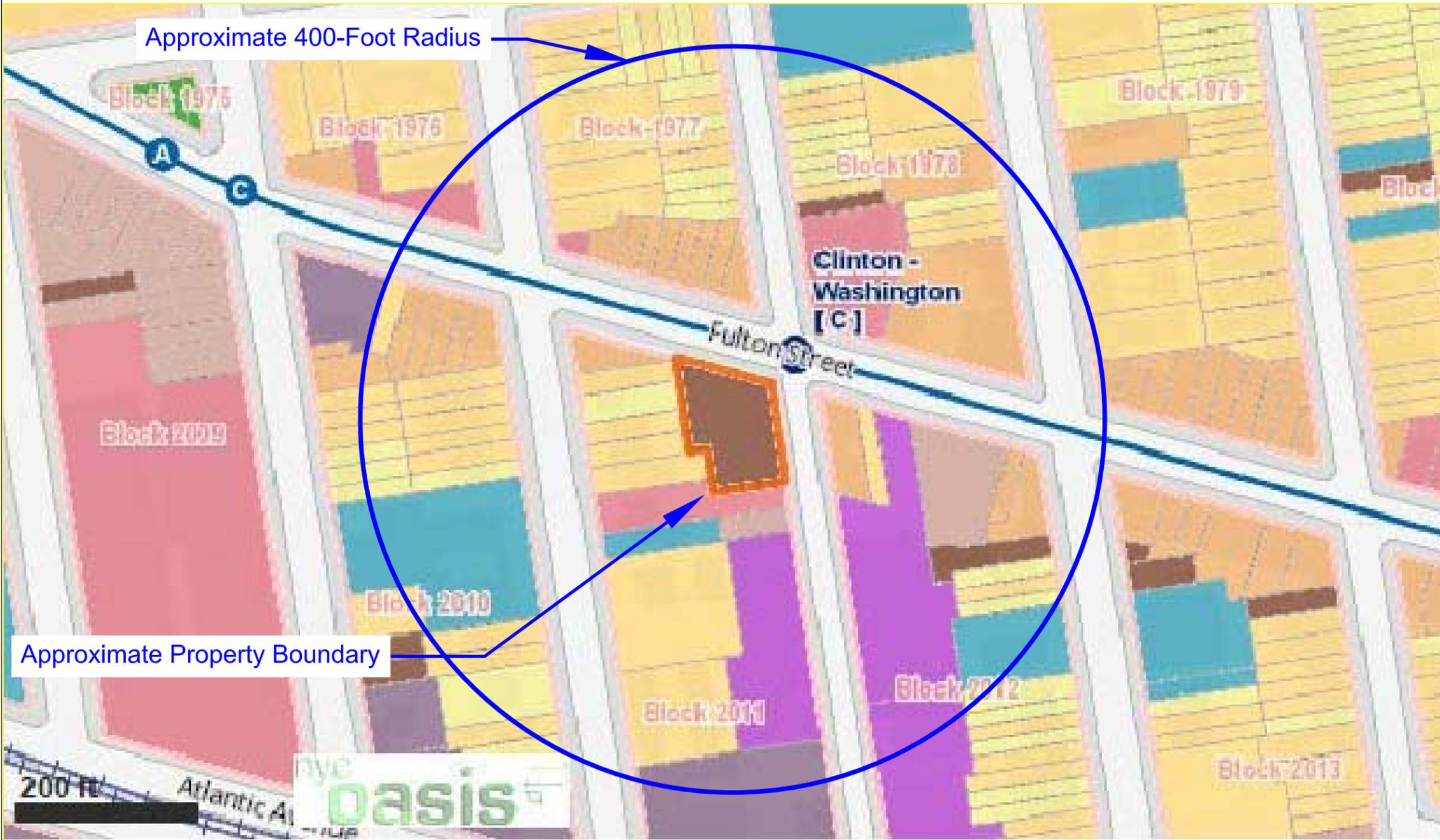
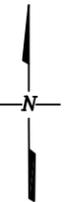
SZCZEPAN H. ROGUSKI
 PROFESSIONAL LAND SURVEYOR

DATE: *January 7, 2013*
 SCALE: *1"=25'*



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nyc oasis

Legend

Transit, Roads, Reference Features
Roads, ferries, commuter rail, neighborhood names

- Roads
- Major Roads
- Interstate Highways
- Tunnels
- NYC subway routes and stations

Parks, Playgrounds, & Open Space

- Parks & Public Lands
- Forested Areas (NJ)
- Community Gardens
- School property with garden
- Playgrounds
- Green Spaces Along Streets
- Golf Courses
- Baseball/Soccer/Football Fields
- Tennis/Basketball/Handball Courts & Tracks
- Cemeteries

Land Use

Block/Lot Boundaries
(Building footprints in gray)

- 1 & 2 Family Residential
- Multi-family Residential
- Mixed Use
- Open space & outdoor recreation
- Commercial
- Institutions
- Industrial
- Parking
- Transportation / Utilities
- Vacant Lots

Neighborhood/Town Labels

- County Boundaries
- Ferry
- Commuter Rail

(Not all items in the legend may be visible on the map.)

CA RICH CONSULTANTS, INC.

Environmental Specialists Since 1982
17 Dupont Street, Plainview, New York 11803

TITLE: Surrounding Land Use		DATE: 3/27/2014
FIGURE: 4		SCALE: AS SHOWN
DRAWING NO: 2014-4	882 Fulton Street Brooklyn, New York	DRAWN BY: J.T.C.
		APPR BY: E.A.W.

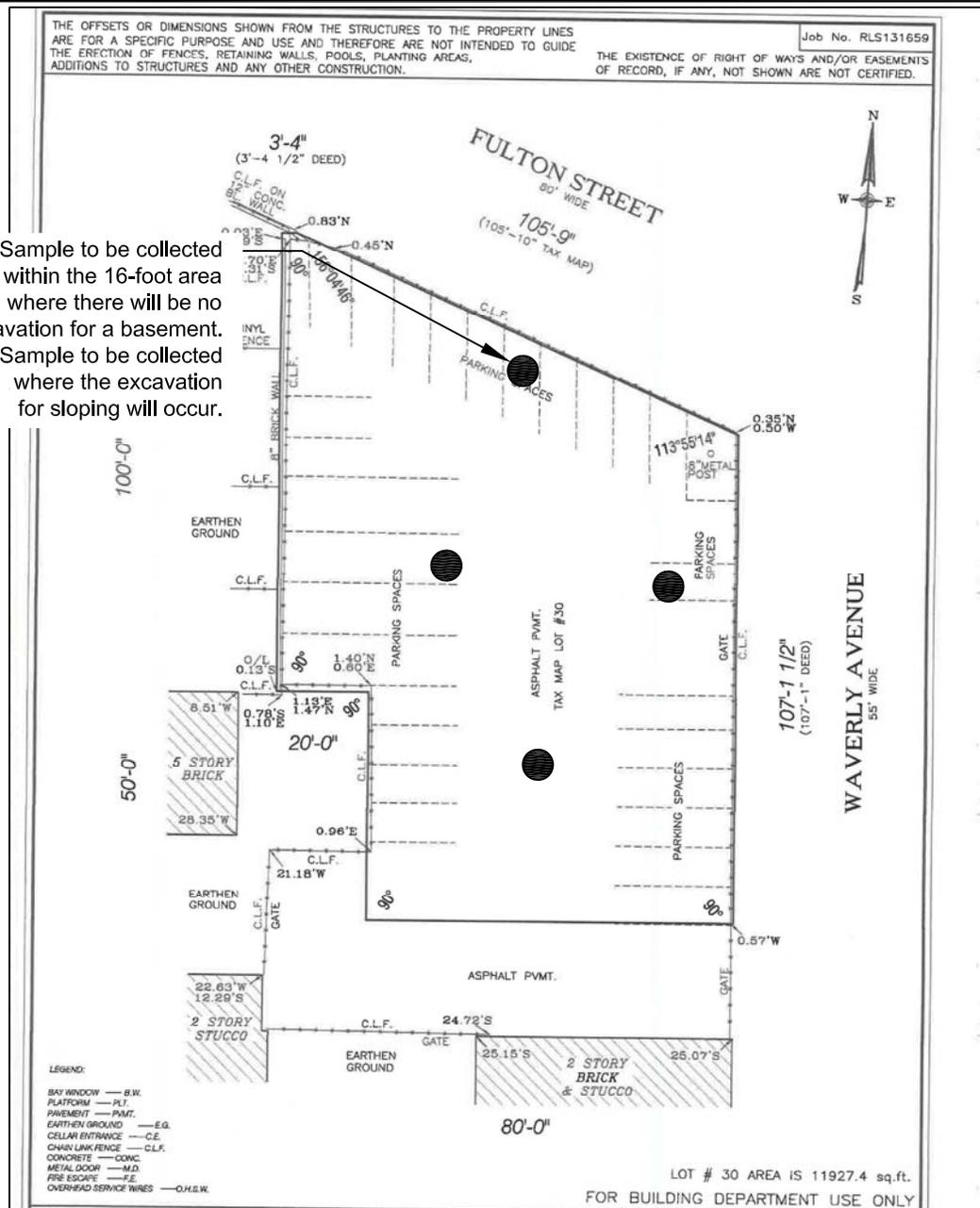
Note:
Map provided courtesy of OASIS website, www.OASISnyc.net.

THE OFFSETS OR DIMENSIONS SHOWN FROM THE STRUCTURES TO THE PROPERTY LINES ARE FOR A SPECIFIC PURPOSE AND USE AND THEREFORE ARE NOT INTENDED TO GUIDE THE ERECTION OF FENCES, RETAINING WALLS, POOLS, PLANTING AREAS, ADDITIONS TO STRUCTURES AND ANY OTHER CONSTRUCTION.

Job No. RLS131659

THE EXISTENCE OF RIGHT OF WAYS AND/OR EASEMENTS OF RECORD, IF ANY, NOT SHOWN ARE NOT CERTIFIED.

Sample to be collected within the 16-foot area where there will be no excavation for a basement. Sample to be collected where the excavation for sloping will occur.



LEGEND:
 BAY WINDOW — B.W.
 PLATFORM — PLY.
 PAVEMENT — PAVT.
 EARTHEN GROUND — E.G.
 CELLAR ENTRANCE — C.E.
 CHAIN LINK FENCE — C.L.F.
 CONCRETE — CONC.
 METAL DOOR — M.D.
 FIRE ESCAPE — F.E.
 OVERHEAD SERVICE WIRES — O.H.S.W.

LOT # 30 AREA IS 11927.4 sq.ft.
 FOR BUILDING DEPARTMENT USE ONLY

SURVEY OF: *Described Property*
 LOCATED AT:
 882 Fulton Street, Brooklyn
 County of Kings
 City and State of New York
 TAX DESIG: Block 2011 Lot 30
 CERTIFIED TO:
 Nathaniel G White

ROGUSKI
 LAND SURVEYING, P.C.

TITLE - ARCHITECTURAL - BOUNDARY - CONSTRUCTION

87-20 WOODHAVEN BLVD, WOODHAVEN, N.Y. 11421
 Tel. • (718) 480-3761 • Cell • (917) 561-0579 •
 Fax • (718) 480-3762 •

SZCZEPAN H. ROGUSKI
 PROFESSIONAL LAND SURVEYOR

DATE: January 7, 2013
 SCALE: 1"=25'



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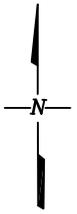
LEGEND

● Proposed Endpoint Sample Location

CA RICH CONSULTANTS, INC.

Environmental Specialists Since 1982
 17 Dupont Street, Plainview, New York 11803

TITLE: Proposed Endpoint Sample Location Map		DATE: 3/27/14
FIGURE: 5		SCALE: Not To Scale
DRAWING NO: 2014-5	DRAWN BY: J.T.C.	
		APPR. BY: E.A.W.



Approximate
Property
Boundary

Floor 1
OPTIONS C

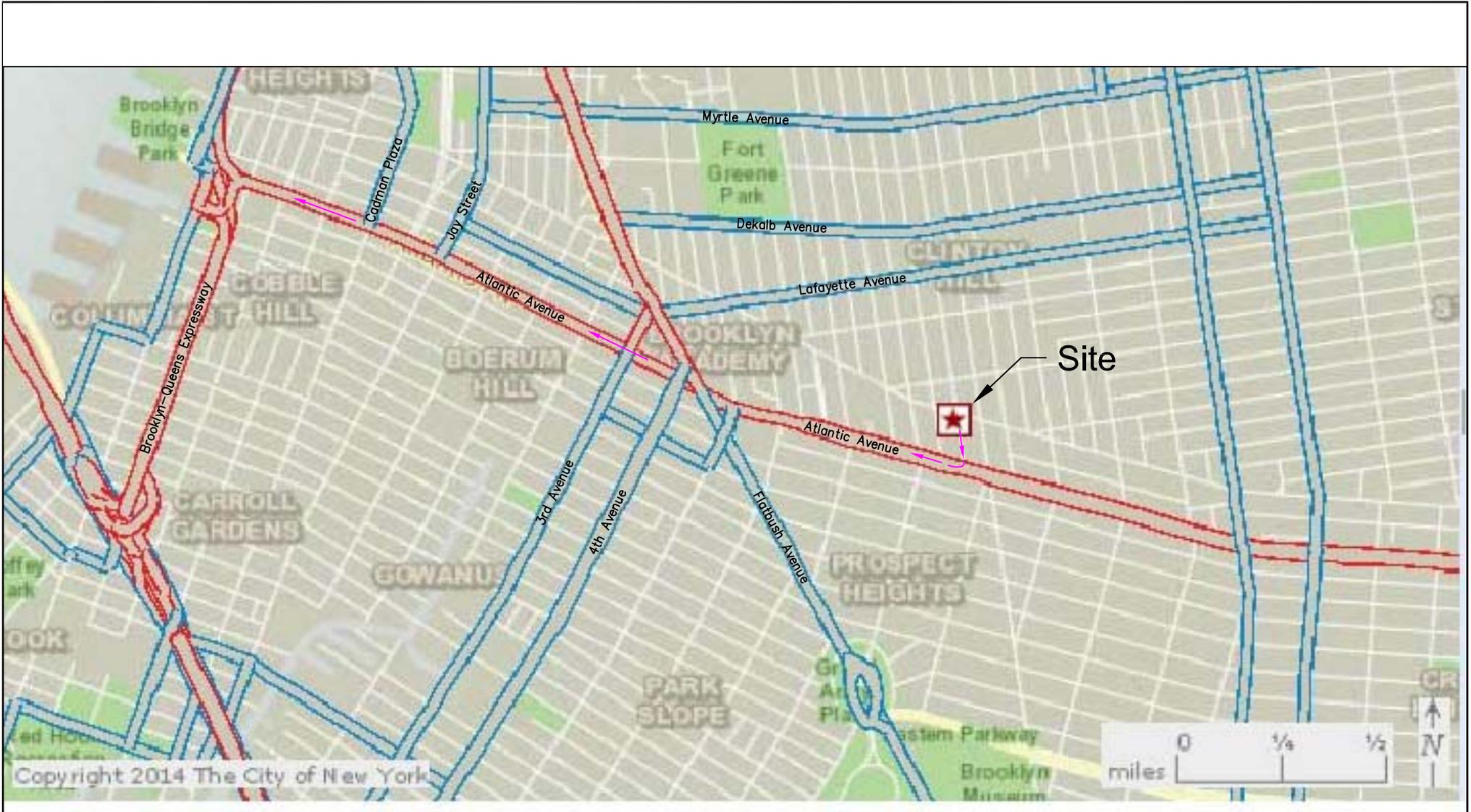
LEGEND

 Concrete slab

CA RICH CONSULTANTS, INC.

Environmental Specialists Since 1982
17 Dupont Street, Plainview, New York 11803

TITLE: Site-Wide Cover System Plan		DATE: 3/27/14
FIGURE: 6		SCALE: Not To Scale
DRAWING NO: 2014-5		DRAWN BY: J.T.C.
		APPR. BY: E.A.W.



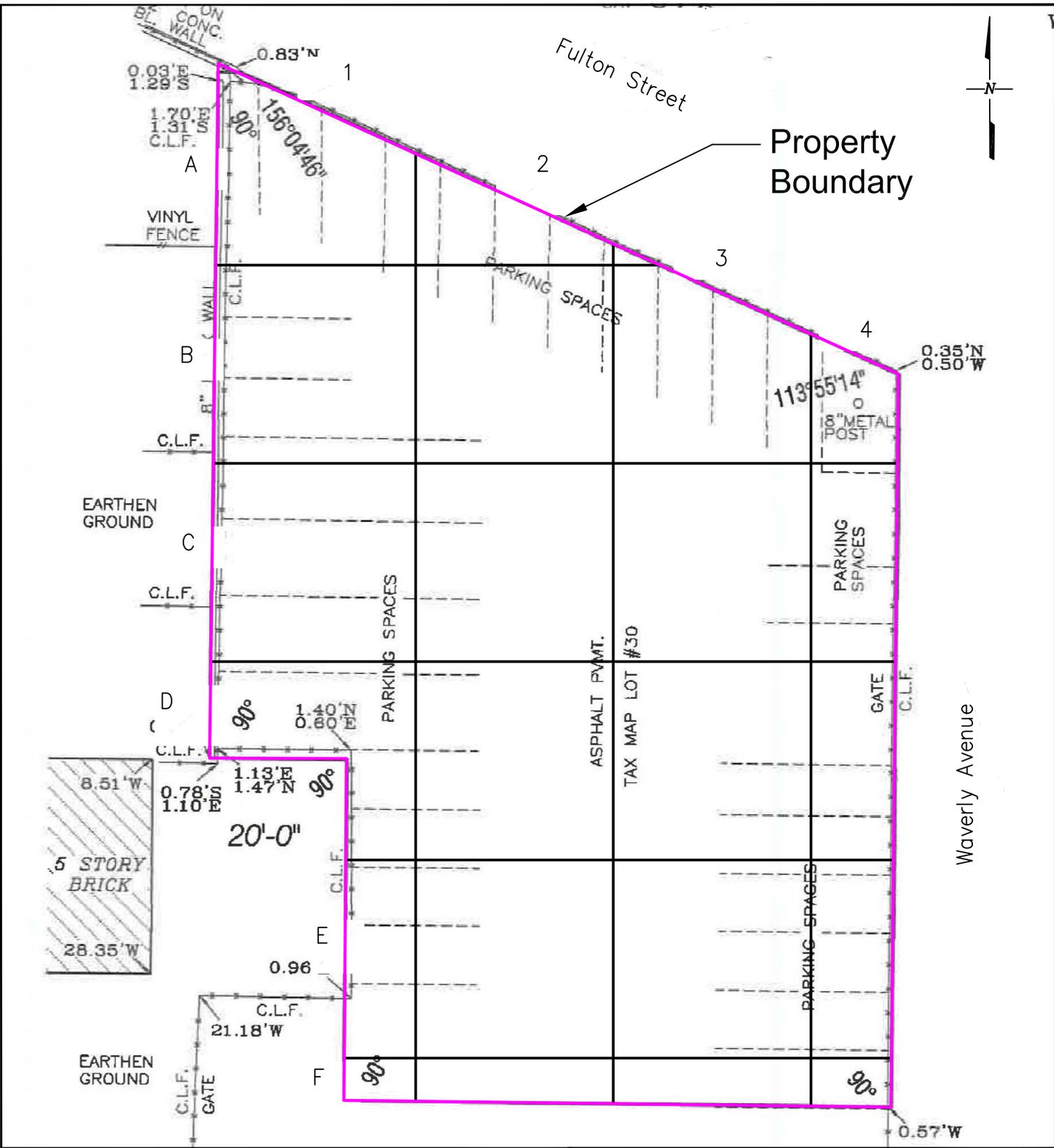
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LEGEND

 Proposed truck route

Transportation	
	DOT Truck Route
	Limited Local
	Local
	Through
	Subway

CA RICH CONSULTANTS, INC.	
Environmental Specialists Since 1982 17 Dupont Street, Plainview, New York 11803	
TITLE: Truck Route	DATE: 3/27/2014
	SCALE: As Shown
FIGURE: 7	DRAWN BY: J.T.C.
DRAWING NO: 2014-7	APPR BY: E.A.W.
882 Fulton Street Brooklyn, New York	

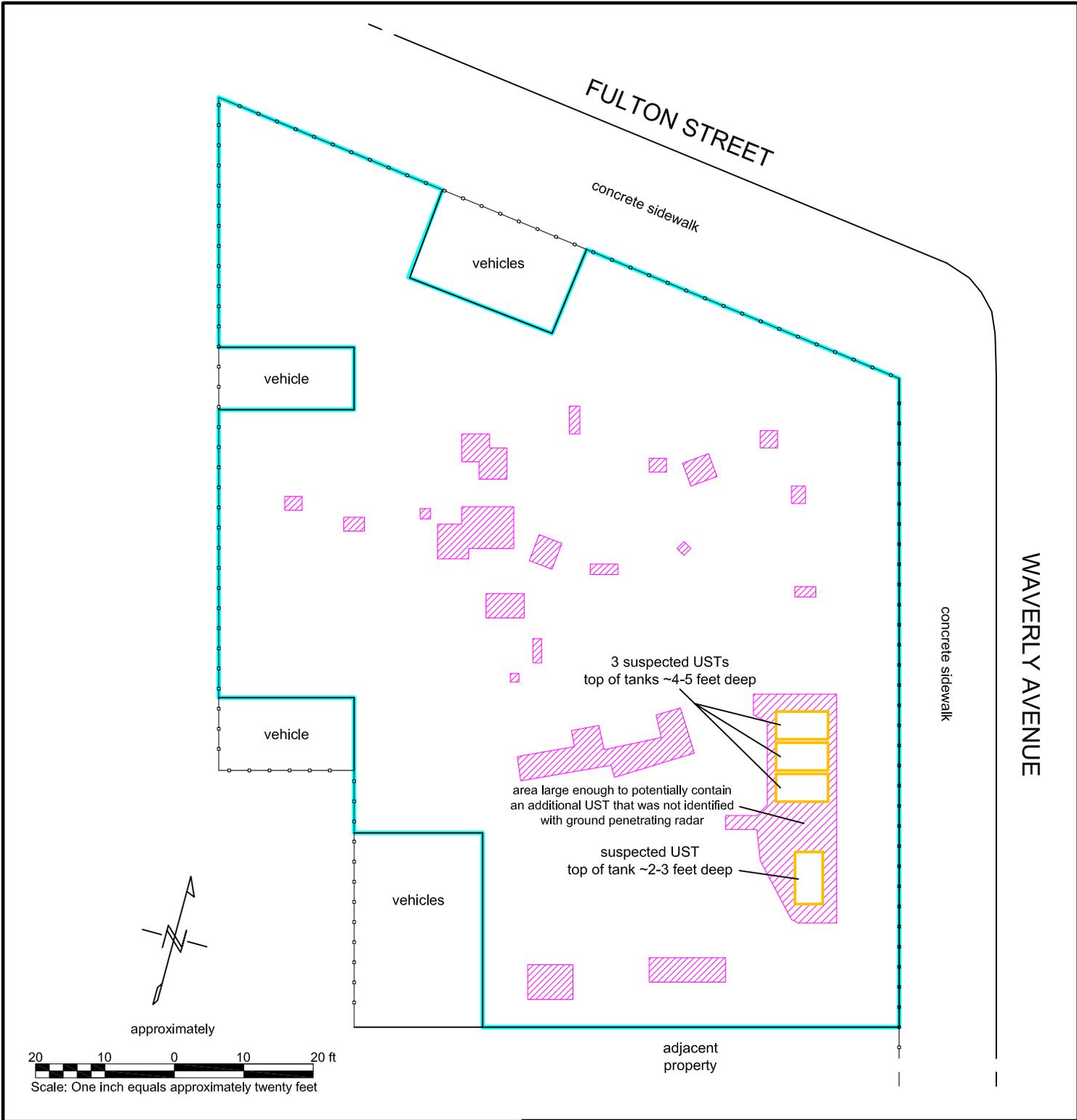


Notes
 A full square is a 30-foot by 30-foot square.

CA RICH CONSULTANTS, INC.

Environmental Specialists Since 1982
 17 Dupont Street, Plainview, New York 11803

TITLE: Alpah Numeric Grid		DATE: 3/27/14
FIGURE: 8		SCALE: Not To Scale
DRAWING NO: 2014-5	DRAWN BY: J.T.C.	
882 Fulton Avenue Brooklyn, New York		APPR. BY: E.A.W.



