

**489 CANAL STREET**  
**(A.K.A. 219 HUDSON STREET)**

**MANHATTAN, NEW YORK**

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**Remedial Action Work Plan**

**NYC VCP Number: 15CVCP010M**  
**OER Project Number: 14EH-N213M**

**Prepared for:**

HSH Construction, LLC

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New York, NY 10013

**Prepared by:**

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**AUGUST 2014**

# **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
CPP	Citizen Participation Plan
CSOP	Contractors Site Operation Plan
DCR	Declaration of Covenants and Restrictions
ECs/ICs	Engineering and Institutional Controls
HASP	Health and Safety Plan
IRM	Interim Remedial Measure
MNA	Monitored Natural Attenuation
NOC	Notice of Completion
NYC VCP	New York City Voluntary 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	Photoionization Detector
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAOs	Remedial Action Objectives
RAR	Remedial Action Report
RAWP	Remedial Action Work Plan
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI	Remedial Investigation
RMZ	Residual Management Zone
SCOs	Soil Cleanup Objectives
SCGV	Standards, Criteria, and Guidance Values
SMP	Site Management Plan
SMMP	Soil/Materials Management Plan
SPDES	State Pollutant Discharge Elimination System
SVOC	Semi-Volatile Organic Compound
USGS	United States Geological Survey
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound

# CERTIFICATION

I, Ernest Hanna, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 489 Canal Street (a.k.a. 219 Hudson Street), Site Number 14EH-N213M and VCP Number: 15CVCP010M.

I, Clifford Bell, am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 489 Canal Street (a.k.a. 219 Hudson Street), Site Number 14EH-N213M and VCP Number: 15CVCP010M.

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 the 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.

\_\_\_\_\_  
Name

\_\_\_\_\_  
NYS PE License Number

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date



\_\_\_\_\_  
QEP Name

\_\_\_\_\_  
QEP Signature

\_\_\_\_\_  
Date

# EXECUTIVE SUMMARY

HSH Construction, LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a 4,280-square foot Site located at 489 Canal Street (a.k.a. 219 Hudson Street) in Manhattan, New York. A remedial investigation was performed by a previous environmental consultant Soil Mechanics Environmental Services (SMES) of Seaford, NY to compile and evaluate data and information necessary to develop this Remedial Action Work Plan (RAWP). GZA reviewed the documents prepared by SMES, and based upon the findings detailed in the documents and its own professional experience prepared a Remedial Investigation Report. 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 values, and conforms with applicable laws and regulations.

## Site Location and Current Usage

The Site is located at 489 Canal Street in the SoHo section in Manhattan, New York and is identified as Block 594 and Lot 108 on the New York City Tax Map. **Figure 1** shows the Site location. The Site is approximately 4,203-square feet in area and is bounded by multi-story retail/residential buildings and a construction Site (future hotel) to the north, Canal Street and a multi-story commercial building (Mr. Lock's Security Systems) to the south, Hudson Street and the approach to the Holland Tunnel to the east, and a two-story commercial building (Polo Electric) to the west. Currently, the Site is used for storage. A portable construction trailer is also located on the Site, as well as, the base of a former billboard sign. The entire Site is covered by asphalt pavement with the exception of a concrete pad located in the southern part of the Site.

## Summary of Proposed Redevelopment Plan

The proposed future use of the Site will consist of an 11-story mixed-use hotel and restaurant space planned for the lower two floors. The Draft First Floor Plan of the proposed Site development is presented on **Figure 2**. The current zoning designation is C6-2A, and the proposed use is consistent with the existing zoning for the property. The two-tiered basement

levels will be an estimated 4.5 feet and 8 feet below ground surface (bgs) featuring mechanical equipment rooms and storage space. Both the upper and lower cellar floors will have an approximately 2.5-foot thick structural slab supported on pile foundation, requiring an estimated total excavation of approximately 9 feet bgs and approximately 12 feet bgs, respectively.

The total square footage of the lot is 4,203 square feet (sf), and the entire lot will be covered by the building footprint. The total proposed floor area is 27,951 sf. The approximate soil volume to be excavated for the building foundation is 1,500 cubic yards or 2,300 tons. The excavation depth is estimated to range between approximately 9 to 12 feet bgs across the Site.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan. Additional development drawings are presented in Appendix A.

### **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. Implementation of a Community Air Monitoring Program (CAMP) for particulates and volatile organic compounds.
3. Performance of a remedial action for the petroleum spill #13-12004 under New York State Department of Environmental Conservation (NYSDEC) Spill program. This remedial action will consist of installation and monitoring of groundwater monitoring wells as required and approved by NYSDEC. A separate RAWP addendum will be

prepared and submitted to DEC. This RAWP does not alter or interfere with the remedial action for the petroleum spill.

4. Request for closure of onsite petroleum spill number 13-12004 under the authority of NYSDEC pending the results of the investigation and remediation and in accordance with CP-51 soil cleanup objectives. This RAWP does not alter or interfere with the remedial action for the petroleum spill. A separate Spill closure report will be prepared and submitted to NYSDEC.
5. Establishment of Track 4 Site Specific Soil Cleanup Objectives (SCOs).
6. Site mobilization involving Site security setup, equipment mobilization, utility mark outs, and marking and staking excavation areas.
7. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs. Excavation for construction of the new building's cellar level would take place to a depth of approximately 9 to 12 feet bgs across the Site. A small portion (elevator shaft area) will be further excavated to depths of 15 feet bgs. Approximately 1,500 cubic yards or 2,300 tons of soil will be excavated and removed from this Site.
8. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
9. Removal of previously closed-in-place USTs (seven known USTs) and removal of any other USTs and/or associated feed lines etc. (if encountered), and closure of petroleum spills (if evidence of a new spill/leak is encountered during Site excavation) in compliance with applicable local, state and federal laws and regulations.
10. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
11. Maintain records as described in this RAWP, including waste disposal manifests, clean fill/top soil sampling results, and appropriate health and safety forms and documentation.
12. 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 RAWP. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on Site.

13. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
14. Import of materials to be used for backfill and cover in compliance with this RAWP and in accordance with applicable laws and regulations.
15. Installation of a vapor barrier/waterproofing membrane beneath the building slab and outside foundation sidewalls below grade will mitigate potential vapor exposure migratory pathways within the new building. The vapor barrier/waterproofing membrane will be comprised of Grace Preprufe 300R, Preprufe 160R, Bituthene 4000, and/or HydroDuct 220 below-grade foundation dampproofing material or equivalent.
16. Construction and maintenance of an engineered composite Site cover consisting of an approximately 2.5-foot thick basement slab and an approximately 4-inch thick concrete pavement at grade to prevent human exposure to residual soil/fill remaining under the Site.
17. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
18. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations. Excavation will extend below groundwater table and will require dewatering. Dewatering permits will be obtained from NYCDEP prior to start of remediation.
19. Submission of a Remedial Action Report (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.
20. Submission of an approved Site Management Plan (SMP) in the 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.

21. The property will continue to be registered with an E-Designation by the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in conformance 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 NYC OER-approval.

## 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 soil, 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. A search of the NYC OER’s SPEED application was performed by GZA on April 9, 2014. Search results for sensitive receptors including schools, hospitals, and day care centers indicated that none of these receptors is currently located within 500 feet of the Site.

**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 Health and Safety Plan that is designed to protect community residents and on-Site workers. The elements of this RAWP are in compliance with applicable safety requirements of the United States Occupational Safety and Health Administration. This RAWP 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 will be identified when contracted by the client.

**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 odor. 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 include steps to be taken if nuisances are detected. Generally, dust is managed by application of physical covers and by water sprays. Odor is 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 applicable NYC noise control standards. If you observe problems in these areas, please contact the on-Site Project Manager Clifford Bell at 212-594-8140 (x-8931)

or NYC Office of Environmental Remediation Project Manager Samantha Morris at 212-341-2082.

**Quality Assurance.** This clean up 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 are 7:00 AM to 5:00 PM and Monday through Saturday days of operation.

**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 Clifford Bell at 212-594-8140 (x-8931), the NYC Office of Environmental Remediation Project Manager Samantha Morris at 212-341-2082, 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. In addition to extensive sampling and chemical testing of soil 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, odor, 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 applicable 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 the 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 the Remedial Action Report) that will be available for you to review in the public document repositories located at New York Public Library located at 188 Madison Avenue, New York, NY 10016.

**Long-Term Site Management.** To provide long-term protection after the cleanup is complete, 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 defined in the 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

HSH Construction, LLC has applied to enroll in the New York City Voluntary Cleanup Program (NYC VCP) to investigate and remediate a property located at 489 Canal Street in the Soho section of Manhattan, New York (the “Site”). A Remedial Investigation 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 alternative 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 values, and applicable laws and regulations.

### 1.1 SITE LOCATION AND CURRENT USAGE

The Site is located at 489 Canal Street in the SoHo section in Manhattan, New York and is identified as Block 594 and Lot 108 on the New York City Tax Map. **Figure 1** shows the Site location. The Site is approximately 4,203-square feet in area and is bounded by multi-story retail/residential buildings and a construction Site (future hotel) to the north, Canal Street and a multi-story commercial building (Mr. Lock's Security Systems) to the south, Hudson Street and the approach to the Holland Tunnel to the east, and a two-story commercial building (Polo Electric) to the west. Currently, the Site is used for storage. A portable construction trailer is also located on the Site, as well as, the base of a former billboard sign. The entire Site is covered by asphalt pavement with the exception of a concrete pad located in the southern part of the Site.

### 1.2 PROPOSED REDEVELOPMENT PLAN

The proposed future use of the Site will consist of an 11-story mixed-use hotel with restaurant space planned for the lower two floors. The First Floor Plan of the proposed Site development is presented on **Figure 2**. The current zoning designation is C6-2A, and the

proposed use is consistent with the existing zoning for the property. The two-tiered basement levels will be at approximately 4.5 feet and 8 feet bgs featuring mechanical equipment rooms and storage space. The total square footage of the lot is 4,203 sf, and the entire lot will be covered by the building footprint. A narrow strip of property on the north side of the parcel totaling 447 sf is currently occupied by an existing one-story totaling 248 sf and a two-story building totaling 199 sf that will remain. The total proposed floor area is 27,951 sf. The anticipated excavated soil volume to be excavated for the building foundation is 1,500 cubic yards or 2,300 tons. The proposed excavation depth will range from approximately 9 to 12 feet bgs across the Site.

The remedial action contemplated under this RAWP may be implemented independently of the proposed redevelopment plan. Additional development drawings are presented in Appendix A.

### **1.3 DESCRIPTION OF SURROUNDING PROPERTY**

The Site is situated in the southern section of the community district of SoHo and borders the northern section of Tribeca. The urban area surrounding the Site is characterized by multi-story residential, retail and commercial buildings. The Hudson River and entrance to the Holland Tunnel are located approximately 900 feet east of the Site. A search of OER's SPEED website was performed by GZA on April 9, 2014. The results indicated that the Site is zoned as C6-2A. **Figure 3** shows the surrounding land usage.

### **1.4 REMEDIAL INVESTIGATION**

A remedial investigation was performed by SMES in 2013 and the results were documented in their report dated March 11, 2013. GZA reformatted Soil Mechanics Environmental Services (SMES) Remedial Investigation Report and submitted to the NYC OER as a companion report entitled "*Remedial Investigation Report, 489 Canal Street (a.k.a. 219 Hudson Street)*" dated June 2014.

#### **Summary of Past Uses of Site and Areas of Concern**

The subject property is currently utilized for storage. Prior to its current use, the Site was used as a parking lot beginning in the 1990s. Pursuant to information presented by SMES in

their January 2013 Phase I Report and according to historical records between 1894 and the early 1930s, the Site was improved by several multi-story buildings. Site usage was considered residential/commercial in nature. According to multiple sources, the subject property was operated as a gasoline filling and vehicle service station from the early 1930s through the 1980s. During a Phase I Site reconnaissance performed by SMES, a concrete pad was observed along the southern portion of the Site. This pad location was consistent with the location of former gasoline dispensers and was confirmed during a subsequent Site visit by GZA on May 7, 2014.

Metallic road boxes, labeled as gasoline, were observed on the northeastern portion of the Site within a public sidewalk. SMES identified these road boxes as fill ports, and GZA confirmed they were marked as "GASOLINE". According to records provided to SMES by the property owner, up to seven 550-gallon USTs were located on the property. Based upon a letter dated July 14, 1987, these tanks were evacuated of all combustible materials and all fill lines were cemented in place by AAR-BEE Oil Service Inc., of Whitestone, NY, a NYCDEP-approved and FDNY-approved firm. A second document (receipt) indicates that three of the USTs were removed circa November 30, 1990, although the address of the Site is not on the receipt. Violation order #D71550 was issued by FDNY's Bureau of Fire Prevention for the Site on September 16, 1998 and required the sealing of seven 550-gallon gasoline USTs. Lastly, an undated letter was provided to SMES by the property owner. This letter, which was issued by the FDNY to Mr. Jerafi, stated that based upon documentation provided to the Department by Mr. Jerafi, violation order #D71550 was revoked. Although unconfirmed, according to the above referenced information four USTs potentially remain in-place at the Site.

Based on the remedial investigation conducted by SMES, the Areas of Concern (AOC) identified for this Site include:

1. the historical use of the property as a gasoline filling and vehicle service station;
2. the Site is listed as an E Designated Site with an effective date of August 19, 2003;

3. file correspondence leaving in question the number of USTs that potentially remain on the Site; and
4. NYSDEC open spill number 1312004 was assigned to the address on March 23, 2014 to address BTEX contamination in groundwater.

### **Summary of Prior Remedial Investigation Activities**

SMES and GZA performed the following RI Activities:

1. SMES conducted a Site inspection on December 12, 2012, and GZA conducted a Site inspection on May 7, 2014 to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. SMES installed six soil borings across the entire project Site, and collected nine soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. SMES installed three groundwater monitoring wells at the Site to establish groundwater flow and collected three groundwater samples for chemical analysis to evaluate groundwater quality in January 2012. GZA collected additional groundwater samples in May 2014 from wells MW-1 and MW-2;
4. SMES installed three soil vapor probes around the Site perimeter and collected three samples for chemical analysis.

### **Summary of Environmental Findings**

SMES performed geotechnical explorations in December 2012 and subsurface assessment activities at the Site relative to identified Recognized Environmental Conditions (REC) in January 2013. GZA performed a geotechnical exploration from April 9-14, 2014. GZA also performed additional groundwater sampling on May 12, 2014.

1. Borings B-1 and B-2 were surveyed at 8.08 and 7.83 feet as referenced to Borough of Manhattan Map 17 and Bench Mark Elevation 7.30 feet at the corner of Hudson and Canal Streets and presented by Soil Mechanics Drilling Corporation on their January 2013 Subsurface Investigation Report. The property is relatively level.

2. Depth to groundwater is approximately 7 feet bgs at the Site.
3. Groundwater flow is generally from northeast to southwest beneath the Site based only on topographic considerations. However, the direction of groundwater flow could be significantly influenced by local features including subsurface drainage, subsurface structural features such as the adjacent Port Authority tunnel structures, and/or local pumping.
4. Depth to bedrock is greater than 102 feet at the Site as GZA completed a geotechnical boring on April 8, 2014 to this depth and did not encounter bedrock.
5. The stratigraphy of the Site, from the surface down, consists of fill to approximately 10 feet bgs, and is comprised of fine to coarse sand with up to 10 percent gravel and up to 20 percent silt with occasional brick fragments, 0.5 to 2 feet of peat immediately underlying the fill, underlain by fine to coarse sand with up to 40 percent silt and 20 percent gravel below the peat stratum to the end of the GZA boring at 102 feet.
6. Soil sample results were compared to NYSDEC Part 375-6 Unrestricted Use (Track 1) and Restricted Commercial Use (Track 2) Soil Cleanup Objectives (SCOs). Soil samples showed detectable concentrations of volatile organic compounds (VOC), semi-volatile organic compounds (SVOC) and metals in exceedance of their respective Restricted Residential Use SCOs. Five VOCs were detected above their respective Unrestricted Use SCOs and included toluene (max of 809 ppb), Ethylbenzene (max of 51,500 ppb), m,p-xylene (6,500 ppb), o-xylenes (3,910 ppb), ispropylbenzene (19,400 ppb). Ispropylbenzene and ethylbenzene also exceeded their respective Restricted Residential SCOs. SVOCS including benzo(a)anthracene (max 1,130 ppm), chrysene (max of 1,340 ppm), benzo(b)flouranthene (max of 1,720 ppm), benzo(a)pyrene (max of 1,300 ppm), and ideno(1,2,3-cd)pyrene (max of 955 ppm) exceeded their respective Restricted Residential SCOs. Five metals were detected exceeding Restricted Residential SCOs both in the 0-2' samples and the 4-6' samples and included cadmium (max. of 3.35 ppm), copper (max of 147 ppm), lead (max of 1,840 ppm), mercury (max of 3.40 ppm), and zinc (max of 1350 ppm). Of these metals, lead and mercury also exceeded Restricted Commercial Use SCOs. Two pesticides including 4,4'-DDE (max of 6.57 ppb) and 4,4'-

DDT (max of 30.0 ppb) were detected in one soil sample each and were above Unrestricted Use SCOs and below Restricted Residential SCOs. PCBs were not detected. Other than lead and mercury, no VOCs, SVOCs and pesticides exceeded Restricted Commercial Use SCOs.

7. Groundwater samples collected were compared to NYSDEC 6NYCRR Part 703 Ambient Water Quality Standards and Guidance Values (GQS) or TOGS 1.1.1. Two groundwater samples were collected by GZA during the May, 2014 remedial investigation and three groundwater samples collected by SMES during the January 2013 remedial investigation showed concentrations of pesticides, VOCs, SVOCs, and metals above their respective GQS. Several metals were identified but only antimony (6.01), barium (max of 1.61 mg/L), iron (12,100 µg/L), magnesium (69,300 µg/L), manganese (1,962 µg/L), sodium (max of 987 µg/L), and lead (max of 0.075 µg/L) exceeded their respective GQSs. Several VOCs were detected including isopropylbenzene (200 µg/L), ethylbenzene (590 µg/L), benzene (170 µg/L), n-butylbenzene ( max of 22 µg/L), sec-butylbenzene ( max of 14 µg/L), toluene (max of 39 µg/L), p/m-xylene (max of 170 µg/L), o-xylene (max of 17 µg/L), p-isopropyltoluene (max of 13 µg/L), n-propylbenzene (max of 300 µg/L), 1,3,5-trimethylbenzene (max of 84 µg/L), 1,2,4-trimethylbenzene (max of 17 µg/L), and acetone (66.4 mg/L). Several SVOCs were detected above their respective GQSs and including naphthalene (max. of 836 mg/L), pentachlorophenol (max of 4.7 µg/L), and bis(2-ethylhexyl)phthalate (max of 9.1 µg/L) . No pesticides or PCBs were detected in groundwater.
8. Soil vapor samples collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. All three soil vapor samples collected during the remedial investigation showed low-level concentrations of several VOC constituents. All compounds were detected at concentrations less than 10 µg/m<sup>3</sup>. None of the sample detections exceeded the New York State Department of Health Air Guideline Values (NYSDOH AGV). Chlorinated VOCs including PCE, TCE, 1,1,1- TCA, and Carbon Tetrachloride were all non- detect.

For more detailed results, consult the Remedial Investigation Report. Based on an evaluation of the data and information from the Remedial Investigation Report 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 remedial investigation, the following Remedial Action Objectives (RAOs) have been identified for this Site:

### **Groundwater**

- Remove contaminant sources causing impact to groundwater.
- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

### **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 (SCGV). A remedy is then developed based on the following ten criteria:

- Protection of human health and the environment;
- Compliance with SCGVs;
- Short-term effectiveness and impacts;
- Long-term effectiveness and permanence;
- Reduction of the toxicity, mobility or volume of impacted material;
- Implementability;
- Cost Effectiveness;
- Community Acceptance;
- Land Use; and,
- Sustainability

The following is a detailed description of the alternatives analysis and remedy selection to address impacted media at the Site. As required, a minimum of two remedial alternatives including a Track 1 Unrestricted Use scenario are evaluated, as follows:

#### **Alternative 1:**

- Selection of NYDEC 6NYCRR Part 375 Table 6.8 Unrestricted Use (Track 1) Soil Cleanup Objective (SCOs).

- Removal of soil/fill exceeding Track 1 Unrestricted Use SCOs throughout the Site. Based on the results of the Remedial Investigation, it is expected that this alternative would require excavation across the Site to a depth of approximately 9 to 12 feet bgs for cellar levels. If soil/fill containing analytes at concentrations above Unrestricted Use SCOs is still present at the base of the excavation after removal of the soil required for construction of the new building's cellar level is complete, additional excavation will be performed to remove the 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 barrier/waterproofing membrane would be installed beneath the cellar foundation and behind foundation sidewalls of the new building as part of the development to limit the potential for future exposures from off-Site soil vapor.
- As part of the new development, the proposed final cover consists of an approximately 2.5-foot thick structural basement slab and an approximately 4-inch thick concrete pavement at grade.

**Alternative 2 involves:**

- Establishment of Site Specific (Track 4) SCOs.
- Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs and confirmation that Track 4 Site Specific SCOs have been achieved with post excavation endpoint sampling. Historic fill at Site extends to a depth of approximately 10 feet bgs. Excavation for construction of the new building's cellar levels would take place to a depth of approximately 9 to 12 feet beneath the footprint of the building. Therefore, if soil/fill containing analytes at concentrations above Track 4 Site-Specific SCOs is still present at the base of the excavation after removal of the soil required for new development, additional excavation would be performed to meet Track 4 Site-Specific SCOs.
- During Site redevelopment, GZA will perform assessment activities as necessary, including the collection of soil samples near the fill ports and concrete pad noted in **Section 1.1**. Additional assessment is warranted to further evaluate potential sources of subsurface impacts related to former usage of the Site as a gasoline filling and vehicle service station. Historical documentation indicates the potential for up to seven USTs at

the Site. GZA will assess subsurface conditions during excavation activities relative to these USTs and will observe and document their removal.

