674 Ninth Avenue Site
674 Ninth Avenue
New York, New York
Block 1037, Lot 63
NYSDEC Site No. C231125

DRAFT

REMEDIAL INVESTIGATION WORK PLAN

NOVEMBER 12, 2018

PREPARED FOR:
Mr. Matthew Rowe
674 Ninth Ave, LLC
579 Fifth Avenue, 4th Floor
New York, New York 10017

PREPARED BY:
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45-18 Court Square, Suite 602
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PHONE 646.553.3500

PROJECT NO: 57182

November 12, 2018

Mr. Christopher Allan
New York State Department of Environmental Conservation
47-40 21st Street, long Island City
New York, NY 10038

RE: Remedial Investigation Work Plan
674 Ninth Avenue Site
New York, New York
Block 1037, Lot 63
NYSDEC Site No. C231125

Dear Mr. Allan:

Vertex Engineering, PC (VERTEX) is pleased to submit this RIWP for the above-referenced property (the Site) on behalf of the Volunteer (674 Ninth Ave, LLC). The Site is identified with NYSDEC Site No. C231125. A BCA has not been executed at this time.

Please do not hesitate to contact us at your convenience should you have any questions or comments regarding this report or our recommendations.

Sincerely,
Vertex Engineering, PC

DRAFT

Joseph J.C. Dultz
Vice President

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LIST OF ACRONYMS

Acronym	Definition
AAR	Alternative Analysis Report
ACRIS	Automated City Register Information System
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
BGS	Below Ground Surface
CLASS GA	Groundwater Effluent Limitations
CP PLAN	Citizens Participation Plan
DER	Division of Environmental Remediation
DNAPL	Dense Non-Aqueous Phase Liquid
DOT	Department of Transportation
DUSR	Data Usability Summary Report
EM	Electromagnetic
ESA	Environmental Site Assessment
ELAP	Environmental Laboratory Accreditation Program
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FSI	Focused Site Investigation
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IDW	Investigation-Derived Waste
LNAPL	Light Non-Aqueous Phase Liquid
MG/KG	Milligram per kilogram
NYCDEP	New York City Department of Environmental Protection
NYCDOB	New York City Department of Buildings
NYCDOT	New York City Department of Transportation
NYCRR	New York Codes Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ORP	Oxidation-Reduction Potential

Acronym	Definition
OSHA	United States Occupational Health and Safety Administration
PEI	People's Environmental, Inc.
PFAS	Per-and Polyfluoroalkyl Substances
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethene
PE	Professional Engineer
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PID	Photo-Ionization Detector
PPE	Personal Protective Equipment
PPM	Parts Per Million
PVC	Poly Vinyl Chloride
QAPP	Quality Assurance Project Plan
QA / QC	Quality Assurance / Quality Control
RI	Remedial Investigation
RIR	Remedial Investigation Report
RIWP	Remedial Investigation Work Plan
ROI	Radius of Influence
RUSCO-RR	Restricted Residential Soil Cleanup Objective
SCOs	Soil Cleanup Objectives
SIM	Selective Ion Monitoring
SSDS	Sub-Slab Depressurization System
SSSG	Sub-Slab Soil Gas
SVOCs	Semi Volatile Organic Compounds
TCE	Trichloroethylene
TOGS	Technical and Operational Guidance Series
UG/L	Micrograms Per Liter
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VI	Vapor Intrusion
VOCs	Volatile Organic Compounds

REMEDIAL INVESTIGATION WORK PLAN
674 Ninth Avenue Site 674 Ninth Avenue
New York, New York
Block 1037, Lot 63
NYSDEC Site No. C231125

1.0 INTRODUCTION

This RIWP has been developed for the 674 Ninth Avenue Site located at 674 Ninth Avenue in Manhattan, New York (the Site). The Volunteer (674 Ninth Ave, LLC) has submitted a New York State BCP application for approval. The Site is identified with NYSDEC Site No. C231125.

This RIWP has been prepared in general accordance with NYSDEC DER-10 / Technical Guidance for Site Investigation and Remediation (May 3, 2010).

1.1 Site Description

The Site is located at 674 Ninth Avenue, Manhattan, New York. According to the New York City ACRIS, the Site consists of one parcel of land occupying 0.05 acres and is identified as Block 1037 Lot 63. The Site is bound to the west by Ninth Avenue and mixed use (commercial and residential) properties to the north, east, and south. The Site location is depicted on Figure 1.

The Site is developed with one, two-story building with a one-story addition that comprises approximately 4,000 square feet. The Site is currently vacant but was most recently occupied by JMC Custom Framing (2nd floor) and Empire Tailors & Cleaners (1st floor). The Site building is serviced by municipal water (NYCDEP), municipal sanitary and storm sewer (NYCDEP), and electric (Consolidated Edison). The building footprint covers the entire Site.

Based on a review of the New York City Department of City Planning Zoning and Land Use mapping program, the Site is zoned C1-5. The C1 (commercial overlay) zoning is mapped within

residential districts to serve local retail needs (grocery stores, dry cleaners, restaurants, etc.). The Site is not located within an Environmental Zone.

The Site is generally flat. The entirety of the Site is covered with impervious surface (building footprint, concrete sidewalks, and brick). Storm water drainage is expected to exit the Site via overland flow and enter the municipal storm drains located in the adjoining roadways.

1.2 Surrounding Land Use

The Site is located in a commercial and residential area. The uses and features of adjoining properties are described in the following table.

NEARBY/ADJOINING PROPERTY SUMMARY		
DIRECTION	**PROPERTY USE**	**CONCERNS**
North	DCA Productions (676 Ninth Ave), Kiehl's Since 1851 (678 Ninth Avenue) and residences (upper floors)	None
East	UT47 Manhattan (358 W 47th St) and residences	None
South	Amy's Bread (672 Ninth Ave), Best Wash & Dry Inc., Ren Libo (nail salon), Mr. Green Laundry (670 Ninth Ave), residences (upper floors)	None
West	Restaurants and retail stores: Tabouleh (673 Ninth Ave), Lilly's Craft Kitchen (675 Ninth Ave), O'Neill's Irish Bar (675 Ninth Ave), B Squared (679 Ninth Ave), residences (upper floors)	None

The surrounding properties to the south and north were formerly occupied by drycleaners. Figure 3 depicts the locations of these former dry cleaners.

Based on visual observations during a Site reconnaissance in June 2018 and a review of the New York City Oasis mapping program, the following sensitive human receptors (residences and/or schools) were identified in the vicinity of the Site:

Sensitive Human Receptors			
Name	**Address**	**Distance/Direction from the Site**	**Gradient in Relation to the Site**
Midtown West (PS 212)	328 West 48th Street New York, NY 10036	415 feet/northeast	Up-gradient
Success Academy Midtown West	439 West 49th Street New York, NY 10019	960 feet/northwest	Cross-gradient
Mather Building Arts & Craftsmanship High School	439 West 49th Street New York, NY 10019	960 feet/northwest	Cross-gradient
Residences	Various	Adjacent North, South, East, and West	Various

A map depicting the sensitive receptors in the vicinity of the Site is provided as Figure 2.

1.3 Historic Use of the Site

The Site was developed prior to 1890. The original building consisted of four stories with a basement and a one-story addition. In 1936, the building consisted of two stories with a basement and a one-story addition and appeared as it does at present day. Historically, the Site was occupied by the following: Herman Kellerman Painters and Supplies from 1920 through 1934, Harold Alpert Linoleum and Carpets from 1938 through 1983, Empire Tailors & Cleaners from at least 1988 through 2018, Teknokool in 1998, Marlen Gallery in 2000, New York Tae Kwon Do Academy in 2006, and JMC Custom Framing, Inc. from 2010 through at least 2014.

1.4 Site Geology and Hydrogeology

According to the USDA Web Soil Survey, soils at the Site consist of Urban Land. Urban Land soils are those which have been so altered by human activities that the soil has lost its original characteristics and is thus unidentifiable.

Drilling refusal was encountered in the soil borings installed in 2018 as part of the Phase II LSI, at depths ranging from one foot below the basement slab to nine feet below grade in the eastern portion of the Site building (first floor addition). Drilling refusal was due to encountering bedrock. A review of the Bedrock and Engineering Geologic Maps of New York County and Parts of Kings and Queens Counties, New York and Parts of Bergen and Hudson Counties, New Jersey, bedrock is located at approximately 15 feet bgs in the vicinity of the Site. During the Phase II LSI, bedrock was encountered at a shallower depth of 10 feet bgs or less. Based on the Bedrock and Engineering Geologic Maps of New York County and Part of Kings and Queens Counties, New York and Parts of Bergen and Hudson Counties, New Jersey, bedrock appears to dip to the south in the immediate area of the Site.

Groundwater is expected to flow to the west towards the Hudson River or towards the south based on bedrock geology and surface topography. Groundwater was not encountered in any of the overburden borings installed during the Phase II LSI but is expected to be encountered between 20 and 25 feet bgs within the underlying bedrock.

In accordance with New York Codes, Rules and Regulations Title 6 Part 701: Classifications - Surface Waters and Groundwater, groundwater at the Site is identified as Class GA (fresh groundwater). There are no known groundwater supply wells on the Site, and currently there are no known deed restrictions on the use of groundwater at the Site. Groundwater in the vicinity of the Site is not utilized for industrial, agriculture, or public supply purposes.

1.5 Wetlands and Floodplain

Review of the U.S. Fish & Wildlife Service, National Wetlands Inventory, Wetlands Mapper program identified no Federally-regulated wetlands on the Site. The closest wetland area is located approximately 2,670 feet to the northwest. A wetland map is included as Figure 4. No

State-regulated wetlands were identified on the Site or in close proximity to the Site, based on a review of the NYSDEC tidal wetlands map.

No naturally-occurring surface water bodies were observed on-Site. The nearest surface water body is the Hudson River, located approximately 2,670 feet northwest of the Site.

According to the FEMA FIRM, the Site is located in Zone X, which is an area of minimal flood hazard.

2.0 PREVIOUS VAPOR INTRUSION AND SOIL CHARACTERIZATION

The following provides a summary of the Site characterization activities completed to date at the Site. These activities include sub-slab soil vapor, indoor air, and soil sampling performed in March 2018 and July 2018.

2.1 Vapor Intrusion Investigation

Vapor intrusion sampling conducted in March 2018 by a previous consultant at the Site, included the collection of one sub-slab soil vapor sample, two indoor air samples, and one ambient air sample. All samples were analyzed for the presence of VOCs by USEPA Method TO-15. Evaluation of the soil vapor analytical data identified concentrations of PCE in exceedance of the NYSDOH matrix sub-slab soil vapor concentration criteria. In addition, indoor air concentrations of TCE and PCE were identified at elevated concentrations. These contaminants are likely associated with the former on-Site dry-cleaning operations. Evaluation of the soil vapor data compared to the indoor air data using the NYSDOH Vapor/Indoor Air Matrix Guidance (May 2017) identified contaminant concentrations that are elevated to such levels that mitigation of the vapor intrusion concern is warranted.

A figure depicting the vapor intrusion sampling locations and results is provided as Figure 5. A table summarizing the results of the vapor intrusion investigation is provided as Table 1.

2.2 Soil Investigation

The subsurface investigation conducted in July 2018 included the installation of eight soil borings (VTX-1 through VTX-8) in the basement and first floor addition of the Site building. Two soil borings were to be converted to temporary monitoring wells for the collection of groundwater

samples. Groundwater was not encountered; accordingly, groundwater samples were not collected. Soil samples were collected and analyzed for VOCs.

- An on-Site source of PCE-impacted soil was identified below the southeastern (on-grade) portion of the Site building, confirming what is the likely source of the SSSG concentrations detected during a previous investigation performed by PEI.
- Concentrations of PCE detected in the Site soils exceeded the RUSCO-RR. It is likely that soils with higher PCE concentrations may be found within the area of VTX-3 and VTX-4, as these samples were biased towards the southern exterior perimeter of the building.
- Concentrations of PCE were detected in all soil samples. Very low concentrations (0.001 to 0.0064 mg/kg) of PCE were detected in the four basement boring locations (VTX-05 through VTX-08). Relatively low (0.012 to 1.1 mg/kg) concentrations of PCE were detected in the northern first floor samples (VTX-01 and VTX-02), and high (13 to 24 mg/kg) concentrations were detected in the southern first floor samples (VTX-03 and VTX-04).

A figure depicting the soil sampling locations and results is provided as Figure 6. A table summarizing the results of the soil investigation is provided as Table 2.

3.0 QUALITY ASSURANCE PROJECT PLAN

A QAPP was prepared to guide the implementation of the proposed RI activities. QA/QC procedures will be used to provide performance information with regard to accuracy, precision, sensitivity, representation, completeness, and comparability associated with the sampling and analysis for the RI at the Site.

3.1 Project Technical Personnel and Contractors

The table below summarizes the planned principal personnel to participate in the RI activities.

Project Technical Personnel and Contractors			
Name	**Company**	**Responsibility**	**Contact Information**
Madalyn Kulas	The Vertex Companies, Inc.	Project Manager	(908) 333-4317
Joseph Dultz	Vertex Engineering, PC	Project Manager / Technical Support	(908) 333-4312
Richard J. Tobia, P.E.	Vertex Engineering, PC	New York-licensed Professional Engineer	(908) 458-9604
Shawn Miller	Aquifer Drilling & Testing	Drilling Services	(516) 616-6026
Rhett Teller	Ground Penetrating Radar Systems Inc.	Geophysical Contractor	(347) 215-4249
Ethan Leighton	Alpha Analytical Inc.	Laboratory Contact	(508) 439-5146

3.2 Sampling Methodology

All sampling will be conducted in accordance with NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 3, 2010, and Sampling Guidelines and Protocols, dated March 1991.

Soil samples will be collected by VERTEX from discrete, six-inch intervals, from unique borings advanced at the Site via a track-mounted direct-push drill rig (e.g., Geoprobe®) and a jack-hammer probe. The direct-push drill rig will advance a five-foot long stainless-steel macro-core sampler, while the jack-hammer probe advances two-foot samplers. Per each advancement, a dedicated, disposable polybutyl acetate liner will be used in which the soil samples are held for field assessment. Continuous soil cores will be screened with a PID and visually and olfactory inspected. Disposable nitrile gloves will be worn during the soil screening process and sampling collection. The soil samples will be collected in dedicated laboratory-provided Encore samplers and laboratory-provided containers.

For the collection of groundwater samples from permanent monitoring wells by VERTEX, the wells will be purged with disposable polyethylene tubing and a stainless-steel submersible pump. Three well volumes will be purged using the volume averaged sampling method. Following purging, a grab groundwater sample will be collected using a polyethylene disposable bailer. The groundwater samples will be collected in dedicated laboratory-provided containers.