LEGEND

-  metal-detector anomaly
-  area of investigation



225 N Route 303, Suite 102
 Congers, NY 10920
 (845)268-1800
 (845)268-1802 FAX

Figure 9 Results of Geophysical Investigation
 private parking lot
 882 Fulton Street, Brooklyn, New York

Client	CA Rich Consultants Inc.	Date of Work	October 09, 2013
Project No.	C1310091X	Map By	Kelly A. Weyer

ALL UNDERGROUND FACILITIES MAY NOT BE DEPICTED ON THIS MAP

TABLES

Table 3
Analytical Results for Pesticides, PCBs, Metals
862 Fulton Street
Brooklyn, New York

Client Sample ID: Laboratory ID: Sampling Date:	Matrix:	Units	Limits	Limits	Limits	SB-1 (0-2)	SB-1 (13-15)	SB-2 (0-2)	SB-2 (13-15)	SB-3 (0-2)	SB-3 (13-15)	SB-4 (0-2)	SB-4 (13-15)	SB-5 (0-2)	SB-5 (13-15)	SB-6 (0-2)	SB-6 (13-15)	SB-7 (0-2)	SB-7 (13-15)	SB-8 (0-2)	SB-8 (13-15)	SB-XX	Field Blank 10/11	
						1310114-01	1310114-02	1310114-03	1310114-04	1310114-05	1310114-08	1310114-09	1310114-10	1310114-11	1310114-12	1310114-13	1310114-14	1310114-15	1310114-16	1310114-17	1310114-18	1310114-19	1310114-20	
						Soil	Soil	Soil	Liquid															
PESTICIDES																								
4,4'-DDE	PPB	13000 ⁽¹⁶⁾	3.3 ⁽¹⁴⁾	2600 ⁽¹⁵⁾		1.3 J	2.7 U	2.6 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
4,4'-DDD	PPB	8900 ⁽¹⁶⁾	3.3 ⁽¹⁴⁾	1800 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.6 U	2.4	2.6 U	2.6 U	2.7 U	1.6 J	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
4,4'-DDT	PPB	7900 ⁽¹⁶⁾	3.3 ⁽¹⁴⁾	1700 ⁽¹⁵⁾		1.3 J	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.2	2.6 U	2.6 U	2.7 U	4.9 P	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Aldrin	PPB	97 ⁽¹⁶⁾	5 ⁽¹⁴⁾	19 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
alpha-BHC	PPB	480 ⁽¹⁶⁾	20 ⁽¹⁴⁾	97 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
beta-BHC	PPB	360 ⁽¹⁶⁾	36 ⁽¹⁴⁾	72 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Chlordane	PPB	4200 ⁽¹⁶⁾	94 ⁽¹⁴⁾	910 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
DBCP	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
delta-BHC	PPB	100000 ⁽¹⁶⁾	40 ⁽¹⁴⁾	100000 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Dieldrin	PPB	200 ⁽¹⁶⁾	5 ⁽¹⁴⁾	39 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.6 U	1.2 J	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Endosulfan I	PPB	24000 ⁽¹⁶⁾	2400 ⁽¹⁴⁾	4800 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Endosulfan II	PPB	24000 ⁽¹⁶⁾	2400 ⁽¹⁴⁾	4800 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Endosulfan sulfate	PPB	24000 ⁽¹⁶⁾	2400 ⁽¹⁴⁾	4800 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Endrin	PPB	11000 ⁽¹⁶⁾	14 ⁽¹⁴⁾	2200 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Endrin aldehyde	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Endrin ketone	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
gamma-BHC	PPB	1300 ⁽¹⁶⁾	100 ⁽¹⁴⁾	280 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	18	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Heptachlor	PPB	2100 ⁽¹⁶⁾	42 ⁽¹⁴⁾	420 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Heptachlor epoxide	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Hexachlorobenzene	PPB	1200 ⁽¹⁶⁾	330 ⁽¹⁴⁾	330 ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Hexachlorocyclopentadiene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	1.9 J	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Methoxychlor	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
Toxaphene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		2.7 U	2.7 U	2.6 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.7 U	2.8 U	2.7 U	2.7 U	2.7 U	2.6 U	2.8 U	2.7 U	2.7 U	2.7 U	0.05 U
PCBS																								
Aroclor 1016	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	0.5 U						
Aroclor 1221	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	0.5 U						
Aroclor 1232	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	0.5 U						
Aroclor 1242	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	0.5 U						
Aroclor 1248	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	0.5 U						
Aroclor 1254	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	0.5 U						
Aroclor 1260	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	1.3 J	2.1 U	2.2 U	2.1 U	2.2 U	2.1 U	2.2 U	2.2 U	0.5 U
Aroclor 1262	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	0.5 U						
Aroclor 1268	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾		2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.0 U	2.1 U	2.1 U	2.1 U	2.2 U	2.2 U	0.5 U						
METALS																								
Aluminum	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		8110	5770	9210	4650	7960	4590	2660	5040	3100	5960	5280	5130	17600	5810	9800	5930	9290	0.02 U	
Antimony	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		0.527 U	0.530 U	0.542 U	0.532 U	0.527 U	0.53 U	0.512 U	0.512 U	0.515 U	0.533 U	0.436 U	0.526 U	0.534 U	0.531 U	0.548 U	0.543 U	0.548 U	0.548 U	0.02 U
Arsenic	PPM	16 ⁽¹⁶⁾	13 ⁽¹⁴⁾	16 ⁽¹⁵⁾		3.03	1.99	3.1	1.71	3.43	1.88	2.67	1.79	2.42	2.08	5.38	1.84	4.55	1.66	3.53	2.33	4.05	0.025 U	
Barium	PPM	400 ⁽¹⁶⁾	350 ⁽¹⁴⁾	350 ⁽¹⁵⁾		50.4	34.2	57.7	31.7	38.2	40.1	32.2	33.4	31.3	34.4	68.6	32.9	37.7	41.8	29.9	42.8	43.6	0.02 U	
Beryllium	PPM	72 ⁽¹⁶⁾	7.2 ⁽¹⁴⁾	14 ⁽¹⁵⁾		0.422 U	0.431 U	0.434 U	0.425 U	0.422 U	0.424 U	0.41 U	0.41 U	0.412 U	0.426 U	0.444 U	0.421 U	0.427 U	0.425 U	0.439 U	0.435 U	0.438 U	0.438 U	0.02 U
Cadmium	PPM	4.3 ⁽¹⁶⁾	2.5 ⁽¹⁴⁾	2.5 ⁽¹⁵⁾		0.464	0.431 U	0.434 U	0.422 U	0.422 U	0.424 U	0.115 J	0.41 U	0.412 U	0.426 U	0.633	0.421 U	0.427 U	0.425 U	0.439 U	0.435 U	0.438 U	0.438 U	0.01 U
Calcium	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		23300	1160	3330	1270	2440	1310	49600	1550	46400	1460	26600	1280	1510	1670	641	1210	875	0.025 U	
Chromium	PPM	180 ⁽¹⁶⁾	30 ⁽¹⁴⁾	36 ⁽¹⁵⁾		12.6	18	16.7	12.8	15.2	19.4	6.56	13.7	7.19	36.3	10.9	12.5	12.6	19	11.4	19.6	14.2	0.02 U	
Cobalt	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾		0.422 U	0.431 U	0.434 U	0.425 U	0.422 U	0.424 U	0.41 U	0.41 U	0.412 U	0.426 U	0.444 U	0.421 U	0.427 U	0.425 U	0.439 U	0.435 U	0.438 U	0.438 U	0.02 U
Copper	PPM	270 ⁽¹⁶⁾	50 ⁽¹⁴⁾	270 ⁽¹⁵⁾		15.5	22.4	19.3	14.4	24.9	19.9	10.1	14.6	8.17	15.6	18.5	31.3	15	26.9	16	16.8	21	0.02 U	
Iron	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾ </																				

Table 4

Analytical Results for Soil Vapor Probes
882 Fulton Street
Brooklyn, New York

Client Sample ID:	SVP-1 10/17/13	SVP-2	SVP-3	SVP-4	SVP-5	SVP-XX 10/17/13
Lab Sample ID:	JB50673-1	JB50276-2	JB50276-3	JB50276-4	JB50276-5	JB50673-2
Date Sampled:	10/17/2013	10/14/2013	10/14/2013	10/14/2013	10/14/2013	10/17/2013
Matrix:	Soil Vapor Comp.					
Units	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
TO-15 ug/m3						
Acetone	94.3	29.9	38.2	226	166	106
1,3-Butadiene	<1.8	3.8	21	19	32.1	<1.8
Benzene	62.3	5.8	14	18	41.5	97.4
Bromodichloromethane	<5.4	<5.4	<5.4	<5.4	<5.4	<5.4
Bromofrom	<8.3	<8.3	<8.3	<8.3	<8.3	<8.3
Bromomethane	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1
Bromoethene	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5
Benzyl Chloride	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1
Carbon disulfide	188	134	33.6	40.2	604	169
Chlorobenzene	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7
Chloroethane	<2.1	<2.1	<2.1	<2.1	<2.1	<2.1
Chloroform	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
Chloromethane	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7
3-Chloropropene	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
2-Chlorotoluene	<4.1	<4.1	<4.1	<4.1	<4.1	<4.1
Carbon tetrachloride	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Cyclohexane	6.9	<2.8	3.8	6.5	11	226
1,1-Dichloroethane	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,1-Dichloroethylene	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2-Dibromoethane	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1
1,2-Dichloroethane	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
1,2-Dichloropropane	<3.7	<3.7	<3.7	<3.7	<3.7	<3.7
1,4-Dioxane	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9
Dichlorodifluoromethane	2.8 J	<4.0	2.8 J	2.7 J	2.8 J	2.9 J
Dibromochloromethane	<6.8	<6.8	<6.8	<6.8	<6.8	<6.8
trans-1,2-Dichloroethylene	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
cis-1,2-Dichloroethylene	<3.2	<3.2	<3.2	<3.2	<3.2	<3.2
cis-1,3-Dichloropropene	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6
m-Dichlorobenzene	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8
o-Dichlorobenzene	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8
p-Dichlorobenzene	<4.8	<4.8	<4.8	<4.8	<4.8	<4.8
trans-1,3-Dichloropropene	<3.6	<3.6	<3.6	<3.6	<3.6	<3.6
Ethanol	24.5	4.9	13	11	10	24.1
Ethylbenzene	7.8	2.7 J	4.8	6.1	5.2	20
Ethyl Acetate	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9
4-Ethyltoluene	<3.9	<3.9	<3.9	<3.9	<3.9	4.7
Freon 113	<6.1	<6.1	<6.1	<6.1	<6.1	<6.1
Freon 114	<5.6	<5.6	3.8 J	<5.6	<5.6	<5.6
Heptane	19	9.4	3.8	13	85.7	139
Hexachlorobutadiene	<8.5	<8.5	<8.5	<8.5	<8.5	<8.5
Hexane	56	18	35	55	186	272
2-Hexanone	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3
Isopropyl Alcohol	<2.0	<2.0	5.7	5.4	<2.0	<2.0
Methylene chloride	17	20	82.7	22	23	65.7
Methyl ethyl ketone	22	4.7	8	38.9	49	20
Methyl Isobutyl Ketone	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3
Methyl Tert Butyl Ether	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9
Methylmethacrylate	<3.3	<3.3	<3.3	<3.3	<3.3	<3.3
Propylene	630	171	587	514	2030	625
Styrene	<3.4	4.3	9.4	11	10	<3.4
1,1,1-Trichloroethane	4.0 J	<4.4	5.3	4.9	<4.4	4.0 J
1,1,2,2-Tetrachloroethane	<5.5	<5.5	<5.5	<5.5	<5.5	<5.5
1,1,2-Trichloroethane	<4.4	<4.4	<4.4	<4.4	<4.4	<4.4
1,2,4-Trichlorobenzene	<5.9	<5.9	<5.9	<5.9	<5.9	<5.9
1,2,4-Trimethylbenzene	6.9	<3.9	2.5 J	3.1 J	2.3 J	6.9
1,3,5-Trimethylbenzene	2.3 J	<3.9	<3.9	<3.9	<3.9	5.9
2,2,4-Trimethylpentane	<3.7	5.6	<3.7	21	5.1	<3.7
Tertiary Butyl Alcohol	9.7	<2.4	<2.4	<2.4	<2.4	9.1
Tetrachloroethylene	5.4	16	10	10	14	3.5
Tetrahydrofuran	9.4	<2.4	<2.4	20	<2.4	<2.4
Toluene	47.1	29	87.4	93.1	84.8	50.9
Trichloroethylene	<0.86	<0.86	2.3	2.0	4.1	<0.86
Trichlorofluoromethane	<4.5	<4.5	2.6 J	2.3 J	2.9 J	3.4 J
Vinyl chloride	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl Acetate	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
m,p-Xylene	26	7.8	13	16	14	27
o-Xylene	7.8	2.4 J	4.3	5.6	4.3	6.9
Xylenes (total)	33	10	17	22	18	34

Notes:

SVP-XX is a duplicate sample of SVP-1

Highlighted values are for concentrations that are greater than non-detect

Table 5
 Analytical Results of VOCs in Soil Samples during drilling for MW-1
 882 Fulton Street
 Brooklyn, New York

VOC	Analyte	Units	SampleID:			MW-1 (2-4')	MW-1 (4-6')
			Sampling Date:	Limits	Limits	Limits	1/20/2014
	1,1,1,2-Tetrachloroethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,1,1-Trichloroethane	PPB	100000 ⁽¹⁶⁾	680 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	1,1,2,2-Tetrachloroethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,1,2-Trichloro-1,2,2-trifluoroethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,1,2-Trichloroethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,1-Dichloroethane	PPB	26000 ⁽¹⁶⁾	270 ⁽¹⁴⁾	19000 ⁽¹⁵⁾	5.8 U	5.6 U
	1,1-Dichloroethene	PPB	100000 ⁽¹⁶⁾	330 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	1,1-Dichloropropene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,2,3-Trichlorobenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,2,3-Trichloropropane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,2,4,5-Tetramethylbenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,2,4-Trichlorobenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,2,4-Trimethylbenzene	PPB	52000 ⁽¹⁶⁾	3600 ⁽¹⁴⁾	47000 ⁽¹⁵⁾	5.8 U	5.6 U
	1,2-Dibromo-3-chloropropane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,2-Dibromoethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,2-Dichlorobenzene	PPB	100000 ⁽¹⁶⁾	1100 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	1,2-Dichloroethane	PPB	3100 ⁽¹⁶⁾	20 ⁽¹⁴⁾	2300 ⁽¹⁵⁾	5.8 U	5.6 U
	1,2-Dichloropropane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,3,5-Trimethylbenzene	PPB	52000 ⁽¹⁶⁾	8400 ⁽¹⁴⁾	47000 ⁽¹⁵⁾	5.8 U	5.6 U
	1,3-Dichlorobenzene	PPB	49000 ⁽¹⁶⁾	2400 ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,3-dichloropropane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	1,4-Dichlorobenzene	PPB	13000 ⁽¹⁶⁾	1800 ⁽¹⁴⁾	17000 ⁽¹⁵⁾	5.8 U	5.6 U
	1,4-Dioxane	PPB	13000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	9800 ⁽¹⁵⁾	5.8 U	5.6 U
	2,2-Dichloropropane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	2-Butanone	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	12 U	11 U
	2-Chloroethyl vinyl ether	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	2-Chlorotoluene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	2-Hexanone	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	12 U	11 U
	2-Propanol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	4-Chlorotoluene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	4-Isopropyltoluene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	4-Methyl-2-pentanone	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	12 U	11 U
	Acetone	PPB	100000 ⁽¹⁶⁾	50 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.3 B	3.2 B
	Benzene	PPB	4800 ⁽¹⁶⁾	60 ⁽¹⁴⁾	2900 ⁽¹⁵⁾	5.8 U	5.6 U
	Bromobenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Bromochloromethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Bromodichloromethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Bromoform	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Bromomethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Carbon disulfide	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Carbon tetrachloride	PPB	2400 ⁽¹⁶⁾	760 ⁽¹⁴⁾	1400 ⁽¹⁵⁾	5.8 U	5.6 U
	Chlorobenzene	PPB	100000 ⁽¹⁶⁾	1100 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	Chlorodifluoromethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Chloroethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Chloroform	PPB	49000 ⁽¹⁶⁾	370 ⁽¹⁴⁾	10000 ⁽¹⁵⁾	5.8 U	5.6 U
	Chloromethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	cis-1,2-Dichloroethene	PPB	100000 ⁽¹⁶⁾	250 ⁽¹⁴⁾	59000 ⁽¹⁵⁾	5.8 U	5.6 U
	Cyclohexane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Dibromochloromethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Dibromomethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Dichlorodifluoromethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Diisopropyl ether	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Ethanol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	23 U	22 U
	Ethylbenzene	PPB	41000 ⁽¹⁶⁾	1000 ⁽¹⁴⁾	30000 ⁽¹⁵⁾	5.8 U	5.6 U
	Freon-114	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Hexachlorobutadiene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Isopropylbenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	m,p-Xylene	PPB	100000 ⁽¹⁶⁾	260 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	12 U	11 U
	Methyl Acetate	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Methyl tert-butyl ether	PPB	100000 ⁽¹⁶⁾	930 ⁽¹⁴⁾	62000 ⁽¹⁵⁾	5.8 U	5.6 U
	Methylene chloride	PPB	100000 ⁽¹⁶⁾	50 ⁽¹⁴⁾	51000 ⁽¹⁵⁾	6.1 B	5.1 B
	Naphthalene	PPB	100000 ⁽¹⁶⁾	12000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	3.2 J
	n-Butylbenzene	PPB	100000 ⁽¹⁶⁾	12000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	n-Propylbenzene	PPB	100000 ⁽¹⁶⁾	3900 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	o-Xylene	PPB	100000 ⁽¹⁶⁾	260 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	p-Diethylbenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	p-Ethyltoluene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	sec-Butylbenzene	PPB	100000 ⁽¹⁶⁾	11000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	Styrene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	t-Butyl alcohol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	tert-Butylbenzene	PPB	100000 ⁽¹⁶⁾	5900 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	Tetrachloroethene	PPB	19000 ⁽¹⁶⁾	1300 ⁽¹⁴⁾	5500 ⁽¹⁵⁾	5.8 U	5.6 U
	Toluene	PPB	100000 ⁽¹⁶⁾	700 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	trans-1,2-Dichloroethene	PPB	100000 ⁽¹⁶⁾	190 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5.8 U	5.6 U
	trans-1,3-Dichloropropene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Trichloroethene	PPB	21000 ⁽¹⁶⁾	470 ⁽¹⁴⁾	10000 ⁽¹⁵⁾	5.8 U	5.6 U
	Trichlorofluoromethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Vinyl acetate	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	5.8 U	5.6 U
	Vinyl chloride	PPB	900 ⁽¹⁶⁾	20 ⁽¹⁴⁾	210 ⁽¹⁵⁾	5.8 U	5.6 U

(16) NYSDEC 375 Restricted Residential Use Limits

(15) NYSDEC 375 Residential Use Limits

(14) NYSDEC 375 Unrestricted Residential Use Limits

Abbreviation:

NA = Not available, no value specified in NYSDEC 375 RES. Limits

PPB = parts per billions

Q = Laboratory qualifier

U = Not Detected

B = Analyte was detected in the associated method blank

J = Value is estimated

Table 6
Analytical Results for SVOCs during drilling for MW-1
882 Fulton Street
Brooklyn, New York

SVOC	Analyte	Units	SampleID: Sampling Date:			MW-1 (2-4') 1/20/2014	MW-1 (4-6') 1/20/2014
			Limits (16)	Limits (14)	Limits (15)	Q	Q
	1,2,4-Trichlorobenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	1,2-Dichlorobenzene	PPB	100000 ⁽¹⁶⁾	1100 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	280 U	270 U
	1,3-Dichlorobenzene	PPB	49000 ⁽¹⁶⁾	2400 ⁽¹⁴⁾	17000 ⁽¹⁵⁾	280 U	270 U
	1,4-Dichlorobenzene	PPB	13000 ⁽¹⁶⁾	1800 ⁽¹⁴⁾	9800 ⁽¹⁵⁾	280 U	270 U
	2,3,4,6-Tetrachlorophenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2,4,5-Trichlorophenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2,4,6-Trichlorophenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2,4-Dichlorophenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2,4-Dimethylphenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2,4-Dinitrophenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	560 U	550 U
	2,4-Dinitrotoluene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2,6-Dinitrotoluene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2-Chloronaphthalene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2-Chlorophenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2-Methylnaphthalene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	140 J	430
	2-Methylphenol	PPB	100000 ⁽¹⁶⁾	330 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	280 U	270 U
	2-Nitroaniline	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	2-Nitrophenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	3,3'-Dichlorobenzidine	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	3,4-Methylphenol	PPB	100000 ⁽¹⁶⁾	330 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	42 J	36 J
	3-Nitroaniline	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	4,6-Dinitro-2-methylphenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	560 U	550 U
	4-Bromophenyl phenyl ether	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	4-Chloro-3-methylphenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	4-Chloroaniline	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	4-Chlorophenyl phenyl ether	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	4-Nitroaniline	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	4-Nitrophenol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	560 U	550 U
	Acenaphthene	PPB	100000 ⁽¹⁶⁾	20000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	330	1600
	Acenaphthylene	PPB	100000 ⁽¹⁶⁾	100000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	690	140 J
	Acetophenone	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Aniline	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Anthracene	PPB	100000 ⁽¹⁶⁾	100000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	1300	2700 m
	Atrazine	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Azobenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Benzaldehyde	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	560 U	550 U
	Benzidine	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	560 U	550 U
	Benzo(a)anthracene	PPB	1000 ⁽¹⁶⁾	1000 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	3700 m	5000 m
	Benzo(a)pyrene	PPB	1000 ⁽¹⁶⁾	1000 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	2700	3900
	Benzo(b)fluoranthene	PPB	1000 ⁽¹⁶⁾	1000 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	2700	3600
	Benzo(g,h,i)perylene	PPB	100000 ⁽¹⁶⁾	100000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	1900	2200
	Benzo(k)fluoranthene	PPB	3900 ⁽¹⁶⁾	800 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	2400 m	2800
	Benzoic acid	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	560 U	550 U
	Benzyl alcohol	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Biphenyl	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	45 J	110 J
	Bis(2-chloroethoxy)methane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Bis(2-chloroethyl)ether	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Bis(2-chloroisopropyl)ether	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Butyl benzyl phthalate	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Carbazole	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	490	1400
	Chrysene	PPB	3900 ⁽¹⁶⁾	1000 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	3600	4800 m
	Dibenzo(a,h)anthracene	PPB	330 ⁽¹⁶⁾	330 ⁽¹⁴⁾	330 ⁽¹⁵⁾	490 m	550 m
	Dibenzofuran	PPB	59000 ⁽¹⁶⁾	7000 ⁽¹⁴⁾	14000 ⁽¹⁵⁾	300	1200
	Diethyl phthalate	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Dimethyl phthalate	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Di-n-butyl phthalate	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Di-n-octyl phthalate	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	560 U	550 U
	Fluoranthene	PPB	100000 ⁽¹⁶⁾	10000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	9100	14000
	Fluorene	PPB	100000 ⁽¹⁶⁾	30000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	450	1200
	Hexachlorobenzene	PPB	1200 ⁽¹⁶⁾	330 ⁽¹⁴⁾	330 ⁽¹⁵⁾	280 U	270 U
	Hexachlorobutadiene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Hexachlorocyclopentadiene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Hexachloroethane	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Indeno(1,2,3-c,d)pyrene	PPB	500 ⁽¹⁶⁾	500 ⁽¹⁴⁾	500 ⁽¹⁵⁾	2200	2600
	Isophorone	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Naphthalene	PPB	100000 ⁽¹⁶⁾	12000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	250 J	650
	Nitrobenzene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	N-Nitrosodimethylamine	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	N-Nitrosodi-n-propylamine	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	N-Nitrosodiphenylamine	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U
	Parathion	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	560 U	550 U
	Pentachlorophenol	PPB	6700 ⁽¹⁶⁾	800 ⁽¹⁴⁾	2400 ⁽¹⁵⁾	560 U	550 U
	Phenanthrene	PPB	100000 ⁽¹⁶⁾	100000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	5500	15000
	Phenol	PPB	100000 ⁽¹⁶⁾	330 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	280 U	270 U
	Pyrene	PPB	100000 ⁽¹⁶⁾	100000 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	6900	11000
	Pyridine	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	280 U	270 U

(16) NYSDEC 375 Restricted Residential Use Limits

(15) NYSDEC 375 Residential Use Limits

(14) NYSDEC 375 Unrestricted Residential Use Limits

Abbreviation:

NA = Not available, no value specified in NYSDEC 375 RES. Limits

U = Not Detected

J = Value is an estimate

Q = Laboratory qualifier

Highlighted value exceed NYSDEC 375 Unrestricted Residential Use Limits

Table 7
Analytical Results for Pesticides, PCBs, and Metals in Soil Samples during Drilling for MW-1
882 Fulton Street
Brooklyn, New York