- Installation of a soil vapor barrier/waterproofing membrane beneath the building slab and along foundation side walls of proposed building to limit the potential future exposures from off-Site soil vapor.
- Placement of a final cover over the Site to limit exposures to remaining soil/fill;
- Establishment of use restrictions including prohibitions on the use of groundwater from the Site; prohibitions of Sensitive Site uses such as farming or vegetable gardening, to mitigate the potential for future exposure pathways; and prohibition of a higher land use without OER approval.
- Establishment of an approved Site Management Plan to ensure long-term management of these engineering and institutional controls including the performance of periodic inspections and certification that the controls are performing as they were intended; and
- Continued registration as an E-designated property to memorialize the remedial action and the Engineering and Institutional Controls required by this RAWP.

### **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 impacted soil/fill that exceeds Track 1 Unrestricted Use SCOs and groundwater protection standards thus mitigating the risk for constituents to leach into the groundwater. The composite cover system would mitigate the potential for direct contact with remaining underlying fill material.

**Alternative 2** would achieve comparable protection of human health and the environment by excavating historic fill at the Site that exceeds the Track 4 Site Specific SCOs and by documenting that remaining soil/fill meets Track 4 SCOs, as well as by placement of EC/IC including a composite Site cover system. The composite Site cover system would mitigate the potential for direct contact with remaining on-Site soil/fill. Implementing institutional controls including an SMP and continued “E” Designation of the property would document that the composite Site cover system remains intact and protective. Establishment of Track 4 SCOs would minimize the risk of constituents leaching into the groundwater.

For both alternatives, potential exposure to impacted soil or groundwater during construction would be minimized by implementing a Construction Health and Safety Plan (CHASP), an approved Soil/Materials Management Plan (SMMP), and a Community Air Monitoring Plan (CAMP). Potential contact with impacted groundwater would be mitigated as its use is prohibited by city laws and regulations. Potential future migration of off-Site soil vapors would be mitigated by installing a vapor barrier/waterproofing membrane below the new building’s basement slab and continuing the vapor barrier/waterproofing membrane up along the foundation walls.

### **3.2. BALANCING CRITERIA**

#### **Compliance with Standards, Criteria, and Guidance Values (SCGV)**

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 the soil to achieve Track 1 Unrestricted Use SCOs and Groundwater Protection Standards. Compliance with SCGs for soil vapor would also be achieved by removal of soil and by installing a vapor barrier/waterproofing membrane as part of the building foundation.

**Alternative 2** would achieve compliance with the remedial goals and chemical-specific SCGs and RAOs for soil through removal of the soil to achieve Track 4 SCOs.

Compliance with SCVs for soil vapor would also be achieved by removal of soil down to the planned depth of the building foundation (approximately 9 to 12 feet bgs) or deeper and by installation of a vapor barrier/waterproofing membrane below the new building's basement slab and continuing the vapor barrier/waterproofing membrane around foundation walls. A SMP would document the long-term integrity and protectiveness of these controls.

Health and safety measures contained in the CHASP and CAMP that conform to applicable SCGs will be implemented during Site redevelopment under this RAWP. For both Alternatives, focused attention on means and methods employed during the remedial action such that handling and management of impacted material would be in compliance with applicable SCGs. These measures will protect on-Site workers and the surrounding community from exposure to Site-related constituents.

### **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.

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 short-term effectiveness during their respective implementations, as each requires excavation of historic fill material and possible removal of up to seven 550-gallon USTs. Both alternatives would result in short-term dust generation impacts associated with excavation, handling, load out of materials, and truck traffic. Short-term impacts would be higher for Alternative 1 since excavation of greater amounts of historical fill material is

required below the excavation depth of the proposed building. However, focused attention to means and methods during the remedial action during a Track 1 removal action, including community air monitoring and appropriate truck routing, would minimize the overall impact of these activities.

An additional short-term adverse impact and risk to the community associated with both remedial alternatives is increased truck traffic. Approximately 40, 24-cubic yard capacity truck trips would be necessary to transport fill and soil excavated during Site development. 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.

Both alternatives would employ appropriate measures to mitigate the potential for short-term impacts, including a CHASP, a CAMP, and a SMMP during the on-Site soil disturbance activities and would minimize the release of constituents into the environment. Both alternatives provide short-term effectiveness in protecting the surrounding community by decreasing the risk of contact with on-Site constituents. Construction workers operating under appropriate management procedures and a CHASP will be protected from on-Site constituents (personal protective equipment would be worn consistent with the documented risks 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** would achieve long-term effectiveness and permanence related to on-Site constituents by permanently removing the impacted soil/fill that exceeds Track 1 Unrestricted Use SCOs. Removal of on-Site constituent sources will mitigate the potential for future groundwater impacts. In addition to impacted soil/fill removal, the potential exists to remove

up to seven 550-gallon USTs and associated fill piping. These actions will also serve to reduce potential sources of subsurface impacts.

**Alternative 2** would provide long-term effectiveness by removing most on-Site impacted media and potential sources of impacts including up to seven USTs and attaining Track 4 SCOs; a composite Site cover system across the Site's building footprint maintaining use restrictions, establishing an SMP to document long-term management of EC/IC, and maintaining continued registration as an E-designated property to record these controls for long term. The SMP would document long-term effectiveness of the EC/IC by requiring periodic inspection and certification that these controls and restrictions continue to be in place and are functioning as they were intended, thereby documenting that protections designed into the remedy would continue to provide an acceptable level of protection.

Both alternatives would result in removal of impacted material exceeding the Soil Cleanup Objectives (SCOs) providing a high level, effective and permanent remedy over the long-term with respect to a remedy for impacted material, which will mitigate the migration to groundwater. Potential sources of soil vapor and groundwater impacts will also be mitigated as part of the remedy. In alternatives, installation of a vapor barrier/waterproofing membrane beneath the slab and along foundation walls would provide protection against potential on-Site soil vapors.

### **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.

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** will mitigate toxicity, mobility, and volume of constituents on the Site by removing soil in excess of Track 1 UUSCOs.

**Alternative 2** would remove most of the historic fill at the Site, and any remaining on-Site soil beneath the proposed building footprint would meet Track 4 SCOs.

### **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.

The techniques, materials and equipment to implement both remedial Alternatives 1 and 2 are readily available and have been proven effective in remediating the constituents associated with the subject Site. They use standard materials and services that are well-established technologies. The reliability of each remedy is also high. There are no special difficulties associated with 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.

The depth of historic fill at the Site was evaluated during a geotechnical assessment as well as during the remedial investigation activities. Historic fill likely extends to a depth of up to approximately 10 feet bgs at the Site. The proposed building construction (basement level) requires excavation of the entire Site to a depth of approximately 9 and 12 feet bgs for the cellar levels and to depths of up to approximately 15 feet bgs for the proposed elevator shaft areas. The localized water table was observed at approximately 7 feet bgs, above the proposed excavation depth. Costs associated with **Alternative 1** are considered higher than those associated with **Alternative 2** as additional fill material will be removed from the Site as will implementation of a dewatering system.

In addition to environmental concerns associated with historic fill, up to seven 550-gallon USTs may still be located on the property. These USTs will be encountered during Site redevelopment, as the installation depth of the USTs is likely located within the proposed construction depth of approximately 9 to 12 feet bgs. These potential sources of subsurface impacts will be removed from the Site and associated costs for UST removal are anticipated to be comparable regardless of which **Alternative** is selected.

Costs associated with **Alternative 1** would be significantly higher than **Alternative 2** especially if soil with analytes above Track 1 UUSCOs is encountered below the proposed excavation depth of approximately 9 to 12 feet bgs. Historic fill extends up to approximately 10 feet bgs or approximately 1 foot below the proposed excavation depth for the upper cellar. The layer of fill also extends into the groundwater table. Additional costs associated with **Alternative 1** would include additional shoring/underpinning of adjacent buildings, disposal of additional soil, dewatering and disposal/treatment of recovered groundwater and import of clean soil for backfill. Long-term costs for **Alternative 2** may be similar or eventually trump costs of **Alternative 1** based on implementation of a SMP as part of **Alternative 2**.

The remedial plan creates an approach that combines the remedial action with redevelopment of the Site, including construction of the building foundation and subgrade structures. The remedial plan is also cost effective in that it will take into consideration the

selection of the closer and more appropriate facilities to reduce transportation and disposal costs during the excavation of historic fill and other soil during the redevelopment of the Site.

### **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 and initial permitting associated with the proposed Site development, no adverse community opinion is anticipated for either alternative. This RAWP will be subject to a public review under the NYC VCP and will provide the opportunity for detailed public input on the remedial alternatives and the selected remedy. Public comments will be considered by OER prior to approval of this RAWP. The Citizen Participation Plan (CPP) for the project is provided in **Appendix B**.

### **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 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 proposed redevelopment of the Site is comparable with its current zoning and is consistent with recent development patterns. Following remediation, the Site will meet either Track 1 Unrestricted Use SCOs or Site Specific Track 4 SCOs, which are appropriate for the planned residential use. Improvements in the current environmental condition of the property achieved by both alternatives are also consistent with the City's goal for cleanup of impacted

land and bringing such properties into productive reuse. 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 remedial alternatives are comparable with respect to the opportunity to achieve sustainable remedial action. The remedial plan would take into consideration shorter trucking routes for the transportation of historic fill and other soil thereby reducing greenhouse gas emissions and conserving energy used to fuel trucks. The New York City Clean Soil Bank also may be utilized for reuse of native soil. To the extent practicable, energy efficient building materials, appliances and equipment will be utilized to complete the development. A complete list of green remedial activities considered part of the NYC VCP is provided in the Sustainability Statement included in **Appendix C**.

## 4.0 REMEDIAL ACTION

### 4.1 SUMMARY OF PREFERRED REMEDIAL ACTION

The preferred remedial action alternative is the Track 4 Alternative (**Alternative 2**). 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 and 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. Implementation of a Community Air Monitoring Program (CAMP) for particulates and volatile organic compounds.
3. Performance of a remedial action for the petroleum spill #13-12004 under New York State Department of Environmental Conservation (NYSDEC) Spill program. This remedial action will consist of installation and monitoring of groundwater monitoring wells as required and approved by NYSDEC. A separate RAWP addendum will be prepared and submitted to DEC. This RAWP does not alter or interfere with the remedial action for the petroleum spill.
4. Request for closure of onsite petroleum spill number 13-12004 under the authority of NYSDEC pending the results of the investigation and remediation and in accordance with CP-51 soil cleanup objectives. This RAWP does not alter or interfere with the remedial action for the petroleum spill. A separate Spill closure report will be prepared and submitted to NYSDEC.
5. Establishment of Track 4 Site Specific Soil Cleanup Objectives (SCOs).

6. Site mobilization involving Site security setup, equipment mobilization, utility mark outs, and marking and staking excavation areas.
7. Excavation and removal of soil/fill exceeding Track 4 Site Specific SCOs. Excavation for construction of the new building's cellar level would take place to a depth of approximately 9 to 12 feet bgs across the Site. A small portion (elevator shaft area) will be further excavated to a depth of approximately 15 feet bgs. Approximately 1,500 cubic yards or 2,300 tons of soil will be excavated and removed from this Site.
8. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
9. Removal of previously closed-in-place USTs (seven known USTs) and removal of any other USTs and/or associated feed lines etc. (if encountered), and closure of petroleum spills (if evidence of a new spill/leak is encountered during Site excavation) in compliance with applicable local, state and federal laws and regulations.
10. Management of excavated materials including temporarily stockpiling and segregating to prevent co-mingling of contaminated material and non-contaminated materials.
11. Maintain records as described in this RAWP, including waste disposal manifests, clean fill/top soil sampling results, and appropriate health and safety forms and documentation.
12. 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 RAWP. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media on Site.
13. Collection and analysis of end-point samples to determine the performance of the remedy with respect to attainment of SCOs.
14. Import of materials to be used for backfill and cover in compliance with this RAWP and in accordance with applicable laws and regulations.
15. Installation of a vapor barrier/waterproofing membrane beneath the building slab and outside foundation sidewalls below grade will mitigate potential vapor exposure migratory pathways within the new building. The vapor barrier/waterproofing membrane

will be comprised of Grace Preprufe 300R, Preprufe 160R, Bituthene 4000, and/or HydroDuct 220 below-grade foundation dampproofing material or equivalent.

16. Construction and maintenance of an engineered composite Site cover consisting of an approximately 2.5-foot thick basement slab and an approximately 4-inch thick concrete pavement at grade to prevent human exposure to residual soil/fill remaining under the Site.
17. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
18. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations. Excavation will extend below groundwater table and will require dewatering. Dewatering permits will be obtained from NYCDEP prior to start of remediation.
19. Submission of a Remedial Action Report (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.
20. Submission of an approved Site Management Plan (SMP) in the 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.
21. The property will continue to be registered with an E-Designation by the NYC Buildings Department. Establishment of Engineering Controls and Institutional Controls in this RAWP and a requirement that management of these controls must be in conformance 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 NYC OER-approval.

## 4.2 SOIL CLEANUP OBJECTIVES AND SOIL/FILL MANAGEMENT

Site-specific (Track 4) SCOs are proposed for this project. The SCOs for this Site are the NYSDEC 6 NYCRR Part 375 Table 375-6.8b Restricted Commercial Use Soil Cleanup Objectives as amended by the following site specific SCOs:

The following Track 4 Site Specific SCOs are proposed:

<u>Contaminant</u>	<u>Track 4 SCOs</u>
Total SVOCs	200 ppm
Lead	1,200 ppm
Mercury	3.0 ppm

Soil and materials management on the Site and off the Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in **Appendix D**. The location of planned excavations is shown on **Figure 4**.

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 and disposed off the Site is approximately 1,500 cubic yards or 2,300 tons.

Disposal facilities will be reported to NYC OER when they are identified and prior to the start of remedial action.

### **End-Point Sampling**

Removal actions for development purposes under this RAWP will be performed in conjunction with confirmation soil sampling. Five confirmation samples will be collected from the base of the excavation at locations to be determined by NYC OER. For comparison to Track

4 Site Specific SCOs, analytes will only include trigger compounds and elements established on the Track 4 Site Specific SCO list.

The dimensions of the proposed excavation are approximately 4,203 square feet by 9 to 12 feet deep. Since excavations extend to the property limits, post-excavation samples will be comprised of Five (5) bottom samples. The proposed location of planned post-excavation samples is shown on **Figure 5**.

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 NYC 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 towards 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 selection of sample containers used to collect samples is based on the criteria of sample matrix, analytical method, and potential constituents of concern, reactivity of container material with the sample, QA/QC requirements, and regulatory protocol requirements. Sample bottles/jars will be provided by the analytical laboratory and will conform to the requirements of USEPA’s Specifications and Guidance for Constituent-Free Sample Containers.

Non-dedicated reusable equipment will require field decontamination. Reusable sampling equipment will be made of stainless steel. Acids and solvents will not be used in the field decontamination of such equipment. Decontamination typically involves scrubbing/washing

with isopropyl alcohol rinse to remove visibly impacted material, followed by potable (tap) water and analyte-free water rinses. Tap water may be used from treated municipal water system; the use of an untreated potable water supply is not an acceptable substitute. If equipment becomes visually impacted, a hexane rinse may be used on the object, followed by triple rinsing with analyte free water. Equipment will be allowed to dry prior to use. Steam cleaning or high-pressure hot water cleaning may be used in the initial removal of gross, visibly impacted material.

In general, soil samples will be cooled to 4°C with no chemical preservatives added. Chemical preservatives will be added to the sample bottles (prior to sample collection) by the analytical laboratory if required. The pH of samples will be spot-checked in the field and additional preservative will be added as needed. Sample preservation is checked upon sample receipt by the laboratory; this information is reported to the GZA Quality Assurance Officer (QAO) within two business days of sample receipt. If it appears that the level of chemical preservation added is not adequate, additional preservative will be added in the field by the sampling team.

Equipment blanks demonstrate whether the sampling equipment has the potential for constituent crossover to give a false positive of constituents in the environmental sample. When blank water is used to rinse a piece of sampling equipment (before it is used to sample), the rinsate is collected and analyzed to see if the environmental samples could be biased by residual constituents on the equipment.

Once the sample containers are filled, they will be immediately placed in the cooler with ice (in sealed plastic bags to minimize leakage) or synthetic ice packs to maintain the samples at 4°C. The field sampler will indicate the sample designation/location number in the space provided on the chain-of-custody form for each sample. The chain of custody forms will be signed and placed in a sealed plastic bag in the cooler. The completed shipping container will be closed for transport with nylon strapping, or a similar shipping tape, and two paper seals will be affixed to the lid. The seals must be broken to open the cooler. Broken seals before receipt at the laboratory will indicate sample tampering. A label may be affixed identifying the cooler as containing "Environmental Samples" and the cooler will be shipped by an

overnight delivery service to the laboratory. When the laboratory receives the coolers, the custody seals will be checked and lab personnel will sign the chain-of-custody form.

### **Import and Reuse of Soil**

Import of soil onto the property and reuse of soil already on Site will be performed in conformance with the SMMP in **Appendix D**. The estimated quantity of soil to be imported into the Site for backfill and cover soil is 0 tons. The estimated quantity of on-Site soil/fill expected to be reused/relocated on Site is 100 tons.

### **4.3 ENGINEERING CONTROLS**

The Site will achieve Track 4 Restricted Residential SCOs. Engineering Controls are required in the remedial action to address residual contamination remaining at the site. The Site has two (2) primary Engineering Control Systems. These are:

- Composite cover system consisting of concrete building slabs; and
- Waterproofing soil vapor barrier.

The building slab will be built below the water table and there is no potential for soil vapor to accumulate beneath the building slab.

#### **Composite Site Cover System**

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

- an approximately 2.5-foot thick concrete basement slab; and
- an approximately 4-inch thick concrete pavement at grade.

**Appendix A includes** First Floor and Cellar plans indicating each remedial cover type proposed for the Site.

The composite Site 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 Site cover system and underlying

residual soil/fill is disturbed after the remedial action is complete. Maintenance of this composite Site cover system will be described in the Site Management Plan in the RAR.

### **Vapor Barrier/Waterproofing Membrane**

Migration of soil vapor will be mitigated with a combination of building slab and vapor barrier/waterproofing membrane. The vapor barrier/waterproofing membrane will extend beneath the footprint of the new building to be constructed on the Site. The specifications for installation will be provided to the construction management company and the foundation contractor or installer of the liner. Installation of the vapor barrier/waterproofing membrane will be observed and documented by the Engineer.

The vapor barrier/waterproofing membrane will be comprised of Grace Preprufe 300R, Preprufe 160R, Bituthene 4000, and/or HydroDuct 220 below-grade foundation damp proofing material or equivalent. Joints will be sealed with Preprufe LT tape and Bituthene EdgeGuard tape or equivalent. The vapor barrier/waterproofing membrane will provide a barrier to water and moisture, and will be chemically resistant to the constituents present in groundwater. Appendix E includes manufacturer specifications for the above-referenced vapor barrier/waterproofing membrane.

The Remedial Action Report will include photographs of the installation process, PE- or RA-certified letter on letterhead from the 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 (IC) have been incorporated 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 SMP that will be included in the RAR. The property will continue to be registered with an E-Designation by the NYC Buildings Department.

Institutional Controls for this remedial action are:

- The property will continue to be registered with an E-Designation at the NYC Buildings Department. This RAWP includes a description of all ECs and ICs 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;

- Submittal of a Site Management Plan in the RAR for approval by OER that provides procedures for appropriate operation, maintenance, monitoring, inspection, reporting and certification of ECs. 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 in contact with residual soil materials;
- 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;
- The Site will be used for a commercial hotel and restaurant and will not be used for a higher level of use without prior approval by OER.

#### **4.5 SITE MANAGEMENT PLAN**

Site Management is 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 the DCR and 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 Voluntary Cleanup Agreement with OER. This includes a plan for: (1) implementation of ECs and ICs; (2) implementation of monitoring programs; (3) operation and maintenance of ECs; (4) inspection and certification of ECs; 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 are sufficient to complete a Qualitative Human Health Exposure Assessment (QHHEA). As part of the NYC 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 remedial investigation 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**

Historic fill material is present at the Site from grade to approximately 11 to 13 feet bgs. Based on the results of the Remedial Investigation Report, the constituents of concern are:

## **Soil**

- Metals including cadmium, copper, lead, mercury and zinc were identified exceeded the Track 1 SCOs. Only lead and mercury exceeded Restricted Commercial Use SCOs.
- Pesticides including 4,4'-DDE and 4,4'-DDT were identified but did not exceed Restricted Residential or Restricted Commercial Use SCOs.
- VOCs including toluene, ethylbenzene, m,p-xylene, o-xylenes and isopropylbenzene were identified but did not exceed Restricted Residential or Restricted Commercial Use SCOs.
- SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene were detected above Track 2 Restricted Residential Use SCOs, but did not exceed their Restricted Commercial Use SCOs.

## **Groundwater**

- Metals including antimony, barium, iron, magnesium, manganese, sodium, and lead were detected above their respective AWQS.
- VOCs including isopropylbenzene, ethylbenzene, benzene, n-butylbenzene, sec-butylbenzene, toluene, p/m-xylene, o-xylene, 1,3,5-trimethylbenzene, 1,3,4-trimethylbenzene, and acetone were detected above their respective AWQS.
- SVOCs including naphthalene, pentachlorophenol, and bis(2-ethylhexyl)phthalate were detected above their respective AWQS.