Concrete core samples will be collected using rotary cutting tools. The concrete cores will penetrate the full thickness of the building slab in order to obtain a sample representative of the entire slab. The concrete samples will be collected in laboratory-provided containers.

Equipment will be operated in accordance with the manufacturer's specifications, including calibration of all field instruments, which will be performed prior to the initiation of field work and on a schedule indicated by the manufacturer.

Following the soil, groundwater, and concrete sample collection, the sample containers will be secured, labeled, and placed in a storage/transportation cooler and cooled to acceptable temperatures (e.g., four degrees Celsius) with ice. Samples will then be transported by a field

courier to the laboratory following proper chain of custody procedures. The courier will relinquish custody to the log-in sample custodian upon arrival at the laboratory.

3.3 Report Logs

Field logs and borings logs will be completed during the course of RI activities. A field log will be completed on a daily basis, which will describe all field activities including: project number and Site address; date and time; weather conditions; on-Site personnel and associated affiliations; description of field activities; pertinent sample collection information (sample identification, description of sample, sample location, sample collection time, sampling methodology, name of collector, field screening results, and analysis to be conducted). A boring log will be completed for each soil boring/monitoring well, which will include the following: project number and Site address; date and time; drilling company name and drilling method; boring/monitoring well identification, total boring depth and water table depth; and pertinent sample collection information (sample identification, sample depth, interval, recovery amount, color, composition, percent moisture, PID readings, and visual/olfactory observations).

3.4 Laboratory Summary

All samples collected during the RI activities will be submitted under proper chain-of-custody protocols to Alpha in Westborough, Massachusetts (New York ELAP No. 11148).

3.5 Analytical Method/Quality Assurance

As part of the RI activities, soil, groundwater, and concrete samples will be collected. The sampling, including matrix, frequency of collection, analytical parameter, analytical method, sample preservation, sample container volume and type, and holding time are provided in the summary tables below.

Based on the historic on-Site dry-cleaning operations and conversations with the NYSDEC during a project meeting on November 1, 2018, additional site characterization sampling in accordance with DER-10 is warranted. As discussed, analysis of two soil samples and all groundwater samples will be conducted for VOCs via USEPA Method 8260, SVOCs via USEPA Method 8270, pesticides via USEPA Method 8081, PCBs via USEPA Method 8082, and metals via USEPA Method 6010/7471. The other two soil samples will be analyzed for VOCs only. To address the NYSDEC's concern with emerging contaminants, initial groundwater samples will also be analyzed for 1,4-dioxane via USEPA Method 8270 SIM and PFAS via USEPA Method 537. Following the review of the initial PFAS results in groundwater, consideration will be made to analyze soil samples for PFAS and/or the continued analysis of additional groundwater samples for PFAS, if warranted.

Soil Sampling Summary					
Matrix Type	**Analytical Parameter**	**Analytical Method**	**Sample Preservation**	**Sample Container**	**Sample Holding Time**
Soil	VOC	8260	Cool, 4°C	Encore	48 Hours
Soil	SVOC	8270	Cool, 4°C	4 oz amber	14 days
Soil	Pesticides	8081	Cool, 4°C	4 oz amber	14 days
Soil	PCB	8082	Cool, 4°C	4 oz amber	14 days
Soil	Metals	6010/7471	Cool, 4°C	4 oz amber	180 days
Soil	1,4-Dioxane	8270	Cool, 4°C	8 oz Glass Jar	14 Days
Soil	PFAS	537 (m)	Trizma, Cool, 4°C	(2) 250 ml Vials	14 Days

Groundwater Sampling Summary					
Matrix Type	**Analytical Parameter**	**Analytical Method**	**Sample Preservation**	**Sample Container**	**Sample Holding Time**
Aqueous	VOC	8260	HCl, Cool, 4°C	40 mL Vials	14 days
Aqueous	SVOC	8270	Cool, 4°C	250 mL Amber	7 days/40 days*
Aqueous	Pesticides	8081	Cool, 4°C	120 mL Amber	7 days/40 days*
Aqueous	PCB	8082	Cool, 4°C	120 mL Amber	7 days/40 days*
Aqueous	Metals	6020	HNO_3	250 mL	180 days
Aqueous	Mercury	7470	HNO_3	250 mL	28 days
Aqueous	1,4-Dioxane	8270	Cool, 4˚C	500 mL Amber Glass	7/40 days
Aqueous	PFAS	537	Trizma, Cool, 4°C	(2) 250 mL Vials	14 Days

* - Pre and post extraction

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

A thorough evaluation of the laboratory data will be completed and a DUSR will be prepared. The primary objective for the evaluation of analytical data will be to determine whether or not the data, as presented, meets the Site-specific criteria for data quality and use. The preparation of the DUSR will be prepared by a qualified, independent data validation expert. The resume of the data validation expert is provided in Appendix A. The DUSR will be prepared in accordance with *Appendix 2B, Guidance for Data Deliverables and the Development of Data Usability Summary Reports* included in NYSDEC *DER-10: Technical Guidance for Site Investigation and Remediation*.

3.6 Quality Assurance Samples

Field blanks and trip blanks will be submitted to the laboratory to evaluate the quality and performance of the analytical laboratory's analysis and reporting of the soil and groundwater sample results. Field (equipment) blanks will be analyzed to assess any contamination contributed from sampling location conditions, and the transport, handling, and storage of the samples. The trip blank will be analyzed to determine if sample containers may have been contaminated during transportation and storage. In accordance with DER-10, field duplicates and field blanks will be collected at a frequency of 1 per 20 samples and will be analyzed for VOCs, SVOCs, pesticides, PCBs, metals including mercury, 1,4-dioxane, and PFAs. Aqueous trip blanks will be analyzed for VOCs only.

4.0 HEALTH AND SAFETY PLAN

A HASP was prepared to guide the conduct of the RI work in the event that petroleum hydrocarbons and/or hazardous substances are encountered during the performance of the field activities. A copy of the HASP is included as Appendix A. The purpose of the HASP is to minimize the likelihood of exposure of VERTEX employees to hazardous concentrations of chemicals encountered during field activities, minimize impacts to the environment, and provide safety guidelines for subcontractors.

Investigative work performed under this RIWP 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 investigation work will ensure that performance of work is in compliance with the HASP and applicable laws and regulations. Field activities will be completed with OSHA level D PPE consisting of hard hats, safety glasses, protective gloves and steel toed boots.

An emergency contact sheet with names and phone numbers for all pertinent project personnel as well as regulatory hotline information is included in the HASP. That document will define the specific project contacts for use in case of emergency.

Health and safety activities will be monitored throughout the RI activities, and the HASP will be subject to change, as necessary, based on new conditions that may be encountered during the field investigation.

5.0 REMEDIAL INVESTIGATION WORK PLAN

The objective of the RI is to further characterize soil, groundwater, and concrete at the Site to determine the appropriate remedial action for the impacted media including the following: installation of soil borings and the collection of soil samples to further evaluate soil quality below the footprint of the Site building, to delineate source areas, and characterize soils for pending off-Site disposal; installation of permanent monitoring wells and the collection of groundwater samples to characterize, and possibly delineate, groundwater impacts; and the collection of concrete core samples to characterize the concrete for pending off-Site disposal.

5.1 Citizen Participation

In accordance with BCP requirements, a Draft CP Plan was prepared and submitted to the NYSDEC under separate cover. The Draft CP Plan provided a summary of the BCP and citizen participation activities, Site information, project contacts, and the RI process.

5.2 Utility Clearance and Geophysical Evaluation

As part of the subsurface investigation, VERTEX's drilling subcontractor will contact the New York one call system prior to initiating the drilling activities. VERTEX will also retain the services of a geophysics subcontractor to conduct a geophysical survey using GPR and EM evaluation to mark-out subsurface utilities, evaluate drains and subsurface piping, and "clear" any proposed soil boring locations prior to drilling. VERTEX will also coordinate with the property owners or Site contacts, and/or obtain existing utility plans, if available, in an attempt to confirm that all drilling locations, if warranted, are free of underground utilities.

5.3 Soil Boring Installation

This task will involve advancing up to four soil borings utilizing direct push (i.e., Geoprobe®) drilling techniques in the sidewalk along Ninth Avenue, the basement, and the first-floor addition to bedrock refusal or a maximum depth of 35 feet bgs. Two of the boring locations will be collocated with the proposed permanent monitoring well locations. The proposed boring locations are depicted on Figure 7. The location of the soil borings may need to be adjusted in the field, based on the findings of the geophysical evaluation and/or due to Site access limitations (i.e. tenant operations, structural obstructions, etc.).

5.3.1 Soil Sampling

Soil samples will be collected continuously and screened in the field for the presence of total volatile organic vapors using a PID calibrated to 100 parts per million (ppm) by volume of isobutylene. The PID readings, soil lithology, and field observations will be documented in the field by VERTEX. Samples will be biased to the interval with the strongest evidence of suspected impacts based on PID readings, odors, staining, etc. In the event no field evidence of hazardous constituents is observed, soil samples will be collected from the first six-inch interval of soil present above the soil/groundwater interface or drilling refusal, as warranted by field observations and conditions.

All soil samples will be grab samples; no composite soil samples are proposed. Following soil sample collection, boreholes will be backfilled with soil cuttings with an upper bentonite plug and capped with concrete patch.

The soil piles observed in the basement of the Site were sampled during the Phase II LSI. No further investigation is necessary at this time. Disposal of the waste piles will be discussed in the Remedial Action Work Plan.

5.4 Monitoring Well Installation

This task will involve the installation of two groundwater monitoring wells utilizing air rotary drilling techniques within the first-floor addition and in the City-owned sidewalk, to the maximum depth of 30feet bgs or 10 feet into competent bedrock. The proposed monitoring well locations are depicted on Figure 7. The locations of the monitoring wells may need to be adjusted in the field, based on the findings of the geophysical evaluation and/or due to Site access limitations (i.e. parked vehicles, equipment, etc.). One monitoring well location will be positioned directly below the ceiling fan located in the first-floor addition as this is the only area in the rear of the building where soil contamination was detected at elevated concentrations that allows sufficient height to utilize the required drill rig for bedrock well installation. The second well will be installed in the sidewalk along Ninth Avenue, the only other area immediately adjacent to the property that will allow for the installation of a monitoring well.

VERTEX will coordinate with our drilling subcontractor to obtain the required NYCDOT permits for sidewalk opening, temporary pedestrian walkway, occupancy of sidewalk, occupancy of street, and repair of the sidewalk to facilitate the monitoring well installation activities. These permits will be obtained for the sidewalk along Ninth Avenue where drilling is proposed. In accordance with NYCDOT requirements, drilling activities will only be conducted between 9 AM and 3 PM, Monday through Friday.

Hollow stem auger drilling techniques will be used to advance through the overburden soils to the top of bedrock. Air rotary drilling techniques will be used to drill approximately one to two feet into competent bedrock where steel casing will be set. A seal consisting of cement or

bentonite will be set at the bottom of the borehole and steel casing. Grout will be pumped into the annular space between the borehole wall and casing to the ground surface. Once the grout is cured and a seal is established, the borehole will be further advanced using air rotary techniques until groundwater is encountered.

Details of the monitoring well completion depths and construction information will be recorded by VERTEX in the field. The monitoring wells will be constructed of 2-inch diameter Schedule 40 slotted (0.010 inch) PVC screen and 2-inch diameter PVC riser to grade. The well screen annulus will be filled with sand pack from the base of the screen to 1 to 2 feet above the top of the screen. A bentonite/grout slurry will be installed from the top of the sand pack to ground surface. VERTEX assumes that the monitoring wells will be installed to a depth no greater than 35 feet bgs. The screened interval for the monitoring wells (10 feet) will be installed to intersect the groundwater table and will extend to the completion depth of the well. Surface finishing will consist of a flush-mount traffic-rated manhole with a bolt-on lid set into a concrete pad. Additionally, an expandable locking cap will be fitted to the top of the PVC riser in the well.

The monitoring wells will be developed following installation to improve the hydraulic efficiency, by the removal of the fine-grained material generated during the drilling process. The monitoring wells will be developed following installation. Groundwater will be purged from the monitoring wells using disposable polyethylene tubing and a submersible pump, until turbid-free water is observed.

5.4.1 Groundwater Sampling

The newly installed monitoring wells will be allowed to stabilize and sampled a minimum of one week following installation and development. The groundwater sampling event will begin with groundwater level measurements from each well using a product/water interface probe. Purging of the wells prior to sampling will be conducted using low-flow purging methodologies with

disposable polyethylene tubing and a stainless-steel submersible pump. Field parameters to be measured before and during the sampling will consist of pH, specific conductance, ORP, temperature, dissolved oxygen, and turbidity. The groundwater will be inspected for the presence of any odor and/or surface sheen. Sample collection will be conducted following a three well volume purge.

A second groundwater sampling event will be conducted 30 days following the initial sampling event. The monitoring well sampling will be conducted as outlined above.

5.5 Concrete Sampling

Concrete core samples will be collected to characterize the waste concrete pending off-site disposal. Three concrete core samples will be collected using rotary cutting tools; one from the first-floor addition, one from the basement in the vicinity of the former PCE drums, and a second from the basement in the vicinity of the waste soil pile. The concrete cores will penetrate the full thickness of the building slab in order to obtain a sample representative of the entire slab.

5.6 Investigation-Derived Waste Management

IDW generated during the RI activities would include soil cuttings generated during the soil boring and/or monitoring well installations and purge development water generated during monitoring well development and sampling.

Soil cuttings generated during the installation of the permanent monitoring wells will be placed in sealed and labeled U.S. DOT-approved 55-gallon drums pending off-Site disposal at a permitted facility.

Purge water from the development of the wells and sampling of the wells will be containerized in DOT-approved 55-gallon drums for off-Site disposal at a permitted facility.

During the installation of soil borings, the soil will be disposed at the Site, within the borehole that generated them, unless free product or grossly contaminated soil are present in the cuttings. Contaminated soil cuttings, if encountered, will be placed in sealed and labeled DOT-approved 55-gallon drums pending off-Site disposal at a permitted facility. All boreholes which require drill cuttings disposal would ultimately be filled with bentonite chips and hydrated.

Disposable sampling equipment including, spoons, gloves, bags, paper towels, etc. that came in contact with environmental media will be double bagged and disposed as municipal trash in a facility trash dumpster as general refuse.

5.7 Reporting

VERTEX will prepare a RIR/AAR in accordance with NYSDEC *DER-10: Technical Guidance for Site Investigation and Remediation*. The RIR/AAR will present the findings of the RI activities, evaluate remedial alternatives, and provide a recommendation for a remedial strategy to address soil, groundwater, and/or vapor intrusion concerns.

Soil analytical results will be compared to the NYSDEC Part 375-6.8(a) Unrestricted Used Soil Cleanup Objectives and appropriate Part 375-6.8(b) Restricted Soil Cleanup Objectives. Groundwater analytical results will be compared to the NYSDEC Part 703 Groundwater Quality Standards (Class GA) and Division of Water TOGS 1.1.1 AWQS.