Analyte	Units	SampleID: Sampling Date:			MW-1 (2-4')	MW-1 (4-6')
		Limits	Limits	Limits	1/20/2014	1/20/2014
PESTICIDES						
4,4'-DDD	PPB	13000 ⁽¹⁶⁾	3.3 ⁽¹⁴⁾	2600 ⁽¹⁵⁾	2.8 U	2.7 U
4,4'-DDE	PPB	8900 ⁽¹⁶⁾	3.3 ⁽¹⁴⁾	1800 ⁽¹⁵⁾	2.8 U	2.7 U
4,4'-DDT	PPB	7900 ⁽¹⁶⁾	3.3 ⁽¹⁴⁾	1700 ⁽¹⁵⁾	6.3	2.7 U
Aldrin	PPB	97 ⁽¹⁶⁾	5 ⁽¹⁴⁾	19 ⁽¹⁵⁾	2.8 U	2.7 U
alpha-BHC	PPB	480 ⁽¹⁶⁾	20 ⁽¹⁴⁾	97 ⁽¹⁵⁾	2.8 U	2.7 U
beta-BHC	PPB	360 ⁽¹⁶⁾	36 ⁽¹⁴⁾	72 ⁽¹⁵⁾	2.8 U	2.7 U
Chlordane	PPB	4200 ⁽¹⁶⁾	94 ⁽¹⁴⁾	910 ⁽¹⁵⁾	22 U	21 U
Chlorobenzilate	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	2.8 U	2.7 U
DBCP	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	2.8 U	2.7 U
delta-BHC	PPB	100000 ⁽¹⁶⁾	40 ⁽¹⁴⁾	100000 ⁽¹⁵⁾	2.8 U	2.7 U
Dieldrin	PPB	200 ⁽¹⁶⁾	5 ⁽¹⁴⁾	39 ⁽¹⁵⁾	4.1	2.7 U
Endosulfan I	PPB	24000 ⁽¹⁶⁾	2400 ⁽¹⁴⁾	4800 ⁽¹⁵⁾	2.8 U	2.7 U
Endosulfan II	PPB	24000 ⁽¹⁶⁾	2400 ⁽¹⁴⁾	4800 ⁽¹⁵⁾	2.8 U	2.7 U
Endosulfan sulfate	PPB	24000 ⁽¹⁶⁾	2400 ⁽¹⁴⁾	4800 ⁽¹⁵⁾	2.8 U	2.7 U
Endrin	PPB	11000 ⁽¹⁶⁾	14 ⁽¹⁴⁾	2200 ⁽¹⁵⁾	2.8 U	2.7 U
Endrin aldehyde	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	2.8 U	2.7 U
Endrin ketone	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	2.8 U	2.7 U
gamma-BHC	PPB	1300 ⁽¹⁶⁾	100 ⁽¹⁴⁾	280 ⁽¹⁵⁾	2.8 U	2.7 U
Heptachlor	PPB	2100 ⁽¹⁶⁾	42 ⁽¹⁴⁾	420 ⁽¹⁵⁾	2.8 U	2.7 U
Heptachlor epoxide	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	2.8 U	2.7 U
Hexachlorobenzene	PPB	1200 ⁽¹⁶⁾	330 ⁽¹⁴⁾	330 ⁽¹⁵⁾	2.8 U	2.7 U
Hexachlorocyclopentadiene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	2.8 U	2.7 U
Methoxychlor	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	2.8 U	2.7 U
Toxaphene	PPB	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	28 U	27 U
PCBS						
Aroclor 1016	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
Aroclor 1221	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
Aroclor 1232	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
Aroclor 1242	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
Aroclor 1248	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
Aroclor 1254	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
Aroclor 1260	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
Aroclor 1262	PPB	1000 ⁽¹⁶⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
Aroclor 1268	PPB	1000 ⁽¹⁵⁾	100 ⁽¹⁴⁾	1000 ⁽¹⁵⁾	22 U	21 U
METALS						
Aluminum	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	4010	7210
Antimony	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	0.577 U	0.544 U
Arsenic	PPM	16 ⁽¹⁶⁾	13 ⁽¹⁴⁾	16 ⁽¹⁵⁾	2.6	2.92
Barium	PPM	400 ⁽¹⁶⁾	350 ⁽¹⁴⁾	350 ⁽¹⁵⁾	42.5	29.9
Beryllium	PPM	72 ⁽¹⁶⁾	7.2 ⁽¹⁴⁾	14 ⁽¹⁵⁾	0.461 U	0.435 U
Cadmium	PPM	4.3 ⁽¹⁶⁾	2.5 ⁽¹⁴⁾	2.5 ⁽¹⁵⁾	0.461 U	0.435 U
Calcium	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	27300	803
Chromium	PPM	180 ⁽¹⁶⁾	30 ⁽¹⁴⁾	36 ⁽¹⁵⁾	7.3	15.9
Cobalt	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	3.83	0.435 U
Copper	PPM	270 ⁽¹⁶⁾	50 ⁽¹⁴⁾	270 ⁽¹⁵⁾	12.2	13.4
Iron	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	3090	9260
Lead	PPM	400 ⁽¹⁶⁾	63 ⁽¹⁴⁾	400 ⁽¹⁵⁾	42.8	18.9
Magnesium	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	1710	2050
Manganese	PPM	2000 ⁽¹⁶⁾	1600 ⁽¹⁴⁾	2000 ⁽¹⁵⁾	144	236
Mercury	PPM	0.81 ⁽¹⁶⁾	0.18 ⁽¹⁴⁾	0.81 ⁽¹⁵⁾	0.125	0.0484
Nickel	PPM	310 ⁽¹⁶⁾	30 ⁽¹⁴⁾	140 ⁽¹⁵⁾	13.2	14.4
Potassium	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	1400	1180
Selenium	PPM	180 ⁽¹⁶⁾	3.9 ⁽¹⁴⁾	36 ⁽¹⁵⁾	0.577 U	0.544 U
Silver	PPM	180 ⁽¹⁶⁾	2 ⁽¹⁴⁾	36 ⁽¹⁵⁾	0.461 U	0.435 U
Sodium	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	161	50
Thallium	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	0.577 U	0.544 U
Vanadium	PPM	NA ⁽¹⁶⁾	NA ⁽¹⁴⁾	NA ⁽¹⁵⁾	11.2	18.7
Zinc	PPM	10000 ⁽¹⁶⁾	109 ⁽¹⁴⁾	2200 ⁽¹⁵⁾	41.8	34.1
(16) NYSDEC 375 Restricted Residential Use Limits (15) NYSDEC 375 Residential Use Limits (14) NYSDEC 375 Unrestricted Residential Use Limits Abbreviation: PPB = parts per billion NA = Not available, no value specified in NYSDEC 375 RES. Limits U = Not Detected Q = Laboratory qualifier						

APPENDIX 4
Health and Safety Plan



Health and Safety Plan

**882 FULTON AVENUE
Brooklyn, New York 11238**

November 2013

Prepared for:

**Orange Management
6 West 14th Street, 2nd Floor
New York, NY 10011**

Prepared by:

**CA RICH CONSULTANTS, INC.
17 Dupont Street
Plainview, NY 11803-1614**

Health & Safety Plan

PHASE II INVESTIGATION

882 Fulton Avenue
Brooklyn, NY 11238
Block 2011; Lot 30

1.0 INTRODUCTION

This Health and Safety Plan ("HASP") is developed for utilization during implementation of the Phase II Investigation (Phase II) at the above referenced site located in 882 Fulton Avenue in Brooklyn, New York (the Site). The HASP is to be enforced by CA RICH's Project Health and Safety Manager and the on-site Health & Safety Coordinator (HSC) or his/her designee. The on-site HSC will interface with the Project Manager and is vested with the authority to make field decisions including the termination of on-site activities if an imminent health and safety hazard, condition or related concern arises. Information and protocol in the HASP is applicable to all on-site personnel who will be entering the designated work zone.

2.0 POTENTIAL HAZARDS

2.1 Chemical Hazards

CA RICH is currently unaware of any chemical hazards on-site. Soil samples were recently collected from the Site. Low levels of Volatile Organic Compounds (VOCs) were identified below Restricted Residential Soil Cleanup Objectives (SCOs). Low levels of Semi Volatile Organic Compounds (SVOCs) and metals were identified. A few SVOCs and metals were detected above Restricted Residential SCOs. CA RICH will operate as if there is a potential for VOCs, SVOCs, and metals contamination on-site.

VOC and SVOCs are typically described as "sweet" or "aromatic" smelling and are narcotic in high concentrations. Acute exposure to significant concentrations of these chemicals can cause irritation of the skin, eyes and mucus membrane, headache, dizziness, nausea, and in high enough concentrations, loss of consciousness and death (*Sax, 1984*). These compounds are suspected to be carcinogenic with chronic exposure.

Physical properties and additional toxicological information for potential contaminants are included in Appendix A.

2.2 Other Health & Safety Risks

Normal physical hazards associated with using drilling and excavation equipment and hand tools as well as hazards associated with adverse climatic conditions (heat & cold) or physical site-related debris represent a certain degree of risk to be assumed by on-site personnel.

Certain provisions in this Plan, specifically the use of personnel protective equipment, may tend to increase the risk of physical injury, as well as susceptibility to cold or heat stress. This is primarily due to restrictions in dexterity, hearing, sight, and normal body heat transfer inherent in the use of protective gear.

3.0 RISK MANAGEMENT

3.1 Work / Exclusion Zones

For each proposed investigation activity a work / exclusion zone will be established. Access to this area will be limited to properly trained, properly protected personnel directly involved with investigation. Enforcement of the work / exclusion zone boundaries is the responsibility of the on-site Health & Safety Coordinator or his/her designee.

3.2 Personnel Protection

Health & Safety regulatory personnel have developed different levels of personnel protection to deal with differing degrees of potential risks of exposure to chemical constituents. The levels are designated as **A**, **B**, **C**, and **D** and are ranked according to the amount of personnel protection afforded by each level. Level **A** is the highest level of protection and Level **D** is the lowest level of protection.

The different levels are primarily dependent upon the degree of respiratory protection necessary, in conjunction with appropriate protective clothing. Levels of protection mandate a degree of respiratory protection. However, flexibility exists within the lower levels (B, C, and D) concerning proper protective clothing.

The four levels of protection were developed for utilization in situations which involve suspected or known atmospheric and/or environmental hazards including airborne contamination and skin-affecting substances.

It is anticipated that all of the investigation work will be performed using Level D protection (no respiratory protection with protective clothing requirements limited to long sleeved shirts, long pants or coveralls, work gloves and steel-toe leather work boots).

Level D may be modified by the HSC to include protective clothing or equipment (Saran-coated disposable coveralls or PVC splash suits, safety glasses, hard hat with face shield, and chemically resistant boots) based upon physical hazards, skin contact concerns, and real-time monitoring.

Real-time air monitoring for total airborne organics using either an OVA or an HNU will determine if and when an upgrade from Level D to a higher level of respiratory protection is warranted. Decisions for an upgrade from Level D to higher levels of protection, mitigative actions, and/or suspension of work are the responsibility of the Project Manager and/or the designated on-site Health & Safety Coordinator.

In the event odors are detected, Level C respiratory protection will be employed. Organic vapor cartridges are capable of removing xylenes at a concentration of 1,000 ppm and trimethylbenzenes at a concentration of 250 ppm.

3.2 Air Monitoring

The Health & Safety Coordinator or his/her properly trained assignee will conduct "Real Time" air monitoring for total organic vapors. 'Real-time' monitoring refers to the utilization of instrumentation, which yields immediate measurements. The utilization of real time monitoring helps determine immediate or long-term risks to on-site personnel and the general public, the appropriate level of personnel respiratory protection necessary, and actions to mitigate the recognized hazard.

3.2.1. Organic Vapor

A. Instrumentation

Real-time monitoring for total organic vapor (TOV) utilizes either a photo-ionization detector (PID) or flame ionization detector (FID). The appropriate PID is an intrinsically safe HNU Systems Model PI-101, MiniRae 3,000 or equivalent PID, which is factory calibrated to benzene and is capable of detecting petroleum-related contamination. The appropriate FID is a Foxboro model 128 Organic vapor Analyzer (OVA), which is factory calibrated to methane.

B. Application

Organic vapor monitoring is performed as outlined in the NYSDOH Community Air Monitoring Plan. Specifically, monitoring shall be conducted at the downwind perimeter of the work zone periodically during work activities. If TOV levels exceed 5 milligrams per meter cubed (mg/m^3) above established pre-work background levels, work activities will be halted and monitoring will be continued under the provision of a Vapor Emission Response Plan (outlined in Section 5).

3.3 Worker Training

Personnel working in the contamination area must be trained, fit-tested, and medically-Certified (OSHA 29 CFR 1910. 134).

All personnel working within the work/exclusion area must confirm their participation in an ongoing health surveillance program. The program must consist of an initial "baseline" examination stipulated by OSHA (29 CFR 1910. 134). The examination is designed to screen for evidence of adverse effects of occupational exposure (particularly to toxic substances) and determine personnel fitness with respect to the use of respiratory protection.

Each worker enlisted in the medical surveillance program receives an annual examination similar to the baseline exam to evaluate irregularities or trends in his/her health with respect to potential exposure. Upon termination of employment, contract/subcontract or job completion, each worker/employee must take an 'exit examination' identical to the annual exam. All physicals will be performed by licensed physicians with medical histories to be confidentially maintained by their employer.

Prior to any work, all workers involved with the project should be aware of the potential chemical, physical and biological hazards discussed in this document, as well as the general safety practices outlined below. A safety briefing by the on-site HSC and/or assistant designee shall take place at the outset of work activities.

3.4 General Safety Practices

The following safety practices shall be followed by all project personnel.

1. Avoid unnecessary skin exposure to subsurface materials. Sleeved shirts tucked into long pants (or coveralls), work gloves, and steel-toe leather work boots are required unless modified gear is approved by the HSC. Remove any excess residual soil from clothes prior to leaving the site.
2. No eating, drinking, gum or tobacco chewing, or smoking allowed in designated work areas. Thoroughly wash hands prior to these activities outside the work area. Avoid sitting on the ground during breaks or while eating and drinking. Thoroughly wash all exposed body areas at the end of the workday.

3. Some symptoms of acute exposure include: dizziness, light-headedness, drowsiness, headache, and nose/eye/skin irritation. If these symptoms are experienced or strong odor is detected, leave the work area and immediately report the incident to the on-site HSC.

3.5 Enforcement

Enforcement of the Site Safety Plan will be the responsibility of the HSC or his/her designee. The Coordinator or his/her designee should be on-site on a full-time basis and perform or directly oversee all aspects of Project Health & Safety operations including: air monitoring; environmental mitigation; personnel respiratory and skin protection; general safety practices; documentation; emergency procedures and protocol; and reporting and recordkeeping as described below.

3.6 Reporting & Recordkeeping

Incidents involving injury, symptoms of exposure, discovery of contained (potentially hazardous) materials, or unsafe work practices and/or conditions should be immediately reported to the HSC.

A logbook must be maintained on-site to document all aspects of HASP enforcement. The log is paginated and dated with entries made on a daily basis in waterproof ink, initialed by the HSC or designee. Log entries should include date and time of instrument monitoring, instrument type, measurement method, test results, calibration and maintenance information, as well as appropriate mitigative actions responding to detections. Miscellaneous information to be logged may include weather conditions, reported complaints or symptoms, regulatory inspections, and reasons to upgrade personnel protection above the normal specification (Level D).

4.0 EMERGENCIES

4.1 EMERGENCY RESPONSE SERVICES

- | | | |
|-----|---|-----------------------|
| (1) | HOSPITAL
The Brooklyn Hospital Center
121 DeKalb Avenue
Brooklyn, NY 11201
(by Ashland Avenue) | (718) 250-8000 |
| (2) | AMBULANCE | 911 |
| (3) | FIRE DEPARTMENT
HAZARDOUS MATERIALS | 911 |
| (4) | POLICE DEPARTMENT | 911 |
| (5) | POISON CONTROL CENTER | (800) 222-1222 |

The preceding list and associated attached map (Figure 1) illustrating the fastest route to the nearest hospital must be conspicuously posted in areas of worker congregation and adjacent to all on-site telephones (if any).

4.2 EMERGENCY PROCEDURES

4.2.1 Contact or Exposure to Suspected Hazardous Materials

In the event of a fire, chemical discharge, medical emergency, workers are instructed to immediately notify the HSC and proper emergency services (posted). Should physical contact with unknown or questionable materials occur, immediately wash the affected body areas with clean water and notify the HSC. Anyone experiencing symptoms of exposure should exit the work area, notify the HSC, and seek medical attention.

4.2.2 Personnel Decontamination, First Aid, and Fire Protection

The first step in the treatment of skin exposure to most chemicals is to rinse the affected area with water. For this reason, adequate amounts of potable water and soap are maintained on-site in a clearly designated and readily-accessible location. Portable emergency eyewash stations and a first aid kit must be made available and maintained in the same locations as the potable water. Fire extinguishers are also to be maintained on-site in designated locations. All on-site personnel are to be made aware of the locations of the above-mentioned on-site Health & Safety accommodations during the initial Health and Safety briefing.

4.2.3 Ingress/egress

Clear paths of ingress/egress to work zones and site entrances/exits must be maintained at all times. Unauthorized personnel are restricted from accessing the site.

5.0 VAPOR EMISSIONS RESPONSE PLAN

If the ambient air concentration of organic vapors exceeds 5 mg/m^3 above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 mg/m^3 above background, work activities can resume. If the organic vapor levels are greater than 5 mg/m^3 over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- The organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 mg/m^3 over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Major Vapor Emission

If any organic levels greater than 5 mg/m^3 over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 mg/m^3 above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and, if organic vapor levels are approaching 5 mg/m³ above background for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 mg/m³ above background.

Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the Health & Safety Plan of the Corrective Action Plan will go into effect.
2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.
3. Frequent air monitoring will be conducted at 30 minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.

6.0 HEALTH & SAFETY PLAN REFERENCES

1. American Conference Governmental Industrial Hygienists, 1989; Threshold Limit Values and Biological Exposure Indices, 111 Pp.
2. Geoenvironmental Consultants, Inc.; 1987; Safety & Operations At Hazardous Materials Sites
3. NIOSH Guide To Chemical Hazards, 2002, US Department Of Health And Human Services, Centers For Disease Control
4. US Department Of Labor Occupational Safety & Health Administration, 1989; Hazardous Waste Operations And Emergency Response Interim Final Rule, 29 CFR Part 1910
5. Sax, N. I. Dangerous Properties Of Industrial Materials; © 1984

7.0 KEY PERSONNEL

<u>Responsibility</u>	<u>Name and Phone Number</u>	<u>Task Description</u>
Project Manager	<u>Eric Weinstock (516) 576-8844</u>	Oversee and coordinate all technical aspects for the project
Site Safety Officer	<u>Jason Cooper (516) 576-8844</u>	Coordinate and inspect all health and safety operations from the project site
Client Representative	<u>Andrew Bradfield (212) 431-5900</u>	
Project Manager Alternate	<u>Steve Sobstyl (516) 576-8844</u>	
Site Safety Officer Alternate	<u>Victoria Whelan (516) 576-8844</u>	

FIGURE



Notes

Trip to:

121 Dekalb Ave

Brooklyn, NY 11201-5425

1.17 miles / 3 minutes



882 Fulton St, Brooklyn, NY 11238-1707

Download
Free App



1. Start out going east on **Fulton St** toward **Waverly Ave**. [Map](#)

0.08 Mi

0.08 Mi Total



2. Turn **left** onto **Washington Ave**. [Map](#)

0.5 Mi

Washington Ave is just past Waverly Ave

0.5 Mi Total

Happy Happy Chinese Restrnt is on the corner

If you reach St James Pl you've gone a little too far



3. Turn **left** onto **De Kalb Ave / Dekalb Ave**. [Map](#)

0.6 Mi

De Kalb Ave is 0.1 miles past Lafayette Ave

1.2 Mi Total

If you reach Willoughby Ave you've gone about 0.1 miles too far



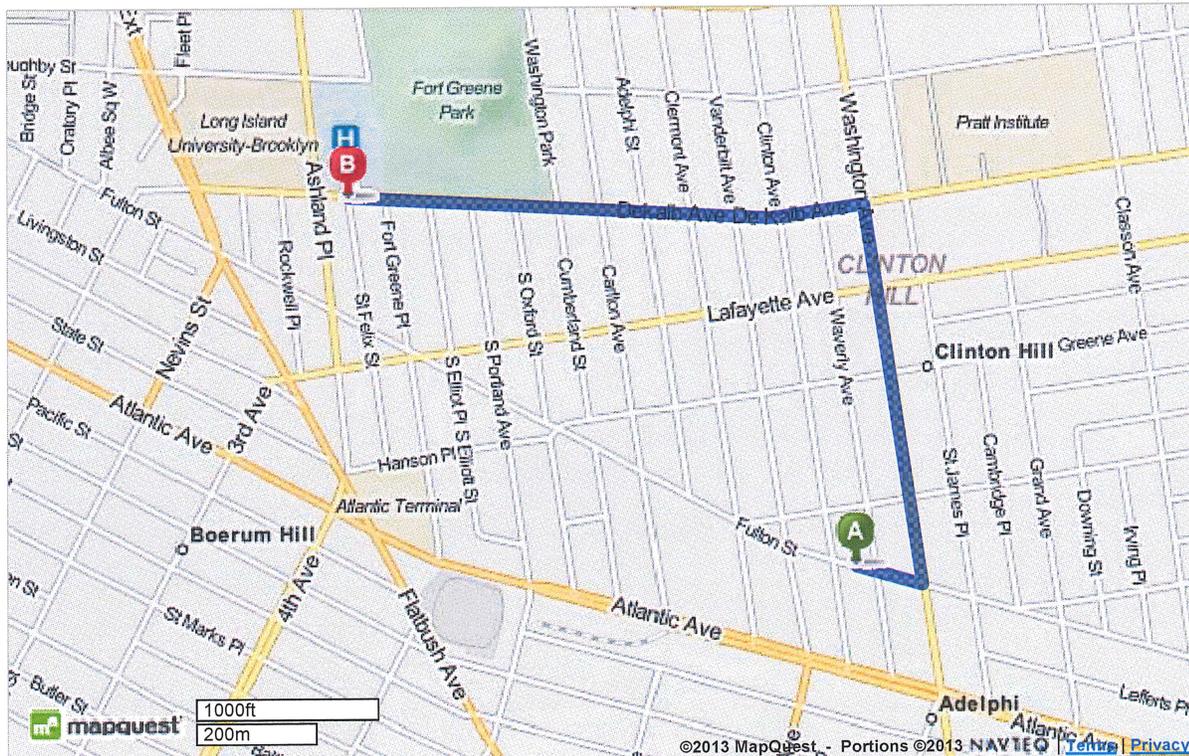
4. **121 DEKALB AVE** is on the **right**. [Map](#)

Your destination is just past Fort Greene Pl

If you reach Ashland Pl you've gone a little too far



121 Dekalb Ave, Brooklyn, NY 11201-5425



Appendix A

Toxicological Information



Search the Pocket Guide

SEARCH

Enter search terms separated by spaces.

Arsenic (inorganic compounds, as As)

Synonyms & Trade Names Arsenic metal: Arsenia

Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite and all inorganic compounds containing arsenic except ARSINE.]

CAS No. 7440-38-2 (metal)	RTECS No. CG0525000 (metal) (/niosh-rtecs/CG802C8.html)	DOT ID & Guide 1558 152 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=152) (http://www.cdc.gov/Other/disclaimer.html) (metal) 1562 152 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=152) (http://www.cdc.gov/Other/disclaimer.html) (dust)
Formula As (metal)	Conversion	IDLH Ca [5 mg/m ³ (as As)] See: 7440382 (/niosh/idlh/7440382.html)
Exposure Limits NIOSH REL : Ca C 0.002 mg/m ³ [15-minute] See Appendix A (nengapdx.html) OSHA PEL : [1910.1018] TWA 0.010 mg/m ³		Measurement Methods NIOSH 7300 (/niosh/docs/2003-154/pdfs/7300.pdf), 7301 (/niosh/docs/2003-154/pdfs/7301.pdf), 7303 (/niosh/docs/2003-154/pdfs/7303.pdf), 7900 (/niosh/docs/2003-154/pdfs/7900.pdf), 9102 (/niosh/docs/2003-154/pdfs/9102.pdf); OSHA ID105 (http://www.osha.gov/dts/sltc/methods/inorganic/id105/id105.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)

Physical Description Metal: Silver-gray or tin-white, brittle, odorless solid.

MW: 74.9	BP: Sublimes	MLT: 1135°F (Sublimes)	Sol: Insoluble	VP: 0 mmHg (approx)	IP: NA
Sp.Gr: 5.73 (metal)	Fl.P: NA	UEL: NA	LEL: NA		

Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.

Incompatibilities & Reactivities Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]

Exposure Routes inhalation, skin absorption, skin and/or eye contact, ingestion

Symptoms Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]

Target Organs Liver, kidneys, skin, lungs, lymphatic system

Cancer Site [lung & lymphatic cancer]

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See [procedures \(firstaid.html\)](#))
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations
 (See [Appendix E \(nengapdx.html\)](#))

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0013 \(/niosh/ipcsneng/neng0013.html\)](#)
 See [MEDICAL TESTS: 0017 \(/niosh/docs/2005-110/nmed0017.html\)](#)

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Lead

Synonyms & Trade Names

Lead metal, Plumbum

CAS No. 7439-92-1	RTECS No. OF7525000 (/niosh-rtecs/OF72D288.html)	DOT ID & Guide
Formula Pb	Conversion	IDLH 100 mg/m ³ (as Pb) See: 7439921 (/niosh/idlh/7439921.html)

Exposure Limits

NIOSH REL *: TWA (8-hour) 0.050 mg/m³ [See Appendix C \(nengapdxc.html\)](#) [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]
OSHA PEL *: [1910.1025] TWA 0.050 mg/m³ [See Appendix C \(nengapdxc.html\)](#) [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]

Measurement Methods

NIOSH 7082 (</niosh/docs/2003-154/pdfs/7082.pdf>), **7105** (</niosh/docs/2003-154/pdfs/7105.pdf>), **7300** (</niosh/docs/2003-154/pdfs/7300.pdf>), **7301** (</niosh/docs/2003-154/pdfs/7301.pdf>), **7303** (</niosh/docs/2003-154/pdfs/7303.pdf>), **7700** (</niosh/docs/2003-154/pdfs/7700.pdf>), **7701** (</niosh/docs/2003-154/pdfs/7701.pdf>), **7702** (</niosh/docs/2003-154/pdfs/7702.pdf>), **9100** (</niosh/docs/2003-154/pdfs/9100.pdf>), **9102** (</niosh/docs/2003-154/pdfs/9102.pdf>), **9105** (</niosh/docs/2003-154/pdfs/9105.pdf>);
OSHA ID121
(<http://www.osha.gov/dts/sltc/methods/inorganic/id121/id121.html>)
 (<http://www.cdc.gov/Other/disclaimer.html>), **ID125G**
(<http://www.osha.gov/dts/sltc/methods/inorganic/id125g/id125g.html>)
 (<http://www.cdc.gov/Other/disclaimer.html>), **ID206**
(<http://www.osha.gov/dts/sltc/methods/inorganic/id206/id206.html>)
 (<http://www.cdc.gov/Other/disclaimer.html>)
See: [NMAM \(/niosh/docs/2003-154/\)](/niosh/docs/2003-154/) or [OSHA Methods \(http://www.osha.gov/dts/sltc/methods/index.html\)](http://www.osha.gov/dts/sltc/methods/index.html)
(<http://www.cdc.gov/Other/disclaimer.html>)

Physical Description

A heavy, ductile, soft, gray solid.

MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble	VP: 0 mmHg (approx)	IP: NA
Sp.Gr: 11.34	Fl.P: NA	UEL: NA	LEL: NA		

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities

Strong oxidizers, hydrogen peroxide, acids



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Mercury compounds [except (organo) alkyls] (as Hg)

Synonyms & Trade Names Mercury metal: Colloidal mercury, Metallic mercury, Quicksilver
Synonyms of "other" Hg compounds vary depending upon the specific compound.

CAS No. 7439-97-6 (metal)

RTECS No.
OV4550000 (metal)
(/niosh-rtecs/OV456D7o.html)

DOT ID & Guide 2809 172 (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=172>)
(<http://www.cdc.gov/Other/disclaimer.html>) (metal)

Formula Hg
(metal)

Conversion

IDLH 10 mg/m³ (as Hg)
See: 7439976 (/niosh/idlh/7439976.html)

Exposure Limits

NIOSH REL :

Hg Vapor: TWA 0.05 mg/m³ [skin]
Other: C 0.1 mg/m³ [skin]

OSHA PEL † ([nengapdxg.html](http://www.nengapdxg.html)): TWA 0.1 mg/m³

Measurement Methods

NIOSH 6009  (/niosh/docs/2003-154/pdfs/6009.pdf);

OSHA ID140

(<http://www.osha.gov/dts/sltc/methods/inorganic/id140/id140.html>)
 (<http://www.cdc.gov/Other/disclaimer.html>)

See: **NMAM** (/niosh/docs/2003-154/) or **OSHA Methods**
(<http://www.osha.gov/dts/sltc/methods/index.html>)
(<http://www.cdc.gov/Other/disclaimer.html>)

Physical Description Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.]

MW:
200.6

BP:
674°F

FRZ:
-38°F

Sol:
Insoluble

VP: 0.0012 mmHg

IP: ?

Sp.Gr:
13.6
(metal)

Fl.P:
NA

UEL:
NA

LEL: NA

Metal: Noncombustible Liquid

Incompatibilities & Reactivities Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria

Target Organs Eyes, skin, respiratory system, central nervous system, kidneys

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))

Skin: Prevent skin contact

Eyes: No recommendation

Wash skin: When contaminated

Remove: When wet or contaminated

Change: Daily

First Aid (See [procedures \(firstaid.html\)](#))

Eye: Irrigate immediately

Skin: Soap wash promptly

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations

Mercury vapor:

NIOSH

Up to 0.5 mg/m³:

(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern[†]

(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m³:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern[†](canister)

Up to 2.5 mg/m³:

(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern[†]

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern[†]

(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern(canister)

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m³:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

Any appropriate escape-type, self-contained breathing apparatus

Other mercury compounds: NIOSH/OSHA

Up to 1 mg/m³:

(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern[†]

(APF = 10) Any supplied-air respirator

Up to 2.5 mg/m³:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister)

Up to 5 mg/m³:

(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†

(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern(canister)

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Up to 10 mg/m³:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0056](#)

[\(/niosh/ipcsneng/neng0056.html\)](#) See MEDICAL TESTS: [0136 \(/niosh/docs/2005-110/nmed0136.html\)](#)

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Chromium metal

Synonyms & Trade Names Chrome, Chromium

CAS No. 7440-47-3	RTECS No. GB4200000 (/niosh-rtecs/GB401640.html)	DOT ID & Guide
Formula Cr	Conversion	IDLH 250 mg/m ³ (as Cr) See: 7440473 (/niosh/idlh/7440473.html)
Exposure Limits NIOSH REL : TWA 0.5 mg/m ³ See Appendix C (nengapdx.html) OSHA PEL *: TWA 1 mg/m ³ See Appendix C (nengapdx.html) [*Note: The PEL also applies to insoluble chromium salts.]		Measurement Methods NIOSH 7024 (/niosh/docs/2003-154/pdfs/7024.pdf), 7300 (/niosh/docs/2003-154/pdfs/7300.pdf), 7301 (/niosh/docs/2003-154/pdfs/7301.pdf), 7303 (/niosh/docs/2003-154/pdfs/7303.pdf), 9102 (/niosh/docs/2003-154/pdfs/9102.pdf) ; OSHA ID121 http://www.osha.gov/dts/sltc/methods/inorganic/id121/id121.html (http://www.cdc.gov/Other/disclaimer.html), ID125G http://www.osha.gov/dts/sltc/methods/inorganic/id125g/id125g.html (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods http://www.osha.gov/dts/sltc/methods/index.html http://www.cdc.gov/Other/disclaimer.html

Physical Description Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.

MW: 52.0	BP: 4788°F	MLT: 3452°F	Sol: Insoluble	VP: 0 mmHg (approx)	IP: NA
Sp.Gr: 7.14	Fl.P: NA	UEL: NA	LEL: NA		

Noncombustible Solid in bulk form, but finely divided dust burns rapidly if heated in a flame.

Incompatibilities & Reactivities Strong oxidizers (such as hydrogen peroxide), alkalis

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin; lung fibrosis (histologic)

Target Organs Eyes, skin, respiratory system

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))**Skin:** No recommendation**Eyes:** No recommendation**Wash skin:** No recommendation**Remove:** No recommendation**Change:** No recommendation**First Aid** (See [procedures \(firstaid.html\)](#))**Eye:** Irrigate immediately**Skin:** Soap wash**Breathing:** Respiratory support**Swallow:** Medical attention immediately**Respirator Recommendations****NIOSH****Up to 2.5 mg/m³:**

(APF = 5) Any quarter-mask respirator.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.***Up to 5 mg/m³:**

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.*

(APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m³:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.*

Up to 25 mg/m³:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Up to 250 mg/m³:

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](/niosh/npg/pgintrod.html) See ICSC CARD: [0029 \(/niosh/ipcsneng/neng0029.html\)](/niosh/ipcsneng/neng0029.html)

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Chromium(III) compounds (as Cr)

Synonyms & Trade Names Synonyms vary depending upon the specific Chromium(III) compound. [Note: Chromium(III) compounds include soluble chromic salts.]

CAS No.	RTECS No.	DOT ID & Guide
	Conversion	IDLH 25 mg/m ³ [as Cr(III)] See: cr3m3 (/niosh/idlh/cr3m3.html)
Exposure Limits NIOSH REL : TWA 0.5 mg/m ³ See Appendix C (nengapdxc.html) OSHA PEL : TWA 0.5 mg/m ³ See Appendix C (nengapdxc.html)		Measurement Methods NIOSH 7024  (/niosh/docs/2003-154/pdfs/7024.pdf), 7300  (/niosh/docs/2003-154/pdfs/7300.pdf), 7301  (/niosh/docs/2003-154/pdfs/7301.pdf), 7303  (/niosh/docs/2003-154/pdfs/7303.pdf), 9102  (/niosh/docs/2003-154/pdfs/9102.pdf) ; OSHA ID121 http://www.osha.gov/dts/sltc/methods/inorganic/id121/id121.html  (http://www.cdc.gov/Other/disclaimer.html), ID125G http://www.osha.gov/dts/sltc/methods/inorganic/id125g/id125g.html  (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods http://www.osha.gov/dts/sltc/methods/index.html  http://www.cdc.gov/Other/disclaimer.html

Physical Description Appearance and odor vary depending upon the specific compound.

Properties vary depending upon the specific compound.				

Incompatibilities & Reactivities Varies**Exposure Routes** inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes; sensitization dermatitis

Target Organs Eyes, skin

Personal

Protection/Sanitation (See [protection codes](#) ([protect.html](#)))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet or contaminated

Change: No recommendation

First Aid (See [procedures \(firstaid.html\)](#))

Eye: Irrigate immediately

Skin: Water flush promptly

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations

NIOSH/OSHA

Up to 2.5 mg/m³:

(APF = 5) Any quarter-mask respirator.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.*

Up to 5 mg/m³:

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.*

(APF = 10) Any supplied-air respirator*

Up to 12.5 mg/m³:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode*

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.*

Up to 25 mg/m³:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-

contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See [MEDICAL TESTS: 0052 \(/niosh/docs/2005-110/nmed0052.html\)](#)

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Benzene

Synonyms & Trade Names Benzol, Phenyl hydride

CAS No. 71-43-2	RTECS No. CY1400000 (/niosh-rtecs/CY155CCo.html)	DOT ID & Guide 1114 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=130) (http://www.cdc.gov/Other/disclaimer.html)
Formula C ₆ H ₆	Conversion 1 ppm = 3.19 mg/m ³	IDLH Ca [500 ppm] See: 71432 (/niosh/idlh/71432.html)

Exposure Limits

NIOSH REL : Ca TWA 0.1 ppm ST 1 ppm See [Appendix A \(nengapdx.html\)](http://www.niosh.gov/AppendixA/nengapdx.html)
OSHA PEL : [1910.1028] TWA 1 ppm ST 5 ppm See [Appendix F \(nengapdx.html\)](http://www.niosh.gov/AppendixF/nengapdx.html)

Measurement Methods

NIOSH 1500 ([/niosh/docs/2003-154/pdfs/1500.pdf](http://www.niosh.gov/docs/2003-154/pdfs/1500.pdf)), **1501** ([/niosh/docs/2003-154/pdfs/1501.pdf](http://www.niosh.gov/docs/2003-154/pdfs/1501.pdf)), **3700** ([/niosh/docs/2003-154/pdfs/3700.pdf](http://www.niosh.gov/docs/2003-154/pdfs/3700.pdf)), **3800** ([/niosh/docs/2003-154/pdfs/3800.pdf](http://www.niosh.gov/docs/2003-154/pdfs/3800.pdf));
OSHA 12
(<http://www.osha.gov/dts/sltc/methods/organic/org012/org012.html>)
 (<http://www.cdc.gov/Other/disclaimer.html>), **1005**
(<http://www.osha.gov/dts/sltc/methods/validated/1005/1005.html>)
 (<http://www.cdc.gov/Other/disclaimer.html>)
See: **NMAM** ([/niosh/docs/2003-154/](http://www.niosh.gov/docs/2003-154/)) or **OSHA Methods**
(<http://www.osha.gov/dts/sltc/methods/index.html>)
(<http://www.cdc.gov/Other/disclaimer.html>)

Physical Description Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]

MW: 78.1	BP: 176°F	FRZ: 42°F	Sol: 0.07%	VP: 75 mmHg	IP: 9.24 eV
Sp.Gr: 0.88	Fl.P: 12°F	UEL: 7.8%	LEL: 1.2%		

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities Strong oxidizers, many fluorides & perchlorates, nitric acid

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs Eves. skin. respiratory system. blood. central nervous system. bone marrow

Cancer Site [leukemia]**Personal Protection/Sanitation** (See [protection codes \(protect.html\)](#))**Skin:** Prevent skin contact**Eyes:** Prevent eye contact**Wash skin:** When contaminated**Remove:** When wet (flammable)**Change:** No recommendation**Provide:** Eyewash, Quick drench**First Aid** (See [procedures \(firstaid.html\)](#))**Eye:** Irrigate immediately**Skin:** Soap wash immediately**Breathing:** Respiratory support**Swallow:** Medical attention immediately**Respirator Recommendations**(See [Appendix E \(nengapdx.html\)](#))**NIOSH****At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0015 \(/niosh/ipcsneng/nengo015.html\)](#) See MEDICAL TESTS: [0022 \(/niosh/docs/2005-110/nmed0022.html\)](#)

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Ethyl benzene

Synonyms & Trade Names Ethylbenzol, Phenylethane

CAS No. 100-41-4	RTECS No. DAO700000 (/niosh- rtecs/DAAAE6o.html)	DOT ID & Guide 1175 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=130) (http://www.cdc.gov/Other/disclaimer.html)
Formula CH ₃ CH ₂ C ₆ H ₅	Conversion 1 ppm = 4.34 mg/m ³	IDLH 800 ppm [10%LEL] See: 100414 (/niosh/idlh/100414.html)
Exposure Limits NIOSH REL : TWA 100 ppm (435 mg/m ³) ST 125 ppm (545 mg/m ³) OSHA PEL † (nengapdxg.html): TWA 100 ppm (435 mg/m ³)		Measurement Methods NIOSH 1501 (/niosh/docs/2003-154/pdfs/1501.pdf); OSHA 7 (http://www.osha.gov/dts/sltc/methods/organic/org001/org001.html) (http://www.cdc.gov/Other/disclaimer.html), 1002 (http://www.osha.gov/dts/sltc/methods/mdt/mdt1002/1002.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)

Physical Description Colorless liquid with an aromatic odor.

MW: 106.2	BP: 277°F	FRZ: -139°F	Sol: 0.01%	VP: 7 mmHg	IP: 8.76 eV
Sp.Gr: 0.87	Fl.P: 55°F	UEL: 6.7%	LEL: 0.8%		

Class IB Flammable Liquid: FLP. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities Strong oxidizers

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

Personal Protection/Sanitation (See [protection codes \(protect.html\)](http://www.cdc.gov/Other/disclaimer.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet (flammable)

Change: No recommendation

First Aid (See [procedures \(firstaid.html\)](http://www.cdc.gov/Other/disclaimer.html))

Eye: Irrigate immediately

Skin: Water flush promptly

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations**NIOSH/OSHA****Up to 800 ppm:**

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

(APF = 10) Any supplied-air respirator*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0268 \(/niosh/ipcsneng/nengo268.html\)](#)
See MEDICAL TESTS: [0098 \(/niosh/docs/2005-110/nmed0098.html\)](#)

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m-Xylene

Synonyms & Trade Names 1,3-Dimethylbenzene; meta-Xylene; m-Xylol

CAS No. 108-38-3	RTECS No. ZE2275000 (/niosh-rtecs/ZE22B6B8.html)	DOT ID & Guide 1307 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=130) (http://www.cdc.gov/Other/disclaimer.html)
Formula C ₆ H ₄ (CH ₃) ₂	Conversion 1 ppm = 4.34 mg/m ³	IDLH 900 ppm See: 95476 (/niosh/idlh/95476.html)
Exposure Limits NIOSH REL : TWA 100 ppm (435 mg/m ³) ST 150 ppm (655 mg/m ³) OSHA PEL † (nengapdxg.html): TWA 100 ppm (435 mg/m ³)		Measurement Methods NIOSH 1501 (/niosh/docs/2003-154/pdfs/1501.pdf), 3800 (/niosh/docs/2003-154/pdfs/3800.pdf); OSHA 1002 (http://www.osha.gov/dts/sltc/methods/mdt/mdt1002/1002.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)

Physical Description Colorless liquid with an aromatic odor.

MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight	VP: 9 mmHg	IP: 8.56 eV
Sp.Gr: 0.86	Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%		

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities Strong oxidizers, strong acids

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)

First Aid (See [procedures \(firstaid.html\)](#))
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Change: No recommendation

Respirator Recommendations

NIOSH/OSHA

Up to 900 ppm:

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

(APF = 10) Any supplied-air respirator*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0085 \(/niosh/ipcsneng/neng0085.html\)](#)

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o-Xylene

Synonyms & Trade Names 1,2-Dimethylbenzene; ortho-Xylene; o-Xylol

CAS No. 95-47-6

RTECS No.
[ZE2450000 \(/niosh-rtecs/ZE256250.html\)](#)

DOT ID & Guide 1307 130 (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=130>) [☒](#)
(<http://www.cdc.gov/Other/disclaimer.html>)

Formula C₆H₄(CH₃)₂

Conversion 1 ppm =
4.34 mg/m³

IDLH 900 ppm
See: [95476 \(/niosh/idlh/95476.html\)](#)

Exposure Limits

NIOSH REL : TWA 100 ppm (435 mg/m³)
ST 150 ppm (655 mg/m³)
OSHA PEL † ([nengapdxg.html](#)): TWA 100 ppm
(435 mg/m³)

Measurement Methods

NIOSH 1501 [☒](#) ([/niosh/docs/2003-154/pdfs/1501.pdf](#)),
3800 [☒](#) ([/niosh/docs/2003-154/pdfs/3800.pdf](#));
OSHA 1002
(<http://www.osha.gov/dts/sltc/methods/mdt/mdt1002/1002.html>)
[☒](#) (<http://www.cdc.gov/Other/disclaimer.html>)
See: **NMAM** ([/niosh/docs/2003-154/](#)) or **OSHA Methods**
(<http://www.osha.gov/dts/sltc/methods/index.html>) [☒](#)
(<http://www.cdc.gov/Other/disclaimer.html>)

Physical Description Colorless liquid with an aromatic odor.

MW:
106.2

BP:
292°F

FRZ:
-13°F

Sol:
0.02%

VP: 7 mmHg

IP: 8.56 eV

Sp.Gr:
0.88

Fl.P:
90°F

UEL:
6.7%

LEL:
0.9%

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities Strong oxidizers, strong acids

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet (flammable)

First Aid (See [procedures \(firstaid.html\)](#))

Eye: Irrigate immediately

Skin: Soap wash promptly

Breathing: Respiratory support

Swallow: Medical attention immediately

RECOMMENDATION: ~~None~~ (None)

Change: No recommendation

Respirator Recommendations

NIOSH/OSHA

Up to 900 ppm:

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

(APF = 10) Any supplied-air respirator*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0084 \(/niosh/ipcsneng/neng0084.html\)](#)

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p-Xylene

Synonyms & Trade Names 1,4-Dimethylbenzene; para-Xylene; p-Xylol

CAS No. 106-42-3	RTECS No. ZE2625000 (/niosh-rtecs/ZE280DE8.html)	DOT ID & Guide 1307 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=130) (http://www.cdc.gov/Other/disclaimer.html)
Formula C ₆ H ₄ (CH ₃) ₂	Conversion 1 ppm = 4.41 mg/m ³	IDLH 900 ppm See: 95476 (/niosh/idlh/95476.html)
Exposure Limits NIOSH REL : TWA 100 ppm (435 mg/m ³) ST 150 ppm (655 mg/m ³) OSHA PEL † (nengapdxg.html): TWA 100 ppm (435 mg/m ³)		Measurement Methods NIOSH 1501 (/niosh/docs/2003-154/pdfs/1501.pdf), 3800 (/niosh/docs/2003-154/pdfs/3800.pdf); OSHA 1002 (http://www.osha.gov/dts/sltc/methods/mdt/mdt1002/1002.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)

Physical Description Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

MW: 106.2	BP: 281°F	FRZ: 56°F	Sol: 0.02%	VP: 9 mmHg	IP: 8.44 eV
Sp.Gr: 0.86	Fl.P: 81°F	UEL: 7.0%	LEL: 1.1%		

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities Strong oxidizers, strong acids

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)

First Aid (See [procedures \(firstaid.html\)](#))
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Change: No recommendation

Respirator Recommendations

NIOSH/OSHA

Up to 900 ppm:

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

(APF = 10) Any supplied-air respirator*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0086 \(/niosh/ipcsneng/neng0086.html\)](#)

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Chlorodiphenyl (54% chlorine)

Synonyms & Trade Names Aroclor® 1254, PCB, Polychlorinated biphenyl

CAS No. 11097-69-1	RTECS No. TQ1360000 (/niosh-rtecs/TQ14Co80.html)	DOT ID & Guide 2315 171 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=171) (http://www.cdc.gov/Other/disclaimer.html)
Formula C ₆ H ₃ Cl ₂ C ₆ H ₂ Cl ₃ (approx)	Conversion	IDLH Ca [5 mg/m ³] See: IDLH INDEX (/idlh/intridl4.html)
Exposure Limits NIOSH REL *: Ca TWA 0.001 mg/m ³ See Appendix A (nengapdx.html) [*Note: The REL also applies to other PCBs.] OSHA PEL : TWA 0.5 mg/m ³ [skin]		Measurement Methods NIOSH 5503 (/niosh/docs/2003-154/pdfs/5503.pdf); OSHA PV2088 (http://www.osha.gov/dts/sltc/methods/partial/t-pv2088-01-8812-ch/t-pv2088-01-8812-ch.html) (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html)

Physical Description Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.

MW: 326 (approx)	BP: 689-734°F	FRZ: 50°F	Sol: Insoluble	VP: 0.00006 mmHg	IP: ?
Sp.Gr(77°F): 1.38	Fl.P: NA	UEL: NA	LEL: NA		

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities Strong oxidizers**Exposure Routes** inhalation, skin absorption, ingestion, skin and/or eye contact**Symptoms** irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Chlorodiphenyl

Target Organs Skin, eyes, liver, reproductive system

Cancer Site [in animals: tumors of the pituitary gland & liver, leukemia]

Personal Protection/Sanitation (See protection codes (protect.html))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet or contaminated

Change: Daily

Provide: Eyewash, Quick drench

First Aid (See procedures (firstaid.html))

Eye: Irrigate immediately

Skin: Soap wash immediately

Breathing: Respiratory support

Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.

[Click here \(pgintrod.html#nrp\)](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0939](#)

[\(/niosh/ipcsneng/nengo939.html\)](#) See MEDICAL TESTS: [0176 \(/niosh/docs/2005-110/nmed0176.html\)](#)

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Tetrachloroethylene

Synonyms & Trade Names Perchloroethylene, Perchloroethylene, Perk, Tetrachlorethylene

CAS No. 127-18-4	RTECS No. KX3850000 (/niosh-rtecs/KX3ABF10.html)	DOT ID & Guide 1897 160 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=160) (http://www.cdc.gov/Other/disclaimer.html)
Formula Cl ₂ C=CCl ₂	Conversion 1 ppm = 6.78 mg/m ³	IDLH Ca [150 ppm] See: 127184 (/niosh/idlh/127184.html)
Exposure Limits NIOSH REL : Ca Minimize workplace exposure concentrations. See Appendix A (nengapdx.html) OSHA PEL † (nengapdxg.html): TWA 100 ppm C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm		Measurement Methods NIOSH 1003 (/niosh/docs/2003-154/pdfs/1003.pdf); OSHA 1001 http://www.osha.gov/dts/sltc/methods/mdt/mdt1001/1001.html (http://www.cdc.gov/Other/disclaimer.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods http://www.osha.gov/dts/sltc/methods/index.html http://www.cdc.gov/Other/disclaimer.html

Physical Description Colorless liquid with a mild, chloroform-like odor.

MW: 165.8	BP: 250°F	FRZ: -2°F	Sol: 0.02%	VP: 14 mmHg	IP: 9.32 eV
Sp.Gr: 1.62	Fl.P: NA	UEL: NA	LEL: NA		

Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.

Incompatibilities & Reactivities Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: liver tumors]

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))**Skin:** Prevent skin contact**Eyes:** Prevent eye contact**Wash skin:** When contaminated**Remove:** When wet or contaminated**Change:** No recommendation**Provide:** Eyewash, Quick drench**First Aid** (See [procedures \(firstaid.html\)](#))**Eye:** Irrigate immediately**Skin:** Soap wash promptly**Breathing:** Respiratory support**Swallow:** Medical attention immediately**Respirator Recommendations****NIOSH****At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0076](#)[\(/niosh/ipcsneng/neng0076.html\)](#) See MEDICAL TESTS: [0179 \(/niosh/docs/2005-110/nmedo179.html\)](#)

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Trichloroethylene

Synonyms & Trade Names Ethylene trichloride, TCE, Trichloroethene, Trilene**CAS No.** 79-01-6**RETECS No.** [KX456D70](http://www.niosh-rtecs.com/KX456D70.html)
([/niosh-rtecs/KX456D70.html](http://www.niosh-rtecs.com/KX456D70.html))**DOT ID & Guide** 1710 160 (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=160>)
(<http://www.cdc.gov/Other/disclaimer.html>)**Formula** ClCH=CCl₂**Conversion** 1 ppm = 5.37 mg/m³**IDLH** Ca [1000 ppm]
See: [79016](http://www.niosh.gov/IDLH/79016.html) ([/niosh/idlh/79016.html](http://www.niosh.gov/IDLH/79016.html))**Exposure Limits****NIOSH REL** : Ca See Appendix A ([nengapdx.html](http://www.niosh.gov/AppendixA.html))
See Appendix C ([nengapdx.html](http://www.niosh.gov/AppendixC.html))**OSHA PEL** † ([nengapdx.html](http://www.niosh.gov/AppendixG.html)): TWA 100 ppm C
200 ppm 300 ppm (5-minute maximum peak
in any 2 hours)**Measurement Methods****NIOSH 1022** ([/niosh/docs/2003-154/pdfs/1022.pdf](http://www.niosh.gov/docs/2003-154/pdfs/1022.pdf)),
3800 ([/niosh/docs/2003-154/pdfs/3800.pdf](http://www.niosh.gov/docs/2003-154/pdfs/3800.pdf));**OSHA 1001**<http://www.osha.gov/dts/sltc/methods/mdt/mdt1001/1001.html> (<http://www.cdc.gov/Other/disclaimer.html>)See: **NMAM** ([/niosh/docs/2003-154/](http://www.niosh.gov/docs/2003-154/)) or **OSHA Methods**<http://www.osha.gov/dts/sltc/methods/index.html> <http://www.cdc.gov/Other/disclaimer.html>**Physical Description** Colorless liquid (unless dyed blue) with a chloroform-like odor.**MW:**
131.4**BP:**
189°F**FRZ:** -99°F**Sol:** 0.1%**VP:** 58 mmHg**IP:** 9.45 eV**Sp.Gr:**
1.46**Fl.P:** ?**UEL(77°F):**
10.5%**LEL(77°F):**
8%

Combustible Liquid, but burns with difficulty.