## **Soil Vapor**

- Chlorinated VOCs were detected below New York State Department of Health (NYSDOH) Soil Vapor Guidance Values including 1,1,1-trichloroethane, PCE, TCE, and carbon tetrachloride.
- Petroleum constituents were detected at relatively low concentrations.

## **Nature, Extent, Fate and Transport of Contaminants**

VOCs, SVOCs, and metals are present in the historic fill and groundwater at the Site above their respective Track 1 UUSCOs and AWQS. Petroleum constituents were identified in the soil vapor samples at low concentrations with no exceedances of the NYSDOH guidance values. Under the proposed remediation, the soil will be removed to 8 feet bgs. Chemical constituents in

the groundwater at the southern portion of the Site may be subject to a southwesterly hydraulic gradient.

### **Potential Routes of Exposure**

The five elements of an exposure pathway are: (1) a constituent source; (2) constituent 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 are documented. A potential exposure pathway exists when any one or more of the elements cannot be documented. An exposure pathway may be eliminated from further evaluation when any one of the elements has not existed in the past, does not exist in the present, and will not exist in the future. Three potential primary routes exist by which chemicals can enter the body:

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

### **Existence of Human Health Exposure**

Current Conditions: The Site is developed with asphalt pavement and concrete pad. The exposure to surficial soil/fill material does not exist under current conditions. Groundwater is marginally contaminated but 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 and there is no potential for exposure.

Construction/Remediation Activities: Once redevelopment activities begin, construction workers may come into direct contact with impacted historic fill or soil. On-Site construction workers could potentially ingest, inhale, have dermal contact or have contact via the eyes with impacted historic fill or soil. Off-Site receptors could potentially inhale dust particulates or vapor from impacted historic fill or soil that could emanate off the Site.

Potential on-Site and off-Site exposures to particulates from impacted material on the Site will be addressed through a SMMP, dust controls, and through the implementation of both a Community Air Monitoring Program and a Construction Health and Safety Plan.

Proposed Future Conditions: The subsurface historic fill at the Site will be removed to 8 feet bgs, with the potential for exposure to constituents exceeding Track 1 UUSCOs. However, the Site will be capped with the building's foundation thereby mitigating direct exposure to soil and groundwater. The building slab is anticipated to be built into the water table and vapors are not expected to accumulate beneath the slab. A vapor barrier/waterproofing membrane will mitigate exposure to any potential off-Site soil vapor that may emanate onto the Site. There are no recognizable off-Site pathways for ingestion, inhalation, or dermal exposure to constituents derived from the Site under future conditions.

### **Receptor Populations**

The Site is currently vacant and access to the Site is restricted. On-site receptors are limited to trespassers and site representatives and visitors granted access to the property. During construction activities, potential on-Site receptors are construction workers performing the remedial construction, visitors, Site representatives, trespassers, and any Site security personnel. Potential off-Site receptors within a 0.25-mile radius of the Site include commercial and construction workers, pedestrians, children, and nearby residents based on the following:

1. Commercial Business (up to 0.25 miles)
2. Residential Buildings (up to 0.25 miles)
3. Construction Sites (up to 0.25 miles)
4. Pedestrians, Cyclists (up to 0.25 miles)
5. City Parks (up to 0.25 miles)

### **Overall Human Health Exposure Assessment**

There are no complete exposure pathways (e.g., source, route to exposure, receptor population) for the current condition and for the post-construction condition. This assessment takes into consideration the reasonably anticipated use of the Site, which includes a hotel/restaurant structure, foundation cap, and subsurface vapor barrier/waterproofing membrane. Post-construction groundwater use is not anticipated to be an issue because groundwater is not used as a potable water source in New York City. There is no surface water within 500 feet of

the Site that could be considered potential receptors of Site related impacts. Based on this analysis, on-Site exposure pathways appear to be present only during the remedial action phase.

During remedial construction, on-Site and off-Site exposures to impacted dust from historic fill and petroleum impacted fill will be addressed through dust and vapor control and the implementation of the Community Air Monitoring Program, the Soil/Material Management Plan, and a Construction Health and Safety Plan. After the remedial action is complete, there will be no remaining exposure pathways to on-Site soil/fill, as all soil above Site Specific Track 4 SCOs will have been removed and the vapor barrier/waterproofing membrane will have been installed as part of the development.

## **5.0 REMEDIAL ACTION MANAGEMENT**

### **5.1 PROJECT ORGANIZATION AND OVERSIGHT**

Principal personnel who will participate in the remedial action include Rafi Gibly (HSH Construction, LLC), John M. Gavras (GZA Principal-in-Charge), and Samantha Morris (NYC OER Project Manager OER). The Professional Engineer (PE) and Qualified Environmental Professional (QEP) for this project are Ernest Hanna (GZA) and Clifford Bell (GZA), respectively.

### **5.2 SITE SECURITY**

Site access will be controlled by gated entrances to the fenced property. If necessary, 24-Hour security may be employed.

### **5.3 WORK HOURS**

The hours for operation of remedial construction will be from 7:00 AM to 5:00 PM. These hours conform to the New York City Department of Buildings construction code requirements.

### **5.4 CONSTRUCTION HEALTH AND SAFETY PLAN**

The Construction Health and Safety Plan (CHASP) is included in **Appendix F**. The Site Safety Coordinator will be determined at a later date, and OER will be notified of their contact information when available. 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 CHASP and applicable laws and regulations. The CHASP 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 CHASP and be required to sign a CHASP 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 CHASP. 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. Exceedences of action levels observed during performance

of the Community Air Monitoring Plan (CAMP) will be reported to the NYC 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 NYC 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 ( $\text{mcg}/\text{m}^3$ ) 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 NYC 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 NYC 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**

NYC 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 RAWP 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 applicable 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.

## **Dewatering**

Based on the proposed depth of the basement slab and the associated foundation elements, dewatering of the foundation excavation will likely be required during construction. HSH Construction, LLC will subcontract an outside service for the preparation and filing of a dewatering permit application with the New York City Department of Environmental Protection Bureau of Wastewater Treatment. The dewatering permit will outline the details of dewatering and any pre-treatment, if required.

## **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 the 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 soil, 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 NYC 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 NYC 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 applicable 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 NYC OER will be notified and corrective measure plan designed to remove and clean dislocated material will be submitted to NYC OER and implemented following approval by NYC OER and granting of Site access by the property owner. Impacted off-Site areas may require characterization based on Site conditions, at the discretion of NYC OER. If on Site 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 NYC OER at the completion of Site inspection. An inspection report established by NYC OER is available on NYC OER's website ([www.nyc.gov/oer](http://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 NYC 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 on-Site or off-Site 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 NYC 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. Assuming use of disposal facilities in New Jersey, the planned route on local roads for trucks leaving the Site is as follows:

### **Trucks Under 12'6" Height:**

- Drive north on Hudson Street towards Spring Street;
- Turn right onto Spring Street;
- Turn right onto Varick Street;
- Follow signs for I-78 Westbound/ Holland Tunnel
- Proceed through the Holland Tunnel (right tunnel lane only) and onwards to disposal facility in New Jersey.

### **Trucks Between 12'6" and 13'6" in Height:**

- Drive north on Hudson Street towards Houston Street;
- Turn left onto Houston Street;
- Turn right onto West Street, continue onto 11<sup>th</sup> Avenue;
- Turn right onto W 57th Street;
- Turn left onto Amsterdam Avenue and follow towards W 181<sup>st</sup> Street;
- Turn right onto W 181<sup>st</sup> Street and follow signs for I-95 Southbound/ George Washington Bridge;
- Continue onto George Washington Bridge, Upper Level and onwards to disposal facility in New Jersey.

## **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 NYC 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 NYC OER project manager based on planned project tasks. Daily email reports are not intended to be the

primary mode of communication for notification to NYC 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 NYC OER project manager by personal communication. Daily reports will be included as an Appendix in the Remedial Action Report.

### **Record Keeping and Photo-Documentation**

Job-Site record keeping for all remedial work will be performed. These records will be maintained on the Site during the project and will be available for inspection by NYC 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 NYC OER. Complaints will be addressed and outcomes will also be reported to NYC OER in daily reports. Notices to NYC 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 NYC 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 NYC 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 NYC 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 RAWP. 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 RAR. The certification will include the following statements:

*I, Ernest Hanna, 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 489 Canal Street (a.k.a. 219 Hudson Street) Site number 12-703.*

*I, Clifford M. Bell, am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 489 Canal Street (a.k.a. 219 Hudson Street) Site Number 12-703.*

*I certify that the NYC OER-approved Remedial Action Work Plan dated July 2014 and Stipulations in a letter dated \_\_\_\_\_ 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

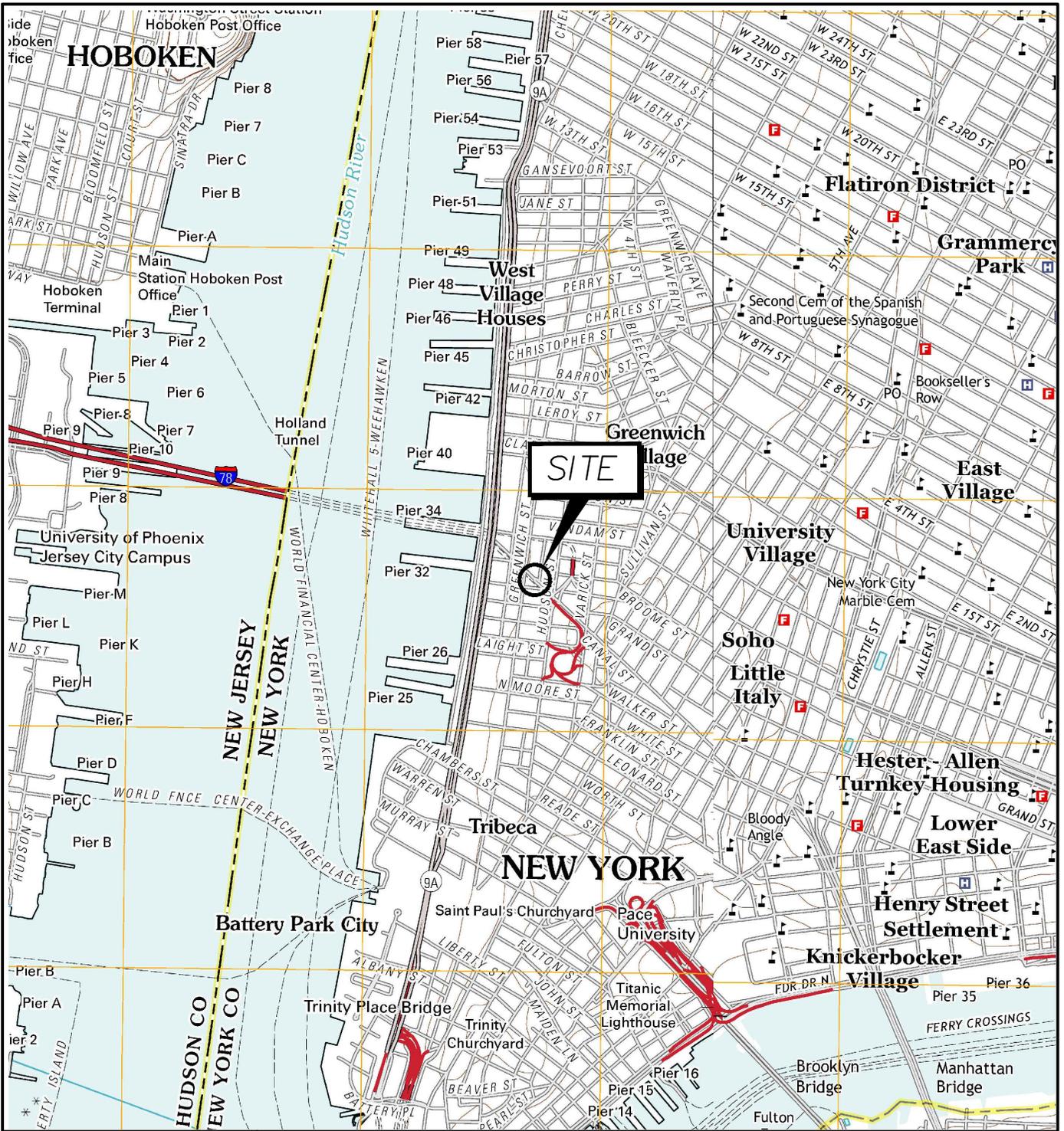
The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to NYC OER. Currently, a seven months remediation period is anticipated.

<b>Schedule Milestone</b>	<b>Weeks from Remedial Action Start</b>	<b>Duration (weeks)</b>
NYC OER Approval of RAWP	0	NA
Fact Sheet 2 Announcing Start of Remedy	0	NA
Mobilization	8	2
Remedial Excavation	10	8
Demobilization	18	2
Submit RAR	28	10



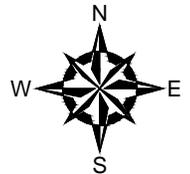
## **FIGURES**

© 2014 - GZA GeoEnvironmental, Inc. GZA-\\GZAFAM1\Jobs\162100s\41.0162191.00\Figures\CAD\162191.00.F1\_rvb.dwg [1] August 07, 2014 - 5:48pm rahul.bhatia



QUADRANGLE LOCATION

SOURCE:  
 USGS TOPOGRAPHIC MAPS: JERSEY CITY, NJ (2011) &  
 BROOKLYN, NY (2011). CONTOUR INTERVAL 10 FT.,  
 NAVD-1988, ORIGINAL SCALE 1:24,000 (1"=2,000 FT.).



UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

489 CANAL STREET  
 NEW YORK, NEW YORK

PREPARED BY:  
 **GZA GeoEnvironmental**  
 of New York  
 Engineers and Scientists  
 www.gza.com

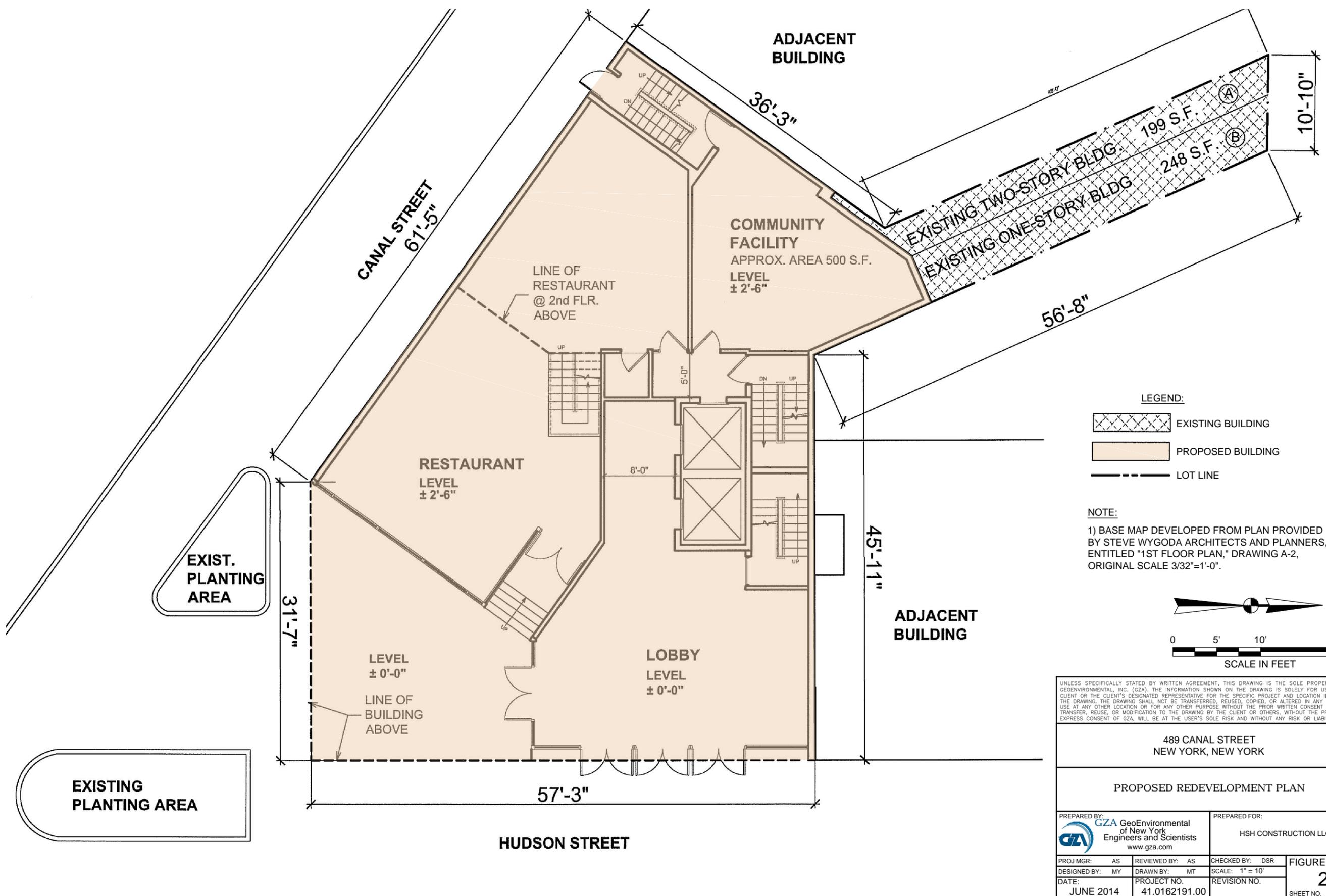
PREPARED FOR:  
 HSH CONSTRUCTION LLC

SITE LOCATION PLAN

PROJ MGR: CB	REVIEWED BY: CB
DESIGNED BY: RB	DRAWN BY: MT
DATE: JUNE 2014	PROJECT NO. 41.0162191.00

CHECKED BY: RB	FIGURE <b>1</b> SHEET NO.
SCALE: 1" = 2000'	
REVISION NO.	

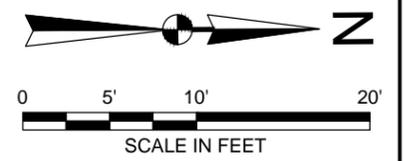
©2014 - GZA GeoEnvironmental, Inc. GZA-\\GZAHAM1\Jobs\162100s\41.0162191.00\Figures\CAD\162191.00\F2\_3\_4.dwg [2] August 07, 2014 - 6:42pm rahul.bhatia



**LEGEND:**

- EXISTING BUILDING
- PROPOSED BUILDING
- LOT LINE

**NOTE:**  
 1) BASE MAP DEVELOPED FROM PLAN PROVIDED BY STEVE WYGODA ARCHITECTS AND PLANNERS, ENTITLED "1ST FLOOR PLAN," DRAWING A-2, ORIGINAL SCALE 3/32"=1'-0".



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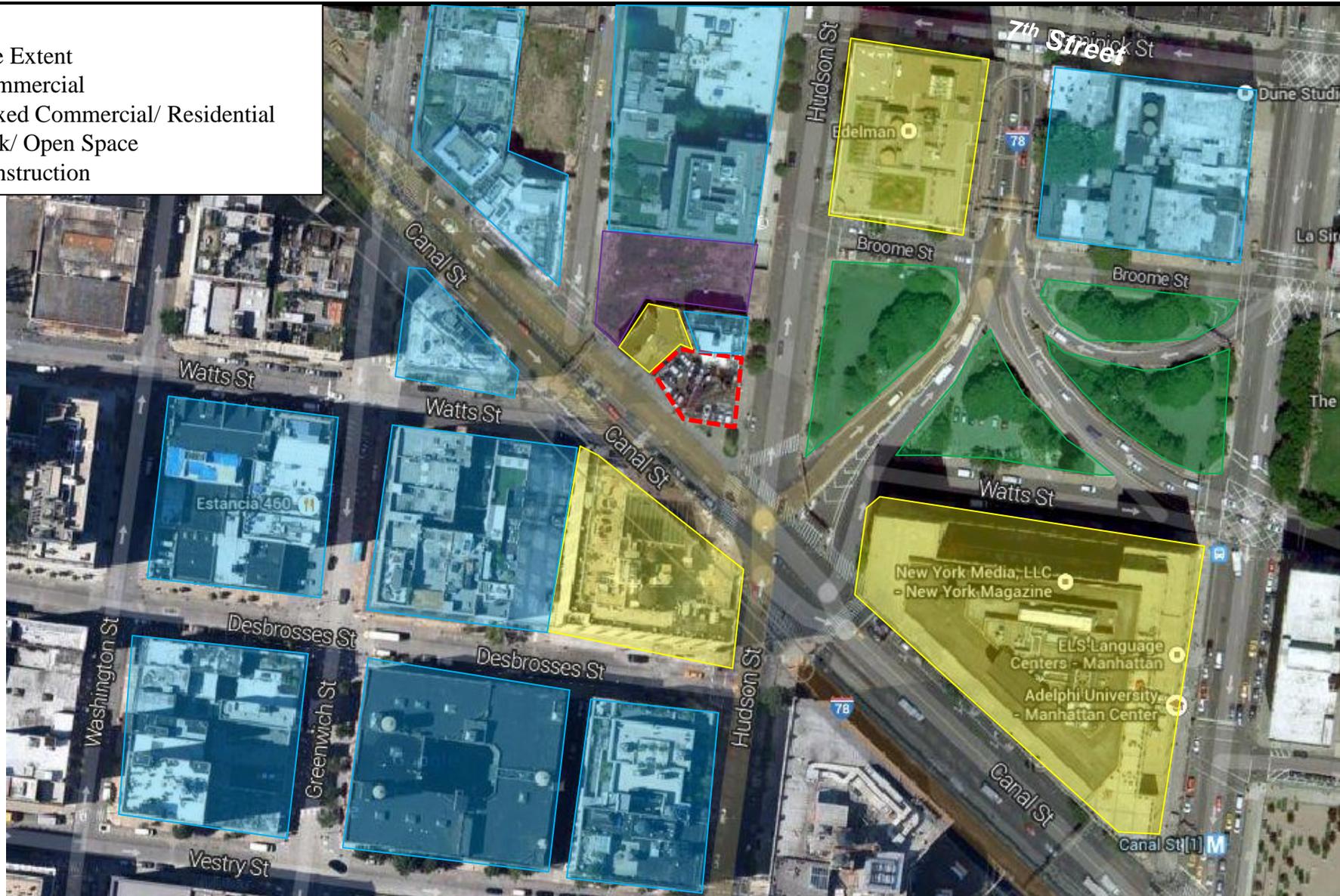
**489 CANAL STREET  
 NEW YORK, NEW YORK**

**PROPOSED REDEVELOPMENT PLAN**

PREPARED BY: <b>GZA GeoEnvironmental of New York Engineers and Scientists</b> www.gza.com		PREPARED FOR: <b>HSH CONSTRUCTION LLC</b>	
PROJ MGR: AS	REVIEWED BY: AS	CHECKED BY: DSR	<b>FIGURE 2</b>
DESIGNED BY: MY	DRAWN BY: MT	SCALE: 1" = 10'	
DATE: JUNE 2014	PROJECT NO: 41.0162191.00	REVISION NO.	
			SHEET NO.