A thorough evaluation of the laboratory data will be completed and a DUSR will be prepared by a qualified, independent data validation expert. The DUSR will be prepared in accordance with

Appendix 2B, Guidance for Data Deliverables and the Development of Data Usability Summary Reports included in NYSDEC *DER-10: Technical Guidance for Site Investigation and Remediation*.

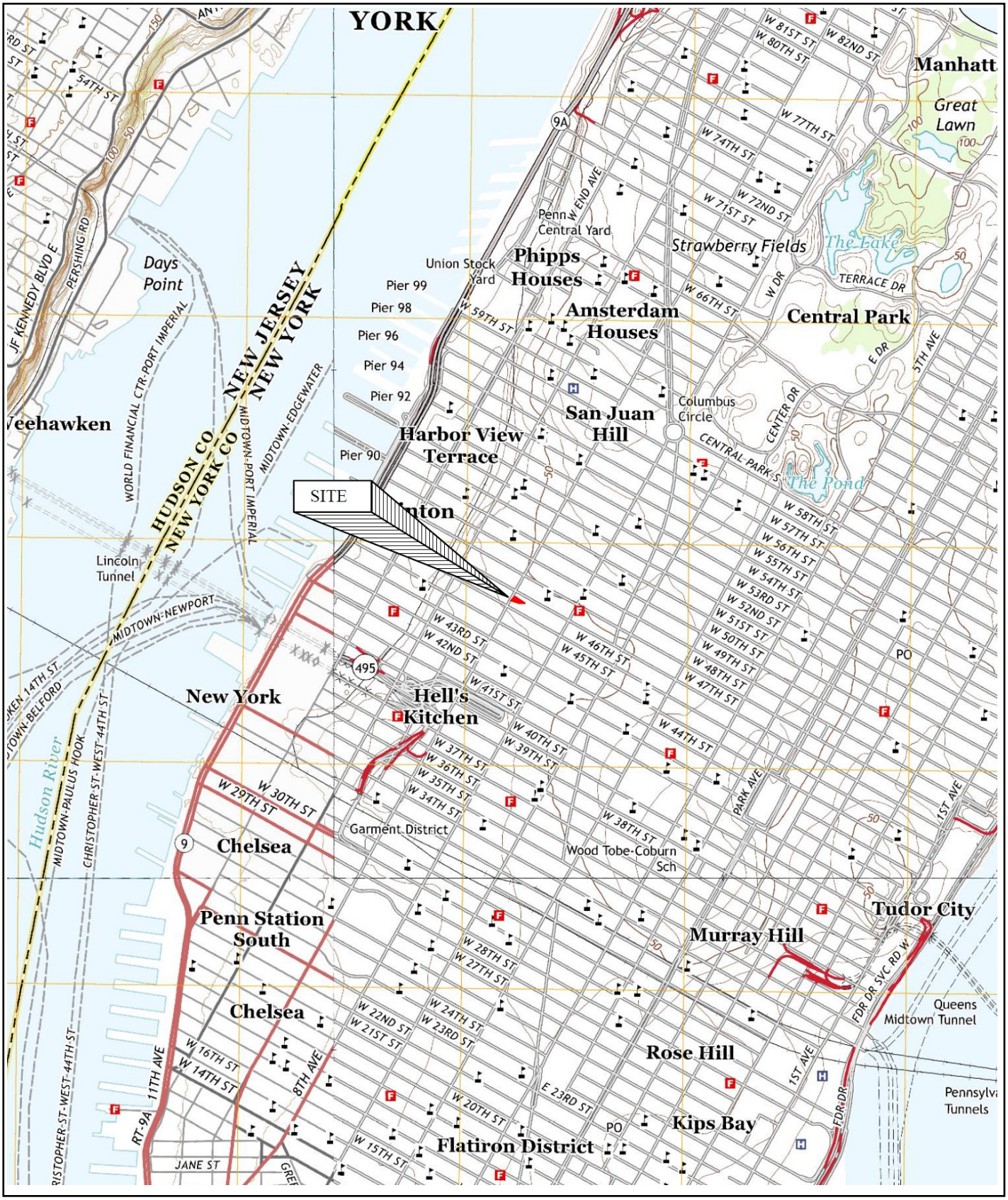
The report will include Site location and sample location figures, color photographic documentation, summary of methods, laboratory reports and data summaries, and other pertinent support documentation as required by applicable NYSDEC and NYSDOH regulations.

5.8 Implementation Schedule

The following is the estimated schedule to implement the RI activities.

Implementation Schedule	
Task	**Estimated Completion Date**
Submit RIWP and CP Plan to NYSDEC	November 12, 2018
Public Comment Period and NYSDEC Review for RIWP	January 17, 2018
NYSDEC Approval of RIWP	January 17, 2018
Implement RI Activities	February 1, 208
Submit RIR/AAR	March 21, 2019

FIGURES



Source: USGS, 1997 Central Park, NY Quadrangle Contour Interval: 10 feet	SITE LOCUS MAP 674 Ninth Avenue New York, New York VERTEX Proj. No. 51102	VERTEX® THE VERTEX COMPANIES, INC. FIGURE NO. 1

Map Source: Oasis Mapping Program

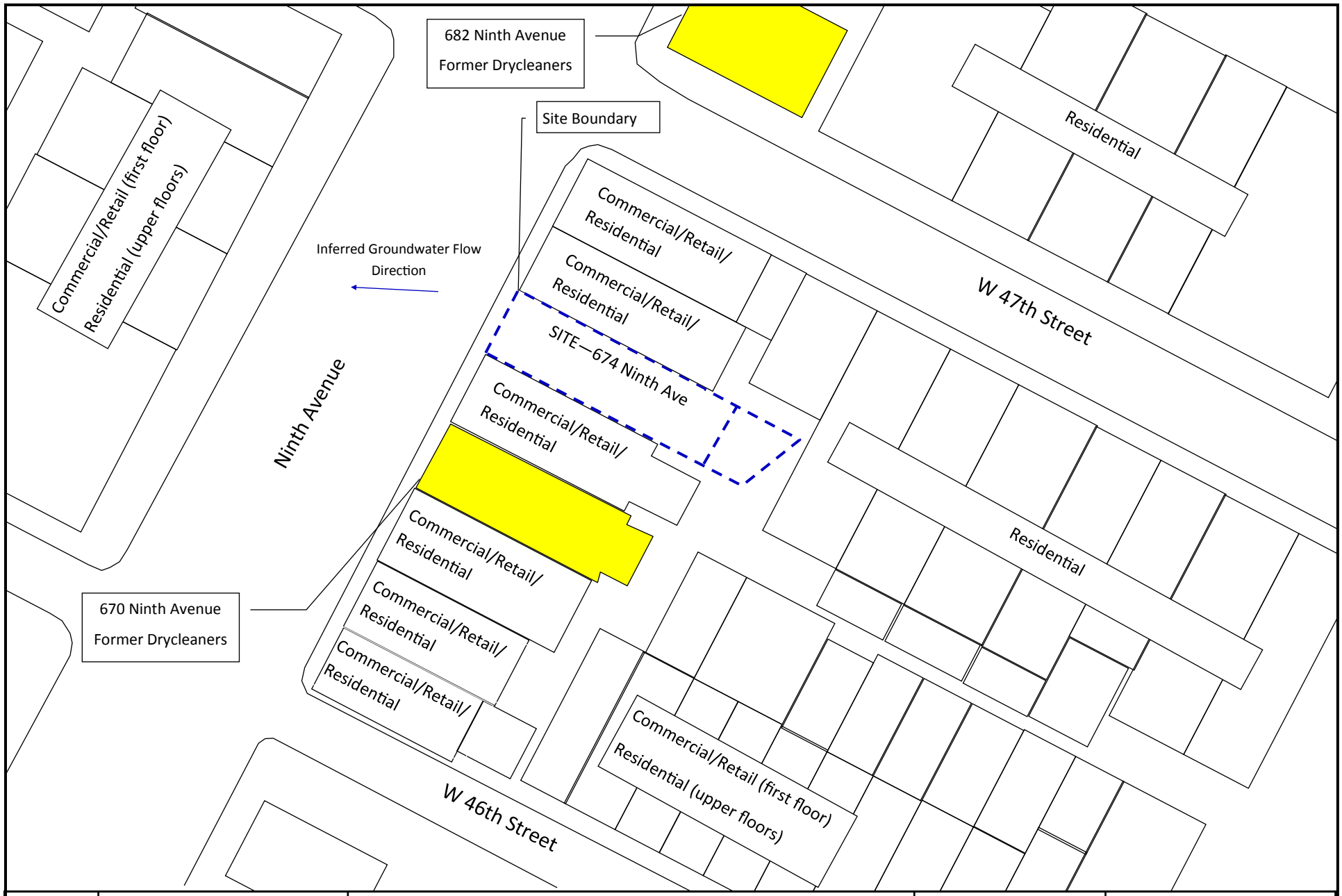
LAND USE SUMMARY MAP

674 NINTH AVENUE
MANHATTAN, NEW YORK

VERTEX ENGINEERING, PC

FIGURE NO. 2

VERTEX Project Number
51782



Base Map Source:
GOOGLE EARTH

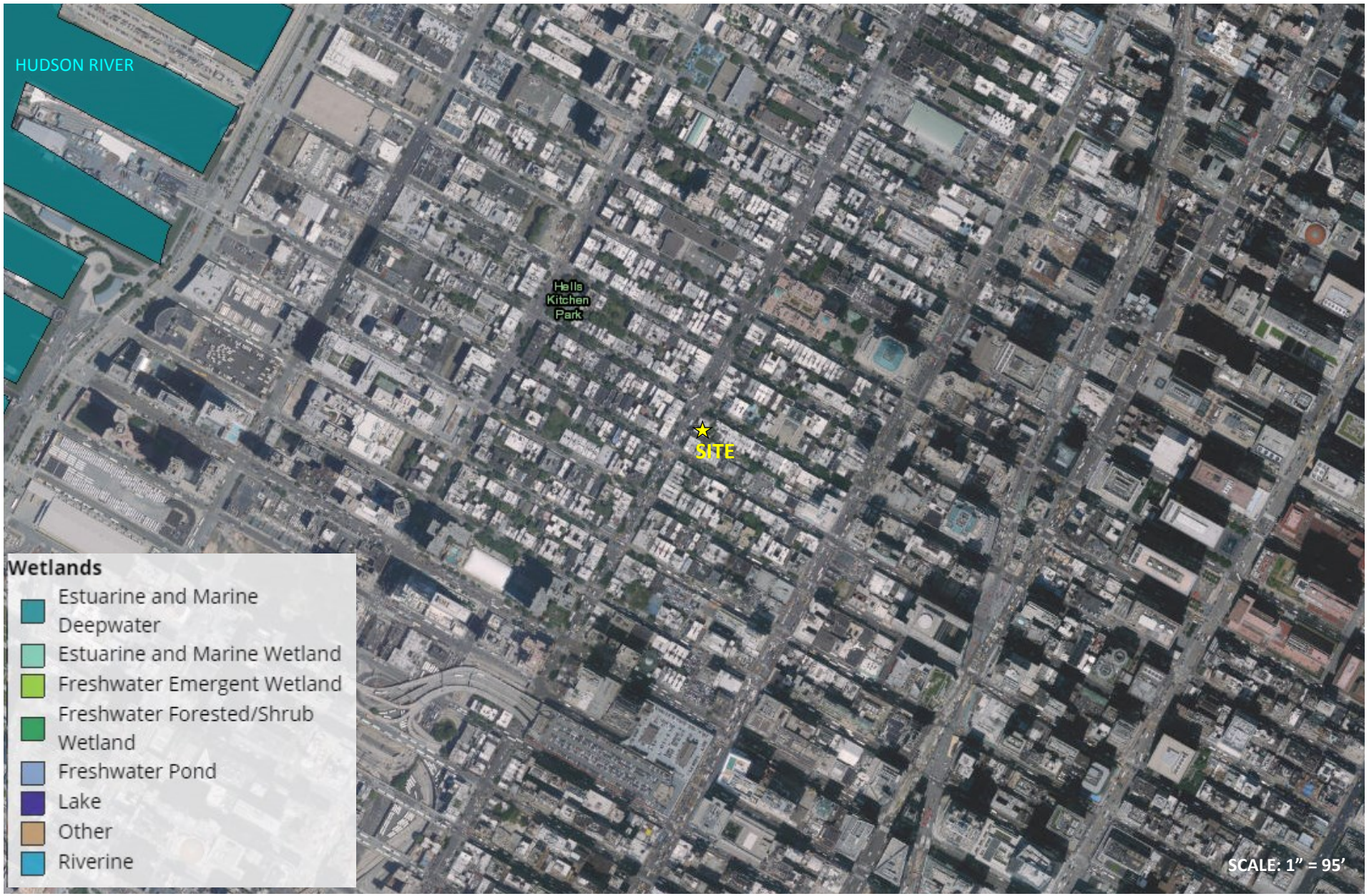
SITE SCHEMATIC

674 Ninth Avenue
MANHATTAN, NEW YORK

FIGURE NO. 3

VERTEX Project No. 51782

VERTEX®
THE VERTEX COMPANIES, INC.