Incompatibilities & Reactivities Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)**Exposure Routes** inhalation, skin absorption, ingestion, skin and/or eye contact**Symptoms** irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]**Target Organs** Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system**Cancer Site** [in animals: liver & kidney cancer]**Personal Protection/Sanitation** (See [protection codes](http://www.niosh.gov/protect.html) ([protect.html](http://www.niosh.gov/protect.html)))**First Aid** (See [procedures](http://www.niosh.gov/firstaid.html) ([firstaid.html](http://www.niosh.gov/firstaid.html)))**Eye:** Irrigate immediately

Control Measures

Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid Measures

Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0081 \(/niosh/ipcsneng/neng0081.html\)](#)

See MEDICAL TESTS: [0236 \(/niosh/docs/2005-110/nmedo236.html\)](#)

Page last reviewed: April 4, 2011

Page last updated: November 18, 2010

Content source: [National Institute for Occupational Safety and Health \(NIOSH\)](#) Education and Information Division

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Search the Pocket Guide

Enter search terms separated by spaces.

Toluene

Synonyms & Trade Names Methyl benzene, Methyl benzol, Phenyl methane, Toluol

CAS No. 108-88-3

RTECS No.
[XS5250000 \(/niosh-rtecs/XS501BDo.html\)](#)

DOT ID & Guide 1294 **130** (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=130>)
(<http://www.cdc.gov/Other/disclaimer.html>)

Formula C₆H₅CH₃

Conversion 1 ppm =
3.77 mg/m³

IDLH 500 ppm
See: [108883 \(/niosh/idlh/108883.html\)](#)

Exposure Limits

NIOSH REL : TWA 100 ppm (375 mg/m³)

ST 150 ppm (560 mg/m³)

OSHA PEL † ([nengapdxg.html](#)): TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)

Measurement Methods

NIOSH 1500 ([/niosh/docs/2003-154/pdfs/1500.pdf](#)), **1501**

([/niosh/docs/2003-154/pdfs/1501.pdf](#)), **3800**

([/niosh/docs/2003-154/pdfs/3800.pdf](#)), **4000**

([/niosh/docs/2003-154/pdfs/4000.pdf](#));

OSHA 111

(<http://www.osha.gov/dts/sltc/methods/organic/org111/org111.html>)

(<http://www.cdc.gov/Other/disclaimer.html>)

See: **NMAM** ([/niosh/docs/2003-154/](#)) or **OSHA Methods**

(<http://www.osha.gov/dts/sltc/methods/index.html>)

(<http://www.cdc.gov/Other/disclaimer.html>)

Physical Description Colorless liquid with a sweet, pungent, benzene-like odor.

MW:

92.1

BP:

232°F

FRZ:

-139°F

Sol(74°F):

0.07%

VP: 21 mmHg

IP: 8.82 eV

Sp.Gr:

0.87

Fl.P:

40°F

UEL:

7.1%

LEL: 1.1%

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities Strong oxidizers

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

Personal Protection/Sanitation (See [protection codes \(protect.html\)](#))

Skin: Prevent skin contact

First Aid (See [procedures \(firstaid.html\)](#))

Eye: Irrigate immediately

Skin: Soap wash promptly

Eyes: Prevent eye contact**Wash skin:** When contaminated**Remove:** When wet (flammable)**Change:** No recommendation**Breathing:** Respiratory support**Swallow:** Medical attention immediately**Respirator Recommendations****NIOSH****Up to 500 ppm:**

(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*

(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

(APF = 10) Any supplied-air respirator*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection \(pgintrod.html#mustread\)](#)See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](#) See ICSC CARD: [0078](#)([/niosh/ipcsneng/neng0078.html](#)) See MEDICAL TESTS: [0232 \(/niosh/docs/2005-110/nmedo232.html\)](#)

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APPENDIX 5
Proposed Development Plan

**502 Waverly Avenue,
Brooklyn, NY 11238
A.K.A. 882 Fulton Street**

OWNER
500 Waverly Property Owner L.L.C.
c/o Orange Management Inc.
6 West 14th Street, 2nd Floor
New York, NY 10011
Tel: 212-431-5900

ARCHITECT
Gerner Kronick + Valcarol
443 Park Avenue South, 2nd Floor
New York, NY 10016
Tel: 212 679-6362

CONSTRUCTION MANAGER
Ryder Construction Incorporated
519 Eighth Avenue
New York, NY 10018
Tel: 212 465 8700

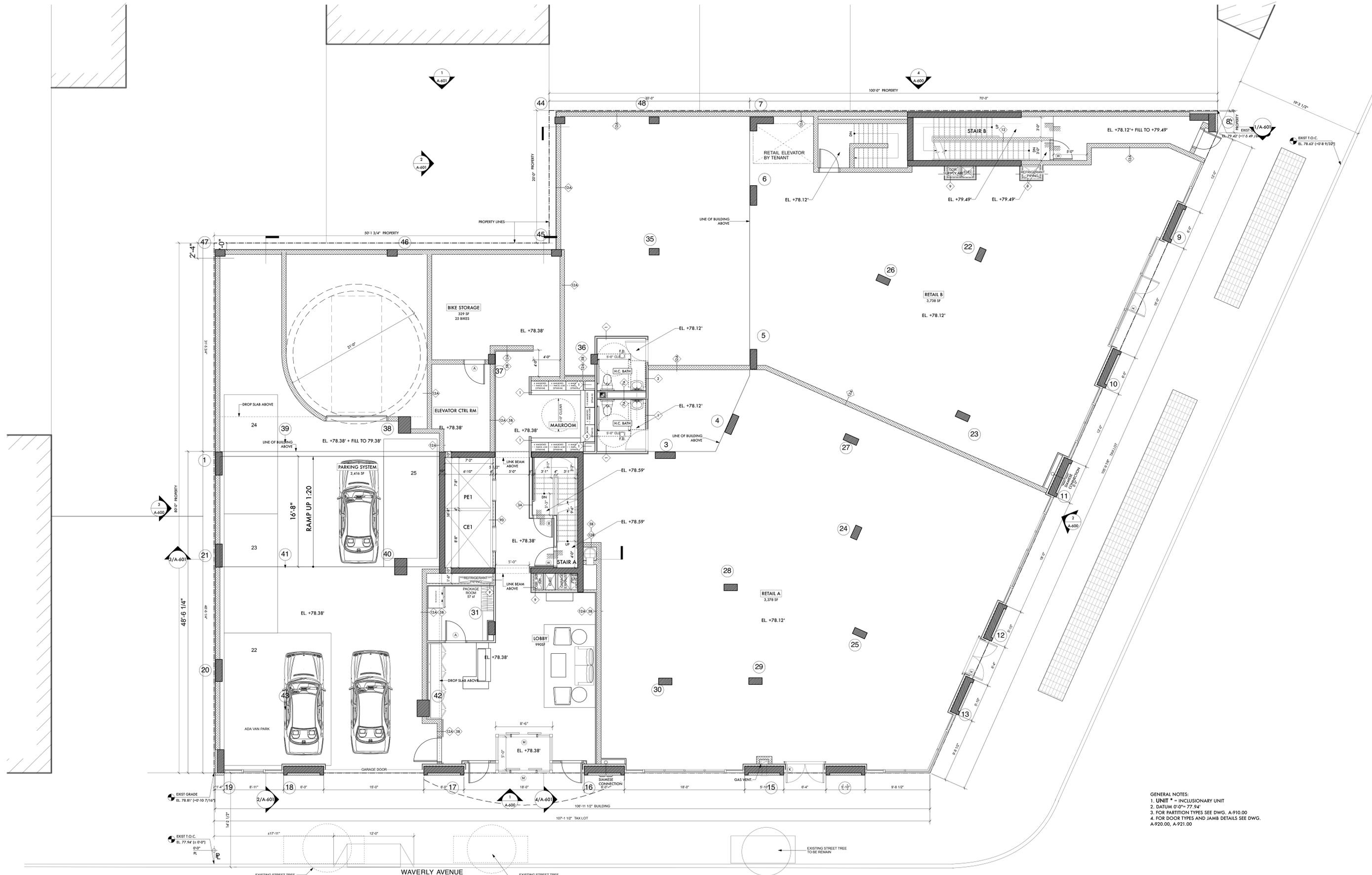
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226 East Merrick Road
Valley Stream, NY 11580
Tel: 516 256-0317

STRUCTURAL ENGINEER
WSP
228 East 45th Street
New York, NY 10017
Tel: 212 687-9888

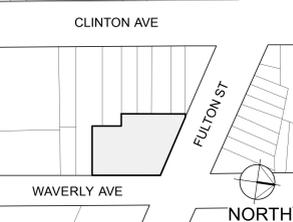
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545 8th Avenue,
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Tel: 212-643-8006

SOE ENGINEER
FNA Associates
165 Passaic Avenue, Suite 306
Fairfield, NJ 07004
Tel: 201 241-2444

GEOTECHNICAL ENGINEER
Langan Engineering
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, NY 10001
Tel: 212 479 5400



GENERAL NOTES:
1. UNIT * = INCLUSIONARY UNIT
2. DATUM 0'-0" = 77.94'
3. FOR PARTITION TYPES SEE DWG. A-910.00
4. FOR DOOR TYPES AND JAMB DETAILS SEE DWG. A-920.00, A-921.00



Revisions

No.	Issue	Date

5. 50% CD ISSUE FOR REVIEW	06/16/14	
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3. ISSUE FOR HPD REVIEW	06/03/14	
2. ISSUE FOR D.D.	05/07/14	
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No.	Issue	Date

GKV Project 1062-01
Scale: 1/4"=1'-0"

Drawing Title:
**GROUND FLOOR
CONSTRUCTION PLAN**

Drawing No.
A-101.00

Sheet No:

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Brooklyn, NY 11238**
A.K.A. 882 Fulton Street

OWNER
500 Waverly Property Owner L.L.C.
c/o Orange Management Inc.
6 West 14th Street, 2nd Floor
New York, NY 10011
Tel: 212-431-5900

ARCHITECT
Gerner Kronick + Valcarcel
443 Park Avenue South, 2nd Floor
New York, NY 10016
Tel: 212 679-6362

CONSTRUCTION MANAGER
Ryder Construction Incorporated
519 Eighth Avenue
New York, NY 10018
Tel: 212 465 8700

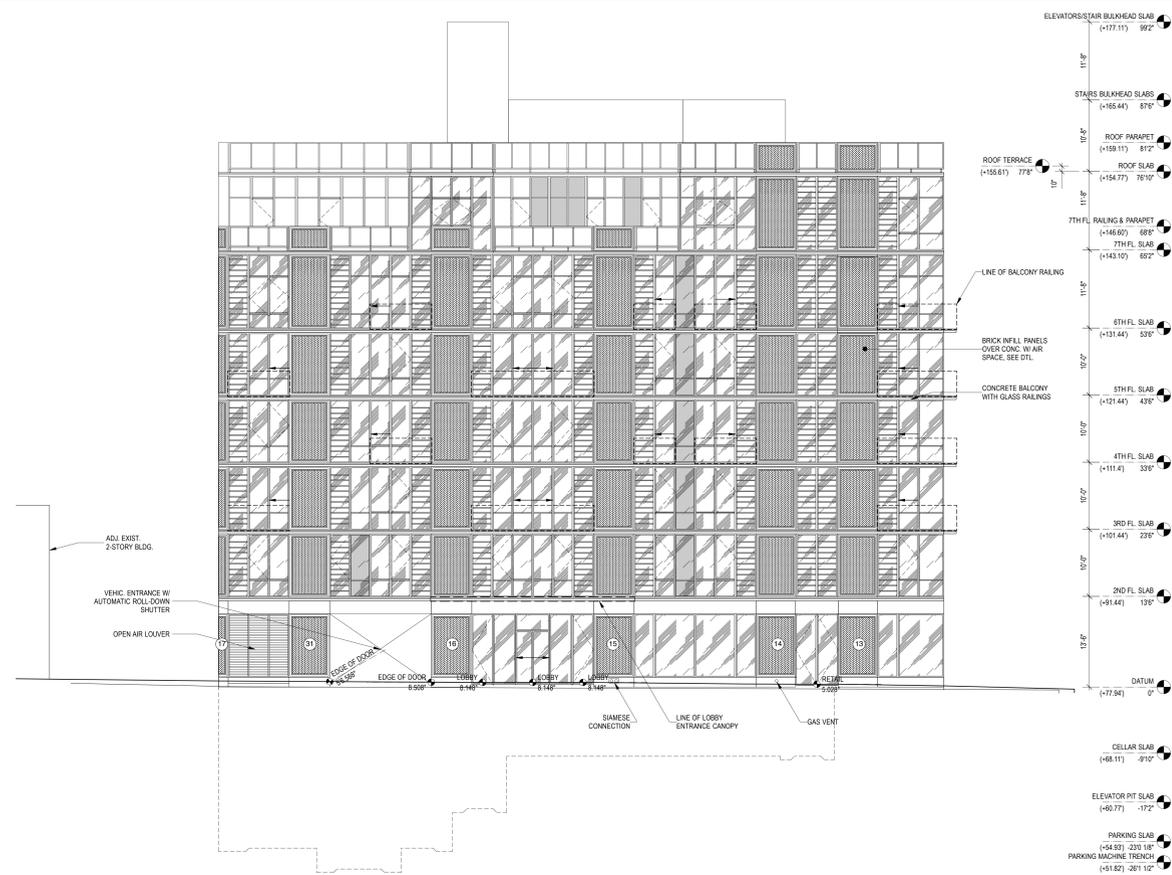
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226 East Merrick Road
Valley Stream, NY 11580
Tel: 516 256-0317

STRUCTURAL ENGINEER
WSP
228 East 45th Street
New York, NY 10017
Tel: 212 687-9888

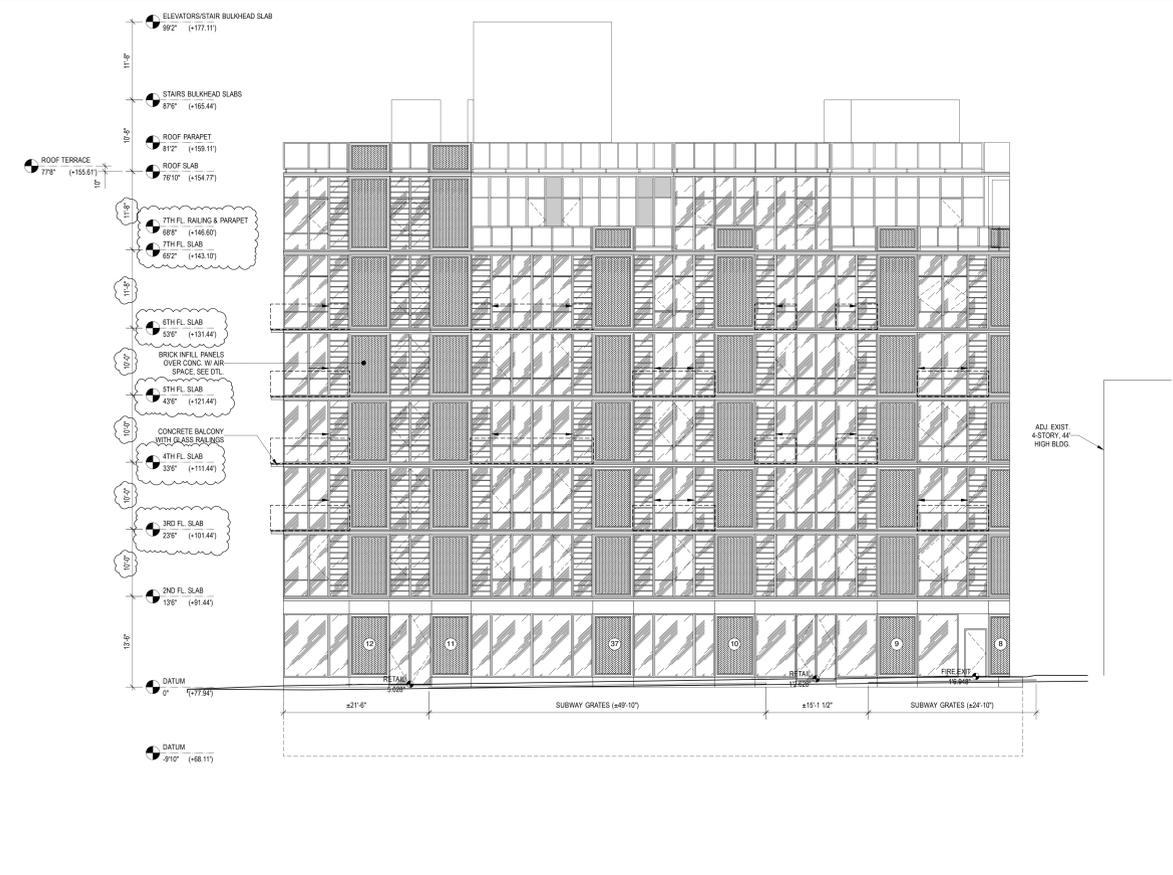
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GEA Consulting Engineers
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FNA Associates
165 Passaic Avenue, Suite 306
Fairfield, NJ 07004
Tel: 201 241-2444

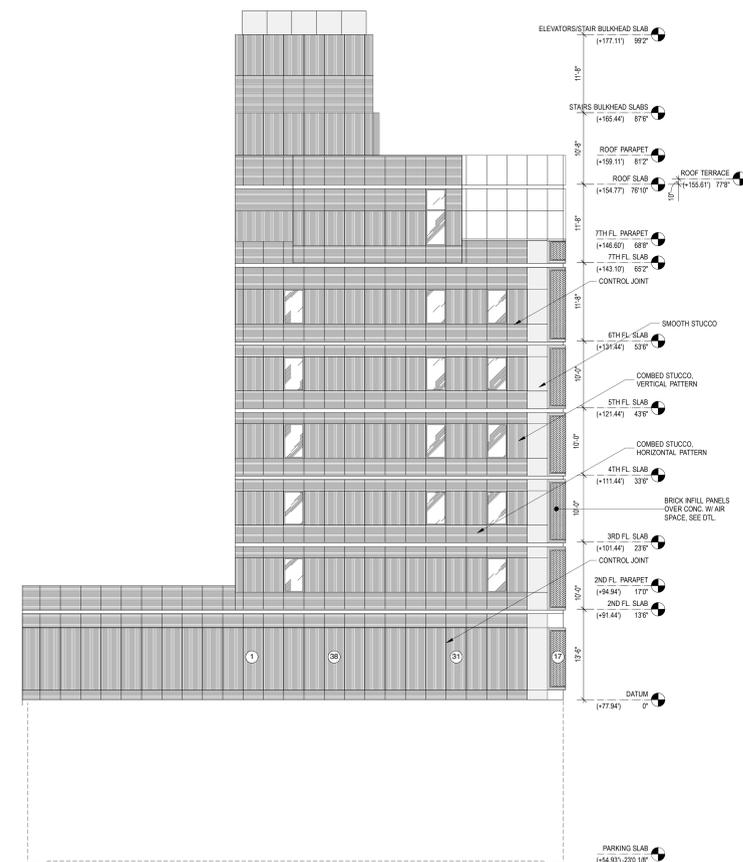
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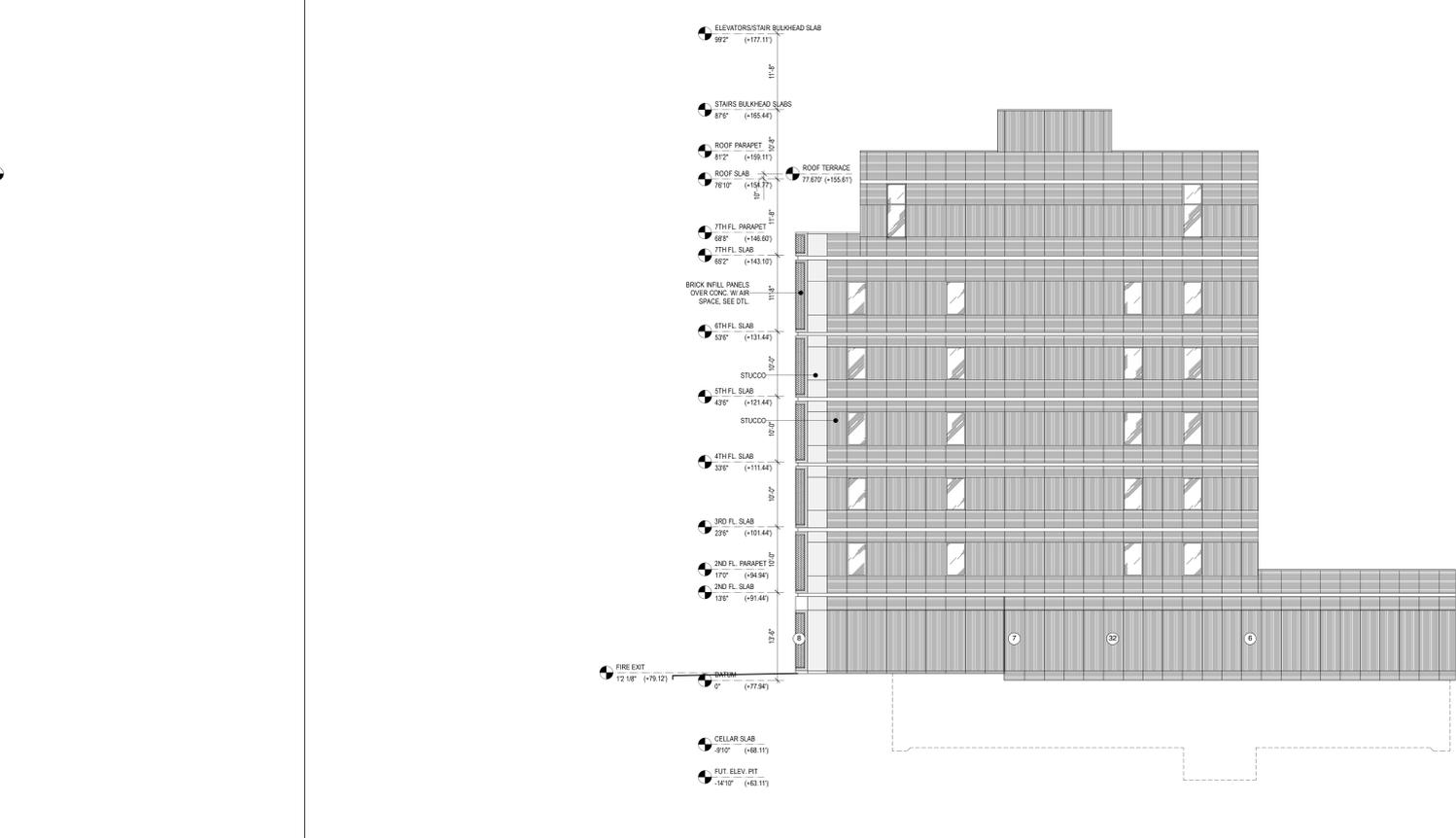
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Scale: 1/8" = 1'-0"



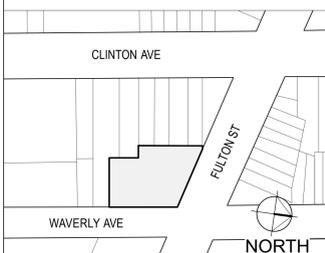
2 FULTON STREET ELEVATION (NORTH ELEVATION)
Scale: 1/8" = 1'-0"