**Key:**

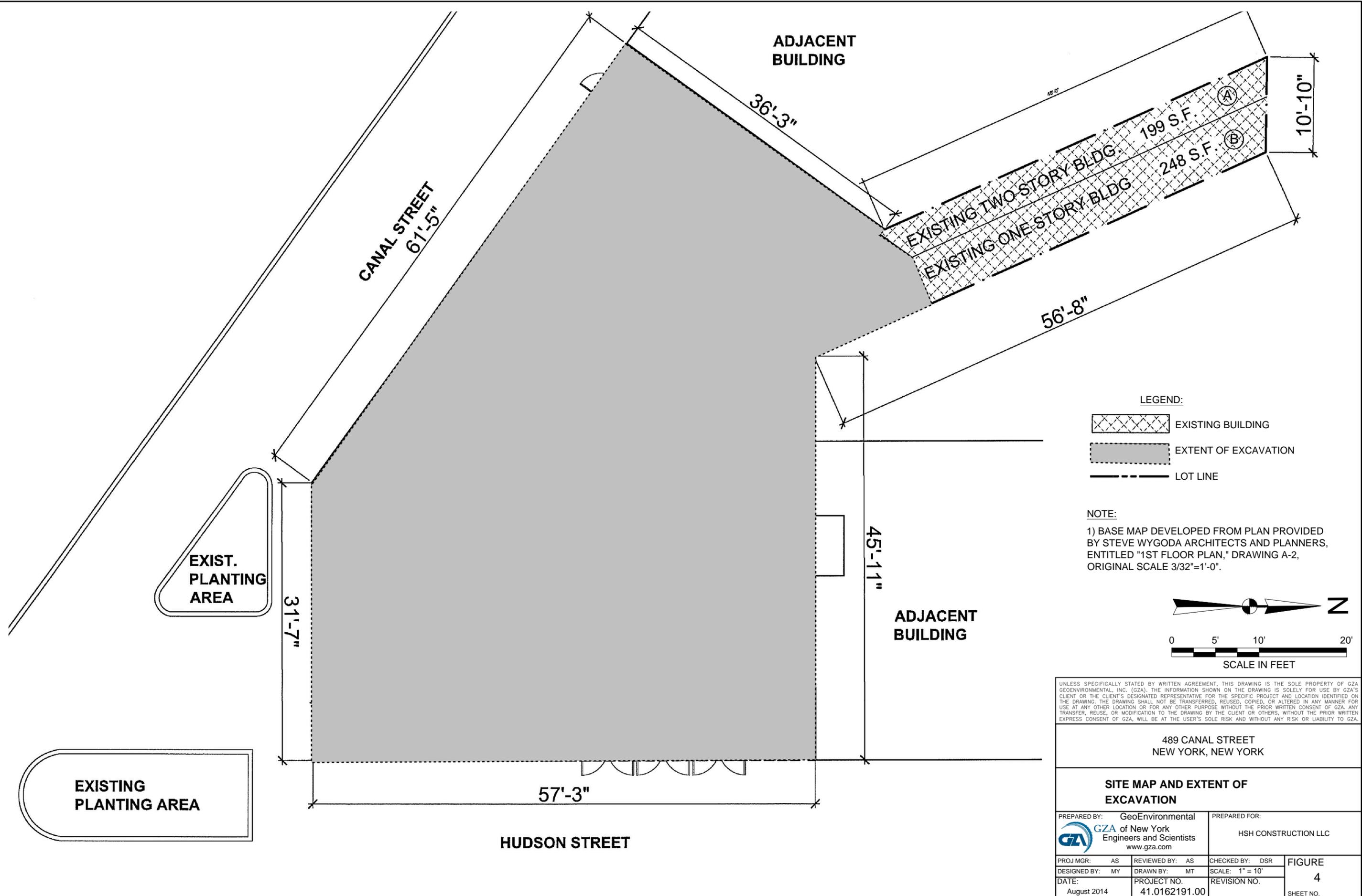
- Site Extent
- Commercial
- Mixed Commercial/ Residential
- Park/ Open Space
- Construction



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PROJECT NO: 41.0162191.00	<b>Surrounding Land Use Plan</b>	Source: Google Earth, 2014		PROJECT MGR: CB DESIGNED BY: ES REVIEWED BY: CB	DRAWN BY: ES DATE: August 2014
Figure: <b>3</b>	<b>489 Canal Street New York, New York</b>	PREPARED FOR: HSH Construction, LLC	<b>GZA GeoEnvironmental of New York</b> Engineers & Scientists		

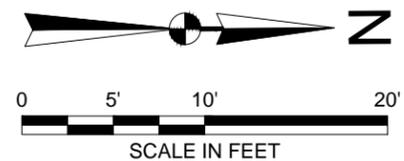
©2014 - GZA GeoEnvironmental, Inc. GZA-J\162100s\41.0162191.00\Figures\CAD\162191.00\F2\_3\_4.dwg [2] June 23, 2014 - 3:58pm miguel.torres



**LEGEND:**

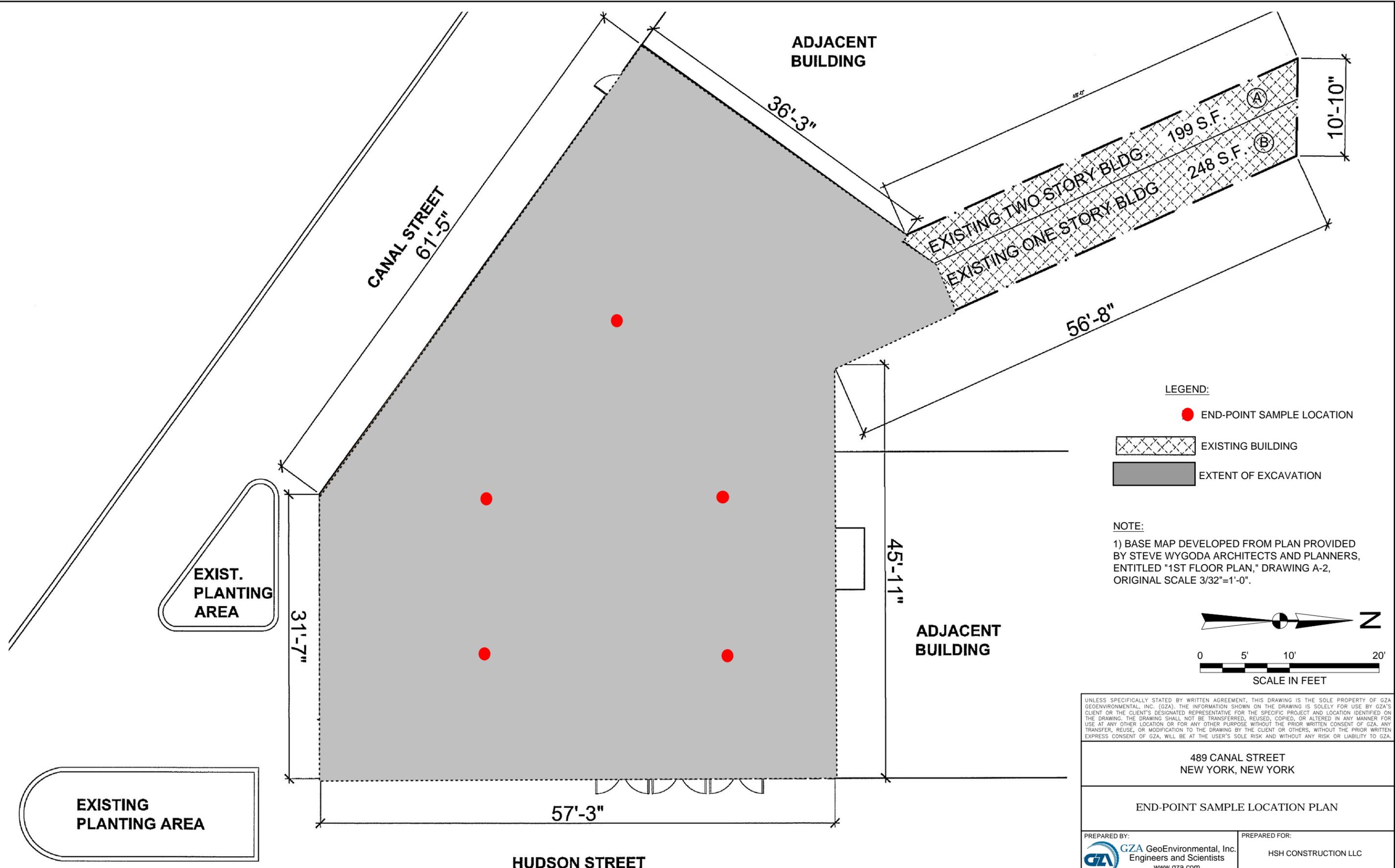
-  EXISTING BUILDING
-  EXTENT OF EXCAVATION
-  LOT LINE

**NOTE:**  
 1) BASE MAP DEVELOPED FROM PLAN PROVIDED BY STEVE WYGODA ARCHITECTS AND PLANNERS, ENTITLED "1ST FLOOR PLAN," DRAWING A-2, ORIGINAL SCALE 3/32"=1'-0".



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489 CANAL STREET NEW YORK, NEW YORK			
<b>SITE MAP AND EXTENT OF EXCAVATION</b>			
PREPARED BY: GeoEnvironmental  GZA of New York Engineers and Scientists www.gza.com		PREPARED FOR: HSH CONSTRUCTION LLC	
PROJ MGR: AS	DESIGNED BY: MY	REVIEWED BY: AS	CHECKED BY: DSR
DATE: August 2014	PROJECT NO. 41.0162191.00	DRAWN BY: MT	SCALE: 1" = 10'
			FIGURE 4
			SHEET NO.

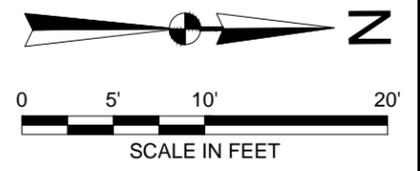


**LEGEND:**

- END-POINT SAMPLE LOCATION
- EXISTING BUILDING
- EXTENT OF EXCAVATION

**NOTE:**

1) BASE MAP DEVELOPED FROM PLAN PROVIDED BY STEVE WYGODA ARCHITECTS AND PLANNERS, ENTITLED "1ST FLOOR PLAN," DRAWING A-2, ORIGINAL SCALE 3/32"=1'-0".



UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

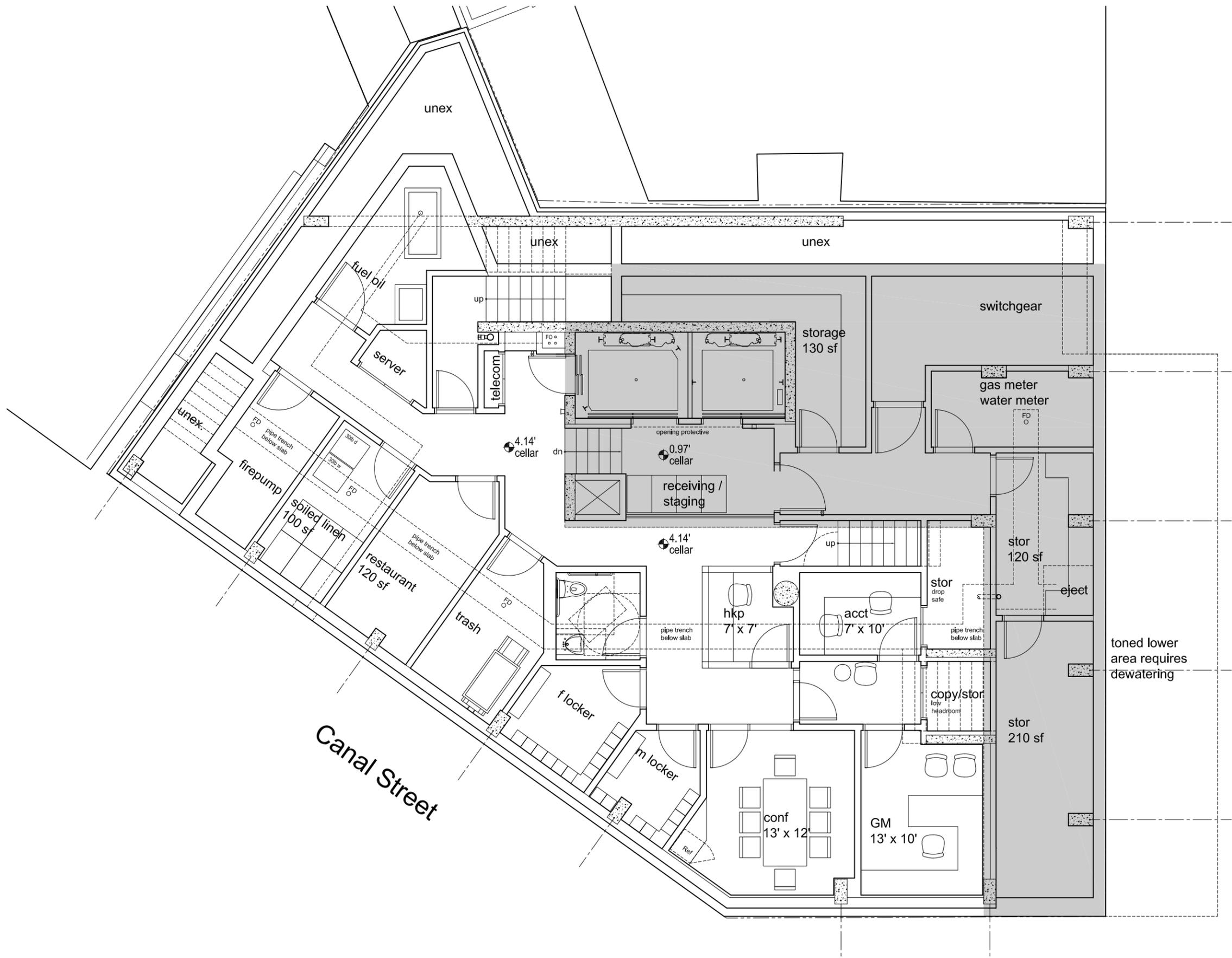
489 CANAL STREET NEW YORK, NEW YORK			
END-POINT SAMPLE LOCATION PLAN			
PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com		PREPARED FOR: HSH CONSTRUCTION LLC	
PROJ MGR: AS	REVIEWED BY: AS	CHECKED BY: DSR	<b>FIGURE</b> <b>5</b> <b>SHEET NO.</b>
DESIGNED BY: MY	DRAWN BY: MT	SCALE: 1" = 10'	
DATE: SEPT. 2014	PROJECT NO. 41.0162191.00	REVISION NO.	

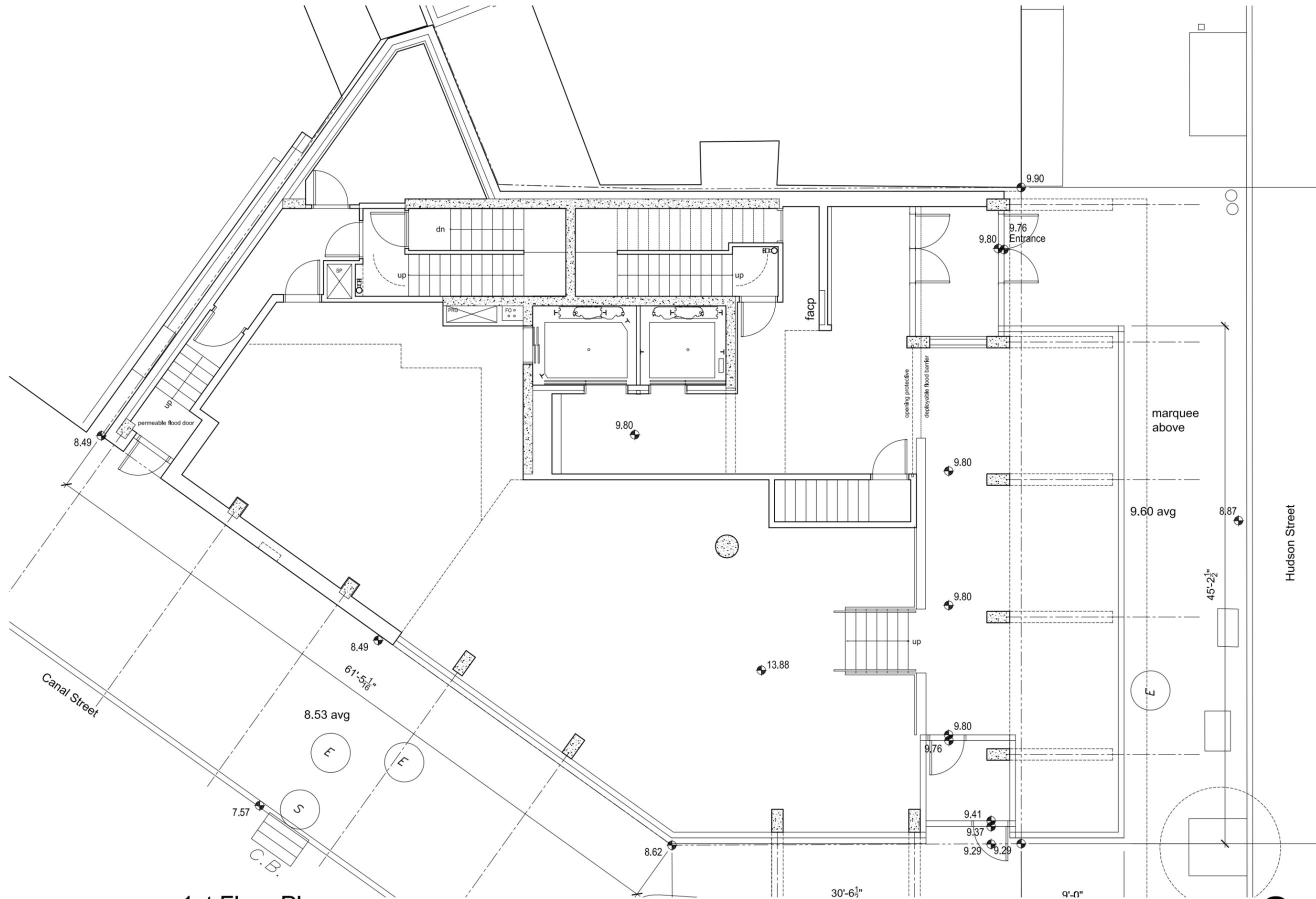


## **APPENDICES**



**APPENDIX A**  
**PROPOSED DEVELOPMENT DRAWINGS**





219 Hudson

Rawlings architects pc  
 337 Broome Street, 2nd floor  
 New York, New York 10002

1st Floor Plan

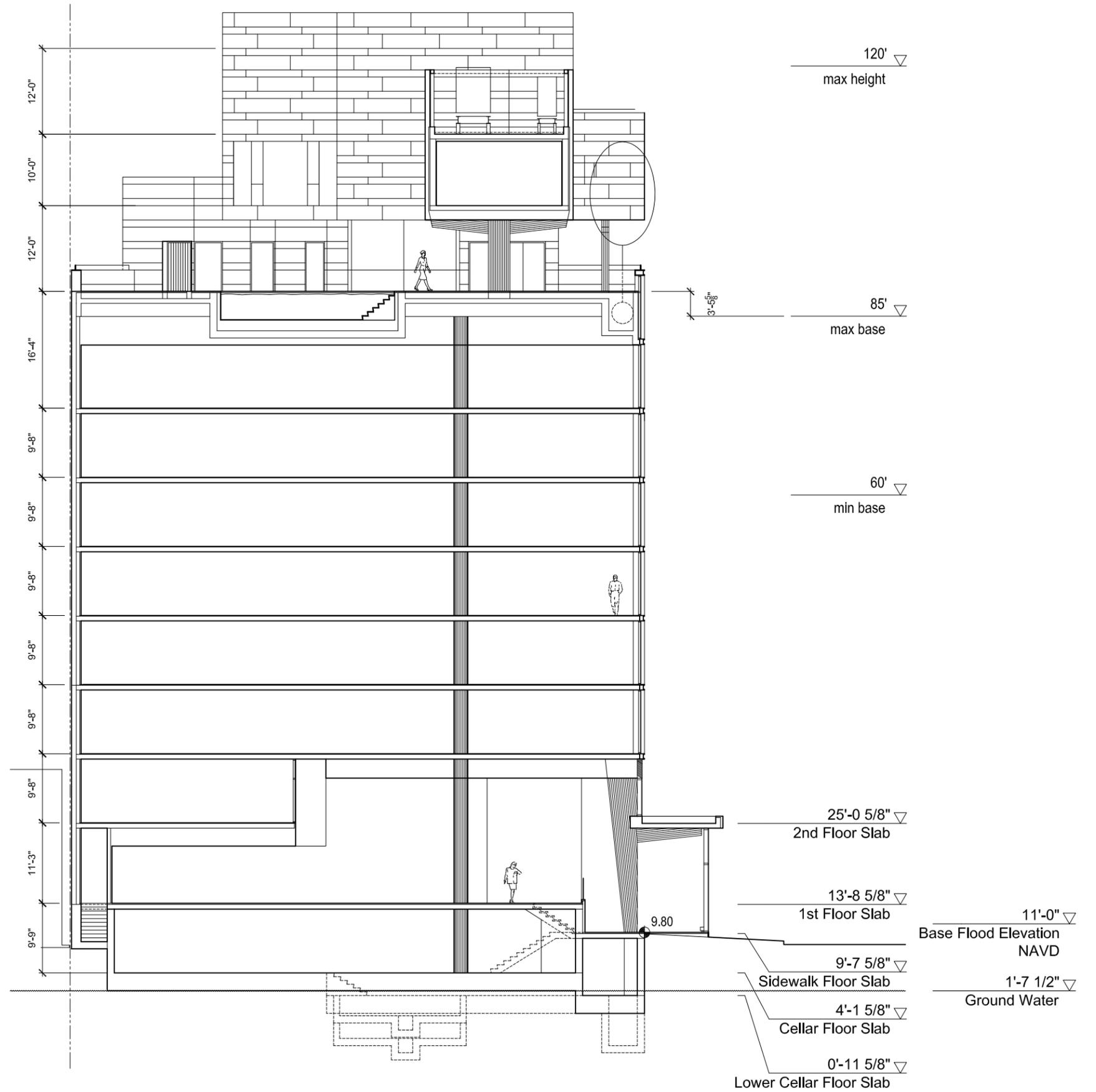
08aug14

The data contained within this preliminary analysis is considered schematic and for review purposes only and should be reviewed / confirmed by a Land Use Attorney prior to any actions regarding this site.