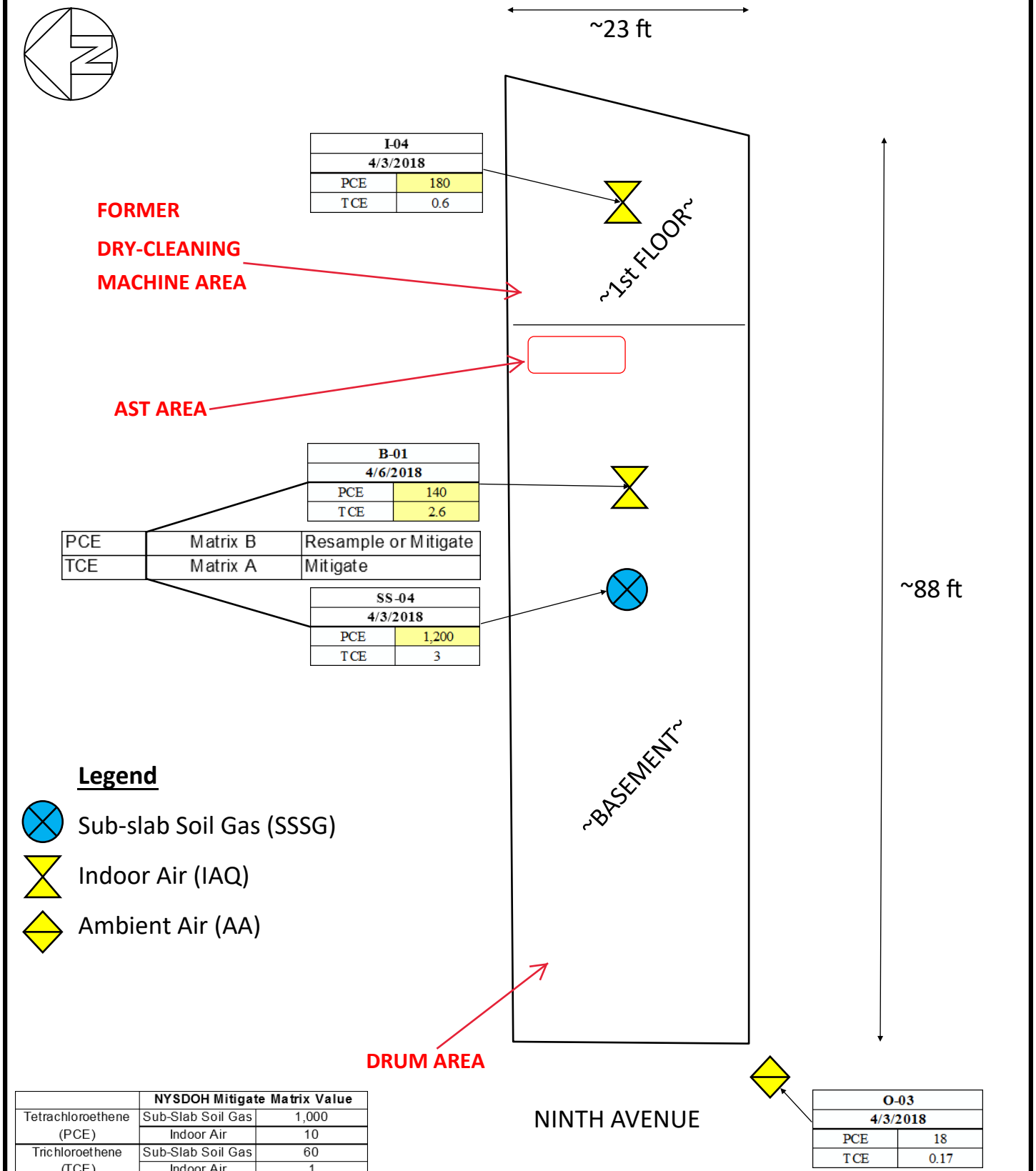
WETLANDS MAP

674 NINTH AVENUE
NEW YORK, NEW YORK

VERTEX ENGINEERING, PC

FIGURE NO. 4

VERTEX Project Number
48122



	NYSDOH Mitigate Matrix Value	
Tetrachloroethene (PCE)	Sub-Slab Soil Gas	1,000
	Indoor Air	10
Trichloroethene (TCE)	Sub-Slab Soil Gas	60
	Indoor Air	1

- Source: Google Earth Pro
- IAQ Sampling Locations are Approximate Source: PEI April 2018
- Highlighted concentrations exceed the NYSDOH Mitigate Matrix Values.
- All concentrations are in ug/m3.

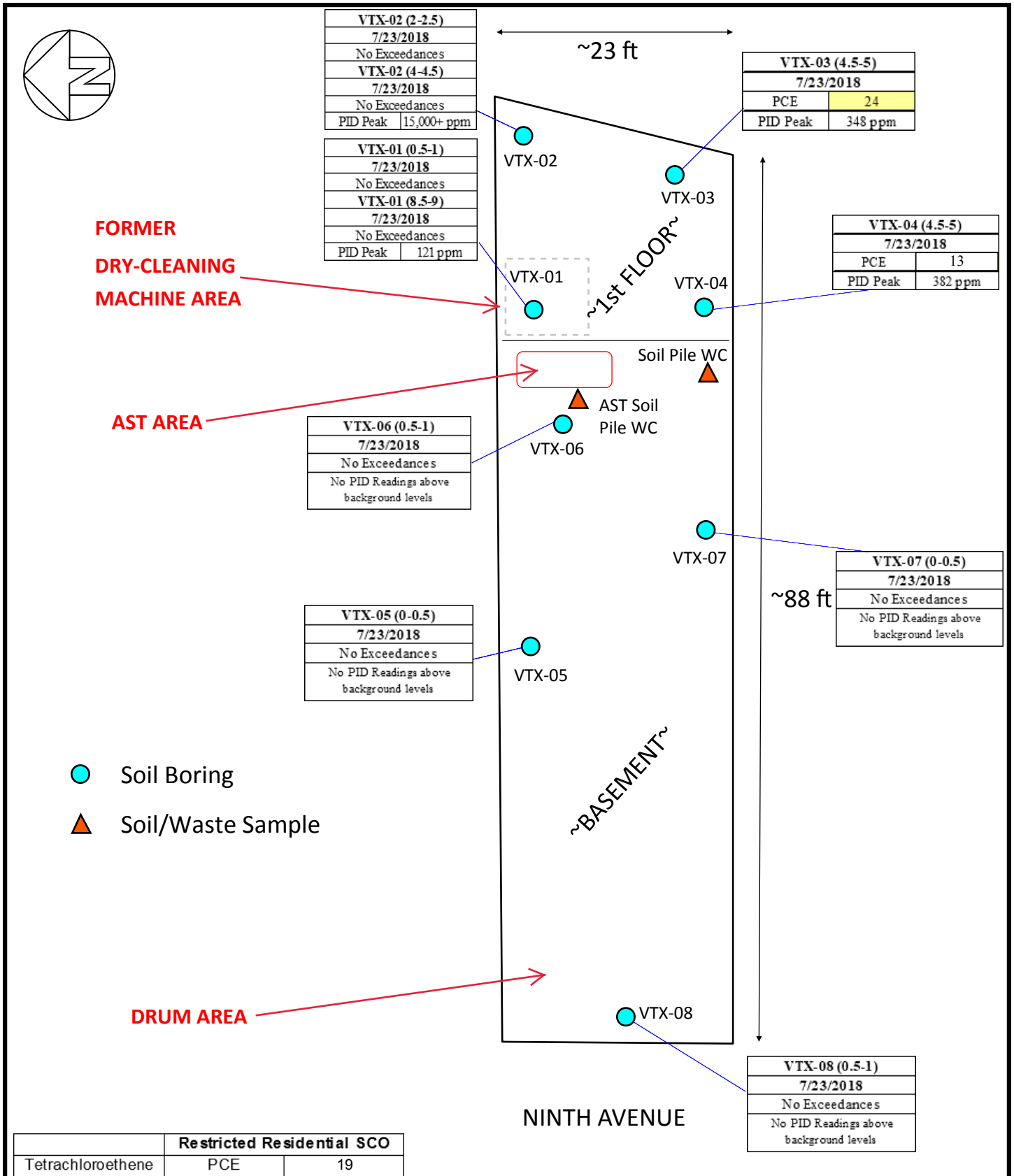
VAPOR INTRUSION RESULTS MAP

674 NINTH AVENUE
NEW YORK, NY

VERTEX Project No. 51782

VERTEX Engineering, PC

FIGURE NO. 5



	Restricted Residential SCO	
Tetrachloroethene	PCE	19

Source: Google Earth Pro

- All results are in mg/kg (ppm)
- Highlighted concentrations indicate an exceedance of the Restricted Residential SCOs.

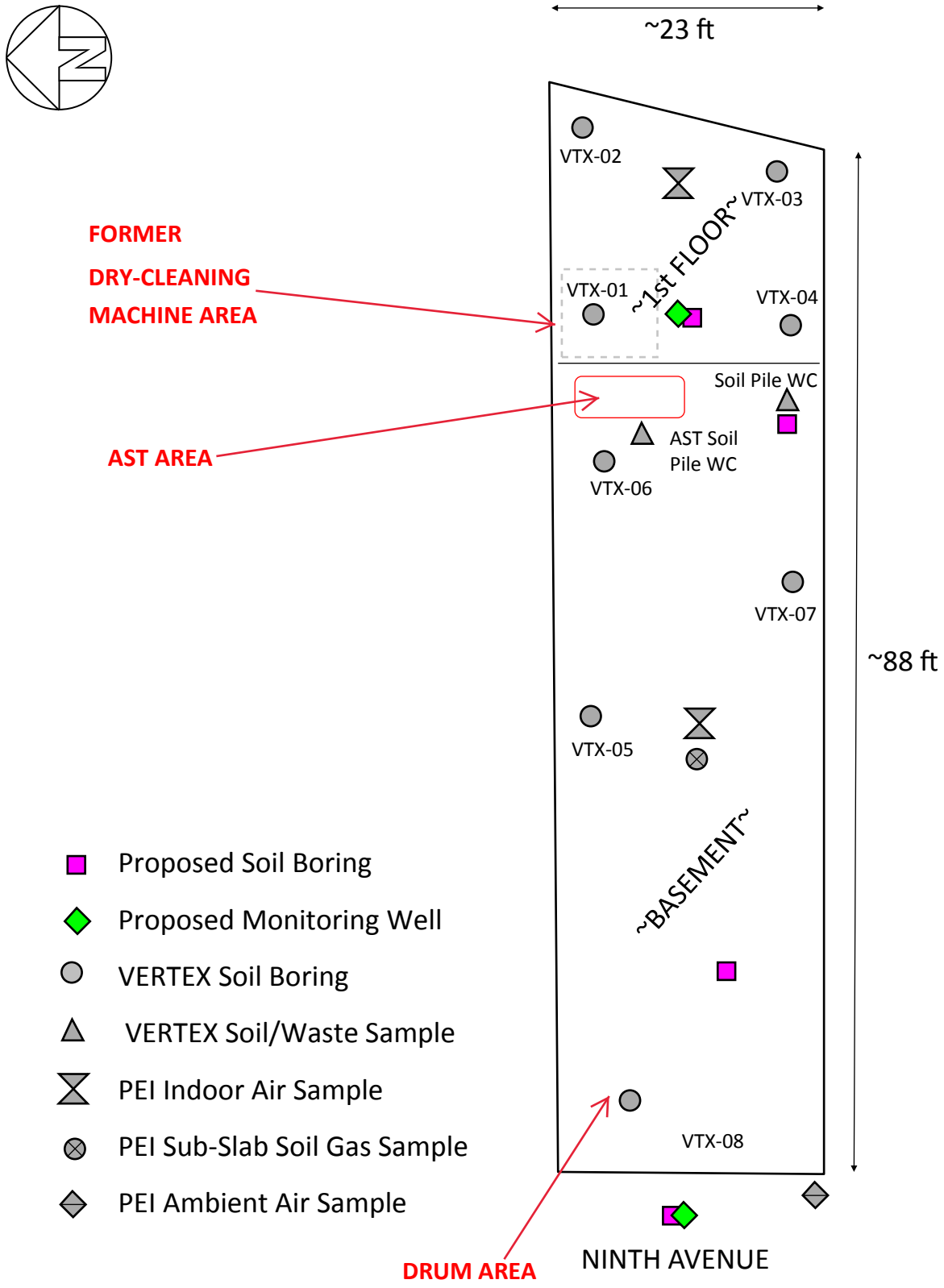
SOIL RESULTS MAP

674 NINTH AVENUE
NEW YORK, NY

VERTEX Project No. 51782

VERTEX Engineering, PC

FIGURE NO. 6



Source: Google Earth Pro - All results are in mg/kg (ppm) - Highlighted concentrations indicate an exceedance of the Restricted Residential SCOs.	PROPOSED SAMPLING LOCATIONS 674 NINTH AVENUE NEW YORK, NY VERTEX Project No. 51782	VERTEX Engineering, PC FIGURE NO. 6

TABLES

Table 1
Summary of Vapor Intrusion Investigation Results
People's Environmental, Inc.
674 Ninth Avenue, New York, New York

Compound	NYSDEC AGVs*	Cellar Sub-Slab Vapor Sample (ug/m3)	Cellar IA Sample (ug/m3)	1st Floor IA Sample (ug/m3)	Ambient Air Sample (ug/m3)
	Sample ID	SS-04	B-01	I-02	O-03
PCE	30	**1200**	**140**	**180**	18
TCE	2	**3**	**2.6**	0.6	0.17

Notes:
* - See NYSDOH Soil Vapor/Indoor Air Matrix for Recommended Measures
BOLD - Concentration detected above the NYSDOH AGV
Concentration detected above the NYSDOH recommended immediate action level.

Table 2
Summary of Soil Sampling Results
674 Ninth Avenue, New York, New York

LOCATION	RUSCO R	Units	VTX-01 (0.5-1)		VTX-01 (8.5-9)		VTX-02 (2-2.5)		VTX-02 (4-4.5)		VTX-03		XTX-04		VTX-05		VTX-06		VTX-07		VTX-08	
SAMPLING DATE			7/23/2018		7/23/2018		7/23/2018		7/23/2018		7/23/2018		7/23/2018		7/23/2018		7/23/2018		7/23/2018		7/23/2018	
LAB SAMPLE ID			L1828205-01		L1828205-02		L1828205-03		L1828205-04		L1828205-05		L1828205-06		L1828205-07		L1828205-08		L1828205-09		L1828205-10	
SAMPLE DEPTH (ft.)			0.5-1		8.5-9		2-2.5		4-4.5		4.5-5		4.5-5		0-0.5		0.5-1		0-0.5		0.5-1	
Volatile Organics by 8260/5035																						
1,2,4,5-Tetramethylbenzene		mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	U	-	-	0.0027	U
1,2,4-Trimethylbenzene	52	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	U	-	-	0.0027	U
1,3,5-Trimethylbenzene	52	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	U	-	-	0.0027	U
Benzene	4.8	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00051	U	-	-	0.00068	U
cis-1,2-Dichloroethene	100	mg/kg	0.0014	U	0.00096	U	0.0012	U	0.0015	U	0.18	U	0.071	U	0.0013	U	0.0013		0.0019	U	0.0014	U
Ethylbenzene	41	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	U	-	-	0.0014	U
Isopropylbenzene		mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	U	-	-	0.0014	U
Naphthalene	100	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0041	U	-	-	0.0054	U
n-Propylbenzene	100	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	U	-	-	0.0014	U
o-Xylene		mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	U	-	-	0.0014	U
p/m-Xylene		mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002	U	-	-	0.0027	U
p-Isopropyltoluene		mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	U	-	-	0.0014	U
Tetrachloroethene	19	mg/kg	0.062		0.012		0.49*		1.1*		24		13		0.001		0.0064		0.0018		0.0015	
Toluene	100	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00092	J	-	-	0.00075	J
Trichloroethene	21	mg/kg	0.00072	U	0.00048	U	0.00062	U	0.00082		0.089	U	0.035	U	0.00067	U	0.00051	U	0.00097	U	0.00068	U
Vinyl chloride	0.9	mg/kg	0.0014	U	0.00096	U	0.0012	U	0.0015	U	0.18	U	0.071	U	0.0013	U	0.001	U	0.0019	U	0.0014	U
Xylenes, Total	100	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.001	U	-	-	0.0014	U
Total TIC Compounds		mg/kg	0.00295	J	-	0.2	J	0.8	J	-	-	-	0.352	J	-	-	-	-	0.00621	J	0.0663	J

Notes:
* Concentration detected in initial Low Level Analysis exceeded calibration range. Sample was re-analyzed as a High Level Methanol.
U - Compound was undetected at the listed laboratory method detection limit.
J - The compound was detected; however, the concentration is below the laboratory method detection limit. Accordingly, this concentration is estimated.
NS - No NYSDEC Soil Criteria established for this compound.