3 SOUTH BUILDING SIDE ELEVATION
Scale: 1/8" = 1'-0"



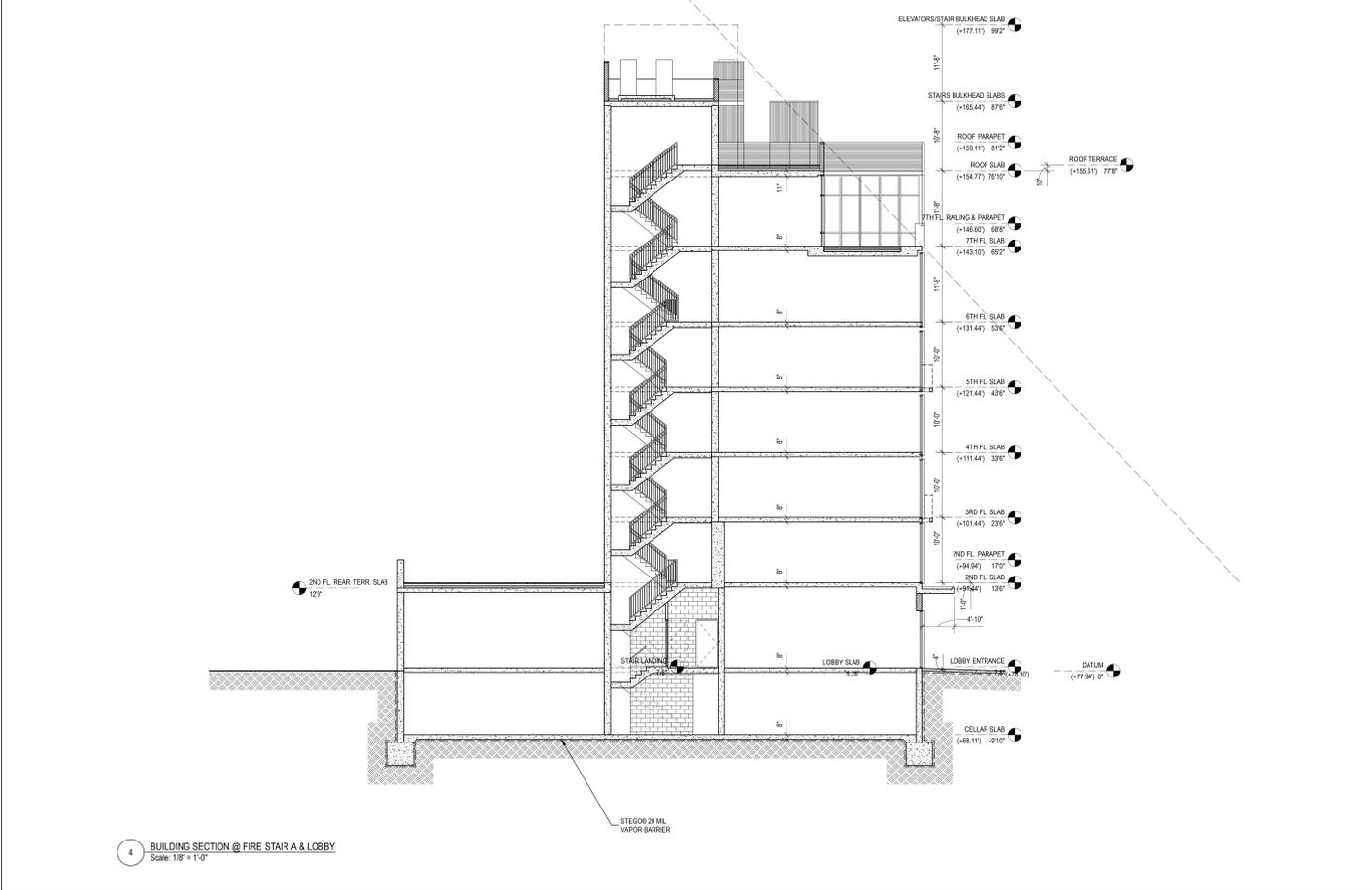
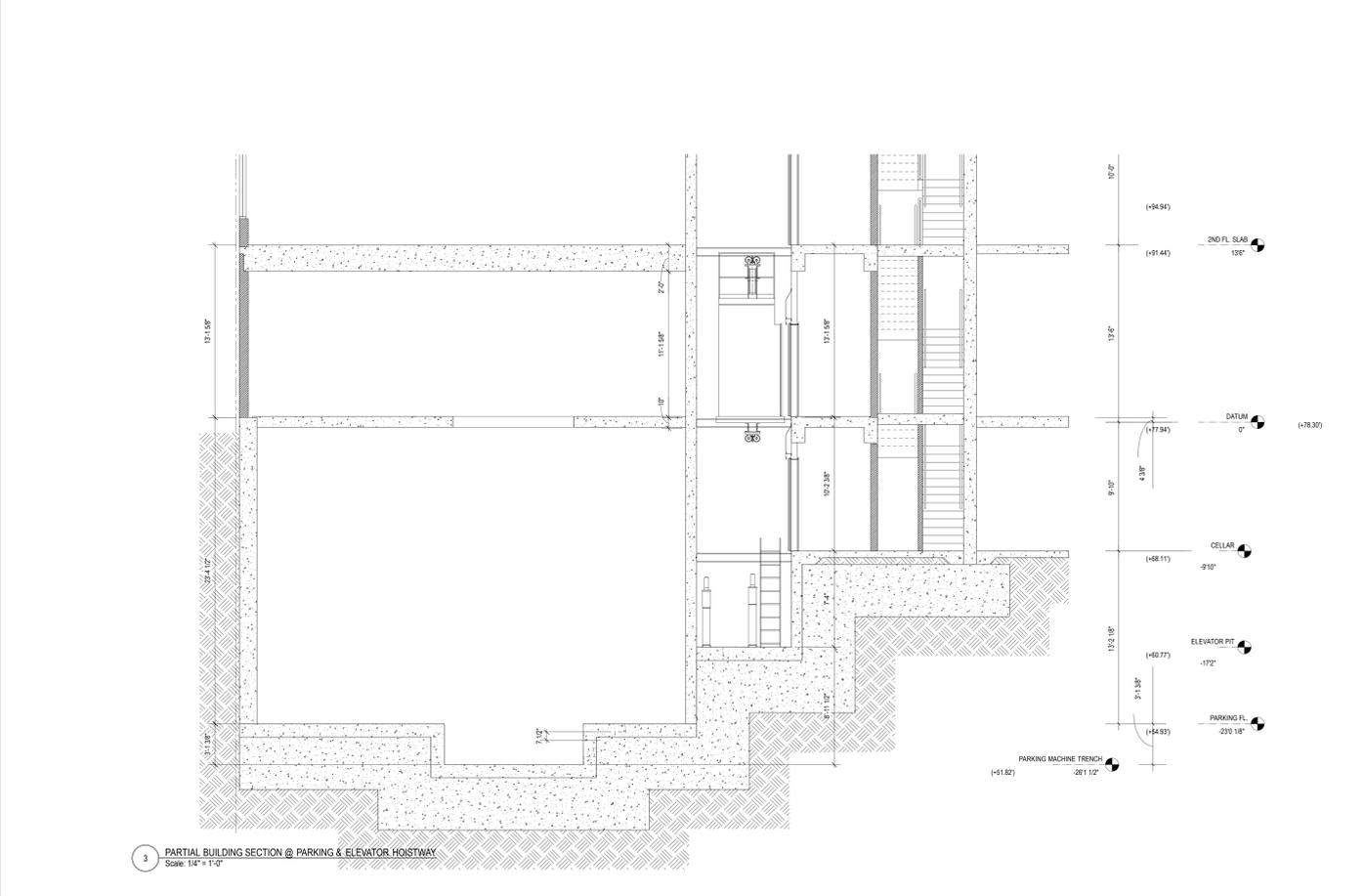
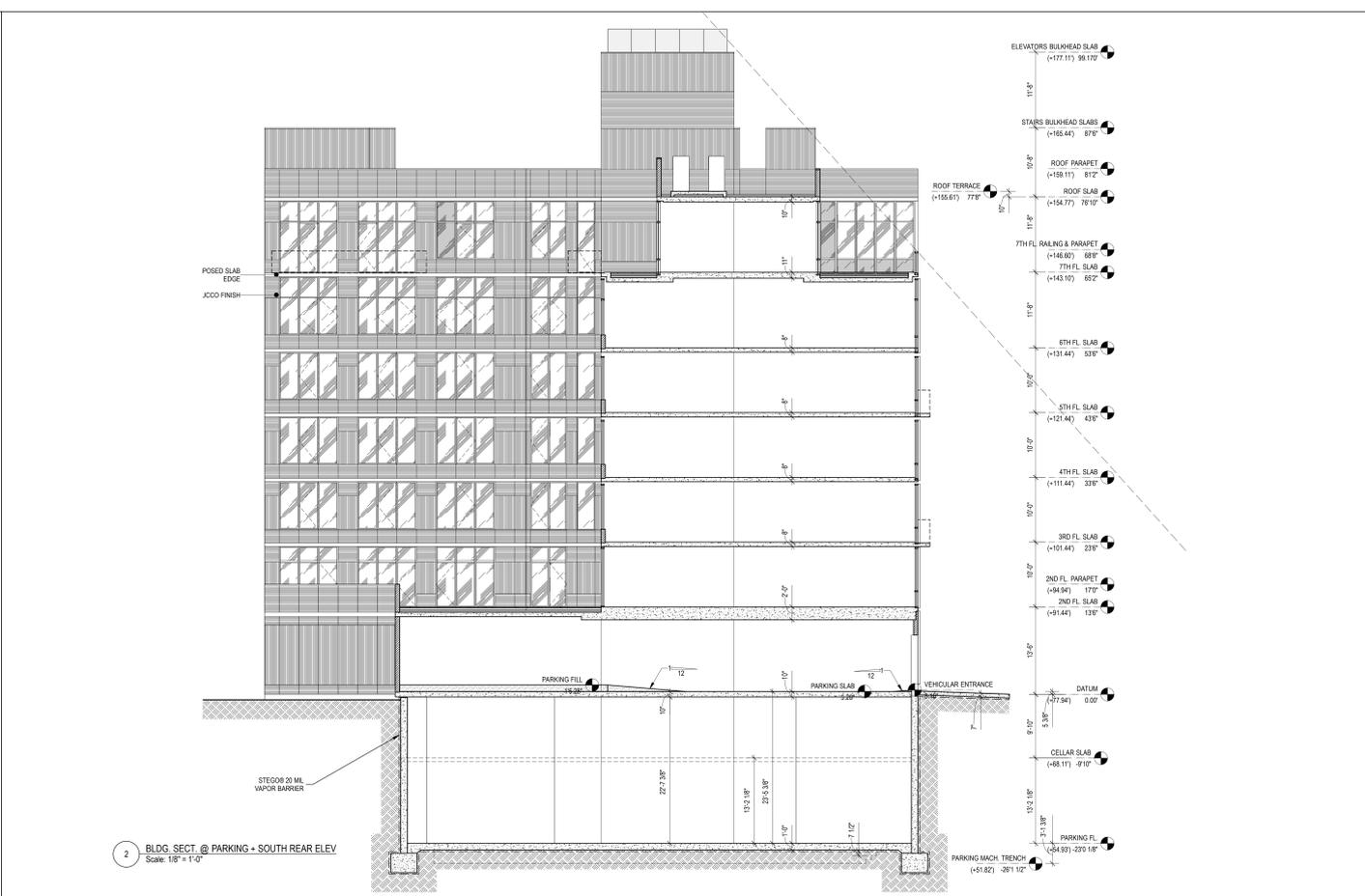
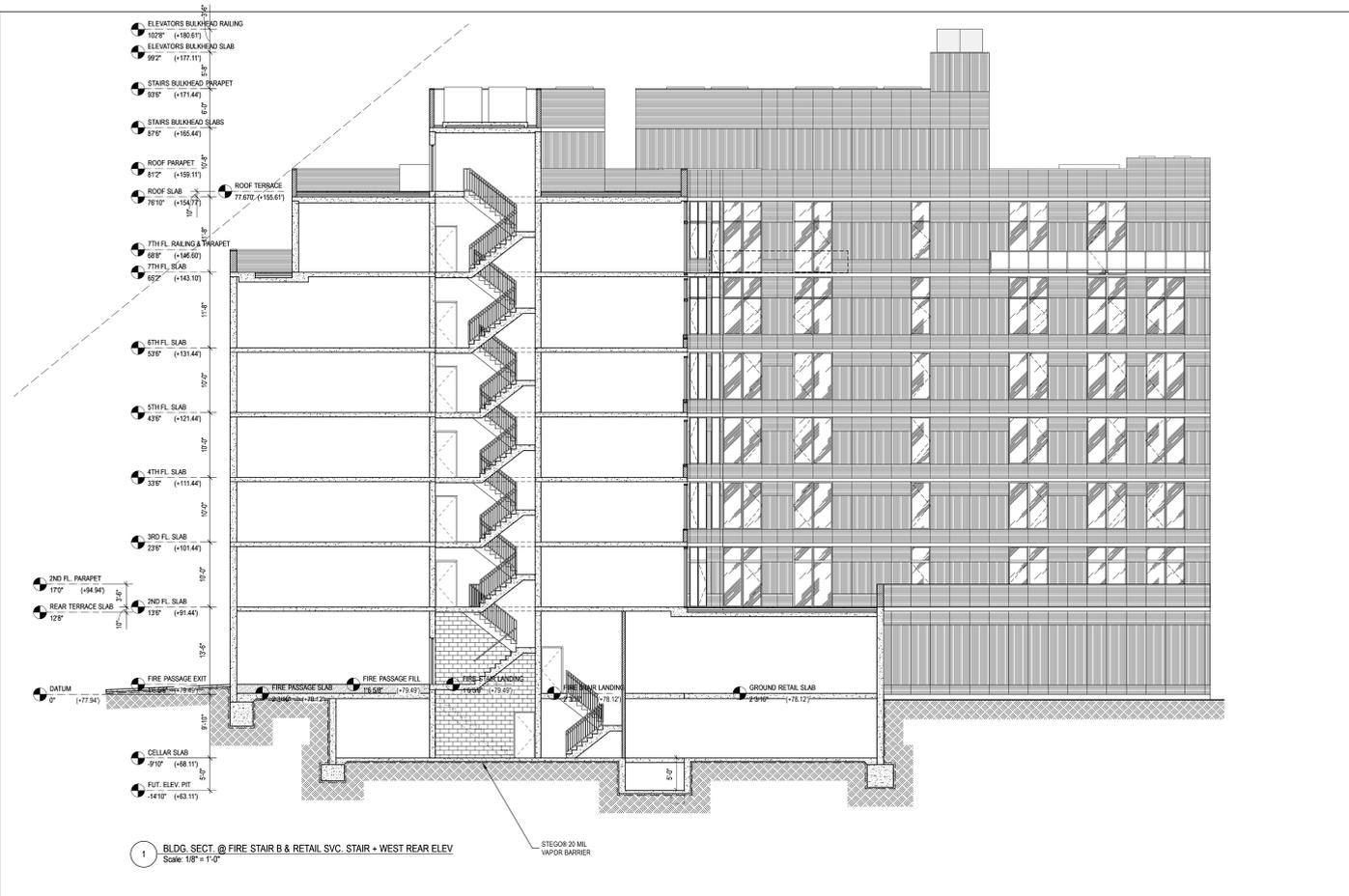
4 WEST BUILDING SIDE ELEVATION
Scale: 1/8" = 1'-0"



Revisions

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4.	ISSUE FOR FILING	06/16/14
3.	ISSUE FOR HPD REVIEW	06/03/14
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GKV Project 1062-01
Scale:
Drawing Title:
STREET & SIDE ELEVATIONS
Drawing No. **A-600.00**
Sheet No:



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A.K.A. 882 Fulton Street**

OWNER
500 Waverly Property Owner L.L.C.
c/o Orange Management Inc.
350 Seventh Avenue, Suite 1604
New York, NY 10011
Tel: 212-431-5900

ARCHITECT
Gerner Kronick + Valcarcel
443 Park Avenue South, 2nd Floor
New York, NY 10016
Tel: 212-679-6362

CONSTRUCTION MANAGER
Ryder Construction Incorporated
519 Eighth Avenue
New York, NY 10018
Tel: 212-465-8700

EXPEDITOR
Domani Consulting Inc
226 East Merrick Road
Valley Stream, NY 11580
Tel: 516-256-0317

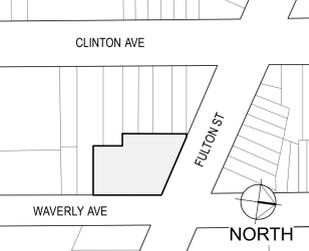
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WSP
228 East 45th Street
New York, NY 10017
Tel: 212-687-9888

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GEA Consulting Engineers
545 8th Avenue
New York, NY 10018
Tel: 212-643-8006

SOE ENGINEER
FNA Associates
165 Passaic Avenue, Suite 306
Fairfield, NJ 07004
Tel: 201-241-2444

GEOTECHNICAL ENGINEER
Langan Engineering
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, NY 10001
Tel: 212-479-5400

LOW VOLTAGE ENGINEER
Engineering Plus
9018 Heritage Parkway-Suite 1000
Woodridge, IL 60517
Tel: 630-786-4200



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GKV Project 1062-01
Scale:
Drawing Title:
REAR ELEVATIONS, SECTIONS

Drawing No. **A-601.00**
Sheet No:

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OWNER
500 Waverly Property Owner L.L.C.
c/o Orange Management Inc.
6 West 14th Street, 2nd Floor
New York, NY 10011
Tel: 212-431-5900

ARCHITECT
Gerner Kronick + Valcarcel
443 Park Avenue South, 2nd Floor
New York, NY 10016
Tel: 212 679-6362

CONSTRUCTION MANAGER
Ryder Construction Incorporated
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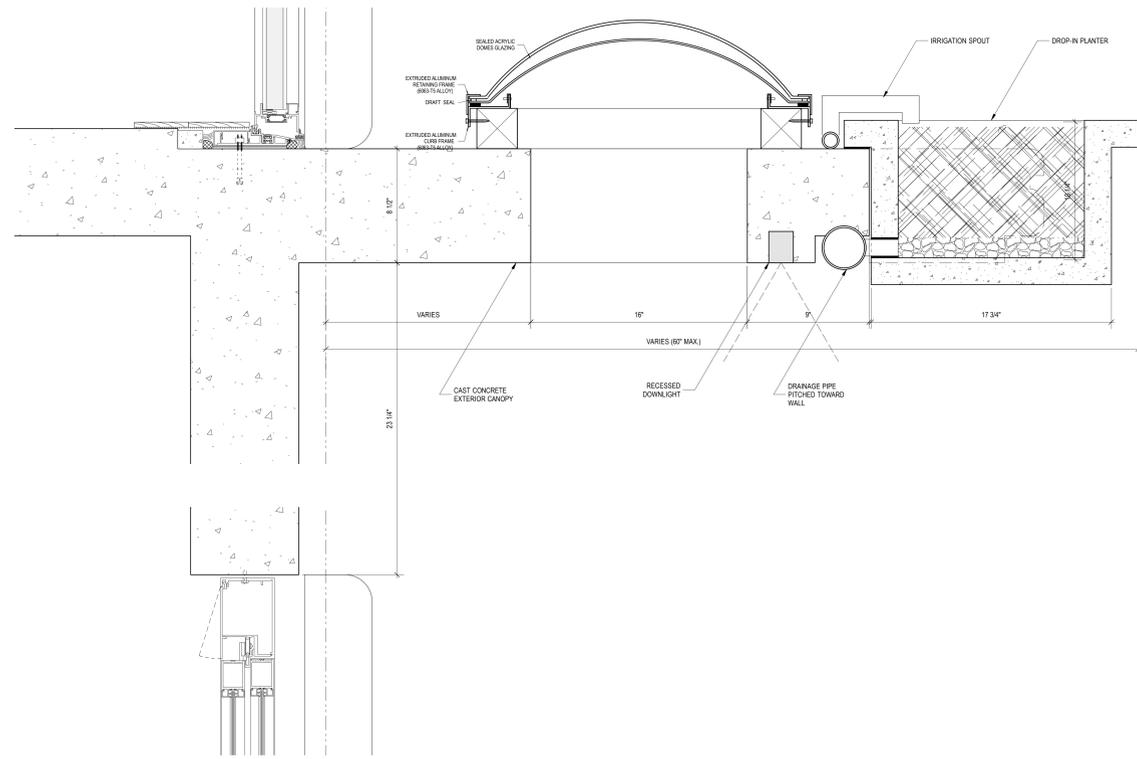
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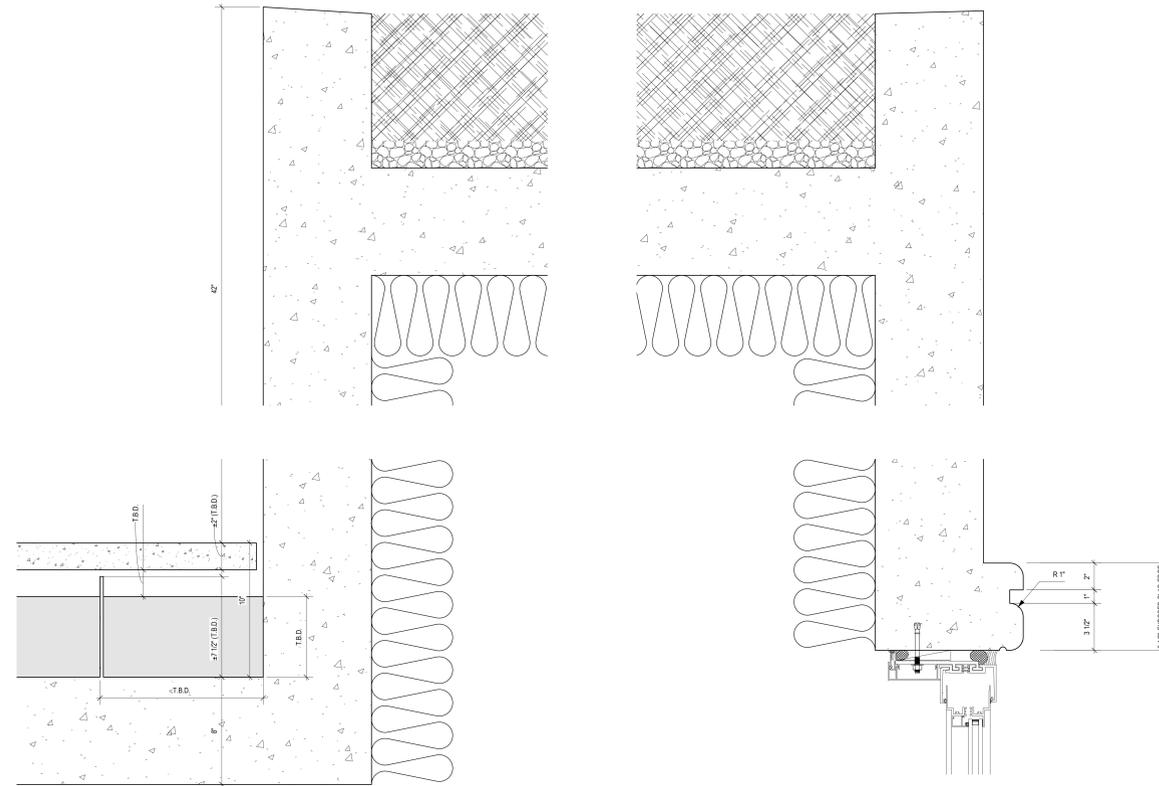
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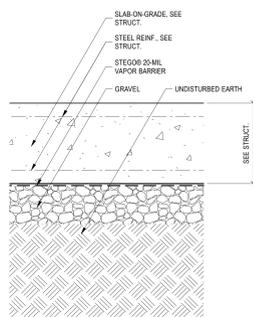
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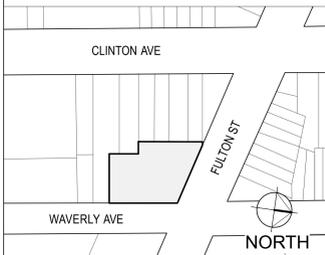
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Scale: 3" = 1'-0"



2 ROOF TERRACE PLANTER SECTIONS
Scale: 3" = 1'-0"



4 SECTION OF TYP. SLAB-ON-GRADE WITH VAPOR BARRIER
Scale: 3" = 1'-0"



Revisions



4. ISSUE FOR FILING 06/16/14
3. ISSUE FOR HPD REVIEW 06/03/14
2. ISSUE FOR D.D. 05/07/14
1. 25% ISSUE FOR PRICING 03/31/14
No. Issue Date

GKV Project 1062-01

Scale:

Drawing Title:
**ROOF PLANTERS, ENTRANCE
CANOPY DETAILS**

Drawing No. **A-722.00**

Sheet No:

WAIVERS
 DOT requirement waived
 As per / Date

1)
 2)

GENERAL REQUIREMENTS

- ALL DESIGNS, MATERIALS, CONSTRUCTION METHODS AND WORKMANSHIP SHALL COMPLY WITH THE FOLLOWING PUBLICATIONS OF THE BUREAU OF HIGHWAYS: STANDARDS SPECIFICATIONS, STANDARD DETAILS OF CONSTRUCTION; RULES OF THE BUREAU OF HIGHWAY OPERATIONS; GUIDELINES FOR THE DESIGN OF INFRASTRUCTURE COMPONENTS.
- ALL NON STANDARD MATERIALS AND CONSTRUCTION PROCEDURES SHALL BE SPECIFICALLY APPROVED IN WRITING BY THE DOT.
- ANY WORK NOT COMPLYING WITH THE REQUIREMENTS OF THE DOT SHALL BE REMOVED AND REPLACED.
- THIS PLAN SHALL BE VALID FOR THE ISSUANCE OF CONSTRUCTION PERMITS FOR A PERIOD OF ONE YEAR FROM THE DATE OF APPROVAL OR SELF CERTIFICATION, AS APPLICABLE.
- ALL SIDEWALK AND STREET AREAS CONSTRUCTED UNDER THIS PLAN SHALL REMAIN OPEN TO THE PUBLIC AT ALL TIMES.