0 4' 8'



a2



219 Hudson

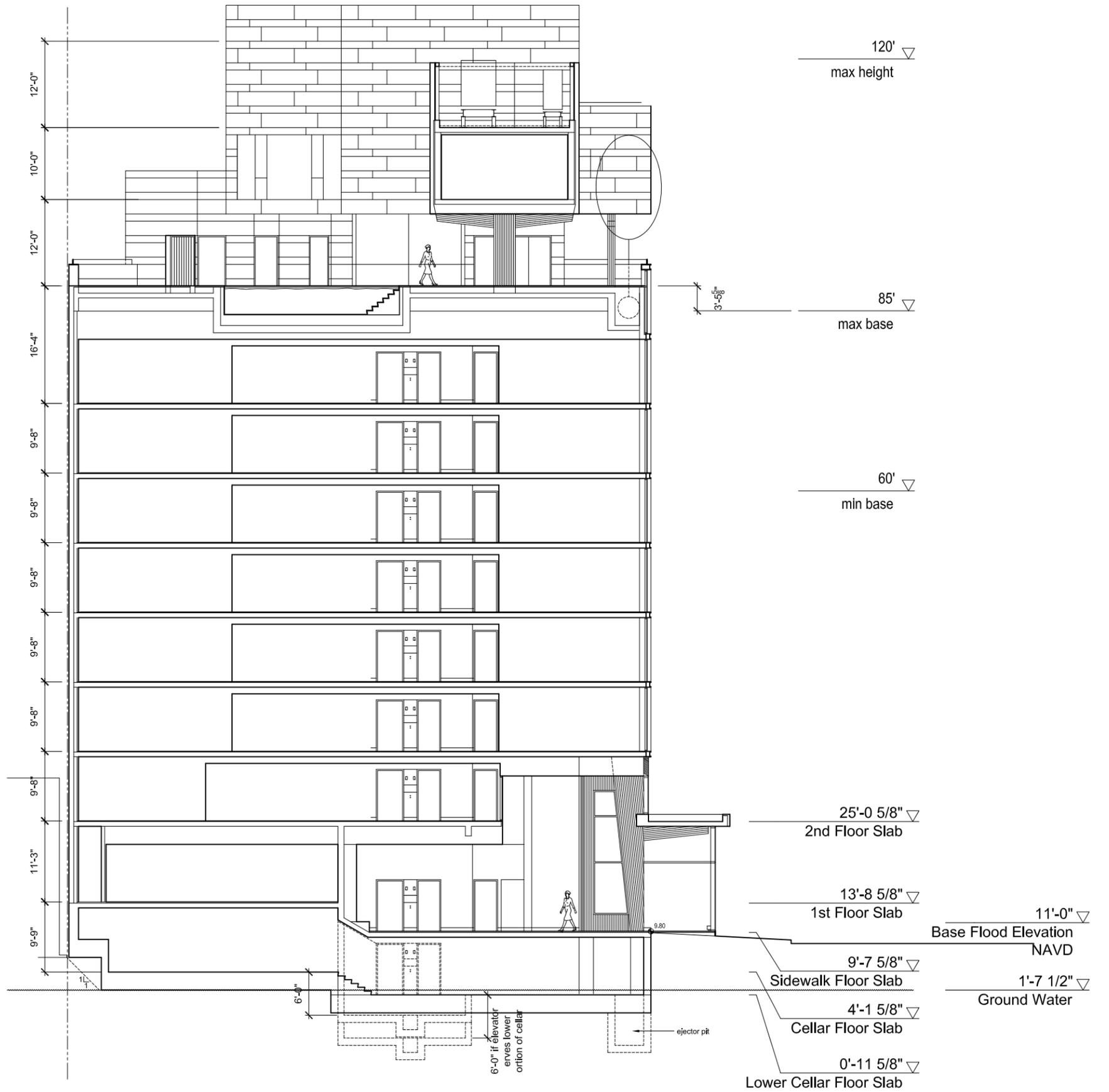
Rawlings architects pc  
 337 Broome Street, 2nd floor  
 New York, New York 10002

Building Section

08aug14

The data contained within this preliminary analysis is considered schematic and for review purposes only and should be reviewed / confirmed by a Land Use Attorney prior to any actions regarding this site.





219 Hudson

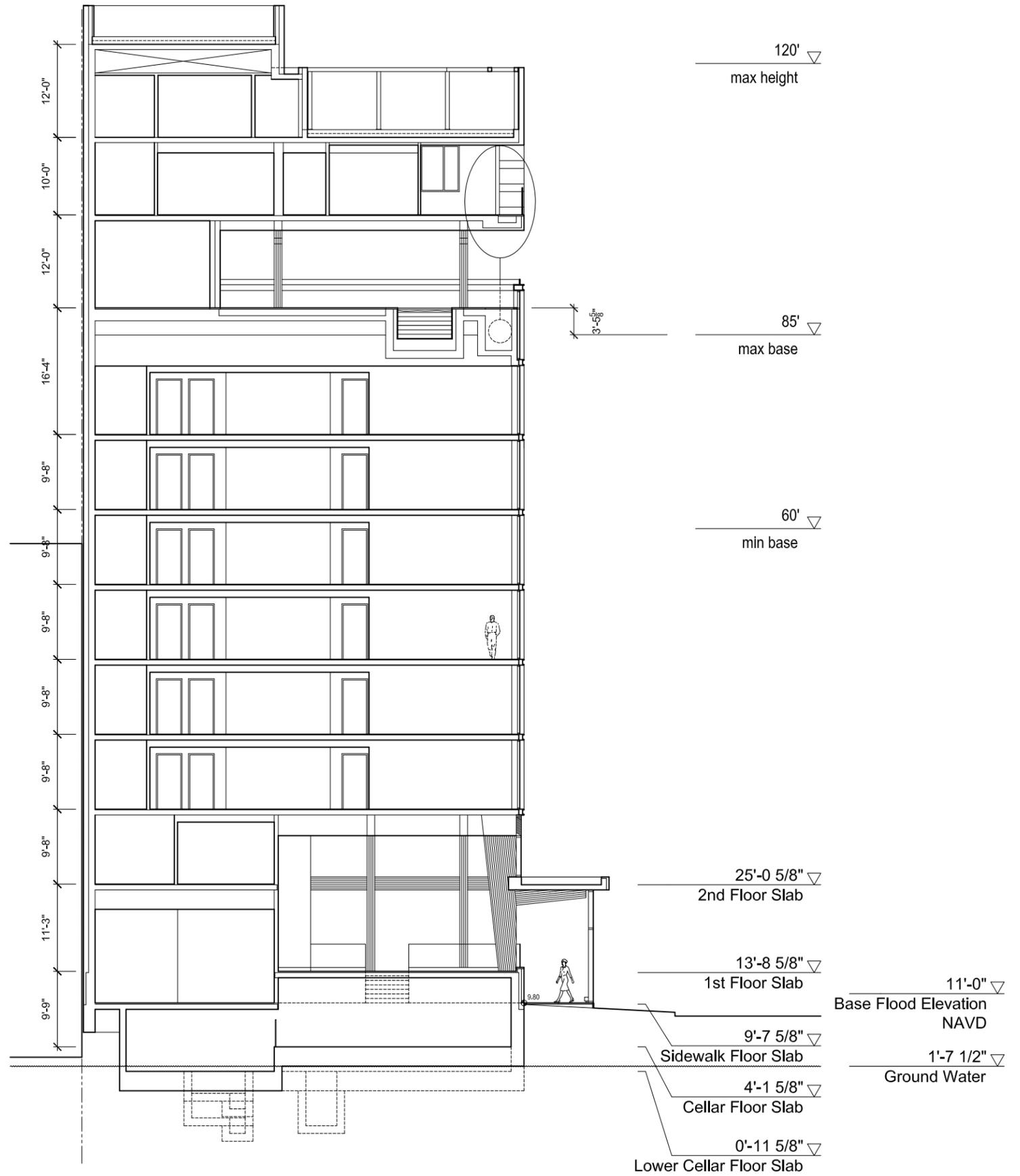
Rawlings architects pc  
 337 Broome Street, 2nd floor  
 New York, New York 10002

Building Section

08aug14

The data contained within this preliminary analysis is considered schematic and for review purposes only and should be reviewed / confirmed by a Land Use Attorney prior to any actions regarding this site.





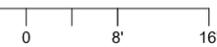
219 Hudson

Rawlings architects pc  
 337 Broome Street, 2nd floor  
 New York, New York 10002

Building Section

08aug14

The data contained within this preliminary analysis is considered schematic and for review purposes only and should be reviewed / confirmed by a Land Use Attorney prior to any actions regarding this site.



## **APPENDIX B**

### **CITIZEN PARTICIPATION PLAN**

The NYC Office of Environmental Remediation and HSH Construction, LLC have established this Citizen Participation Plan (CPP) because the opportunity for citizen participation is an important component of the NYC Voluntary Cleanup Program. This CPP 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, HSH Construction, LLC will maintain a repository for project documents and provide public notice at specified times throughout the remedial program. This RAWP also takes into account potential environmental justice concerns in the community that surrounds the project Site. Under this CPP, 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 (NYC 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 NYC OER's project manager assigned to this Site, Samantha Morris, 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.** NYC 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 NYC 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](mailto:brownfields@cityhall.nyc.gov).

**Repositories.** A document repository is maintained in the nearest public library that maintains evening and weekend hours. 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. HSH Construction, LLC will inspect the repositories to ensure that they are fully populated with project information. The repository for this project is:

New York Public Library, Science, Industry, and Business Library

188 Madison Avenue, New York, NY 10016-4314

(917) 275-6975

Repository Hours of Operation:

Monday, Friday, Saturday: 11:00AM to 6:00PM

Tuesday, Wednesday, Thursday: 10:00AM to 8:00PM

**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.

**Identify Issues of Public Concern.** 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 NYC 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 HSH Construction, LLC, reviewed and approved by NYC OER prior to distribution and mailed by HSH Construction, 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 NYC OER will consider all public comments. Approval will not be granted until the public comment period has been completed. NYC OER

**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 NYC 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 HSH Construction, LLC, reviewed and approved by NYC OER prior to distribution and mailed by HSH Construction, 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 NYC 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 Remedial Investigation Report 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 NYC 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 C**

### **SUSTAINABILITY STATEMENT**

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

**NYC OER 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. If possible, HSH Construction, LLC will reuse clean, non-virgin materials, the results of which 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 minimal under this RAWP, 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 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 the Site.

As part of the building development, a vapor barrier/waterproofing membrane will be installed at the base of the basement foundation and along foundation walls that will mitigate the potential for future migration of soil vapor from off-Site sources. An estimate of the area of the Site that utilizes recontamination controls under this RAWP 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 Voluntary Cleanup Program.** HSH Construction, LLC is participating in NYC OER's Paperless Voluntary 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.** HSH Construction, LLC is participating in NYC 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 D**

### **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 NYC OER. Excavated soil 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 soil 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 the Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soil proposed for reuse on the Site will be managed as defined in this RAWP.

## **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 RAWP 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 the Site will not be performed without prior NYC 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 the Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are as follows:

**Trucks Under 12’6” Height:**

- Drive north on Hudson Street towards Spring Street;
- Turn right onto Spring Street;
- Turn right onto Varick Street;
- Follow signs for I-78 Westbound/ Holland Tunnel
- Proceed through the Holland Tunnel (right tunnel lane only) and onwards to disposal facility in New Jersey.

**Trucks Between 12’6” and 13’6” in Height:**

- Drive north on Hudson Street towards Houston Street;
- Turn left onto Houston Street;
- Turn right onto West Street, continue onto 11<sup>th</sup> Avenue;
- Turn right onto W 57th Street;
- Turn left onto Amsterdam Avenue and follow towards W 181<sup>st</sup> Street;
- Turn right onto W 181<sup>st</sup> Street and follow signs for I-95 Southbound/ George Washington Bridge;
- Continue onto George Washington Bridge, Upper Level and onwards to disposal facility in New Jersey.

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 THE 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 Manhattan, 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 RAR 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 soil taken off the 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 the Site will be stored, transported, and disposed of in compliance with applicable laws and regulations. A sample non-hazardous waste disposal manifest is presented in Attachment A.

## **NYC OER1.7 MATERIALS REUSE ON THE SITE**

Soil and fill that is derived from the property that meets the SCOs established in this RAWP may be reused on the Site. The SCOs for on-Site reuse shall meet the NYSDEC Part 375-6 RRSCO. 'Reuse on the 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 on **Figure 4**.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on the 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 soil, pavement and associated sub-soil, 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 soil will meet NYC OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are the Part 375 RRSCO.

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 the 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 NYC 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 NYC 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 soil and reported to NYC 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-Site 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 soil. If odor develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soil 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 odor. If nuisance odor are identified, work will be halted and the source of odor will be identified and corrected. Work will not resume until all nuisance odor have been abated. NYC 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 and QEP certifying the RAR.

### **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. NYC 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 and QEP responsible for certifying the RAR.

### **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 E**  
**WATERPROOFING AND VAPOR BARRIER**  
**SPECIFICATIONS**

# Grace Below Grade Waterproofing

## PREPRUFE® 300R Plus & 160R Plus

Pre-applied waterproofing membranes that bond integrally to poured concrete for use below slabs or behind basement walls on confined sites

### Description

Preprufe® 300R Plus & 160R Plus membranes are unique composite sheets comprising, a thick HDPE film, an aggressive pressure sensitive adhesive a weather resistant protective coating and an adhesive to adhesive seam overlap.

Unlike conventional non-adhering membranes, which are vulnerable to water ingress tracking between the unbonded membrane and structure, the unique Preprufe bond to concrete prevents ingress or migration of water around the structure.

The Preprufe R Plus System includes:

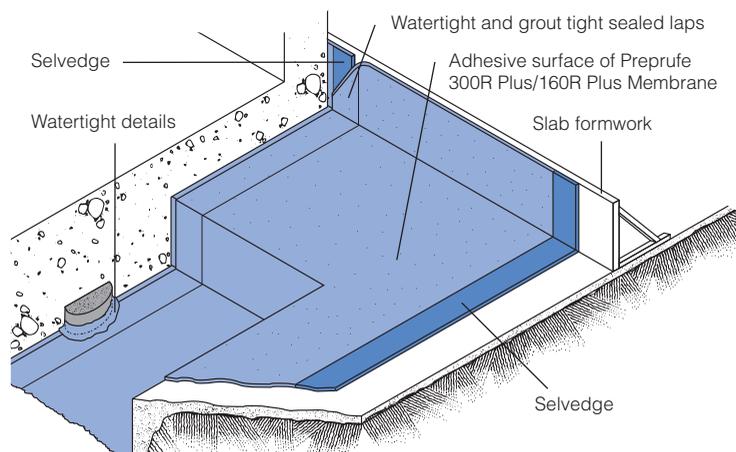
- **Preprufe 300R Plus**—heavy-duty grade for use below slabs and on rafts (i.e. mud slabs). Designed to accept the placing of heavy reinforcement using conventional concrete spacers.
- **Preprufe 160R Plus**—thinner grade for blindside, zero property line applications against soil retention systems.
- **Preprufe Tape LT**—for covering cut edges, roll ends, penetrations and detailing (temperatures between 25°F (-4°C) and 86°F (+30°C)).
- **Preprufe Tape HC**—as above for use in Hot Climates (minimum 50°F (10°C)).
- **Bituthene® Liquid Membrane**—for sealing around penetrations, etc.
- **Adcor™ ES**—waterstop for joints in concrete walls and floors
- **Preprufe Tieback Covers**—preformed cover for soil retention wall tieback heads
- **Preprufe Preformed Corners**—preformed inside and outside corners

Preprufe 300R Plus & 160R Plus membranes are applied either horizontally to smooth prepared concrete, carton forms or well rolled and compacted earth or crushed stone substrate; or vertically to permanent formwork or adjoining structures. Concrete is then cast directly against the adhesive side of the membranes. The specially developed Preprufe adhesive layers work together to form a continuous and integral seal to the structure.

Preprufe can be turned up the inside face of slab formwork but is not recommended for conventional twin-sided formwork on walls, etc. Use Bituthene® self-adhesive membrane or Procor® fluid applied membrane to walls after removal of formwork for a fully bonded system to all structural surfaces.

### Advantages

- **Forms a unique continuous adhesive bond to concrete poured against it**—prevents water migration and makes it unaffected by ground settlement beneath slabs
- **Fully-adhered adhesive to adhesive watertight laps and detailing**
- **Provides a barrier to water, moisture and gas**—physically isolates the structure from the surrounding ground
- **Easy roll/kick out installation**—reduces installation time and cost
- **Release Liner free**—expedites installation and reduces construction site waste
- **Solar reflective**—reduced temperature gain
- **Simple and quick to install**—requiring no priming or fillets
- **Can be applied to permanent formwork**—allows maximum use of confined sites
- **Self protecting**—can be trafficked immediately after application and ready for immediate placing of reinforcement
- **Unaffected by wet conditions**—cannot activate prematurely
- **Inherently waterproof, non-reactive system:**
  - not reliant on confining pressures or hydration
  - unaffected by freeze/thaw, wet/dry cycling
- **Chemical resistant**—effective in most types of soils and waters, protects structure from salt or sulphate attack



Drawings are for illustration purposes only.  
Please refer to [graceconstruction.com](http://graceconstruction.com) for specific application details.

## Installation

The most current application instructions, detail drawings and technical letters can be viewed at [graceconstruction.com](http://graceconstruction.com). For other technical information contact your local Grace representative.

Preprufe Plus has colored zip strips at the top and bottom of the seam area on the edge of the roll. Both zip strips cover an aggressive adhesive. Once the yellow zip strip on the top of the membrane and the blue zip strip on the bottom of the membrane are removed, a strong adhesive to adhesive bond is achieved in the overlap area.

### Substrate Preparation

**All surfaces**—It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability (see Figure 1).

**Horizontal**—The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.

**Vertical**—Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

### Membrane Installation

Preprufe can be applied at temperatures of 25°F (-4°C) or above. When installing Preprufe in cold or marginal weather conditions <40°F (<4°C) the use of Preprufe Tape LT is recommended at all laps and detailing. Preprufe Tape LT should be applied to clean, dry surfaces and the release liner must be removed immediately after application. Alternatively, Preprufe Plus Low Temperature (LT) is available for low temperature condition applications. Refer to Preprufe Plus LT data sheet for more information.

**Horizontal substrates**—Kick out or roll out the membrane HDPE film side to the substrate with the yellow zip strip facing towards the concrete pour. End laps should be staggered to avoid a build up of layers. Leave yellow and blue zip strips on the membrane until overlap procedure is completed.

Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with the blue zip strip on top of the yellow zip strip. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.

Refer to Grace Tech Letter 15 for information on suitable rebar chairs for Preprufe.

**Vertical substrates**—Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the yellow zip strip facing towards the concrete pour. The membrane may be installed in any convenient length. Fastening can be made through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge with the blue zip strip on top of the yellow zip strip. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap. Peel back and remove both the yellow and

blue zip strips in the overlap area to achieve an adhesive to adhesive bond at the overlap. Roll firmly to ensure a watertight seal.

**Roll ends and cut edges**—Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly (see Figure 2). Immediately remove tinted plastic release liner from the tape.

### Details

Refer to Preprufe Field Application Manual, Section V Application Instructions or visit [graceconstruction.com](http://graceconstruction.com). This manual gives comprehensive guidance and standard details.