Restricted Residential Use (RUSCO-RR)

APPENDIX A:
DATA VALIDATION EXPERT RESUME

Crista Trapp
Senior Scientist

[ctrapp@vertexeng.com]

Highlights:

Over 18 years experience specializing in human health risk assessment methods and laboratory analytical and data validation techniques

Expertise:

Environmental Health & Safety
Groundwater & Soil Characterization
Lead
Vapor Intrusion Investigations & Remediation
Other

Education/Training:

M.S., Environmental Health, Environmental Science and Engineering, Harvard School of Public Health, 2002
B.S., Environmental Health Science and Protection, Salisbury University, 1998

Biography:

Ms. Trapp is a Senior Scientist at VERTEX with over 19 years experience specializing in human health risk assessment methods and laboratory analytical data validation techniques. Ms. Trapp provides technical expertise for a full range of environmental investigation and remediation projects at industrial, commercial, and residential properties throughout the United States as well as at Superfund sites. Inclusive in her human health risk assessment and data validation experience, areas of specialization include regulatory compliance, laboratory analytical procedures, data management and interpretation, and vapor intrusion. Ms. Trapp is relied upon to provide high quality risk-based approaches to address complex environmental issues.

Associations:

- Society of Environmental Toxicology and Chemistry, Member 2002-present
- Society for Risk Analysis, Member 2005-2013
- Licensed Site Professional Association, Member 2005-present

Publications/Presentations:

- Trapp, Crista J. and James H. Zigmont. 2018. LSPA's Loss Prevention Committee Meets with MassDEP Audit Chiefs and Enforcement Agents - June 6, 2017. LSP Association Newsletter. March.
- Trapp, Crista J. 2017. Four Risk Characterization Issues and a Practice Tip from Fiscal Year 2016 NOAF Review. LSP Association Newsletter. August.
- Trapp, Crista J. 2016. Learning From Risk Characterization Mistakes: Fiscal Year 2015 NOAF Review. LSP Association Newsletter. December.
- Trapp, Crista J. 2016. LSPA's Loss Prevention Committee Meets with MassDEP Audit and Enforcement Chiefs. LSP Association Newsletter. December.
- Trapp, Crista J. 2016. Monitoring Risk From Dust at MCP Sites. LSP Association Newsletter. June.
- Trapp, Crista J., et al. 2016. Getting Entangled in Local Rules - A Member Survey. LSP Association Newsletter. January.
- Shine, James P., Trapp, Crista J., Coull, Brent A. 2003. Use of

Receiver Operating Characteristic Curves to evaluate sediment quality guidelines for metals. Environmental Toxicology and Chemistry: Vol. 22, No. 7

- "Tropospheric Ozone Exposure in Rural Maryland" poster at the National Environmental Health Association Annual Education Conference, Centers for Disease Control and Prevention Environmental Health Research Competition, Student Poster Session, Third Place Winner, June 1998
- "Risk-based Action Levels for PCBs in Porous Surfaces" poster at the SETAC North America 31st Annual Meeting, November 2010.
- "Assessing the Vapor Intrusion Pathway: The Critical Role of Science and a Sound Approach" presentation at the SETAC North America 29th Annual Meeting, November 2008.

Relevant Experience:

[RISK ASSESSMENT] *Former MGP Sites, PA*

Supporting risk assessment for several former MGP sites located throughout Pennsylvania. Statewide and site-specific risk characterization methods that have been employed in accordance with Pennsylvania's Act 2 Land Recycling Program. The pathways evaluated in these risk assessments include direct and indirect (i.e., inhalation of vapors) exposure to soil, soil gas, groundwater, surface water, and sediment, exposure to non-aqueous phase liquid (NAPL), and exposure to volatile compounds in indoor air from the vapor intrusion pathway.

[RISK ASSESSMENT] *Pittsfield Landfill, Pittsfield, MA*

Supported risk assessor for a former landfill in Pittsfield, MA that was occupied by a construction storage yard and office building. The purpose of the risk assessment was to support proper closure of the landfill and to identify potential human health, ecological, public welfare, and safety risks associated with current and proposed use of the property.

[RISK ASSESSMENT] *Former Industrial Property, Cambridge, MA*

Assessed risk to human health, safety, public welfare, and the environment in support of an RAO under the MCP. Evaluated data and conducted a MCP Method 3 Risk Characterization to assess potential risks to human and ecological receptors. Assisted in preparation of an Activity and Use Limitation (AUL) Opinion. Risk assessments were conducted both prior to redevelopment in order to evaluate risks to receptors during construction activities and after construction completion, to assess potential risks from compounds remaining on site and to close out the site under the regulatory process.

[RISK ASSESSMENT] *Former Gas Works, Northampton, MA*

Assessed risk to human health, safety, public welfare, and the environment in support of a partial RAO under the MCP. Evaluated data and conducted a MCP Method 3 Risk Characterization to assess potential risks to human and ecological receptors. Performed Representativeness Evaluations and Data Usability Assessments (REDUAs) as required of the partial RAO.

[RISK-BASED ACTION LEVELS] *Confidential Private University, Cambridge, MA*

Helped develop risk-based action levels and best management practices related to remediation of PCB-containing building and adjacent materials (caulking, concrete, bricks, patios, and adjacent soils) from four residential,

occupied buildings.

[RISK ASSESSMENT] *Confidential Client, Sandusky, OH*

Performed human health risk calculations in support of a property transaction consistent with the U.S. EPA Risk Assessment Guidance for Superfund (RAGS).

[DATA VALIDATION] *Beede Waste Oil Superfund Site, Plaistow, NH*

Provided support in updating the Quality Assurance Project Plan (QAPP). Conducted data validation on data included in various workplans associated with the Superfund site.

[QAPP UPDATE] *Risdon Corporation, Danbury, CT*

Provided support in updating the Quality Assurance Project Plan (QAPP).

[RISK ASSESSMENT] *Hanford Superfund Site, WA*

Provided risk assessment support for the baseline human health risk assessment (HHRA) for the Columbia River. Chemicals of concern in river media primarily include heavy metals, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and radioisotopes. The HHRA includes an evaluation of potential recreational exposures through direct contact with surface water and sediment and ingestion of finfish and exposures associated with tribal subsistence fishing. Originated dose, exposure, and risk calculation spreadsheets using Microsoft Excel software for each receptor and media exposure scenario.

[RISK ASSESSMENT] *Texas Instruments, Attleboro, MA*

Conducted the MCP Method 3 Risk Characterization in support of a Phase II Comprehensive Site Assessment for Cooper's Pond. Exposure media include sediment and surface water.

[VAPOR INTRUSION WORKPLAN] *Linemaster Switch Corporation Superfund Site, Woodstock, CT*

Developed a vapor intrusion workplan as required by the USEPA in response to the 5-year review of the groundwater monitoring program.

[SEDIMENT SAMPLING AND RISK ASSESSMENT] *Town of Manchester-by-the-Sea, MA*

Conducted supplemental sediment sampling to delineate extent of Site fill impacts to adjacent brook. Conducted the MCP Method 3 Risk Characterization in support of a Phase II Comprehensive Site Assessment. Exposure media include soil, sediment, and surface water.

[DATA USABILITY ASSESSMENT, DATA GAP EVALUATION, FOCUSED RISK CHARACTERIZATION] *NorthPoint Redevelopment, Cambridge, MA*

Conducted data quality and usability assessments on and completed QA/QC checklists for soil and groundwater analytical data for disposal or inclusion in the risk assessment. Performed data gaps assessment for sample locations and quantities for the infrastructure portions of the site to evaluate adequate characterization. Conducted focused risk characterization for construction of roadways.

[HUMAN HEALTH RISK ASSESSMENT, DATA USABILITY ASSESSMENT] *Prime Hyundai, Quincy, MA*

Conducted a Massachusetts Contingency Plan (MCP) Method 1 Risk Assessment and Representativeness Evaluation and Data Usability Assessment (REDUA) for a former automobile dealership.

[FOCUSED RISK CHARACTERIZATION, PEER REVIEW OF HUMAN HEALTH

RISK ASSESSMENT] *Freightliner, Everett, MA*

Conducted a peer review of a human health risk assessment conducted by another consultant and performed a qualitative focused risk characterization for construction based on the results of the human health risk assessment.

[DATA USABILITY ASSESSMENT, HOT SPOT EVALUATION, ADULT LEAD METHODOLOGY] *25 Parcels, Chelsea, MA*

Conducted data quality and usability assessments on and completed QA/QC checklists for soil and groundwater analytical data for site characterization. Performed an evaluation of soil data to identify potential hot spots or areas of elevated concentrations that may require remediation or that would result in significant risk when the risk assessment is conducted. Used the United States Environmental Protection Association (USEPA) Model for Adult Exposures to Lead in Soil (i.e., Adult Lead Methodology or ALM) to evaluate construction worker health risks associated with lead concentrations in soil.

[HUMAN HEALTH RISK ASSESSMENT, DATA USABILITY ASSESSMENT] *Commercial Property, Burlington, MA*

Conducted a Massachusetts Contingency Plan (MCP) Method 3 Risk Assessment and Representativeness Evaluation and Data Usability Assessment (REDUA) on soil, groundwater, and soil gas analytical results.

[DATA VALIDATION, REMEDIAL ACTION LEVELS] *Ellsworth Industrial Park, Downers Grove, IL*

Performed data quality review of soil and groundwater data collected by VERTEX and wrote associated data validation reports. Determined appropriate soil remedial action levels for trichloroethylene (TCE) and tetrachloroethylene (PCE) for soil remediation approach.

[FOCUSED RISK CHARACTERIZATION, DATA USABILITY ASSESSMENT] *Foxborough Town Hall, Foxborough, MA*

Performed a focused risk characterization for construction of the new town hall. Conducted data quality review on soil and groundwater data and completed QA/QC checklists.

[HUMAN HEALTH RISK ASSESSMENT, DATA USABILITY ASSESSMENT] *Former Industrial Property, Cambridge, MA*

Conducted a Massachusetts Contingency Plan (MCP) Method 3 Risk Assessment and Representativeness Evaluation and Data Usability Assessment (REDUA) for a former industrial property being redeveloped for residential use. Completed QA/QC checklists for soil and groundwater data. The redevelopment of the site has been viewed favorably by the community because the work addressed the long-term environmental issues present at the site.

[ARSENIC DATA QUALITY REVIEW, EXPOSURE POINT CONCENTRATION EVALUATION] *625 Crane Avenue, Aurora, IL*

Performed data quality review of arsenic data to confirm appropriate exposure point concentration was used in comparison to state standards. Recommended use of 95% upper confidence levels (UCLs) using USEPA ProUCL software.

[HUMAN HEALTH RISK CHARACTERIZATION] *Residential Property, Middleton, MA*

Conducted a Massachusetts Contingency Plan (MCP) Method 3 Risk Assessment and Representativeness Evaluation and Data Usability Assessment (REDUA) for a residential property using soil, groundwater, and indoor air analytical results.

[DATA USABILITY ASSESSMENT, HUMAN HEALTH RISK ASSESSMENT] *North Bennet Street School, Boston, MA*

Conducted a Massachusetts Contingency Plan (MCP) Method 1 Risk Assessment and Representativeness Evaluation and Data Usability Assessment (REDUA) using soil, groundwater, and indoor air data associated with a release attributed to a No. 2 fuel oil underground storage tank (UST) and urban fill.

[HUMAN HEALTH RISK ASSESSEMENT, VAPOR INTRUSION MODELING] *Private Residence, Needham, MA*

Conducted MCP Method 1 Risk Assessment using soil, sump water, soil gas, and indoor air data. Release associated with a No. 2 fuel oil aboveground storage tank (AST) in basement. Eight lines of evidence were used to rule out a complete vapor intrusion pathway including use of the Johnson and Ettinger vapor intrusion model and petroleum aerobic biodegradation attenuation factors.

[FOCUSED RISK CHARACTERIZATION] *Former Chelsea Clock, Chelsea, MA*

Conducted multiple MCP-compliant focused risk characterizations for the protection of health of construction workers and nearby receptors to prevent unacceptable exposures to chlorinated solvents, lead, and radium at a former clock manufacturer, automotive junk yard, and lumber yard. Also evaluated remedial options related to contaminant hot spots and upper concentration limit (UCL) exceedances. Performed data usability assessments on laboratory data and managed data tables.

[METHOD 3 RISK CHARACTERIZATION] *300 Lindelof Avenue, Stoughton, MA*

Conducted a streamlined Method 3 Human Health Risk Characterization to support a Permanent Solution Statement (PSS) for a small commercial/industrial site where there were identified impacts attributed to former underground storage tanks (USTs). Existing soil and groundwater concentrations indicated there was not a complete vapor intrusion pathway and resulted in a condition of No Significant Risk to a hypothetical future resident. Because a resident is considered to be the most sensitive receptor, no Activity and Use Limitation was required even though the site will likely remain a commercial property.

[DATA VALIDATION] *Union Point Recreation Complex - South Weymouth, MA*

Performed data validation of dewatering influent and effluent samples for multiple analyses including PFOA/PFOS. Generated data validation summary reports for multiple laboratory analytical reports.

[DATA VALIDATION] *Delahunt Parkway - South Weymouth, MA*

Performed data validation of soil, concrete, and groundwater samples for multiple analyses including PFOA/PFOS. Generated data validation summaries for multiple laboratory analytical reports.

APPENDIX B:
HASP

VERTEX SITE SPECIFIC

HEALTH AND SAFETY PLAN (HASP)

674 Ninth Avenue
Manhattan, New York

Prepared For:

HUBBNYC

Prepared By:

The Vertex Companies, Inc.

Vertex Project No: 51782

Date of Project Work: 7/23/18

Prepared by: Madalyn Kulas **Signature:** _____ **Date:** _____

Project Manager: Madalyn Kulas **Signature:** _____ **Date:** _____

H&S Team Member: Richard Tobia **Signature:** _____ **Date:** _____

HASP Limitations and Acknowledgement

This HASP addresses those activities and site procedures to be followed by VERTEX personnel during work performed at this site(s). *This HASP is designed to comply with OSHA standards, such as HAZWOPER, 29 CFR 1910.120, and VERTEX Companies Safety Polices, so compliance with this HASP is required by VERTEX personnel*. The content of this HASP may change or undergo revision based upon additional information made available to VERTEX. Changes proposed must be approved by VERTEX's H&S Team and the Project Manager.