ISSUANCE OF PERMITS

- NO SIDEWALK, CURB OR ROADWAY WORK SHALL BE DONE WITHOUT A PERMIT FROM THE BOROUGH HIGHWAY SUPERINTENDENT. APPLICATION SHALL BE MADE THREE DAYS BEFORE STARTING CONSTRUCTION. THE CONTRACTOR SHALL HAVE ALL REQUIRED INSURANCE COVERAGE ON FILE.
- NO WORK ON DRAINAGE STRUCTURES SHALL BE DONE WITHOUT A PERMIT FROM THE BOROUGH OFFICE OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.
- ANY VAULT WORK AT THE SITE SHALL BE DONE AS PER THE APPLICABLE RULES OF THE DOT AND THE DEPT. OF BUILDINGS.

CONSTRUCTION ACTIVITY

- A CONSTRUCTION PLAN SHOWING MAINTENANCE AND PROTECTION OF TRAFFIC INCLUDING PLACEMENT OF SIDEWALK BRIDGES, BARRIERS AND SIGNAGE, SHALL BE SUBMITTED TO THE BOROUGH HIGHWAY OFFICE BEFORE CONSTRUCTION BEGINS.
- NO SIDEWALK SHALL BE CLOSED WITHOUT A PERMIT. PEDESTRIAN AND TRAFFIC SAFETY SHALL BE PROTECTED AT ALL THE TIMES. ROADWAY CLOSINGS SHALL BE AS DIRECTED.
- THE SITE SHALL BE MAINTAINED IN A CLEAN AND SAFE CONDITION.

FINAL SIGN-OFF

- PERMITS SHALL BE PRESENTED FROM ALL PUBLIC AGENCIES AND UTILITIES HAVING OWNERSHIP OF STRUCTURES RELOCATED OR REMOVED DURING CONSTRUCTION.
- ALL PAVEMENT MARKINGS INCLUDING THERMOPLASTIC LANE DIVIDERS, REMOVED DURING CONSTRUCTION SHALL BE REPLACED IN KIND TO THE BUREAU OF TRAFFIC STDs.
- ALL EXISTING CATCH BASINS ON THE SITE SHALL BE CLEANED AND MADE OPERABLE.
- ALL DAMAGE CAUSED BY CONSTRUCTION ON THIS PROJECT OUTSIDE THE PROJECT LIMITS SHALL BE REPAIRED AS DIRECTED.
- THE ROADWAY SHALL BE PAVED TO THE REQUIREMENTS OF THE DOT AND AS DIRECTED.

BUILDERS PAVEMENT PLAN LEGEND

- LOCATION OF SPOT GRADE
- EXISTING SPOT GRADE
- PROPOSED SPOT GRADE
- GRADE CORRECTED FROM SURVEY GRADE
- GRADE INTERPOLATED FROM EXISTING ADJACENT SPOT GRADES
- PROPOSED BOTTOM OF CURB
- EXISTING BOTTOM OF CURB
- PROPOSED TOP OF CURB
- EXISTING TOP OF CURB
- PROPOSED GRADE AT PROPERTY LINE OR OUTSIDE FACE OF BUILDING
- EXISTING GRADE AT PROPERTY LINE OR OUTSIDE FACE OF BUILDING
- PROPOSED TOP OF FRAME GRADE AT EXISTING DRAINAGE STRUCTURE
- EXISTING TOP OF FRAME GRADE AT EXISTING DRAINAGE STRUCTURE
- EXISTING GRADE ELEVATION AT MTA VENT
- EXISTING FIRE ALARM BOX (RESET TO NEW SIDEWALK GRADE)
- EXISTING STREET LIGHTS (RESET TO NEW SIDEWALK GRADE)
- EXISTING FIRE HYDRANT
- EXISTING CATCH BASIN (WITH GRATING AT EXISTING GRADE OR RESET TO NEW GRADE)
- BORO PRESIDENTS MONUMENT - DO NOT DISTURB
- STREET REPAIR, RETOPPING OR RECONSTRUCTION OF PRECAST PAVERS
- NEW CURB - SEE PLAN FOR TYPE
- EXISTING MTA GRATING
- EXISTING TREE TO BE REMOVED UNDER SEPERATE AGREEMENT WITH NYC DPR
- EXISTING TREE IN RECONSTRUCTED 5' X 10' TREE PIT
- NEW STREET TREE IN NEW 5' X 10' TREE PIT
- NEW VEHICULAR DROPPED CURB
- EXISTING ADJACENT CURB CUT
- NEW PEDESTRIAN CORNER RAMP

EXPANSION JOINT NOTES:

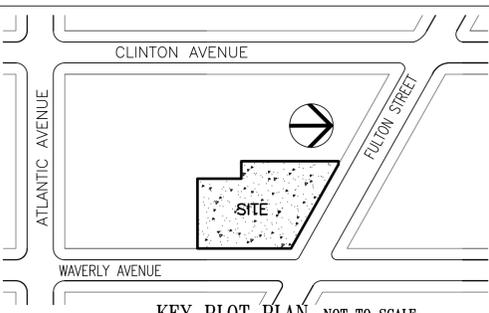
(iii) Expansion joints shall be placed approximately 20' apart in line with joints in curb and at the property or lot line, and shall be 4" in width and shall be filled with preformed joint filler to within 1" of the sidewalk surface. The top 1" shall be sealed with poured joint filler. The expansion joint, with filler, shall extend continuously from the back of the curb to the building line and a joint must also separate the sidewalk from the curb.

DRAWING NOTES:

- Reset all existing valve boxes, drainage structures and utility structures to new sidewalk or street grade. Coordinate reset utilities with utility companies.
- Reset existing traffic signs to existing locations
- Reset street lights to new grade
- At adjacent property lines; meet existing curbs, and existing sidewalks in a smooth transition.

CONTRACTOR EXPERIENCE NOTE:

THE WORK SHOWN ON THESE DRAWINGS IS SPECIALIZED WORK WHICH SHOULD BE DONE ONLY BY AN EXPERIENCED SIDEWALK CONTRACTOR WHO IS FAMILIAR WITH THE REQUIREMENTS OF THE DOT AND DOB. FAILURE TO HIRE AN EXPERIENCED SIDEWALK CONTRACTOR MAY RESULT IN PROBLEMS DURING SIGNOFF OF THE SIDEWALK WORK.



STREET TREE ZONING REQUIREMENTS:

TOTAL STREET FRONTAGE OF NEW BUILDING	212.95
TOTAL STREET FRONTAGE OF OTHER BUILDINGS ON ZONING LOT	0
TOTAL STREET FRONTAGE	212.95
DIVIDE BY 25'	8.52
TOTAL REQUIRED STREET TREES (ROUNDED UP OR DOWN)	9

STREET TREE ZONING REQUIREMENTS ARE MET AS FOLLOWS:

NUMBER OF EXISTING OR RELOCATED TREES TO REMAIN ALONG THIS FRONTAGE	1
NUMBER OF NEW STREET TREES ALONG THIS FRONTAGE	1
NUMBER OF NEW TREES TO BE PLANTED AT OFF SITE LOCATIONS OR PAID INTO DPR TREE FUND	7
TOTAL REQUIRED STREET TREES	9

NOTE:
 NUMBER OF EXISTING TREES TO BE REMOVED (WITH SEPERATE PARKS DEPT APPROVAL) 2

CONCRETE TESTING NOTE:

PER NYCDOT HIGHWAY RULES, SECT 2-09, f, 4, iv, (A) - CORE EVALUATION REPORTS SHALL BE REQUIRED AS FOLLOWS:

SIDEWALKS LESS THAN 100' TOTAL FRONTAGE - NOT REQUIRED

SIDEWALKS MORE THAN 100' TOTAL FRONTAGE - REQUIRED, PROVIDE 1 CORE FOR EACH 500 SF OF INSTALLED SIDEWALK

CONTRACTOR SHALL KEEP CONCRETE TICKETS FOR ALL SIDEWALK CONCRETE DELIVERIES

STREET TREE PLANT LIST

KEY	BOTANICAL NAME	COMMON NAME	QTY	SIZE	ROOT	SPACING	COMMENTS	
MAJOR TREES								
GT	GLEDTISIA TRIACANTHOS VAR.	HALKA HONEYLOCUST	1	2 1/2"-3" CAL	B & B	AS SHOWN	STRAIGHT TRUNKS, MATCHED SPECIMENS	
PAYMENT INTO DPR TREE FUND			7	PROVIDE RECEIPT & PERMITS FROM DPR TO DOB PRIOR TO BPP SIGNOFF				

TREE PLANTING NOTES:

- TREE SPECIE AND TREE SIZE MENTIONED IN PLANT LIST ABOVE IS FOR SCOPE PURPOSES ONLY. PARKS FORESTRY REPRESENTATIVE MAY CHANGE THE SIZE AND SPECIE OF TREE - THIS WILL BECOME KNOWN DURING THE TREE PERMIT PROCESS.
- PRIOR TO STARTING WORK ON SIDEWALK, CONTRACTOR TO OBTAIN STREET TREE PLANTING PERMIT FROM NYC DEPARTMENT OF PARKS, BOROUGH FORESTRY OFFICE.
- ANY DEVIATIONS IN STREET TREE LOCATION ARE TO BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT.
- Planting contractor will contact NYC Parks if any underground infrastructure (gas/water/electric etc.) affects any proposed/existing trees on site. Planting contractor is aware that any work done on or near a city tree requires a permit from NYC Parks. This includes utility, sidewalk, pruning or any other work within the dripline of a tree (within the right of way) done by the general contractor or any subcontractors. Planting contractor will follow NYC Parks planting & forestry specifications. Utilities may not be labelled. If unknown, the Project Manager must amend plan with NYC Parks in the future.
- All pit sizes indicated are to be fully excavated to the dimensions labelled and replaced with new topsoil to NYC Parks Standards.
- DPR MAY SEND REPRESENTATIVES TO THE SITE TO OVERSEE SOE WORK, FOUNDATION EXCAVATION OR OTHER OPERATIONS EXERCISE CAUTION IN WORKING AROUND EXISTING TREES. WHEN IN DOUBT REQUEST PRE-CLEARANCE FROM DPR FOR ANY WORK AROUND TREES.

STREET TREE LOCATION NOTE:

- ALL NEW STREET TREE LOCATIONS ARE APPROXIMATE.
- PLACE NEW STREET TREES IN NEW TREE PITS WHICH ALIGN WITH NEAREST 5' WIDE SIDEWALK SCORING PATTERN
- PARKS FORESTRY REPRESENTATIVE MAY CHANGE THE LOCATION AND SIZE OF TREE PITS
- PARKS FORESTRY REPRESENTATIVE MAY CHANGE THE SPECIE AND SIZE OF TREE
- BRING ANY SPECIAL CONDITIONS TO THE ATTENTION OF THE NYC DEPT OF PARKS BOROUGH FORESTRY OFFICE.

Planting contractor is aware that any work done on or near a city tree requires a permit from NYC Parks. This includes utility, sidewalk, pruning or any other work within the dripline of a tree (within the right of way) done by the general contractor or any subcontractors. Planting contractor will follow NYC Parks planting & forestry specifications. Utilities may not be labelled. If unknown, the Project Manager must amend plan with NYC Parks in the future.

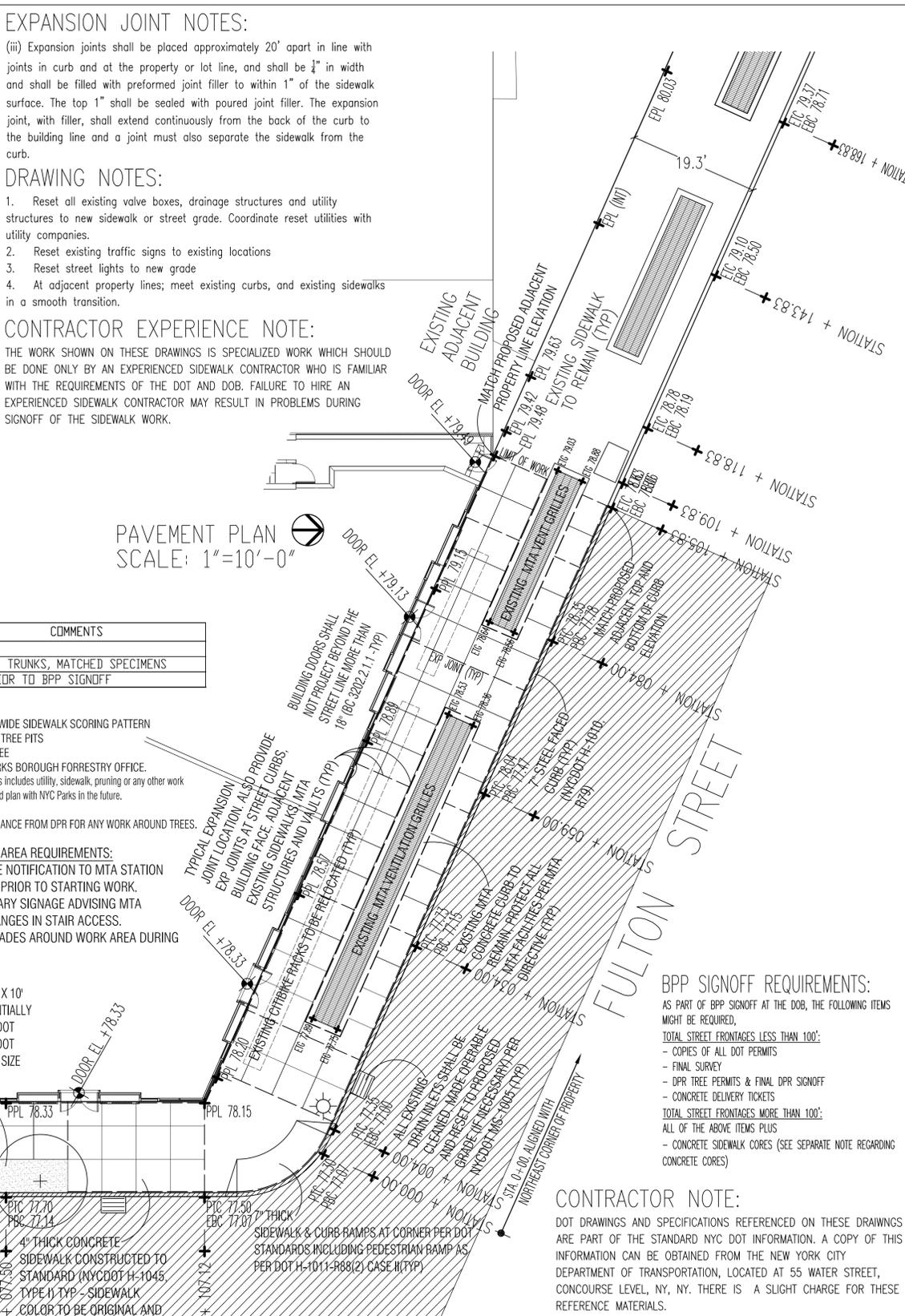
SURVEY NOTE:

ONLY SELECT SURFACE VICINITY FEATURES ARE SHOWN ON THIS DRAWING. CONTRACTOR TO REFER TO THE SITE SURVEY DRAWING FOR THE LOCATION OF MORE COMPLETE INFORMATION ON THE SURFACE AND UNDERGROUND UTILITY FACILITIES ALONG THE PROJECT SITE.

GENERAL MTA WORK AREA REQUIREMENTS:

- PROVIDE ADVANCE NOTIFICATION TO MTA STATION MANAGER 48 HOURS PRIOR TO STARTING WORK.
- PROVIDE TEMPORARY SIGNAGE ADVISING MTA PASSENGERS OF CHANGES IN STAIR ACCESS.
- PROVIDES BARRICADES AROUND WORK AREA DURING PHASES OF WORK.

RECONSTRUCT EXISTING TREE PIT TO 5' X 10' TREE PIT SIZE, SUBSTANTIALLY IN ACCORDANCE WITH DOT PLANTING DETAIL (NYCDOT H-1046)-MODIFIED FOR SIZE OF TREE PIT



CATCH BASIN NOTES:

- All new catch basins required under this plan shall be in accordance with the latest N. Y. C. D. E. P. standards and requirements, all new catch basin connections shall be made to existing sewers at manholes, and shall consist of 12" ductile iron pipe class 56, with "push-on" joints laid on 6" of broken stone for the entire width of trench and for one-half the pipe diameter. The broken stone shall be hard unweathered stone uniformly graded from 1/4" to 3/4" in diameter, conforming to commercial 1/4" to 3/4" stone.
- All existing non-standard basins within the project limits shall be replaced or modified to conform with the latest N. Y. C. D. E. P. standards and requirements.
- All abandoned basins, inlets and drainage structures shown on the paving plans shall be bulkheaded and cut down to two (2) feet below subgrade, and filled with compacted clean sand. Basin connections not required shall be plugged at both ends.
- All damaged manholes caused by the contractors work shall be repaired or replaced by the contractor, as directed by the engineer, at no cost to the city.
- Prior to the installation of the drainage facilities proposed under this plan, permits are to be obtained from the local sewer record office of the Department of Environmental Protection (D.E.P.). Construction inspection is to be requested at least 24 hours in advance from the house connection inspection unit of the D.E.P. division of sewer regulation and control.

LIST OF ESTIMATED QUANTITIES

New Curb (frontage)	213 (STEEL FACED)	Lin.ft.
New Curb (Corner)	20 (STEEL FACED)	Lin.ft.
New Sidewalk	3582	Sq.Ft.
New Roadway	610	Sq.yds
New Trees	8 (1 ON SITE & 7 PAID INTO DPR TREE FUND)	Each
New CBs	0	Each
New DIP	0	Lin.ft.
New Manholes	0	Each

3RD DRAFT DATE 17 JUNE 2014
 2ND DRAFT DATE 2 JUNE 2014
 1ST DRAFT DATE 19 MAY 2014

Borough:	BROOKLYN	Sheet	1 of 2
DOB Curb Cut #:	TBD	DOB BPP #:	TBD
DOB NB #:	TBD	Con Ed Layout #:	N/A
		DOT Vault #:	N/A

NEW YORK CITY

BUILDERS PAVEMENT PLAN

PROJECT DATA

Block 2011 Zoning R7A Lot(s) 30 Zoning Map No. 16c

Street Address 502 Waverly Avenue, Brooklyn, New York

Owner: Name Orange Management Inc.
 Address 350 7th Avenue, Suite 1601
 New York, New York, 10001
 212 431 5900

Plan prepared by: SULLIVAN GROUP DESIGN LLC
 Name 109 WEST 27TH STREET
 City / State / Zip NEW YORK, N.Y. 10001
 Phone No. 212-352-8636
 Fax No. 212-352-8637

Seal
 SEE SEAL BELOW
 Signature

DOB APPROVAL

Proposed and existing work shown here reviewed for compliance with all applicable rules and requirements by:

Plan Examiner
 Approval for issuance of work permits granted by:

Chief / Builders Pavement Section Date

Project
 Street Address 502 Waverly Avenue, Brooklyn, New York
 Owner: Name Orange Management Inc.
 Address 350 7th Avenue, Suite 1601
 New York, New York, 10001
 212 431 5900

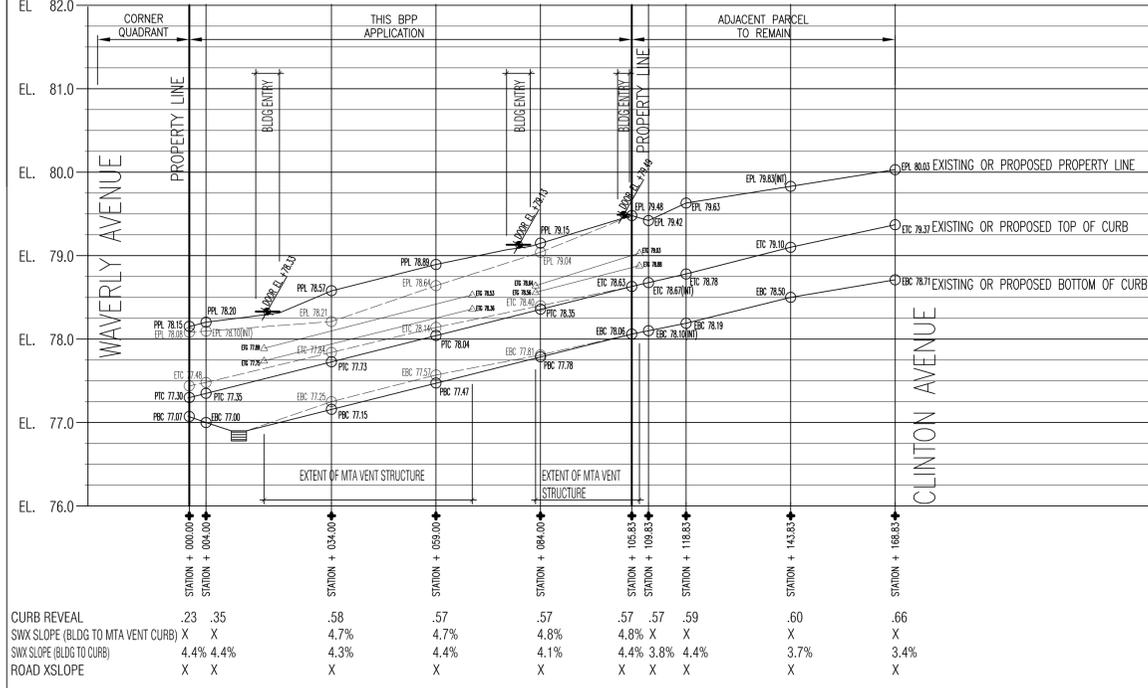
Drawing Title
BUILDERS PAVEMENT PLAN
 For GROUND FLOOR sidewalk areas outside property limits

Seal & Signature Architect: Sullivan Group Design LLC
 109 West 27th Street
 New York, NY, 10001
 212 352 8636

Dwg Number: BPP-001.00
 Sheet 1 of 2

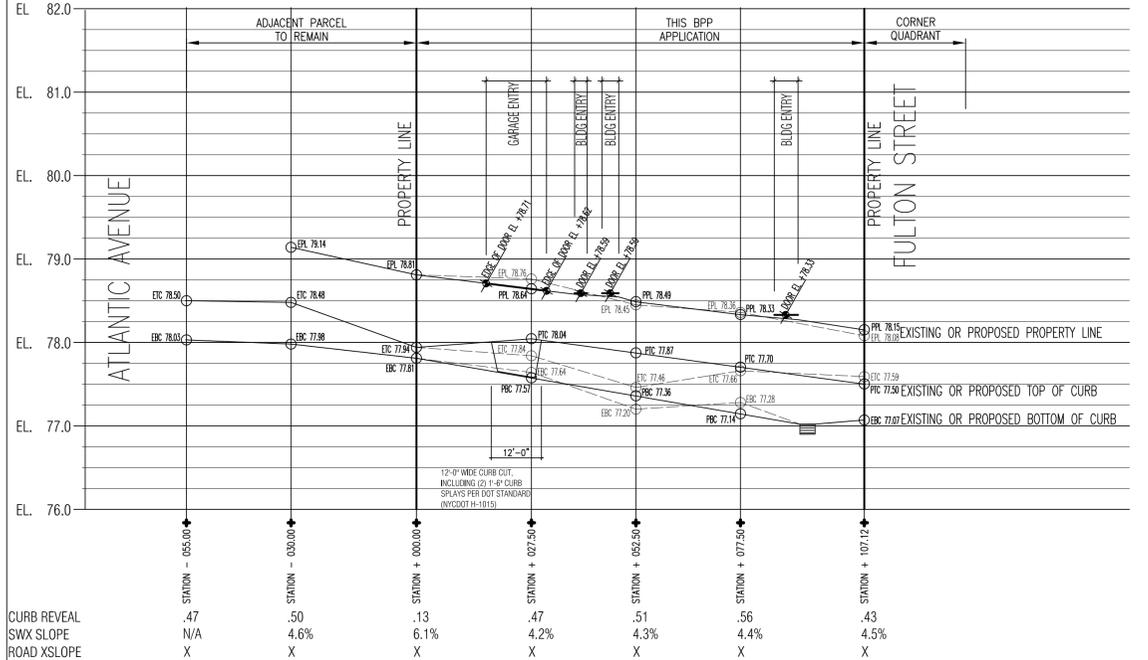
FULTON STREET PROFILE

HORIZONTAL SCALE 1" = 20'-0"
VERTICAL SCALE 1" = 1'-0"



WAVERLY AVENUE PROFILE

HORIZONTAL SCALE 1" = 20'-0"
VERTICAL SCALE 1" = 1'-0"