### Membrane Repair

Inspect the membrane before installation of reinforcement steel, formwork and final placement of concrete. The membrane can be easily cleaned by power washing if required. Repair damage by wiping the area with a damp cloth to ensure the area is clean and free from dust, and allow to dry. Repair small punctures (0.5 in. (12 mm) or less) and slices by applying Preprufe Tape centered over the damaged area and roll firmly. Remove the release liner from the tape. Repair holes and large punctures by applying a patch of Preprufe membrane, which extends 6 in. (150 mm) beyond the damaged area. Seal all edges of the patch with Preprufe Tape, remove the release liner from the tape and roll firmly. Any areas of damaged adhesive should be covered with Preprufe Tape. Remove tinted plastic release liner from tape. Where exposed selvedge has lost adhesion or laps have not been sealed, ensure the area is clean and dry and cover with fresh Preprufe Tape, rolling firmly. Alternatively, use a hot air gun or similar to activate adhesive and firmly roll lap to achieve continuity.

### Pouring of Concrete

Ensure the plastic release liner is removed from all areas of Preprufe Tape.

It is recommended that concrete be poured within 56 days (42 days in hot climates) of application of the membrane. Following proper ACI guidelines, concrete must be placed carefully and consolidated properly to avoid damage to the membrane. Never use a sharp object to consolidate the concrete. Provide temporary protection from concrete over splash for areas of the Preprufe membrane that are adjacent to a concrete pour.

### Removal of Formwork

Preprufe membranes can be applied to removable formwork, such as slab perimeters, elevator and lift pits, etc. Once the concrete is poured the formwork must remain in place until the concrete has gained sufficient compressive strength to develop the surface bond. Preprufe membranes are not recommended for conventional twin-sided wall forming systems.

A minimum concrete compressive strength of 1500 psi (10 N/mm<sup>2</sup>) is recommended prior to stripping formwork supporting Preprufe membranes. Premature stripping may result in displacement of the membrane and/or spalling of the concrete.

Refer to Grace Tech Letter 17 for information on removal of formwork for Preprufe.

Figure 1

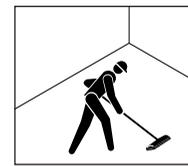
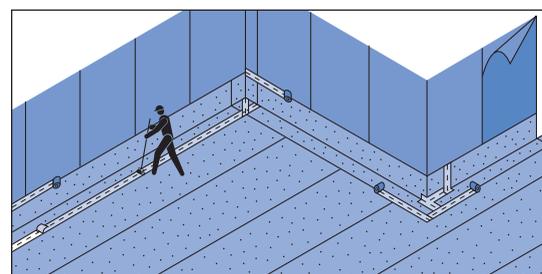
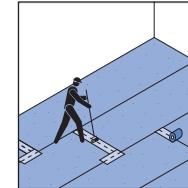


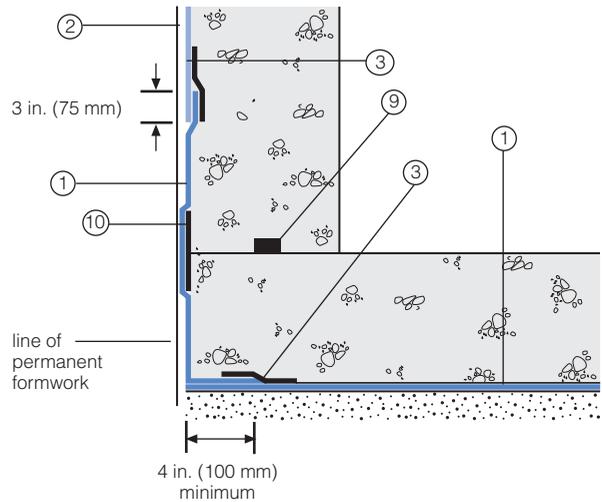
Figure 2



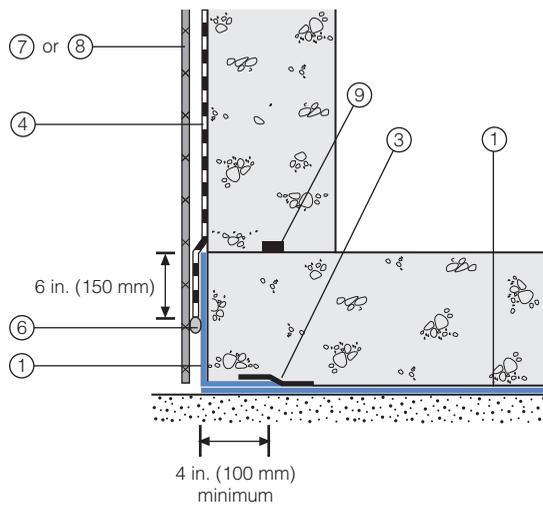
## Detail Drawings

Details shown are typical illustrations and not working details. For a list of the most current details, visit us at [graceconstruction.com](http://graceconstruction.com). For technical assistance with detailing and problem solving please call toll free at 866-333-3SBM (3726).

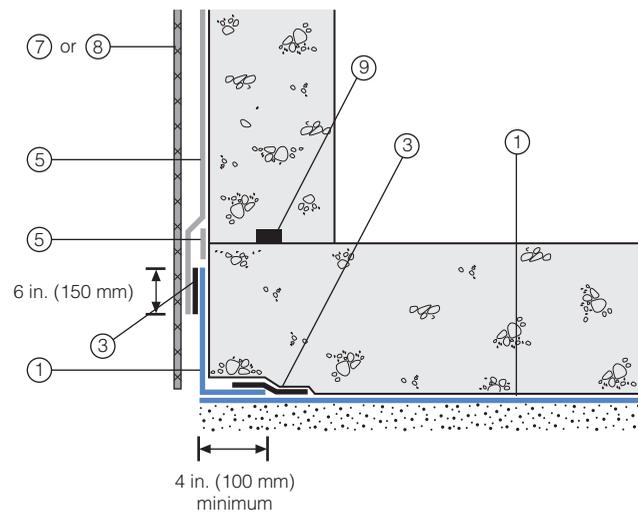
### Wall base detail against permanent shutter



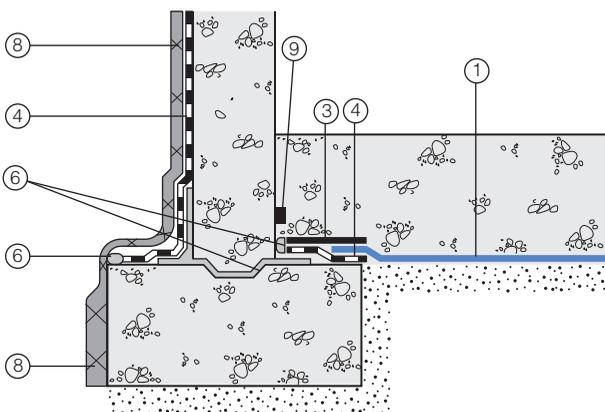
### Bituthene wall base detail (Option 1)



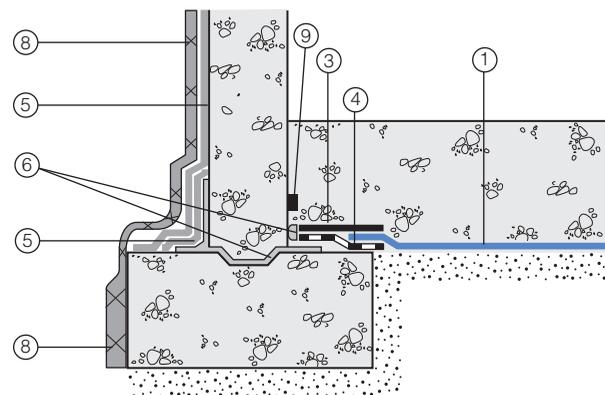
### Procor wall base detail (Option 1)



### Bituthene wall base detail (Option 2)



### Procor wall base detail (Option 2)



- 1 Preprufe 300R Plus
- 2 Preprufe 160R Plus
- 3 Preprufe Tape
- 4 Bituthene®

- 5 Procor
- 6 Bituthene Liquid Membrane
- 7 Protection

- 8 Hydroduct®
- 9 Adcor ES
- 10 Preprufe CJ Tape

## Supply

Dimensions (Nominal)	Preprufe 300R Plus Membrane	Preprufe 160R Plus Membrane	Preprufe Tape (LT or HC*)
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	
Roll size	3 ft. 10 in. x 102 ft. (1.17m x 31.15m)	3 ft. 10 in. x 120 ft. (1.17m x 36.6m)	4 in. x 49 ft (100 mm x 15 m)
Roll area	392 ft <sup>2</sup> (36 m <sup>2</sup> )	460 ft <sup>2</sup> (42 m <sup>2</sup> )	
Roll weight	108 lbs (50 kg)	92 lbs (42 kg)	4.3 lbs (2 kg)
Minimum side/end laps	3 in. (75 mm)	3 in. (75 mm)	3 in. (75 mm)
* LT denotes Low Temperature (between 25°F (-4°C) and 86°F (+30°C)) HC denotes Hot Climate (50°F (>+10°C))			
<b>Ancillary Products</b>			
Bituthene Liquid Membrane—1.5 US gal (5.7 liter) or 4 US gal (15.1 liter)			

## Physical Properties

Property	Typical Value 300R Plus	Typical Value 160R Plus	Test Method
Color	white	white	
Thickness	0.046 in. (1.2 mm)	0.032 in. (0.8 mm)	ASTM D3767
Lateral Water Migration Resistance	Pass at 231 ft (71 m) of hydrostatic head pressure	Pass at 231 ft (71 m) of hydrostatic head pressure	ASTM D5385, modified <sup>1</sup>
Low temperature flexibility	Unaffected at -20°F (-29°C)	Unaffected at -20°F (-29°C)	ASTM D1970
Resistance to hydrostatic head	231 ft (71 m)	231 ft (71 m)	ASTM D5385, modified <sup>2</sup>
Elongation	500%	500%	ASTM D412, modified <sup>3</sup>
Tensile strength, film	4000 psi (27.6 MPa)	4000 psi (27.6 MPa)	ASTM D412
Crack cycling at -9.4°F (-23°C), 100 cycles	Unaffected, Pass	Unaffected, Pass	ASTM C836 <sup>4</sup>
Puncture resistance	221 lbs (990 N)	100 lbs (445 N)	ASTM E154
Peel adhesion to concrete	5 lbs/in. (880 N/m)	5 lbs/in. (880 N/m)	ASTM D903, modified <sup>5</sup>
Lap peel adhesion at 72°F (22°C)	8 lbs/in. (1408 N/m)	8 lbs/in. (1408 N/m)	ASTM D1876, modified <sup>6</sup>
Lap peel adhesion at 40°F (4°C)	8 lbs/in. (1408 N/m)	8 lbs/in. (1408 N/m)	ASTM D1876, modified <sup>6</sup>
Permeance to water vapor transmission	0.01 perms (0.6 ng/(Pa x s x m <sup>2</sup> ))	0.01 perms (0.6 ng/(Pa x s x m <sup>2</sup> ))	ASTM E96, method B

### Footnotes:

- Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the membrane.
- Hydrostatic head tests of Preprufe Membranes are performed by casting concrete against the membrane with a lap. Before the concrete cures, a 0.125 in. (3 mm) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to the head indicated.
- Elongation of membrane is run at a rate of 2 in. (50 mm) per minute.
- Concrete is cast against the Preprufe membrane and allowed to cure (7 days minimum)
- Concrete is cast against the protective coating surface of the membrane and allowed to properly dry (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 2 in. (50 mm) per minute at room temperature.
- The test is conducted 15 minutes after the lap is formed (per Grace published recommendations) and run at a rate of 2 in. (50 mm) per minute at 72°F (22°C).

## Specification Clauses

Preprufe 300R Plus or 160R Plus shall be applied with its adhesive face presented to receive fresh concrete to which it will integrally bond. Only Grace Construction Products approved membranes shall be bonded to Preprufe. All Preprufe system materials shall be supplied by Grace Construction Products, and applied strictly in accordance with their instructions. Specimen performance and formatted clauses are also available.

NOTE: Use Preprufe Tape to tie-in Procor with Preprufe.

## Health and Safety

Refer to relevant Material Safety data sheet. Complete rolls should be lifted and carried by a minimum of two persons.

[www.graceconstruction.com](http://www.graceconstruction.com)

**For technical assistance call toll free at 866-333-3SBM (3726)**

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## **Section 071324**

### **Pre-Applied Sheet Membrane Waterproofing**

#### **PART 1 — GENERAL**

##### **1.01 SUMMARY**

- A. The Work of this Section includes, but is not limited to, pre-applied sheet membrane waterproofing that forms an integral bond to poured concrete for the following applications:
  - 1. Vertical Applications: Membrane applied against soil retention system prior to placement of concrete foundation walls;
  - 2. Horizontal Applications: Membrane applied on prepared subbase prior to placement of concrete slabs.
- B. Related sections include, but are not limited to, the following:
  - 1. Section 031000 - Concrete Forming
  - 2. Section 312000 – Earth Moving
  - 3. Section 031500 – Concrete Accessories
  - 4. Section 031500 – Hydrophilic Waterstop
  - 5. Section 316200 - Driven Piles
  - 6. Section 316400 - Caissons
  - 1. Section 032000 - Concrete Reinforcing
  - 2. Section 033000 – Cast-In-Place Concrete

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**NOTE TO SPECIFIER: For vertical applications, coordinate with concrete formwork section to require one-sided wall forming system to minimize punctures to the sheet membrane waterproofing during formwork installation.**

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##### **1.02 SUBMITTALS**

- A. Submit manufacturer's product data, installation instructions and membrane samples for approval.

##### **1.03 REFERENCE STANDARDS**

- A. The following standards and publications are applicable to the extent referenced in the text.
- B. American Society for Testing and Materials (ASTM):
  - C 836 Standard Specification for High Solids, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
  - D 412 Standard Test Methods for Rubber Properties in Tension
  - D 570 Standard Test Method for Water Absorption of Plastics
  - D 903 Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
  - D 1876 Standard Test Method for Peel Release of Adhesives (T-Peel)
  - D 1970 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

- D 3767 Standard Practice for Rubber - Measurements of Dimensions
- D 5385 Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
- E 96 Standard Test Methods for Water Vapor Transmission of Materials
- E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer: Sheet membrane waterproofing system shall be manufactured and marketed by a firm with a minimum of 20 years experience in the production and sales of sheet membrane waterproofing. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past 5 years.
- B. Installer: A firm which has at least 3 years experience in work of the type required by this section.
- C. Materials: For each type of material required for the work of this section, provide primary materials which are the products of one manufacturer.
- D. Pre-Installation Conference: A pre-installation conference shall be held prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Agenda for meeting shall include review of special details and flashing.
- E. Schedule Coordination: Schedule work such that membrane will not be left exposed to weather for longer than that recommended by the manufacturer.

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's instructions. Protect from damage from weather, excessive temperature and construction operations. Remove and dispose of damaged material in accordance with applicable regulations.

#### **1.06 PROJECT CONDITIONS**

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials used. Proceed with installation only when the substrate construction and preparation work is complete and in condition to receive sheet membrane waterproofing.

#### **1.07 WARRANTY**

- A. Sheet Membrane Waterproofing: Provide written five year material warranty issued by the membrane manufacturer upon completion of work.

## PART 2 — PRODUCTS

### 2.01 MATERIALS

- A. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Preprufe® 300R Membrane [or Preprufe 300LT Membrane for application temperatures between 25°F (-4°C) and 60°F (+16°C)] by Grace Construction Products, a 1.2mm (0.046 in) nominal thickness composite sheet membrane comprising 0.8 mm (0.030 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

**NOTE TO SPECIFIER: Preprufe 300R and Preprufe 300LT can both be installed at temperatures 25°F (-4°C) and above. For temperatures 25°F (-4°C) to 55°F (13°C) Grace Technical Bulletin #16 states the use of Preprufe LT Tape is recommended at all sidelaps when using Preprufe 300R. Alternatively, contractors may elect the use of Preprufe 300LT which does not require the use of Preprufe LT Tape at sidelaps in temperature ranges 25°F (-4°C) to 55°F (13°C). For this reason, Grace suggests that both products be incorporated into the specification.**

#### PHYSICAL PROPERTIES FOR PREPRUFE 300R (or 300LT) MEMBRANE:

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767 Method A	1.2 mm (0.046 in.) nominal
Lateral Water Migration Resistance	ASTM D 5385 Modified <sup>1</sup>	Pass at 71 m (231 ft) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -29°C (-20°F)
Elongation	ASTM D 412 Modified <sup>2</sup>	500%
Crack Cycling at -23°C (-9.4°F), 100 Cycles	ASTM C 836	Unaffected, Pass
Tensile Strength, film	ASTM D 412	27.6 MPa (4,000 lbs/in. <sup>2</sup> )
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>3</sup>	880 N/m (5.0 lbs/in.)
Lap Adhesion	ASTM D 1876 Modified <sup>4</sup>	880 N/m (5.0 lbs/in.)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>5</sup>	71 m (231 ft)
Puncture Resistance	ASTM E 154	990 N (221 lbs)
Permeance	ASTM E 96 Method B	0.6 ng/Pa x s x m <sup>2</sup> (0.01 perms)
Water Absorption	ASTM D 570	0.5%

*Footnotes:*

1. Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.
2. Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.
3. Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
4. The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute.
5. Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.

- B. Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Preprufe® 160R Membrane [or Preprufe 160LT Membrane for application temperatures between 25°F (-4°C) and 60°F (+16°C)] by Grace Construction Products, a 1.0mm (0.032 in) nominal thickness composite sheet membrane comprising 0.4 mm (0.016 in.) of high density polyethylene film, and layers of specially formulated synthetic adhesive layers. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Provide membrane with the following physical properties:

**NOTE TO SPECIFIER: Preprufe 160R and Preprufe 160LT can both be installed at temperatures 25°F (-4°C) and above. For temperatures 25°F (-4°C) to 55°F (13°C) Grace Technical Bulletin #16 states the use of Preprufe LT Tape is recommended at all sidelaps when using Preprufe 160R. Alternatively, contractors may elect the use of Preprufe 160LT which does not require the use of Preprufe LT Tape at sidelaps in temperature ranges 25°F (-4°C) to 55°F (13°C). For this reason, Grace suggests that both products be incorporated into the specification.**

**PHYSICAL PROPERTIES FOR PREPRUFE 160R (or 160LT) MEMBRANE:**

Property	Test Method	Typical Value
Color		White
Thickness	ASTM D 3767 Method A	1.0 mm (0.032 in.) nominal
Lateral Water Migration Resistance	ASTM D5385, Modified <sup>1</sup>	Pass at 71 m (231 ft) of hydrostatic head pressure
Low Temperature Flexibility	ASTM D 1970	Unaffected at -29°C (-20°F)
Elongation	ASTM D 412 Modified <sup>2</sup>	500%
Crack Cycling at -23°C (-9.4°F), 100 Cycles	ASTM C 836	Unaffected, Pass
Tensile Strength, film	ASTM D 412	27.6 MPa (4,000 lbs/in. <sup>2</sup> )
Peel Adhesion to Concrete	ASTM D 903 Modified <sup>3</sup>	880 N/m (5.0 lbs/in.)
Lap Adhesion	ASTM D 1876 Modified <sup>4</sup>	880 N/m (5.0 lbs/in.)
Resistance to Hydrostatic Head	ASTM D 5385 Modified <sup>5</sup>	Pass at 71 m (231 ft)
Puncture Resistance	ASTM E 154	445 N (100 lbs)
Permeance	ASTM E 96 Method B	0.6 ng/Pa x s x m <sup>2</sup> (0.01 perms)
Water Absorption	ASTM D 570	0.5%

*Footnotes:*

- Lateral water migration resistance is tested by casting concrete against membrane with a hole and subjecting the membrane to hydrostatic head pressure with water. The test measures the resistance of lateral water migration between the concrete and the blind side waterproofing membrane. A hydrostatic head pressure of 71 m (231 ft) of water is the limit of the apparatus.*
- Elongation of membrane is run at a rate of 50 mm (2 in.) per minute.*
- Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.*
- The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute.*
- Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 71 m (231 ft) of water which is the limit of the apparatus.*

- C. Waterstop: Adcor™ ES hydrophilic non-bentonite waterstop by Grace Construction Products for non-moving concrete construction joints.

**PHYSICAL PROPERTIES FOR GRACE ADCOR™ ES HYDROPHYLIC WATERSTOP:**

Property	Typical Value
Color	Green
Size	1.0 in. x ½ in. x 16 ft. rolls (25.4 mm x 12.7 mm x 4.9 m)
Hydrostatic Head Resistance	70 m (231 ft)
Wet - Dry Cycling [25 Cycles @ 231 ft. (70 m)]	No Effect
Adhesion to Concrete using Adcor ES Adhesive	Excellent

- D. Preformed Soil Retention Wall Tieback Cover: Preprufe Tieback Cover by Grace Construction Products as a prefabricated detail for soil retention wall tiebacks.
- E. Preformed Inside and Outside Corners: Preprufe Preformed Corners by Grace Construction Products as prefabricated inside and outside corners.
- F. Tape for covering cut edges, roll ends, penetrations and detailing: Preprufe Tape LT (for temperatures between 25°F (-4°C) and 86°F (+30°C)) and Preprufe Tape HC (for use in Hot Climates, minimum 50°F (10°C))
- G. Miscellaneous Materials: accessories specified or acceptable to manufacturer of pre-applied waterproofing membrane.

**PART 3 — EXECUTION**

**3.01 EXECUTION**

- A. The installer shall examine conditions of substrates and other conditions under which this work is to be performed and notify the Contractor, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed with work until unsatisfactory conditions are corrected.