The information in this HASP supplements the health and safety training that each VERTEX employee receives. It is not possible to discover, evaluate, and provide protection for all possible hazards, which may be encountered. This plan is written for the specific-site conditions, purposes, dates, and personnel specified, and must be amended if these conditions change.

Compliance with this HASP is required by persons who enter the site.

This HASP will expire 1 Year after the H&S Team's Signature Date, or if site conditions change. A review and approval by the H&S Team is required to extend the HASP Duration.

VERTEX Colleagues

Name: _____ Signature: _____ Date: _____

Name: _____ Signature: _____ Date: _____

Name: _____ Signature: _____ Date: _____

Name: _____ Signature: _____ Date: _____

Name: _____ Signature: _____ Date: _____

Subcontractors, Owner, and Others

Subcontractors must review this HASP, but must prepare their own site-specific HASP based upon their company health and safety program, and the risks and precautions of their work on the site. The subcontractor HASP will be at a minimum consistent with the provisions of this HASP.

This HASP is not intended to satisfy the requirement for the owner or designated subcontractor to prepare their own site-specific HASPs. This HASP does not relieve the owner, subcontractor, or their designated representatives of their responsibility to comply with all federal, state and local laws, regulations and ordinances governing worker health and safety.

VERTEX expressly disclaims any and all guarantees or warranties, expressed or implied that this plan will meet the specific needs or requirements of any subcontractor or its employees. VERTEX, therefore, cannot and does not assume any liability by the use or reuse of this plan by any client, subcontractor or their employees or agents. Any reliance on this plan or the information herein will be at the sole risk and liability of such party.

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

Name:_____ Employer:_____ Signature:_____ Date:_____

TABLE OF CONTENTS

Attachments

1.0 CONTACT INFORMATION

EMERGENCY PHONE NUMBERS

Ambulance, Police, and Fire	911, in case of emergency.
Poison Control Center	1-800-222-1222
Chemtrec	1-800-424-9300
National Response Center	1-800-424-8802
Utility Clearance (National)	811
Local Fire Department	(718) 999-2000
Local Police Department	(212) 767-8400
Water/Sewer Department	(212) NEW YORK (639-9675)
Electrical Company	1-800-752-6633
Gas Company	1-800-752-6633
WorkCare Injury Intervention	1-888.449.7787

HOSPITAL INFORMATION

Mount Sinai West: Emergency Room	(212) 523-6800 1000 10th Ave, New York, NY 10019

A HOSPITAL MAP AND DIRECTIONS ARE ATTACHED

PERTINENT SITE CONTACT INFORMATION

SITE CONTACT	Matt Rowe (908) 868-4658
PROJECT MANAGER - VERTEX OFFICE	VERTEX Branchburg, NJ Office 3322 US 22 West Suite 907, Branchburg, NJ 08876 908-448-2627
Health and Safety (HANDS) Phone Number	339-499-4995
H&S Team Member working on this HASP	908-448-2627

2.0 SITE DESCRIPTION AND RELEVANT INFORMATION

The site consists of one parcel of land occupying 0.05 acres and is identified as Block 1037, Lot 63. The site is developed with a two-story commercial building with basement and a one-story addition.

The site was developed prior to 1890. The original building consisted of four stories with a basement and a one-story addition. In 1936, the building consisted of two stories with a basement and a one-story addition and appeared as it does at present day. Historically, the site was occupied by the following: Herman Kellerman Painters and Supplies from 1920 through 1934, Harold Alpert Linoleum and Carpets from 1938 through 1983, Empire Tailors & Cleaners from at least 1988 through 2018, Teknokool in 1998, Marlen Gallery in 2000, New York Tae Kwon Do Academy in 2006, and JMC Custom Framing, Inc. from 2010 through at least 2014. The presence of a dry cleaner from at least 1988 through 2018 is a REC for the site.

VERTEX observed evidence of a fuel oil aboveground storage tank (AST) located in the basement. The gauge on the AST indicated 110 gallons of fuel oil were present in the AST. VERTEX could not observe the condition of the AST or the floor below the AST, as it in encased in concrete. In addition, oil staining was observed on the AST fill piping in the basement. Accordingly, until the integrity of the AST can be confirmed, the presence of the AST is considered a REC for the site.

A blue steel drum containing metal debris was observed in the basement on the western side of the site. The drum was labeled as containing tetrachloroethylene (PCE). It could not be determined if there was any liquid in the drum in addition to the debris. The bottom of the drum appeared to be heavily corroded. A black steel drum was noted in the basement. The drum was covered with vehicle tires. The contents of the black steel drum could not be determined. The bottom of the drum was heavily corroded. A plastic containment drum with a hazardous waste label with the waste codes F002 (spent-halogenated wastes) and D039 (PCE) was located in the basement. The plastic containment drum was not opened to determine the contents. The presence of drums with PCE labeling and a plastic containment drum labeled as hazardous waste confirms the use of PCE during site dry-cleaning operations, which have already been identified as a REC.

Piles of unknown waste material with staining were observed in the basement. The origin of the waste material piles and composition could not be confirmed.

Contaminants of concern include PCE and its breakdown constituents TCE, DCE, and vinyl chloride.

2.1 Scope of Work and Tasks

The VERTEX scope of work for this project includes the following tasks:

- GPR survey oversight;
- drilling oversight;
- soil sampling;
- groundwater sampling.

2.2 Subcontractors Scope of Work

GPRS is performing and subcontracting the following tasks during this project:

- *Geophysical survey.*

Hawk Drilling is performing and subcontracting the following tasks during this project:

- *Drilling; and,*
- *temporary well installations*.

3.0 JOB SAFETY ANALYSES

The following JSAs will be followed during this project. The JSAs are included in the Attachment

A. Site Reconnaissance and GPR Survey Oversight

B. Drilling Oversight

C. Soil Sampling

D. Groundwater Measuring

E. Groundwater Sampling

3.1 Site Reconnaissance/Site Entrance

The Site is accessible through the entrance on Ninth Avenue. The site entrance is locked outside of working hours.

3.2 Ladders

No ladders will be utilized during the sampling event

3.3 Special Risks

No special risks are associated with the site and work being performed.

4.0 WORK ZONES

Work zones in an environmental remediation project typically include three specific areas:

1. The Support Zone
2. The decontamination Zone
3. The exclusion Zone

The zones are shown on the site plan on the cover of this HASP.

The following tables provide general guidelines for the establishment of work zones. The information provided should be adjusted if warranted by field observations and measurements, laboratory analytical results, or at the request of the H&S Team.

ACTIVITY	GENERAL WORK ZONE RADIUS (FEET)	WORK ZONE EVALUATION
Soil/Sediment Sampling	5	The site supervisor may modify the work zone radius based upon field conditions (examples below): Physical barriers or walls that may reduce the work zone to the barrier or wall. High traffic area may increase the work zone to allow for worker safety.
Direct Push (Drilling)	15	The site supervisor may modify this radium based upon the specific equipment being use. Generally, height of equipment plus 5 feet.
Overhead Power Lines	10	Assumes < 50 kV. Additional 4-inches per 50 kV.

5.0 CLEANLINESS AND HYGIENE

5.1 Housekeeping

Proper housekeeping is the foundation for a safe work environment. It prevents incidents and fires, as well as creating a businesslike work area. Materials will be stored in a stable manner so that it will not be subject to falling. Rubbish, scraps and debris will be removed from the work area on a daily basis to job-site dumpster or truck as required. Materials and supplies will not be left in stairways, walkways, near floor openings or at the edge of the building when exterior walls are not built.

5.2 Hygiene Facilities

Hygiene facilities include washing and toilet facilities. The hygiene facilities for this project will be located on site and will consist of portable toilets.

6.0 AIR MONITORING AND ACTION LEVELS

Air monitoring is required whenever we anticipate exposure to airborne chemicals or dust. The purpose of air monitoring is to keep track of the concentration of the contaminants of concern (COC) and minimize the exposure to VERTEX colleagues, workers and the general public. The following table presents the air monitoring methods, exposure guidelines and action levels.

MONITORING PROTOCOLS AND ACTION LIMITS FOR PETROLEUM VOCs		
RANGE	**PPE**	**ACTION**
Background to 5 ppmv	LEVEL D	Continue air monitoring
Above 5 ppmv	LEVEL D	Pause work and contact the Project Manager and the H&S Team for guidance.

6.1 Exposure Guidelines

Airborne Contaminant Monitoring VERTEX Responses Based on Level D PPE				
Parameter	**Contaminant Measurements**	**VERTEX Response**	**Comments**	**Frequency of Measurement**
VOCs – normal concentration: 0 - 5 ppm Depending on the concentration you may sense an oily odor	< 5 ppm	Continue working	VOCs are group of compounds with various PELs. Benzene and vinyl chloride have low PEL, each is 1 ppm. A PID is usually used to measure VOCs. The lamp selected, usually either 10.6 or 11.7eV must be appropriate for the contaminants of concern. If the work is intended to be completed only in Level D PPE, then work should stop at 5 ppm. A decision would be made at that point about whether to use a Draeger Tube to test for benzene, or to wear a respirator.	VOCs will be continuously logged in the datalogger.
	5 – 10 ppm	**Temporarily stop work and contact the CIH**		
	1-5 mg/m^3	**Temporarily stop work and contact the CIH**		
	> 5 mg/m^3	**Stop work, respiratory protection will be required**		

7.0 DECONTAMINATION

Our goal is always to keep contaminated material where it belongs, either on a project site or in an appropriate waste disposal process. We should avoid taking contaminated materials with us on our clothes or the bottoms of our work boot, into our vehicles or to our homes. This practice applies to staff who may encounter hazardous materials/waste, and it is also reasonable to manage nuisance dirt from sites in a responsible manner.

VERTEX supports proper project planning and execution to minimize risks. This requires:

- Planning before going to the site:
- Responsible actions at the site:
- After you leave the site:

It is critical that decontamination takes place prior to break periods and at the end of the day to reduce the chances of ingesting contaminants, or carrying them off the site. Disposable PPE is to be removed and discarded before breaks and before leaving the site.

8.0 TRAINING AND MEDICAL SURVEILLANCE

8.1 Training

Colleagues and workers assigned to a VERTEX project must have proper training and experience to enable our project to be performed successfully. At a minimum, completion of the OSHA 10-Hour Construction Safety and OSHA 40 HAZWOPER training sessions are required for all VERTEX colleagues.

8.2 Medical Surveillance

Field staff who are exposed to chemicals will participate in VERTEX's Medical Surveillance Program. Our program is administered by our Human Resources Department. The examination is responsive to many chemicals, but not all chemicals, so prior to a project, the Project Manager should check with Human Resources or the H&S Team, especially if unusual chemicals or elements are involved in the scope of work. VERTEX colleagues can verify the content of their exams by contacting Human Resources. The colleague must successfully pass the physical examination prior to field work on the project.

SAFETY MEETINGS

Safety meetings are vital to set the tone for safe work performance at the beginning of a project and each day. These meetings should be attended by all project participants, that is, VERTEX colleagues, contractors, and client staff if they are on-site. Several types of meetings may take place during a project:

- Kick-off meeting. This meeting begins a project and may take place at the field site or in an office or trailer. The scope of work should be reiterated, along with the hazards and precautions. This meeting is important to setting the tone and expectations for performance.
- Daily tailgate safety meeting. Held at the beginning of each shift, this meeting reiterates the scope of work planned during the shift, the hazards and precautions. Ideally, a different person, including contractor workers, would lead the meeting each day of a project to engage everyone and make each meeting fresh.
- Post project meeting. Although this meeting does not always take place, it is a good idea to wrap up a project and share what went well and what should be improved the next time the project team is together, or share lessons to take to the next project regardless of the team.
- Root cause analysis meeting is held following an incident or near miss to understand the root cause of what went wrong or almost went wrong (near miss) to reduce the chance of recurrence and to share lessons learned. These discussions are an essential part of any people-based safety program.

9.0 EMERGENCY RESPONSE PLAN

Incidents and near misses, no matter how minor, must be reported immediately to the Project Safety Supervisor or VERTEX H&S Team! The Safety Hotline is 339.499.4995. Other information is included in the Contact Information chart at the beginning of this HASP. Directions to the nearest hospital are attached at the end of the HASP so that they can be posted in an accessible location.

9.1 Emergency Incident

The nature of our work makes emergencies on site a continual possibility. Although emergencies are unlikely and occur infrequently, a contingency plan is required to assure timely and appropriate response actions. The contingency plan is reviewed at the tailgate safety meetings.

Discuss client Emergency Response Plans with all project participants so that everyone knows their part and expectations.

Upon Incident, Near Miss, Physical Reaction or Excessive Exposure: Leave area immediately and seek appropriate medical assistance. This may include, but not be limited to, any of the following physiological reactions:

- Dizziness
- Nausea
- Rash
- Asthmatic Reaction
- Abdominal Pain
- Distorted Vision of Hearing
- Excessive Coughing
- Edema or Localized Swelling
- Headaches
- Exposure to High/Cold Temperatures

9.2 Upon Emergency Incident, Take the Following Actions:

1. Size-up the situation based on the available information.
2. Follow the VERTEX Wallet Card guidance: Notify the Supervisor/Site Supervisor, VERTEX H&S Team, Human Resources, Project Manager/Client, Account Manager.
3. Only respond to an emergency if personnel are sufficiently trained and properly equipped.
4. As appropriate, evacuate site personnel and notify emergency response agencies, e.g., fire, police, etc.
5. As necessary, request assistance from outside sources and/or allocate personnel and equipment.
6. Consult the posted emergency phone list and contact key personnel.
7. Prepare an incident/near miss report. Forward incident report to Project Manager/VERTEX H&S Team within 24 hours via the HandS@vertexeng.com email.

9.3 Upon Medical Emergency, Take the Following Actions:

1. Assess the severity of the injury and perform first aid/CPR as necessary to stabilize the injured person. Follow universal precautions to protect against exposure to bloodborne pathogens.

2. Get medical attention for the injured person immediately. Call 911 or consult the Emergency Contacts list which must be posted at the site.

3. Notify a Site Safety Officer or a Field Supervisor immediately. The site Safety Officer will assume charge during a medical emergency.

4. Contact the VERTEX H&S Team next at 339.499.4995.

5. Depending on the type and severity of the injury, transport the injured employee to the nearest hospital emergency room. If the injury is not serious, then transport the injured employee to a nearby medical clinic. Consult the Health and Safety Team for guidance, if necessary.

6. Notify VERTEX Human Resources

7. Prepare an incident report. The Site Safety officer is responsible for its preparation and submittal to the Health and Safety Manager within **24 hours by email at HandS@vertexeng.com**.