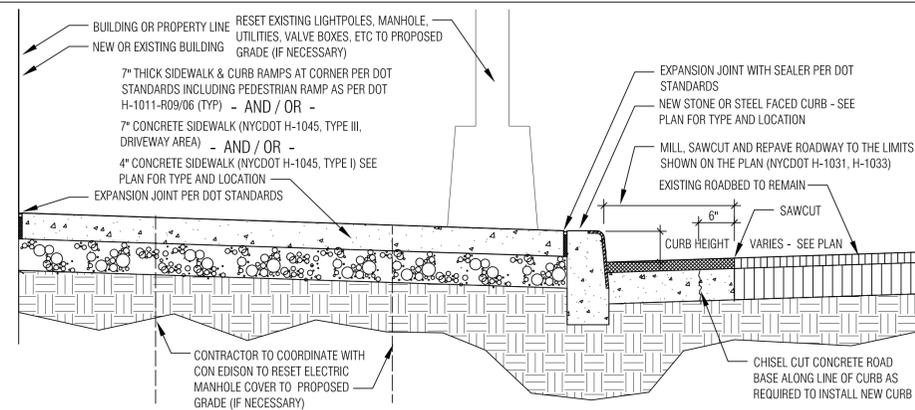
BUILDERS PAVEMENT PLAN LEGEND

- ⊕ LOCATION OF SPOT GRADE
- 11.11 EXISTING SPOT GRADE
- 11.11 PROPOSED SPOT GRADE
- 11.11 C GRADE CORRECTED FROM SURVEY GRADE
- 11.11 INT GRADE INTERPOLATED FROM EXISTING ADJACENT SPOT GRADES
- PBC PROPOSED BOTTOM OF CURB
- ETC EXISTING TOP OF CURB
- PTC PROPOSED TOP OF CURB
- ETC EXISTING TOP OF CURB
- PPL PROPOSED GRADE AT PROPERTY LINE OR OUTSIDE FACE OF BUILDING
- EPL EXISTING GRADE AT PROPERTY LINE OR OUTSIDE FACE OF BUILDING
- PTF PROPOSED TOP OF FRAME GRADE AT EXISTING DRAINAGE STRUCTURE
- ETF EXISTING TOP OF FRAME GRADE AT EXISTING DRAINAGE STRUCTURE
- ETG EXISTING GRATE ELEVATION AT MTA VENT

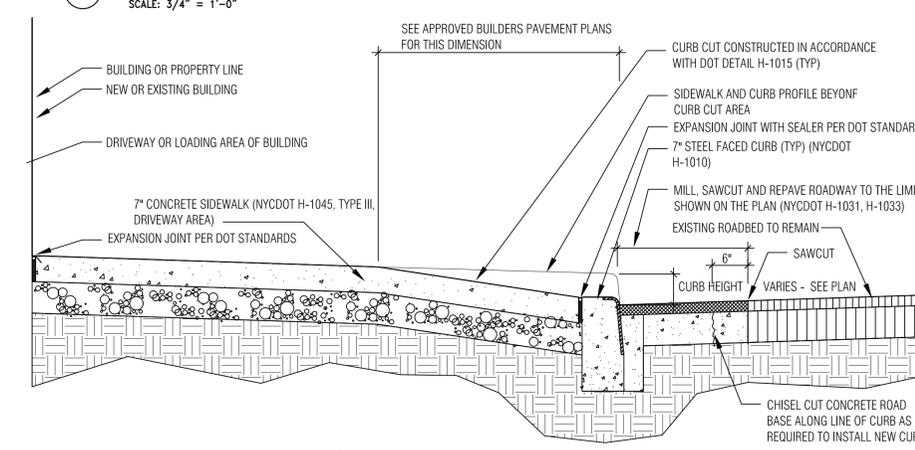
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New CBs	0	Each
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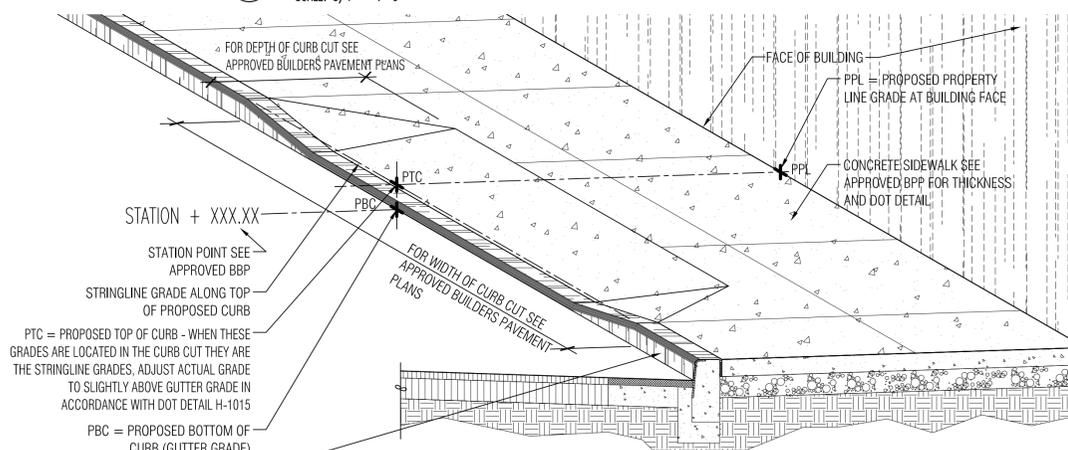
3RD DRAFT DATE 17 JUNE 2014
2ND DRAFT DATE 2 JUNE 2014
1ST DRAFT DATE 19 MAY 2014



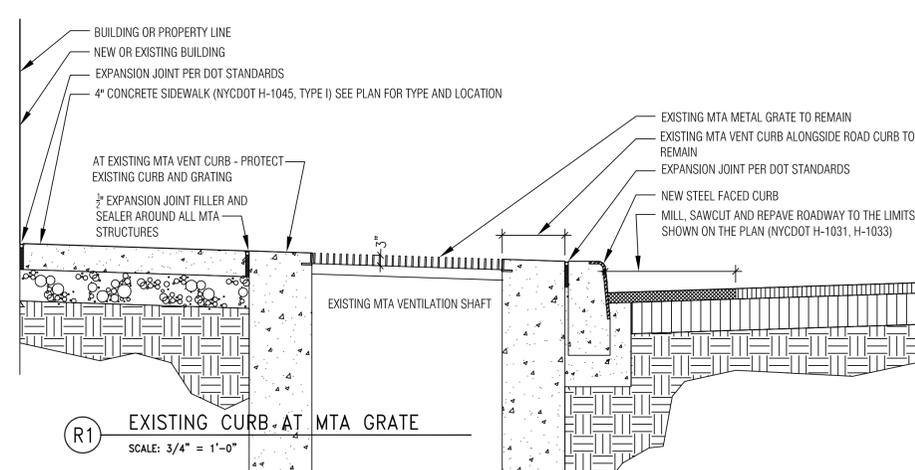
1 TYPICAL SIDEWALK CROSS SECTION
SCALE: 3/4" = 1'-0"



2 TYPICAL DRIVEWAY / DROP CURB CROSS SECTION
SCALE: 3/4" = 1'-0"



C1 PROPOSED TOP OF CURB ELEVATIONS AT DROPPED CURBS
SCALE: 1/2" = 1'-0"



R1 EXISTING CURB AT MTA GRATE
SCALE: 3/4" = 1'-0"

Borough: BROOKLYN Sheet 2 of 2
DOB Curb Cut #: TBD DOB BPP #: TBD
DOB NB #: TBD Con Ed Layout #: N/A DOT Vault #: N/A
NEW YORK CITY
BUILDERS PAVEMENT PLAN
PROJECT DATA
Block 2011 Lot(s) 30
Zoning R7A Zoning Map No. 16c
Street Address 502 Waverly Avenue, Brooklyn, New York
Owner: Name Orange Management Inc.
350 7th Avenue, Suite 1601
Address New York, New York, 10001
212 431 5900
Plan prepared by: Seal
Name SULLIVAN GROUP DESIGN LLC
Street Address 109 WEST 27TH STREET
City / State / Zip NEW YORK, N.Y. 10001
Phone No. 212-352-8636
Fax No. 212-352-8637
SEE SEAL BELOW
Signature

WAIVERS
DOT requirement waived As per / Date
1) _____
2) _____
3) _____
4) _____

GENERAL REQUIREMENTS

- ALL DESIGNS, MATERIALS, CONSTRUCTION METHODS AND WORKMANSHIP SHALL COMPLY WITH THE FOLLOWING PUBLICATIONS OF THE BUREAU OF HIGHWAYS: STANDARDS SPECIFICATIONS, STANDARD DETAILS OF CONSTRUCTION, RULES OF THE BUREAU OF HIGHWAY OPERATIONS, GUIDELINES FOR THE DESIGN OF INFRASTRUCTURE COMPONENTS.
- ALL NON STANDARD MATERIALS AND CONSTRUCTION PROCEDURES SHALL BE SPECIFICALLY APPROVED IN WRITING BY THE DOT.
- ANY WORK NOT COMPLYING WITH THE REQUIREMENTS OF THE DOT SHALL BE REMOVED AND REPLACED.
- THIS PLAN SHALL BE VALID FOR THE ISSUANCE OF CONSTRUCTION PERMITS FOR A PERIOD OF ONE YEAR FROM THE DATE OF APPROVAL OR SELF CERTIFICATION, AS APPLICABLE.
- ALL SIDEWALK AND STREET AREAS CONSTRUCTED UNDER THIS PLAN SHALL REMAIN OPEN TO THE PUBLIC AT ALL TIMES.
- ISSUANCE OF PERMITS
- NO SIDEWALK, CURB OR ROADWAY WORK SHALL BE DONE WITHOUT A PERMIT FROM THE BOROUGH HIGHWAY SUPERINTENDENT. APPLICATION SHALL BE MADE THREE DAYS BEFORE STARTING CONSTRUCTION. THE CONTRACTOR SHALL HAVE ALL REQUIRED INSURANCE COVERAGE ON FILE.
- NO WORK ON DRAINAGE STRUCTURES SHALL BE DONE WITHOUT A PERMIT FROM THE BOROUGH OFFICE OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.
- ANY VAULT WORK AT THE SITE SHALL BE DONE AS PER THE APPLICABLE RULES OF THE DOT AND THE DEPT. OF BUILDINGS.
- CONSTRUCTION ACTIVITY
- A CONSTRUCTION PLAN SHOWING MAINTENANCE AND PROTECTION OF TRAFFIC INCLUDING PLACEMENT OF SIDEWALK BRIDGES, BARRIERS AND SIGNAGE, SHALL BE SUBMITTED TO THE BOROUGH HIGHWAY OFFICE BEFORE CONSTRUCTION BEGINS.
- NO SIDEWALK SHALL BE CLOSED WITHOUT A PERMIT. PEDESTRIAN AND TRAFFIC SAFETY SHALL BE PROTECTED AT ALL TIMES. ROADWAY CLOSINGS SHALL BE AS DIRECTED.
- THE SITE SHALL BE MAINTAINED IN A CLEAN AND SAFE CONDITION.
- FINAL SIGN-OFF
- PERMITS SHALL BE PRESENTED FROM ALL PUBLIC AGENCIES AND UTILITIES HAVING OWNERSHIP OF STRUCTURES RELOCATED OR REMOVED DURING CONSTRUCTION.
- ALL PAVEMENT MARKINGS INCLUDING THERMOPLASTIC LANE DIVIDERS, REMOVED DURING CONSTRUCTION SHALL BE REPLACED IN KIND TO THE BUREAU OF TRAFFIC STDS.
- ALL EXISTING CATCH BASINS ON THE SITE SHALL BE CLEANED AND MADE OPERABLE.
- ALL DAMAGE CAUSED BY CONSTRUCTION ON THIS PROJECT OUTSIDE THE PROJECT LIMITS SHALL BE REPAIRED AS DIRECTED.
- THE ROADWAY SHALL BE PAVED TO THE REQUIREMENTS OF THE DOT AND AS DIRECTED.

DOB APPROVAL
Proposed and existing work shown here reviewed for compliance with all applicable rules and requirements by:

Plan Examiner
Approval for issuance of work permits granted by:

Chief / Builders Pavement Section Date

Project
Street Address 502 Waverly Avenue, Brooklyn, New York
Owner: Name Orange Management Inc.
350 7th Avenue, Suite 1601
Address New York, New York, 10001
212 431 5900

Drawing Title
BUILDERS PAVEMENT PLAN
For GROUND FLOOR sidewalk areas outside property limits
Seal & Signature Architect: Sullivan Group Design LLC
109 West 27th Street
New York, NY, 10001
212 352 8636
Dwg Number: BPP-002.00
Sheet 2 of 2

APPENDIX 6
**Design Diagrams and Specifications for Vapor
Barrier/Waterproofing Membrane**

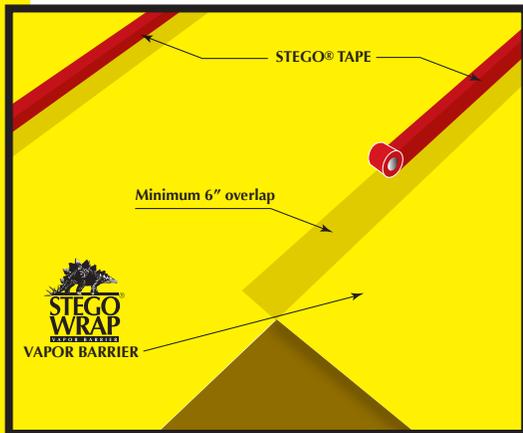
PART 1

STEGO WRAP VAPOR BARRIER/RETARDER INSTALLATION INSTRUCTIONS



IMPORTANT: Please read these installation instructions completely, prior to beginning any Stego Wrap installation. The following installation instructions are based on ASTM E 1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs. If project specifications call for compliance with ASTM E 1643, then be sure to review the specific installation sections outlined in the standard along with the techniques referenced in these instructions.

FIGURE 1: UNDER-SLAB INSTALLATION



UNDER-SLAB INSTRUCTIONS:

1. Stego Wrap can be installed over an aggregate, sand, or tamped earth base. It is not necessary to have a cushion layer or sand base, as Stego Wrap is tough enough to withstand rugged construction environments.
2. Unroll Stego Wrap over the area where the slab is to be placed. Stego Wrap should completely cover the concrete placement area. All joints/seams both lateral and butt should be overlapped a minimum of six inches and taped using Stego Tape.

NOTE: The area of adhesion should be free from dust, dirt, moisture, and frost to allow maximum adhesion of the pressure-sensitive tape.

3. ASTM E 1643 requires sealing the perimeter of the slab. *Extend vapor retarder over footings and seal to foundation wall, grade beam, or slab at an elevation consistent with the top of the slab or terminate at impediments such as waterstops or dowels.* Consult the structural engineer of record before proceeding.

SEAL TO SLAB AT PERIMETER:*

NOTE: Clean the surface of Stego Wrap to ensure that the area of adhesion is free from dust, dirt, moisture, and frost to allow maximum adhesion of the pressure-sensitive adhesive.

- a. Install Crete Claw® on the entire perimeter edge of Stego Wrap.
- b. Prior to the placement of concrete, ensure that the top of Crete Claw is free of dirt, debris, or mud to maximize the bond to the concrete.

STEGO LABOR SAVER!

This method not only complies with ASTM E 1643, but it also:

- reduces labor compared to other perimeter sealing techniques.
- can be used even without an existing wall or footing, unlike alternatives.

FIGURE 2a: SEAL TO SLAB AT PERIMETER

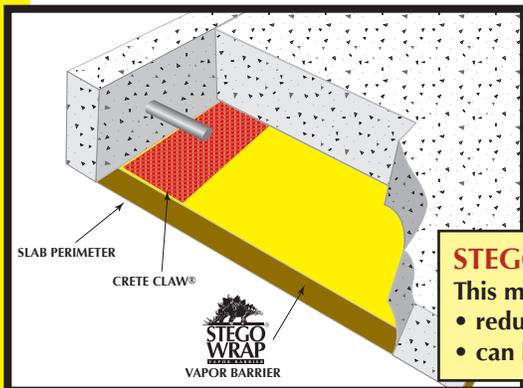


FIGURE 2b: SEAL TO PERIMETER WALL

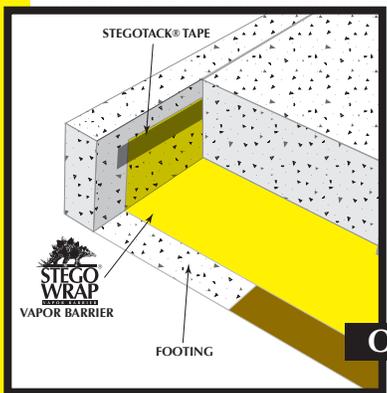
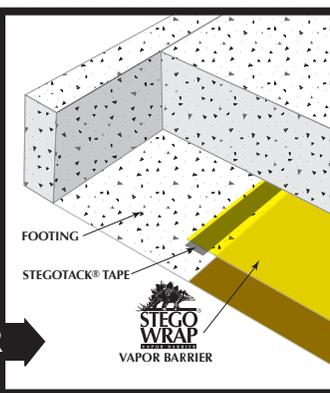


FIGURE 2c: SEAL TO FOOTING



OR SEAL TO PERIMETER WALL OR FOOTING WITH STEGOTACK® TAPE:*

- a. Make sure area of adhesion is free of dust, dirt, debris, moisture, and frost to allow maximum adhesion.
- b. Remove release liner on one side and stick to desired surface.
- c. When ready to apply Stego Wrap, remove the exposed release liner and press Stego Wrap firmly against StegoTack Tape to secure.

* If ASTM E 1643 is specified, consult with project architect and structural engineer to determine which perimeter seal technique should be employed for the project.

NOTE: Stego Industries, LLC's ("Stego") installation instructions are based on ASTM E 1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs. These instructions are meant to be used as a guide, and do not take into account specific job site situations. Consult local building codes and regulations along with the building owner or owner's representative before proceeding. If you have any questions regarding the above mentioned installation instructions or Stego products, please call us at 877-464-7834 for technical assistance. While Stego employees and representatives may provide technical assistance regarding the utility of a specific installation practice or Stego product, they are not authorized to make final design decisions.

- In the event that Stego Wrap is damaged during or after installation, repairs must be made. Stego Tape can be used to repair small holes in the material. For larger holes, cut a piece of Stego Wrap to a size and shape that covers any damage by a minimum overlap of six inches in all directions. Clean all adhesion areas of dust, dirt, moisture, and frost. Tape down all edges using Stego Tape (see figure 3, Sealing Damaged Areas).

FIGURE 3: SEALING DAMAGED AREAS



- IMPORTANT: ALL PENETRATIONS MUST BE SEALED.** All pipe, ducting, rebar, wire penetrations and block outs should be sealed using Stego Wrap, Stego Tape and/or Stego Mastic (see figure 4a, Pipe Penetration Sealing).

FIGURE 4a: PIPE PENETRATION SEALING



STEGO WRAP PIPE PENETRATION REPAIR DETAIL:

- Install Stego Wrap around pipe penetrations by slitting/cutting material as needed. Try to minimize the void space created.
- If Stego Wrap is close to pipe and void space is minimized then seal around pipe penetration with Stego Tape and/or Stego Mastic. **[See Figure 4a]**
- If detail patch is needed to minimize void space around penetration, then cut a detail patch to a size and shape that creates a six inch overlap on all edges around the void space at the base of the pipe. Stego Pre-Cut Pipe Boots are also available to speed up the installation.
- Cut an "X" the size of the pipe diameter in the center of the pipe boot and slide tightly over pipe.
- Tape down all sides of the pipe boot with Stego Tape.
- Seal around the base of the pipe using Stego Tape and/or Stego Mastic. **[See Figure 4b]**

FIGURE 4b: DETAIL PATCH FOR PIPE PENETRATION SEALING

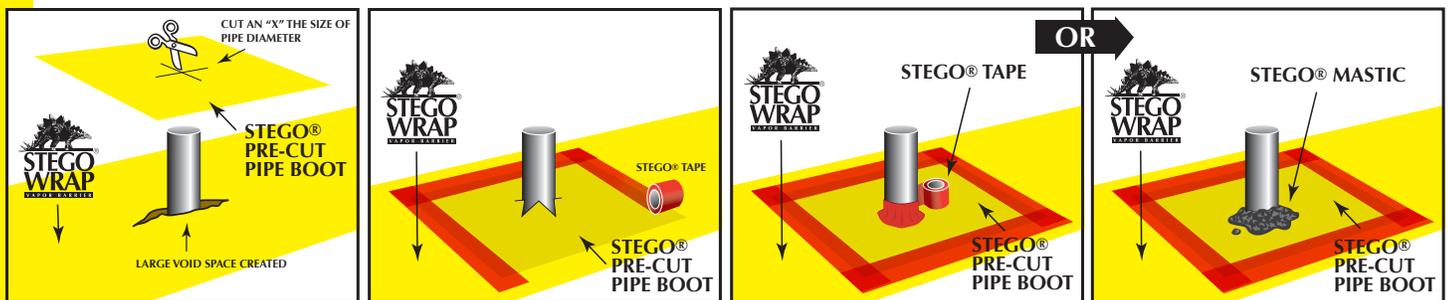


FIGURE 5: MULTIPLE PIPE PENETRATION SEALING



MULTIPLE PIPE PENETRATION SEALING:

Multiple pipe penetrations in close proximity and very small pipes may be sealed using Stego Wrap and Stego Mastic for ease of installation (see figure 5, Multiple Pipe Penetration Sealing).

NOTE: Stego Industries, LLC's ("Stego") installation instructions are based on ASTM E 1643 - *Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs*. These instructions are meant to be used as a guide, and do not take into account specific job site situations. Consult local building codes and regulations along with the building owner or owner's representative before proceeding. If you have any questions regarding the above mentioned installation instructions or Stego products, please call us at 877-464-7834 for technical assistance. While Stego employees and representatives may provide technical assistance regarding the utility of a specific installation practice or Stego product, they are not authorized to make final design decisions.



Stego® Wrap 20-Mil Vapor Barrier

STEGO INDUSTRIES, LLC



Vapor Retarders
07 26 00, 03 30 00

1. Product Name

Stego Wrap 20-Mil Vapor Barrier

2. Manufacturer

Stego Industries, LLC
216 Avenida Fabricante, Suite 101
San Clemente, CA 92672
Sales, Technical Assistance
Ph: (877) 464-7834
Fx: (949) 257-4113
www.stegoindustries.com

3. Product Description

USES: Stego Wrap 20-Mil Vapor Barrier is used as a below-slab vapor barrier, and as a protection course for below grade waterproofing applications.

COMPOSITION: Stego Wrap 20-Mil Vapor Barrier is a multi-layer plastic extrusion manufactured with only the highest grade of prime, virgin, polyolefin resins.

ENVIRONMENTAL FACTORS:

Stego Wrap 20-Mil Vapor Barrier can be used in systems for the control of soil gases (radon, methane), soil poisons (oil by-products) and sulfates.

5. Installation

UNDER SLAB: Unroll Stego Wrap 20-Mil Vapor Barrier over an aggregate, sand or tamped earth base. Overlap all seams a minimum of six inches and tape using Stego Tape or Crete Claw® Tape. All penetrations must be sealed using a combination of Stego Wrap and Stego accessories.

For additional information, please refer to Stego's complete installation instructions.

6. Availability & Cost

Stego Wrap 20-Mil Vapor Barrier is available nationally via building supply distributors. For current cost information, contact your local Stego Wrap distributor or Stego Industries' sales department.

7. Warranty

Stego Industries, LLC believes to the best of its knowledge, that specifications and recommendations herein are

accurate and reliable. However, since site conditions are not within its control, Stego Industries does not guarantee results from the use of the information provided and disclaims all liability from any loss or damage. No warranty, express or implied, is given as to the merchantability, fitness for a particular purpose, or otherwise with respect to the products referred to.

8. Maintenance

None required.

9. Technical Services

Technical advice, custom CAD drawings, and additional information can be obtained by contacting Stego Industries' technical assistance department or via the website.

4. Technical Data

TABLE 1: PHYSICAL PROPERTIES OF STEGO WRAP 20-MIL VAPOR BARRIER

PROPERTY	TEST	RESULTS
Under Slab Vapor Retarders	ASTM E 1745 Class A, B & C – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs	Exceeds Class A, B & C
Water Vapor Permeance	ASTM F 1249 – Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor	0.0071 perms
Puncture Resistance	ASTM D 1709 – Test Methods for Impact Resistance of Plastic Film by Free-Falling Dart Method	3500+ grams*
Tensile Strength	ASTM D 882 – Test Method for Tensile Properties of Thin Plastic Sheeting	97.7 lbf/in.
Permeance After Conditioning (ASTM E 1745 Sections 7.1.2 - 7.1.5)	ASTM E 154 Section 8, F 1249 – Permeance after wetting, drying, and soaking ASTM E 154 Section 11, F 1249 – Permeance after heat conditioning ASTM E 154 Section 12, F 1249 – Permeance after low temperature conditioning ASTM E 154 Section 13, F 1249 – Permeance after soil organism exposure	0.0088 perms 0.0081 perms 0.0084 perms 0.0077 perms
Thickness	ACI 302.1R-04 – Minimum Thickness (10 mils)	20 mils
Roll Dimensions		14 ft. wide x 105 ft. long or 1,470 ft ²
Roll Weight		140 lbs.

Note: perm unit = grains/(ft² *hr* in.Hg)

* The material maxed out the testing equipment and did not fail at 3746 grams.