**3.02 SUBSTRATE PREPARATION**

- A. It is essential to create a sound and solid substrate to eliminate movement during the concrete pour. Substrates must be regular and smooth with no gaps or voids greater than 0.5 in. (12 mm). Grout around all penetrations such as utility conduits, etc. for stability.
1. Horizontal Surfaces - The substrate must be free of loose aggregate and sharp protrusions. Avoid curved or rounded substrates. When installing over earth or crushed stone, ensure substrate is well compacted to avoid displacement of substrate due to traffic or concrete pour. The surface does not need to be dry, but standing water must be removed.
  2. Vertical Surfaces - Use concrete, plywood, insulation or other approved facing to sheet piling to provide support to the membrane. Board systems such as timber lagging must be close butted to provide support and not more than 0.5 in. (12 mm) out of alignment.

### **3.03 INSTALLATION, HORIZONTAL APPLICATIONS**

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Place the membrane HDPE film side to the substrate with the clear plastic release liner facing towards the concrete pour. End laps should be staggered to avoid a build-up of layers.
  2. Leave the plastic release liner in position until overlap procedure is completed.
  3. Accurately position succeeding sheets to overlap the previous sheet 3 in. (75 mm) along the marked selvedge. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
  4. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
  5. Completely remove the plastic liner to expose the protective coating. Any initial tack will quickly disappear.

### **3.04 INSTALLATION, VERTICAL APPLICATIONS**

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Mechanically fasten the membrane vertically using fasteners appropriate to the substrate with the clear plastic release liner facing towards the concrete pour. The membrane may be installed in any convenient length.
  2. Fastening through the selvedge using a small and low profile head fastener so that the membrane lays flat and allows firmly rolled overlaps.
  3. Immediately remove the plastic release liner.
  4. Ensure the underside of the succeeding sheet is clean, dry and free from contamination before attempting to overlap.
  5. Roll firmly to ensure a watertight seal.
  6. Overlap all roll ends and cut edges by a minimum 3 in. (75 mm) and ensure the area is clean and free from contamination, wiping with a damp cloth if necessary.
  7. Allow to dry and apply Preprufe Tape LT (or HC in hot climates) centered over the lap edges and roll firmly.
  8. Immediately remove printed plastic release liner from the tape.

### **3.05 WATERSTOP INSTALLATION**

- A. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
1. Secure Adcor ES using masonry nails 1½ in. - 2 in. (40 mm – 50 mm) long with a washer ¾ in. (20 mm) in diameter. Hilti EM6-20-12 FP8 shot fired fixings with ¼ in. (6 mm) nuts and ¾ in. (20 mm) diameter washers may also be used. Fixings should be spaced at a maximum of 12 in. (300 mm) centers with a minimum spacing that ensures proper contact to substrate.
  2. On irregular concrete faces, or on vertical surfaces, apply a ½ in. (12 mm) bead of Adcor ES Adhesive as bedding for Adcor ES.

3. Adcor ES joints should overlap a minimum of 4 in. (100 mm), ensuring full contact between jointed pieces.

### **3.06 PROTECTION**

- A. Protect membrane in accordance with manufacturer's recommendations until placement of concrete. Inspect for damage just prior to placement of concrete and make repairs in accordance with manufacturer's recommendations.

**END OF SECTION**

**W.R. Grace & Co.-Conn. 62 Whittemore Avenue Cambridge, MA 02140**

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**APPENDIX F**  
**CONSTRUCTION HEALTH AND SAFETY PLAN**

**CONSTRUCTION  
HEALTH AND SAFETY PLAN  
BLOCK 594, LOT 108  
489 CANAL ST. (AKA 219 HUDSON ST.)  
NEW YORK, NEW YORK**

**PREPARED FOR:**  
HSH Construction, LLC  
405 Broadway  
New York, New York 10013

**PREPARED BY:**  
GZA GeoEnvironmental of New York  
104 West 29<sup>th</sup> Street, 10<sup>th</sup> Floor  
New York, New York 10001

July 2014  
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# 1.0 INTRODUCTION

## 1.1 Overview

This project-specific Construction Health and Safety Plan (CHASP) has been developed by GZA GeoEnvironmental of New York (GZA) on behalf of HSH Construction, LLC (Client) to establish the procedures necessary for protection from potential contaminated soils, groundwater, and soil vapors resulting from the excavation of soils at 489 Canal Street (a.k.a. 219 Hudson Street) in New York, New York (Site) due to re-development plans. This CHASP is intended to supplement the Client's Corporate Safety Management Program (CSMP). Subcontractors must establish their CHASP applicable to Subcontractor employees and/or activities. Subcontractors who use this CHASP as a model for their own CHASP are responsible for determining its adequacy and applicability to its own employees and its own activities on site. The procedures in this plan have been developed based on current knowledge regarding the hazards which are known or anticipated for the operations to be conducted at this Site.

## 1.2 Site Hazards

This CHASP covers only the hazards associated with potential chemical exposures. Physical hazards such as injuries from typical excavation field work activities, including the operation of heavy equipment, noise exposure, heat and cold stress, electrical hazards, fire hazards, excavation hazards and general safety hazards associated with walking on working surfaces (trip and fall) are covered by the Client's CSMP.

The contractor will also contact New York DigNet, the underground utility protective organization, telephone (800-272-4480) for a utility mark-out and for information regarding buried utilities in public right-of-ways prior to the start of excavation at the Site. There are no known utilities in the vicinity of the tank excavation, however if any utilities are uncovered, the contractor will be responsible for protecting and supporting, if necessary, those utilities during excavation.

Site activities may pose chemical exposure hazards. Potential chemical exposure hazards include skin contact, ingestion and inhalation hazards which may result from the presence of volatile organic compounds, semi-volatile organic compounds, and inorganic metallic elements (metals) on-Site. The potential adverse health effects from these detected contaminants are diverse. Many of these compounds are known or suspected to result in chronic illness from long-term exposures. However, due to the limited nature of the proposed construction, only acute effects are a potential concern. See **Section 2.0** for detailed chemical hazard information.

## 1.3 Project Team

The organizational structure established for the implementation of health and safety requirements established by this CHASP are outlined in the CSMP. Personnel who have been assigned specific authority to implement and enforce the provisions of this CHASP will be identified by the Client.

Name	Project Title/Assigned Role	Phone Numbers
------	-----------------------------	---------------

TBD		Work: Cell:
TBD		Work: Cell:

The control of Site hazards is dependent upon the degree to which management enforces compliance and employees cooperate with the specified health and safety requirements. Therefore, personnel at all levels of the organization must recognize their individual responsibility to comply. All activities covered by this CHASP must be conducted in compliance with this CHASP and with applicable federal, state, and local health and safety regulations, including 29 CFR 1910.120. Personnel covered by this CHASP who cannot or will not comply must be excluded from Site activities by the Project Superintendent, as defined in the CSMP.

## 2.0 HAZARD ASSESSMENT

The following hazard assessment applies only to the activities within the specified scope of this CHASP.

### 2.1 Chemical Hazards and Known/ Suspect Chemicals of Concern

The chemical hazard information provided below is based on data provided in the Phase II Environmental Site Investigation (ESI) dated January 2012, prepared by Soil Mechanics Environmental Services (SMES), and a groundwater sampling event conducted by GZA in May 2014. During the investigations, representative Site soils, groundwater, and soil vapor were collected. Soils were sampled for volatile organic compounds (VOC), semi-volatile organic compounds (SVOCs), total metals, pesticides, and Polychlorinated biphenyls (PCBs). Groundwater was sampled for VOCs, SVOCs, pesticides, PCBs, total metals, and dissolved metals. Soil vapor was sampled for VOCs.

Metals, VOCs, SVOCs, and pesticides were detected above Track 1 Unrestricted Use SCOs in soils. Elevated levels of metals and VOCs were detected above New York Ambient Water Quality Standards (AWQS) in groundwater. Soil vapor samples concluded that VOCs were detected below the New York State Department of Health (NYSDOH) standards. Prominent constituents which exceeded concentrations and their respective health effects are listed below for reference. Information presented is based upon established Occupational Safety and Health Administration (OSHA) permissible exposure limits (PEL) and The National Institute for Occupational Safety and Health (NIOSH) recommended exposure limits (RELs). All other analytical parameters were reported within acceptable levels for Site urban residential land use. See Section 4.2 for a description of the personal protection equipment (PPE) that should be used for this Site.

<b>Chemicals</b>	<b>REL/PEL/STEL (ppm)</b>	<b>Health Hazards</b>
Fuel Oil	PEL = 400 ppm REL = 350 mg/m <sup>3</sup>	Nausea, irritation – eyes, hypertension, headache, lightheadedness, loss of appetite, poor coordination; long-term exposure – kidney damage, blood clotting problems; potential carcinogen.
Lead	PEL = 0.05 mg/m <sup>3</sup> REL = 0.05 mg/m <sup>3</sup>	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension.
Mercury	PEL = 0.05 mg/m <sup>3</sup> REL = 0.1 mg/m <sup>3</sup>	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.

<b>Chemicals</b>	<b>REL/PEL/STEL (ppm)</b>	<b>Health Hazards</b>
Benzo(a)pyrene	PEL = 0.2 mg/m <sup>3</sup> TWA REL = 0.1 mg/m <sup>3</sup> TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Benzo(a)anthracene	PEL = 0.2 mg/m <sup>3</sup> TWA REL = 0.1 mg/m <sup>3</sup> TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Benzo(b)fluoranthene	PEL = 0.2 mg/m <sup>3</sup> TWA REL = 0.1 mg/m <sup>3</sup> TWA	No signs or symptoms of acute or chronic exposure have been reported in humans; suspect human carcinogen.
Acetone	PEL = 2,400 mg/m <sup>3</sup> TWA REL = 590 mg/m <sup>3</sup> TWA	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis.
Chrysene	PEL = 0.2 mg/m <sup>3</sup> TWA REL = 0.1 mg/m <sup>3</sup> TWA	Irritation to respiratory system, bladder, kidneys, skin; dermatitis, bronchitis, cumulative lung damage; suspect human carcinogen.
Copper	PEL = 1 mg/m <sup>3</sup> TWA REL = 1 mg/m <sup>3</sup> TWA	Irritation of the nose, mouth and eyes and causes headaches, stomachaches, dizziness, vomiting and diarrhea. Intentionally high uptakes of copper may cause liver and kidney damage and even death.  Read more: <a href="http://www.lenntech.com/periodic/elements/cu.htm#">http://www.lenntech.com/periodic/elements/cu.htm#</a>
Zinc	PEL = 15 mg/m <sup>3</sup> TWA REL = 10 mg/m <sup>3</sup> TWA	Irritation eyes, skin, upper respiratory system; cough.
Isopropyl Benzene	PEL = 50 mg/m <sup>3</sup> TWA REL = 50 mg/m <sup>3</sup> TWA	Irritation of the eyes, skin mucous membrane, dermatitis, headache, narcosis, coma. Targets the eyes, skin, respiratory system, and central nervous system.

Chemicals	REL/PEL/STEL (ppm)	Health Hazards
4,4'-DDT	PEL = 1.0 mg/m <sup>3</sup> TWA REL = 0.5 mg/m <sup>3</sup> TWA	Very large doses are followed promptly by vomiting, due to local gastric irritation; delayed emesis or diarrhea may occur. With smaller doses, symptoms usually appear 2-3 hours after ingestion. These include tingling of lips, tongue, and face; malaise, headache, sore throat, fatigue, coarse tremors of neck, head, and eyelids; apprehension, ataxia, and confusion. Convulsions may alternate with periods of coma and partial paralysis. Vital signs are essentially normal, but in severe poisoning the pulse may be irregular and abnormally slow; ventricular fibrillation and sudden death may occur at any time during acute phase. Pulmonary edema usually indicates solvent intoxication.

## 2.2 Volatile Organic Compounds (VOCs)

VOCs including including isopropylbenzene, ethylbenzene, benzene, n-butylbenzene, sec-butylbenzene, toluene, p/m-Xylene, o-xylene, 1,3,5-Trimethylbenzene, 1,3,4-Trimethylbenzene, and acetone were detected above the NYSDEC Ambient Water Quality Standards (AWQS) groundwater criteria. VOCs including toluene, ethylbenzene, m,p-xylene, o-xylenes and isopropylbenzene were detected in soil samples exceeding Track 1 Unrestricted Use SCOs. Soil Vapor Guidelines including Chlorinated VOCs (1,1,1-Trichloroethane, PCE, TCE, and Tetrachloride) were detected below New York State Department of Health (NYSDOH) guidance values. Petroleum hydrocarbons were detected at low concentrations site wide.

The vapor pressures of these compounds are potentially high enough to generate airborne vapor. On sites where high concentrations of these compounds are present, a potential inhalation hazard to the field team during subsurface construction can result. Depth to groundwater is approximately 7 feet bgs. Soil vapor samples collected during the April 2014 Remedial Investigation indicated that VOCs were detected below the NYSDOH standards. If the site is ventilated and the anticipated quantities of the degraded compounds are small (i.e., part per billion concentrations in the soil or groundwater), overexposure potential will also be small. Air quality monitoring for VOC concentrations will be implemented throughout the Site during all phases of excavation, and dust management will be in place to ensure minimal exposure to soil and groundwater VOCs.

## 2.3 Semi-Volatile Organic Compounds (SVOCs)

SVOCs including benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene were detected above Track 1 Unrestricted Use SCOs in the soil. Several SVOCs including naphthalene, pentachlorophenol, and bis(2-ethylhexyl)phthalate were detected in the groundwater samples above respective AWQS.

However, if Site conditions are dry, the generation of contaminated dusts may pose a potential inhalation hazard. Therefore, dust levels should be controlled with wetting if necessary, as described in Section 3.2. In addition, repeated contact with certain SVOCs compounds has been associated with the development of skin cancer. Contact of SVOC compounds with the

skin may cause photosensitization of the skin, producing skin burns after subsequent exposure to ultraviolet radiation. Protective measures, such as the wearing of chemically resistant gloves, are appropriate when handling SVOC contaminated materials.

## **2.1 Petroleum Hydrocarbons (PHCs)**

Petroleum Hydrocarbons such as fuel oil are generally considered to be of low toxicity. Chemicals that occur in PHCs include hexane, benzene, toluene, and xylenes. Inhalation of low concentrations of vapor may cause irritation of the mucous membranes of the upper respiratory tract, nose and mouth. Overexposure may also result in the depression of the central nervous system. Symptoms of such exposure include drowsiness, headache, fatigue and drunken-like behavior. Repeated or prolonged direct skin contact with the oil may produce skin irritation as a result of defatting. Benzene has been determined to be a carcinogenic, targeting blood-forming organs and bone marrow.

The vapor pressures of these compounds are high enough (>5mm Hg) to generate significant quantities of airborne vapor especially in confined spaces such as excavations and trenches. On sites where high concentrations of these compounds are present, this can result in a potential inhalation hazard to the field team during subsurface investigations or development. Levels of airborne PHCs, if encountered during excavation, will be measured with a PID. To reduce the potential for exposure to the vapors of the organic compounds of concern, vapor suppression measures or respiratory protection, may be required.

As discussed above benzene was determined to be the target volatile organic driving inhalation toxicity for VOCs identified at the site. The OSHA action level for benzene is 0.5 ppm. The action level criteria is therefore based on benzene and presented in **Section 9**.

## **2.4 Metals**

Various metals including cadmium, copper, lead, mercury and zinc were detected in concentrations exceeding the Track 1 Unrestricted Use SCOs. NYSDEC Part 375 Unrestricted Residential criteria in soil and groundwater samples collected and are attributed to historic fill materials present throughout the Site. Overexposure to metal compounds has been associated with a variety of local and systemic health hazards, both acute and chronic in nature, including lung damage, neurological effects, gastrointestinal effects, kidney and liver damage, allergic dermatitis and other skin disorders. Exposure to metals is most commonly through inhalation and ingestion of dust. Metallic mercury is unique among metals, as it releases toxic vapors at normal room temperatures, and can be absorbed through the skin.

To estimate health risk, GZA calculated the airborne mercury exposure through dust. The basis of comparison used was the more conservative nuisance dust standard of the ACGIH Threshold Limit Value, 8-hour time-weighted average of 10 milligram per cubic meter of air (mg/m<sup>3</sup>). This nuisance dust is a general rule of thumb for the dust allowed before preventive measures, such as soil wetting of exposed soil, are used.

Based on the maximum concentration of mercury detected in soil of 3.4 mg/kg, and lead detected in soil of 1,840 mg/kg, GZA converted the units for better comparison.

3.4 mg x  $\rightarrow$  1 kg  $\rightarrow$  x  $\rightarrow$  1 g  $\rightarrow$  = 0.0000034 mg mercury

1,840 mg x  $\rightarrow$  1 kg  $\rightarrow$  x  $\rightarrow$  1 g  $\rightarrow$  = 0.001840 mg lead

1 kg  $\rightarrow$  1000 g  $\rightarrow$  1000 mg  $\rightarrow$  10 mg soil (dust)

Since the maximum dust in air concentration is anticipated to be 10 mg/m<sup>3</sup>, the maximum mercury concentration is anticipated to be 0.000034 mg/m<sup>3</sup>, and the maximum lead concentration is anticipated to be 0.001840 mg/m<sup>3</sup>. The OSHA Permissible Exposure Level (PEL) for mercury is a ceiling concentration of 0.1 mg/m<sup>3</sup>, and for lead is 0.05 mg/m<sup>3</sup>. When compared, the expected mercury in air concentration is a full six orders of magnitude less than the OSHA PEL.

GZA believes that airborne mercury, lead, and additional listed metals are not a significant risk to Site workers. GZA understands that mercury is a volatile element. GZA does not anticipate measurable mercury vapor concentrations, given the relatively low soil concentrations.

## **2.4 PCBs and Pesticides**

PCBs were not detected in excess of applicable SCOs in any of the soil samples collected at the Site. Pesticides 4,4'-DDT (max of 30.0 ppm) and 4,4'-DDE (max of 6.57 ppm) were identified above the Unrestricted Use SCO. PCBs and pesticides were not detected in groundwater.

### 3.0 AIR MONITORING

Air monitoring falls into two separate categories: direct reading/environmental monitoring, and personal exposure monitoring. The following Sections summarize the types of environmental monitoring as well as the appropriate response actions applicable to the Site.

#### 3.1 Organic Vapor Monitoring

Potential volatile organic vapor hazards have been identified for the Site (see Section 2.0) in addition to emissions associated with diesel powered heavy equipment. The equipment will be exhausted to the atmosphere at grade level. However, as a protective measure, organic vapor monitoring with a photoionization detector (PID) and carbon monoxide monitoring will be required for the Site.

##### AIR MONITORING INSTRUMENTS AND ACTION LEVELS: PHOTO-IONIZATION DETECTOR

##### Organic Vapor Detector (PID) - Breathing Zone Readings

0 to 10 ppm	Remain in Level D.
10 to 250 ppm	Withdraw from work area and contact Project Management. Proceed to Level C protection for re-entry, or discontinue operation
> 250 ppm	Secure operations, withdraw from work area, and discontinue work at that location until contaminants can be evaluated, and detailed supplemental site safety plan can be implemented.

#### 3.2 Total Particulates

Due to the presence of VOCs in groundwater on-Site, and the potential for SVOCs in soils, total respirable particulates may be a concern. Dust levels should be visually monitored and if levels become noticeable, soils should be wetted down to control dusty conditions. Wetting may be accomplished using various methods, including a hose connected to a fire hydrant or other on-Site source of water. The Client's Project Superintendent shall be responsible for determining when the wetting of soils is needed and the most appropriate method to use. In addition, recommended measurements for particulate monitoring are detailed below.

Concentrations should be measured at the start of each work day during active handling of excavated materials (including stockpiling and truck loading) and periodically thereafter to establish background conditions. The particulate air monitoring work will be conducted using a pDR-1200 personal airborne particulate monitor (or approved equivalent) calibrated daily.

The particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers (um) in size (PM-10) and capable of integrating over a period of 5-minutes or less for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate excess of the action level.

Dust migration will be visually assessed during all work activities, and at no time will the work

area particulate levels be allowed to exceed a total standard of 10 mg/m<sup>3</sup> (or “nuisance” dust levels).

If the particulate level is 100 micrograms per cubic meter (ug/m<sup>3</sup>) greater than the background for a 5-minute period, or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques (e.g., soil wetting) provided the downwind PM-10 particulate levels do not exceed 150 ug/m<sup>3</sup> above the upwind level and no visible dust is migrating from the work area.

If, after implementation of dust suppression techniques, PM-10 particulate levels are greater than 150 ug/m<sup>3</sup>, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the PM-10 particulate concentrations to within 150 ug/m<sup>3</sup> of the background and in preventing visible dust migration.

### 3.3 Particulate Monitoring, Response Levels, and Actions

Parameter	Monitoring Instrument	Response Levels (above background levels)	Action	Conditions for Continuing Work Activities
Particulates < 10 um (PM-10)	Dust Meter	Fugitive dust migration	1. Implement dust suppression	Dust suppression techniques are in place
		> 100 ug/m <sup>3</sup> but < 150 ug/m <sup>3</sup>	1. Implement dust suppression techniques	Levels must not exceed 150 ug/m <sup>3</sup> with dust suppression techniques in place
		> 150 ug/m <sup>3</sup>	1. Halt activity 2. Re-evaluate activities	Levels decrease below 150 ug/m <sup>3</sup> and fugitive dust migration is prevented

## **4.0 PERSONAL PROTECTIVE EQUIPMENT**

PPE will be donned as described below for the activities covered by this CHASP. Based on available analytical data and the proposed intrusive activities, GZA anticipates that all activities will require Level D or Modified Level D PPE.

### **4.1 General Site Work**

General Site work conducted outside the excavation areas, operators of heavy equipment, and non-intrusive activities which do not generate dust will require Level D protective equipment.