ATTACHMENTS

JOB SAFETY ANALYSES

VERTEX

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Task to Be Performed:	**Drilling Oversight**	**Analyzed By:**	Dan Cron
		Date	1-Sep-17
Project Name & Location:	84-01 Roosevelt Ave, Queens, NY		

Possible Risks at a Glance	**Engineering Controls at a Glance**
Possible risks include associated with groundwater sampling include: **1. Vehicular traffic;** **2. Potential to encounter utilities;** **3. Excessive noise;** **4. Drill rig moving and heated mechanisms;** **5. Muscle strains from lifting;** **6. Eye injury from dust and debris;** **7. Inhalation of dust and debris;** **8. Lacerations;** **9. Muscle strain from heavy lifting;** **10. Slip/Trip/Fall hazards due to equipment, debris, and/or slippery surfaces.** **11. Mechanical failure leading to injury or property damage; and,** **12. Pinch points.**	**None** **Work Practice Controls at a Glance** **Wear appropriate PPE, practice safe drilling and oversite techniques.** **Personal Protective Equipment at a Glance** **Level D PPE including safety glasses, steel-toe boots, chemical resistant gloves, hearing protection, work gloves, hard hat, and reflective safety vest.**

Step #	Specific Steps in the Task	Hazards and Risks by Step That Must Be Controlled	Precautions Actions to Avoid the Risks	Responsible Person
1	Set up necessary traffic and public access controls	1. Personnel could be hit by vehicular traffic.	Set up cones and establish work area. Position vehicle so that field crew is protected from site traffic. Unload as close to work area as safely possible.	
2	Utility Clearance	1. Potential to encounter underground or aboveground utilities while drilling.	Complete utility clearance using State One Call, GPR services, and/or hand augur to 5 feet bgs.	
3	General drill rig operation	1. Excessive noise is generated by rig operations.	When the engine is used at high RPMs or soil samples are being collected, use hearing protection.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
3	General drill rig operation	2. During drill rig operation, surfaces will become hot and cause burns if touched, and COCs in the soil will more readily vaporize generating airborne contaminates.	Use caution handling equipment and wear proper work gloves. Air monitoring should b e performed in accordance with the HASP to monitor the potential volatilization of COCs.	
		3. Moving parts of the drilling rig can pull you in, causing injury. Pinch points on the rig and auger connections can cause pinching or crushing of body parts.	Stay at least 5 feet away from moving parts of the drill rig. Know where the kill switch is, and have the drillers test it to verify that it is working. Do not wear loose clothing and tie back long hair. Avoid wearing jewelry when drilling. Cone off work area to keep general public away from the drill rig.	
		4. Dust and debris can cause eye injury and soil cuttings and/or water could contain COCs.	Wear safety glasses and stay as far away from actual drilling operation as practicable. Wear appropriate gloves to protect from COCs.	
		5. Drilling equipment laying on the ground (i.e. augurs, split spoons, decon equipment, coolers, etc.) create a tripping hazard. Water from decon buckets generate mud and cause a slipping hazard.	Keep equipment and trash picked up and store away from the primary work area. Wear footwear with ankle support.	

		6. The raised derrick can strike overhead utilities, tree limbs, or other elevated items.	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick. Ensure that you are far enough away from overhead power lines.	
4	Mudd rotary drilling	1. This technology used fluid, which collects in a large basin. Fluid can splash out and cause slipping/mud hazard. The fluid can splash into your eyes.	Wear rubber boots if necessary and keep clear of muddy/wet area as much as practicable. If area becomes excessively muddy, consider mud spikes or covering the area in a material that improves traction. Wear safety glasses whenever near the drill rig.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
5	Hollow stem auger drilling	All hazards from Step #3: "General drill rig operation" apply	See Step #3.	
6	Air rotary drilling	1. This drilling method works with high air pressure and can generate flying debris that can strike your body or get in your eyes.	Keep flaps behind the drill rig closed whenever possible to reduce the risk of flying debris. Safety glasses and hard hat should be worn when drill is operating.	
		2. When drilling through bedrock prior to groundwater, dust can be produced from pulverization. Inhalation of dust/powder can occur.	Supplemental water should be used to manage dust creation and/or dust masks should be worn.	
7	Reverse rotary drilling	1. This method uses fresh water to pump out drill cuttings through the center of the casing. Water/sediment mixture that is generated can cause contact with impact soil and/or groundwater.	Ensure that the pit construction can hold the amount of cuttings that are anticipated. Air monitoring should also be used in the pit area.	
		2. Fire hydrants may be used as source of fresh water. Hydrants deliver water at high pressure. Pressurized water can cause flying parts/debris and excessive slipping hazards.	Clear hydrant use with local municipalities prior to use. Only persons that know how to use the hydrant should perform this task. Ensure all connections are tight. Any leaks from the hydrant should be reported immediately.	
		3. Settling pit construction can cause tripping hazards from excavated soils, and plastic sheeting can cause slipping.	Cone off the area to keep the general public away from the settling pit. Ensure proper sloping of the excavation.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
8	Rotosonic drilling	1. Fire hydrants may be used as source of fresh water. Hydrants deliver water at high pressure. Pressurized water can cause flying parts/debris and excessive slipping hazards.	Clear hydrant use with local municipalities prior to use. Only persons that know how to use the hydrant should perform this task. Ensure all connections are tight. Any leaks from the hydrant should be reported immediately.	
		2. Heavy lifting of cores can cause muscle strain.	Always use two people to move core containers. Use caution moving core samples to layout area. Plan layout area to ensure adequate aisle space between core runs for logging. Keep back straight and use proper lifting techniques and body position.	

		3. The rotosonic drill head can move very quickly up and down while working on a borehole. Moving parts can strike someone or catch body parts.	The operator and helper must communicate and stay clear of the path of the drill head. Do not wear loose clothing or jewelry, and keep long hair pulled back at all times.	
9	Direct push drilling	1. The driller rods will be handled by workers most of the time, rather than the rig doing it. Therefore, pinch points can cause lacerations and crushing of fingers and/or body parts.	Keep a minimum of five (5) feet away from drill rig operation and moving parts.	
		2. The direct push rigs are usually meant to fit in small spaces, as they are smaller than other drill rigs. Tight spaces can pin workers.	Do not put yourself between the rig and a fixed object. Use spotters or a tape measure to ensure clearances in tight spaces. Pre-plan equipment movement from one location to the next.	
		3. Wireless devices can fail and equipment can strike workers or cause property damage.	Test wireless equipment in an open area prior to operations. Ensure that operator remains close to rig while using wireless equipment to ensure that the signal is strong.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
9	Direct push drilling	4. Cutting sampling sleeves can lead to lacerations.	When possible, let the driller cut the sleeves open, as they have the proper tools. If we cut the sleeves, use a hook blade, change blade regularly, and cut away from the body.	
10	Rock coring	1. Flying debris can hit workers or cause debris to get in eyes.	Wear safety glasses and hard hat, and stay as far away from actual drilling operation as practicable.	
		2. Heavy lifting of cores can cause muscle strain.	Always use two people to move core containers. Use caution moving core samples to layout area. Plan layout area to ensure adequate aisle space between core runs for logging. Keep back straight and use proper lifting techniques and body position.	
11	Sample collection and processing	1. Injuries can result from pinch points on sampling equipment and from breakage of sample containers.	Care should be taken when opening sampling equipment. Look at empty containers before picking them up. Use dividers or bubble wrap in cooler so that the containers do not break.	
		2. Lifting heavy coolers can cause muscle strain and/or back injuries.	Use proper lifting techniques and body positions; don't carry more than you can handle and get help moving heavy or awkward objects.	

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Task to Be Performed:	**Groundwater Measuring**	**Analyzed By:**	Dan Cron
		Date	1-Sep-17
Project Name & Location:	84-01 Roosevelt Ave, Queens, NY		

Possible Risks at a Glance	**Engineering Controls at a Glance**
Possible risks include associated with groundwater sampling include: **1. Vehicular traffic;** **2. Tripping/slipping hazards;** **3. Pinch points;** **4. Lacerations;** **5. Muscle strains from lifting; and** **6. Exposure to contaminated vapors and/or water.**	**None**
	Work Practice Controls at a Glance
	Wear appropriate PPE, practice safe measuring techniques.
	Personal Protective Equipment at a Glance
	Level D PPE including safety glasses, steel-toe boots, chemical resistant gloves, work gloves, hard hat, and reflective safety vest.

Step #	Specific Steps in the Task	Hazards and Risks by Step That Must Be Controlled	Precautions Actions to Avoid the Risks	Responsible Person
1	Stage at pre-determined sampling location and set up work zone and sampling equipment	1. Personnel could be hit by vehicular traffic.	Set up cones and establish work area. Position vehicle so that field crew is protected from site traffic. Unload as close to work area as safely possible.	
		2. Sampling equipment, tools, and monitoring well covers can cause tripping hazard.	Keep equipment picked up and to monitor changes to site condition.	
2	Open wells to equilibrate and gauge wells	1. When squatting down, personnel can be difficult to see by vehicular traffic.	Wear Class II traffic vest if wells are located in/near vehicular traffic. Use tall cones and the buddy system if practicable.	
		2. Pinch points on well vaults can pinch or lacerate fingers.	Use correct tools to open well vault/cap. Wear leather gloves when removing well vault lids, and chemical protective gloves when gauging. Wear proper PPE including safety boots, knee pads, and safety glasses.	

Step #	Specific Steps in the Task	Hazards and Risks by Step That Must Be Controlled	Precautions Actions to Avoid the Risks	Responsible Person
2	Open wells to equilibrate and gauge wells	3. Lifting sampling equipment can cause muscle strain.	Unload as close to work area as safely possible; use proper lifting and reaching techniques and body positioning; don't carry more than you can handle and get help moving heavy or awkward objects.	
		4. Pressure can build up inside well causing cap to release under pressure.	Keep head away from well cap when removing. If pressure relief valves are on well, use prior to opening.	
		5. Vapors from open wells.	Conduct air monitoring as wells are opened. When opening wells, be positioned downwind when possible.	
3	Measure Depth to Water and Depth to Bottom	1. Well water can get on skin or in eyes when inserting and removing water level indicator.	Slowly insert and remove water level indicator to prevent splashing. Wear safety glasses, work gloves, and recommended PPE.	
		2. Lacerations can occur when inserting water level indicator.	Be aware of sharp edges of well when inserting water level indicator. When possible, wear leather safety gloves.	

4	Equilibrate and gauge well	1. Lifting sampling equipment can cause muscle strain.	Use proper lifting and reaching techniques and body positioning; don't carry more than you can handle and get help moving heavy or awkward objects.	
		2. Water spilling on ground can cause muddy/slippery conditions.	Be careful when walking around work area and wear proper safety boots.	
		3. Lacerations can occur when cutting materials such as plastic tubing.	When cutting tubing, use tubing cutter. No open fixed blades should ever be used. When possible, wear leather safety gloves.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
5	Staging of purged well water	1. Muscle strains can occur when moving purge water or drums.	If using buckets, do not fill buckets up to the top. Always keep lid on buckets when travelling or moving them to another location. Only half fill buckets so bucket weight is manageable.	
		2. Spilling or splashing of purge water.	Make sure that purge water is properly contained with a lid to avoid spilling/splashing the purge water. Wear long sleeve shirts while sampling.	

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Task to Be Performed:	**Groundwater Sampling**	**Analyzed By:**	Dan Cron
		Date	1-Sep-17
Project Name & Location:	84-01 Roosevelt Ave, Queens, NY		

Possible Risks at a Glance	**Engineering Controls at a Glance**
Possible risks include associated with groundwater sampling include: **1. Vehicular traffic;** **2. Tripping/slipping hazards;** **3. Pinch points;** **4. Lacerations;** **5. Muscle strains from lifting;** **6. Electrical shock; and** **7. Exposure to contaminated vapors and/or water.**	**None**
	Work Practice Controls at a Glance
	Wear appropriate PPE, practice safe sampling techniques.
	Personal Protective Equipment at a Glance
	Level D PPE including safety glasses, steel-toe boots, chemical resistant gloves, work gloves, hard hat, and reflective safety vest.

Step #	Specific Steps in the Task	Hazards and Risks by Step That Must Be Controlled	Precautions Actions to Avoid the Risks	Responsible Person
1	Stage at pre-determined sampling location and set up work zone and sampling equipment	1. Personnel could be hit by vehicular traffic.	Set up cones and establish work area. Position vehicle so that field crew is protected from site traffic. Unload as close to work area as safely as possible.	
		2. Sampling equipment, tools, and monitoring well covers can cause tripping hazard.	Keep equipment picked up and monitor any changes to site condition.	
2	Open wells to equilibrate and gauge wells	1. When squatting down, personnel can be difficult to see by vehicular traffic.	Wear Class II traffic vest if wells are located in/near vehicular traffic. Use tall cones and the buddy system if practicable.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
2	Open wells to equilibrate and gauge wells	2. Pinch points on well vaults can pinch or lacerate fingers.	Use correct tools to open well vault/cap. Wear leather gloves when removing well vault lids, and chemical protective gloves when gauging. Wear proper PPE including safety boots, knee pads, and safety glasses.	
		3. Lifting sampling equipment can cause muscle strain.	Unload as close to work area as safely possible; use proper lifting and reaching techniques and body positioning; don't carry more than you can handle and get help moving heavy or awkward objects.	
		4. Pressure can build up inside well causing cap to release under pressure.	Keep head away from well cap when removing. If pressure relief valves are on well, use prior to opening.	
		5. Vapors from open wells.	Conduct air monitoring as wells are opened. When opening wells, be positioned downwind when possible.	
3	Begin purging well and collecting parameter measurements	1. Electrical shock can occur when connecting/disconnecting pump from battery.	Make sure equipment is turned off when connecting/disconnecting. Wear leather gloves. Use GFCIs when using power tools and pumps. Do not use in the rain or run electrical cords through wet areas.	

		2. Purge water can spill or leak from equipment.	Stop purging activities immediately, stop leakage and block any drainage grate with absorbent pads. Call PM to notify them of any reportable spill.	
		3. Water spilling on the ground can cause muddy/slippery conditions.	Be careful when walking around work area and wear proper safety boots.	
		4. Lacerations can occur when cutting materials such as plastic tubing.	When cutting tubing, use tubing cutter. No open fixed blades should ever be used. When possible, wear leather safety gloves.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
3	Begin purging well and collecting parameter measurements	5. Purge water can splash into eyes.	Pour water slowly into buckets/drums to minimize splashing. Wear safety glasses and recommended PPE.	
4	Collect groundwater sample	1. Sample water can splash into eyes.	Minimize splashing potential by wearing safety glasses and appropriate gloves.	
		2. Sample containers could break/leak preservative.	Discard any broken sample containers properly. Wear appropriate eye and hand protection.	
5	Staging of purged well water	1. Muscle strains can occur when moving purge water or drums.	If using buckets, do not fill buckets up to the top. Always keep lid on buckets when travelling or moving them to another location. Only half fill buckets so bucket weight is manageable.	
		2. Spilling or splashing of purge water.	Make sure that purge water is properly contained with a lid to avoid spilling/splashing the purge water. Wear long sleeve shirts while sampling.	