Level D is defined as:

- Hardhat
- Eye protection
- Hearing protection (with site workers at all times and donned when appropriate)
- Steel-toed work boots
- Work clothes

Workers shall wear appropriate hearing protection during designated hearing protection-required tasks (such as, jack hammering, pile driving etc.). To reduce the exposure to noise, personnel working in areas of excessive noise must use hearing protectors (earplugs or earmuffs) in accordance with the CSMP. Rule-of-Thumb: Wherever actual data from sound level meters or noise dosimeters is unavailable, if it is necessary to raise one's voice above a normal conversational level to communicate with others within 3 to 5 feet away, hearing protection should be worn.

### **4.2 Excavation Areas**

Personnel working in the areas of active excavation, but not operating heavy equipment, and any other personnel potentially contacting contaminated materials will be required to wear Modified Level D PPE. Modified Level D is defined as:

- Hardhat
- Eye protection
- Hearing protection (as warranted see above)
- Steel-toed work boots
- Tyvek Coveralls
- Disposable nitrile chemically resistant gloves

Level C PPE and Level B are not expected to be required.

## **5.0 SITE CONTROL**

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with personal protective equipment requirements will be clearly identified with signage. Pedestrian traffic will be managed to the extent possible by the Contractor's Traffic and Pedestrian Control Plan.

The Contractor will designate a work zone and support zone as define below.

### **5.1 Work Zone**

Work zones on Site will be temporary or dynamic, encompassing the work area(s) actively being worked in on that particular day(s). Site personnel will be advised of the current work area(s) as part of site safety meetings.

### **5.2 Support Zone**

The support zone will consist of an area outside the areas of active excavation and soil handling, where equipment and support vehicles will be located. Eating, drinking and smoking will be permitted only in this area. Sanitary facilities will be located on Site. In addition, potable water and water and soap for hand washing will be available at the Site.

### **5.3 Other Site Control and Safety Measures**

The following measures are designed to augment the specific health and safety guidelines provided in this plan. These issues will form the basis of the Site ordination and daily safety meetings discussed in Section 7.0, below.

- The Site hazards will be evaluated by the Client's Project Superintendent using the Site Safety Checklist as defined by the CSMP.
- No one is to perform field work alone. Team members must be intimately familiar with the procedures for initiating an emergency response.
- Avoidance of contamination is of the utmost importance. Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces or materials. Walk around (not through) puddles and dis-colored surfaces. Do not kneel on the ground or set equipment on the ground.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited except in the support zone after proper decontamination as defined in Section 6.0.
- The use of alcohol or drugs is prohibited during the conduct or field operations.
- Safety equipment (e.g., PPE) will be required for all field personnel unless otherwise approved by the subcontractor's health and safety representatives and/or the Project Superintendent.

#### **5.4 Site Security**

The Site shall be unoccupied during Site work except for Contractor personnel and subcontractors. If possible, access to the work areas during field work will be limited by closing site gates to reduce unauthorized pedestrian traffic. The Client's Project Superintendent is responsible for identifying the presence of all employees on Site.

Equipment left on Site during off hours must be locked, immobilized and/or otherwise secured to prevent theft or unauthorized use or access. The Contractor and subcontractors' employees will not be permitted on Site during off-hours without specific client approval.

## 6.0 DECONTAMINATION

Proper decontamination will be performed for personnel and equipment before leaving the Site. All solid waste generated during decontamination will be bagged by the Contractor personnel and stored on Site for disposal. Water will be disposed of by on-Site infiltration into soil within an exclusion zone.

### 6.1 Personal Decontamination

If waste fluids are encountered in the tanks and removed by personnel, decontamination protocol will be implemented. Personal decontamination will be accomplished by following a systematic procedure of cleaning and removal of personal protective equipment (PPE). The Contractor will supply decontamination equipment to allow PPE to be brushed to remove gross contamination and then scrubbed clean in a detergent solution and then rinsed clean. To facilitate this, a three-basin wash system will be set up on site by the Contractor.

Disposable PPE, such as Tyvek coveralls, gloves, and hearing protection, etc. will be placed in trash bags in an on-Site container pending a disposal. Alternative chemical decontamination procedures, such as steam-cleaning reusable rubber outer boots, may be used if necessary.

Steps required in a decontamination sequence will depend on the level of protection worn in accordance with Section 4.0:

1. Remove and wipe clean hard hat
2. Brush boots and gloves of gross contamination
3. Scrub boots and gloves clean
4. Rinse boots and gloves
5. Dry non-disposable equipment with paper towels
6. Remove Tyvek coveralls
7. Remove eye protection
8. Remove chemically resistant gloves

### 6.2 Equipment Decontamination

Hand tools and portable equipment will be decontaminated upon leaving the active excavation areas using the same procedures for personal decontamination. Wooden tools are difficult to decontaminate because they absorb chemicals. Wooden hand tools will be kept on Site for the project duration and handled only by protected workers. At the end of the Site activities, wooden tools will be discarded if they cannot be decontaminated properly.

Large Equipment will be decontaminated in an area near the entrance to the Site. Decontamination of large equipment will mitigate the risk of spreading potentially-contaminated soil off-Site. The Contractor will use a combination of long-handled brushed, rods and shovels for general exterior cleaning and dislodging contaminated soil caught in tires and the undersides of vehicles and equipment.

Prior to leaving the Site, large equipment will be inspected to assure that excess material has not adhered to the equipment. If needed, the Contractor will clean the large equipment, including washing tires and undercarriages with a hose to remove excess adhered soil prior to leaving the Site.

Exposed excavated material will be covered on each truck after loading. The cover will be secured and remain in place until the container has reached the disposal facility.

## **7.0 MEDICAL MONITORING AND TRAINING REQUIREMENTS**

Training records for Site personnel and subcontractors shall be provided by the Contractor prior to on-Site work, and will be maintained on Site.

### **7.1 Medical Monitoring**

Respiratory protection is not required by the levels of soil contamination. Therefore, no medical monitoring requirements will be instituted for this project.

### **7.2 Training**

All personnel covered by this CHASP must have completed the appropriate training requirements specified in 29 CFR 1910.1200 Hazard Communication and 29 CFR 1910.120(e).

Workers requiring access to areas excavated to expose and abandon the tanks (laborers and operators) prior to completion of tank abandonment activities will require 40-hour HAZWOPER training due to the presence of gasoline contaminated soils and underground storage tanks.

Also, at least one Contractor employee must be on Site during all activities to act as the Site Foreman and will be responsible for identifying existing and predictable hazards in surroundings or working conditions that are unsanitary, hazardous, or dangerous to Site workers and or the community, and will have the authorization to take prompt corrective measures to eliminate them. This individual must have documentation of at least three days of supervised field experience as well as completion of the specified 8-hour training course for managers and supervisors. Records of certifications and training should be kept by the Contractor.

### **7.3 Subcontractors**

Subcontractors will be required to provide to the Contractor Project (Site) Manager specific written documentation that each individual assigned to this project has completed the medical monitoring and training requirements specified above. This information must be provided prior to their performing any work on Site.

### **7.4 Site Safety Meetings**

Prior to the commencement of on-Site investigative activities, a Site safety meeting will be held to review the specific requirements of this CHASP. Sign-off sheets will be collected at this meeting (see Attachment A). Short safety refresher meetings will be conducted daily or as conditions or work activates change. In addition, the Project Superintendent will document that Site visitors have had the required training in accordance with 29 CFR 1910.120 and will provide documented pre-entry safety briefings.

## **8.0 EMERGENCY ACTION PLAN**

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." The Contractor personnel covered by this CHASP may not participate in any emergency response where there are potential safety or health hazards (i.e., fire, explosion, or chemical exposure). The Contractor response actions will be limited to evacuation and medical/first aid as described within this section below.

The basic elements of an emergency evacuation plan include employee training, alarm systems, escape routes, escape procedures, critical operations or equipment, rescue and medical duty assignments, designation of responsible parties, emergency reporting procedures, and methods to account for all employees after evacuation.

### **8.1 Employee Information**

General training regarding emergency evacuation procedures are included in the Contractor initial and refresher training courses. Also as described, employees must be instructed in the specific aspects of emergency evacuation applicable to the Site as part of the site safety meeting prior to the commencement of all on-site activities. On-Site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed. This information will be provided during the Site safety meetings (see Section 7.4) will be documented by the Contractor.

### **8.2 Emergency Signal and Alarm Systems**

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial Site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (i.e., noise from heavy equipment, trucks, etc.) and anytime a clear line-of-sight cannot be easily maintained amongst all personnel because of distance, terrain or other obstructions. The Contractor will maintain an air horn (or whistle) on-Site that will be used to signal an emergency so that it can be heard over other construction noises on-Site.

### **8.3 Emergency Contacts**

Police:	911
Fire:	911
Ambulance:	911
New York Downtown Hospital:	(212) 312-5000

## **8.4 Hospital Location**

New York Downtown Hospital is located at 170 William Street, New York, New York. The most direct route to the hospital is to head northwest on Canal Street toward Renwick Street. Take the first left onto Greenwich Street, and turn left onto Duane Street. Take a slight right to stay on Duane Street, then turn right onto Broadway. Turn left onto Ann Street, then take the third left onto William Street and the hospital will be 200 feet down on the right-hand side of the street. **Attachment B** presents a hospital route map.

## **8.5 Incident Reporting Procedures**

Any incident (other than minor first aid treatment) resulting in injury, illness or property damage requires an accident investigation and report. The investigation should be initiated as soon as emergency conditions are under control. The purpose of this investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided.

The investigation should begin while details are still fresh in the mind of anyone involved. The person administering first aid may be able to start the fact gathering process if the injured are able to speak. Pertinent facts must be determined. Questions beginning with who, what, when, where, and how are usually most effective to discover ways to improve job performance in terms of efficiency and quality of work, as well as safety and health concerns.

**ATTACHMENT A**  
**HEALTH AND SAFETY BRIEFING**



**ATTACHMENT B  
ROUTE TO HOSPITAL**

Drive 1.4 miles, 7 min

○ 489 Canal St

New York, NY 10013

- ↑ 1. Head northwest on Canal St toward Renwick St 407 ft

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- ↙ 2. Take the 1st left onto Greenwich St 0.5 mi

---

- ↙ 3. Turn left onto Duane St 174 ft

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- ↘ 4. Slight right to stay on Duane St 0.3 mi

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- ↘ 5. Turn right onto Broadway 0.3 mi

---

- ↙ 6. Turn left onto Ann St 0.2 mi

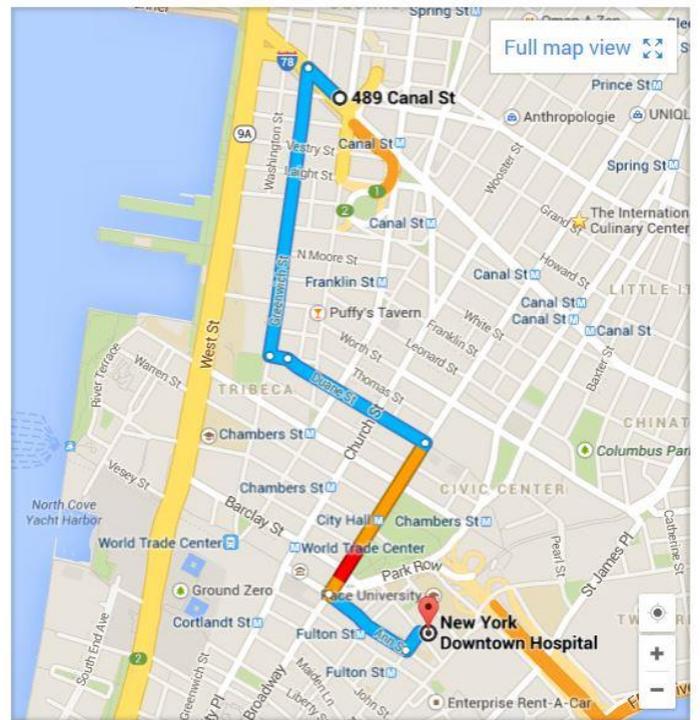
---

- ↙ 7. Take the 3rd left onto William St 210 ft

⊙ New York Downtown Hospital

170 William St, New York, NY 10038

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must



**ATTACHMENT C**  
**DAILY SAFETY MEETING**



**ATTACHMENT D**  
**INCIDENT ANALYSIS/REPORTING FORM**



# INCIDENT/ACCIDENT REPORT and ANALYSIS

For initial report to be submitted within 24 hours of the incident, fill in as much information as available in Sections 1 through 4.

- All EHS Events (incidents, first aid, near misses, unsafe acts/conditions, fires, chemical spills, property damage, and/or extraordinary safe behaviors) must be reported immediately to the Project Manager, and within 24 hours to the EHS Event Reporting Portal at [www.kellersonline.com/portal](http://www.kellersonline.com/portal). Username gempl1; Password ge5607.
- In the event of a chemical release greater than 5 gallons, site personnel will evacuate the affected area and relocate to an upwind location. The GZA Field Safety Officer and client site representative shall be contacted immediately.
- Site work shall not be conducted during severe weather, including high winds and lightning. In the event of severe weather, stop work, lower any equipment (drill rigs), and evacuate the affected area.

Initial Incident Report Prepared/Submitted by:

Name	GZA Office	Date
------	------------	------

1. Classify Incident (select all that apply):

Incident			
Injury			
Near Miss			

2. Description of Incident/Injury and Related Information (Attach photos, drawings, separate page if needed.)

a. Date of Incident:	b. Time of Incident:
b. Address Where Incident Occurred:	
c. If incident occurred on a project work site, provide project information (project number, project name, client info, etc.): -	
d. GZA Supervisor/Project Manager/PIC:	
e. Work conducted out of which GZA office?	
f. EHS Coordinator in Your Office:	
g. Detailed Description of the Incident:	

3. For Work Place Injury or Illness, Fill in this Section (otherwise, skip to Section 4),

a. Person Injured/Illness:
b. Full Name of Injured:
c. Injured Person's Mailing Address:
d. Injured Person's Title, Department, etc.

e. Home or Cell Phone No.	f. Date of Birth:
g. Detailed Description of Injury (be specific):	
h. Was 1 <sup>st</sup> aid administered on site?	
i. If yes, who administered 1 <sup>st</sup> aid, and describe actions:	
j. Did injured person receive emergency medical treatment or ambulance service?	
k. If yes, describe:	
l. Did injured receive professional medical care and/or treatment? m. If yes, what was the nature of care?	
n. Date of first treatment or hospitalization:	
o. Identify name of clinic, hospital, doctor, specialty, (name, address, city, state, zip code, and phone):	
p. Describe the specific medical care or treatment (provide details, specific treatment, specific medications, over-the-counter or prescription, recommendations for follow up, etc.):	
q. Did injured person resume work on the same day of the incident?	
r. Did injured person miss any days at work after the day of the incident?	
s. If yes, first day missed:	
t. Total number of days of work missed:	
u. Was injured person assigned any days of restricted duty at work?	
v. If yes, first day of restricted work duty:	
w. Total number of days of restricted work duty:	

**4. Names of Other Individuals Directly Involved or Witnesses (if any)**

Name	Nature of Involvement	Contact Info. (Company, Phone No.)

**5. Contributory Factors**

a. What was the apparent immediate or direct cause(s) of the incident?
b. Was any safety equipment provided?
c. If yes, was it used?
d. Was an unsafe act being performed, or was an unsafe condition present?
e. If yes, describe:
f. Were any machine parts, tools, or equipment involved?
g. If yes, describe:
h. Was the machine part/tool/equipment in proper working order?
i. If no, explain:
j. Was a non-GZA party (subcontractor, public, etc.) involved in or responsible for the incident?
k. If yes, explain and provide contact information:

1. Identify possible indirect causes, root causes of the incident:  
m. Other Comments:

**6. Corrective Actions, Recommendations, Follow-up** (Attach separate page if necessary.)

- a. Describe corrective or preventative actions implemented at the time of the incident:
- b. Suggest additional corrective or preventative actions that may prevent recurrence of the incident:
- c. Suggest additional follow-up actions (such as corrective actions needed for similar work, safety alert, information, or guidelines to be communicated company-wide, etc.):

**7. Distribution**

V.P. Risk Management: Kenneth Johnston  
EHS Director: Rick Ecord  
Property and Casualty Insurance Manager: Susan Domko  
Regional Office Managers: Ernest Hanna  
District Office Manager: Douglas Roy  
Principal-in-Charge (if project-related): John Gavras  
Project Manager (if project-related): Clifford Bell  
Employee Supervisor:  
Other:

**8. Participants in Incident Analysis/Investigation**

Name	Title	Role/Involvement

**9. Incident Analysis Completion**

OSHA-Recordable? Explain:

For hospitalization, have discharge papers been received? Explain: \_\_\_\_\_  
\_\_\_\_\_

For police involvement, has police report been received? Explain: \_\_\_\_\_  
\_\_\_\_\_



**ATTACHMENT A**

**SAMPLE WASTE MANIFESTS**

<b>UNIFORM HAZARDOUS WASTE MANIFEST</b>		1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number	
5. Generator's Name and Mailing Address			Generator's Site Address (if different than mailing address)			
Generator's Phone:						
6. Transporter 1 Company Name				U.S. EPA ID Number		
7. Transporter 2 Company Name				U.S. EPA ID Number		
8. Designated Facility Name and Site Address				U.S. EPA ID Number		
Facility's Phone:						
9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers		11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
		No.	Type			
1.						
2.						
3.						
4.						
14. Special Handling Instructions and Additional Information						
15. <b>GENERATOR'S/OFFEROR'S CERTIFICATION:</b> I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent. I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.						
Generator's/Offelor's Printed/Typed Name				Signature		Month Day Year
16. International Shipments <input type="checkbox"/> Import to U.S. <input type="checkbox"/> Export from U.S. Port of entry/exit: _____ Transporter signature (for exports only): _____ Date leaving U.S.: _____						
17. Transporter Acknowledgment of Receipt of Materials						
Transporter 1 Printed/Typed Name				Signature		Month Day Year
Transporter 2 Printed/Typed Name				Signature		Month Day Year
18. Discrepancy						
18a. Discrepancy Indication Space <input type="checkbox"/> Quantity <input type="checkbox"/> Type <input type="checkbox"/> Residue <input type="checkbox"/> Partial Rejection <input type="checkbox"/> Full Rejection Manifest Reference Number: _____						
18b. Alternate Facility (or Generator)				U.S. EPA ID Number		
Facility's Phone:						
18c. Signature of Alternate Facility (or Generator)				Signature		Month Day Year
19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)						
1.	2.	3.	4.			
20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a						
Printed/Typed Name				Signature		Month Day Year



Manifest # 4205

GLOBAL JOB NUMBER: \_\_\_\_\_ FACILITY APPROVAL NUMBER: \_\_\_\_\_

**Please Check One:**

- |   |  |  |  |
|---|--|--|--|
| <input type="checkbox"/> Clean Earth of Carteret<br>24 Middlesex Avenue<br>Carteret, NJ 07008<br>Ph: 732-541-8909         | <input type="checkbox"/> Clean Earth of Maryland<br>1469 Oak Ridge Place<br>Hagerstown, MD 21740<br>Ph: 301-791-6220 | <input type="checkbox"/> Clean Earth of New Castle<br>94 Pyles Lane<br>New Castle, DE 19720<br>Ph: 302-427-6633                  | <input type="checkbox"/> Other<br>_____<br>_____ |
| <input type="checkbox"/> Clean Earth of Philadelphia<br>3201 S. 61st Street<br>Philadelphia, PA 19153<br>Ph: 215-724-5520 | <input type="checkbox"/> Clean Earth of North Jersey<br>115 Jacobus Avenue<br>Kearny, NJ 07032<br>Ph: 973-344-4004   | <input type="checkbox"/> Clean Earth of Southeast Pennsylvania<br>7 Steel Road East<br>Morrisville, PA 19067<br>Ph: 215-428-1700 |  |

**Non-Hazardous Material Manifest**

(Type or Print Clearly)

GENERATOR'S NAME & SITE ADDRESS:	GROSS WEIGHT:
	<input type="checkbox"/> Tons <input type="checkbox"/> Yards
	TARE WEIGHT:
	<input type="checkbox"/> Tons <input type="checkbox"/> Yards
GENERATOR'S PHONE: _____	NET WEIGHT:
	<input type="checkbox"/> Tons <input type="checkbox"/> Yards

**DESCRIPTION OF MATERIAL/SAMPLE ID AND LOCATION**

**GENERATOR'S CERTIFICATION** – Incomplete and/or unsigned manifests will cause the load to be delayed and/or rejected.

I hereby certify that the above named material does not contain free liquid as defined by 40 CFR Part 260.10 or any applicable state law, is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, is not a DOT hazardous substance as defined by 49 CFR Part 172 or any applicable state law, has been fully and accurately described above, classified, packaged and is in proper condition for transportation according to all applicable state and federal regulations.

Name: \_\_\_\_\_ Title: \_\_\_\_\_  
Signature: \_\_\_\_\_ Date and Time: \_\_\_\_\_

**TRANSPORTER**

Company: \_\_\_\_\_ Phone Number: \_\_\_\_\_  
Address: \_\_\_\_\_ Truck # and License Plate: \_\_\_\_\_  
Driver: \_\_\_\_\_ SW Haulers Permit #: \_\_\_\_\_  
(Type or Print Clearly) (applicable state permit #)

I hereby certify that the above named material was picked up at the site listed above.

Driver Signature: \_\_\_\_\_ Date and Time: \_\_\_\_\_

**DESTINATION**

I hereby certify that the above named material was delivered without incident to the facility noted above.

Driver Signature: \_\_\_\_\_ Date and Time: \_\_\_\_\_

I hereby certify that the above named material has been accepted at the above referenced facility.

Authorized Signature: \_\_\_\_\_ Date and Time: \_\_\_\_\_

SITE