VERTEX The VERTEX Companies Health & Safety - A HANDS on Approach to Safety

Task to Be Performed:	**Soil Sampling**	**Analyzed By:**	Dan Cron
		Date	1-Sep-17
Project Name & Location:	84-01 Roosevelt Ave, Queens, NY		

Possible Risks at a Glance	**Engineering Controls at a Glance**
Possible risks include associated with groundwater sampling include: **1. Vehicular traffic;** **2. Potential to encounter utilities;** **3. Excessive noise;** **4. Drill rig moving and heated mechanisms;** **5. Muscle strains from lifting;** **6. Eye injury from dust and debris;** **7. Lacerations;** **8. Hand strains and blisters; and** **9. Slip/Trip/Fall hazards due to equipment, debris, and/or slippery surfaces.**	**None** **Work Practice Controls at a Glance** **Wear appropriate PPE, practice safe boring and sampling techniques.** **Personal Protective Equipment at a Glance** **Level D PPE including safety glasses, steel-toe boots, chemical resistant gloves, hearing protection, work gloves, hard hat, and reflective safety vest.**

Step #	Specific Steps in the Task	Hazards and Risks by Step That Must Be Controlled	Precautions Actions to Avoid the Risks	Responsible Person
1	Set up necessary traffic and public access controls	1. Personnel could be hit by vehicular traffic	Set up cones and establish work area. Position vehicle so that field crew is protected from site traffic.	
2	Utility Clearance	1. Potential to encounter underground or aboveground utilities while drilling.	Complete utility clearance using State One Call, GPR services, and/or hand augur to 5 feet bgs.	
3	Installation of boring using drill rig.	1. Excessive noise is generated by rig operations.	When the engine is used at high RPMs or soil samples are being collected, use hearing protection.	

Step #	Specific Steps in the Task	Hazards and Risks by Step That Must Be Controlled	Precautions Actions to Avoid the Risks	Responsible Person
3	Installation of boring using drill rig.	2. During drill rig operation, surfaces will become hot and cause burns if touched, and COCs in the soil will more readily vaporize generating airborne contaminates.	Use caution handling equipment and wear proper work gloves. Air monitoring should b e performed in accordance with the HASP to monitor the potential volatilization of COCs.	
		3. Moving parts of the drilling rig can pull you in, causing injury. Pinch points on the rig and auger connections can cause pinching or crushing of body parts.	Stay at least 5 feet away from moving parts of the drill rig. Know where the kill switch is, and have the drillers test it to verify that it is working. Do not wear loose clothing and tie back long hair. Avoid wearing jewelry when drilling. Cone off work area to keep general public away from the drill rig.	
		4. Dust and debris can cause eye injury and soil cuttings and/or water could contain COCs.	Wear safety glasses and stay as far away from actual drilling operation as practicable. Wear appropriate gloves to protect from COCs.	
		5. Drilling equipment laying on the ground (i.e. augurs, split spoons, decon equipment, coolers, etc.) create a tripping hazard. Water	Keep equipment and trash picked up and store away from the primary work area. Wear footwear with ankle support.	
		6. The raised derrick can strike overhead utilities, tree limbs, or other elevated items.	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick. Ensure that you are far enough away from overhead power lines.	

4	Installation of boring using hand auger, sample probe, and/or trowel	1. Muscle strains from pulling/pushing could occur when installing the boring and when removing the auger from the hole.	Stretch out back/arms/shoulders prior to beginning activities. Using a firm grip on the handle, slowly turn the ager and progress downward in 6" increments. Slowly pull the auger from the hole using legs and proper lifting techniques. Ask for assistance if necessary.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
4	Installation of boring using hand auger, sample probe, and/or trowel	2. Hand strain and blisters could develop from prolonged hand augering.	Select proper gloves for the task (wear padded mechanics glove when turning auger). If hot spots develop on hands, re-adjust gloves or change to better padded gloves.	
		3. Over-exertion could occur when trying to force an auger forward if there is refusal.	If refusal occurs, stop work. Remove auger from the hole and check hole with flashlight. Do not over-exert by using excessive force.	
		4. Fatigue can occur due to strenuous nature of hand augering activities.	Take rest breaks as needed or switch out task with another employee.	
5	Collection of soil sample	1. Contact with impacted soils	Wear chemical protective gloves as outlined in the HASP and wear safety glasses.	
		2. Sharp edges and broken glassware can cause lacerations.	Discard any broken sample containers or glass properly. Do not overtighten containers. Wear cut-resistant gloves when handling sample containers.	
		3. Containerizing and moving soil cuttings can cause muscle strains.	Dispose of leftover soil cuttings in a drum or bucket and dispose properly. Only fill buckets half full due to weight and strength of bucket. Wear leather work gloves and use good lifting techniques when handling buckets.	
6	Decontamination of hand auger, sample probe, and/or trowel	1. Exposure to COCs during equipment decontamination.	Wear chemical protective gloves as outlined in the HASP and wear safety glasses.	
		2. The end of the auger/probe has sharp/pointed edges; lacerations can occur.	Use a brush to scrub off soils. Wear cut-resistant gloves when handling auger. Do not reach into the auger with hands.	
Step #	**Specific Steps in the Task**	**Hazards and Risks by Step That Must Be Controlled**	**Precautions Actions to Avoid the Risks**	**Responsible Person**
7	Fill in sample location	1. Open boreholes are a trip hazard.	Fill in holes with sand or bentonite. Pack down chips as best as possible, adding water as necessary.	
		2. Muscle strain can occur from lifting bags of sand and/or bentonite.	Use proper lifting techniques and body positioning.	

TAILGATE SAFETY MEETING FORMS

VERTEX

THE VERTEX® COMPANIES, INC.

DAILY SAFETY LOG

DATE: _____ SITE LOCATION: _____

WEATHER: _____ PROJECT NUMBER: _____

TOPICS DISCUSSED

- ☐ Expected Activities
- ☐ Health and Safety Emergency Numbers
- ☐ Hospital Location
- ☐ Work Areas (Posted)
- ☐ Standing Orders
- ☐ Confined Space Entry
- ☐ Slip, Trip, Fall
- ☐ Manual Lifting
- ☐ Utility Locations
- ☐ Mechanical Hazards
- ☐ Emergency Communications
- ☐ Electrical Hazards
- ☐ Other_____
- ☐ Chemical Hazards
- ☐ Bonding and Grounding
- ☐ Heavy Equipment
- ☐ Traffic hazards
- ☐ Heat/Cold Stress
- ☐ Noise Hazards
- ☐ Lock-out/Tag-out
- ☐ Excavation Hazards
- ☐ Venting/Inerting
- ☐ Biological Hazards
- ☐ Meeting Place
- ☐ Other_____
- ☐ Other_____

PERSONAL PROTECTIVE EQUIPMENT

- ☐ Energized Systems
- ☐ Eye Protection
- ☐ Hearing Protection
- ☐ Gloves (Specify Type)
- ☐ Respiratory Protection (Specify Type)
- ☐ Engineering Controls (Specify Type)
- ☐ Other _____
- ☐ Other _____
- ☐ Hard Hat
- ☐ Protective Clothing
- ☐ Retrieval System
- ☐ Backup system
- ☐ Lighting
- ☐ Other_____
- ☐ Other_____
- ☐ Other_____

Additional Comments Observations, Deficiencies / Corrective Actions Taken:

_____

_____

_____

MEETING CONDUCTED BY (SSM): _____

Meeting Attended By:

_____ _____

_____ _____

_____ _____

NEAR MISS/INCIDENT REPORT FORMS

VERTEX

THE VERTEX® COMPANIES, INC.

NEAR MISS FORM

This is an official document to be initiated by a VERTEX employee, please answer correctly and with much detail as possible. This report should be forwarded to the OHSM within 24 hours of the near miss.

EMPLOYEE(S) INVOLVED: _____ DATE & TIME OF INCIDENT:

PERSON COMPLETING FORM: _____ DATE: _____

PROJECT NAME / NUMBER: _____ TIME: _____ AM/PM

NEAR MISS LOCATION (ADDRESS): _____

DESCRIBE NEAR MISS: (Defined as an event or situation that could have resulted in an accident, injury, or illness but DID NOT, either by chance of time/distance or through timely intervention). Describe fully, the protocol / procedures being followed including all substances, machinery, equipment (including personnel protective equipment) being used as related to the near miss.

_____

_____

SUBCONTRACTORS OR OTHER COMPANY INVOLVED? NO ☐ IF YES, DESCRIBE

_____

ON A SCALE OF 1 TO 10 HOW SEVERE COULD THE EVENT HAVE BEEN?

Least Severe 1 2 3 4 5 6 7 8 9 10 Most Severe

WHAT IS THE PROBABILITY OF AN INCIDENT IF THIS WERE TO OCCUR AGAIN (HIGH, MEDIUM, LOW)?
(Example: HIGH = task occurs frequently and by numerous individuals; MEDIUM = task occurs on a regular basis by certain individuals; LOW = minor or no injury, no lost dollar)

☐ LOW ☐ MEDIUM ☐ High

WHAT ARE THE SUGGESTED CORRECTIVE ACTIONS? _____

_____

_____

_____

_____

_____

EMPLOYEE _____ _____ _____
Printed Name Signature Date

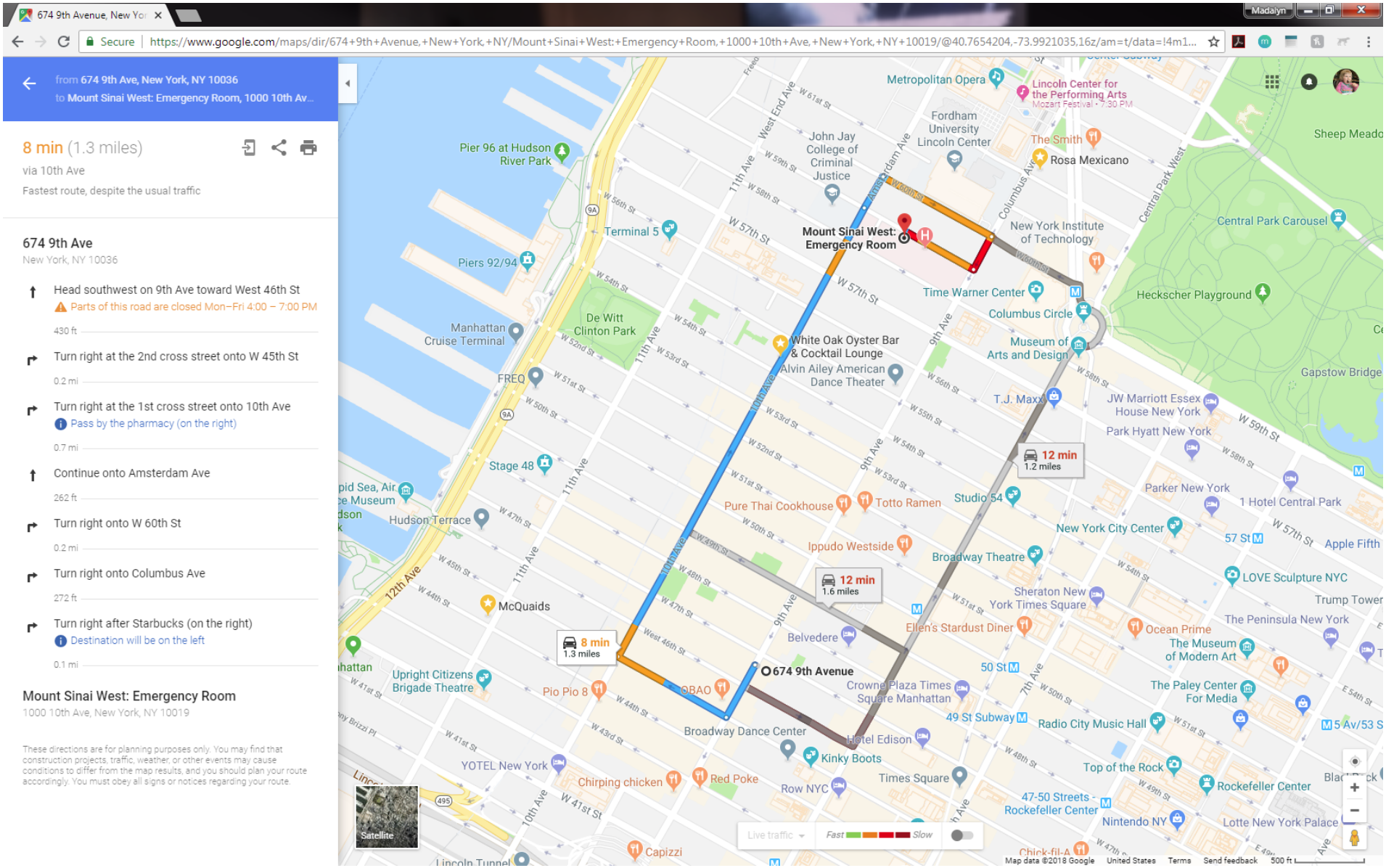
CHSM _____ _____ _____
Printed Name Signature Date

ATTACHMENTS ☐ YES ☐ NO

.

DIRECTIONS TO THE HOSPITAL

VERTEX


674 9th Avenue, New Yor
Madalyn
Secure | https://www.google.com/maps/dir/674+9th+Avenue,+New+York,+NY/Mount+Sinai+West:+Emergency+Room,+1000+10th+Ave,+New+York,+NY+10019/@40.7654204,-73.9921035,16z/am=t/data=!4m1...
from 674 9th Ave, New York, NY 10036
to Mount Sinai West: Emergency Room, 1000 10th Av...
8 min (1.3 miles)
via 10th Ave
Fastest route, despite the usual traffic
674 9th Ave
New York, NY 10036
Head southwest on 9th Ave toward West 46th St
Parts of this road are closed Mon–Fri 4:00 – 7:00 PM
430 ft
Turn right at the 2nd cross street onto W 45th St
0.2 mi
Turn right at the 1st cross street onto 10th Ave
Pass by the pharmacy (on the right)
0.7 mi
Continue onto Amsterdam Ave
262 ft
Turn right onto W 60th St
0.2 mi
Turn right onto Columbus Ave
272 ft
Turn right after Starbucks (on the right)
Destination will be on the left
0.1 mi
Mount Sinai West: Emergency Room
1000 10th Ave, New York, NY 10019
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 obey all signs or notices regarding your route.
Mount Sinai West: Emergency Room
674 9th Avenue
12 min
1.2 miles
12 min
1.6 miles
8 min
1.3 miles
Satellite
Live traffic
Fast
Slow
Map data ©2018 Google
United States
Terms
Send feedback
500 ft